cc: JP ✓
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CITY OF DALLAS

March 4, 2002

Ms. Tommie McPherson, P.E.
Halff Associates, Inc.
8616 Northwest Plaza Drive
Dallas, Texas 75225

Re: 14500 Winwood

Dear Ms. McPherson:

I have reviewed the floodplain reclamation study prepared for Dalcan, Inc. for property at 14500 Winwood Road in Addison, Texas.

The hydraulic analyses presented in the study indicate that City of Dallas criteria have been met. Specifically, there is no rise in the water surface through or upstream of the project site, no creation of erosive velocities, and valley storage loss will be mitigated by excavation. Thus, there is no adverse impact to properties downstream, adjacent to, or upstream of the project site.

This approval is contingent on the excavation of 450 cubic yards of soil from within the floodplain behind 14500 Winwood, and staking of the water easement in the vicinity of Noel Branch prior to construction activity. The excavation is indicated to be on the grounds of the Jefferson Montford Apartments at 5711 Preston Oaks Road.

Please feel free to call me at 214-948-4666 if you need additional information.

Sincerely,

Steve Parker

Steve Parker, P.E.
Program Manager
Flood Plain Management
Engineering and Construction Division

FP Alt Addison 14500 Winwood 020304.doc

c: Mr. Michael E. Murphy, P.E., Director of Public Works, Addison, Texas
Mr. Doug House, Kennedy Wilson Properties, Houston, Texas

FEMA

Voting Aye: Bradbury, Braun, Hirsch, Ryland, Turchin
Voting Nay: None
Absent: Doepfner

Administrative Recommendation:

Administration recommends approval.

Item #R5 - Consideration of an Ordinance approving a meritorious exception to Chapter 62, Signs, Section 62-163(5), Maximum Letter/Logo Height, located at 5000 Belt Line Road, # 210 on application from Voice Stream.

Attachments:

1. Staff Report
2. Application
3. Plans

Administrative Recommendation:

Administration recommends approval.

Item #R6 - **PUBLIC HEARING** and consideration of an Ordinance affecting participation of City employees in the Texas Municipal Retirement System, granting the additional rights authorized by Section 854.202(g) (20 year any age retirement eligibility) of Title 8. Texas Government Code, as amended.

Attachment:

1. Memo from Judy Stafford, Director of Human Resources
2. Proposed Ordinance

Administrative Recommendation:

Administration recommends approval.

Item #R7 - Consideration of an Ordinance amending Chapter 42, "Floods," of the Code of Ordinances of the city by amending Article II, "Flood Damage Prevention" to ensure eligibility for participation in the National Flood Insurance Program.

Passed

Agenda Item

Passed 1-9-01

December 29, 2000

MEMORANDUM

To: Chris Terry, Assistant City Manager

Through: Mike Murphy, P.E., Director of Public Works

From: Steve Chutchian, P.E., Assistant City Engineer SC

Cc: Jim Pierce, P.E., Assistant Director of Public Works JP

Subject: Amendment of CHAPTER 42, "FLOODS," OF THE CODE OF ORDINANCES OF THE CITY BY AMENDING ARTICLE II, "FLOOD DAMAGE PREVENTION," TO ENSURE ELIGIBILITY FOR PARTICIPATION IN THE NATIONAL FLOOD INSURANCE PROGRAM; PROVIDING A SAVING CLAUSE; PROVIDING A SEVERABILITY CLAUSE; AND PROVIDING AN EFFECTIVE DATE

Section 16.3145 of House Bill No. 1018 requires the governing body of each city and county to adopt an ordinance in order to become eligible to participate in the National Flood Insurance Program (NFIP). It further stipulates that adoption of this ordinance must take place prior to January 1, 2001. The attached ordinance was prepared to meet the requirements of the State legislature. Actual participation in the NFIP may be achieved by subsequent Council approval of a resolution that stipulates the desire of the Town of Addison to participate in the NFIP and enforce flood plain management regulations consistent with Federal Emergency Management Association (FEMA) criteria. House Bill 1018 does not include a means of enforcement or penalties for any municipality that fails to enter the program as a member.

Should the Town of Addison pursue participation in the NFIP in the future, the following benefits will be experienced throughout the community:

- Property owners located in the floodplain areas of the Town will become eligible for Federal Disaster Relief Funds, as a result of damage from tornados, flooding, etc.
- Properties may be covered by flood insurance to address other drainage related events, such as water main breaks and construction activity.
- Property owners may obtain flood hazard insurance, in accordance with FHA and VA requirements, when building in designated flood plain areas.

Public Works Department staff was advised by the Mitigation Division of FEMA that the proposed ordinance amendment may be submitted to their Denton, Texas office for disposition subsequent to the January 9, 2001 Council meeting.

Staff recommends that Council authorize the adoption of the above mentioned ordinance amendment, regarding eligibility for participation in the National Flood Insurance Program.

TOWN OF ADDISON

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY COUNCIL OF THE TOWN OF ADDISON, TEXAS, AMENDING CHAPTER 42, "FLOODS," OF THE CODE OF ORDINANCES OF THE CITY BY AMENDING ARTICLE II, "FLOOD DAMAGE PREVENTION," TO ENSURE ELIGIBILITY FOR PARTICIPATION IN THE NATIONAL FLOOD INSURANCE PROGRAM; PROVIDING A SAVING CLAUSE; PROVIDING A SEVERABILITY CLAUSE; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the flood hazard areas of Addison, Texas are subject to periodic inundation which could result in serious damage to properties within those areas, loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which would adversely affect the public health, safety and general welfare; and

Whereas, such flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods, and hazardous to other lands because they are inadequately elevated, floodproofed or otherwise protected from flood damage; and

WHEREAS, members of the community of Addison are not eligible to purchase flood insurance under the National Flood Insurance Program unless Addison joins the National Flood Insurance Program; and

WHEREAS, Section 16.3145 of the Texas Water Code provides that the governing body of each city shall adopt ordinances or orders necessary for the city to be eligible to participate in the National Flood Insurance Program; and

WHEREAS, The City Council desires to amend Chapter 42, "Floods," of the Code of Ordinances to ensure that the Town's regulations are adequately designed to minimize flood losses and ensure eligibility for participation in the National Flood Insurance Program; Now, Therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE TOWN OF ADDISON, TEXAS:

Section 1. Incorporation of Premises. That the above and foregoing premises are true and correct and are incorporated herein and made a part hereof for all purposes.

Section 2. Amendment. That Chapter 42, "Floods," of the Code of Ordinances of the Town of Addison, Texas (the "City") is hereby amended by amending Article II, "Flood Damage Prevention," as set forth in Exhibit A attached hereto and incorporated herein, and all other chapters, sections, subsections, paragraphs, sentences, phrases and words of the Code are not amended but are hereby ratified, verified, approved and affirmed.

Section 3. Savings. That this ordinance shall be cumulative of all other ordinances of the City affecting flooding and shall not repeal any of the provisions of those ordinances except in those instances where the provisions of those Ordinances are in direct conflict with the provisions of this Ordinance.

Section 4. Severability. That the sections, paragraphs, sentences, phrases, clauses and words of this Ordinance are severable, and if any section, paragraph, sentence, phrase, clause or word in this Ordinance or application thereof to any person or circumstance is held invalid or unconstitutional by a Court of competent jurisdiction, such holding shall not affect the validity of the remaining portions of this Ordinance, and the City Council hereby declares that it would have adopted such remaining portions of this Ordinance despite such invalidity, which remaining portions shall remain in full force and effect.

Section 5. Effective Date. That this ordinance shall become effective from and after its date of passage as provided by law.

DULY PASSED AND APPROVED BY THE CITY COUNCIL OF THE TOWN OF ADDISON, TEXAS, this _____ day of _____, 2000.

_____
Mayor Scott Wheeler

ATTEST:

_____
Carmen Moran, City Secretary

APROVED AS TO FORM:

_____
Ken Dippel, City Attorney

EXHIBIT A

ARTICLE II. FLOOD DAMAGE PREVENTION

DIVISION 1. GENERALLY

Sec. 42-31. Statutory Authorization.

Local governments are authorized by Chapter 16 of the Texas Water Code to adopt regulations designed to minimize flood losses, and to take all necessary and reasonable actions to comply with the requirements and criteria of the National Flood Insurance Program.

Sec. 42-32. Definitions.

Unless specifically defined below, words or phrases used in this article shall be interpreted to give them the meaning they have in common usage and to give this article its most reasonable application. The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Alluvial fan flooding means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.

Apex means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.

Area of shallow flooding means a designated AO, AH, or VO zone on the Flood Insurance Rate Map (FIRM) with a one percent or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of special flood hazard means the land in the floodplain subject to a one percent or greater chance of flooding in any given year. The area may be designated as Zone A on the Flood Hazard Boundary Map (FHBM). After detailed ratemaking has been completed in preparation for publication of the FIRM, Zone A usually is refined into Zone A, AE, AH, AO, A1-99, VO, V1-30, VE or V.

Base flood means the flood having a one percent chance of being equaled or exceeded in any given year.

Basement means any area of the building having its floor sub-grade (below ground level) on all sides.

Critical feature means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

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.

Elevated building means a non-basement building (i) built, in the case of a building in Zones A1-30, AE, A, A99, AO, AH, B, C, X, and D, to have the top of the elevated floor, or in the case of a building in Zones V1-30, VE, or V, to have the bottom of the lowest horizontal structure member of the elevated floor elevated above the ground level by means of pilings, columns (posts and piers), or shear walls parallel to the floor of the water and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood. In the case of Zones A1-30, AE, A, A99, AO, AH, B, C, X, and D, "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters. In the case of Zones V1-30, VE, and V, "elevated building" also includes a building otherwise meeting the definition of "elevated building," even though the lower area is enclosed by means of breakaway walls if the breakaway walls meet the standards of Section 60.3(e)(5) of the National Flood Insurance Program regulations.

Existing construction means for the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

Existing 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 pads) is completed before the effective date of the adoption of floodplain management regulations.

Expansion to an existing manufactured home park or subdivision means the preparation of 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 pads).

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; or

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

Flood insurance rate map (FIRM) means the official map on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones.

Flood insurance study means the official report provided by the Federal Emergency Management Agency. The report contains flood profiles, water surface elevation of the base flood, as well as the Flood Boundary-Floodway Map.

Floodplain or flood-prone area means any land area susceptible to being inundated by water from any source (see definition of flooding).

Floodplain management means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain management regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood protection system means those physical structural works for which funds have been authorized, appropriated and expended, and which have been constructed specifically to modify flooding in order to reduce the extent of the areas subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Flood proofing means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway (regulatory 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 a designated height.

Functionally dependent use means a use that cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Highest adjacent grade means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic structure means any structure that is:

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

(2) certified or preliminarily determined by the Secretary of the 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; or

(3) individually listed on the state's inventory of historic places.

Levee means a man-made 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 that 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 floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure usable solely for parking or vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirement of Section 60.3 of the National Flood insurance Program regulations.

Manufactured home means a structure transportable in one or more sections, which is built on a permanent chassis and is designed for use 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.

Mean sea level means, for purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on the Flood Insurance Rate Map are referenced.

National Flood Insurance Program Regulations means those regulations contained in Chapter 1 of Title 44 of the Code of Federal Regulations (CFR) pertaining to floodplain management.

New construction means, for the purpose of determining insurance rates, structures for which the "start of construction" commenced on or after the effective date of an initial FIRM or

after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation 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 pads) is completed on or after December 12, 2000.

Recreational vehicle means a vehicle that is:

(1) built on a single chassis;

(2) 400 square feet or less when measured at the largest horizontal projections;

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

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

Start of construction (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348) 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 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 a building, whether or not that alteration affects the external dimensions of the building.

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

Substantial damage means damage of any origin sustained by a structure 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.

Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before "start of construction" of the improvement. This includes structures that

have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either:

(1) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the building official and which are the minimum necessary conditions; or

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

Variance means a grant of relief from the requirements of this article that permits construction or development in a manner that would otherwise be prohibited by this article.

Violation means the failure of a structure or other development to be fully compliant with the Town's floodplain management regulations. A structure or other development without appropriate certifications, or other required evidence of compliance is presumed to be in violation until such time as that documentation is provided.

Water surface elevation means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

Sec. 42-33. Applicability.

This article applies to all areas of special flood hazard within the jurisdiction of the Town.

Sec. 42-34. Penalties for noncompliance.

No structure or land shall hereafter be constructed, located, extended, converted, or altered, or have its use changed without full compliance with the terms of this article and all other applicable regulations. Violation of the provisions of this article by failure to comply with any of its requirements, including violations of conditions and safeguards established in connection with conditions, shall constitute a misdemeanor. Any person who violates this article or fails to comply with any of its requirements shall upon conviction thereof be fined not more than $500.00 for each violation in accordance with Section 1-7 of this Code, and in addition shall pay all costs and expenses involved in the case. Nothing contained in this article shall prevent the Town from taking such other lawful action as is necessary to prevent or remedy any violation.

Sec. 42-35. Interpretation.

In the interpretation and application of this article, all provisions shall be:

(1) considered as minimum requirements;

(2) liberally construed in favor of the city council; and

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

Sec. 42-36. Purpose.

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

(1) protect human life and health;

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

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

(4) minimize prolonged business interruptions;

(5) minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;

(6) help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and

(7) ensure that potential buyers are notified that property is in a flood area.

Sec. 42-37. Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the Federal Emergency Management Agency in a scientific and engineering report entitled "The Flood Insurance Study for Addison, Texas," with accompanying Flood Insurance Rate Maps and Flood Boundary-Floodway Maps (FIRM and FBFM), dated July 30, 1999, and any revisions thereto are hereby adopted by reference and declared to be a part of this article. The flood insurance study is on file at 4500 Belt Line Road, Addison, Texas.

Sec. 42-38. Abrogation and greater restrictions.

This article is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this article and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

Sec. 42-39. Methods of reducing flood losses.

In order to accomplish its purposes, this article includes methods and provisions for:

(1) restricting or prohibiting uses that are dangerous to health, safety or property in times of flood, or that cause excessive increases in flood heights or velocities;

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

(3) controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

(4) controlling filling, grading, dredging and other development which may increase flood damage; and

(5) preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other areas.

Sec. 42-40. Warning and disclaimer or liability.

The degree of flood protection required by this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. This article does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This article shall not create liability on the part of the Town or any officer or employee thereof for any flood damages that result from reliance on this article or any administrative decision lawfully made under this article.

Secs. 42-41 – 42-55. Reserved.

DIVISION 2. ADMINISTRATION AND ENFORCEMENT

Sec. 42-56. Floodplain administrator.

The Director of Public Works is hereby appointed the Floodplain Administrator to administer and implement this article and other appropriate sections of 44 CFR (National Flood Insurance Program Regulations) pertaining to floodplain management.

Sec. 42-57. Duties & responsibilities of the floodplain administrator.

Duties and responsibilities of the Floodplain Administrator include, but are not limited to, the following:

(1) Maintaining for public inspection all records pertaining to the provisions of this article.

(2) Reviewing permit applications to determine whether proposed building sites, including the placement of manufactured homes, will be reasonably safe from flooding.

(3) Reviewing all applications for development permits required by this article to determine that all permit requirements have been satisfied.

(4) Reviewing permits for proposed development to determine that all necessary permits have been obtained from those federal, state or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.

(5) Making interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions).

(6) Notifying adjacent communities and the Texas Natural Resource Conservation Commission prior to any alteration or relocation of a watercourse, and submitting evidence of such notification to the Federal Emergency Management Agency.

(7) Assuring that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.

(8) Obtaining, reviewing and reasonably utilizing any base flood elevation data and floodway data available from a federal, state or other source, in order to administer this article, when base flood elevation data has not been provided in accordance with Section 42-37.

(9) Requiring that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the FIRM when a regulatory floodway has not been designated, unless it is demonstrated 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 Town.

(10) Making application under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations for a conditional FIRM revision (Conditional Letter of Map Revision) through FEMA, when appropriate

to approve development that increases the water surface elevation of the base flood by more than one foot in Zone A1-30, AE, or AH, on the FIRM.

Sec. 42-58. Development permit – required

A development permit must be obtained before construction or development begins within any area of special flood hazard to ensure conformance with the provisions of this article.

Sec. 42-59. Development permit – procedure.

(a) Application for a Development Permit shall be presented to the Floodplain Administrator on forms furnished by the Administrator and must include, but is not limited to, plans in duplicate drawn to scale showing the location, dimensions, and elevation of proposed landscape alterations, existing and proposed structures, including the placement of manufactured homes, and the location of the foregoing in relation to areas of special flood hazard. Additionally, the following information is required:

(1) Elevation (in relation to mean sea level), of the lowest floor (including basement) of all new and substantially improved structures.

(2) Elevation in relation to mean sea level to which any nonresidential structure shall be floodproofed.

(3) A certificate from a registered professional engineer or architect that the nonresidential floodproofed structure shall meet the floodproofing criteria of Paragraph 2 of Section 42-77.

(4) A description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development.

(b) The Administrator must maintain a record of all such information in accordance with Paragraph 1 of Section 42-57.

(c) Approval or denial of a Development Permit by the Floodplain Administrator shall be based on the provisions of this article and the following relevant factors:

(1) The danger to life and property due to flooding or erosion damage.

(2) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

(3) The danger that materials may be swept onto other lands to the injury of others.

(4) The compatibility of the proposed use with existing and anticipated development.

(5) The safety of access to the property in times of flood for ordinary and emergency vehicles.

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

(7) 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.

(8) The necessity to the facility of a waterfront location, where applicable.

(9) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

(10) The relationship of the proposed use to the comprehensive plan for that area.

Sec. 42-60. Variances.

(a) The building code board of appeals as established by the Town shall hear and decide appeals and requests for variances from the requirements of this article.

(b) The building code board of appeals shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the Floodplain Administrator in the enforcement or administration of this article. All decisions of the building code board of appeals are final.

(c) In passing upon such applications, the building code board of appeals shall consider all technical evaluations, all relevant factors, standards specified in other sections of this article and:

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

(2) The danger to life and property due to flooding or erosion damage;

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

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

(5) The necessity to the facility of a waterfront location, where applicable;

(6) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

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

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

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

(10) 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

(11) The cost 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.

(d) Upon consideration of the factors of this section and the purposes of this article, the building code board of appeals may attach such conditions to the granting of variances as it deems necessary to further the purposes of this article.

(e) The Floodplain Administrator shall maintain a record of all appeal actions, including technical information, and report any variances to the Federal Emergency Management Agency upon request.

(f) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing the relevant factors in Subsections (c)(1) through (c)(11) of this section have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

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

(h) Variances may be issued for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that:

(1) the criteria outlined in this section are met, and

(2) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(i) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this section.

(j) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

(k) Prerequisites for granting variances:

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

(2) Variances shall only be issued upon:

a. a showing of good and sufficient cause;

b. a determination that failure to grant the variance would result in exceptional hardship to the applicant, and

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

(l) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

Secs. 42-61-42-75. Reserved.

DIVISION 3. FLOOD HAZARD REDUCTION

Sec. 42-76. General standards.

In all areas of special flood hazards the following standards are required:

(1) *Anchoring.* All new construction or substantial improvements must be designed (or modified) in such a manner that they are adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

(2) *Construction materials and methods.*

a. All new construction or substantial improvements must be constructed by methods and practices that minimize flood damage.

b. All new construction or substantial improvements must be constructed with materials resistant to flood damage.

(3) *Utilities.*

a. All new construction and substantial improvements must be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and located so as to prevent water from entering or accumulating within the components during conditions of flooding.

b. All new and replacement water supply systems must be designed to minimize or eliminate infiltration of floodwaters into the system.

c. All new and replacement sanitary sewage systems must be designed to minimize or eliminate infiltration of flood waters into the system, and to minimize or eliminate discharge from the systems into flood waters.

d. On-site waste disposal systems must be located to avoid impairment to them or contamination from them during flooding.

Sec. 42-77. Specific standards.

In all areas of special flood hazards where base flood elevation data has been provided as set forth in Section 42-37, regarding the basis for establishing the area of special flood hazard, Paragraph 8 of Section 42-57, pertaining to the use of other base flood data, or Paragraph 3 of Section 42-78, pertaining to standards for subdivision proposals, the following provisions are required:

(1) *Residential Construction.* New construction and substantial improvement of any residential structure must have the lowest floor, including basement, elevated at least two feet above the base flood elevation. A registered professional engineer, architect, or land surveyor shall submit a certification to the Floodplain Administrator that this standard is satisfied. The Administrator shall maintain a record of such certification.

(2) *Nonresidential Construction.* New construction and substantial improvements of any commercial, industrial or other nonresidential structure must either have the lowest floor, including basement, elevated at least two feet above the base flood elevation, or together with attendant utility and sanitary facilities, be designed so

that below the base flood elevation the structure is 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. A registered professional engineer or architect shall develop or review the structural design, specifications, and plans for the construction, and shall certify to the Floodplain Administrator that the design and methods of construction are in accordance with accepted standards of practice as outlined in this article. A record of such certification that includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed must be maintained by the Administrator.

(3) *Enclosures.* New construction and substantial improvements with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding, must be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:

a. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding must be provided.

b. The bottom of all openings must be no higher than one foot above grade.

c. Openings equipped with screens, louvers, valves, or other coverings or devices must permit the automatic entry and exit of floodwaters.

(4) *Manufactured Homes.*

a. Manufactured homes to be placed within Zone A on the FHBM or FIRM must be installed using methods and practices that minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

b. Manufactured homes that are placed or substantially improved within Zones A1-30, AH, and AE on the FIRM on sites (i) outside of a manufactured home park or subdivision, (ii) in a new manufactured home park or subdivision, (iii) in an expansion to an existing manufactured home park or subdivision, or (iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as a result of a flood, must be elevated on a permanent

foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

c. Manufactured homes placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A1-30, AH and AE on the FIRM that are not subject to the provisions of Paragraph (4)b. of this section must be elevated so that either:

i. the lowest floor of the manufactured home is at or above the base flood elevation, or

ii. the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and are securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

(5) *Recreational Vehicles*. Recreational vehicles placed on sites within Zones A1-30, AH, and AE on the FIRM must either:

a. be on the site for fewer than 180 consecutive days;

b. be fully licensed and ready for highway use; or

c. meet the permit requirements of Section 42-59, and the elevation and anchoring requirements for "manufactured homes" in Paragraph 4 of this section. 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 security devices, and has no permanently attached additions.

Sec. 42-78. Standards for subdivision proposals.

(1) All subdivision proposals, including the placement of manufactured home parks and subdivisions, must be consistent with the need to minimize flood damage.

(2) All proposals for the development of subdivisions, including the placement of manufactured home parks and subdivisions, must meet Development Permit requirements of this article.

(3) Base flood elevation data must be provided for subdivision proposals and other proposed development, including the placement of manufactured home parks and subdivisions, that is greater than 50 lots or 5 acres, whichever is less, if not

otherwise provided pursuant to Section 42-37 regarding the basis for establishing the areas of special flood hazard or Paragraph 8 Section 42-57 pertaining to the use of other base flood data.

(4) All subdivision proposals, including the placement of manufactured home parks and subdivisions, must have adequate drainage provided to reduce exposure to flood hazards.

(5) All subdivision proposals, including the placement of manufactured home parks and subdivisions, must have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.

Sec. 42-79. Standards for areas of shallow flooding (AO/AH Zones).

Located within the areas of special flood hazard established in Section 42-37, are areas designated as shallow flooding. These areas have special flood hazards associated with base flood depths of one to three feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply:

(1) All new construction and substantial improvements of residential structures must have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the FIRM (at least two feet if no depth number is specified).

(2) All new construction and substantial improvements of non-residential structures must:

a. have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the FIRM (at least two feet if no depth number is specified);

b. together with attendant utility and sanitary facilities be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.

(3) A registered professional engineer or architect shall submit a certification to the Floodplain Administrator that the standards of this Section are satisfied.

(4) Within Zones AH and AO, adequate drainage paths must be provided around structures on slopes to guide flood waters around and away from proposed structures.

Sec. 42-80. Floodways

Located within areas of special flood hazard established in Section 42-37, are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters that carry debris, potential projectiles and erosion potential, the following provisions apply:

(1) Encroachments are prohibited, including fill, new construction, substantial improvements and other development, within the adopted regulatory floodway, unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the Town during the occurrence of the base flood discharge.

(2) If Paragraph (1) of this Section 42-80 is satisfied to permit encroachment, all new construction and substantial improvements must comply with all applicable flood hazard reduction provisions of this article.

(3) Encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations are prohibited, unless the Floodplain Administrator obtains a conditional FIRM and floodway revision through FEMA.

Chapter 6.1

FLOOD HAZARD*

Sec. 6.1-1. Definitions.

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

Appeal: A request for a review of the building official's interpretation of any provision of this chapter or a request for a variance.

Area of shallow flooding: A designated AO or VO Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three (3) feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident.

Area of special flood hazard: The land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year.

Base flood: The flood having a one per cent chance of being equalled or exceeded in any given year.

Development: 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 located within the area of special flood hazard.

Flood or *flooding:* 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 or runoff of surface waters from any source.

*Cross references—Buildings and building regulations, Ch. 5; zoning, App. A; subdivisions, App. B.

Flood insurance rate map (FIRM): The official map on which the federal insurance administration has delineated both and areas of special flood hazards and the risk premium zones applicable to the community.

Flood insurance study: The official report provided in which the federal insurance administration has provided flood profiles, as well as the flood insurance rate maps and the water surface elevation of the base flood.

Habitable floor: Any floor usable for living purposes, which include working, sleeping, eating, cooking or recreation, or a combination thereof. A floor used only for storage purposes is not a "habitable floor."

New construction: Structures for which the "start of construction" commenced on or after the effective date of this chapter.

Start of construction: The first placement of permanent construction of a structure on a site, such as the pouring of slabs or footings or any work beyond the stage of excavation. 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 property of accessory building, such as garages or sheds not occupied as dwelling units or not as part of the main structure. For a structure without a basement or poured footings, the "start of construction" includes the first permanent framing or assembly of the structure or any part thereof on its piling or foundation.

Structure: Walled and roofed building or a gas or liquid storage tank, that is principally aboveground.

Substantial improvement: Any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds fifty (50) per cent of the market value of the structure either:

(1) Before the improvement or repair is started; or

(2) If the structure has been damaged and is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either:

(1) Any project for improvement of a structure to comply with existing state or local health, sanitary or safety code specifications which are solely necessary to assure safe living conditions; or

(2) Any alteration of a structure listed on the national register of historic places or a state inventory of historic places.

Variance: A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter. (Ord. No. 597, § 3, 7-15-80)

Sec. 6.1-2. Interpretation.

In the interpretation and application of this chapter, all provisions shall be:

(1) Considered as minimum requirements;

(2) Liberally construed in favor of the city council; and

(3) Deemed neither to limit nor repeal any other powers granted under state statutes. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-3. Penalties for noncompliance.

No structure or land shall hereafter be constructed, located, extended, converted or altered without full compliance with the terms of this chapter and other applicable regulations. Violation of the provisions of this chapter by failure to comply with any of its requirements (including violations of conditions and safeguards established in

connection with conditions) shall constitute a misdemeanor. Any person who violates this chapter or fails to comply with any of its requirements shall upon conviction thereof be fined not more than two hundred dollars ($200.00) for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the city from taking such other lawful action as is necessary to prevent or remedy any violation. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-4. Purpose.

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

(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 interruptions;

(5) To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard;

(6) To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas;

(7) To insure that potential buyers are notified that property is in an area of special flood hazard; and

(8) To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions. (Ord. No. 597, § 1, 7-15-80)

Sec. 6.1-5. Abrogation and greater restrictions.

This chapter is not intended to repeal, abrogate or impair any existing easements, covenants or deed restrictions. However, where this chapter and another ordinance, easement, covenant or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-6. Methods of reducing flood losses.

In order to accomplish its purposes, this chapter includes methods and provisions for:

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

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

(3) Controlling the alteration of natural flood plains, stream channels and natural protective barriers, which help accommodate or channel flood waters;

(4) Controlling filling, grading, dredging and other development which may increase flood damage; and

(5) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas. (Ord. No. 597, § 2, 7-15-80)

Sec. 6.1-7. Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the federal insurance administration in a scientific and engineering report entitled "The Flood Insurance Study for the City of Addison, Texas, Dallas County," dated January, 1980, with accompanying flood insurance rate maps, is hereby adopted by reference and declared to be a part of this chapter. The

flood insurance study is on file at 4500 Belt Line Road, Addision, Texas. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-8. Lands affected.

This chapter shall apply to all areas of special flood hazards within the jurisdiction of the city. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-9. Warning; disclaimer of liability.

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This chapter does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the city, any officer or employee thereof or the federal insurance administration for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder. (Ord. No. 597, § 4, 7-15-80)

State law reference—Power of city to provide for exemptions from liability, V.T.C.S. Art. 1175(6).

Sec. 6.1-10. Development permit—Required.

A development permit shall be obtained before construction or development begins within any area of special flood hazard established in section 6.1-7. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-11. Same—Application.

(a) An application for a development permit shall be made on forms furnished by the building inspection department and may include, but not be limited to: Plans in duplicate drawn to scale showing the nature, location, dimensions and elevations of the area in question; existing or proposed

structures, fill, storage of materials and drainage facilities; and the location of the foregoing.

(b) Specifically, the following information is required:

(1) Elevation, in relation to mean sea level, of the lowest floor (including basement) of all structures;

(2) Elevation in relation to mean sea level to which any structure has been floodproofed;

(3) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 6.1-26(2); and

(4) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-12. Building official—Grant of permits.

The building official is hereby appointed to administer and implement this chapter by granting or denying development permit applications in accordance with its provisions. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-13. Same—General duties.

The duties of the building official shall include, but not be limited to:

(1) Review all development permits to determine that the permit requirements of this chapter have been satisfied.

(2) Review all development permits to determine that all necessary permits have been obtained from those federal, state or local governmental agencies from which prior approval is required.

(3) Review all development permits for compliance with the provisions of section 6.1-25, Encroachments. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-14. Use of other base flood data.

When base flood elevation data has not been provided in accordance with section 6.1-7, basis for establishing the areas of special flood hazard, the building official shall obtain, review and reasonably utilize any base flood elevation data available from federal, state or other source, in order to administer sections 6.1-26(1), Specific standards, Residential construction, and 6.1-26(2), Nonresidential construction. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-15. Information to be obtained and maintained.

The building official shall:

(1) Obtain and record the actual elevation (in relation to mean sea level) of the lowest habitable floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

(2) For all new substantially improved floodproofed structures:

a. Verify and record the actual elevation (in relation to mean sea level); and
b. Maintain the floodproofing certifications required in section 6.1-11.

(3) Maintain for public inspection all records pertaining to the provisions of this chapter. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-16. Alteration of watercourses.

The building official shall:

(1) Notify adjacent communities and the federal emergency management agency prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the federal insurance administration.

(2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-17. Interpretation of FIRM boundaries.

The building official shall make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 6.1-18. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-18. Variances—Appeal board.

(a) The appeal board as established by the city shall hear and decide appeals and requests for variances from the requirements of this chapter.

(b) The appeal board shall hear and decide appeals when it is alleged there is an error in any requirement, decision or determination made by the building official in the enforcement or administration of this chapter.

(c) Those aggrieved by the decision of the appeal board, or any taxpayer, may appeal such decision to the municipal court.

(d) In passing upon such applications, the appeal board shall consider all technical evaluations, all relevant factors, standards specified in other sections of this chapter and:

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

(2) The danger to life and property due to flooding or erosion damage;

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

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

(5) The necessity to the facility of a waterfront location, where applicable;

(6) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

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

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

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

(10) 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

(11) 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.

(e) Upon consideration of the factors of this section and the purposes of this chapter, the appeal board may attach such conditions to the granting of variances as it deems necessary to further the purposes of this chapter.

(f) The building official shall maintain the records of all appeal actions, including technical information, and report any variances to the federal insurance administration upon request. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-19. Same—Conditions.

(a) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of

one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (1—11) in section 6.1-18(d) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

(b) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the national register of historic places or the state inventory of historic places, without regard to the procedures set forth in the remainder of this section.

(c) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

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

(e) Variances shall only be issued upon:

(1) A showing of good and sufficient cause;

(2) A determination that failure to grant the variance would result in exceptional hardship to the applicant; and

(3) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 6.1-18(d) or conflict with existing local laws or ordinances.

(f) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-20. Flood hazard reduction—General standards.

In all areas of special flood hazards the standards provided in sections 6.1-21—6.1-26 are required. (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-21. Same—Anchoring.

All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure. (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-22. Same—Construction materials and methods.

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

(b) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage. (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-23. Same—Utilities.

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

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

(c) On-site waste disposal systems shall be located to avoid impairment to them during flooding. (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-24. Same—Subdivision proposals.

(a) All subdivision proposals shall be consistent with the need to minimize flood damage.

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

(c) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage.

(d) Base flood elevation data shall be provided for subdivision proposals and other proposed development which contain at least fifty (50) lots or five (5) acres (whichever is less). (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-25. Same—Encroachments.

In all areas of special flood hazard in which base flood elevation data has been provided, the cumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than [one] foot at any point. (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-26. Same—Specific standards.

In all areas of special flood hazards where base flood elevation data have been provided as set forth in section 6.1-7, Basis for establishing the areas of special flood hazard or in section 6.1-14, Use of other base flood data, the following standards are required:

(1) *Residential construction.* New construction and substantial improvement of any residential structure shall have the lowest floor, including basement elevated two (2) feet above base flood elevation.

(2) *Nonresidential construction.* New construction and substantial improvement of any commerical, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated two (2) feet above the base flood elevations together with attendant utility and sanitary facilities or shall:

a. Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

b. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and
c. Be certified by a registered professional engineer or architect that the standards of this section are satisfied. Such certifications shall be provided to the building official as set forth in section 6.1-14. (Ord. No. 597, § 6, 7-15-80)

[The next page is 575]

o'brien engineering

April 5, 1994

Mr. John Baumgartner, P.E.
City Engineer
City of Addison
16801 Westgrove
Addison, Texas 75001

RE: Floodplain Evaluation, 0.844 Ac. Boston Chicken Tract
Beltline Road at Marsh Lane, Addison, Texas

Dear John:

This letter will serve to summarize my evaluation of the floodplain of Rawhide Creek south of Beltline Road and upstream of Marsh Lane for the proposed development of the referenced tract. In support of this evaluation please find the attached HEC-2 computer printout based on hydraulic modeling of the floodplain between Marsh Lane and Beltline Road. Also refer to my letters to you dated 7/21/93 and 7/26/93 (copies attached), concerning the overall parcel from which this tract has been subdivided.

The referenced tract is a rectangular piece which consists of approximately 0.844 acres. A copy of the boundary and topographic survey as produced by Pacheco Koch Consulting Engineers, Inc., is attached.

Following the same assumptions used in the evaluation of other tracts in this area, the pad sites along Marsh and Beltline were assumed to be filled above the fully developed 100 year flood elevation. The grade from the back of curb was assumed to increase at a 1% slope to a point 30 feet behind the curb (a net 0.3' rise above the back of curb).

The minimum required finished floor elevation on the Boston Chicken tract is 574.98, based on a 100 year flood water surface elevation of 572.98 in line with the east side of the tract. The modeling which generated this elevation is based on the assumptions of no improvement to the drainage system upstream of Beltline Road, and fully developed conditions in the watershed. The model simulates these conditions only for the portion of flow which would be above ground under fully developed conditions in the watershed.

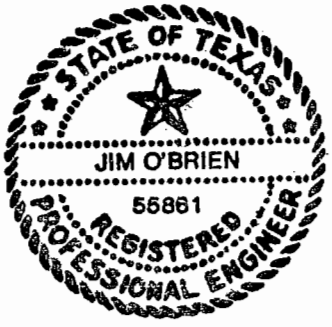
This analysis does not consider effects downstream of Marsh Lane based on the assumed modeling conditions. If significant development in the watershed is to be contemplated without the improvement of the system upstream of Beltline Road, the resulting effects downstream of Marsh Lane should be studied.

If you have any questions or require further information, please call me at 241-0336.

