QUALITY MANAGEMENT SYSTEM

# 2016 LIBMANAN WATER DISTRICT



# **OPERATIONS MANUAL**

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# Introduction

The Operations Manual of Libmanan Water District (LIWAD) contains the general information about the agency, its underlying function, mandates, operating procedures and organization.

The purpose of this manual is to provide its readers knowledge about the district's responsibilities and structure. This shall also serve as a reference for all LIWAD employees and stakeholders.

The manual is divided into several parts as follows: General Information. This section contains the Agency profile, such as the brief history of LIWAD, mandates and functions, its mission and vision, people behind LIWAD its personnel complement, areas of operation, future plans and financial condition.

The Organization and Responsibilities. This part will show the duties and responsibilities of every Section.

Operational Control and Supervision. The powers of authority are described in this part as well as the supervisory and operational controls.

Operating Procedures. Contains the step-by-step procedures and work instructions of LIWAD. Activity flow charts are used to illustrate the different processes involved in daily operations.

# AGENCY PROFILE

Libmanan Water District (LIWAD) is a Government Owned and Controlled Corporation (GOCC) and was formed by the Sangguniang Bayan Resolution No. 03-223 September 8, 2003 in accordance with the Presidential Decree (P.D.) 198 as amended, known as the Provincial Water Utilities Act of 1973. In April 28, 2004, the Certificate of Conformance No. 606 was awarded to the District entitling the rights and privileges to operate as authorized under the Presidential Decree as amended.

Before it became LIWAD, the Libmanan water utility has been in existence far back 1937 during the time of the late Jaime V. Hernandez who was the Minister of Finance. It was run by the municipal government since November 17, 1997. In consonance with the provision of SB Resolution No. 04-053 in March 29, 2004 of the Sangguniang Bayan of Libmanan, providing for transfer of all existing water facilities of Libmanan Waterworks System to Libmanan Water District (LIWAD).

On March 12, 1992 all water districts became Government Owned and Controlled Corporations by virtue of the Supreme Court ruling of September 13, 1991. LIWAD is now under the supervision of the Civil Service Commission as far as personnel matters are concerned and under the Commission on Audit for auditing.

LIWAD is now categorized as Category C Water District with 24 approved plantilla. LIWAD has total 5,232 concessionaires with an average billing of Php 1,570,988.18 million monthly.

# LIWAD's mission:

# LIWAD IS COMMITTED TO:

- 1. Engage its community and its responsible consumers towards:
  - a. A sustainable sewerage and watershed management
  - b. Harnessing the natural water resources of the community to provide potable water services
- 2. Provide viable, modern and affordable services by
  - a. Improving its operations and management
  - b. Developing deeper corporate social responsibility
  - c. Strengthening its linkage to its consumers
- 3. Continuously expand its services.

# LIWAD's vision:

LIWAD being the premier potable water provider characterized by its viable, modern and affordable services towards a progressive, peaceful, sustainable and developed Libmanan by engaging its communities and its responsive consumers.

Libmanan Water District, a dynamic leader in the water sewerage service aims to set a standard of excellence for the industry.

Our concessionaires/customers are our most important stakeholders and lifeblood of our business.

We uphold these core values:

- To provide state of the art customer service and satisfaction in addressing their needs through our quality products and services.
- We subscribe to the call of Stewardship of God's creation, supporting the sustainable utilization of our forest and the environment. This Stewardship shall also apply in building a sense of ownership of corporate assets and resources.

We live in Honesty, being fair, straight forward and adhere to the facts all the time. We highly regard our Integrity in the rendering of service to our stakeholders and the government.

It is then imperative for LIWAD employees and officers to uphold our core values in every transaction by:

- Being committed to meet the expectations of our clients for a prompt and efficient service.
- Recognize the value and our interconnectedness with our natural resource to continue promoting care and preservation of the Eco System
- Strive for higher productivity by complying to the Quality Standard of Drinking Water in accordance with the provision under P.D. 856, otherwise known as CODE ON SANITATION OF THE PHILIPPINES;
- Instill creativity and innovation in all undertakings
- Puts value and professionalism and aim for excellence in all dealings
- Uphold integrity and discipline
- Humbly seek the intercession of the Divine Providence to guide and enlighten in all endeavors

# Our Goals:

- 1. Continuous human resource development of LIWAD Staff
- 2. Promotion, Information Campaign and Education (PICE)
- 3. Watershed Management
- 4. Quality Service Improvement Program
- 5. Research and Development
- 6. Modernization Program
- 7. Networking and Linkaging
- 8. Corporate Social Responsibility (CSR)

### THE MAN AT THE HELM

Under the provisions of P.D. 198, the authority to appoint the General Manager of the District rests with the Board.

The Board of Directors of the Libmanan Water District appointed Engr. Rodolfo A. Jimenez Jr., a licensed Electronics and Communications Engineer by profession. He has devoted his time and effort for the district from its humble beginnings when it was occupying a small room in one of the government office near the Municipal Cultural Center. Having been formed in 2003, it was only in 2007 that GM Jimenez became a permanent government employee, it goes by saying then that he went through a needle hole from the then processing of government service appointment, with the districts low financial viability during the times. He practically brushed it off with patience, perseverance, fist crunching financial management until the district was given the chance to be granted with a loan from LWUA to sustain its operational expansion needs.

LIWAD has evolved from a small water district in 2003 to a Category C Water District in 2013. The mantle of leadership remains under GM Jimenez unprecedented and able stewardship. He has been hands-on in project implementations and improvement of the water system. He took the initiative to acquire equipments and service vehicles that will aid in maximizing work productivity and the repair and maintenance work, including improvement of its infrastructures and facilities.

He has implemented expansion programs for LIWAD which included the construction of Pumping Station to solve the water shortage in Metro Poblacion and has been the key to its expansion of the service areas of the District.

Roughly a total of 119,086.34 linear meters of pipeline consisting of steel pipes, PVC pipes that was laid for the LIWAD pipeline system.

#### POLICY MAKERS

Being the highest policy making body of the District, the member of the Board are appointed by the Municipal Mayor for a term of six (6) years representing the various sectors of the community such as Business, Education, Women, Professional and Civic Sectors. A sixth member is appointed by LWUA as its representative in the Board if the Water District has availed of financial assistance from the Administration.

From its inception, the Libmanan Water District was served by five members of the Board who are all respected members of the community and successful in their fields of endeavor. The first Chairman to serve the district was Mr. Ferdinand Osio, a respected member of the Banking Industry and the Business community, he represents the Civic Sector. He has served Landbank of the Philippines for more than 10 years. The Vice Chairman is a respresentative from the Education Sector, an Icon in Libmanan known for her public service for a decade in the Education field, Ms Diosdada Ursua. The Board Secretary is a respected Civil Engineer representing the Professional Sector, Engr. Dominador Zaldua. Another Banker, representing the Business Sector is Eva V. Dilanco, an Executive for UCPB for more than a decade and known religious and civic organization leader. Representing women is a charmer, Leticia Madrid, a known leader in the community.

