## ENVIRONMENTAL ASSESSMENT REPORT

# TUNASAN SEWERAGE SYSTEM PROJECT



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## **Project Fact Sheet**

Name of Project:	TUNASAN SEWERAGE SYSTEM PROJECT
Location:	Vacant lot beside Tunasan River near Muntinlupa Science High School, Muntinlupa City
Project Proponent:	Maynilad Water Services, Inc.
Business Address:	MWSS Compound, Katipunan Road, Balara, Quezon City, Metro Manila
Type of Project:	Sewerage system
Objective:	To treat the wastewater coming from the Muntinlupa catchment area in accordance with the Effluent Standards of the Department of Environment and Natural Resources (DENR)
Project Component:	20 MLD Sewage Treatment Plant Intake weir at Pasong Diablo Manhole pumps Pump Stations Force main pipe consisting of 450-850mm diameter pipes Force main pipe consisting of >850mm diameter pipes Interceptor (gravity main) consisting of 450-850mm diameter pipes Interceptor (gravity main) consisting of >850mm diameter pipes

Estimated Project Cost: ₽ 12,918,180.00

Contact Persons: Francisco Arellano Senior Vice President Maynilad Water Services, Inc. Telephone: +63(2) 920-5408 / 928-1454

## **1** Introduction

The World Bank (WB), Maynilad Water Services, Inc. (MAYNILAD), and the Land Bank of the Philippines (LBP) have agreed to implement the Muntinlupa Sewage Treatment Water Quality Improvement Project as a component of the Metro Manila Wastewater Management Project (MWMP). Overall, the MWMP aims to increase the coverage and effectiveness of wastewater collection and treatment in Metro Manila and its suburbs.

The MWMP supports the National Sewerage and Septage Management Program (NSSMP), as required under the Philippine Clean Water Act as well as Government efforts to clean up the Laguna de Bay and other water bodies.

The Maynilad together with the Manila Water Company, Inc. (MWCI) are the two concessionaires of Metropolitan Waterworks and Sewerage Services (MWSS) assigned to manage the water supply, sewerage, and sanitation services in Metro Manila. Improvements in wastewater services are priorities for both companies. To achieve 100 percent coverage, both concessionaires have prepared investments in wastewater management in their business plans using a river basin approach and with investments planned at the sub-catchment level to collect and treat wastewater.

For MAYNILAD's service area in Muntinlupa City, a two-stage conveyance and sewerage service system is proposed. The first stage will consist of two (2) STPs, one in Barangay Cupang and another one in Barangay Tunasan. The 2nd stage will be the capacity upgrade of the STP in Barangay Tunasan. The project proposed for financing and immediate implementation is the first-stage STPs that will both drain in Laguna Lake.

To reduce the pollution load being discharged into the rivers and streams that flow through the Muntinlupa catchment, the MAYNILAD proposes to construct a 46 and 20 MLD capacity STPs to be located in Bgy. Cupang and Bgy. Tunasan respectively. Muntinlupa catchment is divided into six (6) sub-catchments based on the topography of the inclusive river basins, Subcatchments: A- Buli River, B-Pasong Diablo River, C- Bayanan River, D- Poblacion River, Etunas an river and F- San Pedro River. Sub-catchments A,B,C,E anf F will be service in Stage 1, while Stage 2 will extend service coverage to include sub-catchment D catering the whole of Muntinlupa. The flows will be conveyed via streams towards creek interceptors', where the wastewater flow will be diverted to a conveyance. The conveyance generally runs along M. L. Quezon, Ilaya, San Guillermo St. and other small roads in some portions. Flows intercepted will be conveyed to the treatment plant prior to reaching Laguna Lake.

This report gives an account of the environmental assessment of the proposed project that was conducted as part of the project preparation and planning. The environmental assessment aims to identify and assess the potential impacts of the proposed project on the environment, and to recommend measures to mitigate the potential adverse impacts arising from its implementation.



#### **1.1 Project Rationale**

Overall, the proposed project aims to:

- Enhance management of wastewater, human waste and storm water;
- Reduce pollution load being discharged into rivers and creeks;
- Contribute to the clean-up of creeks and rivers draining Laguna de Bay;
- Comply with the National Sewerage and Septage Management Program under the Philippine Clean Water Act;
- Contribute to economic growth in Metro Manila, particularly Muntinlupa City; and
- Improve public health and sanitation in the urban environment.

#### **1.2 Summary of Project's Environmental Assessment Process**

#### **1.2.1** Policy, Legal, and Administrative Framework

#### **1.2.1.1** World Bank's Environment Safeguards Requirements

The World Bank Safeguards Policies is outlined in OP/BP 4.01. Considering that the project will be financed through LBP as Financial Intermediary, the entire project has been categorized as FI and LBP as borrower will ensure that the WB's policies as well as relevant national regulations are followed, and appropriate instruments prepared. However, the sub-project is classified as a Category B project. Specifically for the MWMP, an Environment and Social Safeguards Framework (ESSF) was already drafted.

Environmental screening of the project is required to identify key potential environmental issues and to determine the environmental category of the project. Annex A presents the Environmental Screening checklist that was prepared for the Muntinlupa STP project.

The following are the environment safeguard policies of WB that might apply to the proposed project:

Environment	Status		Remarks
Safeguard Policies	Yes	No	
OP/BP 4.01 – Environmental Assessment	$\checkmark$		Based on the Environmental Screening and ESSF, it was deemed that the project falls under Category B and therefore, requires an Initial Environmental Examination (IEE) and an Environmental Management Plan (EMP). MAYNILAD shall be responsible for the implementation of the EMP, subject to regular visits throughout project implementation by LBP.
OP/BP 4.04 – Natural Habitats		$\checkmark$	The project is located in an urban environment. It will not cause any loss or degradation of natural habitat, but rather will contribute to the regeneration of the Laguna de Bay that is currently degraded. Existing trees within the site can be preserved through site development planning.
OP/BP 4.2 Involuntary Resettlement		V	The STP site is a private property. Fifteen ISs families were properly informed as to the plan of the land owner to sell the lot they are occupying. They are willing to vacate their present location of residence and be relocated. Each of the IS were given financial assistance for their affected structures and relocation. A relative of the land seller



		offered her available lot, 40 meters away from the PAPs present location, to be the relocation site of the PAPs and is willing to sell the lot to the at a low price. There are no resettlement issues involved at along the conveyance system.
Chance Finds	$\checkmark$	The project sites are highly developed and are not declared as cultural or heritage sites by the National Museum.
OP 4.10 Indigenous Peoples Policy	$\checkmark$	Not applicable.

#### **1.2.1.2** Philippines Legal and Regulatory Requirements

The Philippine implements an Environmental Impact Assessment (EIA) system by virtue of the Presidential Decree 1586 or the Environmental Impact Statement (EIS) system. P.D. 1586 was originally devised as an administrative procedure for an action- forcing policy that requires proponents of development projects to systematically study and disclose the environmental impacts of their projects.

In accordance with Presidential Decree 1586, development projects are required to conduct an EIA and to prepare environmental assessment reports for review and approval of the Environmental Management Bureau (EMB) prior to the issuance of an Environmental Compliance Certificate (ECC).

Aside from the ECC, there are other environmental permits and approvals that are necessary prior to the implementation of the proposed project, as follows:

Permit/Clearance	Issuing Agency	Purpose
Permit to Cut/Ball Out Trees	DENR-FMB	Applicable if the proposed project will cut/ball out trees
LLDA Clearance	LLDA	Muntinlupa City falls under the jurisdiction of LLDA in terms of wastewater management.
Discharge Permit	LLDA	For operation and maintenance of the STP
Permit to Operate – Air Pollution Source Equipment	DENR-EMB	Applicable if the proposed project will utilize generator sets even if as standby units only
Hazardous Waste Registration	DENR-EMB	For generation of hazardous wastes such as empty chemical containers, used oil, busted fluorescent lamps.