Sincerely,

O'BRIEN ENGINEERING

Jim O'Brien, P.E.
attachments



cc: Mr. Dane Ridenour
Mr. John Koch,Jr.,P.E.

o'brien engineering p.o. box 334 coppell, texas 75019 phone: (214) 241-0336 fax: (214) 241-0370

o'brienengineering

July 26, 1993

Mr. John Baumgartner, P.E.
City Engineer
City of Addison
16801 Westgrove
Addison, Texas 75001

RE: Floodplain Evaluation
Beltline Road at Marsh Lane, Addison, Texas

Dear John:

This letter will serve to make a clarification in regard to my letter to you dated July 21, 1993.

The hydraulic analysis assumes that all proposed tracts along the south side of Beltline Road will be filled to an elevation above the adjacent fully developed 100 year flood elevation starting a distance of 30' behind the back of curb and proceeding south. The space between the back of curb and the 30' backset is assumed to be graded at 1% up from the curb and remain unobstructed. The analysis also assumes no improvement to the underground system upstream of Beltline Road.

Prior to any development in this area, the limits of the fully developed 100 year floodplain would extend onto the property considerably south of Beltline Road. With the proposed development of this area by the assumptions identified above, the limits of the fully developed 100 year floodplain south of Beltline would extend only to the 30' backset. The existing development 100 year floodplain is, of course, non-existent since the entire flood would be contained underground within the existing storm sewer system.

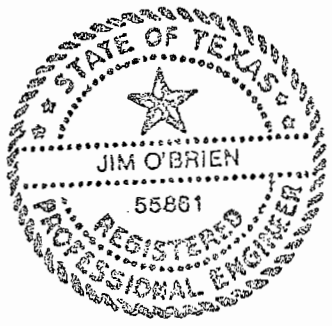
Since our model already considers filing all of the tracts on the south side of the street, the filing of individual tracts will not adversely affect adjacent tracts either upstream (generally to the east) or downstream (generally to the west) provided each tract is filled per the assumptions stated above.

If you have any questions or require further information, please call me at 241-0336.

Sincerely,

O'BRIEN ENGINEERING

Jim O'Brien, P.E.
attachments



cc: Mr. Paul Stephens
Mr. David Glenn
Mr. Chris Hack
Mr. Larry Cates

o'brien engineering p.o. box 334 coppell, texas 75019 phone: (214) 241-0336 fax: (214) 241-0370

o'brien engineering

July 21, 1993

Mr. John Baumgartner
City Engineer
City of Addison
16801 Westgrove
Addison, Texas 75001

RE: Floodplain Evaluation
Beltline Road at Marsh Lane, Addison, Texas

Dear John:

This letter will serve to summarize my evaluation of the floodplain of Rawhide Creek south of Beltline Road and upstream of Marsh Lane for the proposed development of the A.P. Stephens tract and the two outparcels known as Lots 1 and 2 of Block D.

In support of this analysis, please find the attached HEC-2 computer printout based on hydraulic modeling of the floodplain between Marsh Lane and Beltline Road, dated July 21, 1993.

For the purpose of this analysis, each tract was assumed to be filled above the fully developed 100 year flood elevation starting at 30 feet behind the back of the curb of Beltline Road. The grade from the back of curb was assumed to increase at a 1% slope to a point 30 feet south of the curb (a net .3 foot rise above the back of curb).

The capacity of the 2-10x10 (2 boxes, each 10' wide by 10' high) box culvert south of Beltline Road has been increased with the addition of a parallel 84" RCP extending from Marsh Lane to near Business Drive. As a result, the system downstream of Beltline Road now has the capacity to pass the fully developed 100 year flood. However, the system upstream of Beltline Road remains unimproved, and therefore, has essentially the same capacity as indicated by my letter to you dated July 22, 1992 (approximately 1210 cfs). The attached HEC-2 model is based on the assumptions of no improvement to the system upstream of Beltline and fully developed conditions in the watershed. The model simulates these conditions only for the portion of flow which would be above ground.

It is my understanding that the system upstream of Beltline Road will soon be improved to increase it's capacity. It is my recommendation that the system be improved to provide capacity for the fully developed conditions 100 year flood prior to the occurrence of significant additional development in the watershed. With such improvements, the conditions assumed for this analysis represent a worst-case scenario. Under current development conditions in the watershed, the 100 year flood runoff would be entirely contained in the existing underground system. This fact holds for both existing conditions and for conditions as proposed for the subject tracts.

o'brien engineering p.o. box 334 coppell, texas 75019 phone: (214) 241-0336 fax: (214) 241-0370

Under proposed conditions, the fully developed 100 year water surface elevation at the Shell station on the northeast corner of Marsh at Beltline would be 572.27. The finished floor elevation of the existing structure at that location is 572.99.

The minimum required finished floor elevations on the Stephens tract are presented in the table below. The specified distances represent the distance from the east side of Marsh Lane to the most easterly face of any proposed structure measured along Beltline Road.

Distance From Marsh Lane along Beltline Road (feet)	Fully Developed 100 Year Water Surface Elevation (feet msl)	Minimum Required Finished Floor Elevation (feet msl)
100	572.27	574.27
200	572.74	574.74
300	573.22	575.22
400	573.93	575.93

The 100 year water surface elevations on Lots 1 and 2, Block D are 575.41 and 578.44, respectively. The corresponding minimum finished floor elevations as specified previously by plat are 577.46 and 580.48, respectively. This demonstrates that any structure constructed to these elevations will be sufficiently above the fully developed 100 year floodplain.

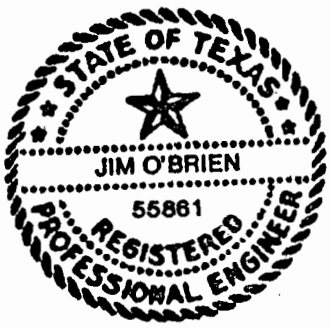
This analysis does not consider effects downstream of Marsh Lane based on the assumed modeling conditions. If significant development in the watershed is to be contemplated without the improvement of the system upstream of Beltline Road, the resulting effects downstream of Marsh Lane should be studied.

If you have any questions or require further information, please call me at 241-0336.

Sincerely,

O'BRIEN ENGINEERING

Jim O'Brien, P.E.
attachments



cc: Mr. Paul Stephens
Mr. David Glenn
Mr. Chris Hack
Mr. Larry Cates

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*********************************************
*  HEC-2 WATER SURFACE PROFILES             *
*                                           *
*  Version   4.6.2;  May 1991               *
*                                           *
*  RUN DATE    21JUL93    TIME   16:39:07   *
*********************************************
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*         (916) 756-1104               *
****************************************
```

```
X    X  XXXXXXX   XXXXX            XXXXX
X    X  X      X  X    X          X    X
X    X  X         X                    X
XXXXXXX  XXXX     X         XXXXX   XXXXX
X    X  X         X                 X
X    X  X         X    X            X
X    X  XXXXXXX   XXXXX             XXXXXXX
```

THIS RUN EXECUTED 21JUL93 16:39:07

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**********************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2;  May 1991
**********************************


T1      RAWHIDE CREEK UPSTREAM OF MARSH LANE FOR KMART CENTER
T2      OVERLAND FLOW PORTION OF 100 YEAR FULLY DEVELOPED CONDITIONS
T3      BASED ON SCS UNIT GRAPH, NO ADD'L CONVEYANCE
T4      Q100 FD AT BELTLINE = 2320 CFS;  CAP'Y OF 2-10X4.5 BOXES IS 1210 CFS
T5      EXCESS FLOW, Q = 1110 CFS;
T6      O'BRIEN ENGINEERING  FOR CATES  4/93

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

         2.                          0.009                                 569.0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

 -1.              -1.


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

 38.       1.          43.         42.         39.         4.          26.         25.         34.         5.

QT   2.       1110.      1110.
NC   0.02     0.02       0.02       0.1         0.3
X1   100.     12.        1505.      1573.
X3                                  1475.
GR   571.5     900.     571.5      1474.9       570.8      1475.     570.5      1505.     570.0      1506.
GR   570.5    1536.     571.0      1537.        571.0      1541.     570.5      1542.     570.0      1572.
GR   570.5    1573.     571.5      1673.

X1   200.     13.        1560.      1628.       100.        100.        100.
X3                                  1530.
GR   573.2    1000.     571.7      1060.        571.7      1529.9    571.1      1530.     570.8      1560.
GR   570.3    1561.     570.8      1591.        571.3      1592.     571.3      1596.     570.8      1597.
GR   570.3    1627.     570.8      1628.        571.8      1728.

X1   420.     17.        1575.      1633.       220.        220.        220.
X3                                  1565.
GR   575.3    1000.     574.3      1055.        574.       1110.     573.4      1170.     573.1      1225.
GR   572.9    1282.     572.9      1544.9       572.2      1545.     571.9      1575.     571.4      1576.
GR   571.9    1606.     572.4      1607.        572.4      1611.     571.9      1612.     571.4      1632.
GR   571.9    1633.     572.9      1733.

X1   600.     16.        1595.      1663.       180.        180.        180.
X3                                  1495.
GR   577.0    1000.     575.5      1058.        574.9      1110.     574.7      1170.     574.8      1225.
GR   574.7    1280.     573.8      1565.        573.5      1595.     573.0      1596.     573.5      1626.
GR   574.0    1627.     574.       1631.        573.5      1632.     573.       1662.     573.5      1663.
GR   574.5    1700.
```

SECTION 830 BLOCKED TO REFLECT FUTURE BLDG (OUT LOT 1)

X1	830.	24.	1630.	1698.	230.	230.	230.			
GR	578.3	1000.	578.1	1060.	577.2	1120.	576.9	1175.	576.8	1230.
GR	576.3	1290.	576.4	1345.	576.	1392.	575.8	1408.5	576.46	1425.
GR	600.0	1425.1	600.	1526.	576.46	1526.1	574.3	1599.9	573.6	1600.
GR	573.3	1630.	572.8	1631.	573.3	1661.	573.8	1662.	573.8	1666.
GR	573.3	1667.	572.8	1697.	573.3	1698.	574.3	1800.		

X1	1010.	21.	1640.	1708.	180.	180.	180.			
X3				1540.						
GR	578.2	1000.	578.0	1055.	578.6	1115.	578.3	1170.	578.1	1225.
GR	577.7	1280.	577.1	1340.	576.8	1400.	576.4	1460.	576.1	1520.
GR	576.1	1609.9	576.1	1610.	575.1	1640.	574.6	1641.	575.1	1671.
GR	575.6	1672.	575.6	1676.	575.1	1677.	574.6	1707.	575.1	1708.
GR	576.1	1808.								

SECTION AT D/S SIDE OF BUSINESS DR.
SECTION 1210 BLOCKED TO REFLECT FUTURE BLDG (OUT LOT 2)

X1	1210.	19.	1385.	1453.	200.	200.	200.			
GR	579.2	1000.	579.1	1040.	579.0	1095.	579.0	1122.65	580.5	1174.9
GR	600.	1175.	600.	1274.9	580.5	1275.	578.1	1354.9	578.1	1355.
GR	577.1	1385.	576.9	1386.	577.1	1416.	577.6	1417.	577.6	1421.
GR	577.1	1422.	576.6	1452.	577.1	1453.	578.1	1553.		

D/S SIDE OF PROPOSED SPAGETTI WHSE BLDG
SECTION BLOCKED TO REFLECT PRESENCE OF PROPOSED BLDG

X1	1410.	20.	1350.	1418.	200.	200.	200.			
GR	580.9	1000.	580.4	1060.	580.	1100.	580.9	1105.	582.7	1150.
GR	589.	1150.	589.	1270.	582.7	1270.	580.7	1320.	579.3	1339.9
GR	578.5	1340.	578.3	1350.	577.8	1351.	578.3	1381.	578.8	1382.
GR	578.8	1386.	578.3	1387.	577.8	1417.	578.3	1418.	579.3	1518.

APPROX 120' U/S OF SPAGETTI WHSE BLDG
SECTION BLOCKED TO REFLECT PRESENCE OF PROPOSED BLDG

X1	1610.	18.	1335.	1403.	200.	200.	200.			
GR	585.1	1000.	582.2	1055.	582.0	1090.	582.7	1135.	590.	1135.
GR	590.	1255	582.7	1255.	580.7	1324.9	579.9	1325.	579.7	1335.
GR	579.2	1336.	579.7	1366.	580.2	1367.	580.2	1371.	579.7	1372.
GR	579.2	1402.	579.7	1403.	580.7	1503.				

X1	1750.	12.	1175.	1243.	140.	140.	140.			
GR	582.3	1000.	579.7	1060.	580.1	1115.	580.3	1175.	579.8	1176.
GR	580.3	1206.	580.8	1207.	580.8	1211.	580.3	1212.	579.8	1242.
GR	580.3	1243.	581.3	1343.						

APPROXIMATELY 50' DOWNSTREAM OF COMMERCIAL ST.

X1	1920.	13.	1180.	1251.	170.	170.	170.			
GR	584.9	1000.	582.8	1055.	581.4	1115.	580.4	1155.	581.0	1180.
GR	580.5	1181.	581.	1211.	581.5	1212.	581.5	1216.	581.	1220.
GR	580.5	1250.	581.0	1251.	582.	1351.				

APPROXIMATELY 95' UPSTREAM OF COMMERCIAL ST.

X1	2065.	12.	1200.	1268.	145.	145.	145.			
GR	584.4	1000.	583.5	1070.	583.6	1140.	582.	1200.	581.5	1201.
GR	582.	1231.	582.5	1232.	582.5	1236.	582.	1237.	581.5	1267.
GR	582.	1268.	583.	1368.						

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
#PROF 1

CCHV=     .100 CEHV=     .300
#SECNO 100.000
3280 CROSS SECTION    100.00 EXTENDED       .25 FEET

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     1475.0    1673.0  TYPE=      1  TARGET=    -1475.000
   100.000      1.75    571.75    571.75    569.00    572.25       .50       .00       .00    570.50
    1110.0     173.2     626.2     310.6      33.0      97.9      74.9        .0        .0    570.50
       .00      5.25      6.40      4.15      .020      .020      .020      .000    570.00   1475.00
   .004599        0.        0.        0.         0        17         0       .00    198.00   1673.00


#SECNO 200.000
3280 CROSS SECTION    200.00 EXTENDED       .47 FEET


3470 ENCROACHMENT STATIONS=     1530.0    1728.0  TYPE=      1  TARGET=    -1530.000
   200.000      1.97    572.27       .00       .00    572.60       .33       .33       .02    570.80
    1110.0     172.5     586.2     351.3      39.5     112.7      96.7        .5        .5    570.80
       .01      4.37      5.20      3.63      .020      .020      .020      .000    570.30   1530.00
   .002520      100.      100.      100.         2         0         0       .00    198.00   1728.00


#SECNO 420.000
3280 CROSS SECTION    420.00 EXTENDED       .41 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     1565.0    1733.0  TYPE=      1  TARGET=    -1565.000
   420.000      1.91    573.31    573.31       .00    573.85       .54       .72       .06    571.90
    1110.0      75.7     615.8     418.5      13.6      92.1      90.7       1.6       1.4    571.90
       .02      5.58      6.69      4.62      .020      .020      .020      .000    571.40   1565.00
   .004420      220.      220.      220.        20         8         0       .00    168.00   1733.00


#SECNO 600.000
3280 CROSS SECTION    600.00 EXTENDED       .20 FEET
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 1495.0 1700.0 TYPE= 1 TARGET= -1495.000

600.000	1.70	574.70	574.70	.00	575.19	.49	.83	.01	573.50
1110.0	405.7	600.6	103.7	86.4	94.4	25.8	2.5	2.1	573.50
.03	4.69	6.36	4.02	.020	.020	.020	.000	573.00	1495.00
.004782	180.	180.	180.	20	15	0	.00	205.00	1700.00

*SECNO 830.000
3280 CROSS SECTION 830.00 EXTENDED 1.10 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.76

830.000	2.61	575.41	.00	.00	575.53	.13	.31	.04	573.30
1110.0	195.8	501.8	412.4	79.2	155.7	163.0	4.1	3.3	573.30
.05	2.47	3.22	2.53	.020	.020	.020	.000	572.80	1562.39
.000630	230.	230.	230.	2	0	0	.00	237.61	1800.00

*SECNO 1010.000
3280 CROSS SECTION 1010.00 EXTENDED .34 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 1540.0 1808.0 TYPE= 1 TARGET= -1540.000

1010.000	1.84	576.44	576.44	.00	576.84	.41	.23	.08	575.10
1110.0	152.7	621.2	336.1	48.8	104.0	83.8	5.4	4.4	575.10
.06	3.13	5.97	4.01	.020	.020	.020	.000	574.60	1540.00
.003704	180.	180.	180.	20	16	0	.00	268.00	1808.00

*SECNO 1210.000
3280 CROSS SECTION 1210.00 EXTENDED .34 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
1210.000	1.84	578.44	578.44	.00	578.92	.48	.81	.02	577.10
1110.0	113.0	630.2	366.7	27.0	99.1	83.5	6.4	5.5	577.10
.07	4.19	6.36	4.39	.020	.020	.020	.000	576.60	1343.74
.004461	200.	200.	200.	20	5	0	.00	209.26	1553.00

#SECNO 1410.000
3280 CROSS SECTION 1410.00 EXTENDED .34 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

1410.000	1.84	579.64	579.64	.00	580.16	.52	.88	.01	578.30
1110.0	71.2	674.4	364.4	13.2	103.9	83.7	7.4	6.4	578.30
.08	5.38	6.49	4.35	.020	.020	.020	.000	577.80	1335.11
.004377	200.	200.	200.	2	5	0	.00	182.89	1518.00

#SECNO 1610.000
3280 CROSS SECTION 1610.00 EXTENDED .34 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

1610.000	1.84	581.04	581.04	.00	581.55	.51	.87	.00	579.70
1110.0	73.0	671.9	365.1	14.6	104.3	84.3	8.3	7.2	579.70
.09	5.01	6.44	4.33	.020	.020	.020	.000	579.20	1312.91
.004285	200.	200.	200.	20	5	0	.00	190.09	1503.00

#SECNO 1750.000
3280 CROSS SECTION 1750.00 EXTENDED .40 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.37

1750.000	2.00	581.70	.00	.00	581.81	.11	.21	.04	580.30
1110.0	637.2	301.2	171.6	235.0	108.1	89.9	9.3	8.0	580.30
.10	2.71	2.79	1.91	.020	.020	.020	.000	579.70	1013.87
.000764	140.	140.	140.	2	0	0	.00	329.13	1343.00

#SECNO 1920.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3280 CROSS SECTION 1920.00 EXTENDED .03 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

1920.000	1.63	582.03	582.03	.00	-582.44	.42	.26	.09	581.00
1110.0	461.8	476.9	171.3	86.7	85.2	52.8	10.6	9.2	581.00
.11	5.32	5.60	3.25	.020	.020	.020	.000	580.40	1088.10
.004482	170.	170.	170.	20	15	0	.00	262.90	1351.00

*SECNO 2065.000
3280 CROSS SECTION 2065.00 EXTENDED .31 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2065.000	1.81	583.31	583.31	.00	583.79	.47	.64	.02	582.00
1110.0	118.4	649.0	342.6	32.2	102.2	81.1	11.3	10.0	582.00
.12	3.67	6.35	4.22	.020	.020	.020	.000	581.50	1150.82
.004286	145.	145.	145.	20	8	0	.00	217.18	1368.00

THIS RUN EXECUTED 21JUL93 16:39:08

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

BASED ON SCS UNIT GRAPH,

SUMMARY PRINTOUT

	SECNO	CWSEL	Q	ELMIN	XLCH	TOPWID	VCH	AREA	.01K	10*KS
*	100.000	571.75	1110.00	570.00	.00	198.00	6.40	205.76	163.68	45.99
	200.000	572.27	1110.00	570.30	100.00	198.00	5.20	248.88	221.12	25.20
*	420.000	573.31	1110.00	571.40	220.00	168.00	6.69	196.35	166.96	44.20
*	600.000	574.70	1110.00	573.00	180.00	205.00	6.36	206.60	160.51	47.82
*	830.000	575.41	1110.00	572.80	230.00	237.61	3.22	397.82	442.29	6.30
*	1010.000	576.44	1110.00	574.60	180.00	268.00	5.97	236.59	182.38	37.04
*	1210.000	578.44	1110.00	576.60	200.00	209.26	6.36	209.61	166.19	44.61
*	1410.000	579.64	1110.00	577.80	200.00	182.89	6.49	200.82	167.77	43.77
*	1610.000	581.04	1110.00	579.20	200.00	190.09	6.44	203.21	169.57	42.85
*	1750.000	581.70	1110.00	579.70	140.00	329.13	2.79	433.08	401.57	7.64
*	1920.000	582.03	1110.00	580.40	170.00	262.90	5.60	224.70	165.80	44.82
*	2065.000	583.31	1110.00	581.50	145.00	217.18	6.35	215.56	169.54	42.86

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 100.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 420.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 420.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 420.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 600.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 600.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 600.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 830.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 1010.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1010.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 1010.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 1210.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1210.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 1210.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 1410.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1410.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1610.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1610.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 1610.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO= 1750.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 1920.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1920.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 1920.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 2065.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 2065.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 2065.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CITY OF DALLAS

June 2, 1982

Mr. Bob Zollars
Huitt Zollars
8730 King George
Dallas, Texas 75235

Re: Fill verification Winnwood at Beltline

Dear Mr. Zollars:

Persuant to your request, the fill on the subject tract has been verified. According to the survey prepared by your firm the building sites proposed in the original flood plain removal application have been met. The sites can therefore be removed from the flood plain on the zoning maps. Only those portions of the tract which have actually been filled should be removed from the flood plain. As additional areas have been filled, they can also be removed from the maps.

Please let me know if there are any questions.

Sincerely,

Nathan D. Maier, P.E.
Assistant Director
Public Works Department

Chapter 6.1

FLOOD HAZARD*

Sec. 6.1-1. Definitions.

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

Appeal: A request for a review of the building official's interpretation of any provision of this chapter or a request for a variance.

Area of shallow flooding: A designated AO or VO Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three (3) feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident.

Area of special flood hazard: The land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year.

Base flood: The flood having a one per cent chance of being equalled or exceeded in any given year.

Development: 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 located within the area of special flood hazard.

Flood or *flooding:* 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 or runoff of surface waters from any source.

*Cross references—Buildings and building regulations, Ch. 5; zoning, App. A; subdivisions, App. B.

(2) If the structure has been damaged and is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either:

(1) Any project for improvement of a structure to comply with existing state or local health, sanitary or safety code specifications which are solely necessary to assure safe living conditions; or

(2) Any alteration of a structure listed on the national register of historic places or a state inventory of historic places.

Variance: A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter. (Ord. No. 597, § 3, 7-15-80)

Sec. 6.1-2. Interpretation.

In the interpretation and application of this chapter, all provisions shall be:

(1) Considered as minimum requirements;

(2) Liberally construed in favor of the city council; and

(3) Deemed neither to limit nor repeal any other powers granted under state statutes. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-3. Penalties for noncompliance.

No structure or land shall hereafter be constructed, located, extended, converted or altered without full compliance with the terms of this chapter and other applicable regulations. Violation of the provisions of this chapter by failure to comply with any of its requirements (including violations of conditions and safeguards established in

Sec. 6.1-5. Abrogation and greater restrictions.

This chapter is not intended to repeal, abrogate or impair any existing easements, covenants or deed restrictions. However, where this chapter and another ordinance, easement, covenant or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail. (Ord. No. 597, § 4, 7-15-80)

Sec. 6.1-6. Methods of reducing flood losses.

In order to accomplish its purposes, this chapter includes methods and provisions for:

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

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

(3) Controlling the alteration of natural flood plains, stream channels and natural protective barriers, which help accommodate or channel flood waters;

(4) Controlling filling, grading, dredging and other development which may increase flood damage; and

(5) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas. (Ord. No. 597, § 2, 7-15-80)

Sec. 6.1-7. Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the federal insurance administration in a scientific and engineering report entitled "The Flood Insurance Study for the City of Addison, Texas, Dallas County," dated January, 1980, with accompanying flood insurance rate maps, is hereby adopted by reference and declared to be a part of this chapter. The

structures, fill, storage of materials and drainage facilities; and the location of the foregoing.

(b) Specifically, the following information is required:

(1) Elevation, in relation to mean sea level, of the lowest floor (including basement) of all structures;

(2) Elevation in relation to mean sea level to which any structure has been floodproofed;

(3) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 6.1-26(2); and

(4) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-12. Building official—Grant of permits.

The building official is hereby appointed to administer and implement this chapter by granting or denying development permit applications in accordance with its provisions. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-13. Same—General duties.

The duties of the building official shall include, but not be limited to:

(1) Review all development permits to determine that the permit requirements of this chapter have been satisfied.

(2) Review all development permits to determine that all necessary permits have been obtained from those federal, state or local governmental agencies from which prior approval is required.

(3) Review all development permits for compliance with the provisions of section 6.1-25, Encroachments. (Ord. No. 597, § 5, 7-15-80)

(2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-17. Interpretation of FIRM boundaries.

The building official shall make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 6.1-18. (Ord. No. 597, § 5, 7-15-80)

Sec. 6.1-18. Variances—Appeal board.

(a) The appeal board as established by the city shall hear and decide appeals and requests for variances from the requirements of this chapter.

(b) The appeal board shall hear and decide appeals when it is alleged there is an error in any requirement, decision or determination made by the building official in the enforcement or administration of this chapter.

(c) Those aggrieved by the decision of the appeal board, or any taxpayer, may appeal such decision to the municipal court.

(d) In passing upon such applications, the appeal board shall consider all technical evaluations, all relevant factors, standards specified in other sections of this chapter and:

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

(2) The danger to life and property due to flooding or erosion damage;

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

one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (1—11) in section 6.1-18(d) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

(b) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the national register of historic places or the state inventory of historic places, without regard to the procedures set forth in the remainder of this section.

(c) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

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

(e) Variances shall only be issued upon:

(1) A showing of good and sufficient cause;

(2) A determination that failure to grant the variance would result in exceptional hardship to the applicant; and

(3) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 6.1-18(d) or conflict with existing local laws or ordinances.

(f) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation. (Ord. No. 597, § 5, 7-15-80)

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

(c) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage.

(d) Base flood elevation data shall be provided for subdivision proposals and other proposed development which contain at least fifty (50) lots or five (5) acres (whichever is less). (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-25. Same—Encroachments.

In all areas of special flood hazard in which base flood elevation data has been provided, the cumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than [one] foot at any point. (Ord. No. 597, § 6, 7-15-80)

Sec. 6.1-26. Same—Specific standards.

In all areas of special flood hazards where base flood elevation data have been provided as set forth in section 6.1-7, Basis for establishing the areas of special flood hazard or in section 6.1-14, Use of other base flood data, the following standards are required:

(1) *Residential construction.* New construction and substantial improvement of any residential structure shall have the lowest floor, including basement elevated two (2) feet above base flood elevation.

(2) *Nonresidential construction.* New construction and substantial improvement of any commerical, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated two (2) feet above the base flood elevations together with attendant utility and sanitary facilities or shall:

a. Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

ORDINANCE NO. 597

AN ORDINANCE OF THE CITY OF ADDISON, TEXAS, ADOPTING FLOOD PLAIN INSURANCE REQUIREMENTS AND GUIDELINES; PROVIDING FOR PURPOSE; METHODS; DEFINITIONS; GENERAL PROVISIONS; ADMINISTRATION; FLOOD HAZARD REDUCTION; PROVIDING FOR A REPEAL OF CONFLICTING ORDINANCES AND DECLARING AN EMERGENCY.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ADDISON, TEXAS:

SECTION 1. Purpose. It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed: 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 interruptions; 5) To minimize damage to public facilities and utilities such as water and gas mains, electric telephone and sewer lines, streets and bridges located in areas of special flood hazard; 6) To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas; 7) To insure that potential buyers are notified that property is in an area of special flood hazard; and, 8) To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

SECTION 2. Methods of Reducing Flood Losses. In order to accomplish its purposes, this ordinance includes methods and provisions for:

(a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

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

(c) Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

(d) Controlling filling grading, dredging, and other development which may increase flood damage; and,

(e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

SECTION 3. 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.

(a) "Appeal" means a request for a review of the building official's interpretation of any provision of this ordinance or a request for a variance.

(b) "Area of shallow flooding" means a designated AO or VO Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident.

(c) "Area of special flood hazard" means the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year.

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

(e) "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 located within the area of special flood hazard.

(f) "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 or runoff of surface waters from any souce.

(g) "Flood Insurance Rate Map" (FIRM) means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

(h) "Flood Insurance Study" means the official report provided in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Insurance Rate Maps and the water surface elevation of the base flood.

(i) "Habitable floor" means any floor useable for living pruposes, which include working, sleeping, eating, cooking or recreation, or a combination thereof. A floor used only for storage purposes is not a "Habitable floor."

(j) "New Cosntruction" means structures for which the "start of construction" commenced on or after the effective date of this ordinance.

(k) "Start of construction" means the first placement of permanent construction of a structure on a site, such as the pouring of slabs or

footings or any work beyond the stage of excavation. 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 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 property of accessory building, such as garages or sheds not occupied as dwelling units or not as part of the main structure. For a structure without a basement or poured footings, the "start of construction" includes the first permanent framing or assembly of the structure or any part thereof on its piling or foundation.

(l) "Structure" means walled and roofed building or a gas or liquid storage tank, that is principally above ground.

(m) "Substantial improvement" means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

1) before the improvement or repair is started, or

2) if the structure has been damaged is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term does not, however, include either

1) any project for improvement of a structure to comply with existing State or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions, or

2) any alteration of a structure listed on the National Register

(n) "Variance" means a grant of relief from the requirements of this ordinance which permits construction in a manner that would otherwise be prohibited by this ordinance.

SECTION 4. General Provisions

A) Lands to Which this Ordinance Applies

This Ordinance shall apply to all areas of special flood hazards within the jurisdiction of the City of Addison, Texas.

B) Basis for Establishing the Areas of Special Flood Hazard

The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for the City of Addison, Texas, Dallas County," dated January 1980, with accompanying Flood Insurance Rate Maps is hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study is on file at 4500 Belt Line Road, Addison, Texas.

C) Penalties for Noncompliance

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) 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 $200.00 for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the City of Addison, Texas from taking such other lawful action as is necessary to prevent or remedy any violation.

D) 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 ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

E) 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.

F) 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 considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazards 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 Addison, Texas, any officer or employee thereof or the Federal Insurance Administration for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

SECTION 5. Administration

A) Establishment of Development Permit

A Development Permit shall be obtained before construction or development begins within any area of special flood hazard established in Section 4(B) Application for a Development Permit shall be made on forms furnished by the Building Inspection Department and may include, but

not be limited to; plans in duplicate drawn to scale showing the nature location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing.

Specifically, the following information is required:

1) Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;

2) Elevation in relation to mean sea level to which any structure has been floodproofed;

3) Certification by a registered professional engineer or architect that the floodproofing methods for any non residential structure meet the floodproofing criteria in Section 6G(2) and,

4) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

B. Designation of the Building Official

The building official is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

C. Duties and Responsibilities of the Building Official

Duties of the building official shall include, but not be limited to:

1) Review all development permits to determine that the permit requirements of this ordinance have been satisfied.

2) Review all development permits to determine that all necessary permits have been obtained from thoseFederal, State or Local governmental agencies from which prior approval is required.

3) Review all development permits for compliance with the provisions of Section 6F, Encroachments.

D. Use of Other Base Flood Data

When base flood elevation data has not been provided in accordance with Section 4(B), BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD

HAZARD, the building offical shall obtain, review and reasonably utilize any base flood elevation data available from Federal, State or other source, in order to administer Sections 6G (1), SPECIFIC STANDARDS, Residential Construction, and 6G(2) Nonresidential Construction.

E. Information to be Obtained and Maintained

1) Obtain and record the actural elevation (in relation to mean sea level) of the lowest habitable floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

2) For all new substantially improved flood proofed structures:

a) verify and record the actural elevation (in relation to mean seal level); and

b) maintain the floodproofing certifications required in Section 5(A)

3) Maintain for public inspection all records pertaining to the provisions of this ordinance.

F. Alteration of Watercourses

1) Notify adjacent communities and the Federal Emergency Management Agency prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.

2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

G. Interpretation of FIRM Boundaries

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Section 5(H)1.

H. Variance Procedure

1) Appeal Board

a) The appeal board as established by the City of Addison, Texas shall hear and decide appeals and requests for variances from the requirements of this ordinance.

b) The appeal board shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the building official in the enforcement or administration of this ordinance.

c) Those aggrieved by the decision of the appeal, or any taxpayer, may appeal such decision to the Municipal Court.

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

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

ii) The danger to life and property due to flooding or erosion damage;

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

iv) The importance of the services provided by the proposed facility to the community;

v) The necessity to the facility of a waterfront location, where applicable;

vi) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

B. Anchoring

All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

C. Construction Materials and Methods

1) all new construction and substantial improvements shall be constructed with new materials and utility equipment resistant to flood damage.

2) all new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

D. Utilities

1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

2) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and

3) On-site waste disposal systems shall be located to avoid impairment to them during flooding.

E. Subdivision Proposals

1) All subdivision proposals shall be consistent with the need to minimize flood damage;

2) All subdivision proposals shall have public utilities and facilities such as sewer, gas electrical, and water systems located and constructed to minimize flood damage;

3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and,

4) Base flood elevation data shall be provided for subdivision proposals and other proposed development which contain at least 50 lots or 5 acres (whichever is less).

F. Encroachments

In all areas of special flood hazard in which base flood elevation data has been provided, the cumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than [redacted] foot at any point.

G. SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data have been provided as set forth in Section 4(B) BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or in Section 5(D), Use of Other Base Flood Data, the following standards are required:

1) Residential Cosntruction

New construction and substantial improvement of any residential structure shall have the lowest floor, including basement elevated two (2) feet above base flood elevation.

2) Nonresidential Construction

New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated two (2) feet above the base flood elevations together with attendant utility and sanitary facilities shall:

a) be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

b) have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

c) be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the official as set forth in Section 5(D).

SECTION 7. The fact that the City of Addison does not have Flood Plain Insurance Requirements and Guidelines creates an urgency and emergency and requires this ordinance to take effect from and after its passage as the law in such cases provides.

DULY PASSED BY THE CITY COUNCIL OF THE CITY OF ADDISON, TEXAS, this the 15th DAY OF July. 1980.

MAYOR

ATTEST:

Jacque Shaps

CITY SECRETARY

2) Variances may be issued for the reconstruction, rehabilitation or estoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this section.

3) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result

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

5) 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 to the applicant; and

iii)a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as indentified in Section 5(H)1, d, or conflict with existing local laws or ordinances.

6) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

SECTION 6. Provisions for Flood Hazard Reduction

A. General Standards

In all areas of special flood hazards the following standards are required:

B. Anchoring

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

viii) the relationship of the proposed use to the comprehensive plan and flood plain management program of that area;

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

x) the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,

xi) 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.

e) Upon consideration of the factors of Section 5(H)1 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.

f) The building official shall maintain the records of all appeal actions including technical information and report and variances to the Federal Insurance Administration upon request.

I. Conditions for Variances

1) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (i-xx) in Section 5(H)1, d have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

The City Council has called a $13.2 million dollar bond program for July 28 through which virtually every road in the city will be upgraded over the next three years. It is anticipated that the bond program will result in a tax increase of no more than $.04 in the upcoming year's budget. If the bond program is approved, the city's tax rate would be $.18 per $100.00 valuation. Your city taxes would be $_____.

The Board of Equalization will be held on July 25th and 26th this year. If you have documented evidence, of a recent date, substantiating a lower market value, you may want to discuss this with the Tax Assessor or appear at the Board of Equalization. If so, please call (214) 233-1331 to schedule an appointment correct for you.

The above values are based on the following type of property:

PERSONAL_____

LEASED_____

REAL PROPERTY_____

Description of real property:

Charles Allen on Lynnwood will be coming in for fill Permit.

