Higher Standards for Floodplain Management

Flood Risk Reduction				
Category	**Type**	**Sample Codes**	**Description**	**Key Provisions**
Freeboard Requirements	*Fixed Freeboard Above BFE*	Aurora, TX: Flood Damage Prevention Ordinance	Establishes additional elevation above FEMA minimum standards to reduce flood risk.	Residential structures and manufactured homes must be elevated a minimum of two feet (2') above the BFE. Nonresidential structures must either meet the same elevation standard or be floodproofed to that elevation.
		Johnson County, TX: Flood Damage Prevention Order	Establishes a three-foot (3') freeboard requirement above FEMA minimum standards.	Residential structures and manufactured homes must be elevated a minimum of three feet (3') above the BFE. Nonresidential structures must either meet the same elevation standard or be floodproofed to that elevation.
	Fully Developed Conditions Freeboard	Denton, TX: Development Code	Incorporates fully developed watershed conditions into freeboard requirements to account for future flood risk.	Minimum finished floor elevations must be established eighteen inches (18") above the 100-year water surface elevation based on fully developed watershed conditions or thirty inches (30") above the flood insurance study water surface elevation. Nonresidential structures must either meet the same elevation standard or be floodproofed to that elevation.
		Mansfield, TX: Flood Damage Prevention Ordinance	Incorporates fully urbanized hydrology studies into minimum elevation standards to account for future development conditions.	Residential structures and manufactured homes must be elevated a minimum of three feet (3') above the BFE or two feet (2') above elevations determined through fully urbanized hydrology studies. Nonresidential structures must either meet the applicable elevation standard or be floodproofed to that elevation.
	Dual-Criteria / Higher-of Standard	Fort Worth, TX: Floodplain Provisions Ordinance	Applies the more restrictive of FEMA flood elevations and fully developed watershed conditions to determine minimum elevation standards.	Residential and nonresidential structures must be elevated a minimum of two feet (2') above the fully developed base flood elevation or FEMA regulatory base flood elevation, whichever is greater. Nonresidential structures may alternatively be floodproofed to the same elevation standard.

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Critical Facility Protection	*Floodplain Avoidance Standards*	Benbrook, TX: Flood Hazard Protection Regulations	Prohibits the placement of critical facilities within high-risk flood hazard areas to reduce potential impacts to public safety, emergency response, and essential services during flood events.	Critical facilities, including emergency centers, hospitals, fire stations, power stations, and hazardous materials storage sites, are prohibited within the 0.2-percent annual chance (500-year) floodplain.
	Elevated Protection Standards	Fort Worth, TX: Floodplain Provisions Ordinance	Establishes enhanced flood protection standards for critical facilities to ensure continuity of essential services during and after flood events.	Critical facilities must be protected to the higher of two feet (2') above the FEMA 0.2-percent annual chance (500-year) flood elevation or the city's 1-percent annual chance (100-year) flood elevation based on fully developed watershed conditions.
		Johnson County, TX: Flood Damage Prevention Order	Establishes enhanced elevation requirements for critical facilities to reduce the risk of flood-related disruption to essential services and emergency operations.	Critical facilities located within the floodplain must have the lowest floor elevated a minimum of three feet (3') above the base flood elevation (BFE).
	Conditional Siting Exceptions	Fort Worth, TX: Floodplain Provisions Ordinance	Prioritizes locating critical facilities outside flood hazard areas while allowing limited siting exceptions when no feasible alternative location exists.	Critical facilities shall be located outside the special flood hazard area whenever feasible. Where no feasible alternative site exists, construction may be permitted within the special flood hazard area provided applicable flood protection standards are met.
		Johnson County, TX: Flood Damage Prevention Order	Prioritizes locating critical facilities outside high-risk flood hazard areas while allowing limited exceptions when no feasible alternative site exists.	Critical facilities should be located outside the 0.2-percent annual chance (500-year) floodplain and A Zones whenever feasible. Where no feasible alternative site exists, development may be permitted provided enhanced flood protection standards are met.