#### PERSONNEL COMPLEMENT

12 years has passed, the District has been utilizing a work force of 15 regular employees, one (1) casual and a number of Job Orders rendering regular tasks which may vary from time to time depending on the needs of the District's project.

Based on the latest Categorization of Local Water Districts, the District is adapting a per Section division, headed by Section OICs.

Administrative and General Services,	Baby Retzel De Laza
Property and Supplies Management Section	·

Accounting and Budget Section,

Billing, Collection and Cash Management Section

Jean DG Avila

Engineering and Construction, Repair and Maintenance Engr. Ailene Buenaobra Production and Water Quality

### THE WATER SYSTEM

The Libmanan Water Utility has been in existence far back 1937 which has the same water supply source as of today. The major supply of water comes from Ducut Cave Spring in Bgy Palong, Libmanan, Camarines Sur. The spring is located at the lower eastern slopes of Mt. Tancong Vaca, a forest reserve.

The total water source production is 259,982 cubic meters as of December 2015.

From its inception, the District was granted a loan of P 22,475,603.06 in 2004. Pump station was constructed in its main office in Bagumabayan, Libmanan Camarines Sur.

#### THE SERVICE AREA

The Libmanan Water District presently serves 38 out of 75 barangays. There are 5,367 active connections as of December 2015.

#### **FUTURE PLANS**

It is in the plan of Libmanan Water District to continuously expand its services; in fact it is currently working on a 5-year development plan (2016-2020) both for service expansion and work process automation to effectively deliver its services to the locality of Libmanan.

To date it has an existing partnership with Kalahi and various Barangay for the Level 2-3 projects as part of its expansion efforts.

The District will embark on an expansion program to answer the growing demand for safe, adequate and potable in the years ahead. The expansion program will involve connecting pipelines from endpoint to meeting points of unreached Barangays in the lower Libmanan, also to the populated terrain areas barangay. It also plans to tap additional sources of water supply to expand its services hopefully to reach other towns. There is also an additional water reservoir to be constructed in its new acquired land within its main office.

Likewise, the welfare of employees and workers, especially those assigned in the field will be provided with safety tools and PPE to effectively cope with maintenance works and other responsibilities inherent in a public utility. A reserve supply of pipes, fittings and accessories will enable the District to cope up with installation of new service connections, repair works and other maintenance works to keep the system operational.

Indeed LIWAD has gone a long way from its modest beginnings since its formation in 2003. It has its own shares of failures and successes but with the able direction of its present and resilient leadership, it has been able to surmount all the odds, and still will be able to face future challenges that lie ahead and live up to the expectation of the public for the efficient delivery of water - that is safe, potable, sufficient and affordable. This can be attained through sustained cooperation of all concerned - employees, government officials and consuming public.

# ORGANIZATION AND RESPONSIBILITIES

# DUTIES AND RESPONSIBILITIES

The Primary Functions Board of Directors is a policy making body. Ensures the availability of adequate financial resources and approves annual budget.

The General Manager serves as the overall in charge of the District operations and authorized decision maker of the Water District.

Administrative and General Services Section is responsible for general services, and Inventory Management. It is in-charge of the procurement; assists in the implementation of special projects program. Also responsible for the recruitment and retention of highly qualified employees for the agency.

Finance Section is responsible for the recording and summarizing of financial transactions, preparation of Financial Reports. Also responsible for the Budget Preparation and assist in allocation and distribution of budgets as wells as monitoring the budget performance.

Billing and Commercial Services Section provides customer services to the concessionaire/client. Responsible for billing and collection of water sales of the district as well as disbursement of funds.

It is divided into two namely:

- Customer Accounts is responsible for meter reading, billing and collection. Assists in the recording and posting of payments and monitoring of the customer accounts.
- Customer Services is responsible in attending customer service requests and complaints. Responsible for the marketing strategies/program implementation and public information. In-charge in inspection and investigation regarding water connection.

Engineering Operations Unit is responsible for the management of the water systems maintenance operations; and management of production and water distribution operations.

Water Systems Maintenance Unit is responsible for the installation of new service connections, including attending to the repairs and maintenance of water distribution lines; and performing of major and minor plumbing services. It is also In-charge in water system project implementation and constructions. It is also responsible for the water maintenance and disconnection and reconnection of service lines.

Production Unit is responsible for the pumping operations and water distributions. Monitors the water quality. In-charge for the pumping facilities maintenance management, gathering and keeping of data analysis.

# OPERATIONAL CONTROL AND SUPERVISION

The Office of the General Manager

The Office of the General Manager is in charge of the overall administration of the District's office operations; oversees personnel management; directs and sets forth procedures; execute duly established policies and guidelines relative to its services in order to affect organizational effectiveness and efficiency.

The General Manager has the ultimate decision-making authority in all matters affecting the district.

The Administrative and General Services, Property and Supply Management Section

- Develops, plans and implement goals and objectives for the Administration and General Services and Property and Supplies Management Section.
- Prepares and administers internal policies and procedures relating to departmental program activities; interprets and explains applicable rules, laws, and regulations to Section OICs and Supervisors.
- Directs, oversees and participates in the section's program work plan; monitor section work flow; reviews and evaluates work outputs, methods and procedures; implements needed work process and automation improvements and methods for improving customer service.
- Ensures the purchasing of materials, supplies, and equipment are conducted in accordance with the District's policies and procedures; Preparation of Purchase Order/Request; Posting to Phil-GEPS for invitation to bid; Preparation of procurements;
- Coordinates agency activities with different sections; provide responsible advice and counsel to the General Manager and Section OICs on a variety of financial, administrative and general services issues; oversees the maintenance of general records and files;
- Administers liability claims and property insurances.
- Manages information technology support for the District including the installation, maintenance and upgrade of District's Data Base System; explore opportunities to improve efficiency and productivity through user friendly information technology enhancements.

- Reviews staffing, supplies, equipments, including properties of the District and conduct annual inventories. Preparation of Creation, Reclassification and upgrade of Positions; also champions Workforce and Succession Planning; Maintenance of 201 files; Updating leave records;
- Manage District's associations, and recognize business opportunities;
- Continuously working to strategically expand, preserve or improve the District's procedures, standards or policies while sticking to business edicts and regulatory guidelines.
- Plans, develops and implements strategic marketing plans and sales plans both short and long range and forecasts to achieve corporate objectives for products and services.
- Develops and manages sales/ marketing operating budgets; plans and oversees advertising and promotion activities of the District;
- Ensures effective control of marketing results, and takes corrective action to guarantee that achievement of marketing objectives falls within designated budgets.
- Oversees and evaluates market research and adjusts marketing strategy to meet changing market and competitive conditions.
- Assist the General Manager in the preparation of marketing activity reports and presents to the Board of Directors;
- Establishes and maintains a consistent corporate image throughout all promotional materials, and events.
- Develops policies and procedures and personally analyzes and resolves the most difficult customer service problems and issues.
- Plans, organizes, assigns, supervises, reviews and evaluates the work of field and office customer service office support staff; recommends selection of staff; trains staff and provides for their professional development; administers discipline as required;
- Assists in planning goals, objectives, procedures and work standards for each division/section;
- Preparation of agenda for Board meeting;

# ACCOUNTING AND BUDGET SECTION

- Manages the preparation and maintenance of financial records and reports, including those related to the general ledger, accounts payable, accounts receivable, payroll, job costing, inventories, budgets and fixed assets
- Oversees preparation and presentation of the District's annual budget; supervises data gathering and financial planning work associated with water rate setting; prepares water rate analysis.