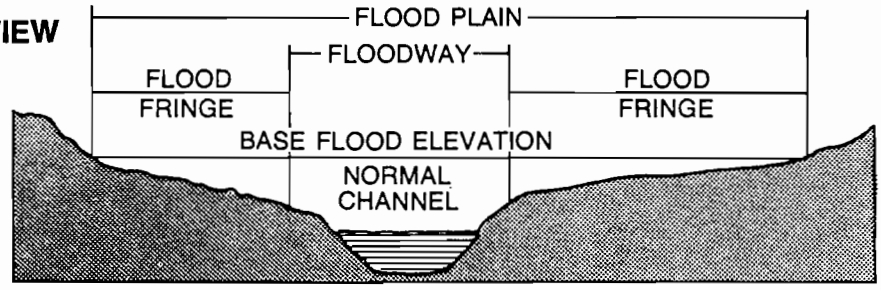
Require plan by R.P.E.

Alert Stewart Bailey (653-2155) when Allen makes his application Stewart lives on Wynnwood

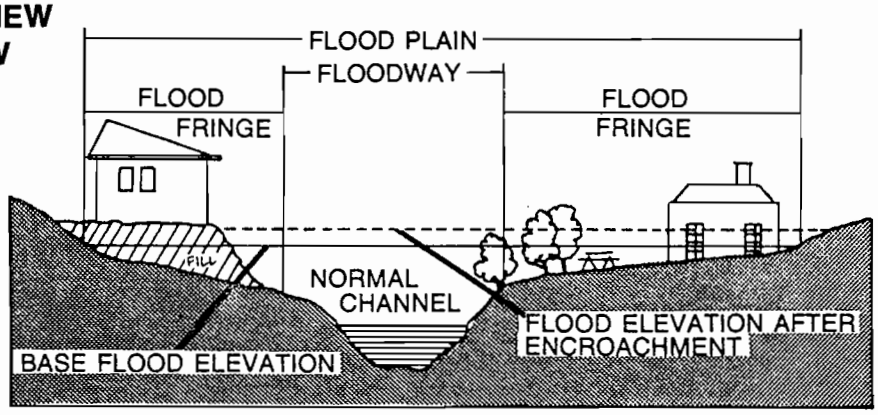
Visit flood plain ufo in Dallas (City) and determine their criteria for approval of fill permits.

STATE OF TEXAS FLOODPLAIN ADMINISTRATORS MANUAL

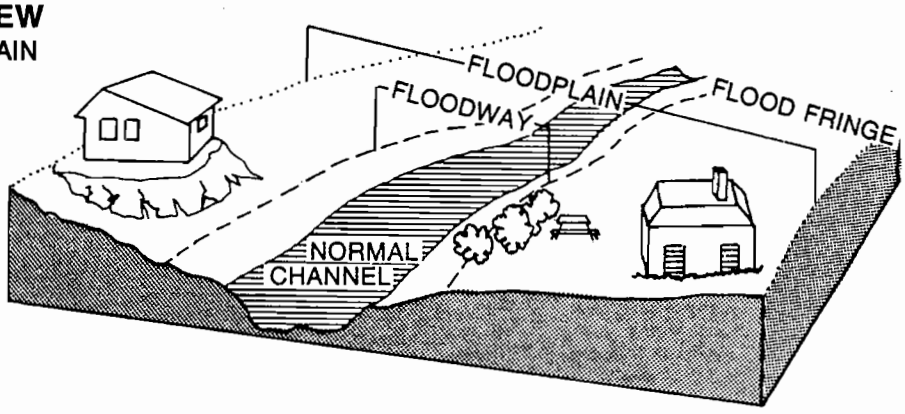
CROSS-SECTIONAL VIEW NO DEVELOPMENT



CROSS-SECTIONAL VIEW WITH EXISTING & NEW DEVELOPMENT



PERSPECTIVE VIEW
100-YEAR FLOOD PLAIN



STATE OF TEXAS

FLOODPLAIN ADMINISTRATORS

MANUAL

September 1990

TEXAS WATER COMMISSION

WATER RIGHTS & USES DIVISION

DAM & FLOODPLAIN SAFETY SECTION

This document was prepared, under FEMA Grant Number EMT-90-K-0185, as part of the National Flood Insurance Program, Community Assistance Program–State Support Services Element. The authors and publisher are solely responsible for the accuracy of the statements and interpretations contained in this publication. Such interpretations do not necessarily reflect the views of the Government.

Our thanks to all the States that provided us a copy of their Floodplain Management Manuals/Handbooks. These manuals provided many excerpts and ideas that were used in various places throughout this Manual.

Published and distributed
by the
Texas Water Commission
Post Office Box 13087
Austin, Texas 78711

PREFACE

The history of flooding in Texas is not a happy one. Our state is large with a great variety of topography, from mountains to flat prairies to coastal plains to beachfront. We have been battered by enormous hurricanes, and by thunderstorms that have set national rainfall records. Statewide we have over 1250 flood prone communities.

Texas has the dubious distinction of leading the nation in total cost of flood damage claims paid. As a state we have not done well in protecting our people or our property from flooding. The National Flood Insurance Program is a nationwide effort to help each state, each community and each property owner do better.

The National Flood Insurance Program (NFIP) is based upon an agreement between local communities and the federal government. If a community implements programs to reduce future flood risks, the federal government will make flood insurance available within the community to insure property owners against potential losses. The intent of the NFIP is not to prohibit development in the floodplain, but to guide such development in a manner consistent with both nature's need to convey flood waters and a community's land use needs.

The information compiled for this handbook is intended to familiarize local officials with the NFIP. Focus has been specifically directed towards:

- Regulations and guidelines for participation in the National Flood Insurance Program.
- Local officials' responsibilities to develop and implement strategies which will reduce future flood damages.

In Texas, the Dam & Floodplain Safety Section of the Texas Water Commission has been designated as the State Coordinating Agency for the NFIP. Along with this coordination, the TWC staff also offers technical and planning assistance to local governments in developing floodplain management programs.

To accomplish the goal of reducing flood losses in Texas through wise use of floodplains, the Dam & Floodplain Safety Section concentrates on the following responsibilities:

- Providing technical information on flood hazards.
- Assisting communities in establishing local floodplain management programs.
- Reviewing impacts of proposed projects in floodplains.
- Coordinating the NFIP activities for 853 participating Texas communities, and providing regular information

about flooding and the NFIP to the additional 407 flood-prone but non-participating communities.

- Assisting the Governor's Division of Emergency Management during flood disasters.

Floodplain management programs depend on local government administration and implementation to assure success. The TWC staff hopes this handbook will help local officials manage their own programs to meet the requirements of participation in the NFIP.

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INTRODUCTION

FLOODING

Streams and rivers are nature's way of collecting and carrying rainfall from higher ground to lakes and oceans. When unusually large amounts of collected water build-up along a watercourse, flooding occurs. The land areas adjacent to the streams, rivers, lakes and oceans that are inundated when flooding occurs are floodplains. Under purely natural conditions, this flooding causes little or no damage. Damage does occur, however, when man attempts to occupy the floodplain.

There are approximately 80,000 miles of rivers and streams throughout the State of Texas. Historically, these watercourses have served as focal points for the establishment and growth of cities and towns by providing needed water resources and vital transportation corridors.

Wichita Falls, TX 1982 City Planning

Along with the benefits of locating next to rivers and streams, however, there is also a certain danger. Triggered by heavy or prolonged rainfall, rivers and streams periodically overtop their banks, spreading floodwaters onto adjacent lowlands or floodplains. In Texas, floods have caused over $900 million worth of property damage and have taken hundreds of lives. Floods are by far the most common and serious natural hazard with which Texas municipalities must contend.

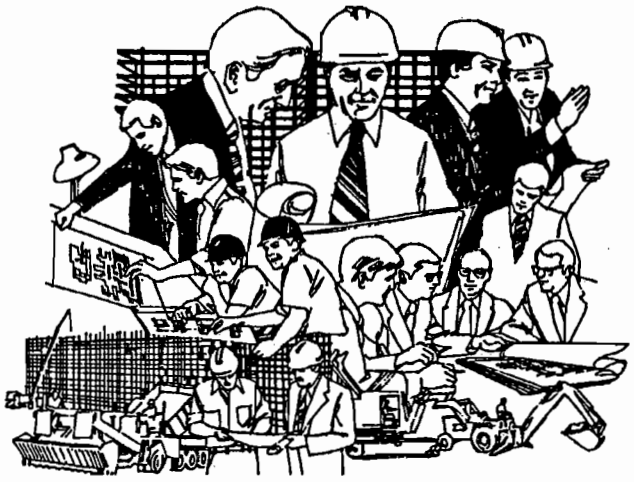
FLOOD CONTROL

At first, the federal government and the State tried to curb escalating flood damages by constructing dams, levees and floodwalls or by enlarging or straightening stream channels.

By the mid 1950's, many of those working in the flood control field began to recognize that the structural approach could never be the entire solution to minimizing flood damage. Studies showed that while expenditures for flood control works increased, so did annual flood damage. It became evident that, although flood control structures were generally holding down flood losses to existing floodplain development, they were also creating a "false sense of security" resulting in the more extensive development of those "protected" areas. As a result, when larger floods occurred which exceeded the design capacity of flood control projects, the amount of damage that actually took

place far exceeded the amount of damage that would have occurred if the floodplain areas were not protected by structural means.

It became clear that something else had to be done, and that rather than trying to control flooding totally, perhaps dealing with the cause of the problem - undesirable floodplain development - would be a more practical and effective solution. Out of this developed the concept of floodplain management.



FLOODPLAIN MANAGEMENT

Floodplain management may be defined as the full range of carefully planned public policy and action designed to promote the wise use of floodplains and to reduce future flood damages. A comprehensive floodplain management program includes both corrective measures to rectify existing problems and preventive measures to keep new problems from developing.

Local governments have the primary responsibility for establishing floodplain management programs. They have the authority to guide land use and development within their jurisdictions and are more familiar with their own flooding problems and what might be done about them. The state and federal governments can play a significant role in helping communities develop and implement floodplain management programs by providing the necessary financial and technical assistance which local governments might not otherwise have.

LOCAL REGULATION

This handbook is directed at just one aspect of local floodplain management: the regulation of construction and development within floodplains. Communities are encouraged to develop and administer regulations as part of a broader floodplain management plan or program which establishes defined goals and objectives within which specific regulatory actions can be guided.

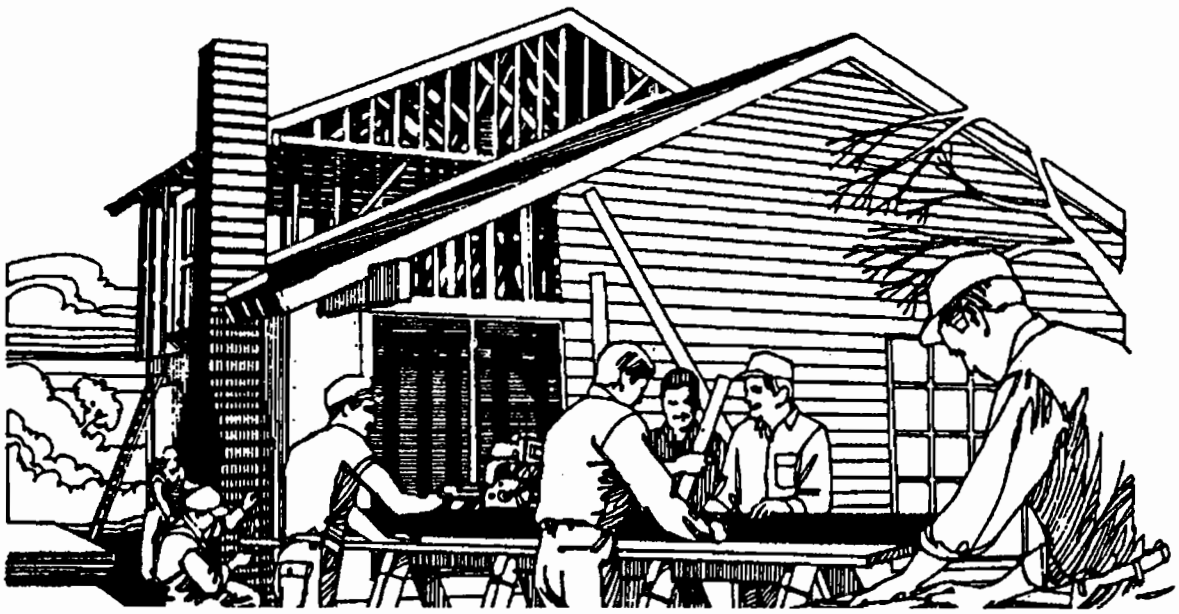
Local land use regulations can be an important part of an overall floodplain management program. Zoning regulations can control the type, density and location of uses within floodplains. Subdivision regulations can be used to insure that known floodprone areas are clearly described on subdivision plans, for effective management and for adequate notification to potential buyers.

Building codes set forth floodproofing design and construction standards to lessen the vulnerability of new buildings to flood damage. Each type of regulation achieves a slightly different objective and

all are important in reducing future flood damages.

The limitations of local regulations must be recognized, however. While they are important in an overall program of floodplain management, they are almost exclusively aimed toward future construction. That is, although they can be used effectively to help prevent the problem from becoming any worse, they will not be very useful in reducing damage potential to existing structures. This emphasizes the need for both corrective and preventive measures to achieve adequate floodplain management.

Both measures are the basis for the guidelines contained in the National Flood Insurance Program Regulations.



CHAPTER 1

NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program (NFIP) was created by the National Flood Insurance Act passed by Congress in 1968. The purpose of the NFIP is twofold.

- To provide the general public with the opportunity to obtain flood insurance at reasonable rates to cover damages to buildings and their contents caused by flooding; and
- To reduce future flood damages by requiring the regulation of new development in floodprone areas.

The NFIP is administered by the Federal Insurance Administration (FIA) within the Federal Emergency Management Agency (FEMA). The NFIP is coordinated in the State of Texas by the Texas Water Commission. Flood insurance is sold through licensed insurance agents.

A property owner may buy flood insurance if the property is located within a community which participates in the NFIP. In return for providing the insurance, the federal government requires participating communities to regulate new construction and substantial improvements in areas subject to flooding.

The federal government has been given the responsibility to identify and map the flood hazard areas of all communities. The NFIP is administered in two phases: the Emergency Phase and the Regular Phase. A community's status as an Emergency or Regular Phase participant depends upon the type and detail of flood data provided by the federal government.

EMERGENCY PHASE

The Emergency Phase is normally the entry stage of participation for communities. In this phase, a community's flood hazard areas are identified by the federal government through the issuance of a *Flood Hazard Boundary Map (FHBM).* This map identifies the flood areas without establishing insurance risk premium zones or providing flood elevation data. Flood insurance can be obtained throughout the community at flat rates based on the type of structure. This rate remains the same regardless of a structure's likelihood of being flooded.

To participate in the Emergency Phase, a community must adopt and enforce local floodplain regulations. The local regulations must satisfy FEMA's minimum regulatory requirements for new construction which takes place within the flood hazard areas (referred to as Zone A)

on the FHBM. A community remains in the Emergency Phase until it is converted to the Regular Phase.

REGULAR PHASE

A detailed engineering study is the most common method of converting a community to the Regular Phase. Study efforts result in the determination of the 100-year flood elevations, designation of high hazard floodway areas, and establishment of flood insurance risk premium zones.

The study results in a report entitled *Flood Insurance Study (FIS)* and accompanying maps entitled the *Flood Boundary and Floodway Map (FBFM)* and the *Flood Insurance Rate Map (FIRM)*. The study text and maps provide local officials with the basis for reviewing proposed developments and enforcing floodplain regulations within their communities.

The FIS and accompanying maps describe the streams which were studied and contain information about stream discharges, flood profiles and insurance zones. Elevation reference marks are also indicated on the maps. The Flood Boundary and Floodway Maps show (for each stream studied by detailed engineering methods):

(1) the 100-year floodplain boundary;

(2) the 500-year floodplain boundary;

(3) location of surveyed cross-section profiles used; and,

(4) delineation of the "floodway."

The "floodway" is the area of a stream and adjacent overbank areas that must be kept free of development that would cause any increase in the base flood elevation. For the streams not studied by detailed engineering methods, the map shows the approximate 100-year floodplain boundary." This represents the lateral extent of the "100-year" flood's inundation area.

Another type of map, entitled the Flood Insurance Rate Map (FIRM), is provided for community officials, lending institutions and insurance agents. A FIRM which results from detailed hydraulic and hydrologic analyses will include 100-year flood elevations and designated insurance rate zones.

Zones indicated as "A" (numbered or unnumbered) "AO" and "AH" are located within the boundaries of the 100-year floodplain; zones identified as "B" are located within the boundaries of the 500-year floodplain; and the remaining areas of a community are normally designated Zone "C". "Numbered A" zones reflect the flood risk of a particular section of the stream.

Since 1985 FEMA has made an effort to consolidate the Floodway Map with the Flood Insurance Rate Map described above. The new combined map, although referred to as a FIRM, combines the data contained on the FBFM with that of the FIRM. For communities receiving a FIRM effective after September, 1985 the following designations for flood hazard areas and flood risk zones will appear on the map. Zones "A", "AO", "AH" and "AE" correspond to the boundaries of the 100-year floodplain. A shaded Zone "X" will correspond to the former "B" zone representing the boundaries of the 500-year floodplain. An unshaded Zone "X" repre-

sents the previous "C" zones. These replacement designations will be used for new maps gradually replacing the "A1-30", "B", and "C" designations.

The federal government obtains a detailed analysis by engaging a private engineering firm or another public agency to undertake the in-depth surveys. Another option exercised is to use existing detailed information from flood studies prepared for purposes other than those of the NFIP.

Sometimes a FIRM is prepared with no 100-year flood elevations indicated. This represents the minimum study effort and is only used where a community's flood areas are small and the potential for future development of the flood areas is unlikely. Under such circumstances, a community's previously issued Flood Hazard Boundary Map serves as the base map for the Flood Insurance Rate Map.

Upon completion of the FIRM, the community is granted ninety days to review a preliminary version of the map(s) and study text. The community or any resident may appeal to FEMA challenging the accuracy of the proposed flood elevation determinations. All appeals must be based on technically sound information showing that the 100-year flood elevations are incorrect. Following expiration of the appeal period, FEMA formally notifies the community that the FIRM will become effective in six months.

To continue as a participant in the Regular Phase, the community must adopt more stringent regulations than those imposed during the Emergency Phase. These new regulations must be enforceable upon the "effective date" printed on the community's FIRM.

During a community's participation in the Emergency Phase, a limited amount (BASIC LIMITS) of insurance is available to property owners at a subsidized rate. When a community becomes eligible for the Regular Phase, additional amounts (ADDITIONAL LIMITS) of flood insurance can be purchased. The premiums for the Regular Phase insurance reflect the actual risk of flooding or actuarial rates. Any structure which existed prior to the community's entry into the Regular Phase qualifies for either the subsidized rate or the actuarial rate for the basic layer of insurance, whichever is lower. (For rating purposes in the Regular Phase, separate rates have been established for the BASIC LIMITS and ADDITIONAL LIMITS).

Communities participating in the Regular Phase must adopt and enforce an ordinance which requires new structures in flood hazard areas to have the lowest floor, including the basement, elevated to or above the Base Flood Elevation. If a Regulatory Floodway has been identified, development in the floodway must not increase the height of the Base Flood.

SPECIAL or DIRECT CONVERSIONS

With the Emergency Program of the NFIP scheduled to expire by September 30, 1991, FEMA has placed a great deal of emphasis on identifying Texas communities that have little or no development pressure and little current flood risk that can be converted to the Regular Phase without a Flood Insurance Study. When a FHBM exists for the community, it may be revised to remain accurate, but it also may just be renamed a FIRM. Flood hazards, people affected, existing floodplain devel-

opment, and future development potential are all evaluated in this conversion process. The community's floodplain ordinance must be updated to meet existing NFIP standards.

BIENNIAL REPORT

Communities participating in the NFIP are requested to return a Biennial Report on floodplain activities to FEMA. Every two years, FEMA sends a form to the community floodplain administrator that should be completed and returned within 30 days. It requests information concerning any changes to the community's flood hazard area, development activities that have taken place in the floodplain, and verification of the number of floodplain residents and structures.

Filling It Out:

Any information that is not accurate should be corrected on the form. There are two sections on the Biennial Report.

Questions in Section One ask about the changes and activities in the floodplain. If there have been changes in the community's territorial limits, be sure to mark "yes" to Question A and include a copy of the new map. Regarding man-made changes in Question C, the replacement of culverts, bridges, and physical changes which affect the characteristics of flooding, construction of dikes or drainage projects are examples of significant man-made changes.

Individual or localized projects such as resurfacing parking lots, building small retention basins, or minor drainage improvements need not be mentioned.

Question D provides the opportunity to indicate whether or not the community is in need of help in its floodplain management program. Check "yes" if in need of assistance.

Section Two asks the number of permits granted in the community's flood hazard areas only in the last two years. Communities need to report the number of variances (if any) granted to the floodplain ordinance.

The last portion of the report asks for the best estimate of the population and the number of 1-4 family structures and other structures (schools, churches, businesses, public buildings) located in the entire community. It then asks for estimates in the community's flood hazard areas only. Changes should be made to correct figures that are no longer accurate.

Finally, the report must be signed by the person completing the form and returned to FEMA at the address provided. A copy for the community's files should be retained for future reference.

The Biennial Report indicates to FEMA the degree of development pressure on the floodplain. Variances issued in the floodplain are of particular interest to FEMA.

COMMUNITY ASSISTANCE VISIT (CAV)

FEMA conducts CAVs in Regular Phase communities to evaluate how they are doing in their efforts to comply with the regulations of the NFIP. The primary

purpose of the CAVs is to help communities identify and solve floodplain management problems.

A Community Assistance Visit is also the foundation of FEMA's Community Compliance Program which outlines procedures for enforcement activities by FEMA under the NFIP. A CAV is the most comprehensive form of FEMA community contact, with a floodplain tour and inspection of floodplain development permit records. Biennial Report information is also verified at this time and the communities overall floodplain management program is evaluated.

Any shortcoming in procedures or enforcement of the local ordinance is identified and appropriate corrective actions are discussed. When non-compliance with the local ordinance or NFIP regulations is cited, FEMA expects the community to identify and take actions necessary to remedy the infractions. Enforcement action against a community can be initiated by FEMA for continued non-compliance.

CHAPTER 2

TEXAS FLOOD CONTROL AND INSURANCE ACT

PURPOSE

The Texas Flood Control and Insurance Act was passed by the State Legislature in 1969. In approving the Act, the Legislature recognized the personal hardships and economic distress caused by flood disasters since it has become uneconomic for the private insurance industry alone to make flood insurance available to those in need of such protection on reasonable terms and conditions. The purpose of this act is to evidence a positive interest by:

- securing flood insurance coverage under the National Flood Insurance Program (NFIP) for those citizens of Texas desiring to participate;
- promoting the public interest by providing appropriate protection against the perils of flood losses; and
- encouraging sound land use by minimizing exposure of property to flood losses.

A copy of the complete Act as it appears in the Texas Water Code is in Appendix A.

WATER COMMISSION

The Texas Water Commission is the state agency charged with the responsibility of cooperating with the Federal Emergency Management Agency (FEMA) in the planning and carrying out of state participation in the NFIP; however, the responsibility for qualifying for the NFIP belongs to any interested political subdivision, whether presently in existence or created in the future. The Commission's responsibilities as the NFIP State Coordinator include:

- providing assistance to local political entities participating or wishing to participate in the NFIP;
- providing services to local, State, and federal political subdivisions as required by the Act; and
- reviewing plans and reports for flood protection and floodplain management prepared by federal, State, and local governments.

Working within the sphere of those responsibilities, the Commission:

- assists political subdivisions to qualify for eligibility in the NFIP;
- coordinates local, State, and federal programs relating to floods, flood losses, and floodplain management;
- evaluates present flood control programs and assesses the extent to which public and private floodplain management activities have been instituted;
- carries out studies with respect to the adequacy of present public and private measures, laws, regulations, and ordinances in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention;
- evaluates available engineering, hydrologic and geologic data relating to floods and their control; and
- carries out floodplain studies and mapping programs of floodplains, flood-prone areas, and flood-risk zones.

On the basis of such studies and evaluations, the Commission, to the extent of its capabilities, periodically identifies and publishes information and maps with respect to all floodplain areas, including the State's coastal area, which have flood hazards, and where possible aid the federal government in identifying and establishing flood-risk zones in all such areas.

STATE BOARD OF INSURANCE

The State Board of Insurance aids, advises, and cooperates with political subdivisions, the Commission, and FEMA when such aid, advice, and cooperation

are requested or deemed advisable by the State Board of Insurance.

POLITICAL SUBDIVISIONS

All political subdivisions which qualify for the NFIP are authorized to take all necessary and reasonable actions to comply with the requirements and criteria of the NFIP. These actions include but are not limited to:

- making appropriate land use adjustments to constrict the development of land which is exposed to flood damage and minimize damage caused by flood losses;
- guiding the development of proposed future construction, where practicable, away from a location which is threatened by flood hazards;
- assisting in minimizing damage caused by floods;
- authorizing and engaging in continuing studies of flood hazards in order to

facilitate a constant reappraisal of the flood insurance program and it's effect on land use requirements;

- engaging in floodplain management and adopting enforcing permanent land use and control measures consistent with the criteria established under the National Flood Insurance Act;
- declaring property, when such is the case, to be in violation of local laws, regulations, or ordinances which are intended to discourage or otherwise restrict land development or occupancy in flood-prone areas and notifying FEMA of such property;
- consulting with, giving information to, and entering into agreements with FEMA for the purpose of:

  a. identifying and publishing information with respect to all flood areas, including coastal areas; and
  b. establishing flood-risk zones in all such areas and making estimates with respect to the rates of probable flood-caused loss for the various flood-risk zones for each of these areas;

- cooperating with FEMA's studies and investigations with respect to the adequacy of local measures in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention;
- taking steps to improve the long-range management and use of flood-prone areas;
- purchasing, leasing, and receiving property from FEMA when such property is owned by the federal government and lies within the boundaries of the political subdivision pursuant to agreements with FEMA or other appropriate legal representative of the United States Government;
- requesting aid pursuant to the entire authorization from the Commission;
- satisfying criteria adopted and promulgated by the Commission pursuant to the NFIP; and
- adopting permanent land use and control measures with enforcement provisions which are consistent with the criteria for land management and use adopted by FEMA.

CHAPTER 3

LOCAL FLOODPLAIN MANAGEMENT REGULATIONS AND NFIP STANDARDS

LOCAL FLOODPLAIN MANAGEMENT ORDINANCES

This chapter briefly outlines the most important aspects of preparing and enacting local floodplain management ordinances. An ordinance is the legal means by which communities can set standards and procedures for regulating floodplain development. To comply with the requirements of the National Flood Insurance Program (NFIP) and the Texas Flood Control and Insurance Act, a community must adopt an ordinance that:

- includes all necessary federal and state floodplain management requirements;
- is legally enforceable;
- applies uniformly to all floodplain areas; and,
- takes precedence over any less restrictive conflicting local ordinances or codes.

THE LEGALITY OF REGULATING FLOODPLAIN DEVELOPMENT

The courts have generally upheld challenges to local floodplain management ordinances as long as the degree of regulation can reasonably be related to the danger posed or to the public interest. If there is a definite danger, even strict regulations have been upheld.

The court decisions on floodplain ordinances support local regulations when it can be proven the ordinance:

- complies with statutory procedures to adopt, administer, and enforce the regulations:
- properly balances public interests with private rights;
- treats similarly situated landowners according to the standards; and
- does not go beyond the powers granted in the enabling legislation.

Therefore, it is important to review carefully what is proposed and to follow closely the enacting procedures which apply.

DEGREE OF REGULATION

To participate in the NFIP, communities are required to adopt development controls which, at a minimum, meet federal and state floodplain management requirements. However, a community

can do more. NFIP requirements are only minimum standards and communities are not limited in their power to adopt greater restrictions. Texas counties may only impose NFIP development restrictions in an identified 100-year floodplain.

The extent to which a community may want to regulate floodplain development beyond the Federal and State minimum requirements is a local matter and will depend on a number of factors, including the following:

- the extent and severity of flooding;
- the amount of land subject to flooding;
- the type, amount and location of existing floodplain development;
- future growth and development patterns;
- the detail to which floodplains are mapped; and,
- the need to protect natural resources and environmental quality.

Floodplain regulations should be part of an overall floodplain management program designed to guide and promote the wise use of floodplain lands and resources (Figure 1). In this respect, floodplain regulations become one of several management techniques employed to attain the goals and objectives of a broader effort to reduce or avoid future flood damages. Having a floodplain management plan or program will help communities design regulations which meet local needs and conditions rather than regulations which simply copy state and federal minimum requirements.

Communities that decide to take stronger measures to control future floodplain development have several options. Some of the more commonly applied regulatory approaches are described in the following subsections.

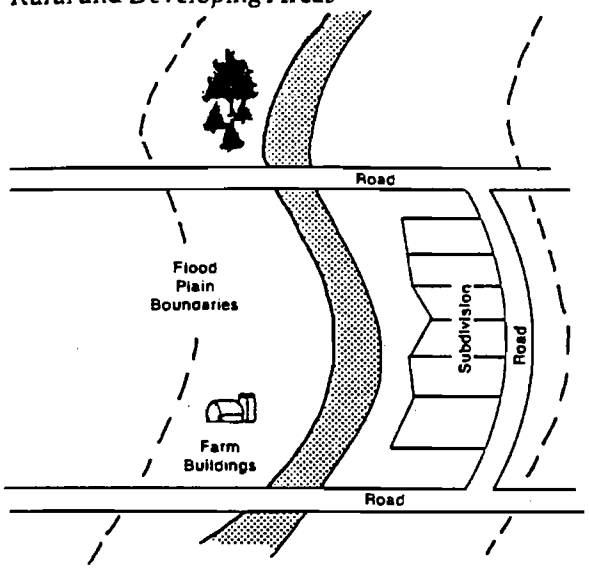
Prohibiting Certain Kinds of Development

Some communities may want to prohibit certain types of development within the floodplain, especially those which present a significant hazard to occupants or a threat to persons living downstream. These includes schools, nursing homes, hospitals, jails, manufactured-home parks, landfills, sewage treatment plants, cemeteries, chemical plants and warehouses, as well as other similar kinds of development that could cause widespread public health and safety problems in the event of flood damage. Emergency facilities such as fire stations, ambulance services, and emergency management offices which are critically needed in times of flooding could also be excluded from the floodplain or any other area where they would be cut off in case of flood.

Restricting Floodway Development

Some communities may want to prohibit certain types of development only within the floodway portion of the floodplain since this is the area which conveys the bulk of the floodwater downstream and is the area where water velocities and forces are the greatest and most destructive. Communities having Flood Insurance Studies are likely to have floodway areas delineated on the Flood Boundary and Floodway Map and can readily use the map description as a basis for further restricting development. Communities which do not have detailed studies can establish a simulated floodway by the use of 50-foot set-back measured landward from the top of the channel to regulate encroachments along floodplains which do not have an identified floodway.

Rural and Developing Areas



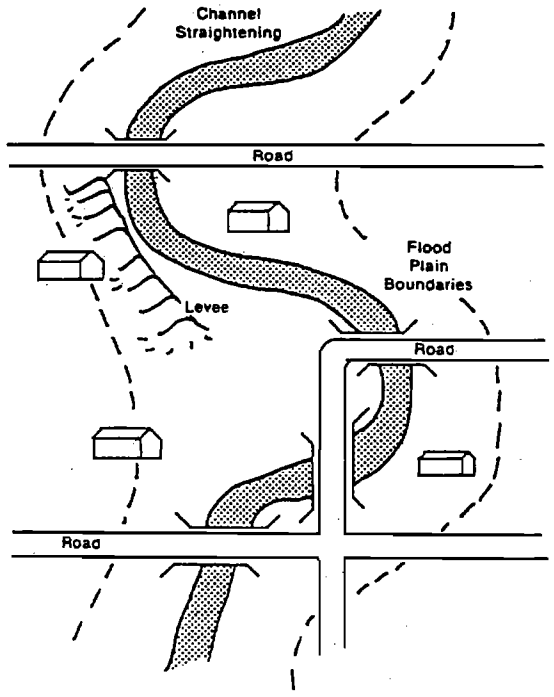
Conditions

1. Little or no development of flood plain.
2. Mixed agriculture and forestry to residential and commercial uses.
3. Scattered increasing land values and taxes.
4. Subdivision and land speculation common.
5. Many on-site sewer and water facilities.
6. Often limited existing zoning and subdivision controls.
7. Increasing recreation demands.

Common Land Use Management Goals

1. Preserve floodway areas; prevent development in selected flood fringe areas with special values.
2. Preserve agricultural uses (in some areas).
3. Provide recreation, wildlife and scenic areas.
4. Prevent subdivision of unsuitable lands.
5. Prevent water pollution and nuisances.
6. Prevent extension of public facilities into flood prone areas (in some circumstances).

Urban Area



Conditions

1. Intensive existing development of flood plain.
2. Agriculture, forestry and other open space uses often uneconomic.
3. High land values and taxes.
4. Levees and channel straightening.
5. Sewer and water.
6. Bridge openings act as restraints upon flood flows.
7. Blighted flood plain areas.
8. Recreation and open space demands.
9. Land use demands for commercial, industrial, and residential uses.
10. Often adopted zoning, subdivision controls, and building codes without flood provisions.

Common Land Use Management Goals

1. Combine flood plain management tools to reduce flood losses to existing uses and prevent losses to new uses.
2. Preserve floodway areas; require flood protection for new uses in flood fringe areas.
3. Provide park and other active recreation areas.
4. Redevelop blighted areas.
5. Provide levees, fill, flood-proofing and other protection for existing uses.
6. Prevent subdivision of unsuitable lands.
7. Permit (in some instances) residential, commercial and industrial uses.

Adapted from *A Perspective on Flood Plain Regulations for Flood Plain Management*, Department of the Army, Office of Engineers, Washington D.C., EP 1165-2-304, June 1, 1976.

Figure 1.–Differing Floodplain Management Contexts

A community could decide to use a lesser or greater distance depending on the size and direction of flow of the stream and other features of the floodplain area.

Maintaining the Flood Flow Capacity of Streams

Communities which do not have identified floodway areas may want to consider including ordinance provisions which would only allow future floodplain development if it would not cause an increase in flood heights above a stated limit. The maximum allowable increase is usually one foot above the base flood elevation. This provision would be administered on a case-by-case basis evaluating the effect of a proposed project and other anticipated floodplain development on flood flows.

Communities which have Flood Hazard Boundary Maps (FHBM) or which have detailed Flood Insurance Studies showing approximate flood-prone areas should seriously consider this option. Section 60.3(b) requirements of the NFIP are specifically designed to protect structures - not the carrying capacity of streams and adjacent floodplains. Excessive filling and developing of a floodplain without regard to effects on flood flows can result in greater flood velocities and increased flood heights.

Selecting a Regulatory Flood

NFIP regulations require communities to use the 100-year flood as the minimum standard for regulating floodplain development. Under certain circumstances, communities have found it advantageous to regulate development using a flood of greater magnitude, such as any larger flood of record. Some communities with detailed Flood Insurance Studies have adopted the 500-year flood as the regulatory flood. Still other communities have gone to the county soil surveys to regulate development within floodplain soils.

Again, the 100-year flood is a minimum standard. Where it makes sense to do so, larger floods can and should be used.

Incorporating a Freeboard Safety Factor

The NFIP only requires protection to the level of the 100-year flood, whereas many communities in Texas require 1, 2, or 3 feet above the 100-year flood elevation.

This added level of protection is called a freeboard safety factor. It represents a margin of safety against possible errors in estimating flood levels and possible increases in flood heights caused by extensive watershed development or obstruction of floodplain areas. Property owners who protect their structures above the 100-year flood elevation may be able to obtain reduced insurance rates.

SELECTING THE TYPE OF ORDINANCE

Once the regulatory approach is selected, the next step before actually drafting an ordinance is to decide which type of ordinance is best suited for the community in order to regulate floodplain development. Floodplain requirements may be contained in a single ordinance or may be incorporated into zoning, subdivision, and building permit ordinances.

A special purpose ordinance is a local law designed to address a particular problem affecting the general health, safety, and welfare of the community. Junkyard, weed, and nuisance ordinances are examples of special purpose ordinances.

