SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY (SSCAFCA)

RESOLUTION 2001 – 6

DRAINAGE DESIGN CRITERIA FOR ROADWAY PROJECTS

WHEREAS, the Board of Directors of the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) met in regular session at the Rio Rancho Country Club, 500 Country Club Drive, Rio Rancho, New Mexico on March 20, 2001 at 1:00 p.m. as per law; and

WHEREAS, the Board of Directors, in 1994, adopted a Drainage Policy wherein it indicated that both public and privately built storm drainage facilities within SSCAFCA's jurisdiction will be designed to accommodate the 100-year storm runoff; and

WHEREAS, the Board of Directors now wishes to adopt a specific design criteria for roadway projects within SSCAFCA's jurisdiction.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY that the Drainage Design Criteria for New Mexico State Highway and Transportation Department Projects (Revised Date: November 1998), is hereby adopted as the official design criteria for Collector, Minor and Major arterial roadway projects within the geographical jurisdiction of SSCAFCA.

A copy of said Criteria is attached hereto and incorporated herein by reference.

PASSED, ADOPTED AND SIGNED by the Board of Directors of SSCAFCA this 20th day of March, 2001.

SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY

By: Wm. C. Yarbrough
Wm. C. Yarbrough
Chairman, Board of Directors

(SEAL)

ATTEST:
Richard Daubel
Secretary

DRAINAGE DESIGN CRITERIA

FOR

NEW MEXICO STATE HIGHWAY & TRANSPORTATION DEPARTMENT PROJECTS

REVISED DATE:

November, 1998

Approved for Implementation: Pete K. Rahn

NMSHTD SECRETARY

12-16-98

Date

DRAINAGE DESIGN CRITERIA FOR NMSHTD PROJECTS

Effective Date: March 1996 Revised Date: November 1998

It is the Policy Administrative Memorandum Number 221, Rural/Urban Drainage, of the New Mexico State Highway & Transportation Department (NMSHTD) to design drainage structures to meet certain minimum standards. In general, drainage structures are designed to safely pass a flood flow, the magnitude of which is commensurate with an appropriate level of public safety and economic risk. This document establishes minimum standards in terms of design frequency floods and their effects on the transportation facility. Design frequency floods shall be estimated using the standard procedures described in the NMSHTD Drainage Manual, latest edition. **Drainage Design Criteria for NMSHTD projects is subject to change without notice. All drainage designers are encouraged to verify that they are using the current Drainage Design Criteria by contacting the NMSHTD Drainage Section in Santa Fe.**

Design frequency flood events have been selected for different roadways based on highway classification, location, average daily traffic (ADT), user safety, risk, and consideration of economic impacts. Drainage structures on most NMSHTD projects should be designed to pass the peak flow from the appropriate design frequency flood. In some instances, the NMSHTD may require a higher design standard. This is potentially the case in urban areas where a separate drainage policy is in effect.

Drainage Structures must also be designed to meet all applicable laws. There are laws concerning:

- Alterations of floodplains established in flood insurance studies.
- Construction in flood hazard areas.
- Encroachments or effects on the waters of the United States.
- Water pollution control, including sediment control.
- Protection of fish and wildlife.
- Protection of neighboring property owners.
- Prevention of adverse social and economic impacts.
- Protection of historic properties and archaeological sites.

Specific legal requirements for each project and possible problem locations should be identified early in the design process. In general, drainage structure design should include the following principles:

- Natural drainage onto and off of the highway right-of-way must be maintained.
- Significant diversion of the natural drainage path must be avoided.
- The legal system recognizes the 100-year frequency flood as a foreseeable event. therefore, the effects of the 100-year frequency flood must be evaluated.
- Drainage Structures should be sized to minimize the attenuation of peak flood flows and to promote the passage of sediment and debris.
- Consideration shall be given to future maintenance operations and to the preservation of the constructed highway.

- The level of hydrologic analysis is related to the importance of the drainage structure.
- Drainage structures should be designed to minimize upstream and downstream effects.
- Adverse effects on adjacent properties should be avoided.

Rural Drainage Design Criteria

Drainage Structure locations are considered rural when the watershed lands are undeveloped, or are used for agricultural purposes including rangeland. Design frequency flood magnitudes for rural areas are listed in Table I. The duration for all design frequency floods is 24 hours, except for the Rational methodology where the duration is one hour. Designers should use these flood magnitudes for design unless otherwise directed in writing by the NMSHTD Drainage Section. Maximum Water Surface limits shown in Table I should be observed. Hydrologic and Hydraulic analyses of drainage structures should be performed using the methods identified in the NMSHTD Drainage Manual, latest edition.

The engineer shall endeavor to match the width of the active channel when designing any structure. The engineer shall avoid decreasing the existing structure size and/or plugging structure unless justifiable.

Detention and retention ponds shall be designed for the 50-year storm with one foot of freeboard.

