APPENDIX

A. DATA COLLECTION/PUBLISHED DATA

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A. DATA COLLECTION/PUBLISHED DATA

A.1 DATA COLLECTION

All of the information presented in this section may not be required to address the needs of each project.

Table A-1, below, lists examples of data, along with typical sources and uses, for three data categories, including:

- Completed or ongoing studies
- Natural resource base
- Manmade features

Drainage projects typically require numerous potential sources of data. Identifying these sources can be difficult and making the subsequent necessary contacts can be time-consuming. To assist in this process, Table A-1, below, includes typical data sources. In many cases, the local community or Water Management District in which the drainage project is being conducted is either the best source of data or the most logical starting point.

The primary use of drainage data is to quantify the hydrologic/hydraulic characteristics of the watershed to evaluate stormwater runoff discharge and volume. Quantification of watershed characteristics is a must for both existing and future conditions. Table A-1, below, presents examples of data uses.

Before initiating calculations, collect drainage data using the following general guidelines:

1. Identify data needs, sources, and uses, using Table A-1 as a checklist. Much of this information will have to be provided in the environmental document and supporting files.

2. Collect published data, based on sources identified in Step 1 and information presented in Section A.2.

3. Compile and document the results of Step 2, and compare data needs and uses with the availability of published data. Identify any additional field data needs.

4. Collect field data based on needs identified in Steps 1 and 3, using information presented in Section A.3.

5. Compile and document the results of Step 4.

Table A-1: Data Needs, Sources, and Uses

Data Needs	Examples	Typical Sources	Examples of Uses
1. Completed or ongoing studies	Storm Master Plan	County, City, or Water Management District	Establish type and configuration of future stormwater control facilities
	208 Plan	• U.S. Environmental Protection Agency • Regional Planning Agency	Delineate watersheds and subbasins
	SCS Pl 566 Plan	U.S. Environmental Protection Agency	Establish flood flows, stages, and area of inundation on principle streams
	Flood Plain Information	U.S. Army Corps of Engineers	Establish flood flows, stages, and area of inundation on principle streams
	Special Studies	• City or County • U.S. Geological Survey • Regional Planning Agency	Varies with Study
	Flood Insurance Study	• U.S. Federal Emergency Management Agency/Department of Housing and Urban Development • City or County	Establish flood flows, stages, and area of inundation of principle streams
	Topographic Map	• U.S. Geological Survey • Regional Planning Agency • Water Management District • Field Survey • FL. Dept. of Environmental Protection	• Delineate watersheds and subbasins • Identity potential detention sites • Determine land slope

Data Needs	Examples	Typical Sources	Examples of Uses
2. Natural Resource Base	Soils	• U.S. Natural Resources Conservation Service • Construction Logs	• Determine the runoff coefficients, curve numbers, and other runoff factors • Evaluate erosion potential • Project construction condition
	Historic Inundation Areas and High Waters	• U.S. Geological Survey • City or County • Water Management District • Regional Planning Agency • News Media – Newspapers, Radio, T.V. • Museums, Historical Societies • Residents • Field Survey	• Document location and severity of historic inundation and other problems
	Precipitation Intensity-Soils Duration-Frequency Data	• National Weather Service • Water Management District	Develop design storms
	Historic Stage and Discharge	• National Weather Service • Water Management District	Assess severity of historic floods
3. Manmade Features	Stream Stage and Discharge	• U.S. Geological Survey • Water Management District	• Develop discharge-probability relationships • Assess severity of historic floods
	Existing Land Use Areas and High Waters	• Regional Planning Agency • Field Survey	Determine runoff coefficients, curve numbers, and other factors
	Land Use Plan	• Regional Planning Agency • City or County	Determine runoff coefficients, curve numbers, and other factors
	Zoning Map and Ordinance	City or County	Project future land use
	Subdivision Plats	City or County	• Project future land use • Established type and configuration of future stormwater control facilities