#### Table 1. Other Environmental Permits Applicable to the Proposed STP Project

#### 1.2.2 EIA Study Schedule & Area

The Environmental Impact Assessment (EIA) study was conducted in March to April 2013. The EIA study area comprises of the catchment area, sites of the conveyance system, and the project site of the proposed STP as primary impact area. The primary impact area is defined as the immediate vicinity to the perimeter up to a radius of 10 meters. This includes part of the adjoining residential houses, commercial establishments in the vicinity, and the streets traversed by the gravity line interceptors and conversion manholes.

Sensitive receptors within the primary impact area were identified in the environmental assessment. The primary impact area was determined based on the potential impacts that may



be generated by the project particularly during the construction phase. These environmental impacts include generation of dust, noise, soil runoff, and traffic that may cause nuisance and hazards to the environment, residents and passersby, impacts to existing utilities, waste generation and disposal, among others.

The secondary impact area is defined as the area within 500-m radius of the proposed project site components wherein a greater number of populations will be affected either directly or indirectly by the potential environmental, health, and socio-economic effects of the project. The secondary impact area is projected to experience impacts associated with improvement of sanitation, community health condition, improvement of water quality of Laguna de Bay, among others.

#### 1.2.3 EIA Methodology

The conduct of the EIA study was guided by the World Bank Safeguards Policies, draft Environment and Social Safeguards Framework of the MWMP, and the Implementing Rules and Regulations of Presidential Decree No. 1586 which is contained under DENR Administrative Order No. 30 Series of 2003 (DAO 2003-30).

This EA report includes information and data on the following:

- General description of the environment of the project area and the need for the project
- Project goals and objectives
- Project scope
- Environmental concerns
- Environmental management plan
- Environmental monitoring plan.

This report presents the primary and secondary data gathered during surveys held in March to April 2013 as well as results of studies commissioned by MAYNILAD during the Feasibility Study (FS) of the project which was completed in June 2011. Activities include survey/data gathering on water quality, air quality, noise, flora and fauna, and socio-economic profiling to characterize the environmental conditions and to further define the environmental impacts of the project.



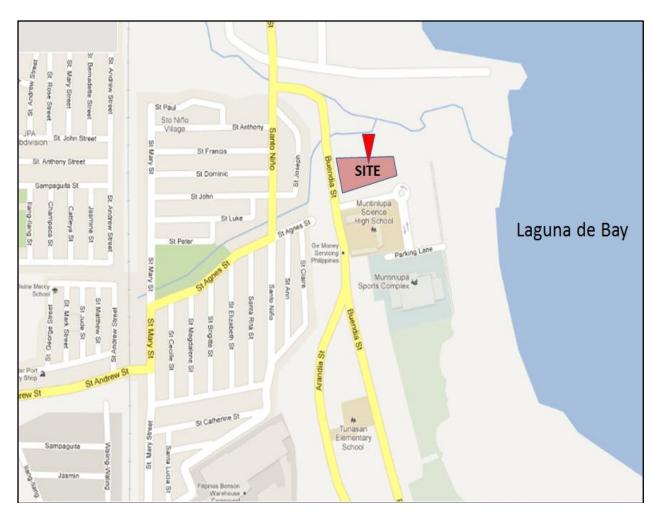


Figure 1. Study Area

Project information and process specifications were provided by MAYNILAD. Secondary data on the project areas were gathered from various national and local agencies including:

- City of Muntinlupa
- Mines and Geosciences Bureau (MGB);
- Philippine Atmospheric, Geophysical and Astronomical Services, Administration;
- Philippine Institute for Volcanology and Seismology;
- National Statistics Office (NSO);
- Pasig River Rehabilitation Commission (PRRC); and
- Environmental Management Bureau (EMB);

Table 2. Generic LIA Approach and Data Sources			
EIA Module	Approach and Data Sources		
Hydrology	FS, survey, actual flow measurements, MMDA data		
Air quality	Secondary data on TSP, SO <sub>2</sub> , and NO <sub>2</sub> from DENR-EMB		
Surface water	FS, water sampling results, secondary data from DENR-EMB		
Land use	Reconnaissance survey, Comprehensive Land Use Plan of Muntinlupa		
	City		

Table 2. Generic EIA Approach and Data Sources

EIA Module	Approach and Data Sources
Soil and geology	Secondary data from MGB
Tectonic setting	Phivolcs, previous researches/studies
Terrestrial flora	Field survey, secondary data from DENR
and fauna	
Climate	PAGASA
Demographics	Secondary data from Socio-economic Profile of Muntinlupa City and
	NSO Census on Population (2006)
Social impact	Public consultation meetings held on October 18, 2011 Session Hall,
assessment	People's Center, Muntinlupa City Hall Compound, Putatan, Muntinlupa
	City

#### **1.2.4** Public Participation and Disclosure

MAYNILAD conducted public consultation meeting with stakeholders last August 31, 2012 to present the proposed project and its benefits and to discuss environmental concerns at the Barangay hall lobby, Tunasan, Muntinlupa City. The consultation meeting aims to solicit ideas, suggestions, comments and concerns about the project. Representatives from the local residents of Tunasan, members of Barangay Council of Tunasan, and representatives of several housing associations attended said public consultation.

Maynilad explained that the project will help improve the prevailing unsanitary conditions in the community and is designed to intercept wastewater flows coming from the drainage system to be diverted to the proposed STP for treatment.

One of the relevant questions raised during the public consultation was regarding the locations of pipelaying for the conveyance system of the proposed STP. President of Park Homes Village HOA, asked if the conveyance will be laid in the different HOA subdivisions in Tunasan and will the project timeline consist of ROW acquisition in those areas. Maynilad clarified the inquiries by presenting the scheme to be used in Muntinlupa South Catchment. The project will be implementing a creek interception and pipelaying will be implemented along Buendia St. in Tunasan. The scheme will eliminate pipelaying in subdivisions and villages therefore avoiding inconvenience for both Maynilad and the HOA.

Another question raised was the roles and responsibilities of the LGU in the project. Maynilad explained that the LGU will play a vital role especially in solid waste management. The local government of Muntinlupa as well as the community is expected to be vigilant in implementing effective solid waste management such as the dumping of wastes in waterways to prevent clogging and blocking of the drainages and rivers. The success of the project lies on the proper and effective management of solid wastes. Maynilad will provide screens in the conveyance manholes and interceptor box. However, if screens will be obstructed with solid waste, wastewater flow to the STP will be reduced and the flow will be diverted to the nearest manhole which may cause flooding of the streets. Maynilad will provide the services in reducing the pollution load being discharged into the rivers and streams by treating the wastewater that will be conveyed via streams towards creek interceptors and the intercepted flows will be conveyed to a treatment plant for treatment prior to reaching Laguna de Bay.

The members of the Barangay council expressed their willingness to cooperate with Maynilad for the timely completion of the project.



The minutes of the public consultation meeting is presented in Annex B.

#### **1.2.4.1 Future Public Participation Plans**

Plans for public involvement during the construction and operational phases of the project will be developed, once the construction program is better defined. These plans will provide forums for updating stakeholders periodically on project progress and the implementation of mitigation measures. These plans will be incorporated into an IEC plan.

## 2 **Project Description**

Maynilad Water Services, Inc. (MAYNILAD) proposes to construct a 20-MLD sewage treatment plant (STP), conveyance system, pump stations and other appurtenances to handle wastewater flows into the Laguna Lake. The proposed STP will serve a hydrological catchment area of 2,550 ha. The The project will be referred to as the "Tunasan Sewage Treatment Plant" project.