There are certain advantages of special purpose ordinances which make them a commonly used means for regulating floodplain development. Perhaps the greatest advantage is that a special purpose ordinance contains all the floodplain management provisions in one document. This makes it easier to understand and administer. Some people think dividing the provisions among the zoning, building codes, and subdivision and land development ordinances can complicate matters, especially for communities without full-time ordinance administrators. Since zoning is often a controversial issue at the local level, the enactment of a special purpose ordinance may avoid the problems and delays associated with the adoption of zoning ordinances.

The other option for regulating floodplain development is to include provisions in zoning, subdivision, and land development ordinances, and in building codes. Communities that have these ordinances enacted or proposed for adoption may find that it is to their advantage to incorporate floodplain management provisions into these regulations. Since the legal and administrative framework is already set up and functioning, it may be best to try to mold the floodplain regulations into the existing system rather than trying to enact an entirely new and distinct ordinance. This may make it easier for a community wishing to regulate land use to enact zoning ordinances solely for floodplain management purposes.

PREPARING REGULATIONS

The actual preparation of an ordinance can be done by the city or county attorney, a private consultant or a local or county planner. Other sources of assistance are the Texas Water Commission, Dam and Floodplain Safety Section, and FEMA-Region VI, Natural and Technological Hazards Division.

FEMA-Region VI has prepared model ordinances that can be used to develop local floodplain management ordinances which will meet the minimum requirements of the NFIP and the Texas Flood Control and Insurance Act, however, they should be reviewed carefully to see if they are adequate to meet local conditions.

Communities may submit a draft of their proposed ordinance to FEMA-Region VI, NTH Division, before they are enacted, to ensure that all minimum requirements have been properly addressed.

NFIP ORDINANCE REQUIREMENTS

The regulations of the National Flood Insurance Program specify certain restrictions which local ordinances must include if the community is to qualify for participation. Generally, these requirements have to do with the circumstances under which buildings and other development may be allowed in floodplain areas.

There are NFIP regulations which apply to all participating communities whether they have no floodplain map at all, or a detailed floodplain map with base

flood elevations. The extent to which a community must impose development guidelines is directly tied to the available flood information that has been supplied by FIA in the form of floodplain maps and studies. Five distinctly different situations exist regarding FIA provided floodplain data. Consequently, floodplain management criteria for flood-prone areas differ and are contained in Section 60.3(a)-(e) of the NFIP Regulations and are summarized below.

60.3(a) -

FIA has not provided any floodplain data. The Community may apply and participate in the NFIP if it agrees to:

1. Require permits for all proposed construction or development so they may determine flood risk;

2. Review proposed development to ensure other required permits have been obtained;

3. Review permit applications to determine whether proposed building sites will be reasonably safe from flooding;

4. Review subdivision proposals and other proposed new development to determine if such proposals will be reasonably safe from flooding;

5. Require new and replacement water supply systems located within flood-prone areas to be designed to minimize or eliminate infiltration of flood waters into the systems; and

6. Require new and replacement sanitary sewage systems and on-site waste disposal systems be protected or sited to prevent contamination or impairment.

60.3(b) -

FIA has provided a Flood Hazard Boundary Map (FHBM) or Flood Insurance Rate Map (FIRM) that identifies special flood hazard areas (A Zones) but has not provided base flood elevation data nor identified a floodway or coastal high hazard area. The Community shall:

1. Require permits for all development in flood hazard areas on the FHBM or FIRM;

2. Require development in flood hazard area to meet standards of 60.3(a)(2)-(6);

3. Require floodplain elevation data for subdivisions over 50 lots or 5 acres be included on the proposal;

4. Obtain, review and reasonably utilize any base flood data available from a Federal, State, or other source, to require development to meet the elevation or floodproofing requirements;

5. When base flood elevation data is utilized, document elevation or floodproofing of structures in the flood hazard area;

6. Notify, in riverine situations, adjacent communities and the Texas Water Commission of any watercourse alteration;

7. Assure carrying capacity of any altered watercourse is maintained; and

8. Require manufactured homes to be placed in flood hazard area be installed using methods and practices which minimize flood damage.

60.3(c) -

FIA has provided final flood elevations for one or more special flood hazard areas of the Community's FIRM but has not identified a regulatory floodway or coastal high hazard area. The Community shall:

1. Require standards of 60.3(b) in all identified flood hazard areas;

2. Require elevation of lowest floor (including basement) of new or substantially improved residential structures to or above the base flood elevation;

3. Require elevation or floodproofing of nonresidential structures to or above the base flood elevation;

4. Require certification by a registered professional engineer or architect that the design and construction methods proposed for a floodproofed structure are in accordance with accepted standards to satisfy the requirements;

5. Fully enclosed area below elevated lowest floors must be designed to automatically equalize hydrostatic pressures on the structure.

6. Require that newly placed or substantially improved manufactured homes, in Zones A1-30 or AE or AH have the lowest floor elevated to or above the base flood elevation on an adequately anchored foundation system (except in an existing manufactured home park or subdivision on a site that has not previously suffered substantial damage from flooding);

7. Require elevation of residential structures in AO zones to or above the depth number on the FIRM (at least two feet if no depth number is specified);

8. Require elevation or floodproofing of nonresidential structures in AO zones to or above the depth number on the FIRM (at least two feet if no depth number is specified);

9. Require within A99 zones on the FIRM the standards of 60.3(a)(1)-(a)(4)(i) and 60.3(b)(5)-(b)(9);

10. Require until a regulatory floodway is designated that no development is permitted within zones A1-30 or AE unless it is demonstrated that the cumulative effect of the proposed development, and existing or anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point in the Community;

11. Require adequate drainage around structures on slopes in AH or AO zones;

12. Require manufactured homes, to be placed or substantially improved, on sites within an existing manufactured home park or subdivision or that have not suffered previous flood damage, within zones A1-30, AH, or AE, on the FIRM, be elevated such that their lowest floor is at or above the base flood elevation or the chassis is 36 inches above grade and is anchored to an adequately anchored foundation system;

13. Under certain conditions, a Community may approve development in zones A1-30, AE, or AH, that would increase the water surface elevation more that one foot. The conditions are established in Section 65.12 of the NFIP Regulations.

14. Require that recreational vehicles placed on sites within zones A1-30, AE or AH, either:
    (i) be on site fewer than 180 consecutive days,
    (ii) be fully licensed and road ready, or
    (iii) meet the requirements of 60.3-(b)(1) and 60.3(c)(6).

60.3(d) -

FIA has provided final base flood elevations within zones A1-30 and/or AE on the FIRM, and has provided information to designate a regulatory floodway, but has not identified a coastal high hazard area. The Community shall:

1. Meet the requirements of (c)(1)-(c)(14) of Section 60.3;

2. Select and adopt a regulatory floodway that will carry the base flood with no more than a one foot increase in the water surface elevation;

3. Prohibit encroachments within the adopted regulatory floodway unless it is demonstrated through hydrologic and hydraulic analyses that the proposed encroachment would not result in any increase in flood levels within the community during a base flood discharge; and

4. An encroachment may be permitted which would increase the flood level more than one foot if the provisions of Section 65.12 are satisfied.

60.3(e) -

FIA has provided final base flood elevations within zone A1-30 and/or AE, has identified zones AH, AO, and A99 if appropriate, and has identified coastal high hazard areas by designating zones V1-30, VE, and/or V. The Community shall:

1. Meet the requirements of (c)(1)-(c)-(14) and (d)(1)-(d)(4) as appropriate;

2. Within zones V1-30, VE, and V, obtain and maintain the elevation of the bottom of the lowest structural member of the lowest floor of new and substantially improved structures;

3. Require new construction in zones V1-30, VE, or V, to be located landward of mean high tide;

4. Require new construction and substantial improvements in zones V1-30, VE, or V, to be elevated such that the bottom of the lowest structural member of the lowest floor is at or above the base flood elevation and the pile or column foundation and the structure attached thereto is anchored against required wind and water loads. Engineering certification of design and construction methods is required.

5. Require the space below the lowest elevated floor be either free of obstruction or constructed with non-

supporting breakaway walls or wood lattice-work or insect screening, designed to collapse under wind and water loads without causing damage to structural support;

6. Prohibit the use of fill for structural support of buildings within zones V1-30, VE, or V;

7. Prohibit man-made alteration of sand dunes and mangrove stands within zones V1-30, VE, or V, which would increase potential flood damage;

8. Require newly placed or substantially improved manufactured homes in zones V1-30, VE, or V (except those in an existing manufactured home park or subdivision that have not previously incurred substantial damage due to flood), to meet the requirements of Section 60.3(e)(2)-(e)(7). Manufactured homes on sites in an existing manufactured home park or subdivision that have not incurred substantial damage from flood may meet the requirements of Section 60.3(c)(12) instead;

9. Require recreational vehicles placed on sites in zones V1-30, VE, or V, either:
   (i) be on site less that 180 consecutive days;
   (ii) be fully licensed and ready for highway use; or
   (iii) meet the requirements in 60.3-(b)(1) and (e)(2)-(e)(7).

CONCLUSION

Local ordinances regulating development are one of the most important aspects of an effective floodplain management program. If they are properly written and administered, they can accomplish the objectives of making flood insurance available through the National Flood Insurance Program and helping to reduce future losses to the community and to others downstream. Standards for floodplain development are included below.

FLOODPLAIN DEVELOPMENT STANDARDS

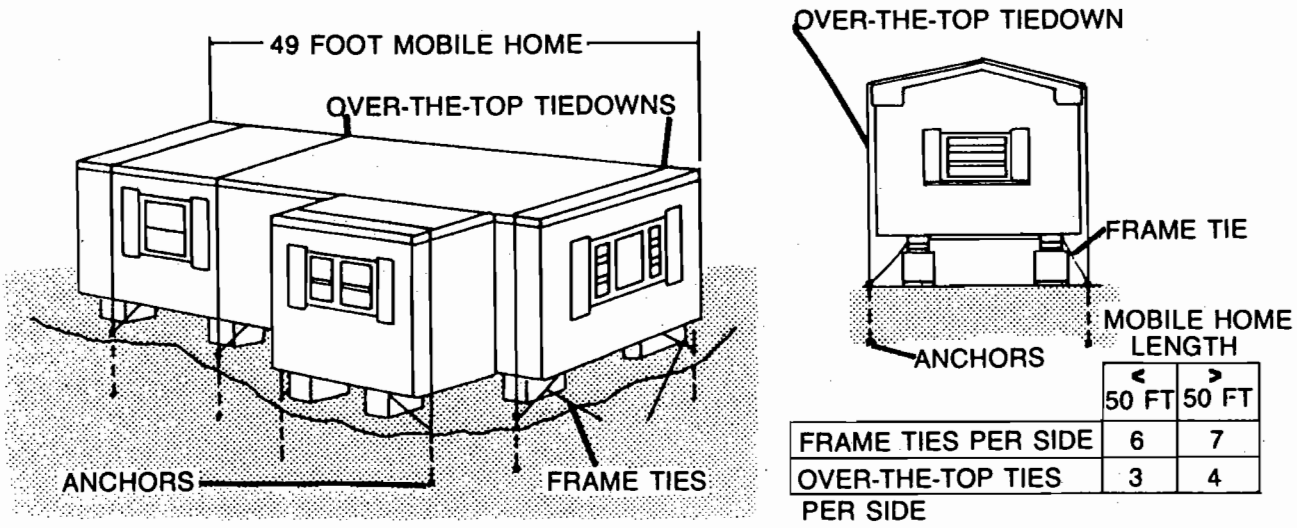
To reduce flood damage, the National Flood Insurance Program has established standards for new or substantially improved construction projects and other developments in special flood hazard areas. The standards are divided into two major categories: general and specific. The general standards apply to all communities participating in the National Flood Insurance Program. The specific standards apply only to those areas where base flood elevations have been established.

GENERAL STANDARDS

The National Flood Insurance Program requires that new or substantially improved construction or development in flood hazard areas meet the standards discussed below.

Anchoring

All new construction and substantial improvements must be properly anchored to prevent flotation, collapse, or lateral movement of the structure.



	< 50 FT	> 50 FT
FRAME TIES PER SIDE	6	7
OVER-THE-TOP TIES PER SIDE	3	4

Figure 2.--Manufactured Home Anchoring

Significant flood damage results from buildings being moved off their foundations. If a structure is elevated on fill to or above the base flood level, the anchoring requirement is satisfied.

The current standards require all manufactured homes to be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

Because they can be easily moved by floodwaters, NFIP regulations prior to 1986 included specific tiedown regulations and performance standards. Due to conflicts with manufacturing standards and state and local regulations, a more general standard has been substituted to permit alternative anchoring techniques that are effective in resisting flood loads. Some anchoring methods are illustrated in Figure 2.

Construction Materials and Methods

New buildings in flood hazard areas must be constructed with materials and by methods to resist or minimize flood damage. The best and most common method is elevation of buildings above the base flood level. Other building methods

will help minimize damage when parts of a structure may be exposed to flooding.

- The structure should offer the least obstruction to floodflows, as when it is aligned parallel to the streamflow.
- Water-resistant building materials should be used. This could include water-resistant lumber, floor coverings, adhesives, and paints; masonry construction and finishes; and waterproof mechanical and electrical fittings. Water-absorbent materials such as gypsum board paneling should be avoided below flood levels.
- Structural walls of a building should be designed to withstand the lateral forces of floodwaters and the vertical or uplift forces from floodwaters and rising ground water levels.
- Footings and foundations should be at sufficient depth and on bearing soil to provide necessary lateral resistance to water pressure and should be able to resist vertical pressures.
- Utilities should be above flood levels or should be floodproofed and secured to prevent displacement due to water pressure. Control panels located above flood levels allow access during flooding. Controls for lower floors and basements may be installed separately to allow independent disconnection during flooding.
- Heating, air conditioning, and ventilating equipment is best protected when located on upper floors or the roof.
- Floor drains and other plumbing below the base flood level should be fitted with valves to prevent backflow of water that would damage the interior of the building.

Utilities

New and replacement water supply systems, sanitary sewer systems, and on-site waste disposal systems must be designed to minimize or eliminate infiltration of floodwaters. Sewage systems must also be designed to avoid causing contamination during flooding.

- Manhole covers should be above the base flood elevation or designed to minimize flood damage.
- Waste disposal facilities, including pumping stations, lagoons, and treatment plants, must be floodproofed. Dikes with adequate armor on the stream side may be necessary to protect waste treatment facilities located below the base flood elevation.
- On-site waste disposal and treatment systems such as septic tanks should be situated and constructed to avoid impairment due to flooding. This may be difficult, because on-site facilities may be substantially below the first floor level. Generally, inlets to or outlets from the septic tank should be equipped with check valves to prevent floodwaters from returning through the pipes. A mound system of waste disposal may have to be used to provide adequate subsurface drainage during flooding.

Subdivision Proposals

New subdivisions must protect utilities and ensure adequate drainage.

- Public utilities and facilities such as electrical, gas, water, and sewer sys-

tems should be located and constructed to minimize damage from floods.
- Electrical facilities should be above the base flood elevation.
- Gas, water, and sewer systems should be designed to withstand leakage or rupture during flooding.
- Building sites and streets should be designed to provide adequate drainage.

Base flood elevation data are required for subdivisions and proposed developments that contain 50 lots or 5 acres or more. If FEMA has not established base flood elevations for the proposed site, the community may generate the base flood elevation data or require the applicant to provide the data.

SPECIFIC STANDARDS

Specific standards are in addition to the general standards and are applicable where the base flood elevation has been established. Communities may wish to strengthen the elevation standards by requiring freeboard requirements above the base flood elevation. For example, a community may require the lowest floor to be one foot above the base flood elevation. Freeboard can be used as a margin of safety to compensate for unknown factors that may contribute to increased flood heights or in recognition of the one-foot rise permitted in determining the floodway boundary. The National Flood Insurance Program recognizes the benefits of increased lowest floor elevation by a reduced rate. This additional consideration is especially important when floodproofing a nonresidential structure. For example, the insurance rate is determined by subtracting one foot from the floodproofed elevation; a structure floodproofed to +2 feet above the base flood elevation would be rated as a structure with lowest floor at +1 foot.

Specific standards are discussed below.

Residential Structures

New construction and substantial improvement of any residential structure is required to have the lowest floor, including basement, elevated to or above base flood elevation.

Nonresidential Structures

New construction and substantial improvement of any commercial, industrial, or other nonresidential structure must have the lowest floor, including basement, elevated or floodproofed to or above the base flood elevation. Where floodproofing is used, a registered engineer or architect must certify that the methods used are in accordance with accepted standards.

Manufactured Homes

The specific elevation standards for manufactured home installations were revised in 1989. The previous rule that manufactured homes be elevated through use of fill or a specified piling foundation was unnecessarily restrictive. The present regulation requires that new manufactured home installations have the lowest floor elevated to or above the base flood elevation, but does not specify the technique to be used. Communities with "existing manufactured home parks or sub-

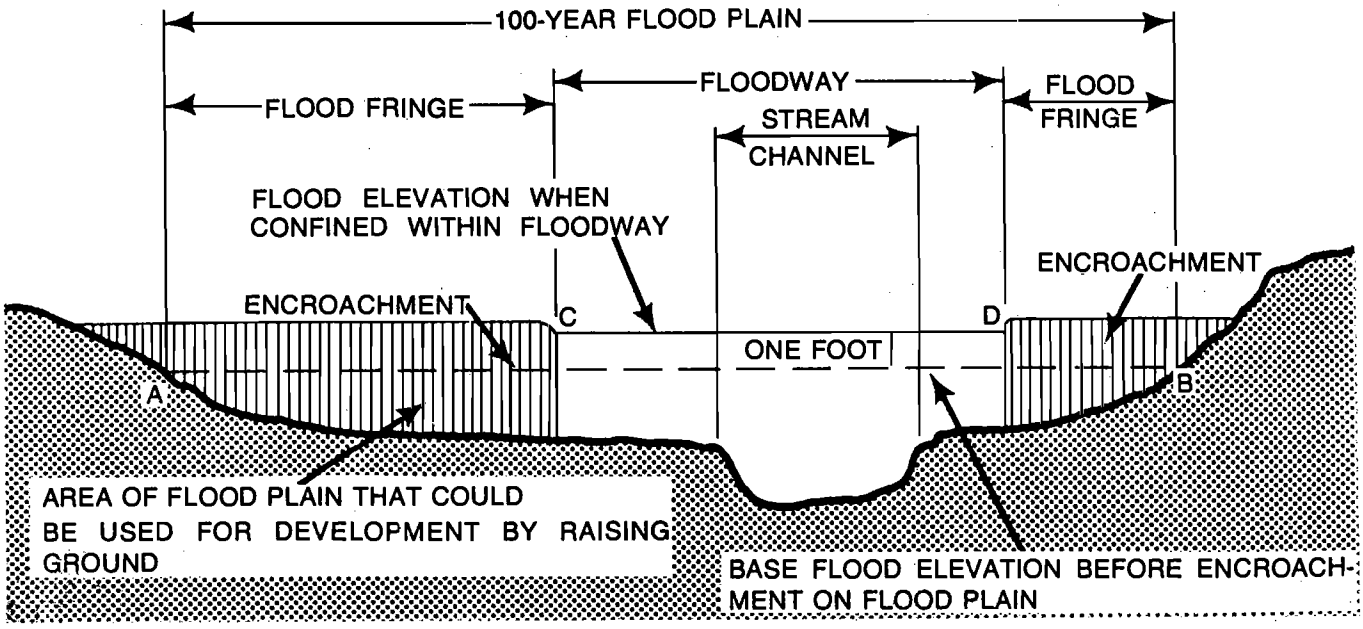


Figure 3.--100-Year Flood Plain

divisions" (as defined in NFIP Regulations, Section 59.1) have an additional option. On sites in existing manufactured home park or subdivision that have not previously suffered substantial damage from a flood, the elevation requirement is lowest floor at or above base flood elevation or the chassis 36 inches above grade.

Floodways

Regulating development in the floodway is important because of the possible depth and velocity of floodwaters and their potential to carry debris and cause erosion. The National Flood Insurance Program defines the floodway as the channel of a stream plus adjacent floodplain areas that must be reserved to discharge the base flood without cumulatively increasing the water surface (Figure 3). The program limits such increases to one foot, provided that hazardous velocities are not produced.

If FEMA has provided a Flood Boundary and Floodway Map, the community must:

- Prohibit encroachments, including fill, new construction, substantial improvements, and other development, unless a technical evaluation demonstrates that encroachments will not result in any increase in flood levels during a base flood discharge.

Communities may wish to adopt higher standards. For example, they might prohibit replacement of a demolished structure because absence of the struc-

ture could reduce flood hazard for other structures in the floodplain.

In areas where the base flood elevation has been determined but without a designated floodway, local administrators must, on a case-by-case basis, require developers in the floodplain to determine by hydraulic analysis whether their project (when combined with existing and future developments) will cause more than a one-foot increase in the base flood elevation. Floodway boundaries are generally determined by applying the "equal degree of encroachment rule", which requires that the quantity of floodwaters conveyed on both sides of the watercourse be reduced by an equal percentage when developing the encroached floodway boundary. In practice, the rule is not always followed because property owners are often not similarly situated. Many factors, including topography, existing development patterns, and comprehensive land use plans, may justify modifications to the rule. However, deviations must be carefully considered, since floodways based on this rule most easily satisfy the legal requirement to treat similarly situated people in a similar manner. Some set-back criteria may be an acceptable option.

Coastal High Hazard Areas

Areas adjacent to the ocean may be subject to higher than normal tides because of barometric pressure differentials, storm surges, and wind-driven waves; erosion that undermines building foundations; and battering by storm-driven debris. These areas, designated V-Zones on the Flood Insurance Rate Map, are defined as those portions of the coastal base floodplain that would be inundated by tidal surges with velocity wave action. Generally, a V-Zone indicates the inland extent of a 3-foot breaking wave, where the wave runup during the base flood decreases to less than 3 feet (Figure 4).

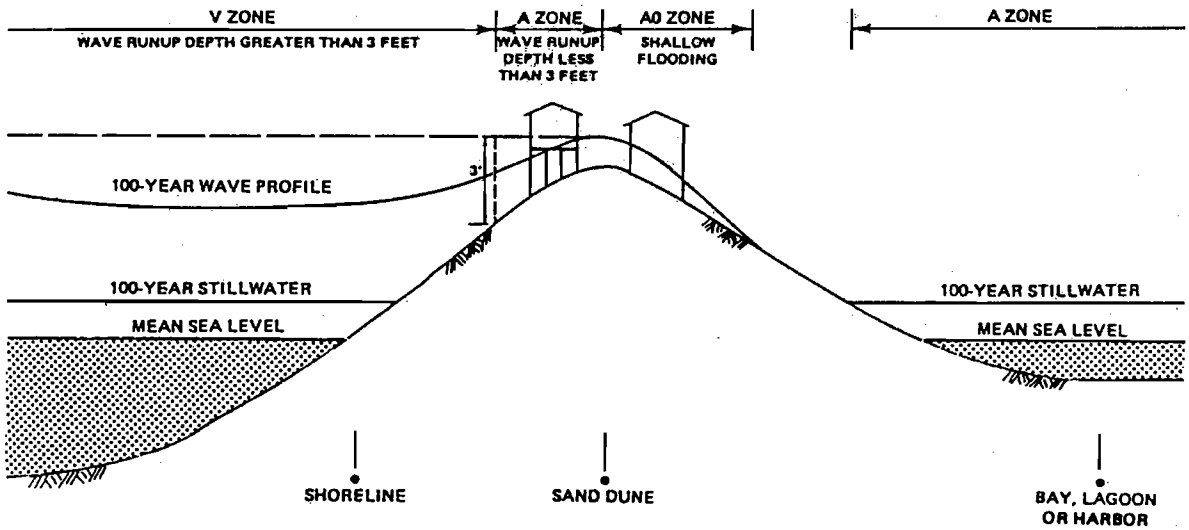


Figure 4.–Typical Transect Schematic

Because of the special hazards in locating in a V-Zone, the National Flood Insurance Program requires additional floodplain management measures. Communities with identified V-Zone areas must adopt regulations that provide for the following:

- New construction must be landward of mean high tide.
- New construction and substantial improvements to existing structures must be elevated on adequately anchored pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor is elevated to or above the base flood elevation (Figure 5).

In addition, the structure must be anchored to resist flotation, collapse, and lateral movement. A registered professional engineer or architect must certify that the design and methods of construc-

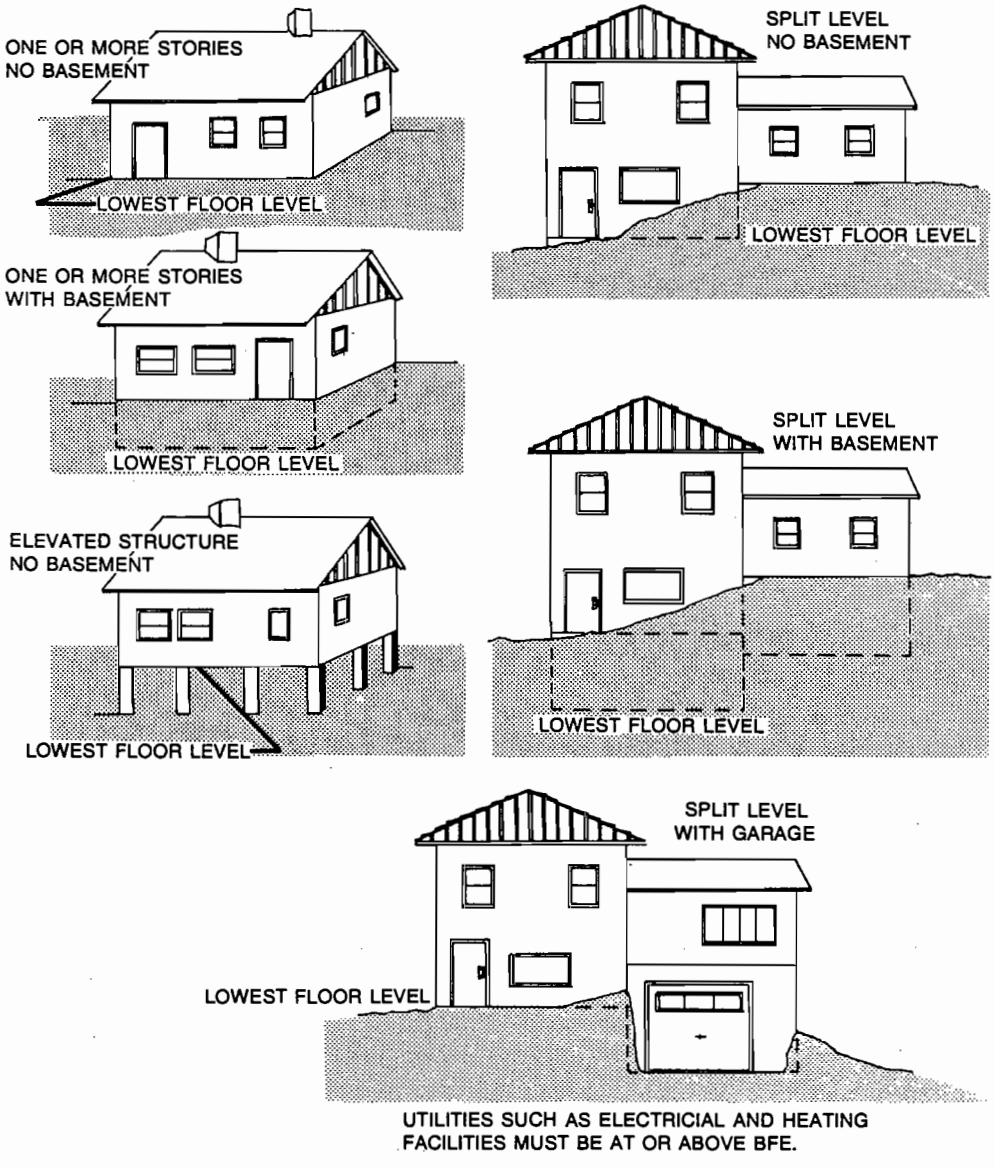


Figure 5.–Determining Lowest Floor Level

tion are in accordance with accepted standards. The space below the lowest floor must be free of obstruction or constructed with breakaway walls that will collapse under abnormally high tides or wind-driven water without jeopardizing the main structure.

- Use of landfill for structural support must be prohibited.
- Human alteration of sand dunes must be prohibited if it would increase potential flood damage.

Additional consideration should be given to setbacks for new construction. To avoid exposure to wind, waves, and debris during severe storms, dwellings should be placed inland of the primary dunes or beach ridge. Construction atop or in front of dunes has historically shown structural damage from storms. Dunes provide a natural shoreline defense against storm wave and water level attack and are often considered a nonstructural coastal protection method.

Substantial Improvements

Substantial improvement is defined as any repair, reconstruction, or improvement of a structure if the cost equals or exceeds half the market value of the structure before the improvement or repair is started (or, if the structure has been damaged and is being restored, before the damage occurred). Substantial improvement to structures can be an addition, a renovation, or both. For this definition, substantial improvement is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

Substantial improvement does not include improvement to comply with state or local health, sanitary, or safety code specifications solely necessary to ensure safe living conditions or alteration of a structure listed on the National Register of Historic Places or State Inventory of Historic Places.

ADDITIONS

When an addition is a substantial improvement, the administrator will probably interpret the regulation to apply only to the addition, and not to the entire structure. For example, a person adding rooms to a home would be required to elevate the floors of those rooms to or above the base flood level, but the entire structure would not have to be elevated. The disadvantage of using this interpretation relates to flood insurance premium rates. When a structure is substantially improved, the structure is considered a new "post-FIRM" structure, and actuarial rates would apply based upon the lowest floor elevation or the lowest flood-proofed elevation of the entire structure.

RENOVATIONS

When a substantial improvement is a renovation, the regulations apply to the entire structure. For example, if the work includes rewiring, new plumbing, siding, painting, or similar activities but does not include a change in exterior dimensions, the structure itself must be elevated so the lowest floor is at or above the base flood level.

PHASED IMPROVEMENTS

A loophole in the substantial improvement regulation is typified by the person who this month requests a permit for an improvement that costs less than half of market value, and next month (or next year) requests a permit to do additional work. While each individual permit represents less than a substantial improvement, the cumulative improvements over time certainly are substantial.

FEMA has no rule as to how these situations should be handled, so interpretation remains with the local administrator. A conservative and consistent approach is recommended. Each permit applicant should be made fully aware of the "substantial improvement" regulations at the time the first permit is requested. The administrator should record the number of permits granted per structure and the cumulative cost.

When the total equals or exceeds half the market value of the structure when the first improvement began, no more permits should be issued unless the entire structure is brought into compliance with the NFIP regulations.

CHAPTER 4

FLOODPLAIN ORDINANCE ADMINISTRATION

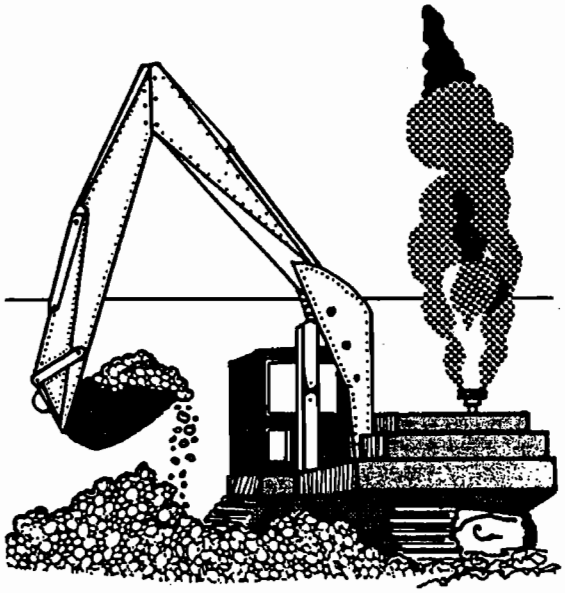
So far, this guidebook has provided information on the National Flood Insurance Program and the 1969 Texas Flood Control & Insurance Act. It has explained the Emergency and Regular Phases of the NFIP, described the floodplain information provided by FIA, and it has detailed the regulatory standards communities must meet to maintain participation in the program. But how does the flood insurance program actually work? What steps must a community take to ensure development in the floodplain is regulated?

This chapter answers these questions. It describes the development permit system that communities must implement in order to regulate development; and it discusses variances, enforcement, record keeping, and the local administrator.

DEVELOPMENT PERMIT SYSTEM

WHAT IT IS

The regulations of the NFIP, in section 60.3(b)(1), state that the community shall, "Require permits for all proposed construction and other developments including the placement of manufactured homes" within special flood hazard areas. In other words, no construction or development may take place in an identified flood hazard area without a permit from the community.



The community may issue a permit only if the proposed development meets the standards of the NFIP outlined in the previous chapter.

It is important to note that the concept of "development" goes beyond the traditional "building" permit. Whereas the building permit is concerned with buildings, the development permit includes buildings and alterations to landscape (such as excavation or use of fill) that would affect drainage patterns or the flood carrying capacity of the watercourse.

WHEN A PERMIT IS REQUIRED

A permit is required when building or enlarging a structure; placing a manufactured home; or mining, dredging, filling, grading, paving, excavating, or drilling within flood hazard areas. In other words–any structural or nonstructural activity that may affect flooding or flood damage must have a permit.

Specifically, all structural (buildings, manufactured homes, storage facilities, dams, dikes, etc.) projects need a permit. There is some latitude for nonstructural activities depending on their type, magnitude and location.

For example, a clearing or grading project that removes vegetation or pushes soil into the river may alter normal channel flow or increase flood heights - thus requiring a permit. On the other hand, a small picket fence is unlikely to affect flooding and wouldn't require a permit.

Whatever the case, communities must remember that any development that could possibly increase or alter the flood hazard requires a permit.

THE PERMIT APPLICATION

Anyone wishing to develop in the floodplain must obtain a permit application form from the local administrator, fill it out, and submit it for approval before beginning any development activities. A sample development permit application is in Appendix E. Communities may, however, adapt their existing permit systems to meet the NFIP requirements. Regardless of the form used, where applicable, the following information must be supplied on a permit application for floodplain development.

- A complete description of the proposed activity. Enough information must be included so that the local administrator can determine whether or not the proposed activity will be safe from flooding and whether or not it will increase flood hazards elsewhere. At a minimum there should be plans drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials drainage facilities; or any other landscape alterations.
- The National Geodetic Vertical Datum of 1979 (NGVD) elevation of the lowest floor (including the basement) of all proposed structures.
- The NGVD elevation to which any proposed nonresidential structures will be floodproofed.
- Certification by a registered professional engineer or architect that any floodproofing method to be used meets the NFIP floodproofing criteria.
- Base flood elevation data for subdivision plats, where it has been determined.
- A description of the extent to which a watercourse (stream, river, drainage ditch) will be altered or relocated.

REVIEWING THE PERMIT APPLICATION

Reviewing the permit application is the most important responsibility of the local administrator. A permit review checklist is found in Appendix F. Local administrators may use the checklist to

help them determine if the proposed project meets the criteria of the floodplain ordinance. Several factors must be taken into consideration when reviewing permit applications that apply to all situations, no matter what the proposed project. In addition, depending on the type of location of a project, special considerations must be included in the review procedure. The items a local administrator must consider for all cases (numbered 1 through 5) and for particular instances (listed under the special considerations) are outlined below:

Locate the Development

The initial item the local administrator must determine is whether or not the proposed development is in the special flood hazard area. If this is not obvious, the administrator should obtain the distance in the field between the proposed development site and one or more identifiable points (centerline of a street, a bridge, the river channel, etc.), then using the map scale, convert the distance from the identifiable point on the map to where the site is located to determine if it is in the special flood hazard area.

For example, in (Figure 6), if the local administrator knows that the proposed structure is 200 feet north of where the railroad intersects Lake Avenue and 25 feet east of 2nd street, he can then see that it will be located in the Special Flood Hazard area and must meet the requirements of the Floodplain Ordinance.

Determine if the Application is Complete

The local administrator cannot properly review an application if it is not complete. Consequently, make sure the application has a thorough description of the proposed development including the elevation of any structures, certification of any floodproofing methods, and base flood elevation data for a subdivision of 5 acres or 50 lots or more. If you don't have enough data to determine whether or not the development will be safe from flooding, ask the applicant for more information.