Data Needs	Examples	Typical Sources	Examples of Uses
	Agricultural and Other Land Management Measures	• U.S. Natural Resources Conversation Services • Regional Planning Agency • Field Survey	Determine runoff coefficients, curve numbers, and other factors
	Transportation, Sewage and Other Public Facility-Systems and Plans	• Regional Planning Agency • City or County • Department of Transportation	• Establish future watershed and sub-basin divides • Project future land use
	Stormwater Systems Maps, Plans, Profiles; As-Builts	• Regional Planning Agency • City or County	• Delineate existing/future watershed and sub-basin divides • Develop hydraulic characteristics
	Bridge, Culverts, Channels, and Other Hydraulic Structure As-Builts or Plans Subdivisions Plats	• Water Management District • Department of Transportation • Field Survey	• Delineate existing/future watershed and sub-basin divides • Develop hydraulic characteristics
	Land Ownership—Public vs. Private	City or County	Identify potential sites for detention and other facilities

A.2 PUBLISHED DATA

Published data include soils, land use, precipitation, topography and contour, streamflow and flood history, and groundwater. A good basic reference for water resources data in Florida is the *Water Resources Atlas of Florida* (Florida State University, 1984). Of particular relevance to drainage projects are data on weather and climate, surface water, groundwater, water quality, drainage, flood control, navigation, and ecosystems.

A.2.1 Soils

Collect published soils data by following this procedure:

1. Identify soils data needed to evaluate runoff, soil erosion, slope and foundation stabilities, and hydraulic conductivity.

2. Obtain soils data from the U.S. Natural Resources Conservation Service (formerly the U.S. Soil Conservation Service [SCS]) in the form of detailed soils reports for the county area being considered. Old plans, construction logs, and soil boring results can provide additional site-specific data. Specific project information usually is available during the final design stage.

When a project involves a channel in which storm tide surge conditions may be expected to result in erosion of the channel, the geology in the area of the channel is important in analyzing the nature of the potential erosion enlargement. More detailed and extensive borings may be important, which would not be the case where channel stability is reasonably assured. You may need to make a preliminary assessment of the potential for enlargement to specify the extent of the geotechnical study required.

A.2.2 Land Use

Collect published land use data by following this procedure:

1. Determine historical land use from older land use maps or aerials.

2. Determine current land use from sources such as land use maps, aerial photographs, and field reconnaissance. Contact appropriate county and municipal governments. Regional Planning Councils and Water Management Districts also may have existing land use data. Compare historical (from Step 1) and current land use to identify areas undergoing rapid growth and an approximate rate of change. Establishing land use at the time of design can be crucial to project success.

3. Determine future land use based on projections of existing land use, land use plans, and site-specific layouts of proposed development, zoning maps, and discussions with public officials. County and municipal governments as well as Regional Planning Councils and Water Management Districts also may be good sources of future land use data.

4. Ascertain the existence of master drainage plans, stormwater management plans, and similar plans that may designate or restrict land use.

A.2.3 Precipitation

Collect published precipitation data by following this procedure:

1. Select an appropriate procedure for hydrologic calculations using information presented in this handbook.

2. Determine the type of precipitation data needed. Generally, either intensity-duration-frequency (IDF) curves or hyetographs for historic or design storm conditions are used.

3. Collect published precipitation data. The primary source is the National Weather Service. Additional data may be available from Water Management Districts. Sources of published precipitation data are briefly discussed below.

A series of publications by the National Weather Service (formerly the U.S. Weather Bureau) presents precipitation depth-duration-frequency data developed from observed precipitation data across the United States. *HYDRO-35*, by Frederick *et al.* (1977), is particularly useful for small drainage areas, since rainfall depths for durations of 5, 10, 15, 30, and 60 minutes are presented for return periods of 2, 5, 10, 25, 50, and 100 years. *Technical Paper No. 40*, by Hershfield (1961), commonly known as TP-40, is a standard reference for obtaining hydrologic design rainfall depths for durations of 30 minutes and one, 2, 3, 6, 12, or 24 hours, and for return periods of one, 2, 5, 10, 25, 50, and 100 years. *Technical Paper No. 49*, by Miller (1964), extends the depth-duration-frequency data presented by Hershfield (1961) to include rainfall depths for durations of 2, 4, 7, and 10 days at return periods of 2, 5, 10, 25, 50, and 100 years. The Department has developed rainfall curves based on these references.

Data for statistical rainfall depth and rainfall intensity for Florida is found in the National Oceanic and Atmospheric Administration's (NOAA's) Hydrometeorological Design Studies Center.