- Oversees investments, and debt management activities.
- Preparation of Annual budget;
- Preparation and release of Payroll;
- Preparation and submission of Alphalist of withholding taxes, annual registration fee & Income Tax Return (ITR); 3. Meet BIR deadlines;
- Preparation of statement of Bank Reconciliation;
- Preparation and updating of PPE Depreciation Schedule; Report of Monthly remittances and loan payment; Preparation and payment of BIR, GSIS, HDMF, Philhealth LWUA)
- Preparation and submission of Report on Salaries and Allowances (ROSA) received by principal officers and governing board of Directors to Commission on Audit (COA);
- Preparation of Financial statements; Submission of Schedule of Accounts Receivable;

The Billing and Commercial, Cash Management and Collection Section shall:

- Oversee the District's needs in terms of its commercial transactions; handle daily business issues, Processing of Applications for: New water service connections, change name, maintenance & inspection order; Accepts Payments and Issuance of Official Receipts; Checking of high water consumption.
- Performs a variety of difficult and complex customer relations and office accounting support activities related to the maintenance of water service records and billing for service.
- Performs difficult and complex water billing calculations, adjustments and reconciliations; authorizes account adjustments and refunds following adopted policies and procedures;
- Researches customer account problems, evaluates alternatives and recommends or effects solutions, depending upon the level of the problem; provides technical assistance to division managers/ supervisors, particularly regarding billing and adjustment issues.
- Achieves satisfactory profit/loss ratio and market share in relation to preset standards and industry and economic trends.
- Oversees cash management and collection efficiency; Reports of daily Collection and Deposit; Submission of Collection Report; Deposits of cash and check collections;
- Administration of Petty Cash Fund; Liquidation of Cash advances
- Preparation of Disbursement Voucher; preparation and release of checks;

The Engineering and Construction, Repair and Maintenance, Production Section

- Plan, organize, direct and coordinate District engineering projects and programs that require significant interaction with outside agencies and the general public, engineering design, securing permits, and project construction activities; to exercise full, functional management responsibility and oversight of assigned engineering projects and programs including department administration, developer, and capital project designs and to provide highly complex staff assistance to the General Manager.
- To assist the General Manager in managing and directing the activities of District operations; to plan, organize and direct the activities of the Engineering and Construction departments; to analyze and recommend the policies and procedures related to assigned departments; and to provide highly complex assistance to the General Manager.
- Facilitate and/or organize technical assistance for determining system water balances (including recommendations for improving losses) for specific water supply systems
- Develop, plan, and implement goals and objectives for reporting consistent with the District's adopted organizational mission to provide the highest quality water to consumers at the lowest possible cost; and to utilize performance planning techniques to identify, establish, achieve and measure goals and objectives for reporting departments.
- Assist in developing and coordinating the District budget; review all budget proposals made by the members of the Engineering Department.
- Monitor and review operations of the different divisions for policy, fiscal, operational, and social impacts; conduct, or assist with conducting policy, staffing and operational studies, primarily involving assigned divisions; recommend the appointment of personnel; conduct performance evaluations; recommend discipline; implement disciplinary procedures; maintain discipline and high standards necessary for the efficient and professional operation of the department;
- Direct, oversee and participate in the development of the Department's work plan; assign work activities, projects and programs; monitor work flow and production; review and evaluate work products, methods and procedures.
- Provide oversight and review of technical reports, designs and approval/acceptance.
- Supervise and participate in the development and administration of the Engineering Department budget; direct the forecast of additional funds needed for staffing, equipment, materials and supplies; monitor and approve expenditures; implement budget adjustments.
- Ensure District safety practices are implemented throughout department to ensure a safe and healthy work environment.

- Research and prepare technical and administrative reports and studies; prepare written• correspondence as necessary.
- Ensures compliance with government's regulations regarding water quality, employee safety, and environmental issues
- Plan, organize, direct and review the activities and operations of the Operations and Maintenance Section including operation and maintenance of District conveyance, water storage, transmission, distribution and treatment facilities.
- Manage District-wide water quality function; to coordinate assigned activities with other departments and outside agencies; and to provide highly responsible and complex administrative support to the General Manager.
- Maintain, coordinate, monitor and supervise the potable water distribution system and appurtenances; construction and maintenance of the wastewater collection system; infrastructure; backflow and facilities maintenance;
- Direct supervision of the electrical section; quality control section; and operations section
- Supervising the District's potable water quality program and collection of potable water samples; troubleshooting problems with the water distribution system; ensuring flows are regulated; supervising day to day operations of the water treatment plant; setting up and monitoring preventive
- Develop a maintenance programs for all areas of responsibilities; overseeing and troubleshooting the repair of machineries, infrastructure and appurtenances under area of responsibility; supervising operational tests and evaluating the condition of related and auxiliary equipment; effectively administering the "Time of Use" requirements for electric energy usage; inspecting work done by contractors; providing input for yearly budget considerations;
- Managing cost center expenditures for division, including purchase of equipment and supplies; facilities maintenance; preparing and maintaining required documents and paperwork; assisting and supporting the Operations in the management and administration; and other duties as required.

# CONDUCT OF SERVICES (WORKFLOW)

### I. COMMERCIAL SERVICES UNIT

#### A. NEW CONNECTION

Step 1:



Step 2:

# B. RECONNECTION OF DISCONNECTED LINES



### C. PAYMENT OF WATER BILLS



# D. COMPLAINTS ON LEAKS



# E. COMPLAINTS IN LOW PRESSURE/ HIGH CONSUMPTION



# F. TRANSFER OF LINE/RELOCATION OF WATER METER



# G. REQUEST FOR VOLUNTARY DISCONNECTION



#### FINANCE SERVICES UNIT

#### ACCOUNTING WORKFLOW

RECEIPTS AND COLLECTION PROCESS



#### DISBURSEMENT PROCESS





ISSUANCE OF NEW SERVICE CONNECTION MATERIALS

#### PROCUREMENT PROCESS





#### RECEIPT OF DELIVERIES OF INVENTORY

# OPERATIONAL WORKING STANDARDS

# LIWAD WORK STANDARDS

# SECTION 1

TRENCH EXCAVATION, BEDDING AND BACKFILL

# 1.01 <u>SCOPE</u>

- 1. This specification refers to trench excavation, bedding, backfill and all works pertaining thereto.
- 2. Trenches shall be excavated only as far in advance of the pipe laying operation as safety, traffic, and weather conditions permit. Caution shall be exercised with respect to structures, piping, or other man-made obstacles that may exist within the working area and due consideration given to the protection and support of such properties and structures.