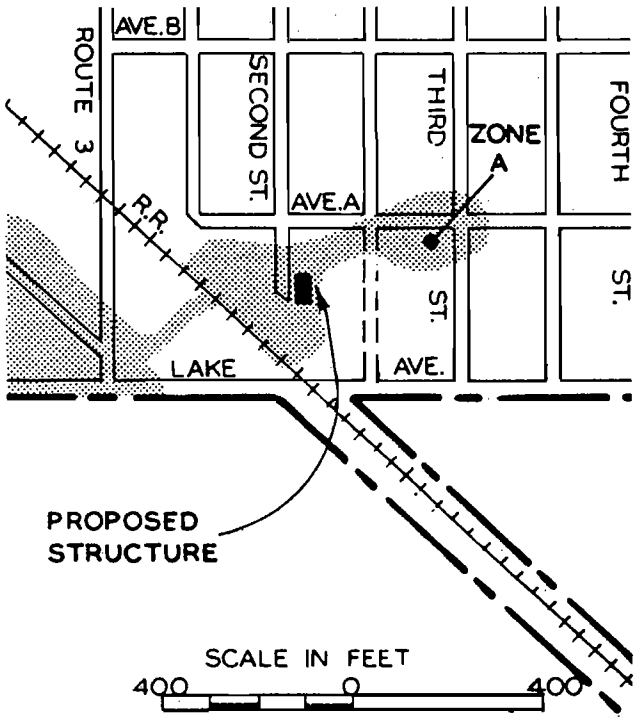


Figure 6.–Locating Site on FHBM

Additional Permits

The local administrator must require that any additional state, local or federal permits for the proposed project are acquired, if applicable. Besides the floodplain development permit, these permits may include Corps of Engineers. A Section 404 permit is needed to discharge dredged or fill materials into rivers and adjacent wetlands, and a Section 10 permit for any project that may affect the course, or location of the navigable capacity of a water body.

In communities that are not participating in the NFIP, the Texas Water Commission issues plan approval for levees and other such improvements along streams that are subject to flooding.

TWC also issues permits for impoundment dams which are constructed across the watercourses of the state, for wastewater, hazardous and industrial solid waste sites, and all facilities affecting water quality in all communities.

The Texas Department of Health permits all public water supply development systems and municipal sanitary landfills.

Determine the Base Flood Elevation (BFE)

In order to review a permit application the local administrator must know what the flood hazard (or base flood elevation) is at the development site. If the local administrator has a Flood Insurance Rate Map and the Flood Insurance Study, BFE data for the development site is readily available. If the FIA has not supplied the community with detailed technical data on the flood hazard, NFIP regulations state that the local administrator must use the best available information to review permits.

But where is this information available? There can be several sources: Reports from other federal or state agencies such as Flood Hazard Analyses from the Soil Conservation Service, Floodplain information or other reports from the Corps of Engineers, or studies done by the Texas Water Commission. The U.S. Geological Service may have data available as well. If there is no technical data available, the local administrator must use his judgement and be guided by the FHBM and by historical flood accounts described by newspaper articles and photos, or by high water marks on buildings, telephone poles, bridges, or other structures.

Once the local administrator has the flood hazard data available, by reviewing the description of the proposed project in relation to the flood hazard, he can then determine whether or not it will be safe from flooding. For example, if the FIRM shows a BFE of 930 FT NGVD and the permit application indicates the proposed structure will have its lowest floor built to an elevation of 927 FT NGVD, then it will be subject to three (3) feet of water during the base flood. The local administrator must not grant a permit for this structure unless the applicant agrees to elevate it to or above the base flood elevation. Or, suppose a proposed project with a basement is in a special flood hazard area on the Flood Hazard Boundary Map and, from the historical newspaper accounts, the local administrator knows that area of town suffers from street and basement flooding during rainstorms. In such a case, the administrator may issue a permit only if the structure is built without a basement.

Other Considerations

The local administrator must make sure the proposed activity meets the standards of the NFIP listed in the previous chapter. The standards address: anchoring requirements, construction materials and methods, utilities, subdivisions, encroachments, elevation of the lowest floor, and floodways. In reviewing an applica-

tion, the key to remember is that the proposed activity itself must be safe from flooding and it must not increase the flood hazard to other areas.

SPECIAL CONSIDERATIONS ON PERMIT REVIEW

FLOODWAYS

If a community has a regulatory floodway delineated on a Flood Boundary/ Floodway Map and the local administrator determines that the proposed development is located in the floodway, then a permit may not be issued unless the applicant can demonstrate that his development will not increase flood heights at all. Usually such development is limited to open space uses for recreation or agriculture. Structures existing in a floodway prior to the floodway identification are "grandfathered" in, and are not subject to NFIP requirements. Any substantial improvements (50% of the market value or more) to such structures, however, must be in compliance with the floodplain ordinance.

ALLOWABLE FLOODWAY USES

The only developments which may be permitted in the floodway are those which will not cause any increase in the BFE. Typically, these include:

1. Agriculture uses not involving structures.
2. Uses incidental to industrial or commercial structures such as loading areas, parking areas, and airport landing strips.
3. Private & public recreational uses, such as golf courses, driving ranges, picnic grounds, boat launching ramps, swimming areas, wildlife & nature preserves, fish hatcheries, target ranges, hunting & fishing areas, hiking & horseback riding trails.
4. Uses incidental to residential structures such as lawns, gardens, parking areas & play areas.
5. Development that an engineering analysis has determined will not increase flood heights at all.

WATERCOURSE ALTERATIONS

Whenever a local administrator reviews a development permit that includes a watercourse alteration (for example, realignment or diversion of a stream, ditch or river), (Figure 7) he must be satisfied that the flow carrying capacity of the watercourse will not be diminished. In order to do this, the permit applicant must supply a thorough description (a set of plans and calculations) of the proposed alteration and its effect on flows.

If the administrator does not have the technical background to review such descriptions, he must rely on outside, professional assistance. Basic items the administrator should look for, however, may include:

- Determination that the hydraulic capacity of the watercourse will be the same or greater after the alteration.

- Maintenance of the flow carrying capacity of the watercourse. For example, if a new road is crossing a stream or coulee, culverts, under the road must not place an undue constriction on the channel, causing flood waters to back up.

- Maintenance of channel stability. Several factors relating to channel stability can influence or change a watercourse. For example, the alignment and grade of a channel or the channel coverage (concrete, clay vegetation, etc.) can affect the flow velocity. Steeper slopes and smooth surfaces may increase velocity, which in turn may cause erosion at the channel outlet or may result in increased flood peaks. New curves in a channel may result in debris settling and, in time, reduce the channel capacity.

Generally, an applicant should provide the administrator with a topographic map of the area in question, a comparison of the existing and proposed channel capacity, a description of the proposed alteration, land use of adjacent properties, description of any obstructions, and photos of the area.

NFIP regulations require the local administrator to notify adjacent communities of any proposed watercourse alterations. It would also be advisable to notify the Texas Water Commission of proposed alterations. Neighboring local governments all have an interest in water resources and they must have the opportunity to review and comment on activities that may affect them.

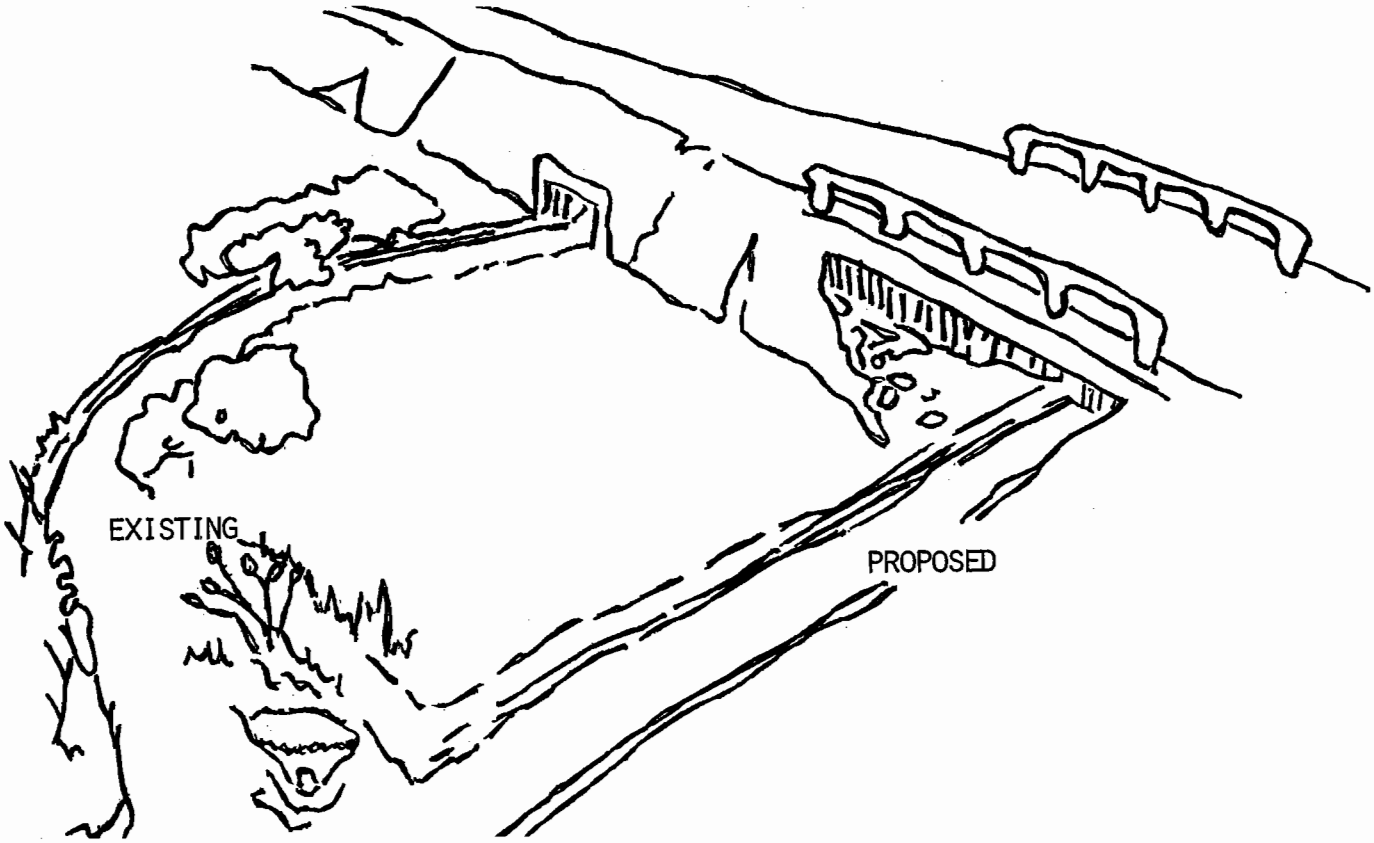


Figure 7.--Watercourse Alteration Through a Roadbed

If the watercourse alteration is significant and changes the watercourse sufficiently (the basis for the Flood Insurance Study), FEMA wants to be notified of these physical changes.

NONRESIDENTIAL STRUCTURES

NFIP regulations allow for nonresidential buildings (commercial structures, warehouse, etc.) to be floodproofed rather than elevated to provide protection from the Base Flood. Floodpoofing consists of designing a structure in such a way that all parts of the structure located below the Base Flood elevation are water-tight and resistant to flood damage. One method of floodproofing is known as dry flood-proofing. This method is described below and illustrated in (Figure 8).

Dry floodproofing consists of the actual design of a structure to provide protection from the Base Flood. The structure must be designed to prevent seepage, collapse or cracking of basement walls, buckling of basement floors and back-up water from sewer lines. Walls must be capable of withstanding hydrostatic pressure and all openings must be located one foot above the base blood elevation. Water proof seals and paints should be used on exterior surfaces exposed to the base flood.

Another acceptable method of floodproofing nonresidential structures under the NFIP is called human intervention. This involves the use of door and window shields as temporary protection from the Base Flood. This method should be used only where adequate flood warning time or devices are present. Extreme caution must be used in designing this floodproofing measure. Generally, door and window

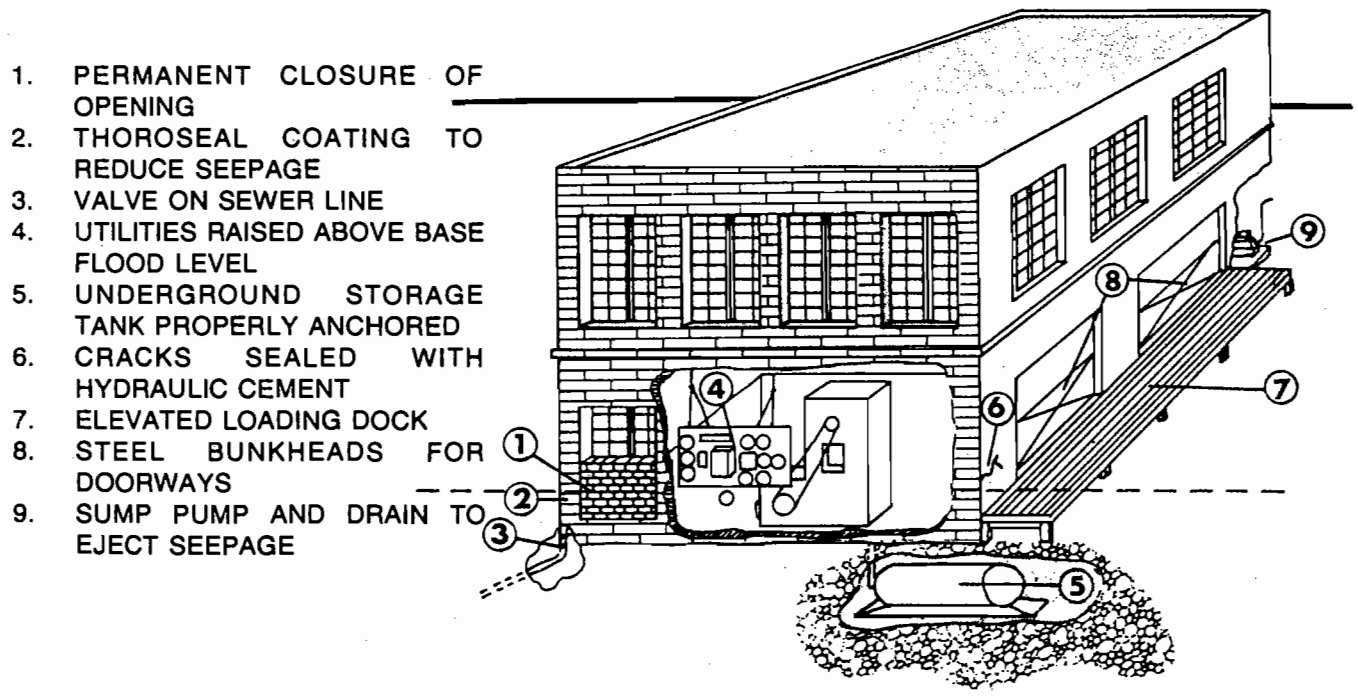


Figure 8.–Floodproofed Commercial Structure

shields are not effective for flood depths in excess of three (3) feet, and may cause more damage to older structures than they prevent.

Certification Requirements: Any time a nonresidential structure is to be floodproofed, the design of the structure must be certified by a registered professional engineer or architect that it will, indeed, provide protection from the Base Flood. This certification should be submitted with the permit application.

RESIDENTIAL STRUCTURES

NFIP regulations do not normally accept floodproofing of residential structures. They must be elevated to or above the base flood elevation on fill, foundation or on piers or columns. These methods are illustrated in (Figure 9). In areas where basements are commonplace, this particular standard of the NFIP is unpopular and can be difficult to enforce.One alternative a community may pursue is to receive an "exception" to this standard from the Federal Insurance Administration. Such exceptions are granted, however, only if the standard may "cause severe hardship and gross inequity for a particular community." Consequently, a community interested in receiving an exception to the rules must supply sufficient environmental, economic, hydrologic and other technical data to the FIA to warrant the exception.

Certification Requirements: NFIP regulations require a community to obtain

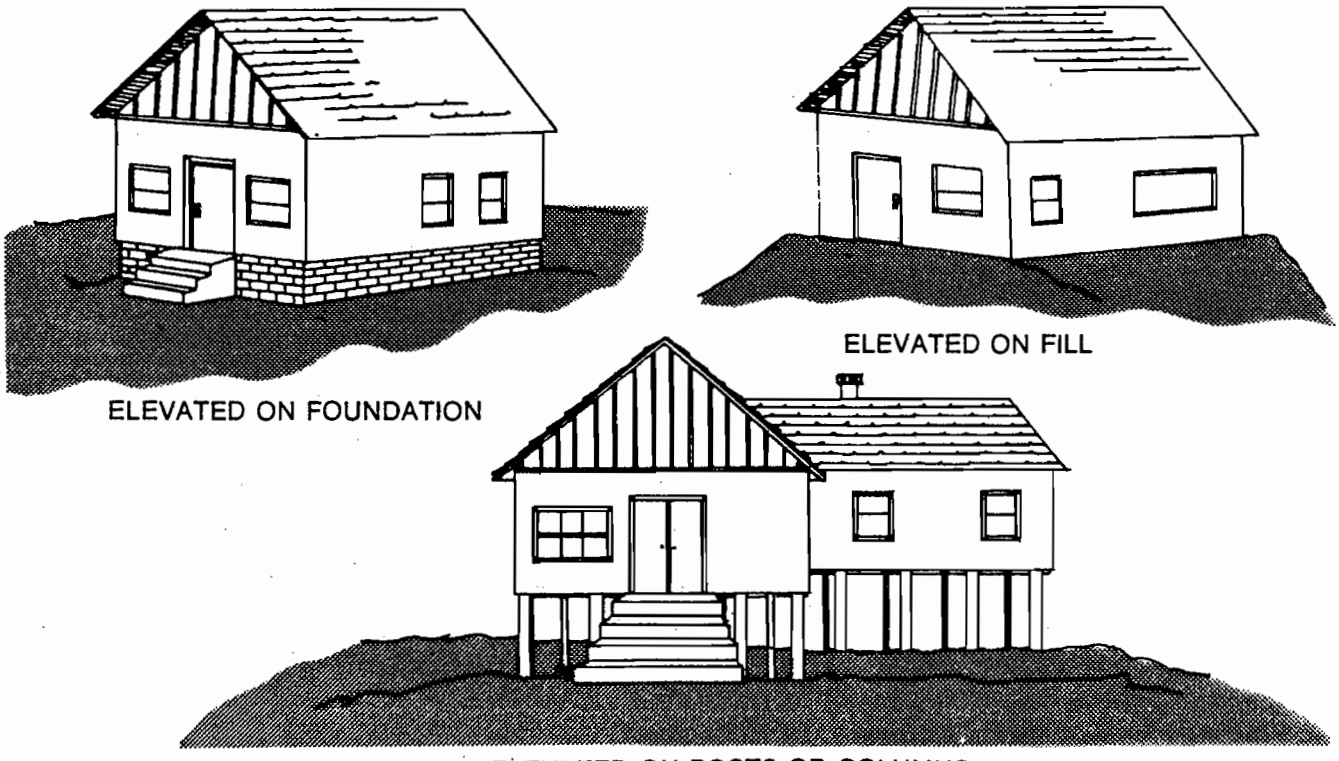


Figure 9.–Elevated Residential Structures

and maintain a record of the elevation of the lowest floor of all new or substantially improved structures in the flood hazard area. To comply with this regulation, communities must require the owner or developer of such structures to provide an "Elevation Certification" once the structure is completed.

SUBDIVISIONS

NFIP regulations require that developers supply Base Flood elevation data for their projects which exceed 50 lots or 5 acres. The intent of this requirement is to obtain base flood elevation data which can be used by the community for requiring protection of new construction to the base-flood (100-year) level. Thus, any elevation data used to satisfy this requirement will in turn be the basis of elevation and floodproofing standards for structural development which takes place in the subdivision.

Accordingly, the elevation data provided by the applicant for subdivision plat approval should be consistent with the scope and scale of his proposal.

For instance, if an applicant proposed to subdivide 20 acres of rural land into 4 equal parcels and no immediate construction was planned, then only the most elementary elevation data would be necessary. However, if a developer's proposal was for 20 acres of land to be divided into 80 lots, then the developer should obtain or develop data which approximates the accuracy of the Flood Insurance Study.

In determining how sophisticated an applicant's base flood elevation data should be, the local administrator should ask questions such as the following:

- How large and complex is the proposed subdivision?
- What percentage of the subdivision's area is flood-prone?
- Is the flood-prone area being used for structural development or is it being reserved for open space or parking?

Answering these questions allows the local administrator to determine the extent of the flood hazard in the subdivision and then he can decide how detailed the applicant's base flood elevation should be.

MANUFACTURED HOMES

The NFIP Regulations provide some optional standards for the placement or substantial improvement of manufactured homes. In most situations a permit to place or substantially improve a manufactured home in an A1-30, AH, AE, V, V1-30, or VE Zone will require elevation on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation, collapse and lateral movement.

However, if the community has an "existing manufactured home park or subdivision", then the community may choose to require elevation of the lowest floor to or above the base flood elevation or require elevation of the chassis to at least

36 inches above grade, whichever is lower. To qualify for the 36 inch above grade option, the site has to be in an "existing manufactured home park or subdivision" (as defined in NFIP Regulations, Section 59.1 and in the local floodplain management ordinance) and a manufactured home must not have previously suffered substantial damage at the site as the result of a flood.

In reviewing permits for completing new manufactured home parks or additions, or permits for manufactured homes placed in a flood hazard area which are not in a manufactured home park or subdivision, the local administrator must require that the manufactured homes will be placed so that the lowest floor will be at or above the BFE. Adequate drainage must also be provided. If BFE data is not available, these homes must meet the anchoring (tie-down) requirements of the NFIP. A manufactured home that is permanently anchored to a foundation, in a manner similar to the way a house is anchored (bolted to a poured concrete or block foundation that extends below the frost line), meets the anchoring requirements. Manufactured homes placed on blocks, however, do not have adequate protection from flooding and must be tied down.

NFIP regulations also require flood prone manufactured home parks to have an established evacuation plan.

AO ZONES

AO Zones are areas subject to shallow flooding (1 to 3 feet) resulting from "sheet flooding." Because no base flood elevation is provided for AO Zones, NFIP regulations require that residential structures in these areas must have the lowest floor

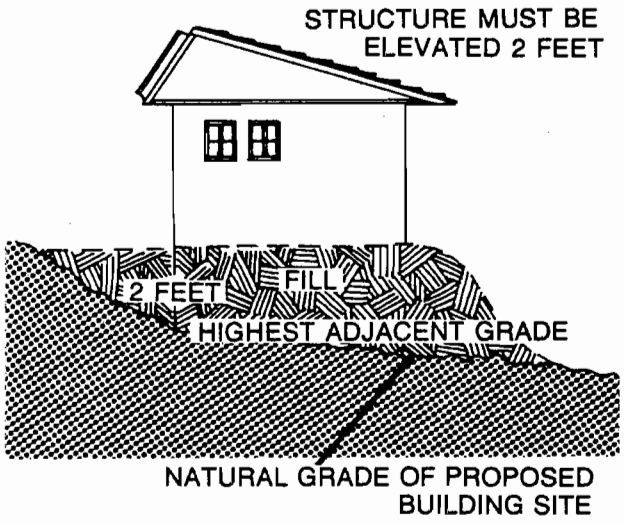


Figure 10.--Elevation in an AO Zone

(including the basement) elevated above the highest adjacent grade, to the depth number specified on the FIRM. Nonresidential structures must be elevated or floodproofed above the highest adjacent grade, to the depth number specified on the FIRM. If no depth number is indicated, a two foot flood protection level is required.

The highest adjacent grade means the highest natural elevation of the ground surface, prior to construction, next to the proposed walls of a structure. Figure 10 illustrates how a structure would need to be elevated in a Zone AO, Depth 2.

ACTING ON THE PERMIT APPLICATION

When a local administrator completes his review of a development permit application, he has three options for action. He may:

Approve the Permit Application

If a permit application describes a development that will be built in compliance with the floodplain ordinance, the local administrator may give his approval simply by marking the appropriate box on the application form, signing it, and providing a copy to the applicant.

Conditionally Approve the Permit

If the permit application describes a development that would be in violation of the floodplain ordinance, the local administrator may conditionally approve the application, if the applicant will modify his development. For example, if the proposed development is a house with a basement in an unnumbered A-Zone, the local administrator may issue a permit only if the house is built without a basement and the lowest floor meets the elevation requirements.

In cases where simple modifications will bring an application into compliance with the ordinance, the local administrator should work with the applicant to iron out the problems with the development.

Deny the Permit

When a permit application is in violation of the flood plain ordinance, the local administrator must deny the permit and explain to the applicant why it was denied.

APPLICANT'S OPTIONS

If an applicant is denied a permit, he has three options.

1. He may redesign his development so that it meets the standards of the NFIP; or

2. If he feels the administrator is in error, he may appeal the decision to the local governing body; or

3. If he feels the ordinance places an undue hardship on his property, he may request a variance to the ordinance.

VARIANCES

A variance is a waiver of one or more of the specific standards required in ordinances. In regard to the flood plain ordinance, variance requests should be considered very carefully.

A variance represents a community's approval to set aside floodplain regulations that were adopted to reduce loss of life and property damages due to flood. While the impact of a single variance on a flood hazard may not be significant, the cumulative impact of several variances may be severe.

If the developer requests a variance, however, the community should have a consistent and fair policy to deal with such requests.

Generally, variances may be granted only upon:

- a showing of good and sufficient cause;
- a determination that failure to grant a variance would result in exceptional hardship to the applicant; and
- a determination that the granting of the variance will not result in increased flood hazards elsewhere.

Administrative Responsibilities

Regarding variances, NFIP regulations list two important documentation requirements:

1. The granting of a variance does not lessen or waive any insurance premium rates. Consequently, when a variance is granted, the local administrator must provide written notification to the applicant that a project granted a variance is not exempt from the insurance requirements. In some instances, a variance may result in increased insurance premium rates that could go as high as $25 per $100 of coverage.

2. Any community granting a variance must maintain a record of all variance actions. This would include the justification for granting the variance, a record of the variance proceedings and a copy of the written notification referred to above.

ENFORCEMENT

A floodplain ordinance cannot effectively reduce the severity of flood damages unless it is properly enforced.

Adequate, uniform, and fair enforcement requires two things:

1. All new development or substantial improvements to existing development must have a permit.

2. All development with a permit must be built to the standards of the NFIP and the State of Texas.

Communities need to establish a procedure to ensure these two requirements are met. For example, the best way to ensure the first requirement is to have a PERMIT form displayed at the development site in full view. Such a form could be brightly colored, so it is easily seen. It should be printed on durable waterproof cardboard to withstand the weather during the construction period. When construction is taking place without a permit, local officials or neighbors can easily report such occurrences to the local administrator.

Communities can ensure the development is actually being built to proper standards by having the local administrator make periodic inspections during the construction period. Such inspections should be documented in the project file.

Communities may also consider establishing a "Certificate of Occupancy" system which would prohibit anyone from occupying a new structure without it first being inspected to ensure it meets all community building codes, including the floodplain ordinance. Remember, before a Certificate can be issued in the flood hazard area, a statement must be submitted by a registered engineer, architect, or surveyor certifying the lowest floor or floodproofing elevation.

Violations

If a local administrator becomes aware that development is occurring in a floodplain without a permit, or contrary to the permitted plans, he should consult with the community's attorney. Together, they should try to persuade the developer to comply with the floodplain ordinance. If the developer refuses to comply the attorney must take legal action.

Enforcement of the floodplain ordinance must not be taken lightly. Communities that do not strictly maintain a permit system, that grant variances regularly or that are lax in their enforcement responsibilities violate the agreement they have with the National Flood Insurance Program. Negligence on the part of the community cannot be tolerated. The consequences of non-compliance for communities participating in the NFIP are listed below.

PENALTIES FOR NONCOMPLIANCE

Communities opting not to participate in the National Flood Insurance Program (NFIP) or communities that are suspended from the NFIP for not enforcing an effective floodplain ordinance are subject to the following consequences:

1. Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.

2. Federal agencies may not provide grants or loans for insurable buildings in identified special flood hazard areas of communities not participating in the NFIP. This includes agencies such as Housing and Urban Development, Small Business Administration and the Economic Development Administration.

3. No Federal mortgage insurance may be provided in identified flood hazard areas. This includes FHA, VA, and Farmers Home Administration.

4. In the event of a federally declared flood disaster, no federal or state disaster assistance would be made available to insurable structures in identified flood hazard areas of nonparticipating communities.

5. Actuarial insurance rates go into effect when the FIA establishes base flood elevation data regardless of whether or not a community participates in the program. Lacking a local ordinance, unsafe construction today may be prohibitively expensive, and therefore unsalable, should the community decide to participate or reenter the NFIP. (The purchase of flood insurance is required by lending institutions when granting loans in flood hazard areas of participating communities. Actuarial rates may make the flood insurance very expensive - as much as $25/$100 of coverage).

Reasons a community may want to reestablish eligibility in the NFIP include:

- New legislative body or inclination of such a body.
- Larger share of mortgage market through FHA, VA, Farmers Home Administration.
- Federal grant or loan for particular project.
- A major disaster, triggering need for disaster aid.
- Changed political pressures.

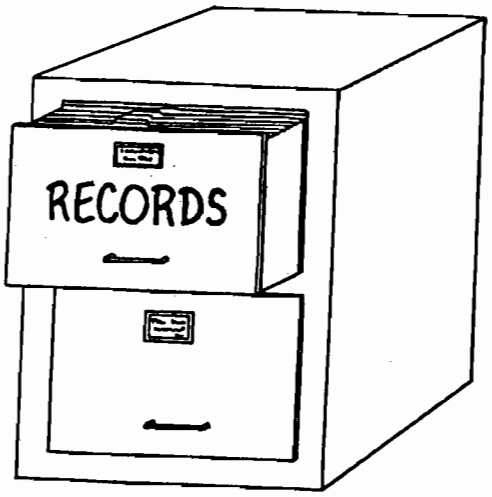
6. Finally local governing bodies may be susceptible to some form of liability by not participating in the NFIP because their action: (1) denies the ability of its citizens to purchase flood insurance, and (2) does not take positive steps to reduce the exposure of life and property to flood damages in the face of the authoritative scientific and technical data.

RECORD KEEPING

Record keeping is an extremely important part of a community's responsibility when participating in the NFIP. Specifically, the following records must be kept on file and open for public use.

1. A complete and up-to-date copy of the floodplain ordinance, the flood map (FHBM or FIRM), and the Flood Insurance Study (FIS). If a FIS has not been completed, the community should obtain and maintain the best flood hazard data available for the area and use it in regulating floodplain development.

2. NFIP regulations specifically require that communities obtain and maintain the elevation of the lowest floor (including the basement) of all new or substantially improved structures in the Special Flood Hazard Area. For floodproofed structures, the elevation to which they have been floodproofed must be obtained and recorded. Local administrators must require developers to complete an Elevation Certification to meet the NFIP requirement.



3. A project file should be kept for each development permit application. This file should contain:

   - A copy of the permit application;
   - A copy of the permit review checklist;
   - Copies of all pertinent correspondence relating to the project;
   - Documentation of inspections of the development;
   - Base flood elevation data for subdivisions of 5 acres, 50 lots or larger;
   - Pre and post construction certification forms for floodproofing and post construction certification forms indicating the lowest floor elevation of all structures;

4. A file should be kept for the Biennial Reports that must be submitted to the Federal Emergency Management Agency every year. The local administrator may want to keep the following information in this file:

   - Copies of previous years' reports;
   - A running total of permits and/or variances granted in the flood hazard area;
   - Maps of new annexations or other boundary changes;

- Census data;
- Record of any major natural or man-made changes affecting flooding patterns.

The Biennial Report will be easy to complete if this information is readily available in one place.

LOCAL ADMINISTRATOR RESPONSIBILITIES

NFIP regulations, in Section 59.22-(b)(1), require a community to designate an official with the responsibilities, authority and means to implement the ordinance they have adopted in compliance with the NFIP. The designation of an administrator is incorporated into the text of the local floodplain management ordinance.

Fair administration is the key to a successful permit system. To ensure fair administration, the person selected as the administrator should be technically qualified (with some knowledge of construction) and should understand the NFIP. He must also have the support of the local governing body.

Often times, particularly in small communities, the position of floodplain administrator is part time and the duties are added to an official's other responsibilities such as the building inspector, zoning administrator, auditor or clerk. The governing board must see to it that the floodplain administrator has the cooperation and support of all other community officials and departments in implementing the floodplain ordinance.

The local administrator's job is not an easy one. If he has questions or problems, technical assistance is available from the Texas Water Commission. The phone number and address are found in Appendix C.

The duties of the local floodplain ordinance administrator are summarized below.

Development Permit Administration

The local administrator is responsible for all aspects of the development permit process, including:

- Making permit application forms available to prospective developers.
- Reviewing all permits to determine whether or not they are in compliance with the ordinance.
- When the FIA has not provided Base Flood Elevation data, the local administrator must obtain the best available data from other sources to use in reviewing permits.
- Approve, conditionally approve or deny all permit applications.
- Follow-up inspections on all permits granted.
- Initiate enforcement proceedings necessitated by ordinance violations.

Obtain and Maintain Information

The local administrator must obtain and maintain all the information described in the record keeping section discussed earlier in this chapter.

Watercourse Alteration Notification

If a development permit application proposes a watercourse (stream, river, drainage ditch) alteration, the local administrator must notify adjacent communities of the proposed action. Such alterations must also be explained to the Federal Insurance Administration in the Biennial Report.

Interpretation of Map Boundaries

When there appears to be a conflict between the boundary on the flood map issued by FIA and actual field conditions, the local administrator must make interpretations as to the exact boundaries of the flood hazard area. The local administrator does not, however, have to determine a particular structure's location on the map for flood insurance purchase requirements of lending institutions. That decision rests with the lender.

CHAPTER 5

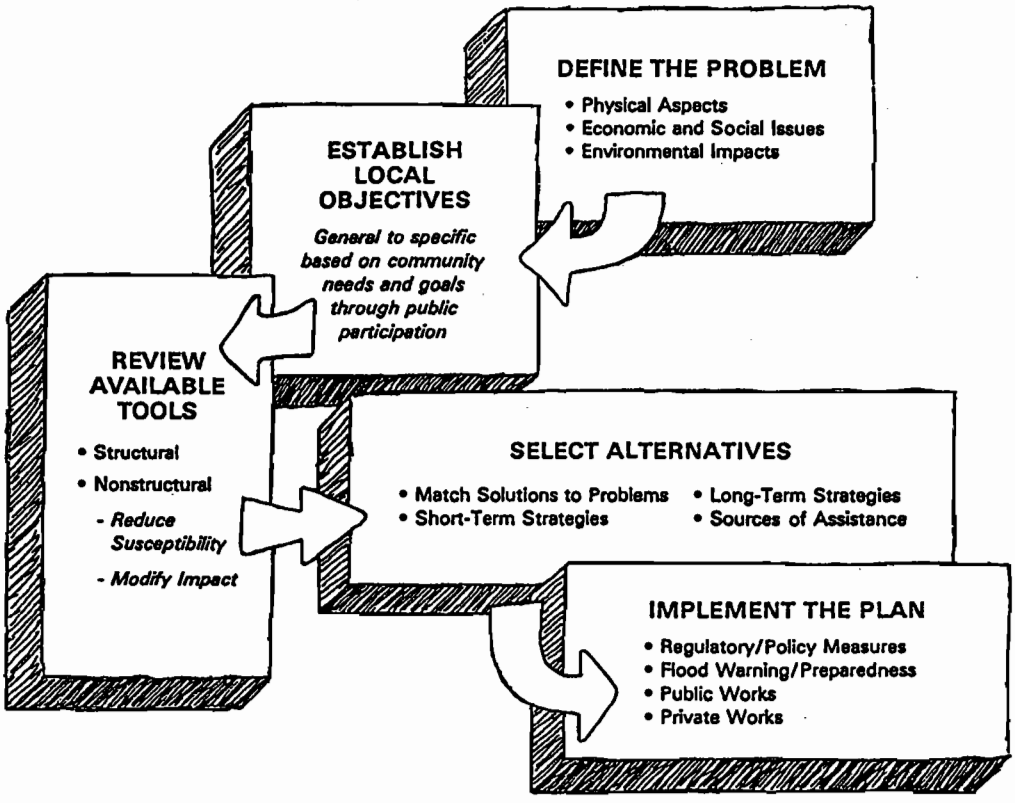
PLANNING TO REDUCE FLOOD DAMAGES

INTRODUCTION

Flooding is this State's major natural disaster. Between 1979 and 1990, 17 Presidential Disasters were declared in the state as a result of floods. Damages to public and private property in that period exceeded one billion dollars. Flooding cannot be eliminated. The damages resulting from floods, however, can be reduced. In order to do so, communities must develop a comprehensive plan for flood hazard mitigation that considers both structural and nonstructural measures.