A.2.4 Topography and Contour Information

Collect topographic data by using the following procedure:

1. Obtain published topographic data. The Florida Department of Environmental Protection (FDEP) may have contour information at one- or two-foot contours developed from LIDAR, Water Management Districts, and municipal or county government agencies. The U.S. Geological Survey (USGS) has maps with five-foot or 10-foot contour intervals, which often are not detailed enough for design.

2. If published data are either unavailable or inadequate for project needs, the Department can develop contours from aerial photographs for large-scale projects or by survey for small areas.

A.2.5 Streamflow and Flood History

Collect streamflow and flood history data by using the following procedure:

1. Obtain published data. The principal source of published streamflow data is the USGS. Additional sources include Water Management Districts and municipal or county government agencies.

2. Because published streamflow data may not be available for a specific project site, an evaluation of flood history may require researching news media sources, making field survey observations, and interviewing local residents and other knowledgeable persons.

Groundwater

Data on groundwater levels and movements can be obtained from information on existing detention ponds and other ponds in the area; existing non-pumping wells or wells that could be temporarily shut off to determine the static groundwater level; observations made by inspectors and others during construction of sanitary sewers, storm drains, and major buildings; and regional or area-wide reports prepared by the USGS or similar state agencies. If existing data sources are not sufficient to define the position of the groundwater table, it may be necessary to construct special observation wells, particularly at potential sites of detention facilities. These wells could be installed in the boreholes used to take soil samples during a site-specific subsurface exploration.

A.3 FIELD INVESTIGATIONS AND SURVEYS

A.3.1 Drainage Areas

If sufficient topographic information for a project site is readily available, a field determination of drainage area may not be necessary, but it is always advisable to spot-check selected control elevations. For those project sites for which detailed information is not available, perform field survey work. In all cases, a site visit is highly recommended to confirm drainage area conditions.

Depending on District preference, drainage areas may be outlined by field survey or drainage personnel on county maps, aerial photographs, USGS contour maps, or specially prepared maps. Drainage area boundaries should connect with the job centerline, typically at high points in grade or at other locations where there is a definite division in the direction of stormflow runoff. After the overall areas are plotted, the Drainage Engineer should subdivide the drainage area to show how the various sections contribute to the structures in the proposed drainage or storm drain system.

Follow all drainage area boundaries from the project centerline, around the area being covered, and close again at the centerline. There is no need to show ridges that do not drain to the project unless this information is pertinent to determine runoff concentration points or flow path segments. Clearly indicate by notation on the map all exceptions to the rule for closing all drainage area boundaries. These notes should show location and elevation of break-over or diversion to or from the drainage area.

Typically, a drainage area should close to each existing culvert along the project and for each probable cross drain location. As an exception, note flow distribution information where two or more structures operate together to drain a single area.

For municipal-type construction surveys, mark appropriate city maps or specially prepared maps to show the boundaries of total areas contributing to the project. Mark streets or other drainage facilities in these areas with flow arrows. In many instances, elevations may have to be determined to accurately delineate direction of flow in gutters.

Show all areas contributing to existing storm drains, which drain to or across the project. In very flat terrain, as is found in South Florida, it often is necessary to develop profiles for cross streets and parallel streets to make a definite determination of drainage areas. In flat terrain, consider collecting additional field data about agricultural ditches to confirm flow patterns.

Specially flown aerial photography is available for most new construction projects. Ridge lines usually can be indicated on the photographs. When using photographs, the field survey party should verify questionable points and supplement the information with structure sizes, elevations, and high water marks as required. Determine drainage areas by stereo interpretation with spot field survey work as appropriate.

A.3.2 High-Water Information

To evaluate flood elevations and establish roadway grades, you will need reliable high-water information. Show high-water elevation locations upstream of the proposed project, upstream of significant existing structures, and at some point along or at the end of outfall ditch surveys. Clearly record the location at which a high-water elevation is taken in the field notes, along with the date and time if available.

At many locations, it is not possible to obtain documented information on high water. In such cases, estimate elevation by observing natural growth or by other means; the survey crew should provide complete information on the methods used. The crew chief should attempt to obtain information from local residents, maintenance personnel (both state and county), and rural mail carriers, school bus drivers, police officers, and school board officials.

The soils crew usually supplies water table information within the right of way; however, the survey crew should note information pertaining to standing water, areas of heavy seepage, or springs within the basin area.