

DRAINAGE DISTRICT NO. 6

DD6 does it all from inception to delivery

When it comes to drainage projects for flood control, Jefferson County Drainage District No. 6 does it all from project design to construction and long-term maintenance. The knowledgeable crew, including everyone at DD6 from engineers to equipment operators, have the combined capability to identify, develop and implement projects to improve drainage across the District.

DD6 covers a little over 487 square miles. That is approximately 5.7 times the size of Beaumont, which is 85.9 square miles, and the District's drainage network consists of over 1,247 miles of channels and 38 detention basins.

Even during last week's heavy rains that inundated some city streets, the significant impact DD6 has in flood prevention was apparent, and DD6 General Manager Dr. Joseph Majdalani and crew have multiple projects in the works to ensure the integrity and expand the functionality of the complex drainage system to accommodate increasingly frequent excessive rainfall events in Southeast Texas. The DD6 team works continuously to maintain the system and improve flow while also specifically targeting areas inside the District that are most likely to flood.

"Flood mitigation is DD6's top priority, and with our highly talented, experienced and knowledgeable staff, projects are handled from inception to delivery," Dr. Majdalani described.

Past projects, such as the extensive Needmore Diversion Channel, evi-



DD6 Maintenance mowing crews

dence DD6's proven ability to initiate and complete complex, large-scale plans, and several of the floodwater structures necessitated by the project were designed and built in-house utilizing DD6 expertise.

The channel itself is an 11.7-mile long ditch beginning just north of Highway 73, located two miles west of Labelle Road, then traveling south to the Gulf Intracoastal Waterway halfway between Port Arthur and High Island, delivering flood flows from Taylor's Bayou to provide relief to the area. The channel, which took 16 years to negotiate, removes 51,000 acres from of the 100-year floodplain, eliminating millions of dollars of damage to homes, crops, pastures and 106 miles of county roads and bridges.

DD6 has recently completed several successful drainage projects, Majdalani shared, and the in-house staff plans, executes and manages every phase of the construction projects. Projects include detention ponds, channelization projects, bridge construction, saltwater barrier structures, pipe construction, repair projects and concrete work.

Construction projects begin with a design from the Engineering Department.

"Reliable infrastructure that minimizes the risk of flooding is a critical element in supporting the growing economy in our area," said Dr. Majdalani. "The engineering staff at DD6 plans the long-term and short-term projects to address the District's needs."

The Engineering Department is managed by licensed Professional Engineers, Registered Professional Land Surveyors and Certified Flood Plain Managers, and has received several awards in recognition of its successful drainage projects that have minimized the risk of flooding throughout Jefferson County.

In order to remain eligible for state and federal grants, the engineering team updates its Hazard Mitigation Plan every five years. The engineering staff also assists with grant development, project planning and design, hydrologic and hydraulic modeling, program management, GIS development, foundation and piling design, and conducts informative and educational public meetings.

"DD6's Welding Department also provides many positive impacts," Majdalani shared.

The welding staff works closely

with the Engineering Department in designing and assembling various types of water control gates and structures. After the initial design, the Project Manager coordinates with DD6's survey crews, engineers and environmentalists to manage the logistics of each project with all necessary equipment and personnel. Contact with property owners is a necessity to acquire the property or easements required to construct the drainage project within the right-of-way boundaries.

"The initial phase of a project normally involves clearing right-of-way, moving fences to easement lines, making calls to locate utilities and pipelines, and initial on-site surveying for construction of the project," Majdalani explained. "DD6 has the equipment and manpower capable of handling all phases of the construction projects for the District."

Scheduling equipment and personnel needs between the numerous projects is crucial. Construction foremen utilize 21 dozers, 13 excavators, 10 articulated off-road dump trucks, 20 on-road dump trucks and three draglines, in addition to numerous smaller pieces of equipment to keep the field crews working and maintain project deadlines. DD6 mechanics and technicians contribute to the effort by performing in-field repairs and maintenance of equipment to ensure continuous operation and minimal downtime.

The Maintenance Department manages eight crews utilizing 18 tractors, 10 bad boy mowers and two herbicide trucks. DD6's ground maintenance includes mowing, weed-eating, pipe inspections and repairs, concrete liner repairs, fence work, ditch slope repairs, removal of silt and debris



The Marsh Master being used to mow Ditch 107



The Needmore Saltwater Structure at GIWW

from ditches, herbicide spraying, and tree and underbrush management.