Flood hazard mitigation is defined as a management strategy that reduces the severity of the effects of a flood disaster. The strategy involves actions which reduce exposure to flooding; which reduce susceptibility to flood damages; and which reduce the impact of damages when a flood does occur. Flood hazard mitigation is a comprehensive approach to solving flooding problems.

Local governments have the best opportunity to implement flood mitigation plans for their communities. They are



close to the problem and have the authority (and responsibility) to carry out solutions to those problems. This document provides a brief review of the process a community can follow to develop a flood hazard mitigation plan. It also describes some of the methods a community can use to reduce future flood damages. The document is divided into five sections:

1) Defining the Problem
2) Establishing Objectives
3) Tools Available
4) Selecting Alternatives
5) Implementation: Making It Work

DEFINING THE PROBLEM

Any approach to flood hazard mitigation planning should begin with an evaluation of the extent to which a flood hazard exists and how those hazards affect the community. The evaluation should address the physical aspects of both the floodplain and the flood itself. It should take into account the economic and social issues associated with flooding, and the environmental values of flooding and floodplains.

PHYSICAL ASPECTS

It is important to obtain as much information as possible on flooding relative to its source and causes; its area and depth of inundation; and such characteristics as frequency, speed of onset, and duration. Information on these physical aspects of a flood is sometimes available from a federal agency or the Texas Water Commission in the form of a floodplain study which delineates floodplain boundaries and lists flood elevations.

When detailed technical data on flooding isn't available, flood problems can be described by historical news accounts or by long time residents. This available data can be used to begin to define flood problems in an area.

Information on the floodplain can be obtained locally by actually conducting a survey of floodplain areas. Zoning maps and land-use plans can also be a good source of information for determining floodplain use. In order to have a good understanding of flooding problems, communities should have complete data regarding the type, condition, and extent of floodplain development; the potential for future development; and the status of any existing flood control structure such as a dam or levee.

ECONOMIC AND SOCIAL ISSUES

Two issues to be considered in defining flood problems and developing a flood hazard mitigation plan are the economic role of floodplain lands and the social effects of flooding.

Generally, floodplains are used for any number of purposes including agricul-

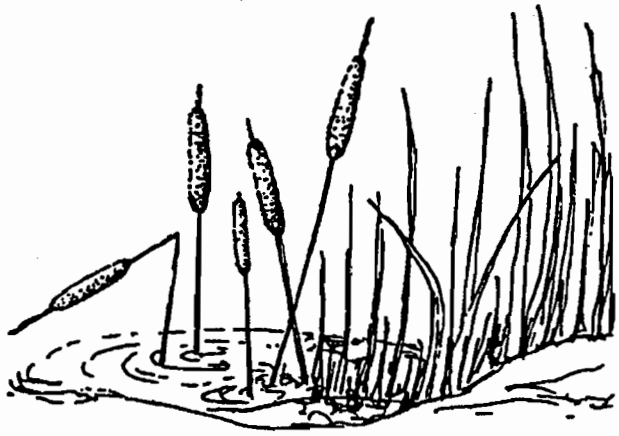
ture; open space; recreation; and residential, commercial, or industrial development. Some of these may be more compatible with existing flooding problems. Others, however, may be of more value to the community through the form of taxes or increased property values. Any analysis of a community flood problem must include an estimate of the costs and benefits of existing or proposed land uses.

The nature and extent of economic issues can be understood by gathering information such as property tax bases, market values, and building costs in floodplain areas. This type of information can be compared against the cost of providing services and utilities such as streets, water, and sewer, and the cost of replacing or repairing those facilities if flood damaged.

The same kind of analysis should be made of the social impacts associated with flooding problems. For example, housing located in the floodplain may be providing needed residences for low income families. At the same time, however, that housing may require protection during flooding or replacement if flood damage is very severe. Flooding may also present employment problems in two ways:

1. Floodplain sites may not be suitable for businesses with employment opportunities. Restriction of economic expansion means jobs will be foregone.

2. Flooding or flood damage can force businesses to close, causing unemployment hardships until the business reopens.



ENVIRONMENTAL ISSUES

Floodplains have many environmental values. They can provide recreation areas, open space, or fish and wildlife habitat. They are often the location of historic sites. Floodplains can serve to lessen the potential destructiveness of floods. They contribute to:

1. moderation of flood levels by acting as natural retention and storage areas;

2. maintenance of water quality by serving as a deposition for sediment, debris, or chemical impurities carried by floodwaters; and

3. protection against erosion since floodplain vegetation can stabilize land due to its tendency to trap sediment and debris.

In defining the problems created by flooding, a community should evaluate the environmental uses of floodplains. Benefits gained through flood control projects might be offset by environmental losses.

ESTABLISHING LOCAL OBJECTIVES

Once a flooding problem is well-defined with good technical data regarding the flood hazard itself and with consideration given to the related economic, social, and environmental issues, a community can take the next step in developing a flood hazard mitigation plan: establishing objectives.

In very general terms, the overall goal of any flood hazard mitigation program is to reduce future flood damages. This goal can be broken down into some general objectives:

- Protecting a new development from flood damage.
- Protecting existing development from flood damage.
- Reducing the impact of damages where flooding problems cannot be eliminated.
- Preserving or restoring natural floodplain values.
- Combining flood loss reduction efforts with other community needs like water supply or recreation facilities.

These general objectives must be further refined to a community's particular situation. For example, a community with a fully developed floodplain might want to tailor its flood hazard mitigation objectives to protect existing development by extending a levee system. Or, it might want to set an objective to try to regain some of the lost environmental values of the floodplain through an aggressive acquisition/relocation program. On the other hand, communities with open floodplains may consider protecting new development a priority for the flood hazard mitigation plan.

Before a flood hazard mitigation program is implemented, a community should look at alternative scenarios for programs with varying degrees of flood control. The scenarios can match community goals with community economic situations to establish the type and degree of floodplain control desired. A community should review both the advantages and disadvantages of any approach to floodplain management, and carefully weigh the benefits of reduced flood damages against the costs of providing flood protection. At the same time, the community must keep in mind nature's need to use floodplain areas to carry excess flood waters.

PUBLIC PARTICIPATION

The process of establishing objectives is highly individual and is unique to each community. Any objectives selected should reflect the needs and desires of the community. For this reason public participation is essential in developing a successful flood hazard mitigation program. A strong public participation program provides a means to: gather input from citizens to identify objectives and needs; inform the public of flooding problems and the planning process; and evaluate the acceptability of various solutions identified to reduce future flood damages.

A public participation program should include methods to encourage and facili-

tate input from all sectors of the community including floodplain residents, developers, realtors, engineers, planners, civic groups, disaster coordinators, and representatives from the business community. Techniques used to acquire input can involve news releases, informational public meetings, formal hearings, surveys, brochures, reports, or formation of committees or neighborhood groups.

While it is important that public involvement extend throughout the hazard mitigation planning process, it is particularly critical during the stage of setting objectives. The objectives should be carefully scrutinized, debated, and revised as necessary because they form the basis for a plan that will guide the implementation of flood hazard reduction measures. Care should be given to ensure that all affected interests have had an opportunity to be heard, and that any conflicts between flood mitigation objectives and those of other authorities or community programs are reconciled. This step is especially important. For example, if a community chooses an objective that does not meet the Federal Emergency Management Agency's minimum development criteria of the flood insurance program, then certain sanctions may be invoked on the community. Or, if an objective like, "Promote recreational uses of flood prone areas" is selected without input and consent from the local parks department, meeting that objective could prove difficult, if not impossible.

Each objective chosen for a hazard mitigation plan must be well thought out. The objectives must balance the needs of the community and those of nature to meet the overall goal of reduced flood damages.

TOOLS AVAILABLE

With objectives firmly established, a community's next step in the hazard mitigation planning process is to review the tools or methods available to meet those objectives. This section describes many of these tools. Essentially there are two major approaches a community can use to reduce or prevent future flood damages: structural and nonstructural.

STRUCTURAL MEASURES

Traditional response to flooding problems has been through structural flood control projects such as dams or levees. These types of structural works attempt to control flood waters. While they can be effective, structural measures often are very expensive, provide a false sense of security, and encourage, rather than discourage, development in flood prone areas. For these reasons, structural methods of reducing flood damages normally can be only a partial solution to flooding problems.

Dams and Reservoirs

Flood protection can be achieved by providing reservoirs to retard or delay excessive runoff for the purpose of reducing flood heights. The function of reservoirs is to store water when streamflow is excessive and to release it gradually after the threat of flooding has passed.

Some reservoirs have controlled outlets that release the flood waters after the peak flow has occurred. These storage areas are designed primarily to relieve flood problems downstream, though can

be multipurpose, and used for increasing water supply, hydropower generation, or recreation.

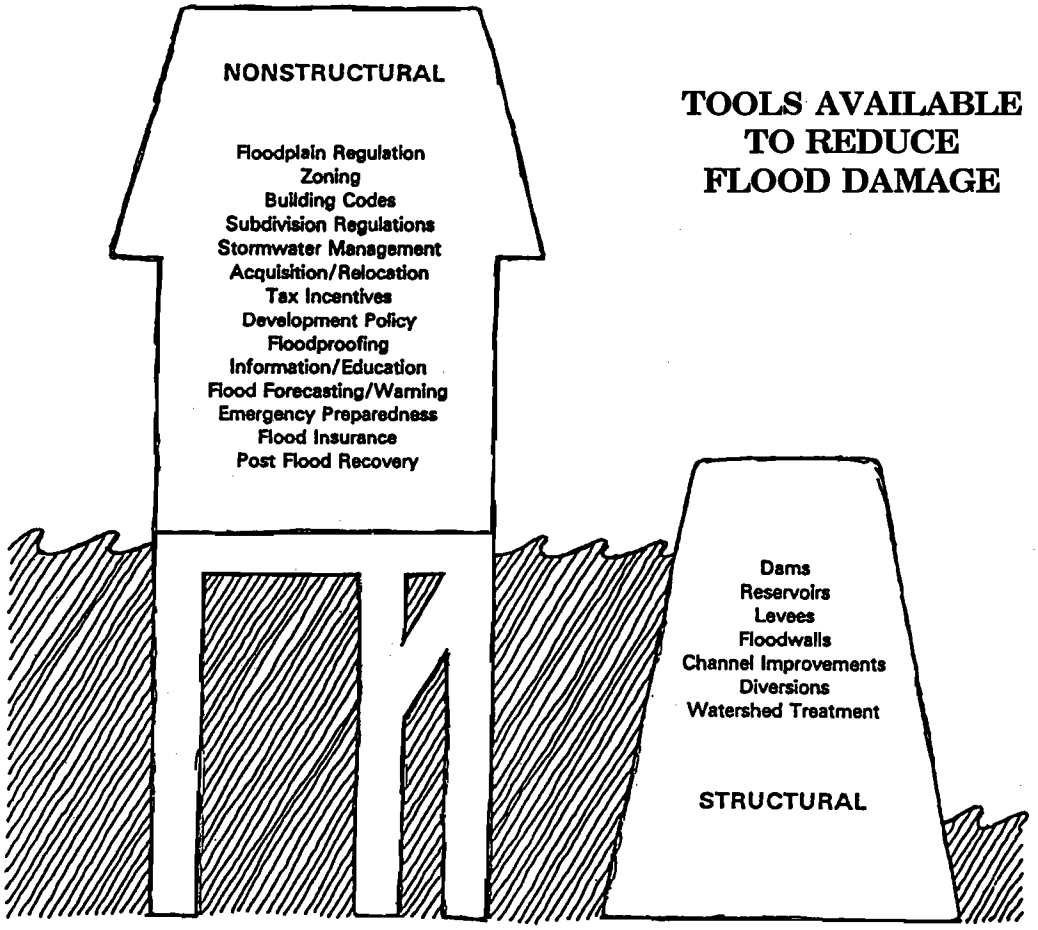
Detention basins are smaller impoundments that, typically, have uncontrolled or fixed outlets. Small impoundments are designed to retain and retard flood waters. They may also improve infiltration for recharge of aquifers. Detention basins may reduce flood damages at a low cost, but the beneficial effects do not extend far below the impoundment.

Levees and Floodwalls

Levees and floodwalls are structures built to prevent flood waters from overflowing onto the floodplain by confining the stream flow. Floodwalls are usually built of reinforced concrete, while levees are usually constructed of earthen materials. A false sense of security can be associated with levees and floodwalls because:

1. they have a limited design life,
2. improper design could cause the system to fail, and
3. these structures could be overtopped by a flood larger than the design flood.

Additionally, many levees were built in haste prior to, or during, the past flood emergencies and do not meet acceptable standards for permanent flood control projects.



Channel Improvements

Flood stages can be reduced by improving flow conditions within a channel and by increasing a stream's carrying capacity. Methods used to obtain improvements of channels include:

- straightening to remove undesirable bends;
- deepening or widening to increase size of waterway;
- clearing to remove brush, trees, and other obstructions; and
- lining with concrete to increase efficiency.

Channel modification may be necessary or useful when used with other structural methods of flood control, such as below storage reservoirs where changes have occurred in the flow of water. Adverse effects of channel modification could occur at or downstream of the site, with unstable channel banks and a possible increase of flood impacts downstream.

Watershed Treatment

Watershed treatment, generally applied to small areas, involves the treatment of land to render the soil more capable of absorbing and retaining excessive rainfall until flood heights in swollen streams have receded. These measures include improving or preserving vegetative cover, regrading, and terracing, all to increase infiltration or delay runoff to the stream channel. Watershed improvements may also reduce erosion, maintain or improve ground water levels, and recharge aquifers.

NONSTRUCTURAL MEASURES

Nonstructural approaches to reduce flood damages are those which do not depend on controlling flood waters. Rather, they concentrate on controlling activities which take place in flood prone areas. The approaches fall into two general categories: reducing susceptibility to flooding and reducing the impact of floods.

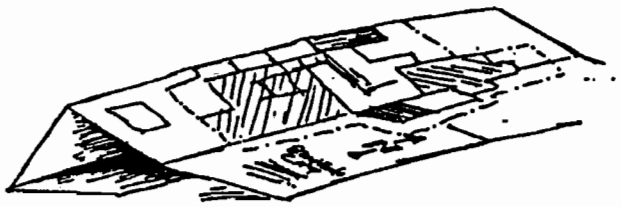
Reducing Susceptibility

The methods available to reduce susceptibility to flood damage are the development of regulations and policies that prohibit dangerous, uneconomical, or unwise floodplain development. Flood damages can be greatly reduced if activities along floodplains can be made more compatible with the natural flooding process. These regulatory programs and policy guidelines consist of a variety of land use management techniques. Methods to reduce susceptibility to flood damage may also include programs which reduce existing development's vulnerability to damage.

Floodplain Regulation

Floodplain regulations do not attempt to reduce or eliminate flooding but are designed to mold floodplain development in such a manner as to lessen the damaging effects of floods. In most Texas communities, floodplain regulations are adopted in compliance with the National Flood Insurance Program. These regulations generally identify a floodway district within

the 100-year floodplain. Development in the floodway is restricted to uses which result in no increase in flood heights. The portion of the 100-year floodplain outside of the floodway can be more intensively developed provided that new uses and additions to existing uses are properly elevated on fill or floodproofed to the 100-year flood protection elevation.



Zoning

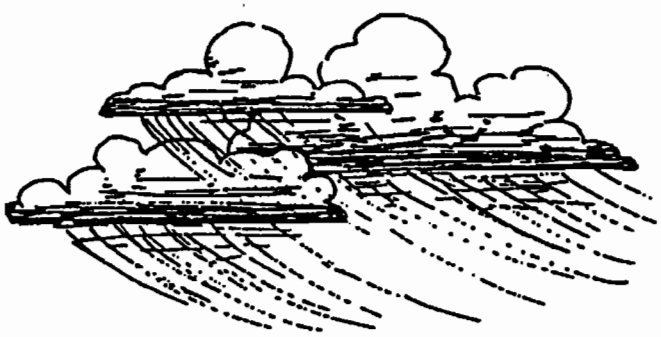
A community's zoning authority can be used to discourage development in the floodplain. For example, flood prone areas could be zoned "agricultural," "open space," or "recreation." Generally, these types of development suffer less flood damages than residential or commercial areas. Another zoning tactic is to control the density of structures by limiting lot sizes. Zoning ordinances can prevent the expansion of nonconforming uses and they could incorporate a single loss option. This stipulation would mean that a property could not be rebuilt after a flood loss of sufficient magnitude (i.e., 50 percent or more).

Building Codes/Subdivision Regulations

Building codes regulate building design and construction materials. Generally, these codes apply uniformly to buildings throughout a locality; however, certain provisions are also included that relate to natural hazards. Generally, four types of construction standards have been incorporated into flood related building codes:

- Minimum protection elevations for the lowest floor or footings of a structure.
- Prohibition of basements or requirements that basements be floodproofed or otherwise protected against flooding.
- Structural reinforcement, waterproofing, or other protection requirements for structures with floors below the flood protection elevation.
- Firmly anchored buildings required to prevent flotation during floods.

Subdivision regulations control the division and sale of land. The regulations require landowners to prepare detailed maps or "plats" prior to the sale of lots. Plats are generally approved by the planning commission and must comply with standards established in the subdivision regulations, zoning, and other laws. Subdivision standards related to flooding typically require that lots are adequately elevated with proper drainage, and that public facilities are protected from flooding.



Stormwater Management

Many times, development occurring outside of floodplain areas causes increased runoff in downstream areas. Native vegetation, croplands, wetlands, and pastures are being replaced by parking lots, streets,

and buildings. Natural drainageways are replaced by storm sewers and culverts. These changes to a watershed result in increased stormwater runoff which can produce larger and more frequent floods. A good stormwater management program is designed to reduce existing runoff problems and prevent new ones from developing. This is accomplished by controlling stormwater where it falls, on-site, through site grading, vegetation areas, temporary storage, and other measures.

Acquisition and Relocation

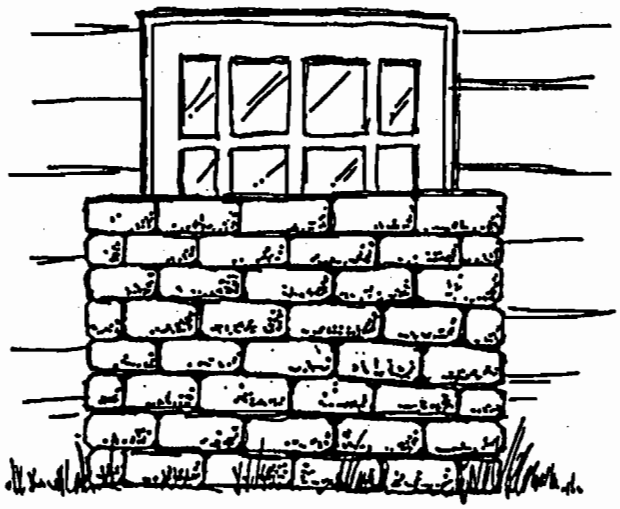
The acquisition of structures located within the floodplain can decrease the amount of hazard associated with flooding. In areas where structures have been acquired and relocated, the land can be used for functions less susceptible to flood damage. While acquisition and relocation of flood prone property can be expensive, in the long run it can be a very common sense approach to reducing flood damages.

Development Policy

Communities making wise decisions or policies to prevent construction of public facilities such as streets, water, and sewer in undesirable areas (such as floodplains) will deter floodplain development. Public facilities such as recreation areas or open spaces could be extended into flood prone areas. Both of these policies can result in a reduced flood damage potential.

Tax Incentives

Tax adjustments for land dedicated to agriculture, recreation, conservation, or other open-space uses may be effective in preserving existing floodplains. Unless such concessions are made, flood prone land adjacent to communities will become more valuable each year as residential or commercial developments expand. This could cause taxes of all adjacent open land to rise to the point where the land no longer can be used profitably for farming or other open uses.



Floodproofing

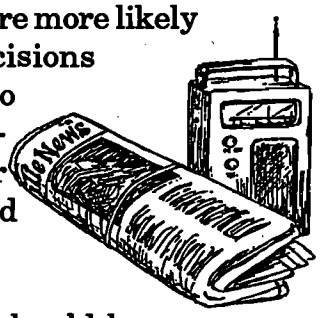
Floodproofing consists of modifications to buildings, their sites, or their contents to keep water out or to reduce the effects of flooding. Although it is more simply and economically applied to new construction, floodproofing can be applicable to existing facilities. Floodproofing may be permanent (i.e., bricked-in openings) or it may be contingent on some action at the time of the flood. There are many different floodproofing measures, and can include: elevation, utility adjustments, wet floodproofing (deliberate flooding of basement areas to offset floodwater pressures), anchoring, protective covering, ring dikes, or permanent closures.

Reducing the Impact

The second nonstructural approach to reducing flood hazards are those activities that attempt to reduce the impact of flooding when it does occur.

Information and Education

A good information and education program is a prerequisite for successful flood hazard mitigation plans. Local residents who are knowledgeable about flooding and flood hazards are more likely to make wise decisions when it comes to protecting themselves and their property from flood damage.



A community should have a continuous public awareness campaign about flooding to increase and reinforce public knowledge of flood hazards. Public media such as radio, television, and newspapers can be used to convey the message to the public. Civic organizations or church groups could be presented information and then asked to disseminate that information. Information could be taught to students in public schools where it will filter back to parents. Messages can be included in utility bills, tax statements, and newspaper deliveries or printed on grocery bags. Warning signs could be positioned on public rights-of-way warning potential property buyers of a flood hazard or indicating the high water mark of past floods.

Flood Forecasting and Warning

Reliable and accurate forecasts and warnings of floods can be coupled with timely evacuation to save lives and reduce property losses. While the federal government (through the National Weather Service) is generally responsible for disaster prediction, it is the local government that must be sure the general public is warned in sufficient time to take protective action. Well organized systems to effectively disseminate flood warning information need to be established by communities in cooperation with the County.

Emergency Preparedness

When a flood is imminent, a community can go a long way in reducing or preventing damages by having an effective emergency operation plan ready for implementation. Emergency flood fighting can involve a variety of activities including evacuation of floodplain residents, installation of temporary pumping stations for interior drainage behind levees, and sandbag closures for openings in levees or low areas. For serious floodprone communities, a well-coordinated flood fight

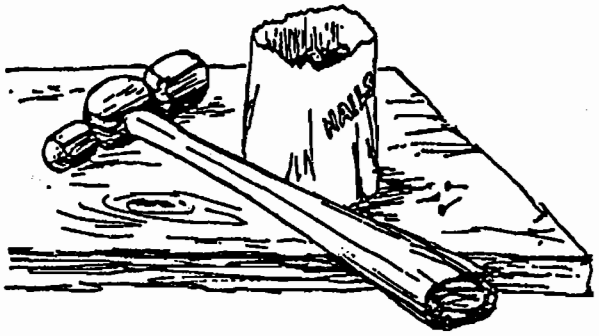
would require a sophisticated flood response and recovery plan defining the responsibilities of various departments within the local unit of government, as well as support from various federal, state, and private agencies. Equipment and materials necessary for flood fight effort must be stockpiled in the community or be immediately accessible to the community for use.

Flood Insurance

Flood insurance, while not able to prevent flood damage, can repay most of the costs associated with flood damages. Flood insurance is available only in communities that agree to establish floodplain management programs. As such, its benefits are two fold: property owners can buy reasonably priced flood insurance, and new construction will be safe from future flood damages.

Post-Flood Recovery

Post-flood recovery activities include the restoration of public and private services and a normal lifestyle to individuals who have been affected by the flood. Although these activities do not reduce the overall impact of the flood damage, they do reduce the overall impact of the flood by shortening the time of disruption within the community.

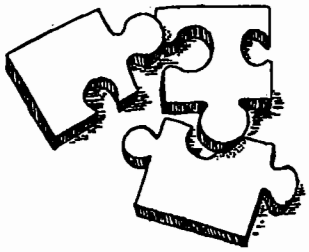


During this time, communities should proceed cautiously with repair and reconstruction. It is an ideal time to look for "mitigation" opportunities. For example, if a school or other public facility was flood damaged, now is a good time to install some floodproofing devices rather than rebuilding the structure to the way it was before the flood. This time is also ideal to explore the possibility for relocating severely damaged structures to flood-free locations.

SELECTING ALTERNATIVES

So far, throughout the planning process, the community has established objectives to eliminate or reduce its flood problem and reviewed the tools available to meet these objectives. Now is the time to put those items together and select alternatives. This section discusses the considerations in matching solutions to problems, suggests implementing short- and long-term strategies, and lists sources of assistance.

MATCHING SOLUTIONS TO PROBLEMS



Before it will work, a plan must be feasible, economical, and acceptable. In other words, the plan must actually be capable of being accomplished; the benefits received should equal or exceed the cost of implementation; and the measures implemented must satisfy the objectives set out early in the planning process. In matching solutions to flooding problems, a community must be keenly aware of these conditions and proceed accordingly.

In developing a flood hazard mitigation program, professional personnel are very important to assist communities in determining feasibility of projects. Com-

munities do not need a full-time staff for this purpose; rather they can rely on assistance from state or federal government or part-time experts. Ideally, a community would have input from a civil engineer, a hydrologist, a land use planner, an economist, and an attorney.

These professionals can help a community decide if a particular flood hazard reduction measure will work.

For example, a community may feel levees would be the best way to protect flood prone areas. After analyzing the project, however, the engineer may determine that the soil conditions in the area would not support levees of the size needed to provide the protection desired. Or, the community may not be able to afford to build levees. In these instances, the community has to look for other solutions to their problem.

Sometimes, flood hazard reduction measures are feasible and economical, but may not be publically acceptable. For example, suppose the levees previously mentioned were feasible and affordable, but unacceptable to neighborhood residents. In this case, land rights could be impossible to acquire and therefore, make the project unattainable.

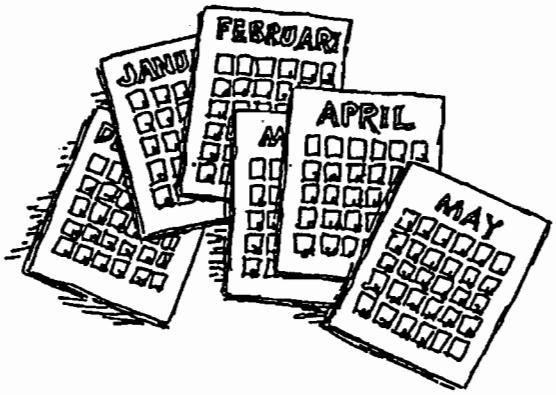
Communities can avoid this problem of unacceptability if they have been careful about acquiring the necessary public input and comment throughout the planning process. One of the best ways to do this is to have a "Flood Hazard Mitigation Committee." This committee should be comprised of the experts listed earlier and of citizens with broad representation in the community. Potentially these citizens might include floodplain residents, zoning commissioners, local officials, and businessmen.

The Flood Hazard Committee should be formulated early in the planning process, and take an active part every step along the way: identifying problems, establishing objectives, reviewing flood hazard reduction measures, and now, matching solutions to problems. The committee can also be the driving force behind implementing the program, which is discussed later in this document.

The process of matching problems and solutions is a complex one requiring careful evaluation of all alternatives on the "feasibility, affordability, and acceptability" criteria. Compromises may be necessary and, in nearly all cases, a combination of approaches will work best. The decision on how to make the compromises can be recommended by the Flood Hazard Mitigation Committee.

SHORT- AND LONG-TERM STRATEGIES

Once alternatives for reducing flood damage are selected, a community should plan for their implementation by developing short and long-term strategies. Short-term measures are those that could be put into effect in a relatively short time period, while long-term measures are those requiring more extensive analysis and preparation before implementation. Each measure in both the short- and long-term strategies should be well described. The plan should identify the person or agency responsible for carrying out the measure, indicate the time-frame for implementation, and explain how the project will be financed.



Short-Term Strategies

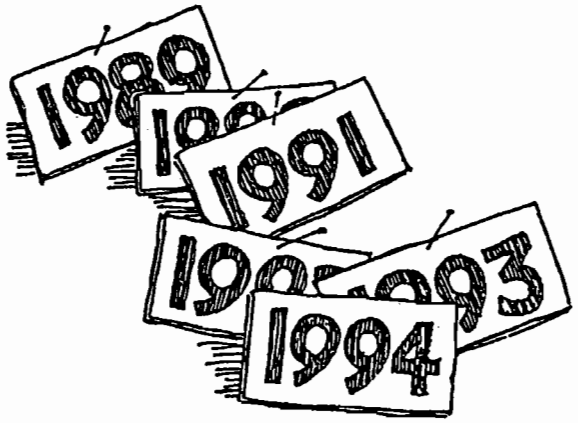
Measures such as floodplain regulations, emergency preparedness plans, and public information programs can be easily implemented if a reliable delineation of the floodplain has been made. Careful analysis, however, is required before any of these measures will prove effective in reducing damage.

Floodplain regulations are tied to the amount of technical data available. The less data available, the less stringent the regulations, and the less effective the program. Emergency preparedness plans must be coordinated with county and state programs. Public information programs should be a part of short-term strategies. Creating a greater public awareness of the flood hazard and providing even minimal information about potential flooding enables people to take flood risk into account in making decisions on future development. It also helps create public interest in participating in the study of longer-term measures and implementation.

Other measures may also be suitable for short-range plans. When severe flooding occurs, an opportunity may exist for acquiring damaged properties. Careful consideration should be given to all types of measures to ensure identifying all reasonable opportunities.

Long-Term Strategies

Long-term measures are those which generally have to be implemented in phases, over a period of years. For example, a measure that calls for a major flood control work to be constructed by the Corps would take several years to accomplish. Or, an acquisition/relocation program may first require a community to restructure its capital improvements program to raise the necessary funds to finance a project.



The formulation and implementation of long-term flood hazard reduction measures usually requires a reevaluation of the selected alternative (or combination of alternatives). This evaluation should eliminate any impractical or uneconomical measures and develop cost-effective designs for those remaining. The process must address key issues:

- Potential for funding, including assistance from state and federal sources.
- Whether the measure can be successfully used with the physical, legal, financial, and other existing restraints.
- Extent to which the measure will achieve established objectives.

- Acceptance by the public.
- Compatibility of the measure with community goals other than floodplain management.

Determining which measures to include in a flood hazard mitigation program can be approached by developing and comparing alternative programs. It may be necessary to consider as few as two or more than a dozen alternatives to evaluate the most effective combinations of measures which are possible.

Comparing the alternatives may make it apparent that some combinations of measures are clearly inferior to others and ought to be dropped from further consideration. Others may be found reasonably satisfactory or even superior, excepting some particular problem which can be corrected through a small adjustment.

SOURCES OF ASSISTANCE

Communities interested in developing flood hazard mitigation plans can receive advice and assistance from several state and federal agencies. Agency addresses and telephone numbers are contained in Appendix C. Communities should look to other entities as well for assistance. For example, water resource boards, regional planning councils, local colleges or universities, professional organizations, or civic groups may all have an interest in flooding and be willing to work in developing a mitigation program.

1. **TEXAS WATER COMMISSION**
   Dam & Floodplain Safety Section
   P.O. Box 13087
   Austin, Texas 78711
   (512) 463-7830

2. **TEXAS DEPARTMENT OF PUBLIC SAFETY**
   Division of Emergency Management
   P.O. Box 4087
   Austin, Texas 78773
   (512) 465-2138

3. **FEDERAL EMERGENCY MANAGEMENT AGENCY**
   FEMA Region VI
   Federal Regional Center
   Denton, Texas 76201
   (817) 898-9125

4. **U.S.D.A. SOIL CONSERVATION SERVICE**
   101 South Main
   Temple, Texas 76501
   (817) 774-1214

5. **U.S. ARMY CORPS OF ENGINEERS**
   Ft. Worth District
   P. O. Box 17300
   Ft. Worth, Texas 76102
   (817) 334-3207

6. **U.S. ARMY CORPS OF ENGINEERS**
   Galveston District
   P. O. Box 1129
   400 Barracuda, Room 141
   Galveston, Texas 77553-1229
   (409) 766-3076

7. **U.S. ARMY CORPS OF ENGINEERS**
   Southwestern Division
   1114 Commerce Street
   Dallas, Texas 75202
   (214) 749-2354

8. **U.S. ARMY CORPS OF ENGINEERS**
   Albuquerque District
   P.O. Box 1580
   Albuquerque, New Mexico 87103
   (505) 766-2627

9. **U.S. ARMY CORPS OF ENGINEERS**
   Tulsa District
   P.O. Box 61
   Tulsa, Oklahoma 74102
   (918) 581-7315

10. **TEXAS PARKS & WILDLIFE DEPARTMENT**
    4200 Smith School Road
    Austin, Texas 78744
    (512) 389-4639

IMPLEMENTATION: MAKING IT WORK

No flood hazard mitigation plan will work unless the community is truly committed to its implementation. This requires allocation of both financial resources and manpower to ensure that selected alternatives recommended by the Flood Hazard Mitigation Committee are carried through. It also requires follow-up to ensure that measures are properly operated and maintained once they are implemented.

The first step in implementing a flood hazard mitigation plan is to have it formally adopted by the local governing body such as the City Council. The plan, as recommended by the Flood Hazard Mitigation Committee, is presented for final review to the local officials. Formal adoption should not be a problem if adequate coordination and public participation has been a part of the planning process.

How the mitigation plan is implemented varies for the different measures identified.

REGULATORY/POLICY MEASURES

Measures which involve policy changes or new regulations are largely a matter of formally adopting ordinances or incorporating flood hazard considerations into policy procedures. For example, a community which has selected an alternative requiring more restrictive building standards in floodplains must: prepare an ordinance incorporating those standards; develop an administrative procedure to carry out and enforce the new regulations; and have the ordinance formally adopted.

If the recommended alternative is a policy change to restrict floodplain areas to open space uses, it will likely be necessary for a community to change its zoning ordinance and to add this new objective to its comprehensive plan.

Maintenance of regulatory measures is usually done on a daily basis through the enforcement procedures established (i.e., permits and inspections). Annual review of the overall program should be conducted, however, to identify any areas where improvements are needed.

FLOOD WARNING AND PREPAREDNESS

Measures which are designed to help a community prepare for, fight, and recover from a flood are primarily organizational in nature. The major step in preparing for the implementation of these measures is to develop detailed plans of action which describe what is to be done in each measure and assign responsibility for its accomplishment. Developing detailed plans of action requires technical skills and experience not always available in the community. These plans can be developed through a joint effort with state and federal agencies. Once that is accomplished, the plans of action (i.e., flood warning, flood fighting, recovery) can be formally adopted by a community and the necessary equipment and supplies can be stockpiled or prepared for use.

Operation and maintenance of these measures is mainly the periodic updating, practice, and testing of the plans.

PUBLIC WORKS

Projects involving major public works such as the construction of dams or levees, acquisition of floodprone property, or floodproofing public buildings are normally part of a long-term strategy and can be costly and complex. Such projects are often carried out in cooperation with state or federal agencies.

Implementation of a large flood control structure requires acquiring the necessary lands, arranging for financing, contracting for construction, and planning for operation and maintenance. Floodplain acquisition projects may require both purchasing lands and structures and modifying the site to facilitate the long-term use of acquired lands. Relocation projects involve acquiring the area to be cleared, acquiring and preparing the area to which any structures are to be moved, moving or demolishing structures, and cleaning up the site.

PRIVATE MEASURES

Several measures identified in a flood hazard mitigation plan may have to be implemented by individuals or private firms. These might include measures for floodproofing residential structures, applying good soil conservation practices, or paying flood insurance premiums. A community's major responsibility in the implementation of these measures is to maintain a good public education/awareness program.