# 1.02 TRENCH EXCAVATION

- 1. Trench excavation shall be classified as common or rock excavation.
- 2. Common excavation shall include all excavation of clay, silt, sand, gravel, hard-pan, earth, roots, rubble, boulders (less than one cubic meter), asphalt, concrete pavement, existing underground and surface utilities and works, and any other obstacles which may be encountered. Common excavation shall include all necessary dewatering.
- Rock excavation is the removal of detached masses of rock including single boulders, and pieces of concrete or masonry having individual volumes in excess of one cubic meter, or solid-rock which requires drilling and breaking with a power-operated tool for its removal.
- 4. Trenches shall be excavated to the section and dimensions as shown on the drawings.
- 5. Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least 150 mm around all sides of pipe, fittings and appurtenances.
- 6. To prevent damage to existing utilities, excavate the last 300 mm above the utility by hand.
- 7. All excavations left unattended shall be adequately protected with approved fencing and barricades and with flashing lights where required.

#### 1.03 PRECUTTING PAVED SURFACES

 When trenching along or across a paved surface, pavement shall first be sawn or cut by methods approved by the Engineer in straight lines parallel to the trench centerline. The total cut width of pavement shall not be greater than the specified maximum trench width at the ground surface shown on the drawings. Concrete curbs and sidewalks shall be sawn at existing joints.

2. Pavement that has been cut and removed to permit trenching shall be disposed of as waste material and shall not be placed in the trench backfill. Pavement that has been removed by grinding may be re-used as backfill if approved by the Engineer.

#### 1.04 SITE PREPARATION

- 1. Remove all brush, weeds, grasses and accumulated debris from the trench width and working area.
- 2. For trenchwork in landscaped statutory rights-of-way, carefully remove fences, shrubs, small trees and other items for replacement after backfilling is completed. If, in the opinion of the Engineer, removed trees are too large to be replaced, the contractor shall not be responsible for their replacement unless otherwise noted on the construction drawings.
- 3. Cut pavement, sidewalks and curbs in accordance with Section 1.03 Precutting Paved Surfaces.

### 1.05 TRENCH ALIGNMENT AND DEPTH

- 1. The trench shall be excavated so that pipe can be laid to the established alignment and depth with allowance made for specified trench wall clearances and bedding as required.
- 2. Prior to or at the commencement of construction, the contractor shall check existing mains for line and elevation at the point of connection. If they are different than what is shown on the construction drawings, the contractor shall immediately report the difference to the Engineer and cease construction pending direction from the Engineer.

#### 1.06 PILING OF EXCAVATED TRENCH MATERIAL

- 1. Common excavation approved by the Engineer as approved native backfill, may be piled along the trench in accordance with work safe regulations and provided the working space is adequate for this purpose and provided that by so doing the backfill material does not spill onto private properties adjacent to the line of the trench thereby disturbing fences, buildings, shrubs, lawns, or other items of value.
- 2. Piling of excavated material along the trench shall not unduly restrict cross traffic at road intersections. Materials shall be cleared from road intersections and provision made for use of the cross road by traffic as soon as possible after excavation has taken place. Pedestrian traffic to individual properties shall be maintained at all times and timber bridges shall be provided where it is necessary to cross open trenches. Roadways, driveways, and drainage facilities shall not be blocked unnecessarily. The spoil pile shall be located such that hindrance to local traffic is minimal.
- 3. The contractor shall take all measures required to protect approved native backfill from contamination, segregation and weather.

#### 1.07 DISPOSAL OF EXCAVATED MATERIAL

- 1. Surplus or waste excavated material shall be removed from the trench area during the excavation or backfilling operations and shall not be left along the trench following the completion of backfilling the trench.
- 2. Surplus excavated material which is not required for the works, as shown on the drawings or specified elsewhere herein shall be disposed of at sites obtained by the Contractor. Waste material shall not be dumped on private property without the written permission of the owner of the property.
- 3. The Contractor shall exercise particular care to avoid spillage on paved roadways over which excavated material is hauled, and any such spillage shall be cleaned up promptly by sweeping.
- 4. Care shall also be exercised to avoid spreading the excavated material over a wide area and rutting or otherwise damaging unnecessarily adjacent property when side casting of excavated material is permitted.

#### 1.08 DEWATERING

1. The bottom of the excavation shall be maintained in a condition to permit the proper installation of the pipe. The installed pipe shall not be used as a drain. The Contractor shall provide, at his own expense, all portable dewatering equipment (including power, pumps and discharge hose) to drain the excavation.

#### 1.09 PIPE BEDDING

1. Bedding sand shall be placed and thoroughly compacted in the trench such that the pipe is supported along its entire length (and under bells and flanges) by a layer of sand, the thickness of which shall be no less than 100 mm. Additional bedding sand shall be placed and compacted around the pipe and to 200 mm above the top of the pipe for the entire width of the trench as shown on Std. Dwg. LWD-001.

#### 1.10 BACKFILL AND COMPACTION

- 1. Backfill material shall be approved native material. Approved native backfill shall be soils native to the excavation and suitable for backfilling to the required compaction densities as determined by the Engineer. The maximum size rock in approved native backfill shall be 200 mm in any dimension. Unsuitable native materials, i.e. rock, clay or silt may be mixed with granular material for use as approved native backfill if approved by the Engineer. In no case shall the silt and clay content exceed 30% by volume.
- 2. If the material excavated from the trench is unsuitable for backfill, the Contractor shall import granular fill. Imported granular fill shall consist of well graded granular material, with not more than 8% passing the 0.075 mm sieve, which contains no stones

larger than 150 mm in diameter and contains no stumps, roots, organic or other deleterious material.

- 3. Placement and compaction of backfill material shall not damage or displace the pipe.
- 4. Under no circumstances shall a trench in a traveled area be left in a hazardous condition.

#### 1.11 SURFACE RESTORATION

- 1. Surface restoration shall be completed immediately following the backfilling operation.
- 2. Restore all disturbed surfaces to a condition equal to or better than the condition that existed prior to construction.
- 3. Repair any damage to adjacent lands or improvements.
- 4. Damaged to paved surfaces shall be seal coated, patched or replaced in an approved manner to the satisfaction of the Engineer.
- 5. Damage to graveled surfaces shall be restored by scarifying, regarding and compacting the surface, or if required, regravelling the surface with base gravel.

#### 1.12 PAVEMENT RESTORATION

- 1. All pavement restorations shall be constructed in accordance with Std. Dwg. LWD-003 or as directed by the Engineer.
- 2. All excavations in traveled paved areas shall be patched on the same day as the excavation with a temporary or permanent patch, or with approved steel plates, unless otherwise directed by the Engineer.

# SECTION 2

PIPING

# 2.01 <u>SCOPE</u>

 The work described shall consist of the construction of pressure pipelines including watermains, pipelines, service lines; including the supply and installation of pipe, appurtenances (crosses, tees, elbows, reducers, caps), as well as accessories such as couplings, service saddles, including gate valves, hydrants, flushouts or semi-blow off; hydrostatic and bacteriological testing of the pipe and the disinfection of pipes used to convey potable water.