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Category	**Type**	**Sample Codes**	**Description**	**Key Provisions**
Safe Access / Ingress-Egress	*Access Elevation Requirements*	Benbrook, TX: Flood Hazard Protection Regulations	Establishes minimum elevation requirements for streets, driveways, and parking areas located within flood hazard areas.	Streets, driveways, and parking lots must be elevated a minimum of two feet (2') above the base flood elevation (BFE), unless otherwise approved.
	Emergency Access Standards	TFMA Model Language: *A Guide for Higher Standards in Floodplain Management*	Establishes access standards to maintain safe ingress and egress during flood events and ensure continued access to critical facilities.	Development should provide safe ingress and egress during flood events, and access routes serving critical facilities should be elevated to or above the base flood elevation (BFE) to the maximum extent practicable.
Match Pre-Development Runoff	*Peak Discharge Matching*	Denton, TX: Stormwater Design Criteria Manual	Maintains pre-development peak discharge rates through on-site stormwater controls.	On-site controls must be designed and constructed to maintain pre-development peak discharge rates from the site. Supporting calculations and documentation demonstrating compliance are required.
		Kennedale, TX: Public Works Design Manual	Maintains pre-development peak discharge rates to reduce downstream flooding impacts associated with development.	On-site stormwater detention basins must be designed to reduce post-development peak discharge rates to existing pre-development peak discharge rates for the 1-, 2-, 5-, 25-, and 100-year storm events at each point of discharge from the development site.
	Downstream Impact Evaluation	Denton, TX: Stormwater Design Criteria Manual	Requires evaluation of downstream conveyance systems to ensure adequate capacity and prevent adverse flood impacts.	Developers must provide supporting calculations and documentation demonstrating that downstream conveyance systems can safely convey full build-out flood mitigation storm discharges without increasing water surface elevations.
Match Pre-Development Runoff	*Downstream Impact Evaluation*	Kennedale, TX: Public Works Design Manual	Requires evaluation of downstream drainage systems to identify and mitigate development-related increases	Developers must conduct a downstream assessment to evaluate post-development impacts. Where downstream post-development velocities exceed pre-development velocities, the existing

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			in flow velocity and erosion potential.	downstream conveyance system must be improved, reinforced, or stabilized, and proposed velocities must not exceed the allowable range of the improved system.
	On-Site Runoff Mitigation	Denton, TX: Stormwater Design Criteria Manual	Requires stormwater controls to reduce downstream flood impacts and maintain existing drainage conditions.	Stormwater controls must be implemented to prevent increases in downstream peak discharges or water surface elevations resulting from development. Acceptable measures include on-site detention, regional controls, levees, floodwalls, and floodproofing.
		Kennedale, TX: Public Works Design Manual	Requires on-site stormwater management controls to reduce downstream impacts and maintain existing runoff conditions.	On-site stormwater management controls must be installed to ensure downstream post-development discharges are at or below pre-development discharges. Supporting documentation and calculations demonstrating compliance are required.

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Floodplain Preservation				
Category	**Type**	**Sample Codes**	**Description**	**Key Provisions**
Valley Storage Preservation	*No Net Loss Standards*	Benbrook, TX: Flood Hazard Protection Regulations	Preserves floodplain storage capacity by prohibiting reductions in valley storage below the base flood elevation.	Floodplain modifications may not result in any loss of valley storage below the base flood elevation.
		Fort Worth, TX: Floodplain Provisions Ordinance	Preserves floodplain storage capacity by prohibiting reductions in valley storage within regulated flood hazard areas.	No reduction in valley storage (0.0%) is permitted within FEMA Special Flood Hazard Areas (SFHAs) and regulated sump areas.
	Allowable Storage Reduction Standards	Denton, TX: Development Code	Establishes limits on floodplain valley storage loss to preserve stream and drainageway storage capacity and minimize downstream flooding impacts.	Valley storage loss is limited to zero percent (0%) for streams with drainage basins of one square mile or greater. For minor tributaries with drainage basins less than one square mile, valley storage reduction may not exceed fifteen percent (15%).
	Compensatory Storage Requirements	Benbrook, TX: Flood Hazard Protection Regulations	Requires replacement of displaced floodplain storage to maintain flood storage capacity within the affected hydrologic reach.	Fill placed within the special flood hazard area must be offset with compensatory storage within the effective hydrologic reach.
		Fort Worth, TX: Floodplain Provisions Ordinance	Requires replacement of displaced floodplain storage to maintain existing valley storage capacity and reduce downstream flood risk.	An equivalent volume of valley storage must be provided within the same watercourse reach or designated sump area as the proposed development.
No-Rise / No-Adverse Impact	*Flood Elevation Impact Standards*	Flower Mound, TX: Floodplain Regulations	Preserves existing flood elevations by prohibiting increases in the 1-percent annual chance water surface elevation.	Permitted construction or floodplain modifications must result in zero increase in the 1-percent annual chance water surface elevation on upstream, downstream, or adjacent properties.