The Tunasan STP's catchment area primarily covers sub-catchment 2 (see Figure 2) or it covers three sub-catchments from the Muntinlupa wastewater catchment, based on the topography of the inclusive river basins namely:

- a) Sub-catchment D -Tunasan River;
- b) Sub-catchment E -Poblacion River;
- c) Sub-catchment F -Pasong Diablo River

The plant is situated some 65 meters north from the road going to the Muntinlupa Sports Complex, 215 meters north from the Buendia and Arandia Street junction, 700 meters north of the corner of Arandia Street and Rodriguez Jr. Street and 1,300 meters northeast from the corner of the National Highway and Rodriguez Jr. Street. Buendia Street, the main access road to the site, is 5 meters wide and cemented

The proposed STP will be built in a property covering a consolidated land area of 8,333 sqm parcel of land located east of Buendia Street, within Bo. Tunasan, Muntinlupa City, Metro Manila. The land consists of various lots owned by different individuals. It is situated some 65 meters north from the road going to the Muntinlupa Sports Complex, 215 meters north from the Buendia and Arandia Street junction, 700 meters north of the corner of Arandia Street and Rodriguez Jr. Street and 1,300 meters northeast from the corner of the National Highway and Rodriguez Jr. Street. Buendia Street, the main access road to the site, is 5 meters wide and cemented.. The STP site is approximately centered by geographic coordinates 14<sup>0</sup>31'54.39" north latitude and 121<sup>0</sup>00'28.88" east longitude.

A combined sewer collection system will be applied by the project. Wastewater will be collected through street drainage lines with outfalls alongside the rivers and creeks in the catchment area. Downstream river flows will be conveyed via streams towards creek interceptors', where the wastewater flow will be diverted to a conveyance. The conveyance generally runs along ML Quezon, Ilaya, San Guillermo St. and other small roads in some portions. Flows intercepted from the rvers/creeks will be conveyed to the treatment plant prior to reaching Laguna Lake. The system will be provided with overflow structures to prevent



excess flows to the STP during heavy downpour. The treated effluent from the STP will be discharged through an outfall into the Laguna de Bay.

Muntinlupa City lies within 14o23' north latitude and 121o03' east longitude and is located on the Southwestern Coast of Laguna de Bay. It is bounded on the North by Taguig, on the Northwest by Parañaque, on the West by Las Piñas, on the Southwest by the Province of Cavite, South by the Province of Laguna and on the East by Laguna de Bay. It is 22 kilometers South of Metro Manila, easily accessible to all points of Metro Manila through the National Highway and South Luzon Expressway.



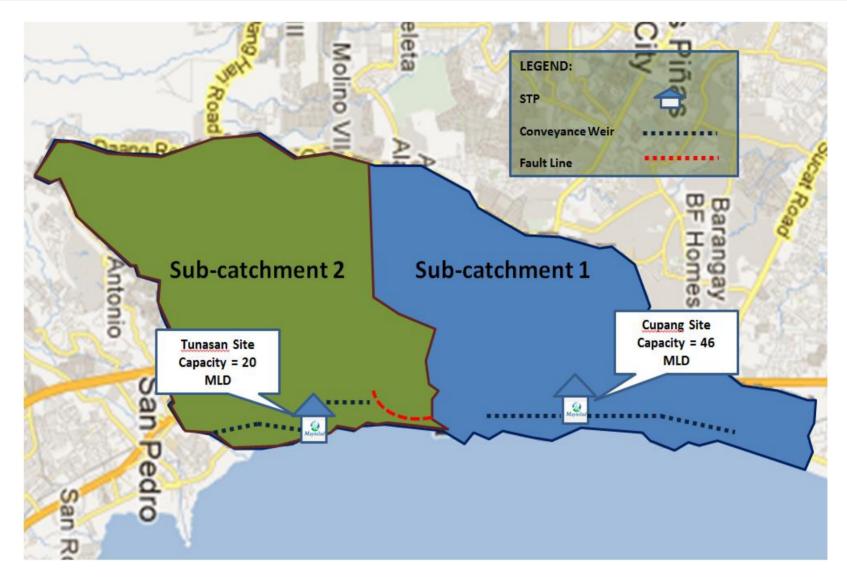


Figure 2. Map showing the proposed locations of the 2 STP's with their areas of coverage, conveyance lines and identified fault lines.



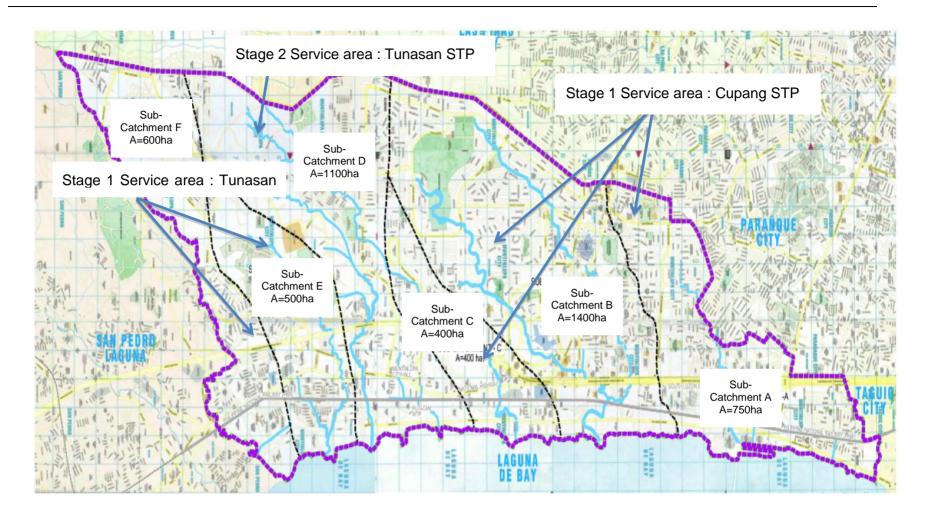


Figure 3. Muntinlupa Wastewater Catchment



A watershed approach was developed whereby the Muntinlupa catchment area was subdivided into six sewerage sub-catchments (see Figure 3). The delineation was based on topography, location of candidate STP sites, and existing drainage collection systems. The hydrological catchment corresponding to this project area is the sum of six sub-catchments named after the local rivers. The natural outlet of these rivers is Laguna Lake. The total land area of the hydrological catchment is approximately 4,750 ha. The hydrological catchment has a natural extension in San Pedro, Laguna and part of the storm water in this area may drain into the river boundary between Muntinlupa and San Pedro. These sub-catchments are:

- Sub-catchment Area A Buli (750 ha)
- Sub-catchment Area B Pasong Diablo (1,400 ha)
- Sub-catchment Area C Bayanan (400 ha)
- Sub-catchment Area D Poblacion (1,100 ha)
- Sub-catchment Area E Tunasan (500 ha)
- Sub-catchment Area F San Pedro (600 ha)

The wastewater catchment of Muntinlupa is bound by its municipal boundaries. The eastern boundary of the catchment is Laguna Lake while Daanghari forms the western boundary. South of the catchment is bounded by San Pedro River, which forms the boundary between Muntinlupa and San Pedro, Laguna. The northern portion of the catchment is bounded by the Municipal boundary of Taguig.

Catchment		Description
Muntinlupa Catchment - A	Sub	The northernmost section of the Muntinlupa catchment that will serve Barangay Buli. Wastewater from this catchment area will be collected through outfalls that drains into the Buli River.
Muntinlupa Catchment – B	Sub	This catchment area encompasses the areas of Barangay Cupang in the east and Barangay Ayala Alabang in the west. Wastewater from this catchment will be collected through outfalls that area drains into Pasong Diablo River.
Muntinlupa Catchment – C	Sub	The catchment area covers Barangay Bayanan and Barangay Poblacion. Wastewater from this catchment area will be collected through outfalls that drain into the Bayanan River.
Muntinlupa Catchment – D	Sub	The eastern section of the catchment covers Barangay Putatan and Barangay Poblacion. Wastewater from this catchment area will be collected through outfalls that drain into the Poblacion River.
Muntinlupa Catchment – E	Sub	The catchment covers Barangay Tunasan. Wastewater from this catchment area will be collected through outfalls that drain into the Tunasan River.
Muntinlupa	Sub	The southern section of the catchment covers Barangay Tunasan.



Catchment	Description
Catchment - F	Wastewater from this catchment area will be collected through outfalls that drain into the San Pedro River.

#### 2.1 Project Alternatives

#### 2.1.1 Evaluation Criteria

The evaluation of project alternatives considered various criteria consisting of availability of land, technical viability, environmental and health benefits, traffic impacts, social acceptability, exposure of workers and community to hazards, ease of construction, maintenance, and operation, and cost of investment.