#### 2.02 CLASSIFICATION OF WORK

- 1. PIPE shall be classified on the following basis:
  - 1. Nominal inside diameter (nom. i.d.) specified on the Plans.
  - 2. Insulated or uninsulated. If not specified, pipe shall be uninsulated.

- 3. Category of pressure pipeline based on use:
  - a. Watermain Lines to distribute potable water including water for fire protection.
  - b. Water Pipelines/Distribution Lines to convey potable water to commercial and residential consumers.
  - c. Service Pipe to convey potable water from distribution line or main line to the residence.
- 2. APPURTENCES Appurtenances shall be classified on the same basis as the Pipe and on the basis of the type of appurtenances:
  - 1. Crosses
  - 2. Tees
  - 3. Elbows
  - 4. Reducers
  - 5. Caps
- 3. ACCESSORIES Accessories shall be defined as items required to complete the installation of watermain and pipeline and shall include such items as:
  - 1. Couplings
  - 2. Adaptors
  - 3. Service Saddles
  - 4. Nuts, bolts and washer
- 4. HYDRANTS AND FLUSHOUTS ASSEMBLIES Hydrants and flushout assemblies may be sub-classified as to:
  - 1. On-line, off-line or end of line
  - 2. Bury depth (if not specified, it shall be 1 meter)
- 5. GATE VALVES Gate valves shall be as specified in part 2.03 of this Section and compatible with the type of pipe installed.
- 6. THRUST BLOCKS Concrete thrust blocks shall be installed on all pipelines and watermains at crosses, tees, elbows, reducers, caps and hydrants in accordance with the Typical Thrust Block Details on Std. Dwg. LWD-009. The minimum bearing areas (upon undisturbed trench soil) for thrust blocks shall be as outlined in Table 2.02.06.

# 2.03 PRODUCTS

- 1. PIPE
  - a. PVC PIPE Each length of pipe shall have an integral bell end with a rubber gasket as supplied by the pipe manufacturer. Pipe lengths shall not exceed six metres.
  - b. POLYETHYLENE PIPE High Density Polyethylene pipe identification shall be placed on each length of pipe and shall include pipe size, and series or DR rating. The pipe shall be uniform in colour, opacity, density and physical properties.

	PIPE DIMENSION TABLE (AS PER ISO 4427)													
COLOR: BLUE														
	SDR 11													
PE 80														
PN12.5 (12.5BARS)														
NOMINAL PIPE SIZE (NP)	MEAN OUTSIDE DIAMETER (OD)	STANDARD LENGTH	WALL THICKNESS (t) PIPE INSIDE WEIGHT WALL THICKNESS (t) DIAMETER PER (ID) METER											
(in)	(mm)	(m/roll)	MIN(mm)	MAX(mm)	(mm)	(kg/m)								
3/8 16 1.6 1.9 13 0.08														
1/2 20 300 2 2.3 16 0.11														
3/4	25		2.3	2.7	20	0.17								
1	32		2.7	3.3	25	0.24								
1-1/4	40		3.7	4.2	32	0.43								
1-1/2	50		4.6	5.2	40	0.66								
2	63		5.8	6.5	51	1.04								
2-1/2	75		6.8	7.6	61	1.46								
3	90		8.2	9.2	73	2.11								
4	125		11.4	12.7	101	4.06								
6	200		18.2	20.2	162	10.36								
8	225		22.7	25.1	202	16.13								

HIGH-DENSITY POLYETHYLENE TUBING



#### 2. APPURTENANCES

- 1. PVC APPURTENANCES PVC appurtenances shall be used only in conjunction with PVC pipe. The appurtenances shall be manufactured in accordance with the same specifications as the PVC series or class pipe, and shall be of the same, or better, series or class as the pipe with which the fittings are used. PVC appurtenances shall be injection moulded for watermains and pipelines.
- 2. POLYETHYLENE APPURTENANCES PE appurtenances shall be used only in conjunction with PE pipe. The appurtenances shall be manufactured in accordance with the same specifications as the PE pipe, and shall be of the same equivalent series rating as the pipe with which the appurtenances are used. PE appurtenances shall be injection moulded for watermains and pipelines.

The following tables are the standard specifications of the different types of appurtenances:

	SL	ZE	A		UNIT V	VEIGHT
90 ELBOW	NPS	DN	in	mm	lbs	kg
	1⁄4	8	1 1/8	29	0.04	0.02
<b>A</b> ►	1/2	15	1 1/8	29	0.22	0.10
The second se	3⁄4	20	1 5/16	33	0.35	0.16
	1	25	1 ½	38	0.64	0.29
	1 ½	40	<b>1</b> 15/16	49	1.15	0.52
A	2	50	2 1⁄4	57	1.94	0.88
	2 1⁄2	65	2 11/16	68	3.44	1.56
<u>.</u>	3	80	3 1/16	78	5.25	2.38
	4	100	3 13/16	98	8.77	3.98
	6	150	5 1/9	130	22.49	10.20

	SL	ZE	A		UNIT V	VEIGHT
45 ELBOW	NPS	DN	in	mm	lbs	kg
	1⁄4	8	13/16	22	0.08	0.04
*	1/2	15	1 1/8	29	0.33	0.15
c/	3⁄4	20	1 5/16	33	0.55	0.25
	1	25	1 ½	38	0.84	0.38
	1 ½	40	1 15/16	49	1.163	0.74
	2	50	2 1⁄4	57	2.43	1.10
	2 1⁄2	65	2 11/16	68	4.81	2.18
	3	80	3 1/16	78	7.01	3.18
Y	4	100	3 13/16	98	11.20	5.08
	6	150	5 1/8	130	25.35	11.50

		SIZ	ZE		A	A			UNIT WT.	
90 REDUCING ELBOW	NPS	DN	NPS	DN	in	mm	in	mm	lbs	kg
	1⁄4	8	1/8	6	3⁄4	19	3⁄4	19	0.09	0.04
	1/2	15	1⁄4	8	1	25	1	25	0.13	0.06
	3/4	20	1⁄4	8	1 1/8	29	1 1/8	29	0.20	0.09
R	-74	20	1/2	15	1 3/16	30	1 ¼	32	0.31	0.14
	1	25	1/2	15	1 ¼	32	1 3/8	35	0.40	0.18
	I	20	3⁄4	20	1 3/8	35	1 7/16	37	0.46	0.21
		40	3⁄4	20	1 ½	38	1 3⁄4	44	0.71	0.32
	1 ½		1	25	1 5/8	41	1 13/16	47	0.88	0.40
			1 ¼	32	<b>1</b> 13/16	47	1 7/8	48	1.06	0.48
A		50	3⁄4	20	1 5/8	41	2	51	1.19	0.54
	2		1	25	1 ¾	44	2	51	1.28	0.58
			1½	40	2	51	2 1/8	54	1.54	0.70
	2 1/2	65	1½	40	2 3/16	56	2 ½	64	2.40	1.09
	2 /2	00	2	50	2 7/16	62	2 5/8	67	2.84	1.29
	3	80	2	50	2 9/16	65	2 15/16	75	3.62	1.64
	5	00	2 ½	65	2 13/16	73	3	76	4.17	1.89
	4	100	3	80	3 5/16	84	3 5/8	92	7.72	3.50