Developers are responsible for the additional runoff generated within the highway right-of-way as a result of new developments; they must ensure that no flows from new developments are allowed within the highway right-of-way.

Table I

Rural Drainage Design Criteria

Roadway Classification	Drainage Structure Type	Design Frequency Flood	Maximum Water Surface
Interstate, four-lane State or Federal Highways	Swells Inlets Rundown	50-year	Not to exceed the edge of driving lane. Limit the water spread to no more than one through-lane for the 100-year frequency flood. Design rundowns to contain water inside the rundowns.
	Crossing Culverts	50-year	Culvert soffit. Limit the 100-year water surface to the edge of shoulder. Existing structures: the water surface can get as high as the edge of shoulder for the design frequency flood.
	Bridges	50-year	A minimum of 2 feet of freeboard from the bottom chord of bridge is required and the 100-year discharge shall not overtop the bridge deck.
	Bridge Scour Analysis	100-year or overtopping	Check the 500-year flood for foundation design.
Two-lane State or Federal Highways	Swales Inlets Rundown	50-year	Not to exceed the edge of driving lane. Limit the water spread to no more than one-half of a through-lane for the 100-year frequency flood. Design rundowns to contain water inside the rundowns.
	Crossing Culverts	50-year	Culvert soffit. Limit the 100-year water surface to the edge of shoulder. Existing structures: the water surface can get as high as the edge of driving lane.
	Bridges	50-year	A minimum of 2 feet of freeboard from the bottom chord of bridge is required and the 100-year discharge shall not overtop the bridge deck.
	Bridge Scour Analysis	100-year or overtopping	Check the 500-year flood for foundation design.
Detours	All Structure Types	2-year	Top of detour culvert soffit.

See General Design Notes on next sheet.

General Design Notes:

1. The design frequency flood may be changed when a risk analysis indicates that an inappropriate design flood has been used.

2. Drainage structures must be sized such that the 100-year floodplain is not made worse on adjacent properties with high cost improvements.

3. Structure sizes should account for sediment bulking of the flow.

4. In no case shall a culvert size be less than a 24" circular pipe culvert or its equivalent hydraulic capacity.

Urban Drainage Design Criteria

Drainage Structure locations are considered urban when the watershed lands have been developed for human activity. Design frequency flood magnitudes for urban areas are listed in Table II. The duration for all design frequency floods is 24 hours, except for the Rational methodology where the duration is one hour. Designers should use these flood magnitudes for design unless otherwise directed in writing by the NMSHTD Drainage Section. Maximum water surface limits shown in Table II should be observed. Hydrologic and Hydraulic analyses of drainage structures should be performed using the methods identified in the NMSHTD Drainage Manual, latest edition.

The engineer shall endeavor to match the width of the active channel when designing any structure. The engineer shall avoid decreasing the existing structure size and/or plugging structure unless justifiable.

Detention and retention ponds shall be designed for the 100-year storm with one foot of freeboard.

Developers are responsible for the additional runoff generated within the highway right-of-way as a result of new developments; they must ensure that no flows from new developments are allowed within the highway right-of-way.

Urban Drainage Procedures

A. Roadway projects within urban areas shall be designed and constructed with an adequate drainage system to enhance the safety, durability, and economy of maintenance without adversely affecting the adjacent properties.

B. A complete evaluation of storm water accumulation shall be conducted within the project limits by the lead agency.

C. The design of the drainage system for collection and disposal of the accumulated runoff shall be based on sound engineering principles.

D. The cost of constructing the drainage system shall be prorated between the roadway project and the municipality based on the following principles:

    1. The cost of drainage structures to accommodate the existing drainage crossing the roadway within a natural or man-made channel shall be included in the roadway cost.

    2. To accommodate overland and street flow tributary to the roadway, a drainage system shall be designed based on a 10-year frequency storm. The responsibility for funding this system shall be as follows:

        a. The cost of the drainage system required to accommodate the runoff from existing tributary drainage areas in existing condition shall be a participating

roadway cost.

1. The existing condition is defined as that "condition" prior to development of local streets and/or other facilities that divert or concentrate flow onto the right-of-way.

2. If the existing condition cannot be reasonably defined, the participating amount will be based upon the flow generated within the NMSHTD right-of-way.

b. The additional cost of the drainage system required to accommodate the runoff from the existing tributary drainage areas in a fully developed condition shall be borne by the municipality.

E. All runoff diverted into the project limits shall be the financial responsibility of the municipality and community; this includes the case when the diverted runoff is discharged into the State's storm drain system and/or right-of-way.

F. When a drainage system proves to be feasible and is recommended by the Department but the municipality does not agree to assume its prorated share, the project shall not proceed unless other agreements are reached.

G. The participating storm drain system costs will be the product of the total cost and the ratio of the existing flow to the developed flow, or as negotiated in the Agreement with the local entity.