#### 2.1.2 Without Project Alternative

A "without project" alternative would result to wastewater being continuously dumped into waterways, i.e. Buli River, Tunasan River, Poblacion River, Bayanan River, and Pasong Diablo River, , which eventually end up in Laguna de Bay. The practice of dumping untreated wastes into these water bodies would continue to contribute to degradation of water quality, worsen sanitation and health conditions in the community, aggravate flooding, and result to the overall deterioration of the living conditions of the communities particularly those living near waterways.

#### 2.1.3 STP Siting Alternatives

Six (6) STP site locations were investigated by MAYNILAD as viable candidates, all of which are near Laguna Lake. The candidate STP site locations were selected based upon the following criteria:

- a) Land area
- b) Proximity to a discharge point
- c) Access
- d) Location within the catchment (upstream/downstream)
- e) Site conditions
- f) Land type
- g) Avoidance of informal settlers
- h) Maintain about a kilometer radius buffer zone from Putatan Water Treatment Plant

Table 4 listed the five option sites for the Muntinlupa STP also refer to Figure 4 for its aerial map.

STP Site	Location	Area (ha)	Discharge Point	Access		Land Type
S1	Vacant lot beside Tunasan River, near Muntinlupa Science High School	1.7	Tunasan River (Laguna Lake)	Along Buendia St.	Good	For verification

#### Table 4. Muntinlupa STP Site Locations



<u></u>	Vegent let beside		Decema Diskla		Cood	
S2	Vacant lot beside		Pasong Diablo	Along ML	Good	For
	Pasong Diablo	4.5	River (Laguna	Quezon Road		verification
	River		Lake)			
S3	Vacant lot		Buli River (Laguna	About 300m	Good	For
	adjacent to		Lake)	from ML		verification
	Tribeca Site			Quezon,		
	beside Buli Creek	2.12		accessible via		
				MLQ Road and		
				Concepcion St.		
04	)/acart lat haved		Ourseh (Care Dadra		Caad	<b>F</b> ar
S4	Vacant lot bound		Cuyab (San Pedro	Off National	Good	For
	by PNR and		River)	Road		verification
	Cuyab (San	3.5				
	Pedro) River,	0.0				
	bordering San					
	Pedro					
S5	Vacant lot in Bgy.		Laguna Lake	Off MLQ Road	Good	For
	Cupang along					verification
	Laguna de Bay	1.8				ronnoadion
	shore					
S6			Deserra Dishla		Cood	- For
30			Pasong Diablo	MLQ Road	Good	For
	Pasong Diablo River	1.24	(Laguna Lake)			verification
	along PNR					

The STP site S6 located in Bgy. Cupang and STP site S1 in Bgy Tunasan were selected as the preferred sites due to its cost, topography, geology and issue on encumbrances among others. The site also matches the technical design requirements of the project.



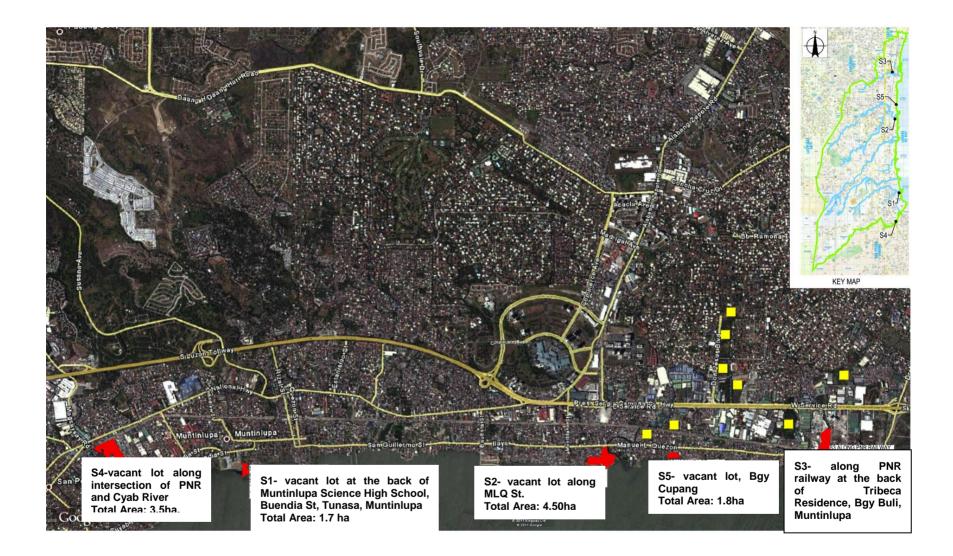


Figure 4. Site Locations of STP Alternatives



#### 2.1.4 Interception Options

In the feasibility study three options were developed for the Muntinlupa conveyance which differ on methodology. These are: interception at points upstream of the creek embankments; conveyance through a pipeline under a concrete lined creek bed; and creek conveyance to downstream interception via creek interceptor weirs.

Conveyance through the creek beds to an interceptor weir (Option C) is preferred and recommended due to its advantages in terms of cost, constructability and overall pollution reduction. Hence, all conveyance options developed are based on the the concept of interception Option C.

The three interception options are discussed below:

**Option A** - Outfall Interception Prior to Pollutants Reaching Creeks.

This option relies on availability of suitable access and roads generally following the creeks' path. Such, in the case of Muntinlupa is a very severe limitation, particularly due to the lack of access to the stormwater outfalls to creeks. Prior to reaching the streams, flows from outfalls would be diverted by means of pump stations or by gravity to a series of sewers which will run generally parallel to the streams then collected by a main line parallel to the Laguna shore. Spine sewers would ideally be laid along the road network to minimize ROW issues. However, the interception of outfalls, in a significant number of cases, would inevitably mean entering properties, particularly those closer to the creeks; which, in majority of cases, are informal settlements.

Any attempt to intercept the existing drains prior to entering the creek will require at least one or a combination of these following strategies:

- Potential relocation of existing residents
- Structural works within private property and restoration
- Extensive residential/stakeholder consultation
- In addition to the above, identifying and procuring suitable locations for pump stations in locations not yet finalized will also be a significant challenge.

Due to the significant disadvantages stated above, the Feasibility Study considers this option to be a less preferred option.

#### **Option B** – Creek Lining, Interception and Conveyance

The general concept of this option is to lay pipes along concrete-lined creeks/rivers. An interceptor box would be installed at every 50m length of river bed. Intercepted flows would be collected and conveyed to the trunklines lying along the river bed. To avoid the possible scouring of the river bed on the pipes of the main trunk, the river would be lined by about 250mm of concrete and a layer of mesh.

Infrastructure and appurtenances required for this option are pipes for conveyance, manholes, interceptor boxes, at least one pump station, concrete creek/river lining, wire mesh and a temporary bypass system for diverting the river flow during construction.





In terms of social perception, this option is favorable to the public because it directly and almost immediately improves the creek conditions. Also, it does not require major relocation of existing tenants along the river easements, which is where most of the informal settlements of Muntinlupa are residing.

In some Muntinlupa creeks, however, informal settlements have gone as far as stilting over the waters. Concrete lining and temporary bypass systems may require relocation for this case. Temporary bypass set- ups and interceptor box installations may cause disruptions, as well, and require area on some, if not all, interception points.

This methodology is comparatively costly in terms of construction and appurtenances.

This alternative, although full of potential, is expensive and has significant disadvantages (i.e. relocation of informal settlements in certain points). Therefore, it is considered to be a less preferred option.



