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Overview

This report presents the design of the water supply, wastewater conveyance, and building plumbing systems for a 90-acre dairy farm industrial park as part of the Environmental Engineering Design Sessional (EWCE 432).

The industrial park is organized into four functional wings – Industrial, Residential, Administrative, and Commercial, distributed across two physical zones: Zone 1 (Residential, Commercial, and Administrative) and Zone 2 (Industrial). An organogram was developed to establish staffing levels, which form the basis for population estimation and subsequent infrastructure design.

Population and water demand were estimated for the present, 10-year, 20-year, and 30-year design periods. Water demand includes domestic, industrial production, commercial, administrative, and firefighting requirements. Deep tube wells were selected as the primary water source based on borehole grain-size analysis, followed by the design of the gravel pack, well strainer, and pumping system. Overhead reservoirs and pumping schedules were then developed to maintain continuous water supply. Both branched and looped distribution networks were designed hydraulically and evaluated for flow and pressure requirements.

A gravity-flow trunk sewer system was designed based on wastewater generation from the individual subzones. The design includes sewer sizing, manhole placement, self-cleansing velocity checks, and longitudinal profiles. In addition, a reference building plumbing system was designed, including down-feed and up-feed distribution, risers, underground and overhead reservoirs, and booster pumping arrangements in accordance with applicable building codes.

Layout and Organogram

The industrial park is organized into four organizational wings – Industrial, Residential, Administrative, and Commercial, distributed across two physical zones: Zone 1 (Residential, Commercial, and Administrative) and Zone 2 (Industrial). Zone 1 accommodates residential, commercial, and administrative activities requiring greater proximity and accessibility, while Zone 2 accommodates industrial and utility-related facilities with greater operational, environmental, and service requirements.

The organizational structure is represented through the corresponding organogram, which establishes the staffing basis for subsequent population and infrastructure design.

Park governance:

The park is governed by a Board of Directors, chaired by the Chairman of the Board. The Park Managing Director oversees executive operations, supported by the Executive Assistant, Board Secretary, Chief Legal Counsel, and Public Relations Officer. Four operational directors oversee the respective wings and report directly to the Managing Director.

Considerations:

The physical zoning generally follows the organizational wings. However, the STP and Solid Waste Dump, although administratively assigned to the Administrative Wing, are physically located in Zone 2 and are therefore included in the Zone 2 hydraulic demand. Their separation from residential areas is intended to minimize potential odor and nuisance impacts. Their location also provides convenient access to the designated discharge area (river) for treated effluent.