The public participation program put in place at the beginning of the planning effort can be modified to carry out informational programs that encourage private sector action and advertise available assistance.

OPTIONAL MEASURES

In the NFIP regulations, planning considerations are outlined for NFIP communities.

Section 60.22 Planning Considerations for Flood-Prone Areas.

(a) The floodplain management regulations adopted by a community for flood-prone areas should:

- Permit only that development of flood-prone areas which (i) is appropriate in light of the probability of flood damage and the need to reduce flood losses, (ii) is an acceptable social and economic use of the land in relation to the hazards involved, and (iii) does not increase the danger to human life; and
- Prohibit nonessential or improper installation of public utilities and public facilities in flood-prone areas.

(b) In formulating community development goals after the occurrence of a flood disaster, each community shall consider:

- Preservation of the flood-prone areas for open space purposes;
- Relocation of occupants away from flood-prone areas;
- Acquisition of land or land development rights for public purposes consistent with a policy of minimization of future property losses; and
- Acquisition of frequently flood damaged structures.

(c) In formulating community development goals and in adopting floodplain management regulations, each community shall consider at least the following factors:

- Human safety;
- Diversion of development to areas safe from flooding, in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible floodplain uses;
- Full disclosure to all prospective and interested parties (including but not limited to, purchasers and renters) that (i) certain structures are located within flood-prone areas, (ii) variances have been granted for certain structures located within flood-prone areas, and (iii) premium rates applied to new structures built at elevations below the base flood substantially increase as the elevation decreases;
- Adverse effects of floodplain development on existing development;
- Encouragement of floodproofing to reduce flood damage;
- Flood warning and emergency preparedness plans;
- Provision for alternative vehicular access and escape routes when normal routes are blocked or destroyed by flooding;
- Establishment of minimum floodproofing and access requirements for schools, hospitals, nursing homes, orphanages, penal institutions, fire stations, police stations, communication centers, water and sewage pumping stations, and other public or quasi-public facilities already located in the flood-prone areas, to enable them to withstand flood damage, and to facilitate emergency operations;
- Improvement of local drainage to control increased runoff that might increase the danger of flooding to other properties;
- Coordination of plans with neighboring communities' floodplain management programs;
- The requirement that all new construction and substantial improvements in areas subject to subsidence be elevated above the Base Flood level equal to expected subsidence for at least a ten-year period;
- For riverine areas, requiring subdividers to furnish delineations for floodways before approving a subdivision;
- Prohibition of any alteration or relocation of a watercourse, except as part of an overall drainage basin plan. In the event of an overall drainage basin plan, provide that the flood carrying capacity within the altered or relocated portion of the watercourse is maintained;
- Requirement of setbacks for new construction within Zones VE or V1-30 on a community's FIRM;
- Requirement of additional elevation above the Base Flood level for all new construction and substantial improvements within Zones A1-30, AE, VE and V1-30 on the community's FIRM to protect against such occurrences as wave wash and floating debris, to provide an added margin of safety against floods having a magnitude greater than the Base

Flood, or to compensate for future urban development;

- Requirement of consistency between state, regional and local comprehensive plans and floodplain management programs;
- Requirement of pilings or columns rather than fill, for the elevation of structures within flood-prone areas, in order to maintain the storage capacity of the floodplain and to minimize the potential for negative impacts to sensitive ecological areas; and
- Prohibition, within any floodway or coastal high hazard area, of plants or facilities in which hazardous substances are manufactured.

SUMMARY

Flooding cannot be eliminated. Communities can, however, protect themselves or reduce their flood damages by planning. This chapter has briefly presented a procedure a community may follow to develop a flood hazard mitigation plan.

The process described - defining problems, establishing objectives, reviewing tools, selecting alternatives, and implementing programs - may sound simplistic, but in reality it is not.

Flood hazard mitigation is a difficult concept that is complicated by the friend who wants to build a basement in the floodplain; by the taxpayer unwilling to vote for a tax increase to finance a dike; and by the apathetic citizen who just doesn't care.

It is important to remember, however, that flood hazard mitigation plans are designed for the good of everyone. Undoubtedly there will be opposition, but mitigation plans implemented in a consistent, fair manner with true concern for those with the problem, will surely be successful in meeting their objective of reducing future flood damages.

CHAPTER 6

COMMUNITY RATING SYSTEM SUMMARY (CRS)

BACKGROUND

Since 1968 the National Flood Insurance Program (NFIP) has provided federally backed flood insurance to encourage communities to enact and enforce floodplain regulations. The program has been very successful in helping flood victims get back on their feet. There are over 2.2 million policies in force. Since 1978, 350,000 insurance losses have been paid out for a total of $2.5 billion.

In order to be covered by a flood insurance policy, a property must be in a community that participates in the NFIP. To qualify, a community adopts and enforces a floodplain management ordinance to regulate proposed development in flood hazard areas. The objective of the ordinance is to ensure that such development will not aggravate existing flooding conditions and that new buildings will be protected from future flood damage. To date nearly 18,000 communities in the United States participate.

The NFIP has been successful in requiring new buildings to be protected from damage by the 100-year flood. However, the program had few incentives for communities to do more than enforce the minimum regulatory standards. Flood insurance rates had been the same in all participating communities, even though some do much more than regulate construction of new buildings to the national standards.

Until now the program did little to recognize or encourage community activities to reduce flood damages to existing buildings, to manage development in areas not mapped by the NFIP, to protect new buildings beyond the minimum NFIP protection level, to help insurance agents obtain flood data, or to help people obtain flood insurance. Because these activities can have a great impact on the insurance premium base, flood damages, flood insurance claims, and federal disaster assistance payments, the Federal Insurance Administration (FIA) has implemented the Community Rating System (CRS).

THE CONCEPT

Experience since the turn of the century has shown that the fire insurance public protection class given to a community has been a very strong incentive for local officials to maintain or improve their fire protection programs. Local governing boards ensure that their fire alarm communications, water supply and distri-

bution, and overall fire department facilities, including staffing, equipment, training, and other items meet or exceed the insurance industry's minimum criteria in order to maintain favorable fire insurance rate classes for their communities.

In March 1987, the Federal Insurance Administrator established a Community Rating Task Force with members from FIA, insurance companies, and state and local floodplain managers. The Task Force established three goals for the CRS:

"[To] encourage, by the use of flood insurance premium adjustments, community and state activities beyond those required by the National Flood Insurance Program to:

- reduce flood losses,
- facilitate accurate insurance rating, and
- promote the awareness of flood insurance."

The Task Force worked with the Association of State Floodplain Managers (ASFPM) and ISO/Commercial Risk Services, Inc. (ISO) to develop a rating Schedule and administrative procedures. ISO is a non-profit corporation subscribed to by more than 1300 insurance companies. Among other services, ISO develops and provides advisory fire insurance classification of community fire protection programs.

The CRS is the product of three years of development, field testing, critiques and reviews with communities, public interest organizations and ASFPM'S technical advisors. The work has been reviewed by 400 professional floodplain managers, 50 public interest organizations, and 41 communities. However, the CRS will always be subject to change and improvement as more experience is gained in administering it and as more is learned about effective floodplain management techniques.

COMMUNITY CLASSIFICATION

Flood insurance premium credits are available in communities based on their CRS classification. There are ten classes with Class 1 having the greatest premium credit and Class 10 having no premium credit. A community's CRS class is based on the number of credit points calculated for the activities that are undertaken to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance.

A community is automatically in Class 10 unless it applies for CRS classification and it shows that the activities it is implementing warrant a better class. The amount of premium credit for each class is published annually by FIA.

The CRS rewards those communities that are doing more than the minimum NFIP requirements to help their residents prevent or reduce flood losses. The system should also provide an incentive for communities to initiate new flood protection activities.

OPERATION

Community application for CRS classification is voluntary. Any community in full compliance with the rules and regulations of the NFIP may apply for a CRS classification. The applicant community submits documentation that it is imple-

menting one or more of the activities recognized in the CRS Schedule.

The *Schedule* identifies 18 creditable activities, organized under four categories in Sections 300-600: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. They are listed on the last page of this Summary. The *Schedule* assigns credit points based on how well an activity affects the three goals of the CRS. Communities are welcome to propose alternative approaches in their applications.

Some of the activities may be implemented by the state or a regional district rather than at the local level. For example, some states have disclosure laws that may meet the credit criteria of Activity 340-Flood Hazard Disclosure. In such cases, any community in those states or districts could receive credit points if the community applies for a CRS classification and if the state or district program is, in fact, being implemented in the community.

The Regional Office of the Federal Emergency Management Agency (FEMA) and the State NFIP Coordinator review and comment on the application. FIA verifies the information and the community's implementation of the activities. FIA sets the credit to be granted and notifies the community, the state, the insurance companies, and other appropriate parties.

The community's activities and performance are reviewed periodically. If it is not properly or fully implementing the credited activities, its credit points and possibly, its CRS classification, will be revised. A community may add or drop creditable activities each year. Credit criteria for each activity may also change as more experience is gained in implementing, observing, and measuring the activities.

COSTS AND BENEFITS

No fee is charged for a community to apply for classification or to participate in the CRS. Because there may be a cost to implement the creditable activities, some communities may be concerned whether the cost of initiating a new activity will be offset by the flood insurance premium credits.

It is important to note that reduction in flood insurance rates is only one of the rewards communities receive from undertaking the activities credited under the Community Rating System. Others include increased public safety, reduction of damages to property and public infrastructure, avoidance of economic disruption and losses, reduction of human suffering, and protection of the environment.

Communities should prepare and implement those activities that best deal with the local flood problem, not just those items that are listed in the *Schedule.* In considering whether to undertake a new activity, communities will want to consider all of the benefits the activity will provide (in addition to insurance premium credits) in order to determine whether it is cost effective.

ACTIVITIES CREDITED UNDER THE COMMUNITY RATING SYSTEM

[Sections 100 and 200 cover other topics in the CRS Schedule]

300 Public Information Activities

310 Elevation Certificate: Maintain FEMA's Elevation Certificate and make copies available to inquirers.

320 Map Determinations: Respond to inquiries for Flood Insurance Rate Map zone and flood data.

330 Outreach Projects: Advise residents about the flood hazard, flood insurance and flood protection measures.

340 Hazard Disclosure: Advise potential purchasers of flood-prone property about the hazard.

350 Flood Protection Library: Maintain and publicize a library or references on flood insurance and flood protection.

360 Flood Protection Assistance: Provide direct advice to property owners desiring to protect themselves from flooding.

400 Mapping and Regulatory Activities

410 Additional Flood Data: Develop new flood elevations, floodway delineations, wave heights, or other regulatory flood hazard data.

420 Open Space Preservation: Credit is provided according to the amount of vacant floodplain that is kept free from buildings and filling.

430 Higher Regulatory Standards: Regulations that require new development to be protected to a level greater than the NFIP rules.

440 Flood Data Maintenance: Make the community's floodplain maps more current, useful, or accurate.

450 Stormwater Management: Regulate new developments throughout the watershed to minimize their impact on surface drainage and runoff.

500 Flood Damage Reduction Activities

510 Repetitive Loss Projects: Develop and implement a plan to mitigate losses in repeatedly flooded areas.

520 Acquisition and Relocation: Purchase or relocate buildings and convert flood-prone properties to open space.

530 Retrofitting: Credit is provided according to how buildings have been retrofitted to protect them from flood damages.

540 Drainage System Maintenance: Conduct periodic inspections and maintain the capacities of the channels and retention basins.

600 Flood Preparedness Activities

610 Flood Warning Program: Provide early flood warnings to the general public and special facilities.

620 Levee Safety: Maintain levees that are not credited with providing base flood protection and develop emergency response plans for them.

630 Dam Safety: All communities in a state with an approved dam safety program receive credit.

For more information about CRS contact the Texas Water Commission, Dam & Floodplain Safety Section.

APPENDICES

APPENDIX A

FLOOD CONTROL and INSURANCE ACT (Subchapter I of Texas Water Code)

SUBCHAPTER I. FLOOD INSURANCE

Cross References

Flood insurance, participation in federal program, see V.A.T.S. Water Auxiliary Laws, art. 8280–13.

Library References

Insurance ⇐404, 423(2).
C.J.S. Insurance §§ 855 et seq., 888 et seq.

§ 16.311. Short Title

This subchapter may be cited as the Flood Control and Insurance Act.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977.

Historical Note

Derivation: Acts 1969, 61st Leg., p. 2313, ch. 782, § 1.	V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 1.

§ 16.312. Purpose

The State of Texas recognizes the personal hardships and economic distress caused by flood disasters since it has become uneconomic for the private insurance industry alone to make flood insurance available to those in need of such protection on reasonable terms and conditions. Recognizing the burden of the nation's resources, congress enacted the National Flood Insurance Act of 1968, as amended (42 U.S.C. Sections 4001 through 4127), whereby flood insurance can be made available through coordinated efforts of the federal government and the private insurance industry, by pooling risks, and the positive cooperation of state and local government. The purpose of this subchapter is to evidence a positive interest in securing flood insurance coverage under this federal program and to so procure for those citizens of Texas desiring to participate and in promoting the public interest by providing appropriate protection against the perils of flood losses and in encouraging sound land use by minimizing exposure of property to flood losses.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977.

Historical Note

Derivation: Acts 1969, 61st Leg., p. 2313, ch. 782, § 2.	V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 2.

§ 16.313. Definitions

In this subchapter:

(1) "Political subdivision" means any political subdivision or body politic and corporate of the State of Texas and includes any county, river authority, conservation and reclamation district, water control and improvement district, water improvement district, water control and preservation district, fresh water supply district, irrigation district, and any type of district heretofore or hereafter created or organized or authorized to be created or organized pursuant to the provisions of Article XVI, Section 59 or Article III, Section 52 of the Constitution of the State of Texas; "political subdivision" also means any interstate compact commission to which the State of Texas is a party, municipal corporation, or city whether operating under the Home Rule Amendment of the Constitution or under the General Law.

(2) "National Flood Insurance Act" means the National Flood Insurance Act of 1968, as amended (42 U.S.C. Sections 4001 through 4127), and the implementation and administration of the Act by the Secretary of the United States Department of Housing and Urban Development.

(3) "Secretary" means the Secretary of the United States Department of Housing and Urban Development.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977.

Historical Note

Derivation:
Acts 1969, 61st Leg., p. 2313, ch. 782, § 3.

V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 3.

§ 16.314. Cooperation of Commission

In recognition of the necessity for a coordinated effort at all levels of government, the commission shall cooperate with the Federal Insurance Administrator of the United States Department of Housing and Urban Development in the planning and carrying out of state participation in the National Flood Insurance Program; however, the responsibility for qualifying for the National Flood Insurance Program shall belong to any interested political subdivision, whether presently in existence or created in the future.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1985, 69th Leg., ch. 795, § 1.051, eff. Sept. 1. 1985.

Historical Note

The 1985 amendment in the section heading substituted "Commission" for "Texas Department of Water Resources" and in the section substituted "commission", for "department".

Derivation:
Acts 1969, 61st Leg., p. 2314, ch. 782, § 4.
V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 4.

§ 16.315. Political Subdivisions; Compliance With Federal Requirements

All political subdivisions are hereby authorized to take all necessary and reasonable actions to comply with the requirements and criteria of the National Flood Insurance Program, including but not limited to:

(1) making appropriate land use adjustments to constrict the development of land which is exposed to flood damage and minimize damage caused by flood losses;

(2) guiding the development of proposed future construction, where practicable, away from a location which is threatened by flood hazards;

(3) assisting in minimizing damage caused by floods;

(4) authorizing and engaging in continuing studies of flood hazards in order to facilitate a constant reappraisal of the flood insurance program and its effect on land use requirements;

(5) engaging in floodplain management and adopting enforcing permanent land use and control measures consistent with the criteria established under the National Flood Insurance Act;

(6) declaring property, when such is the case, to be in violation of local laws, regulations, or ordinances which are intended to discourage or otherwise restrict land development or occupancy in flood-prone areas and notifying the secretary, or whomever he designates, of such property;

(7) consulting with, giving information to, and entering into agreements with the Department of Housing and Urban Development for the purpose of:

(A) identifying and publishing information with respect to all flood areas, including coastal areas; and

(B) establishing flood-risk zones in all such areas and making estimates with respect to the rates of probable flood-caused loss for the various flood-risk zones for each of these areas;

(8) cooperating with the secretary's studies and investigations with respect to the adequacy of local measures in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention;

(9) taking steps to improve the long-range management and use of flood-prone areas;

(10) purchasing, leasing, and receiving property from the secretary when such property is owned by the federal government and lies within the boundaries of the political subdivision pursuant to agreements with the Department of Housing and Urban Development or other appropriate legal representative of the United States Government;

(11) requesting aid pursuant to the entire authorization from the commission;

(12) satisfying criteria adopted and promulgated by the commission pursuant to the National Flood Insurance Program; and

(13) adopting permanent land use and control measures with enforcement provisions which are consistent with the criteria for land management and use adopted by the secretary.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1985, 69th Leg., ch. 795, § 1.051, eff. Sept. 1, 1985.

Historical Note

The 1985 amendment in subd. (2) inserted "a"; in subd. (11) substituted "commission" for "board"; and in subd. (12) substituted "commission" for "department".

Derivation:

Acts 1969, 61st Leg., p. 2314, ch. 782, § 5. V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 5.

Notes of Decisions

In general 1

1. In general

V.A.T.S. Water Auxiliary Laws, art. 8280–13 (see, now, § 16.311 et seq.) authorized political subdivisions to enact land use regulations which had as their purpose and effect compliance with requirements and criteria promulgated pursuant to the National Flood Insurance Program; such regulations had no application outside areas designated by the Flood Insurance Administrator after that designation was made. Op.Atty.Gen.1977, No. H-978.

V.A.T.S. Water Auxiliary Laws, art. 8280–13 (see, now, § 16.311 et seq.) did not empower the Texas Water Development Board to limit the grant of authority to political subdivisions contained therein or to control activities of subdivisions outside the scope of that article. Id.

A county had no present authority to enact land-use regulations for flood-prone areas under V.A.T.S. Water Auxiliary Laws, art. 8280–13 (see, now, § 16.311 et seq.), unless it qualified for participation in the National Flood Insurance Program by June 30, 1970; counties that did qualify for the federal insurance program by that date had continuing authority to enact measures insofar as they were necessary to comply with federal regulations promulgated pursuant to the National Flood Insurance Act. Op.Atty.Gen.1977, No. H-1011.

The county may adopt flood hazard regulations one step at a time, such that they apply only in federally designated flood hazard areas, without constituting a violation of the equal protection clause of the 14th amendment as a matter of law. Op.Atty.Gen.1985, No. JM-328.

§ 16.316. Coordination of Local, State, and Federal Programs by Commission

(a) The commission shall aid, advise, and coordinate the efforts of present and future political subdivisions endeavoring to qualify for participation in the National Flood Insurance Program.

(b) Pursuant to the National Flood Insurance Program and state and local efforts complementing the program, the commission shall aid, advise, and cooperate with political subdivisions, the State Board of Insurance, and the United States Department of Housing and Urban Development when aid, advice, and cooperation are requested or deemed advisable by the board.

(c) The aforementioned aid may include but is not necessarily limited to:

(1) coordinating local, state, and federal programs relating to floods, flood losses, and floodplain management;

(2) evaluating the present structure of all federal, state, and political subdivision flood control programs within or adjacent to the state, including an assessment of the extent to which public and private floodplain management activities have been instituted;

(3) carrying out studies with respect to the adequacy of present public and private measures, laws, regulations, and ordinances in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention;

(4) evaluating all available engineering, hydrologic, and geologic data relevant to flood-prone areas and flood control in those areas; and

(5) carrying out floodplain studies and mapping programs of floodplains, flood-prone areas, and flood-risk zones.

(d) On the basis of such studies and evaluations, the commission, to the extent of its capabilities, shall periodically identify and publish information and maps with respect to all floodplain areas, including the state's coastal area, which have flood hazards, and where possible aid the federal government in identifying and establishing flood-risk zones in all such areas.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1985, 69th Leg., ch. 795, § 1.051, eff. Sept. 1, 1985.

Historical Note

The 1985 amendment in the section heading and subsecs. (a), (b), and (d) substituted "commission" for "department".

V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 6.

Derivation:
Acts 1969, 61st Leg., p. 2315, ch. 782, § 6.

§ 16.317. Cooperation of State Board of Insurance

Pursuant to the National Flood Insurance Program, the State Board of Insurance shall aid, advise, and cooperate with political subdivisions, the commission, and the United States Department of Housing and Urban Development when such aid, advice, and cooperation are requested or deemed advisable by the State Board of Insurance.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1985, 69th Leg., ch. 795, § 1.051, eff. Sept. 1, 1985.

Historical Note

The 1985 amendment substituted "commission" for "department".

V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 7.

Derivation:
Acts 1969, 61st Leg., p. 2315, ch. 782, § 7.

§ 16.318. Rules

Political subdivisions which qualify for the National Flood Insurance Program, the State Board of Insurance, and the commission may adopt and promulgate reasonable rules which are necessary for the orderly effectuation of the respective authorizations herein.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1985, 69th Leg., ch. 795, § 1.051, eff. Sept. 1, 1985.

Historical Note

The 1985 amendment substituted "commission" for "board".

V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 8.

Derivation:
Acts 1969, 61st Leg., p. 2315, ch. 782, § 8.

§ 16.319. Qualification

Political subdivisions wishing to qualify under the National Flood Insurance Program shall have the authority to do so by complying with the directions of the Department of Housing and Urban Development and by:

(1) evidencing to the secretary a positive interest in securing flood insurance coverage under the National Flood Insurance Program; and

(2) giving to the secretary satisfactory assurance that measures will have been adopted for the political subdivision which measures will be consistent with the comprehensive criteria for land management and use developed by the Department of Housing and Urban Development, and that the application and enforcement of such measures will commence as soon as technical information on floodways and on controlling elevations is available.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1977, 65th Leg., 1st C.S., p. 58, ch. 4, § 3, eff. Sept. 1, 1977.

Historical Note

Acts 1977, 65th Leg., 1st C.S., p. 58, ch. 4, § 3 rewrote the section heading, which read "Time Limitation"; in the opening paragraph, deleted "and endeavor" and "by June 30, 1970," before and after "to do so", respectively; in subd. (2), deleted "by June 30, 1970, permanent land use and control" after "satisfactory assurance that".

Section 2 of Acts 1977, 65th Leg., 1st C.S., p. 58, ch. 4, provides:

"All proceedings and actions of any political subdivision as defined in the Flood Control and Insurance Act with respect to participation in and compliance with the National Flood Insurance Program under the Flood Control and Insurance Act are in all things and all respects ratified, confirmed, approved, and validated even though these proceedings and actions may not have occurred within the time limit provided in the Flood Control and Insurance Act; provided, however, that any proceeding or action taken under the Flood Control and Insurance Act by a political subdivision which took action to qualify under Section 9 of that Act after June 30, 1970, and before the effective date of this Act shall expire on the 60th day after the effective date of this Act unless the proceeding or action is reenacted by the governing body of the political subdivision after the effective date of this Act and before the 60th day after the effective date of this Act."

Derivation:

Acts 1969, 61st Leg., p. 2315, ch. 782, § 9. V.A.T.S. Water Auxiliary Laws, art. 8280–13, § 9.

Notes of Decisions

Validity 1

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1. Validity

Section 2 of Acts 1977, 65th Leg., 1st C.S., p. 58, ch. 4, (now, this section) which ratifies past unauthorized actions by political subdivisions with respect to participation in national flood insurance program, is valid exercise of legislative authority; it does not violate Const. Art. 1, § 16, and destroys any cause of action based on lack of legislative authority for actions ratified. Op.Atty.Gen.1977, No. H–1102.

APPENDIX B

NFIP TERMINOLOGY

Before getting involved in administering a floodplain ordinance, there are some basic definitions and terms associated with the National Flood Insurance Program (NFIP) that one should understand and be familiar with: These and additional NFIP definitions are contained in the NFIP Regulations Section 59.1 and are subject to change.

1. **FLOODING** - Flooding is a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters or the unusual and rapid accumulation or runoff of surface waters from any source.

2. **BASE FLOOD** - The Base Flood is referred to as the 100-year flood and is a measure of flooding of a particular magnitude that can occur in a certain time frame. The Base Flood has a 1% chance of occurring or being exceeded in any given year.

3. **FLOODPLAIN** - Areas inundated by the Base Flood constitute the base floodplain of a river, creek, ditch, or other source of flooding. This floodplain is also referred to as the Special Flood Hazard Area (SFHA), and it is the area in a community where development must be regulated to conform to the standards of the NFIP. Any land area susceptible to being inundated by water from any source.

4. **BASE FLOOD ELEVATION** - The level of flooding reached during the Base Flood is referred to as the Base Flood Elevation (BFE). The elevation of the water surface is referenced to the National Geodetic Vertical Datum (NGVD) of 1929. In other words, a Base Flood Elevation of 898 FT or 898 NGVD refers to a water surface elevation of 898 feet above NGVD.

5. **FLOOD FREQUENCY** - This term refers to the probability of a flood of a certain magnitude occurring in a given year. For example, a 100-year flood has the probability of reaching a certain elevation once in a hundred years or a 1 percent chance of occurring in any given year. It must be noted that flood frequency is a probability. Thus, it is possible for 100-year flood to occur three years in a row or not at all for 500 years.

6. **ENCROACHMENT** - Development of floodplains results in the restriction of natural overflow areas that are needed by streams during flooding conditions. Each development encroaches on the natural overflow area of the stream and increases the Base Flood Elevation. Development of floodplains is consequently entitled, "encroachment."

7. **FLOODWAY** - The floodway is the river channel plus any adjacent floodplain areas which are needed to carry the excess waters of the Base Flood without substantial increases in the flood height. NFIP regulations limit this increase to one foot.

8. **FLOOD FRINGE** - The area in the floodplain outside of the floodway is called the flood fringe. It is the area of the floodplain that can be developed without causing substantial increase (more that one foot) in the base flood elevation.

9. **DEVELOPMENT** - For purposes of the NFIP, development refers to 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.

10. **SUBSTANTIAL IMPROVEMENTS** - For purposes of the NFIP, substantial improvement means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure prior to damage or improvement.

11. **LOWEST FLOOR** - The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Section 60.3.

12. **FLOODPROOF** - Floodproofing a structure means, any combination of structural or nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage.

13. **FLOOD HAZARD BOUNDARY MAP (FHBM)** - A FHBM is an official map issued by the Federal Insurance Administration (FIA), designating areas of special flood hazard within a given community. The map forms the basis for both the regulatory and insurance aspects for communities in the Emergency phase of the NFIP.

14. **FLOOD INSURANCE RATE MAP (FIRM)** - A FIRM is an official map issued by the Federal Insurance Administration (FIA), designating areas of special flood hazard and/or flood insurance rate zones for a given community. The map forms the basis for both the regulatory and insurance aspects for communities in the Regular phase of the NFIP.

15. **A-ZONE** - An A-Zone is found on both FHBMs and FIRMs. A-Zones are areas which would be flooded by the Base Flood. These areas may be numbered as AO, AH, A1 to A30, AE or A. Numbered A-Zones indicate a particular area's risk to flooding on FIRMs issued prior to 1987, when they were replaced by AE Zones.

16. **FLOOD INSURANCE STUDY (FIS)**- The FIS is the official report prepared by the Federal Insurance Administration that contains flood profile, base flood water surface elevations and a Flood Boundary/Floodway Map for floodplain regulation purposes.

17. **FLOOD PROFILE** - A flood profile is a graph which shows the relationship of the water surface elevation of a flood event to locations along a river or stream.

18. **FLOOD BOUNDARY/FLOODWAY MAP (FBFM)** - The FBFM is a map which may be included with a Flood Insurance Study. It identifies the floodway and, along with the FIS, provides the technical basis for floodplain management regulations.

19. **FEDERAL INSURANCE ADMINISTRATION (FIA)** - The FIA is the federal office, located within FEMA, that has specific responsibility for administrating the NFIP.

20. **FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)** - FEMA is the agency with overall responsibility for the NFIP.

APPENDIX C

SOURCES OF TECHNICAL ASSISTANCE

1. **TEXAS WATER COMMISSION**
   Dam & Floodplain Safety Section
   P.O. Box 13087
   Austin, Texas 78711
   (512) 463-7830

2. **TEXAS DEPARTMENT OF PUBLIC SAFETY**
   Division of Emergency Management
   P.O. Box 4087
   Austin, Texas 78773
   (512) 465-2138

3. **FEDERAL EMERGENCY MANAGEMENT AGENCY**
   FEMA Region VI
   Federal Regional Center
   Denton, Texas 76201
   (817) 898-9125

4. **U.S.D.A. SOIL CONSERVATION SERVICE**
   101 South Main
   Temple, Texas 76501
   (817) 774-1214

5. **U.S. ARMY CORPS OF ENGINEERS**
   Ft. Worth District
   P. O. Box 17300
   Ft. Worth, Texas 76102
   (817) 334-3207

6. **U.S. ARMY CORPS OF ENGINEERS**
   Galveston District
   P. O. Box 1129
   400 Barracuda, Room 141
   Galveston, Texas 77553-1229
   (409) 766-3076

7. **U.S. ARMY CORPS OF ENGINEERS**
   Southwestern Division
   1114 Commerce Street
   Dallas, Texas 75202
   (214) 749-2354

8. **U.S. ARMY CORPS OF ENGINEERS**
   Albuquerque District
   P.O. Box 1580
   Albuquerque, New Mexico 87103
   (505) 766-2627

9. **U.S. ARMY CORPS OF ENGINEERS**
   Tulsa District
   P.O. Box 61
   Tulsa, Oklahoma 74102
   (918) 581-7315

10. **TEXAS PARKS & WILDLIFE DEPARTMENT**
    4200 Smith School Road
    Austin, Texas 78744
    (512) 389-4639

APPENDIX D

IDENTIFYING FLOODPLAIN AREAS AND USING FLOODPLAIN MAPS

FLOODPLAIN MAPPING

The purpose of floodplain mapping is to identify and locate the floodplain. It becomes the "picture that is worth a thousand words." Without this, each inquiry would have to be field checked, requiring extensive time and effort to determine whether a particular location is within the floodplain. Floodplain maps are the basis for implementing floodplain management regulations.

MAPPING METHODS

There are a number of different methods or techniques that can be used to map floodplains, including the analysis of soils, vegetation, physiography, flood of record and hydrologic and hydraulic factors. The type of mapping needed by a municipality will depend on many things, but, most importantly, it will depend upon the ultimate use of the map.

For regulating floodplain development, a map developed through hydrologic and hydraulic analysis is preferable. The advantage of this method is that specific frequencies of flooding can be selected for delineating a floodplain. It is often difficult to associate the delineation of a floodplain based on soils, physiography or vegetation with a particular frequency of flooding. If applied properly, this method provides a sound technical and legal basis for adopting and administering floodplain management regulations.

However, where it is too costly to do so or where adequate flood data are lacking, other types of maps can be used. Municipalities utilizing these other types of maps are encouraged to incorporate ordinance provisions which require that the floodplain data be refined when considering individual permit applications.

Since the National Flood Insurance Program uses hydrologic and hydraulic analysis in preparing Flood Insurance Studies, it is helpful for those involved in the preparation and administration of floodplain management ordinances compliant with NFIP requirements to have a general understanding of how these maps are developed.

Simply stated, the science of hydrology is used to determine the amount of water which a river or stream must convey for a given storm. This involves calculating the amount of runoff that can be expected to drain from the surrounding watershed. The principles of hydraulics

are applied to help determine how the river or stream channel will handle the flow and to what extent the excess water will spread over the floodplain when the flood is at its peak. Specialized computer programs are used to perform most hydrologic and hydraulic computations.

The following subsections give a brief description of the procedures involved in applying these techniques to prepare floodplain maps.

Step 1. Selecting a Flood

Step 1 in the preparation of a floodplain map is to select a flood of a certain frequency of occurrence. The 100-year frequency flood is the standard typically used throughout the United States. This means that there is one percent or 1 in 100 chance of this size of flood being equalled or exceeded in any given year. A flood of this size could strike twice in the same year, but over a long period of time should average out to occurring once in a hundred years. In more practical terms, a property owner having a 30-year mortgage on a house located within a 100-year floodplain has a 25 percent chance of experiencing a flood equal to, or greater than, a 100-year flood before the final mortgage payment is due.

Step 2. Calculating Flood Flows (Hydrologic Evaluation)

The data collected from rivers and streams that have stream gauging systems can be used to compute flow in the stream for a 100-year flood. For example, this can be done by using the highest peak flow each year in a statistical analysis. Data points are plotted on a special type of graph paper (log-probability) and a line is drawn through these data points. From that graph the flow for a particular frequency flood can be determined. The flow is usually given in the number of cubic feet of water that passes a given location in one second, abbreviated cfs.

On the accompanying (Figure D1), each dot represents the highest peak flow for a given year for a sample stream. Each dot is placed on the chart based on its recurrence interval, which is basically the number of recorded years divided by the number of times over the recorded period that the particular flow has been equalled or exceeded. A line is drawn through the center axis of the dots and is used to project a given flow. Based on this line, the flow for a 100-year flood would be 2,800 cfs.

ESTIMATING FLOW

When stream gauge records are not available or are incomplete, flood peaks must be estimated. Numerous equations for estimating the flood peak have been developed. Their applicability can vary over a wide range. Thus, it is important for the engineer to choose the procedure that best fits the size and locality of the drainage basin. The techniques for large watersheds are usually based on gauged stream data that have been correlated to physical characteristics of the drainage basin. For example, the Federal Highway Administration method takes into consideration drainage area, rainfall, difference in elevation of the main channel between the most distant point in the watershed and the location of interest, the climatic zone and the percentage of surface water storage area in the watershed such as lakes, swamps, etc.

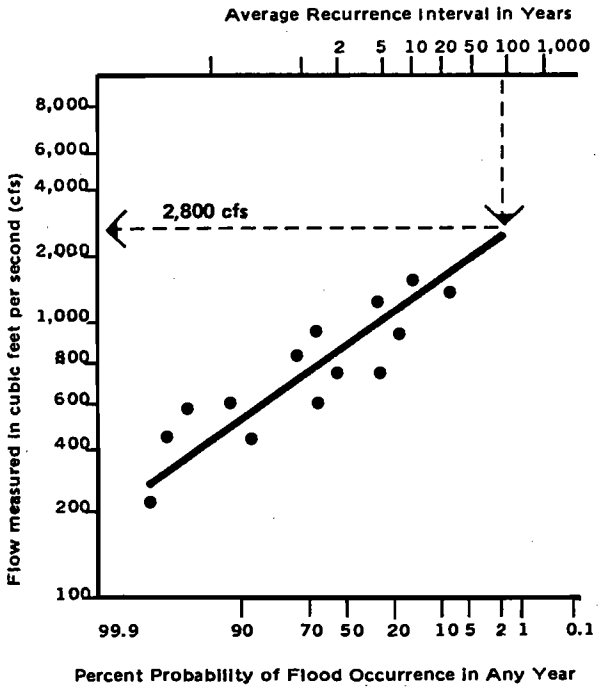


Figure D1.–
Flow vs. Frequency Curve

The equations for small watersheds of less than one square mile are usually simpler in nature. For example, the Rational Method, a method commonly used in these circumstances, uses three factors: the drainage area, intensity of rainfall, and a coefficient of runoff. The coefficient of runoff is the percentage of rain that runs off the land compared to that which actually falls. Experience and good judgment in choosing this coefficient is very important in estimating flows.

Whatever technique is used, a combination of the rainfall or stream flow records and the physical characteristics, of the drainage basin, such a soils, slope, vegetation and land use, should be taken into consideration.

Step 3 - Preparing Field Measurements

Once the flow is known, the particular slope and shape (cross section) of the stream channel and adjoining floodplain are determined at numerous points. A cross section is a graphic picture of a section of the stream and adjoining floodplain cut at right angles to the direction of flow (Figure D2). The best method is by actual field measurement, but the data may be taken from topographic maps. Measurements of man-made encroachments such as dams, bridges and culverts are also obtained.

Step 4 - Estimating Resistance to Flow

The resistance to the flow is then needed to complete the data required to calculate the height of water. This resistance to flow, or roughness factor (called a roughness coefficient) is determined by analyzing the character of the landscape. For example, a wooded floodplain would tend to hold back the water, causing a higher flood level than a grassed floodplain.