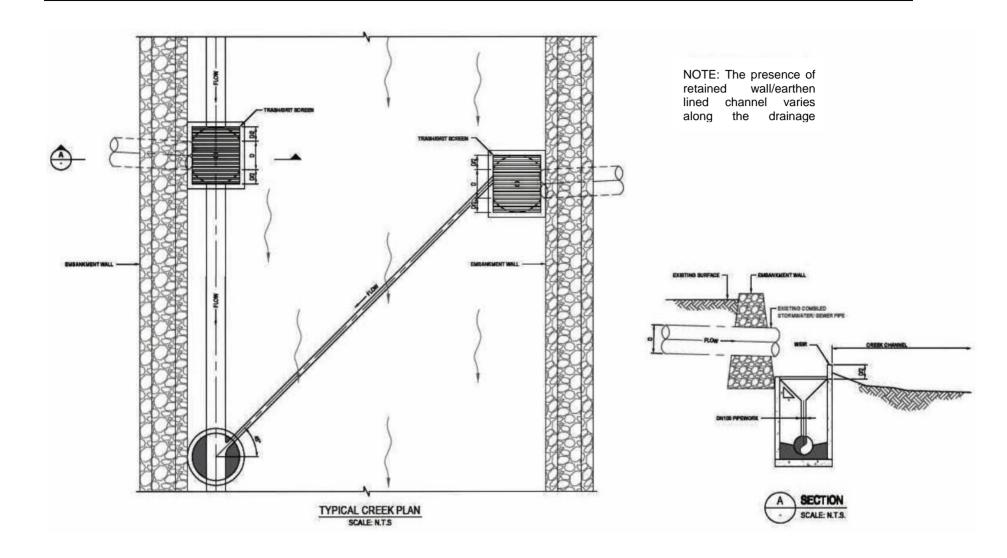


Figure 5. Typical Creek Plan and Section



#### Option C - Creek Interception and Conveyance

This option utilizes creeks and small streams as conveyance to a main interceptor system along Laguna Lake and intercept the Dry Weather flow-borne pollutants by means of interceptor weirs

The key advantages to this option are:

- a) Simplified Construction
- b) Simplified Operation & Maintenance
- c) Preclusion of multiple pump stations and rising mains
- d) Minimal ROW, land acquisition and stakeholder concerns
- e) Provision for channel upgrade, such as building adjacent sewer in creek line, or lining the creek channel
- f) Provision for separate system upgrade

The majority of the outfalls also follow the creeks as shown in Figure 7A, 7B and 7C. This, in addition to the list above makes creek interception advantageous. A specific "Creek Interceptor" conceptual design has been developed and it is shown on Figure 6A and Figure 6B.

The disadvantage on using creeks and small streams as conveyance with the installation of interceptor weirs is it may affect water flow along creeks as it will be used to capture wastewater from various areas around Muntinlupa. As a result of this, the flow of water downstream of the interceptor weirs may potentially decrease or cause the creek to dry up.

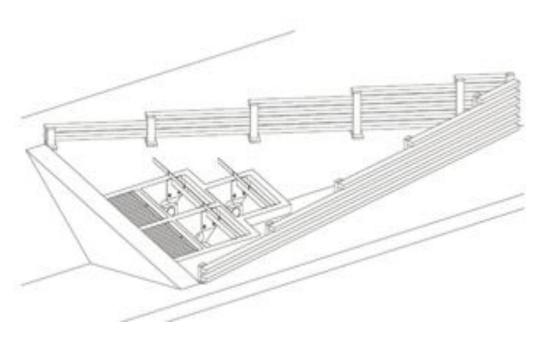


Figure 6A. Creek Interceptor Weir Typical Arrangement



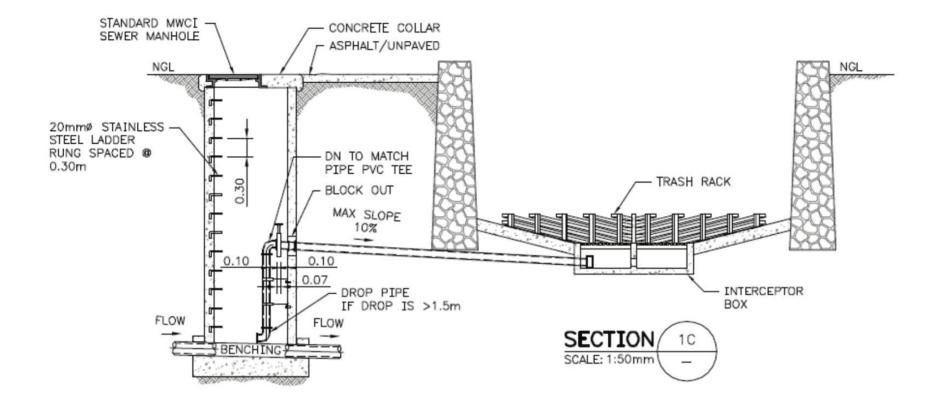
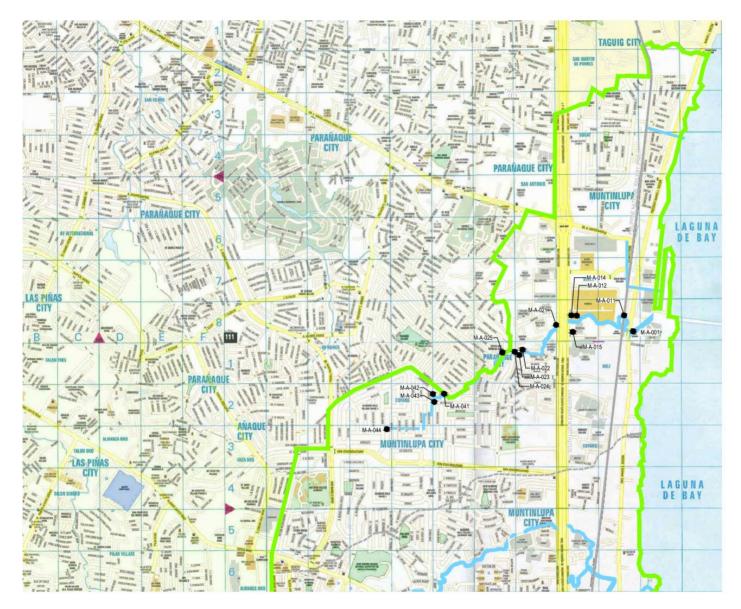


Figure 6B. Creek Interceptor Weir Typical Section







NOTE: LOCATION OF MAPPED OUTFALLS WERE DEPENDENT UPON ACCESS ON THE DAY OF VISIT AND SHOULD BE VALIDATED AT DETAILED DESIGN.

Figure 7A. Distribution of Outfalls in Muntinlupa







NOTE: LOCATION OF MAPPED OUTFALLS WERE DEPENDENT UPON ACCESS ON THE DAY OF VISIT AND SHOULD BE VALIDATED AT DETAILED DESIGN.

Figure 7B. Distribution of Outfalls in Muntinlupa



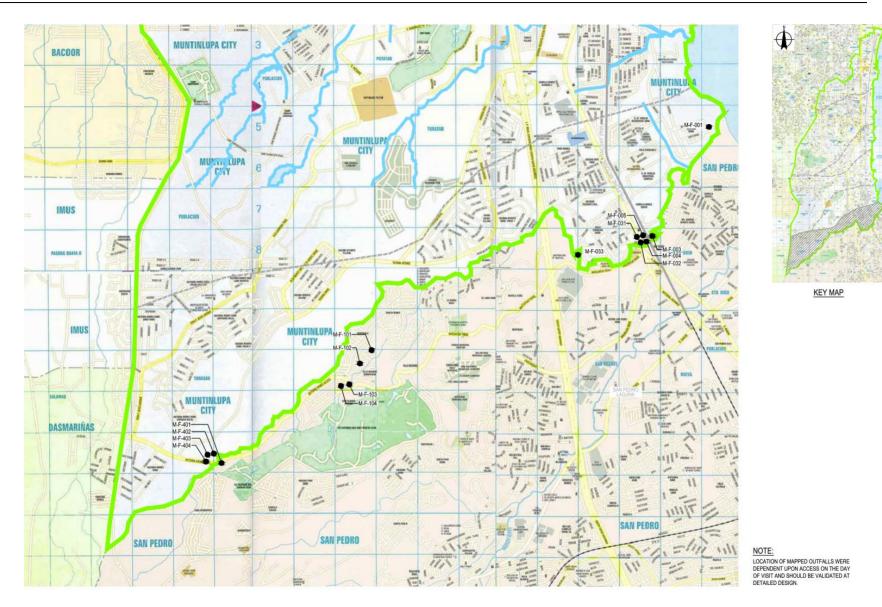


Figure 7C. Distribution of Outfalls in Muntinlupa



#### 2.1.5 Conveyance Options

#### 2.1.5.1 Service Strategy

Muntinlupa is divided into two service areas for the purpose of coveying the flows to the treatment:

- Service Area 1- composed of sub-catchments A, B, C
- Service Area 2 composed of sub-catchments D, E, F

Figure 8A-C shows the distribution of outfalls contributing pollution to the streams and tributaries in Muntinlupa. Wastewater sub-catchments served are the same as the river sub-catchment shown in Figure 3. This is due to the application of creek interception to Muntinlupa, instead of outfall interception.

