Conventional Roof Drainage Systems

PURPOSE
The roof drainage system is designed to receive rainwater as it falls on the roof and convey it to the street, sewer facilities or other means available for its disposal. This system should be sized to handle the maximum rainfall used as design criteria for a project. The following information covers the basic requirements for the sizing of conventional roof drainage systems and the placement of their components.

QUANTITY
To minimize water ponding and insure complete drainage, two roof drains should be installed for total roof areas of 10,000 sq. ft. or less. For larger roof areas, roof drains should be installed at the minimum of one drain for each 10,000 sq. ft. of roof area.

Roofs are of various shapes and dimensions, with sections which may be more or less than the 10,000 sq. ft. recommendation for each drain. Therefore, sometimes it will be necessary to depart from this recommendation as required for proper placement and uniform distribution of roof drains.

PLACEMENT
The placement of roof drains is influenced by roof structure support columns, expansion joints, dividers and other projections. Careful consideration of these elements during the placement-planning phase is essential to provide adequate drainage for each area. Figure 2 shows how the roof drains can be placed on a dimensional basis with a maximum limit from the edge of the roof and between drains.

OVERFLOW RELIEF
The perimeter edge of a roof structure is generally elevated by parapets, cants or other means. A blockage in the drainage piping could cause a water buildup which could overload the roof structure. To prevent this occurrence, it is recommended that overflow relief measures such as scupper or parapet drains be specified at the ratio of at least one for each 20,000 sq. ft. of roof area. The invert elevation of the scupper should not be more than a safe water depth as determined in conjunction with the architect and structural engineer, not more than 5 inches above roof level on flat roofs and 6 inches above low point on sloped roofs.

RAINFALL DATA
The rainfall that can be expected in a given locality can be obtained from the local code authorities or the nearest rainfall recording station. A study of the maximum rate of rainfall in inches per hour that has been recorded or estimated in U.S. Weather Bureau technical papers No. 2, No. 25, and No. 40 has enabled us to develop a composite average of maximum rainfall data for design purposes in various localities as shown in Figure 4. For localities that have not been listed, the approximate maximum rainfall data can be determined from the map shown in Figure 5. It is recommended that the local code authorities be consulted regarding the specific rainfall amount that they may anticipate for design purposes.