	SIZ	E	А		J		UNIT WT.		
90 SIREELELBOW	NPS	DN	in	mm	in	mm	lbs	kg	
	1⁄4	8	13/16	22	<b>1</b> 3/16	30	0.09	0.04	
	1/2	15	1 1/8	29	1 5/8	41	0.22	0.10	
٨	3⁄4	20	<b>1</b> 5/16	33	1 7/8	48	0.37	0.17	
A ►	1	25	1 ½	38	2 1/8	54	0.53	0.24	
	1 ½	40	<b>1</b> 15/16	49	2 11/16	68	1.32	0.60	
	2	50	2 1⁄4	57	3 1⁄4	83	2.73	1.24	
A CALL	2 1⁄2	65	2 11/16	68	3 7/8	98	3.90	1.77	
	3	80	3 1/16	78	4 1⁄2	114	5.95	2.70	
J	4	100	3 13/16	98	5 11/16	144	10.43	4.73	
	½ x 3/8	15x10	<b>1</b> 1/16	27	<b>1</b> 9/16	40	0.13	0.06	
	3∕4 X ½	20x15	<b>1</b> 3/16	30	1 3⁄4	44	0.24	0.11	
	1 x ¾	25x20	1 3/8	35	2 1/16	52	0.44	0.20	
	1¼ x 1	32x25	<b>1</b> 9/16	40	2 5/16	59	0.77	0.35	
	1¼ х ¾	32x20	<b>1</b> 7/16	37	2 1⁄4	57	0.66	0.30	
	1½ x 1¼	40x32	<b>1</b> 13/16	47	2 9/16	65	1.10	0.50	
	1½ x 1	40x25	1 5/8	41	2 ½	64	0.97	0.44	
	2 x 1½	50x40	2	51	2 15/16	75	1.76	0.80	

		SIZ	E		М		UNIT WT.		
REDUCER	NPS	DN	NPS	DN	in	mm	lbs	kg	
	1⁄4	8	1/8	6	1	25	0.04	0.02	
	1⁄2	15	1⁄4	8	1 ¼	32	0.11	0.05	
	3/4	20	1⁄4	8	1 7/16	37	0.18	0.08	
	/4	20	1⁄2	15	1 // 10	57	0.22	0.10	
	1	25	1⁄2	15	1 11/16	43	0.35	0.16	
	•	20	3⁄4	20	1 11/10	10	0.40	0.18	
			1⁄2	15	2 5/16		0.71	0.32	
	1½	40	3⁄4	20		59	0.82	0.37	
			1	25			0.82	0.37	
	2		1/2	15	2 13/16		1.23	0.56	
		50	3⁄4	20		72	1.28	0.58	
A CONTRACTOR	Z	50	1	25		75	1.32	0.60	
M			1 ½	40			1.48	0.67	
		65	1	25	3 ¼		2.05	0.93	
	2 1⁄2		1 ½	40		83	2.03	0.92	
			2	50			2.43	1.10	
			1	25			3.09	1.40	
	З	80	1 ½	40	3 11/16	Q <i>1</i>	3.22	1.46	
	5	00	2	50	5 11/10	74	3.15	1.43	
			2 ½	65			3.22	1.46	
			1 ½	40			4.81	2.18	
	Δ	100	2	50	4 2/R	111	5.03	2.28	
	4	100	2 ½	65	т 5/0		5.84	2.65	
			3	80			6.46	2.93	
	6	150	4	100	4 13/16	124	10.21	4.63	

REDUCING TEE									Z		Y X								
		SIZ	E			Х	{	Y		Z		UNIT	WT.						
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	Mm	lbs	kg						
1/.	0	1/.	0	1/8	6	3⁄4	19	3⁄4	19	3⁄4	19	0.07	0.03						
1/4	ð	<i>У</i> 4	ŏ	3/8	10	15/16	24	15/16	24	7/8	22	0.13	0.06						
		1⁄4	8	1/2	15	1 1/8	29	15/16	24	1 1/8	29	0.22	0.10						
16	15			1⁄4	8	1	25	1	25	1	25	0.20	0.09						
/2	10	1⁄2	15	3⁄4	20	1 ¼	32	1 ¼	32	1 3/16	30	0.37	0.17						
				1	25	1 3/8	35	1 3/8	35	1 ¼	32	0.46	0.21						
		1⁄4	8	3⁄4	20	<b>1</b> 5/16	33	1 1/8	29	1 5/16	33	0.37	0.17						
		1/2	15	1/2	15	1 3/16	30	1 1/8	29	1 ¼	32	0.37	0.17						
		1/2	IJ	3⁄4	20	1 5/16	33	1 ¼	32	1 5/16	33	0.44	0.20						
3⁄4	20			1⁄4	8	1 1/16	27	1 1/16	27	1 1/8	29	0.29	0.13						
		3/4	20	1/2	15	7/8	22	1 3/16	30	1 ¼	32	0.37	0.17						
		/4	20	1	25	1 7/16	37	1 7/16	37	1 3/8	35	0.53	0.24						
				1¼	32	1 5/8	41	1 5/8	41	1 7/16	37	0.82	0.37						
		1⁄4	8	1	25	1 ½	38	1 5/16	33	1 ½	38	0.60	0.27						
				1⁄2	15	1 ¼	32	1 1/8	29	1 3/8	35	0.62	0.28						
		1/2	15	3⁄4	20	1 3/8	35	1 ¼	32	1 7/16	37	0.46	0.21						
				1	25	1 ½	38	1 3/8	35	1 ½	38	0.66	0.30						
				1⁄2	15	1 ¼	32	1 3/16	30	1 3/8	35	0.51	0.23						
1	25	3⁄4	20	3⁄4	20	38	1 3/8	<b>1</b> 5/16	33	1 7/16	37	0.66	0.30						
	1 25			1	25	1 5/16	33	1 7/16	37	1 ½	38	0.68	0.31						
				1⁄4	8	1 1/8	29	1 1/8	29	1 ¾	44	0.44	0.20						
				1⁄2	15	1 ¼	32	1 ¼	32	1 3/8	35	0.62	0.28						
	1		1	1	1	1	1	1	25	3⁄4	20	38	1 3/8	1 3/8	35	1 7/16	37	0.73	0.33
				1 ½	40	<b>1</b> 13/16	47	<b>1</b> 13/16	46	1 5/8	41	1.10	0.50						
				2	50	2	51	2	51	1 ¾	44	1.54	0.70						

		SIZ	E			Х	Х		Y			UNIT WT.	
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	lbs	Kg
		1/2	15	2	50	2 1⁄4	57	1 7/8	48	2 1⁄4	57	2.07	0.94
		3⁄4	20	2	50	2 1⁄4	57	1 15/16	49	2 1⁄4	57	1.94	0.88
		1	25	2	50	2 1⁄4	57	2	51	2 1⁄4	57	2.05	0.93
	50	1 ½	1⁄2 40	1	25	1 ¾	44	1 5/8	41	2	51	1.48	0.67
				1½	40	2	51	1 15/16	49	2 3/16	56	1.85	0.84
2				2	50	2 1⁄4	57	2 3/16	56	2 1⁄4	57	2.16	0.98
				1/2	15	1½	38	1½	38	1 7/8	48	1.59	0.72
				3⁄4	20	1 5/8	41	1 5/8	41	2	51	1.81	0.82
		2	50	1	25	1 3⁄4	44	1 3⁄4	44	2	51	1.72	0.78
				1½	40	2	51	2	51	2 3/16	56	2.47	1.12
				2 1⁄2	65	2 5/8	67	2 5/8	67	2 3/8	60	3.42	1.55

Flow and water meter is a vane wheel, multi-jet, dry dial counter, and straight reading type meters suitable for measuring the total quantity of potable water passing through the pipeline.