#### 2.1.5.2 Stage Timing

Conveyance system coverage is proposed into two stages which has been generally aligned with MAYNILAD targets as shown in Table 5.

#### Table 5. Conveyance Stage Timing

Stage	Timing
1	Commence by 2012
2	Commence between 2016 and 2021

#### 2.1.5.3 Conveyance Options Considered

In the Feasibility Study seven conveyance options were assessed. Two options have been shortlisted as preferred options: Option 5 and 6 for utilizing available public land. Option 5 uses PNR as main corridor while Option 6 uses roads approved by the municipality.

The seven conveyance options are shown in Table 6.

#### **Table 6. Conveyance Options**

OPTION	STRATEGY
1	Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the ML Quezon road and other small roads in some portions. Flows intercepted from the rivers/creeks will be conveyed to two treatment facilities, S1 and S3.
2	Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the ML Quezon road and other small roads in some portions. Flows intercepted from the rivers/creeks will be conveyed to one treatment facility, S1 prior to reaching Laguna Lake, with Area A being serviced at Stage 1 followed by Service Area B at Stage 2.
3	Flows will be conveyed via streams mainly towards creek interceptors' locations,



	where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the ML Quezon road and other small roads in some portions. Flows intercepted from the rivers/creeks will be conveyed to S2 prior to reaching Laguna Lake, with Area A being service at Stage 1, followed Service Area B at Stage 2.
4	Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the ML Quezon road and other small roads in some portions. Flows intercepted from the rivers/creeks will be conveyed to S1 and S2 prior to reaching Laguna Lake, with Area A being service at Stage 1, followed Service Area B at Stage 2.
5	Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the Philippine National Railway (PNR) that is within the Muntinlupa municipal boundary. Flows will be ultimately conveyed to S4 prior to reaching Laguna Lake, with Area A being serviced at Stage 1, followed by Service Area B at Stage 2.
6	Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. Majority of this trunkline runs along the ML Quezon road, other small roads and several meters along the PNR in some portions. Flows will be ultimately conveyed to S4 prior to reaching Laguna Lake, with Area A being service at Stage 1, followed by Service Area B at Stage 2.
7	Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the ML Quezon road, other small roads and several meters along the PNR in some portions. Flows intercepted from the rivers/creeks will be conveyed to S4 and S5 prior to reaching Laguna Lake, with Area B being service at Stage 1, followed Service Area B at Stage 2.

		Us	e of S	Site		Service Strategy		
Conveyance Option	S1	S2	S3	S4	S5	Service Area A (sub-catchment B,C,D,E)	Service Area B (sub-catchment A,F)	
Option 1	Х		Х			Serviced by S1 at Stage 1	A serviced by S3 at Stage 2 F serviced by S1 at Stage 2	
Option 2	Х					Serviced by S1 at Stage 1	Serviced by S1 at Stage 2	
Option 3		Х				Serviced by S2 at Stage 1	Serviced by S2 at Stage 2	
Option 4		Х	Х			Serviced by S2 at Stage 1	A serviced by S3 at Stage 2 F serviced by S2 at Stage 2	
Option 5				Х		Serviced by S4 at Stage 1	A serviced by S4 at Stage 2 F will not be serviced	
Option 6				Х		Serviced by S4 at Stage 1	A serviced by S4 at Stage 2 F will not be serviced	
Option 7				Х	Х	Serviced by S4 at Stage 1	A serviced by S5 at Stage 2 F will not be serviced	

#### Table 7. Summary of Conveyance Options



However, the issue on the recent disclosure of PNR that they are not allowing any pipelaying in their ROW, these seven conveyance options were revised. Hence, in Stage 1, Cupang STP will service sub-catchments A, B and C while Tunasan STP will service sub-catchments E and F. In Stage 2, conveyance will extend its service coverage to sub-catchment D to cover the whole of Muntinlupa, see Figure 8 for the revised conveyance service strategy.



Figure 8. Revised Conveyance Service Strategy

#### 2.1.6 Pollutant Loads

Pollutant sampling was undertaken at a number of outfalls which have been mapped as shown in Figure 9 and described in Table 8. Influent characterization was undertaken and sewage was found to be generally of low strength in terms of BOD, COD and TSS and low to medium strength in terms of nutrient.





Figure 9. Muntinlupa Sampling Point Locations



Sampling Point		Location	Presumed Source of Wastewater			
			Residential	Commercial		
SP3	MC-001	M.L.Quezon Avenue Bridge along Bayanan Creek	Х			
SP4	MC-031	Bayanan Creek Bridge along National Highway	Х			
SP5	MD-011	Railway crossing of Poblacion River	Х			
SP6	ME-004	Tunasan area in La Guerta cor. Sto Nino St. (nr. local vegetable stand)	Х			

#### Table 8. Sampling Point Location and Description



#### 2.1.7 Sewage Treatment Plant Technology Options

Four process treatment technology options were shortlisted in the Feasibility Study to wit; 1) Activated Sludge Process (ASP), 2) Sequencing Batch Reactor (SBR), 3) Membrane Bioreactor (MBR) and 4) Moving Bed Bioreactor (MBBR). Treatment technologies were evaluated based on compact footprint, upgradability, odour generation, process robustness, standardization, ease in operation and maintenance and cost. Although SBR appeared to be more impressive, all technologies were found to be feasible. Table 9 presents the summary of comparison of the sewage treatment processes. Indicative arrangement or plant layout for each of the treatment options were shown in Figure 10-13.

Treatment Process	Remarks
Activated Sludge Process (ASP)	The design of the ASP consists of an aeration tank (or bioreactor) and a clarifier. The same approach was adopted for SBR with the exception that a selector zone has been included for improved settling sludge and a lower Food to Microorganism (F:M) ratio must be used due to the intermittent process operation. ASP designs may also include selector zones. Figure 11 shows an indicative arrangement for ASP
Membrane Bio Reactor (MBR)	MBR combines the conventional activated sludge process but substitutes the clarifiers with membrane separation, which utilizes membrane filters to filter out solids and some of the pathogens in a much smaller tank than the ASP settlement tanks. The design approach for the MBR is the same as ASP's, with the exception that a sludge retention time was used to fit the membrane supplier's specifications. Figure 12 shows an indicative arrangement for MBR
Sequencing Batch Reactor (SBR)	Retention time in the reactor is 24 hours. Aeration time and sedimentation time can be set according to quantity and quality of influent. The process can also conduct digestion, denitrification and removal of biological phosphorus, which makes it ready for future strengthenng of water quality regulations on nitrogen, and phosphorus removal. The process has smaller size requirements. Management and operation is easy; requires little manpower and automatic operation is possible. Figure 13 shows an indicative arrangement for SBR
Moving Bed Biofilm Reactor (MBBR)	MBBR is based on specially designed plastic biofilm carriers or biocarriers that are suspended and in continuous movement within a tank or reactor. The MBBR process has the advantage that nitrification is not expected to occur in the same tanks as BOD removal. Nitrification is not likely because the bacteria grow on the carriers such that the nitrifying