DD6's Administration Department provides vital services required for the District to function. The staff coordinates, prepares and implements Board of Directors meetings; coordinates activities with various local, state and federal agencies; consults with grant administrators, engineering firms and environmentalists; and secures grant funding. They also research new grant opportunities, prepare documents and applications, and track recurrent funding sources for new opportunities. The staff stays abreast of new grant rules and regulations to make sure the District applies properly for every available opportunity.

To implement a successful capital improvement program, which renews and expands the existing infrastructure while minimizing the risk of flooding, DD6 must maintain adequate and stable funding. The Finance Department is managed by a Professional Certified Public Accountant and is responsible for managing payroll, accounts payable and receivable, budgeting, financial reporting and audits, fixed assets, information technology, record retention, office management and numerous other vital functions required for operations.

Additionally, the Finance Department undertakes the arduous task of tracking and reporting grant funds. Each granting authority imposes numerous regulations, such as the Code of Federal Regulations, state and federal requirements, procurement and contracting, monitoring, audit, record retention and many other assurances and grant requirements. The department tracks everything required by each granting authority.

DD6 also has a group of multi-talented vehicle and small engine mechanics and technicians, tire men and welders. This group conducts inspections for regularly scheduled equipment maintenance, and repairs 95% of all district equipment (320 various pieces) and vehicles in-house.

DD6 utilizes a 12-acre laydown yard to house all of its materials, including pipes for culverts, fence materials, articulated concrete block mats, miscellaneous project supplies, as well as equipment storage. By utilizing the talent and experience of in-house mechanics, DD6 is able to make use of the Federal Surplus Re-Utilization Program for used military equipment, such as forklifts, off-road dump trucks, Hummers, Army trucks, water pumps, fuel tanks, trailers, cranes and draglines, saving the District – and taxpayers – millions of dollars.

How does DD6 know when an area is experiencing drainage issues? The Alert Stations Division manages and maintains DD6's state-of-the-art systems, which currently include one base station, two repeater stations and 76 monitoring stations in Jefferson County and the surrounding areas. The DD6 system is fully mechanical and runs on electronics, which require constant maintenance, calibration and continual upgrades to remain reliable and compatible with industry standards.

Not only does the Alert Stations Division monitor flooding, but it also provides data collected by the system



occur every 100 years or have a 1% chance of happening in any given year," explained Dr. Majdalani. "100-year estimates around Beaumont increased from 13 inches to 18 inches, and values previously classified as 100-year events are now much more frequent 25-year events."

The average annual precipitation in Jefferson County is 59 inches per year. One day's max rainfall during Harvey was 27.4 inches, and one day's max rainfall during Imelda was 35.39 inches. DD6's current design criteria for one day's rainfall during a 100-year flood event is 13 inches. NOAA's new rainfall frequency values for Texas will help state and local authorities better understand their flood risk and more accurately plan and design infrastructure to minimize the threat of flooding.

"Current standards used for infrastructure design and floodplain regulations will likely be revised based on the new values," said Majdalani, which would be very helpful in attaining funding to update infrastructure to accommodate 18 inches of rain rather than the current 13 inches. "Recognizing the upward trend in rainfall in our area will help justify major projects."

DD6 is currently considering major projects such as diverting

more runoff to the Neches River, major regional detention basins in the Hillebrandt Bayou and Taylor's Bayou Watersheds, and channelization projects.

DD6 faces many challenges, like flat terrain, high-intensity rain events and aging infrastructure, but the talented team is ready and able to overcome those obstacles.

"DD6 works very hard to surmount these challenges and has implemented numerous programs to serve and maintain the infrastructure it has built in the name of flood damage reduction," Majdalani described. "DD6's diversified team works together on a daily basis to ensure that planning, design, construction, operation and system maintenance are being performed consistently to minimize flooding risks. We are here to help."

– Sharon Brooks

to the National Oceanic and Atmospheric Administration (NOAA) for statistical rainfall analysis and intensity charts. The National Weather Service uses data collected on the system for reporting rainfall amounts and comparing radar estimates for use in modeling to predict rain flood peak elevations.

Due to climate change and the ever-improving availability of rainfall data, statistical rainfall frequency and totals used in infrastructure design and flood risk management is continually changing. A recently released NOAA analysis found significantly higher-than-average rainfall frequency values in parts of Texas, redefining the amount of rainfall it takes to qualify as a 100-year or 1000-year event. The study identified increased values in several parts of Texas, including in Houston and Beaumont.

"This will result in changes to the rainfall amounts that define 100-year events, which are those that on average