	Flood Frequency		Discharge
A.	10 Year	-	1,600 CFS
B.	50 Year	-	2,000 CFS
C.	100 Year	-	2,800 CFS

Figure D2.–Cross Section of Stream and Floodplain

A smooth, concrete-lined channel will obviously convey water with less resistance than a channel strewn with large rocks and fallen trees. Man-made objects such as buildings, fences, highways and bridges will all have an effect on resistance to the flow.

Since each situation is unique, it is often difficult to estimate the roughness coefficient. However, if there are known highwater marks, the roughness coefficient can be adjusted so the calculated water surface profile agrees with the highwater mark elevation. The equation then would give more reliable elevations for the 100-year flow.

Step 5 - Calculating Flood Height (Hydraulic Evaluation)

Factors such as stream slope, shape of channel and floodplain, man-made obstructions and natural obstructions are then used in conjunction with the frequency of flood flows (such as the 100-year flow) to compute the flood height.

Step 6 - Preparing Profile

The flood elevations for each cross section are then plotted on a profile and the points are connected, (Figure D3). A profile is a graphic picture of a section of the stream as if it were cut lengthwise down the centerline giving a side view. The profile is related to the map by listing for each cross section it's distance up or downstream from a stated point. This distance from the reference point can also be measured on the map. This is the next to last step in preparing a map of the floodplain.

Step 7 - Delineating the Floodplain

The last step is to translate from the profile the height of flood at each cross-section onto a topographic map, (Figure D3). The flood elevation for each cross section is plotted on both sides of the stream and the points are connected by lines following contours to show the boundary of the floodplain.

The reliability of the floodplain delineation is dependent on the accuracy of the data used to calculate the elevation and accuracy of the topography and features shown on the floodplain map. For example, if the topographic map has 5-foot contour intervals and the flood elevation was calculated to the nearest one foot, a judgement has to be made where that elevation is located on the map. If that judgement causes a building to be in the floodplain, then more accurate data should be obtained to check the validity of the decision. This is why it is important to know generally what data were used in preparing the floodplain map.

FIA MAPS

Floodplain mapping has been carried on for some years by different agencies of the federal and state governments, but it was not until passage of the National Flood Insurance Act of 1968 that floodplain mapping became a major effort nationwide.

The Federal Insurance Administration (FIA) is responsible for preparing maps of flood hazard areas as part of its duties in administering the NFIP. The remainder of this chapter explains the type of mapping FIA provides to municipalities.

FLOOD HAZARD BOUNDARY MAPS

The time and cost involved in preparing detailed floodplain maps made it impossible for FIA to provide accurate mapping immediately for every flood-prone community. Consequently, the initial effort was aimed at providing Flood Hazard Boundary Maps (FHBM). Because of the lack of detailed flood data and topographic information to serve as a basis for mapping, FHBMs only show the approximate area of the floodplain and do not show 100-year flood elevations.

In addition, not all flood hazard areas may be delineated. For example, FIA does not usually delineate flood hazard areas along streams with drainage areas less than one square mile or flood hazard areas having widths of less than 200 feet. The FHBM also shows the location of roads and highways, railroads, streams and municipal boundaries. Since the FHBM is designed to be used for insurance purposes as well as for municipal use, it identifies "A" Zones (flood hazard areas) and "C" Zones (areas of minimal flood hazard) which are used by insurance agents to determine insurance rates.

When a community receives a FHBM from FIA, it must enact an ordinance regulating all future construction and development within the floodplain, based at a minimum, on the requirements of Section 60.3(a) and (b) of the NFIP Regulations (See Chapter 3).

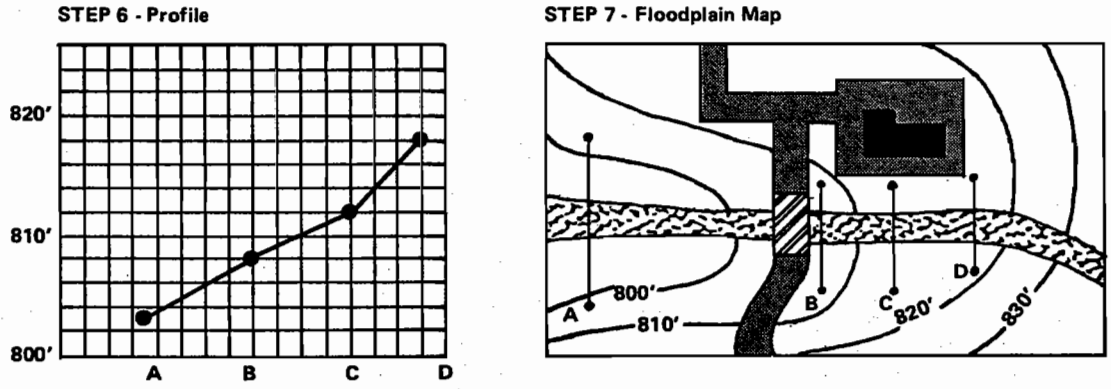


Figure D3.–Flood Profile and Topographic Map

Locating A Site

The FHBM must be used to identify properties subject to floodplain regulations. When it cannot be easily determined whether a property in question is actually within the floodplain by inspecting the FHBM in the office, a field investigation should be conducted. By looking over the physical features of the area, it may be possible to determine that the site is obviously outside the identified floodplain. If the determination cannot be made by a visual inspection, then a further investigation should be made.

Locating a site and the extent of flood hazard area by using the FHBM may require scaling. This is the technique of measuring a distance between two objects shown on the map, converting the map distance to actual ground distance, and making the same measurements on the ground. Because there are relatively few details shown on the FHBM, it is best to measure from a clearly identifiable point such as a sharp bend in a road or the stream or an intersection of two roads, two streams, or a road and stream. It is also helpful to supplement the FHBM with other more detailed maps such as a topographical map. This will aid in locating ground features on the FHBM and vice versa.

Determining Flood Elevations

Flood Hazard Boundary Maps do not show base flood elevations, essential information needed to administer the elevation or floodproofing provisions of local floodplain management ordinances. Recognizing this limitation, FIA requires municipalities to utilize any other existing 100-year elevation data that may be available from Federal or State agencies or from other reputable sources. The U.S. Army Corps of Engineers, the Soil Conservation Service and U.S. Geological Survey, conduct various water resources investigations and may have information which can be used to calculate the 100-year flood elevations for a particular site in question. Agency addresses and telephone numbers are contained in Appendix C.

Another source is historical flood information. Elevations of past floods may be obtained from newspaper articles, high water marks or from residents who remember the flood episode. The problem with using historical information is that it is often difficult to relate a past flood event with a particular frequency or occurrence. Unless the frequency ratio of an historical flood can be verified to be close to a 100-year flood event, caution should be exercised in using the elevation data in regulating floodplain development.

A municipality may want to require an applicant to have an engineer or other qualified professional calculate the base flood elevation for a particular site. This is entirely acceptable provided that the methods used reflect currently accepted technical concepts.

If these other sources are not available, base elevations can be determined by using the Flood Hazard Boundary Map. The base flood level will be the ground elevation at the point on the boundary of the identified floodplain which is nearest the construction site in question. Finding this point will require some field work and scaling from the FHBM. Once it is located on the ground, the actual elevation of that point can be determined by calculating the number of feet above or below a point of known elevation. This can be accomplished by using a level.

FLOOD INSURANCE STUDIES

In urban and rapidly growing areas, FIA prepares Flood Insurance Studies (FIS) which provide more accurate and detailed flood information for a community to use in regulating floodplain development. A Flood Insurance Study includes a written report containing a description of a community's flooding conditions, flood profiles showing 500- ,100- and 50-year flood elevations for each stream reach studied in detail, and tabular data concerning the different characteristics of the floodway calculated for each cross section. In addition, a Flood Boundary and Floodway Map (FBFM) and a Flood Insurance Rate Map (FIRM) are prepared as part of the FIS.

When a FIS is received, the municipality enters the Regular Program of the NFIP and additional insurance coverage is made available at actuarial rates. Upon entering the Regular Program the municipality is required to adopt development regulations which at a minimum meet the requirements of Section 60.3(c), (d), or (e) of the NFIP Regulations (See Chapter 3).

FLOOD INSURANCE RATE MAPS

The Flood Insurance Rate Map (FIRM) is also used for insurance purposes and shows the identified floodplain areas, base flood elevations, and the risk premium zones applicable to a community. The base flood elevations and risk premium zones are used by insurance agents in conjunction with standard NFIP rate tables to determine premium rates for existing and new structures.

FLOOD BOUNDARY AND FLOODWAY MAPS

The Flood Boundary and Floodway Map (FBFM) shows the delineation of 100-year floodplains which are determined either by detailed study or by approximate methods. (The FBFM is used by municipalities for regulatory purposes).

An approximate floodplain is similar to a flood hazard area shown on a FHBM. Base flood elevations are not provided. As a result, development proposed within these areas need only be regulated based on Section 60.3(a) and (b) requirements of the NFIP Regulations.

A 100-year floodplain studied in detail is divided into two parts; the floodway and the flood fringe. The floodway is that portion of the base flood where the greatest flood depths and velocities normally occur. The NFIP defines the floodway as the channel of the stream plus adjacent floodplain areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated amount (normally 1 foot). The flood fringe is the remainder of the floodplain where flood waters are shallow and slow moving. Base flood elevations for detailed areas are shown on the flood profiles contained in the FIS report. Development regulations applied to a floodplain studied in detail must, at a minimum, meet Section 60.3(c), (d) or (e) of the NFIP Regulations, as appropriate.

Along those stream segments studied in detail, the FBFM also shows the boundary of the 500-year flood, cross sections where various measurements are taken of the floodway, and reference marks which can be used in determining elevations.

The FBFM also shows roads and highways, railroads, municipal boundaries and streams.

Locating A Site

Locating a site on the Flood Boundary and Floodway Map should be done by obtaining the distance on the ground between the site and one or more points, for example, the centerline of the stream channel, a benchmark, centerline of a street, etc., shown on the floodway map. From these points, the site can be plotted on the FBFM with distances converted to the map's scale.

Once one location is set, it can be determined whether the location is within the floodway, fringe area or out of the 100-year floodplain completely.

To determine the location of a floodway boundary, measure the map distance from one or more identifiable points to the floodway boundary. This may have to be done in several locations to establish a curving boundary. Using the map scale, convert these distances, then go into the field and measure the distances from the identifiable objects to the boundary. Care has to be taken to use the proper directions if a point is not tied down with a second distance.

Due to inaccuracies of the base map, scaling may not always be correct. If the floodway boundary runs through a building by using the scaling method, attempt to verify the boundary with better information.

Determining Flood Elevations

Flood profiles and floodway data for a given location are examples of the type of flood information contained in Flood Insurance Study Reports. The stream distance scale given on the flood profile is the same as the distance column of the floodway data table. The cross sections listed on the table refer to the same keyed items on the Flood Boundary and Floodway Map and on the flood profile. [The elevation of the 100-year flood should be taken from the flood profile.] In some cases it may differ from the floodway data because of backwater considerations. For example, bridges and other obstructions may cause damming, which raises water levels and is known as a back water effect. The most common way of locating the site on the profile is by knowing the distance up or downstream from a cross section.

Relating the base flood elevation to the actual site can be the most time consuming work in the enforcement of the ordinance. The problem usually is finding a point of known elevation (reference mark or benchmark) close to the site. The Flood Boundary and Floodway Map will show some reference marks.

There are also U.S.G.S. and U.S.C. & G. S. monumented benchmarks and possibly, local resources such as sanitary sewer, road construction, subdivision and public facility plans. It is very important that the datum of the benchmark is the same as the floodplain study. Monumented benchmarks are circular metal plaques placed to show a point of known elevation. If local records are used, construction plans which show how something was actually built as

opposed to what may have been planned beforehand are preferable. These are commonly referred to as "as-built" plans.

APPEALS AND AMENDMENTS

When FIA initially completes a FIS, copies are sent to the community and a 90-day appeal period is initiated in which the municipality or affected persons can contest the determination of the base flood elevations on technical grounds. Only appeals which can adequately demonstrate that the information is technically inaccurate are considered. Individuals may submit an appeal to the governing body who, in turn, forwards it on to FIA for review.

Amendments to maps can be made after the study is completed if a change in the flood hazard warrants such action or if it can be clearly demonstrated that a boundary delineation is incorrect. The amendment procedures for FBFMs and FIRMs are the same as those required for FHBMs. It should be noted that the publication and reprinting of maps and studies is costly. Municipalities are encouraged to save as many copies of these documents as possible and to hand them out judiciously, if at all. A copy of the map displayed prominently in the municipal building should take care of most inquiries concerning floodplain information.

OBTAINING MAPS AND STUDIES

When FIA prepares maps for a community, copies are sent to the local Floodplain Administrator or to the Chief Elected Official.

Additional copies of FHBMs, FBFMS and FIRMs may be obtained by contacting the Flood Map Distribution Center at 1-800-333-1363.

APPENDIX E

SAMPLE PERMITS

PUBLIC WORKS ADMINISTRATOR
Ellis County Courthouse
Waxahachie, Texas 75165

ELLIS COUNTY

DEVELOPMENT PERMIT APPLICATION

$20.00 PERMIT FEE

STATE OF TEXAS)

COUNTY OF ELLIS)

APPLICATION NUMBER _____)

1. NAME OF APPLICANT: _____
   MAILING ADDRESS: _____
   _____

2. LOCATION OF PROPERTY (complete as appropriate)
   If located in a subdivision:

   _____
   Name of Subdivision Section No. Block No. Lot No.

   If NOT located in subdivision:

   _____
   Name and No. of Survey/Abstract Acreage

   _____
   Location Description (Attach a vicinity map)

3. NATURE OF PROPOSED CONSTRUCTION (check and complete as appropriate)

   ( ) Residential ( ) Non-Residential ( ) Other ( ) Placement of Fill

   ( ) Alteration of a Natural Waterway or Drainage Course

4. DESCRIPTION OF PROPOSED CONSTRUCTION (check and complete as appropriate)

   ( ) New Construction ( ) Substantial Improvement to Existing Structure

   ( ) House ( ) Mobile Home ( ) Non-Residential _____
   (Specify)

   ( ) Commercial _____
   (Name and Type of Business)

   ( ) Other _____

WARNING: Please read and acknowledge.
The flood hazard boundary maps and other flood data used by the County Administrator in evaluating flood hazards to proposed developments are considered reasonable and accurate for regulatory purposes and are based on the best available scientific and engineering data. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. Issuance of an exemption certificate does not imply that developments outside the identified areas of special flood hazard will be free from flooding or flood damage. Issuance of an exemption certificate shall not create liability on the part of Ellis County, the County Administrator or any officer or employee of Ellis County in the event flooding or flood damage does occur.

Signature _____

5. APPLICANT WILL PROVIDE ONE COPY OF PLANS AND SPECIFICATIONS OF THE PROPOSED CONSTRUCTION, IF IN A FLOOD PLAIN.

FOR USE BY COUNTY ADMINISTRATOR

IS THE PROPERTY LOCATED IN AN IDENTIFIED FLOOD HAZARD AREA? ( ) Yes ( ) No
IS ADDITIONAL INFORMATION REQUIRED? ( ) Yes ( ) No
ARE OTHER FEDERAL, STATE OR LOCAL PERMITS REQUIRED? ( ) Yes ( ) No
ARE OTHER COUNTY REGULATIONS APPLICABLE? ( ) Yes ( ) No

( ) EXEMPTION CERTIFICATE ISSUED
( ) PERMIT APPLICATION APPROVED
( ) PERMIT APPLICATION REJECTED

_____ Date
County Administrator or
Assistant County Administrator

ELLIS COUNTY

DEVELOPMENT PERMIT EXEMPTION CERTIFICATE

STATE OF TEXAS §

COUNTY OF ELLIS §

APPLICATION NO. _____ §

NAME OF APPLICANT _____

THE ABOVE NAMED APPLICANT APPLIED FOR A DEVELOPMENT PERMIT ON _____. THE APPLICATION HAS BEEN REVIEWED BY THE COUNTY ADMINISTRATOR AND IT IS HIS DETERMINATION THAT THE PROPOSED DEVELOPMENT IS NOT WITHIN AN IDENTIFIED FLOOD PLAIN OF ELLIS COUNTY.

THIS CERTIFICATE EXEMPTS THE APPLICANT FROM DEVELOPMENT STANDARDS REQUIRED BY ELLIS COUNTY FLOOD PLAIN MANAGEMENT REGULATIONS. WORK IS HEREBY AUTHORIZED TO PROCEED ON THE FOLLOWING DESCRIBED PROPERTY:

_____

Name of Subdivision Section No. Block No. Lot No.

If NOT located in subdivision:

_____

Name and No. of Survey/Abstract Acreage

THE COUNTY ADMINISTRATOR HAS REVIEWED THE PLANS AND SPECIFICATIONS OF THE PROPOSED DEVELOPMENT AND DESIRES TO MAKE THE FOLLOWING RECOMMENDATIONS FOR DEVELOPMENT OR DESIGN ALTERATIONS:

_____

_____

_____

WARNING:

The flood hazard boundary maps and other flood data used by the County Administrator in evaluating flood hazards to proposed developments are considered reasonable and accurate for regulatory purposes and are based on the best available scientific and engineering data. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. This exemption certificate does not imply that developments outside the identified areas of special flood hazard will be free from flooding or flood damage. Issuance of this exemption certificate shall not create liability on the part of Ellis County, the County Administrator or any officer or employee of Ellis County in the event flooding or flood damage does occur.

_____

Acknowledgement of Warning by Applicant

_____

Signature of County Administrator or
Assistant County Administrator

Date of Issuance _____

Copy - County Treasurer
Copy - Developer/Builder

ELLIS COUNTY

NOTICE TO DEVELOPMENT PERMIT APPLICANT

STATE OF TEXAS §

COUNTY OF ELLIS §

APPLICATION NO. _____ §

NAME OF APPLICANT _____

THE ABOVE NAMED APPLICANT APPLIED FOR A DEVELOPMENT PERMIT ON _____.THE APPLICATION HAS BEEN REVIEWED BY THE COUNTY ADMINISTRATOR AND IT IS HIS DETERMINATION THAT THE PROPOSED DEVELOPMENT IS LOCATED WITHIN AN IDENTIFIED FLOOD PLAIN OF ELLIS COUNTY.

THE COUNTY ADMINISTRATOR HAS REVIEWED PLANS AND SPECIFICATIONS OF THE PROPOSED DEVELOPMENT FOR CONFORMANCE WITH THE DEVELOPMENT STANDARDS REQUIRED BY ELLIS COUNTY FLOOD PLAIN MANAGEMENT REGULATIONS.

BASED ON THIS REVIEW, THE COUNTY ADMINISTRATOR DEEMS IT APPROPRIATE TO:

( ) APPROVE THE APPLICATION FOR DEVELOPMENT

( ) REJECT THE APPLICATION FOR DEVELOPMENT

CONDITIONS FOR APPROVAL/REASONS FOR REJECTION ARE AS FOLLOWS:

WARNING: The flood hazard boundary maps and other flood data used by the County Administrator in evaluating flood hazards to proposed developments are considered reasonable and accurate for regulatory purposes and are based on the best available scientific and engineering data. On rare occasions, greater floods can and will occur and flood heights may be increased by man-made or natural causes. Construction standards required by Ellis County Flood Plain Management Regulations are the minimum standards deemed necessary to minimize or eliminate flood damage, but reliance on these minimum standards shall not create liability on the part of Ellis County, the County Administrator or any other officer or employee of Ellis County in the event flooding or flood damage occurs.

I, the undersigned applicant, do hereby:

( ) acknowledge the warning and disclaimer of liability of the County:
( ) agree with the conditions of permit approval;
( ) agree to construct my development in strict compliance with the specified conditions once a permit has been issued;
( ) agree to provide certifications of work as may be required;

OR

( ) disagree with the reasons for rejection of my application and desire to make a formal appeal to the Ellis County Commissioners Court.
( ) disagree with the conditions for approval of a development permit and desire to make a formal appeal to the Ellis County Commissioners Court.

_____

Signature of applicant Date

_____

County Administrator Date

ELLIS COUNTY
DEVELOPMENT PERMIT

STATE OF TEXAS)

COUNTY OF ELLIS)

APPLICATION NO. _____)
PERMIT NO. _____)

NAME OF PERMITTEE _____

THE ABOVE NAMED PERMITTEE APPLIED FOR A DEVELOPMENT PERMIT ON _____. THE APPLICATION HAS BEEN REVIEWED BY THE COUNTY ADMINISTRATOR AND IT IS HIS DETERMINATION THAT THE PROPOSED DEVELOPMENT IS LOCATED WITHIN AN IDENTIFIED FLOOD PLAIN OF ELLIS COUNTY.

THE COUNTY ADMINISTRATOR HAS REVIEWED PLANS AND SPECIFICATIONS OF THE PROPOSED DEVELOPMENT FOR CONFORMANCE WITH THE DEVELOPMENT STANDARDS REQUIRED BY ELLIS COUNTY FLOOD PLAIN MANAGEMENT REGULATIONS. YOU ARE HEREBY AUTHORIZED TO PROCEED WITH THE FOLLOWING DESCRIBED WORK: _____
ON THE FOLLOWING DESCRIBED PROPERTY:

_____

TO MAINTAIN COMPLIANCE WITH THE DEVELOPMENT STANDARDS OF ELLIS COUNTY FLOOD PLAIN MANAGEMENT REGULATIONS AND TO ELIMINATE OR MINIMIZE FLOOD DAMAGE POTENTIAL TO THE PROPOSED DEVELOPMENT, YOU ARE HEREBY DIRECTED TO CONSTRUCT YOUR PROPOSED DEVELOPMENT IN ACCORDANCE WITH THE FOLLOWING SPECIAL PROVISIONS:

( ) For residential structures, the lowest floor (including basement) must be elevated to _____ feet mean sea level.
( ) For non-residential structures, the lowest floor (including basement) must be elevated or floodproofed to _____ feet mean sea level.
( ) Permittee must submit a certification from a registered professional engineer, architect, or land surveyor that the finished floor level of the residential structure has been constructed at the specified elevation.
( ) For non-residential floodproofing, a registered professional engineer or architect must certify that the floodproofing methods are adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the base flood.
( ) The foundation of the structure must as a minimum comply with the specifications attached.
( ) The materials used in the structure must be from the list attached.
( ) The water supply inlet and sanitary sewage outlet must have an automatic back water or back flow device installed.
( ) Provide a certified copy of all final plans or as-built drawings to the County Administrator.
( ) Other provisions (see attached list)

_____ _____
Acknowledgement of conditions by permittee Date

_____ _____
Signature of County Administrator Date

Copy - County Treasurer
Copy - Developer/Builder

ELLIS COUNTY

Permit No._____

This Permit must be posted on Foundation, Frame or Front of Construction.

Jimmy M. Reavis
Public Works Administrator
Ellis County
Waxahachie, Texas 75165
214/937-8630

APPENDIX F

PERMIT REVIEW CHECKLIST

PERMIT REVIEW CHECKLIST

Permit No. _____

1. Is development site in the Special Flood Hazard Area? _____ Yes _____ No

2. Is permit application complete?
   - ☐ Appropriate spaces are filled out.
   - ☐ Attached plans adequately describe the proposed development.
   - ☐ Elevations of the lowest floor of proposed structures are provided.
   - ☐ Required certificates (for floodproofing methods) are attached, signed and sealed.
   - ☐ Base Flood Elevation data is provided for large subdivision proposals.
   - ☐ Fee is paid.

3. Does proposed development require other permits? _____ Yes _____ No
   - ☐ They are attached.

4. What is the Base Flood Elevation (or depth number) at the development site?

   _____

   How does this compare to the lowest floor elevations? _____

   _____

5. Does proposed development meet NFIP General Standards?
   - ☐ Construction materials and methods resistant to flood damage.
   - ☐ Anchored properly.
   - ☐ Utilities safe from flooding.
   - ☐ Subdivisions designed to minimize flood damage.
   - ☐ Encroachments-proposed action will not obstruct flood waters.

   Specific Standards?
   - ☐ Lowest floor elevated/floodproofed to or above BFE

6. Is proposed development in disignated floodway? _____ Yes _____ No
   If yes, has applicant demonstrated that development will result in NO increase in flood heights? _____ Yes _____ No

RECOMMENDATION

☐ Grant Permit ☐ Request additional information ☐ Deny Permit

_____ _____

Date Local Administrator

north
1" = 40'

WHITE ROCK CREEK

ROAD

BELT LINE

FILL VERIFICATION SURVEY
OAK BEND ESTATES
ADDISON, TEXAS

OWNER:
WILLARD BAKER & LAVERE BROOKS
TWO TURTLE CREEK VILLAGE
DALLAS, TEXAS 75219

BY:
HUITT ZOLLARS, INC.
8730 KING GEORGE DR.
SUITE 121, DALLAS, TEXAS 75235

STATE OF TEXAS
ROBERT L. [illegible]
2491
REGISTERED PUBLIC SURVEYOR

5-25-82

NOTE: Building pad elevations shown are the highest recorded elevation for each pad.

Proposed 100 Year Flood Inundation Line

PAD EL. 560.6

PAD EL. 560.6

2

MIN. F.F. EL. 561.60
MIN. FILL EL. 560.60

1

MIN. F.F. EL. 561.60
MIN. FILL EL. 560.60

PAD EL. 560.7

3

PAD EL. 560.7

PAD EL. 560.8

4

PAD EL. 562.4

MIN. F.F. EL. 561.60
MIN. FILL EL. 560.60

5

PAD EL. 562.2

MIN. F.F. EL. 561.60
MIN. FILL EL. 560.60

7

PAD EL. 559.7

MIN. F.F. EL. 560.30
MIN. FILL EL. 559.30

8

PAD EL. 559.8

MIN. F.F. EL. 560.30
MIN. FILL EL. 559.30

9

PAD EL. 560.7

MIN. F.F. EL. 560.30
MIN. FILL EL. 559.30

6

PAD EL. 561.4

11

PAD EL. 561.3

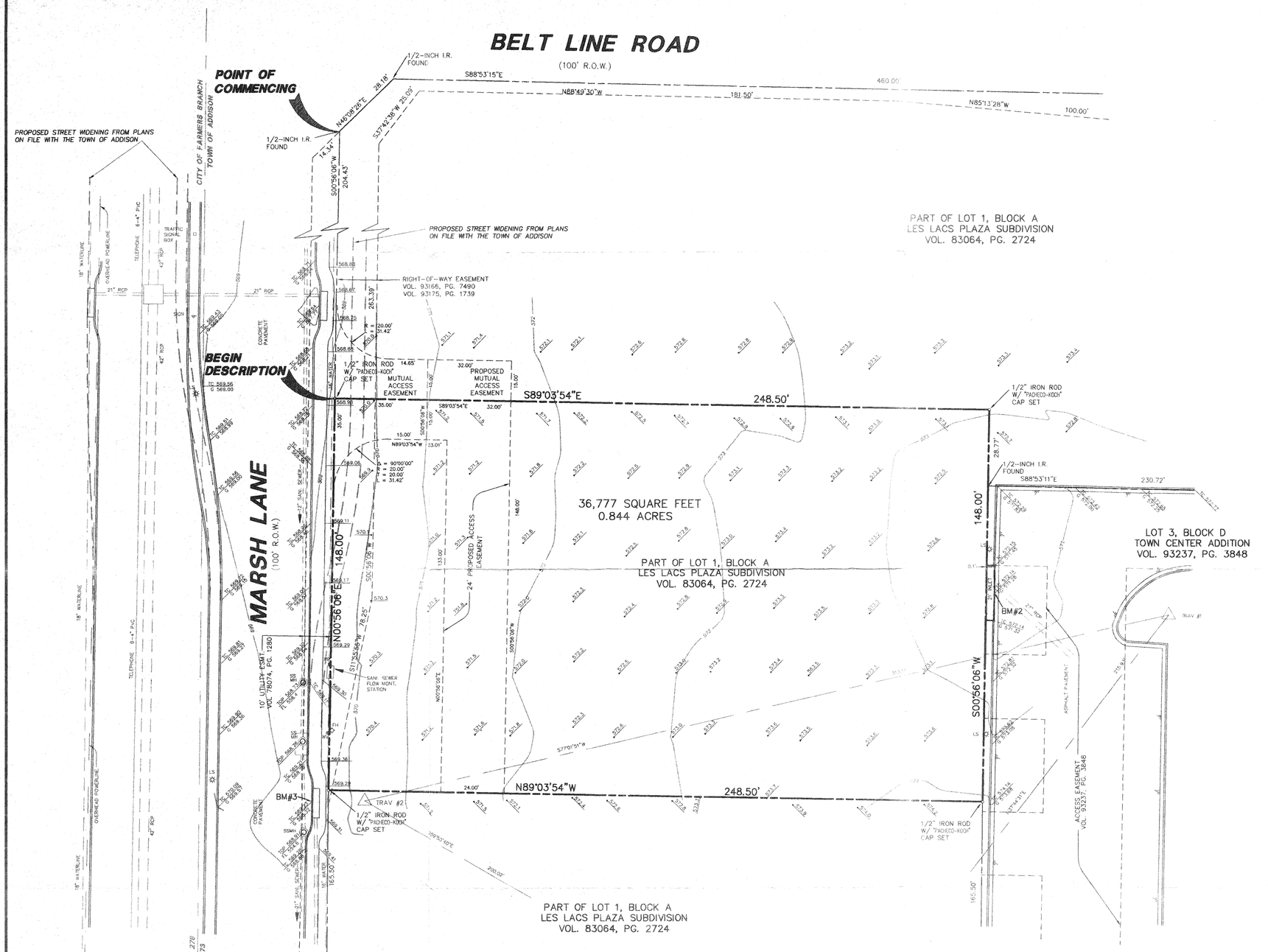
10

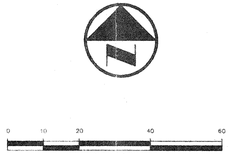
PAD EL. 561.2

WINNWOOD LANE

Existing 100 Year Flood Inundation Line

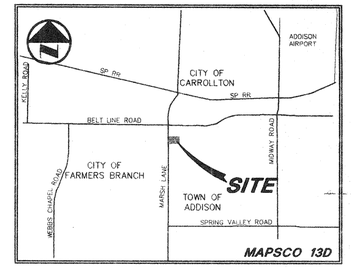
Project No. 78212 Date: May '82





LEGEND

- GM ⊕ ——— GAS METER
- FH ◇ ——— FIRE HYDRANT
- MH ◯ ——— MANHOLE
- CO ⊙ ——— CLEAN OUT
- WV ⊗ ——— WATER VALVE
- WM ▢ ——— WATER METER
- LS ☼ ——— LIGHT STANDARD
- FL ⌘ ——— FLOOD LIGHT
- PP ● ——— POWER POLE
- ——— PROPERTY LINE



VICINITY MAP

DESCRIPTION OF PROPERTY SURVEYED

DESCRIPTION of a 0.844 acre tract of land situated in the Thomas L. Chenoweth Survey, Abstract No. 273, Dallas County, Texas, and also being part of Les Lacs Plaza Subdivision, an addition to the Town of Addison, as recorded in Volume 83064, Page 2724, Deed Records, Dallas County, Texas; said 0.844 acre tract being more particularly described as follows:

COMMENCING, at a 1/2-inch iron rod found at the southwesterly end of a corner clip at the intersection of the east line of Marsh Lane (100-foot right-of-way), and the south line of Belt Line Road (100-foot right-of-way);

THENCE, South 00 degrees, 56 minutes, 06 seconds West, with the east line of Marsh Lane, a distance of 204.43 feet to a 1/2-inch iron rod with "Pacheco Koch" cap set for corner at the POINT OF BEGINNING;

THENCE, South 89 degrees, 03 minutes, 54 seconds East, departing the east line of Marsh Lane, a distance of 248.50 feet to a 1/2-inch iron rod with "Pacheco Koch" cap set;

THENCE, South 00 degrees, 56 minutes, 06 seconds West, passing at a distance of 28.77 feet a northwest corner of Lot 3, Block D of the Town Center Addition, an addition to the Town of Addison as recorded in Volume 93237, Page 3848, continuing with a west line of said Lot 3, Block D, a total distance of 148.00 feet to a 1/2-inch iron rod with "Pacheco Koch" cap set;

THENCE, North 89 degrees, 03 minutes, 54 seconds West, departing the west line of said Lot 3, Block D, Town Center Addition, a distance of 248.50 feet to a 1/2-inch iron rod with "Pacheco Koch" cap set for corner in the easterly line of said Marsh Lane;

THENCE, North 00 degrees, 56 minutes, 06 seconds East, with said east line of Marsh Lane, a distance of 148.00 feet to the POINT OF BEGINNING;

CONTAINING, 36,778 square feet or 0.844 acres of land, more or less.

SURVEYORS CERTIFICATE

I hereby affirm that on the 7th day of March, 1994, this survey was made on the ground as per the field notes shown on this survey and is true, correct, and accurate as to the boundaries and areas of the subject property and the size, location and type of buildings and improvements thereon, if any, and as to the other matters shown hereon, and correctly shows the location of all visible easements and rights-of-way and of all rights-of-way, easements and other matters of record, of which I have knowledge or have been advised, whether or not of record, affecting the subject property.

Except as shown on the survey, there are no encroachments upon the subject property by improvements on adjacent property, there are no encroachments on adjacent property, streets, or alleys by any improvements on the subject property and there are no conflicts or protrusions.

The subject property is shown on the Federal Emergency Management Agency FIA Flood Insurance Rate Map for the Town of Addison, Texas, Community Panel No. 481089 0005 A, dated July 16, 1980, is in "ZONE B", areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less then one square mile; or areas protected by levees from the base flood.

James A. Koch, Jr.
Registered Professional Land Surveyor
No. 4688

Mike
Please file
JB

NOTES:

1. BEARING SYSTEM BASED ON PLAT OF LE LACS PLAZA, AN ADDITION TO THE TOWN OF ADDISON AS RECORDED IN VOLUME 83064, PAGE 2724, DEED RECORDS, DALLAS COUNTY, TEXAS.
2. THE LOCATION AND SIZES OF UNDERGROUND UTILITIES PORTRAYED HAVE BEEN BASED ON INFORMATION ON FILE WITH THE TOWN OF ADDISON.

THE FOLLOWING DO NOT AFFECT THE SUBJECT TRACT

1. DRAINAGE EASEMENT RECORDED IN VOLUME 93084, PAGE 5482

BM#1 "+" CUT TOP FLANGE BOLT EAST SIDE OF FIRE HYD. BETWEEN "CHATTANOOGA" AND AN "TENN", APPROX. 40 FEET WEST OF CENTERLINE MARSH LANE AND 55 FEET SOUTH OF THE CENTERLINE OF BELT LINE ROAD.
ELEV. 570.85

BM#2 "□" CUT IN THE CENTER OF AN 21 FOOT INLET LOCATED ON THE WEST SIDE OF THE PARKING AREA OF THE TOWN CENTER ADDITION AND LOCATED APPROX. 30 SOUTH OF INTERSECTION OF A NORTH LINE OF THE TOWN CENTER ADDITION AND THE EAST LINE OF THE BOSTON CHICKEN ADDITION.
ELEV 572.14

BM#3 "□" CUT IN THE CENTER OF AN INLET ON THE EAST SIDE OF MARSH LANE APPROX. 425 FEET SOUTH OF THE CENTERLINE OF BELT LINE ROAD
ELEV 569.23

CHICAGO TITLE GF# 94-M-447076-MGC

BOUNDARY AND
TOPOGRAPHIC SURVEY

BOSTON CHICKEN ADDITION

LOCATED IN THE TOWN OF ADDISON, TEXAS
AND BEING OUT OF THE
T.L. CHENOWETH SURVEY, ABSTRACT NO. 273
DALLAS COUNTY, TEXAS

PACHECO KOCH Consulting Engineers, Inc.
Civil Engineering • Land Surveying
9401 LBJ Freeway, Suite 300
Dallas, Texas 75243
(214) 235-3031

DRAWN BY	CHECKED BY	SCALE	DATE	JOB NUMBER
NDC	JAK	1"=20'	MAR 1994	1346-94.046

DWG NO: 1346-02