#### Table 9. Comparison of Sewage Treatment Processes

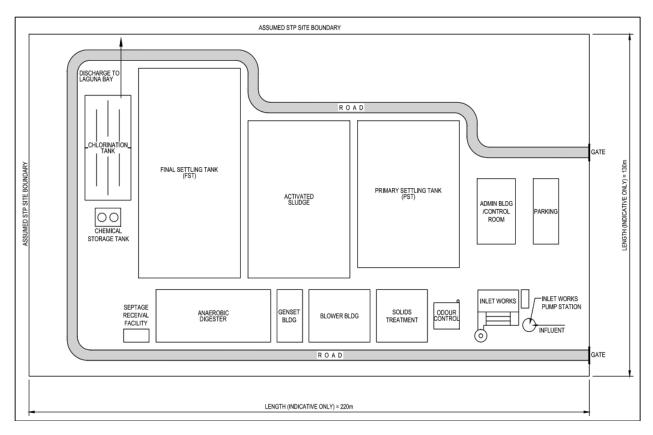


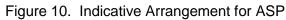
Treatment Process	Remarks
	bacteria are shielded from dissolved oxygen by the organics oxidizing bacteria. The lack of access to oxygen by nitrifying bacteria means that nitrification can not occur concurrently with BOD oxidation in the MBBR option. This in effect reduces the installed aeration requirement. There is also no requirement for an unaerated zone for denitrification in MBBR. However, additional zones will be required if the plant must be upgraded for future nutrient removal. Figure 14 shows an indicative arrangement for MBBR

Since the project will be bidded out using a "design and build" scheme, the selected process design is not final at this stage. However, MAYNILAD, shall issue design guidelines and principles that would include the following principles:

- Design should be based on well-proven technologies, at minimum operating costs.
- Safety should be provided in all aspects of the STP operation, with access of service units for maintenance purposes, and emergency operating procedures in an event of failure or an emergency
- Design should meet all relevant Philippine Standards and international safety standards including but not limited to the Effluent Standards of DENR, Occupational Safety and Health Code, National Structural Code of the Philippines, Philippine Electrical Code, National Plumbing Code, etc.
- The STP shall utilize a centralized control system such as MCC, PLC, and SCADA for ease in operation and monitoring
- Odor and noise levels at the STP should be maintained within allowable range
- The STP should be suitably designed and constructed taking into consideration the environmental impacts and mitigating measures, site conditions, flood levels in the area, site area constraints, geologic hazards, among others.







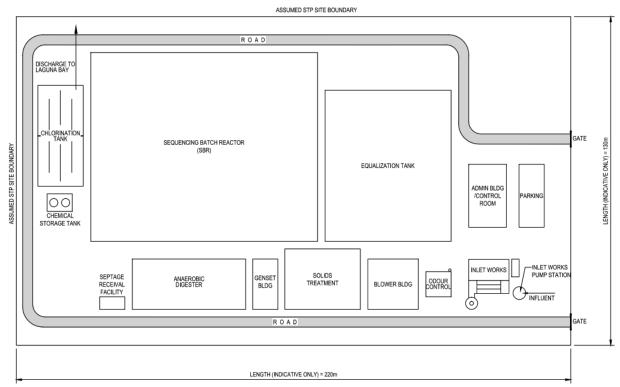
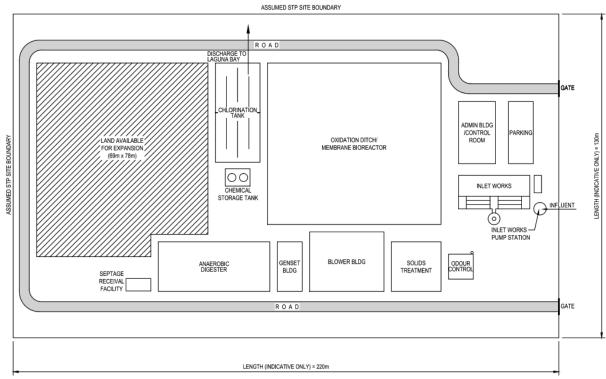
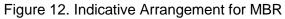


Figure 11. Indicative Arrangement for SBR







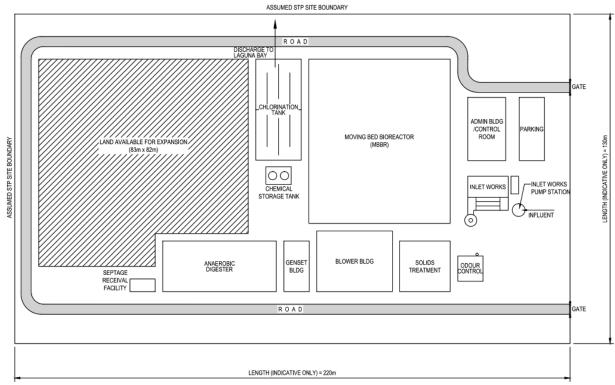


Figure 13. Indicative Arrangement for MBBR



#### 2.1.8 Sludge Management Alternatives

Sludge management is considered as the quantities of sludge that will be likely to be significant regardless of the system characteristics. It aims to stabilize sludge, reduce pathogens and reduce water content.

The sludge will be treated through sludge thickening methods that includes gravity sludge thickening, flotation sludge thickening or centrifugal thickening. Sludge digestion processes are divided into anaerobic sludge digestion and aerobic sludge digestion. Normally, the anaerobic sludge digestion process is adopted in facilities that handle large quantities of sludge. Anaerobic sludge digestion entails biologically decomposing the organic matter in sludge in an anoxic environment. When sludge is left in a sludge digestion tank for around 20 days, the organic matter in the sludge is gasified and the sludge is reduced in quantity to around 40~60%. Following digestion, the sludge undergoes sedimentation and is separated into supernatant (separated liquid) that includes soluble organic matter, digestion gas and stable digested sludge.

Sludge dewatering will be carried out with the objective of removing the water content from sludge, thereby, reducing its volume and making it more amenable to treatment and disposal. Mechanical dewatering methods that are being considered include the centrifugal dewatering machine, belt press filter, and multi-disc dewatering machine.

The dewatered solids will be transported offsite for stabilization. Disposal site of sludge will be in the lahar area in Barangay Telabanca, Concepcion, Tarlac where it is processed as compost and utilized as soil conditioner. The sludge processing facility of F.G. Agro Industrial Corporation holds an approved Environmental Compliance Certificate (ECC) from the DENR-EMB-Region 3. The same facility has been utilized by subprojects under the Manila Second Sewerage Project (MSSP) and Manila Third Sewerage Project. (MTSP).

# 2.2 Project Development Plan

Currently, wastewater is collected, conveyed and discharged into rivers and creeks through street drainage lines with outfalls alongside the rivers and creeks. A combined sewer collection system will be applied by the project because of very congested areas in the service area in Muntinlupa City and also due to the huge cost and construction impact in these areas.

Flows will be conveyed via streams mainly towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the road. Flows will be ultimately conveyed to the proposed treatment facility prior to reaching Laguna Lake. The system will be provided with overflow structures to prevent excess flows to the STP during heavy downpour.

The sewerage system will consist of interceptors, manhole pumps and a STP. Table 10 outlines the project components.



Tunasan STP	Specification	No.
1.STP	Treatment Volume (m <sup>3</sup> /d)	20
	Quantity	1
2. Pump Station	Power(kw)	65-1255 lps
	Quantity	14
3. Force Main Pipe	Diameter(mm)	450 – 850mm / >850mm
	Length (m)	25m / 50m
4. Interceptor(Gravity Main)	Diameter(mm)	>850mm
	Length (m)	4,345

## Table 10. Components of the Tunasan STP Project

As the project will be bidded under a "design and build" scheme, the final specifications may be subject to some changes. The following describes an overview of the project components and general performance specifications of the project.

#### 2.2.1 STP Capacity and Loading

The total capacity of the Tunasan STP is 20 MLD for Stage 1. During Stage 2, Tunasan STP capacity will be upgraded to another 20 MLD and extend its service coverage to cover the whole of Muntinlupa.