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No-Rise / No-Adverse Impact	*Flood Elevation Impact Standards*	Fort Worth, TX: Floodplain Provisions Ordinance	Limits increases in base flood elevations resulting from development within the regulatory floodway.	Encroachments within the adopted regulatory floodway are prohibited unless hydrologic and hydraulic analyses demonstrate that the encroachment will not increase the base flood elevation during the 1-percent annual chance storm event under fully developed conditions.
		Richardson, TX: Floodplain Management Ordinance	Limits increases in base flood elevations resulting from development in areas where a regulatory floodway has not been designated.	Where a regulatory floodway has not been designated, development may only occur if cumulative impacts will not increase the base flood water surface elevation by more than one foot (1') at any point within the community.
		Wise County, TX: Flood Damage Prevention Ordinance	Preserves existing flood elevations by prohibiting increases in base flood elevations resulting from development within special flood hazard areas.	Development within Zone A and Zone AE special flood hazard areas must demonstrate that the difference between existing and proposed base flood elevations does not exceed 0.00 feet.
	Hydraulic Performance Standards	Flower Mound, TX: Floodplain Regulations	Preserves hydraulic performance by prohibiting increases in floodwater velocities resulting from development within flood hazard areas.	Permitted construction or floodplain modifications must result in zero increase in water velocity on upstream, downstream, or adjacent properties.
		Fort Worth, TX: Floodplain Provisions Ordinance	Preserves floodway conveyance and hydraulic performance by restricting encroachments that increase flood flows or flood damages.	Encroachments within the adopted regulatory floodway are prohibited unless hydrologic and hydraulic analyses demonstrate that flood flows and flood damages will not increase under fully developed conditions.

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No-Rise / No-Adverse Impact	*Hydraulic Performance Standards*	Richardson, TX: Floodplain Management Ordinance	Preserves the flood-carrying capacity of altered or relocated watercourses to maintain flood conveyance.	Altered or relocated watercourses must be maintained so that their flood-carrying capacity is not diminished.
	Engineering Demonstration Requirements	Benbrook, TX: Flood Hazard Protection Regulations	Requires applicants to demonstrate that proposed floodplain encroachments will not increase flood risk or adversely affect floodplain function.	Fill and other encroachments within the special flood hazard area are prohibited unless the applicant demonstrates no rise in flood elevations and no adverse impact.
		Flower Mound, TX: Floodplain Regulations	Requires engineering analyses to demonstrate compliance with floodplain exception criteria.	A hydraulic study prepared by a licensed professional engineer must be submitted to verify compliance with floodplain exception requirements.
		Fort Worth, TX: Floodplain Provisions Ordinance	Requires detailed engineering analyses to establish floodplain conditions and support development within flood hazard areas.	Base flood elevations and regulatory floodways must be established through detailed engineering studies and hydrologic and hydraulic analyses where not otherwise provided.
Stream Setbacks	*Fixed Distance Setbacks*	Benbrook, TX: Zoning Ordinance	Establishes fixed setback distances from the Trinity River to protect natural features and vegetation along the river corridor.	Residential structures must be located at least twenty feet (20') from the upper bank of the Trinity River. Trees and natural vegetation with a trunk diameter of four inches DBH or greater may not be removed within ten feet (10') of the top of the riverbank without approval.
	Feature-Based Setbacks	Dallas, TX: Development Code	Establishes natural channel setbacks based on channel geometry and soil conditions.	Development must be located behind the natural channel setback line, which is determined using channel crest and toe locations, minimum setback distances, and designated side slopes based on soil conditions.

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Category	**Type**	**Sample Codes**	**Description**	**Key Provisions**
Stream Setbacks	*Resource Protection Buffers*	Denton, TX: Development Code	Establishes protective buffers around environmentally sensitive riparian and water-related habitat areas and limits disturbance within protected resources.	Disturbances exceeding allowable limits within protected riparian and water-related habitat areas require approved mitigation measures to offset impacts to ecological resources.
	Floodway-Based Setbacks	TFMA Model Language: *A Guide for Higher Standards in Floodplain Management*	Establishes development setbacks measured from floodway boundaries and stream channel features to preserve floodplain function and reduce flood risk.	Proposed development adjacent to riverine floodplains must be set back a specified distance from the floodway boundary, top of channel bank, or stream centerline where a floodway has not been delineated.

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