Table II
Urban Drainage Design Criteria

Roadway Classification	Drainage Structure Type	Design Frequency Flood	Maximum Water Surface
Interstate Highways	Swales Inlets Rundown	50-year	Not to exceed the edge of driving lane. Limit the water spread to no more than one through-lane for the 100-year frequency flood. Design rundowns to contain water inside the rundowns.
	Curb Drop Inlets	50-year	Limit the water spread to shoulder plus 1/3 of the driving lane. Trunkline shall be designed so that the 100-year hydraulic grade line is maintained below the grate elevation.
	Crossing Culverts	50-year	Culvert soffit. Limit the 100-year water surface to the edge of shoulder. Existing structures: the water surface can get as high as the edge of shoulder for the design frequency flood.
	Bridges	100-year.	A minimum of 2 feet of freeboard from the bottom chord of bridge is required and the 100-year discharge shall not overtop the bridge deck.
	Bridge Scour Analysis	100-year or overtopping	Check the 500-year flood for foundation design.

Table II
Urban Drainage Design Criteria
(Continued)

Four-lane & Two-lane State or Federal Highways	Swales Rundown	50-year	Not to exceed the edge of driving lane. Limit the water spread to no more than one half through-lane for the 100-year frequency flood. Design rundowns to contain water inside the rundowns.
	Storm drain, Inlets, and Trunklines	10-year	Maintain one-through lane open to traffic at all times and the 100-year storm shall be contained within the right-of-way. In no case shall the 100-year HGL at the trunkline exceed the inlet grate elevation.
	Crossing Culverts	50-year	Culvert soffit. Limit the 100-year water surface to the edge of shoulder. Existing structures: the water surface can get as high as the edge of driving lane for the design frequency flood.
	Bridges	50-year	A minimum of 2 feet of freeboard from the bottom chord of bridge is required and the 100-year discharge shall not overtop the bridge deck.
	Bridge Scour Analysis	100-year orovertopping	Check the 500-year flood for foundation design.
Detours	All Structure Types	2-year	Top of detour culvert soffit.

General Design Notes:

1. The design frequency flood may be changed when a risk analysis indicates that an inappropriate design flood has been used.
2. Drainage structures must be sized such that the 100-year flood plain is not made worse on adjacent properties with high cost improvements.
3. Structure sizes should account for sediment bulking of the flow.
4. In no case shall a culvert size be less than a 24" circular pipe culvert or its equivalent hydraulic capacity.
5. For interstate highways, use the 100-year design if population exceeds 250,000.

DRAINAGE REQUIREMENTS FOR STREETS AND ROADS

	City of Albuquerque	City of Rio Rancho	NMSH&TD	AMAFCA	SSCAFCA	Village of Corrales
Design Storm/Duration	100 year/6-hr	100 year/6-hr	50 year/24hr[1]	100 year/6-hr	100 year/6 hr	100 year/duration not specified
Depth of Flow in Street [2]	0.87 ft at any point within ROW or 0.2 feet above top of curb. During a 10-year storm, the product of depth times velocity shall not exceed 6.5 at any location in any street.	0.87 ft at any point within ROW or 0.2 feet above top of curb During a 10-year storm, the product of depth times velocity shall not exceed 6.5 at any location in any street.	Not to exceed edge of driving lane. Limit the water spread to no more than one half through-lane for 100 year frequency flood.	Not specified. Follows City of Alb. criteria.	Not specified	Not specified. Requires bar ditch 1' deep minimum.
Crossings	Streets other than arterial, collector and sole access may cross major arroyos and other water-courses by means of a "dip section" or "overflow section" provided depth times velocity does not exceed 6.5 for that portion of the 10-year storm runoff crossing the street	Streets other than arterial, collector and sole access may cross major arroyos and other water-courses by means of a "dip section" or "overflow section" provided depth times velocity does not exceed 6.5 for that portion of the 10-year storm runoff crossing the street	"Dip Sections" not allowed. Culvert must be designed and installed so that the upstream water surface does not rise above the soffit of the culvert. Culvert must be minimum of 24" diameter, or equivalent hydraulic capacity. Limit the 100-year water surface to the edge of shoulder.	Not specified. Follows City of Alb. criteria.	Not specified	Not specified
[2] Street Type	Local, Major Local, Collector, Minor/Major Arterials	Local, Major Local, Collector, Minor/Major Arterials	Collector, Minor/Major Arterials	Follows City of Alb. criteria	All	All

[1] NMSH&TD requires that the effects of a 100-year/24 hour storm be evaluated.

Note: A 100-yr/6 hr storm will produce approximately 2.25 inches of rain at Loma Larga Road and the Bernalillo/Sandoval County Line. A 50-year/24hr storm will produce approximately 2.38 inches of rain at the same location. A 100 yr/24hr storm produces 2.65"; 10yr/24hr storm produces 1.77"; 10yr/6hr storm produces 1.50".