#### SPECIFICATIONS: WEIGHT AND DIMENSION

WATER METER	METER SIZE	(mm)	15	20	25	40	50
	LENGTH	(Lmm)	259	294	310	375	438
	WIDTH	(L1mm)	165	195	225	245	300
		(Dmm)	98	98	103	125	135
	HEIGHT	(Hmm)	114	114	114	114	153
	CONNECTING	ISO					
	THREAD	R228	G3/4	G1	G11/4	G11/2	G2
			(19mm)	(25mm)	(32mm)	(38mm)	(40mm)
	WEIGHT	kg.	1.8	2	2.3	5.4	5.8

### QUALITY MANAGEMENT SYSTEM

# MAIN TECHNICAL DATA

Normal Siza	inch	1⁄2″	3⁄4″	1″	1¼″	1½″
NOLITIAL SIZE	mm	15	20	25	32	40
Maximum flow (Qmax)	m³/h	3	5	7	12	20
Nominal flow (Qn)	m³/h	1.5	2.5	3.5	6	10
Transitional flow (Qt)	l/h	120	200	280	480	800
Minimum flow (Qmin)	l/h	30	50	70	120	200
Starting flow (Qs)	l/h	16	20	25	35	60
Minimum reading	m³/h	0.0001	0.0001	0.0001	0.0001	0.0001
Maximum reading	m³/h	99999	99999	99999	99999	99999
Nominal Pressure	bar	10	10	10	10	10
Headloss at Qmax	bar	<1	<2	<3	<4	<5
Test Pressure	bar	<10	<10	<10	<10	<10
Maximum Temperature	С	50	50	50	50	50

# DIMENSION AND WEIGHT

	Ciao	L Length	B Width	H Height	Connecting Flange			Weight
FLOW WETER	SIZE	mm		mm	bolt circle Ø	connecting bolt Ø	kg.	
a literature	50	200	242	360	165	125	4xM16	12
	65	200	242	360	185	145	4xM16	13
	80	225	265	360	200	160	8xM16	15
	100	250	270	360	220	180	8xM16	19
	125	250	275	360	250	210	8xM16	22
	150	300	300	420	280	240	8xM20	28
L	200	350	352	420	340	295	8xM20	42
	250	400	430	660	395	350	12xM20	80
	300	450	490	660	445	400	12xM20	115

### MAIN TECHNICAL DATA

Size	Overload Flow (Qs)	Nominal Flow (Qp)	Nominal Transitional Mi Flow (Qp) Flow (Qt) (		Min. Reading	Max. Reading
(mm)	m³/h		m <sup>3</sup>			
50	30	15	3	0.45	0.01	999999
60	50	25	5	0.75	0.01	999999
80	80	40	8	1.2	0.01	999999
100	120	60	12	1.8	0.01	999999
125	200	100	20	3	0.01	999999
150	300	150	30	4.5	0.1	999999
200	500	250	50	7.5	0.1	999999
250	800	400	80	12	1	999999
300	1200	600	120	18	1	999999

### 3. JOINTS

The joints shall be as follows:

- 1. Bell and spigot push-on type with appropriate rubber gasket when used with PVC.
- 2. Bell and spigot mechanical joint type with cast iron gland, all stainless steel nuts, bolts and washers, and the appropriate rubber gasket when used with PVC.
- 3. Flanged with appropriate full face rubber gasket epoxy coated ductile iron backup ring and all stainless steel nuts and bolts when used with polyethylene pipe.

# 3. GATE VALVES

1. The valve shall be complete with a counter-clockwise opening non-rising spindle. The joints shall be of the same type as the pipe to which the valve is joined. Each gate valve shall be complete with a valve box (see STD. DWG. LWD. 004), including an extension spindle with a 50 mm square operating nut, stone disc, and metal valve box (see gate valve installation detail page 23 of 33). The box and extension spindle shall be adjustable to suit the depth of bury specified for the pipe, plus or minus 0.3 metres.

# 4. HYDRANTS

1. The hydrant bonnet shall be of "dry-top" design such that the water is prevented from reaching the operating mechanism when the hydrant is discharging water. The hydrant shall have a means of lubricating the operating mechanism.

- 2. The hydrant main valve shall be compression-type closing with water pressure. The diameter of the main valve shall be not less than 112 mm. The main valve shall open when the operating nut is turned counter-clockwise. The main valve and main valve seat shall be removable as a unit by turning the valve stem counter-clockwise at body level after removing the bonnet. The hydrant barrel shall be a minimum 175 mm inside diameter.
- 3. The hydrant body shall be painted chrome yellow. The bonnet and nozzle caps shall be painted black or silver.
- All hydrants shall be installed complete with hydrant support blocks 700 x 700 x 240 mm size or precast concrete block and a guard post as illustrated on Std. Dwg. LWD-007.

# 5. ACCESSORIES

 Accessories (i.e.; adaptors and couplings) required to join two different types of pipe shall be of type compatible with the pipes being used and installed in accordance with the manufacturer's recommendations, and shall be subject to the approval of the Engineer.

	SIZE		W		UNIT WEIGHT	
COOPLINGS	NPS	DN	in	mm	lbs	kg
	1⁄4	8	<b>1</b> 1/16	27	0.04	0.02
	1⁄2	15	1 5/16	33	0.18	0.08
	3⁄4	20	1 ½	38	0.26	0.12
	1	25	<b>1</b> 11/16	43	0.44	0.20
W	1 ½	40	2 1/8	54	0.93	0.42
	2	50	2 1⁄2	64	1.37	0.62
	2 1⁄2	65	2 1/8	73	2.34	1.06
	3	80	3 3/16	81	3.22	1.46
	4	100	3 11/16	94	5.62	2.55

BRASS TO IRON							
	SIZE		W		UNIT WEIGHT		
UNIONS	NPS	DN	in	mm	lbs	kg	
	1⁄4	8	<b>1</b> 13/16	47	0.44	0.20	
	1⁄2	15	<b>1</b> 15/16	49	0.37	0.17	
	3⁄4	20	2 1/16	52	0.55	0.25	
	¾ X ½	20x15	2 1/16	52	0.49	0.22	
	1	25	2 7/16	62	1.06	0.48	
and the second second	1 ½	40	2 ¾	70	1.98	0.90	
	2	50	2 15/16	75	2.91	1.32	
	2 1⁄2	65	3 5/8	92	3.53	1.60	
	3	80	3 3⁄4	95	4.85	2.20	