State & City	Rainfall in inches per hour
ALABAMA	
Anniston	3.6
Birmingham	3.6
Mobile	4.2
Montgomery	3.8
ALASKA	
Anchorage	1.0
Fairbanks	1.2
Juneau	1.0
ARIZONA	
Phoenix	2.5
Tucson	3.0
ARKANSAS	
Bentonville	3.8
Fort Smith	3.9
Little Rock	3.7
CALIFORNIA	
Bakersfield	1.5
Eureka	1.6
Fresno	1.5
Los Angeles	2.0
Sacramento	1.4
San Diego	1.5
San Francisco	1.6
San Jose	1.6
COLORADO	
Denver	2.5
Durango	1.7
Grand Junction	1.6
Pueblo	2.6
CONNECTICUT	
Hartford	3.0
New Haven	3.0
DELAWARE	
Wilmington	3.5
DISTRICT OF COLUMBIA	
Washington	3.4
FLORIDA	
Apalachicola	4.3
Fort Meyers	4.3
Jacksonville	4.0
Key West	4.5
Miami	4.6
Pensacola	4.3
Tampa	4.2
GEORGIA	
Atlanta	3.5
Augusta	3.6
Columbus	3.7
Macon	3.7
Savannah	4.0
Thomasville	4.0
HAWAII	
Hilo	3.0
Honolulu	3.2
IDAHO	
Boise	1.1
Lewiston	1.1
Pocatello	1.3
ILLINOIS	
Cairo	3.4
Chicago	3.0
Peoria	3.1
Springfield	3.3
INDIANA	
Evansville	3.0
Fort Wayne	2.6
Indianapolis	2.8
South Bend	2.8
Terre Haute	2.9
IOWA	
Burlington	3.3
Davenport	3.2
Des Moines	3.3
Dubuque	3.1
Sioux City	3.3
KANSAS	
Concordia	3.7
Dodge City	3.6
Topeka	3.7
Wichita	3.7
KENTUCKY	
Lexington	2.8
Louisville	2.9
LOUISIANA	
Lake Charles	4.4
New Orleans	4.5
Shreveport	4.0
MAINE	
Portland	2.3
MARYLAND	
Baltimore	3.4
MASSACHUSETTS	
Boston	2.6
Nantucket	3.0
MICHIGAN	
Alpena	2.2
Detroit	3.0
Escanaba	2.3
Grand Rapids	2.6
Marquette	2.2
Port Huron	2.4
Saginaw	2.4
Sault St. Marie	2.0
MINNESOTA	
Duluth	2.6
Minneapolis	3.0
St. Paul	3.0
MISSISSIPPI	
Jackson	3.8
Meridan	3.8
Vicksburg	3.7
MISSOURI	
Columbia	3.6
Hannibal	3.4
Kansas City	3.7
St. Joseph	3.6
St. Louis	3.4
Springfield	3.7
MONTANA	
Billings	2.0
Havre	1.8
Helena	1.5
Missoula	1.3
NEBRASKA	
Lincoln	3.6
North Platte	3.3
Omaha	3.5
NEVADA	
Reno	1.2
NEW HAMPSHIRE	
Concord	2.4
NEW JERSEY	
Atlantic City	3.5
Newark	3.0
Trenton	3.2
NEW MEXICO	
Albuquerque	2.1
Roswell	2.6
Santa Fe	2.2
NEW YORK	
Albany	2.5
Binghamton	2.5
Buffalo	2.4
New York	3.2
Rochester	2.4
Syracuse	2.3
NORTH CAROLINA	
Asheville	3.2
Charlotte	3.4
Greensboro	3.4
Raleigh	3.7
Wilmington	4.0
NORTH DAKOTA	
Bismark	2.8
Fargo	2.8
OHIO	
Cincinnati	2.7
Cleveland	3.0
Columbus	2.7
Dayton	2.6
Sandusky	3.0
Toledo	3.0
Youngstown	2.6
OKLAHOMA	
Oklahoma City	3.9
Tulsa	3.9
OREGON	
Medford	1.4
Pendleton	1.0
Portland	1.4
PENNSYLVANIA	
Allentown	3.0
Erie	3.0
Harrisburg	2.9
Philadelphia	3.3
Pittsburgh	2.7
Reading	3.0
Scranton	2.6
PUERTO RICO	
San Juan	4.0
RHODE ISLAND	
Block Island	3.0
Providence	3.0
SOUTH CAROLINA	
Charleston	4.1
Columbia	3.6
Greenville	3.4
SOUTH DAKOTA	
Pierre	2.9
Rapid City	2.7
Sioux Falls	3.3
TENNESSEE	
Chattanooga	3.3
Knoxville	3.2
Memphis	3.6
Nashville	3.1
TEXAS	
Abilene	3.5
Amarillo	3.4
Austin	4.0
Brownsville	4.5
Corpus Christi	4.5
Dallas	4.0
Del Rio	4.5
El Paso	2.4
Fort Worth	4.0
Galveston	4.6
Houston	4.5
Port Arthur	4.5
San Antonio	4.0
Wichita Falls	3.8
UTAH	
Salt Lake City	1.3
VERMONT	
Burlington	2.0
VIRGINIA	
Lynchburg	3.4
Norfolk	3.8
Richmond	3.6
Roanoke	3.3
WASHINGTON	
Port Angeles	1.0
Seattle	1.0
Spokane	1.0
Tacoma	1.1
Walla Walla	1.0
Yakima	1.0
WEST VIRGINIA	
Charleston	2.8
Huntington	2.8
Parkersburg	2.6
WISCONSIN	
Green Bay	2.6
La Crosse	2.9
Madison	3.0
Milwaukee	2.7
WYOMING	
Casper	2.1
Cheyenne	2.5
Sheridan	2.1
Yellowstone Park	1.5

FIGURE 4