# SADDLE CLAMP FOR DUCTILE IRON PIPE, PVC PIPE & STEEL PIPE



Specifications:

- 1. Saddle body: Ductile Iron to BS2789 Grade 420/12, 500/7
- 2. pn10/16
- 3. Coating: Fusion Bonded Epoxy to SABS 1217
- 4. Color: Black or Blue
- 5. Bolt and Nuts: ss304
- 6. Rubber gasket: EPDM

SIZE						
(Pipe Size x Outlet Size)						
DN (mm)	NPS (in)					
40 x 15	1 ½ x ½					
50 x 15	2 x ½					
50 x 20	2 x ¾					
65 x 15	2 ½ x ½					
65 x 20	2 ½ x ¾					
80 x 15	3 x ½					
80 x 20	3 x ¾					
100 x 15	4 x ½					
100 x 20	4 x ¾					
150 x 15	6 x ½					
150 x 20	6 x ¾					
200 x 15	8 x ½					
200 x 20	8 x ¾					

#### FLANGE ADAPTOR (UNIVERSAL) Dimensions (mm)

	PIPE	۸	D	C	PN10	PN10 Flanged		BOLT	Bolt Size	
DN	OD	А	D	C	D	D1	N-ØD	Nr	(M x L)	
40	56	19	73	105	150	110	4-19	4	12x100	
50	66	19	73	105	165	125	4-19	4	12x100	1
60	77	19	73	105	175	135	4-19	4	12x100	
65	82	19	73	105	185	145	4-19	4	12x100	
80	98	19	73	105	200	160	8-19	4	12x100	1
100	118	19	73	105	220	180	8-19	4	12x100	
125	144	19	76	115	250	210	8-19	4	12x100	
150	170	19	76	115	285	240	8-23	4	12x110	
200	222	20	90	115	340	295	8-23	4	12x110	
250	274	22	90	130	400	350	12-23	6	12x120	

Features:

ith FBE coated.

2. PN10 working pressure.

3. Equipped with galvanized steel bolts, nuts.

4. EPDM or NBR rubber seals.

# 2.04 PIPE TESTING

- 1. PRESSURE TEST After the pipes have been laid and jointed, the main shall be tested. Test pressure for 100mmØ Pipe Class 100 should be 100Psi or 150 Psi for Class 150 Pipe and sustained for a period of 2 hours. The Contractor shall pressure test the pipeline under the direct supervision of the Engineer. Polyethylene pipes shall be tested in accordance with the manufacturer's recommendations.
- 2. CHLORINATION TEST All mains shall be swabbed and disinfected before being put to supply. After the pipeline has been pressure tested, cleaned and flushed, it is then filled with a chlorine solution having a strength of 50mg/I as a concentrated solution at a rate proportional to the inflow of water filling the main, which is to be measured accurately to ensure uniform and correct solution strength.

Acceptable forms of chlorine which may be used to prepare disinfecting solutions include calcium hypochlorite granules (powder), calcium hypochlorite tablets, and sodium hypochlorite solutions (liquid).

After a contact period of 24 hrs, the chlorine residual of samples taken at service connections or sampling points along the entire length of the pipelines shall not be less than 25 mg/l as determined by the Engineer. The pipelines shall then be flushed with clear water until the residual chlorine is not greater than 1.0 mg/l for watermain from the point of injection but not less than 0.30 mg/l at endpoint. If less than the permissible residual then the pipe work shall remain charged for a further 72 hrs after which the potability of water is to be checked at every point along the main at which a sample is drawn.

- 3. BACTERIOLOGICAL TESTS Following sterilization, the main shall then be refilled and a sample of the water shall be taken for Bacteriological Analysis. Considerable care shall be taken when obtaining samples for testing and only sterile containers shall be used. Samples shall be tested within 6 hours of collection. Water samples may be tested by accredited laboratory.
- 4. FLUSHING THE MAINS When pipelines have been satisfactorily tested and connected to the main, they shall be flushed out with potable water through a standpipe placed on the end hydrant before the pipeline is brought into use.

### 2.05 <u>CLEAN-UP</u>

- 1. The Contractor shall remove all equipment, surplus and waste materials from the site. Trenches shall be left in a neatly bladed condition. The pipeline trench shall be left mounded sufficiently to allow for the future settlement and consolidation of the excavated materials used to backfill the trench.
- 2. All construction areas including ditches shall be restored and maintained to original grade and conditions. All boulders, surface debris, etc. shall be removed from site and the construction area shall be neatly graded smooth without surface protrusions or holes.
- 3. The Contractor shall restore and clean up construction areas as soon as possible after pipeline and service line installation including restoration and repair of fences.

**SECTION 3** 

TABLE OF STANDARD DRAWINGS	
STD. DWG. LWD-001	TYPICAL TRENCH DETAILS
STD. DWG. LWD-002	CONCRETE CASEMENT DETAILS

STD. DWG. LWD-003	PAVEMENT REPAIR SECTIONS
STD. DWG. LWD-004	VALVE & VALVE BOX INSTALLATION
STD. DWG. LWD-005	STANDARD HYDRANT INSTALLATION FOR ROADS WITH CURB & GUTTER
STD. DWG. LWD-006	STANDARD HYDRANT INSTALLATION FOR ROADS WITHOUT CURB & GUTTER
STD. DWG. LWD-007	FIRE HYDRANT GUARD POST
STD. DWG. LWD-008	DEAD END BLOW-OFF ASSEMBLY
STD. DWG. LWD-009	THRUST BLOCK DETAILS
STD. DWG. LWD-010	SERVICE CONNECTION OF $1\!\!\!/_2$ " OR $3\!\!\!/_4$ " Above ground meter sets
STD. DWG. LWD-011	STANDARD UTILITY LOCATIONS IN LOCAL STREET (FOR PROVINCIAL & MUNICIPAL ROAD)
STD. DWG. LWD-012	STANDARD UTILITY LOCATIONS IN NATIONAL ROAD
STD. DWG. LWD-013	EARLY WARNING DEVICE (BARRICADE)
STD. DWG. LWD-014	EARLY WARNING DEVICE

The Libmanan Water District adopts a Quality Management System guided by certain policies approved by the District's Board of Directors.

- Leadership and Administration System
- Loss Identification Risk Assessment and Risk Control
- Documents and Records Control
- Legal Requirements
- Communication
- Central Follow Up System
- PPE
- Hiring and Placement
- Training System
- Emergency Management System (BUSINESS CONTINUITY PLAN)
- Planned Inspection and Maintenance
- Work Permit System
- Accident and Incident Reporting

Such policies serve as the Agency's guide in its Quality Management System.

APPENDICES Reference: Department of Budget and Management (2011). Revised Local Water District manual on categorization, re-categorization and other related matters (LWD – MaCRO). Retrieved October 5, 2015 from http://www.lwua.gov.ph/wd\_classification/RevisedLocal-Water-District-Manual-MaCRO.pdf