The STP shall be designed to accept the full flow to treatment during peak flow duration without overflowing. Below are the design parameters required for the plant:

•	Average dry weather flow (ADWF), m3/day	- 46,000
٠	Peak factor (p.f.)	- 1.5
•	Peak flow duration	- 3 hrs
•	Full Flow to Treatment (m3/day) * GWI – Ground Water Infiltration	- 1.5ADWF+GWI*

ADWF is defined as the average daily flow to the treatment plant during dry seasons. It is the sum of the wastewater entering the system or the wastewater flow (WW) plus the non-rainfall dependent groundwater infiltration (GWI). Hence, ADWF is used to refer to the ultimate sizing of treatment facilities.

Wastewater flows is the sum of all sanitary flows entering the system, such as domestic, industrial and commercial flows. Wet Weather Flows (WWF) which is defined as the flows under wet weather conditions is not considered in the design or sizing of STP. Increased dilution during wet weather events significantly lowers the risks of discharging flows to the environment. Thus, minimizing the need to treat WWFs. However, it is important to note that even if the system is not sized to accommodate WWF, here will be enough capacity to handle some amount of rainfall and runoff occurring during the dry and wet months. This is due to a peak factor selection of 1.5 and the assumption of sewers running at 75% full.

A pollutant peaking factor (varies in each parameter) will have to be adopted to account for the possible industrial flow. These pollutant peaking factors were based on available domestic and industrial water quality data of similar catchment characteristics, such as that of Valenzuela



catchment. The pollutant loadings indicated in Table 11 are the raw wastewater characteristics to be adopted in the design of the STP during Stage 1 (domestic, commercial and industrial flows) and Stage 2 (domestic flows only).

Parameter	Pollutant Peaking Factor	Adopted Design Values (mh/L)		
		Stage 2	Stage 1	
BOD5	3.0	91	273	
COD	3.0	156	468	
TSS	7.0	25	175	
TP	1.3	6	8	
TN	2.0	35	70	
NO3	2.0	1	2	
O&G	1.3	4	5	
NH4	1.3	39	51	

 Table 11. Raw Wastewater Characteristics for Stage 1 and Stage 2 Flows

The effluent from the STP should meet the Effluent Standards for Class C water (Table 12). The BOD value of 273mg/l in the design criteria is higher than the actual raw wastewater taken from sampling results. This higher BOD value will be considered in consideration of future plans for a separate system.

#### Table 12. Effluent Standards

Parameter	Unit	Maximum Value (Class C)
COD	mg/L	100 <sup>a</sup>
BOD	mg/L	50 <sup>b</sup>
TSS	mg/L	50 <sup>°</sup>
Oil/grease	mg/L	5 <sup>c</sup>
Total coliform	MPN per 100ml	1,000 <sup>c</sup>
Nitrate as NO3-N	mg/L	10
Phosphate	mg/L	1
pH		6.0 - 9.0

Notes:

a - COD level above 468mg/l at the influent, the plant should have the capability of 85% removal efficiency

b - BOD level above 273 mg/l at the influent, the plant should have the capability of 90% removal efficiency

c – parameters above influent, the plant should not exceed the DENR Effluent Standard (DAO 35).

The STP shall be designed to treat incoming wastewater from the system. It will be provided with preliminary screens, bar racks, preliminary grit and oil and grease removal system to remove inert and other floating solids and debris that may have entered the sewer lines. To accommodate sewage peak flows and shock loadings, methods such as flow equalization shall



be provided. The plant shall also have the capability to address removal of nutrients and a disinfection system to eliminate pathogenic microorganisms in the effluent prior to discharge.

## 2.2.2 Description of Project Phases

The major phases of the project are the pre-construction, construction, operation, and abandonment phases.

## 2.2.2.1 Pre-Construction Phase

This phase consists of the project planning and activities relating to securing the necessary permits and clearances prior to project construction. The acquisition of the project site also forms part of this phase. The acquisition of the project site also forms part of this phase.

#### 2.2.2.2 Construction Phase

The construction of the project can be divided into two phases: the construction of the treatment facility and the construction of the interception and conveyance system. These are separate items and differ in locations but both need to be phased together so that when sewage is conveyed through the network of pipelines to the STP facility for treatment, treated sewage will be discharged through an effluent outfall to a selected discharged point.

For the interception and conveyance system, the pipes or sewer lines will run mostly along roads, therefore traffic management issues and plans for mitigation (e.g., road closures, detours, etc.) will be discussed and agreed upon with the local municipal officers concerned, prior to commencing construction.

Just as roads require detours during pipe laying, installation of creek interceptor weirs require bypass systems for diverting the creek flows to clear the work area when installing the weir. Any interference expected from this construction should also be discussed with concerned local officers, before work is commenced.

Consequently, a detailed design will then be carried out for the more practical option. Tender documents will be prepared based from the detailed design. These documents will be sent to Maynilad accredited contractors for tendering. The pipelines, sewers and pump stations will be installed and SCADA integration will be set-up.

For the treatment facility, upon acquisition of land, STP construction will most likely be procured as a Design and Build contract. Timeframe is largely dependent on the contractor's approach;

## 2.2.2.3 Operation Phase

As soon as the target start-up date has been determined by Maynilad, the STP operations such as the collection, conveyance, and treatment of wastewater will commence. The STP will operate with consideration of applicable/related environmental laws and regulations that need to be complied with. Operations and maintenance of the project will be managed by the Maynilad.



#### 2.2.2.4 Abandonment Phase

The lifespan of an STP is estimated at 60-80 years while the conveyance and interceptor works are estimated at 50-70 years assuming proper operations and maintenance are observed. During the abandonment phase, in case of business closure, possible demolition or transfer of the facility or due to force majeure, necessary rehabilitation measures will be implemented by Maynilad. All structures such as conveyance and STP components will be decommissioned. An abandonment plan will be developed and will be implemented once a decision to abandon the project has been made.

#### 2.3 Project Duration and Schedule

The project implementation will be constructed in stages. Stage 1 will include construction of the 20-MLD STP and pipeline and appurtenances (creek interceptors, weirs and pump stations). Although timetable will be dependent on Maynilad arrangements, the goal is to accomplish Stage 1 completion by 2016.

Stage 2 will then include another 20-MLD STP and laying the remaining lengths of pipes and construction of respective appurtenances.

Assuming proper operations and maintenance are observed, conveyance system components can exceed 70 years, while the STP facility, with a number of upgrades, can operate well in excess of 60 years.

# 2.4 Project Cost

The proposed project will have an estimated cost of Php 12,918,180.00 including the cost of land, civil, mechanical, electrical, and other works.



# **3** Analysis of Key Environmental Impacts

# 3.1 Physical Resources

# 3.1.1.1 Land Use

#### Catchment

Muntinlupa City has a total land area of 4,670 ha. Based on the Comprehensive Land Use Plan (CLUP), 46.04% of the city is residential, 6.00% commercial, 6.83% industrial, 1.67% institutional, 1.37% agricultural, and 38.09% open space.

Industrial establishments in Muntinlupa are located densely in the northern portion of the city and near Laguna Lake (see Figure 14). Brgy Sucat and Brgy Cupang host the most number of industries in the city. Among the industries present in Muntinlupa are the 600-megawatt Power Station of the National Power Corporation and Zilog Electronics in Brgy. Sucat; Concepcion Industries in BrgyBul i; Uratex and Amkor, Inc in Brgy Cupang; Nestle and Sharp in Brgy Alabang, and Pepsi Cola, Inc in Brgy Tunasan.

Informal settlements are present throughout Muntinlupa. Most lie along river easements, banks and shorelines. This is expected as, in most cases, no sanitation reticulation is available for these areas and disposal of wastes into streams is convenient. As such, informal settlements have considerable effects on the bodies of water as they directly contribute significant untreated biological load. A map of informal settlements in Muntinlupa is shown in Figure 15.





Figure 14. Location of Industries in Muntinlupa

#### LEGEND



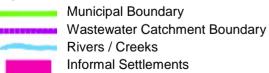
Wastewater Catchment Boundary





Figure 15. Location of Informal Settlements in Muntinlupa

#### LEGEND





#### STP Site:

The proposed STP will be built in a property covering a consolidated land area of 8,333 sqm parcel of land located east of Buendia Street, within Bo. Tunasan, Muntinlupa City, Metro Manila. The land consists of various lots owned by different individuals. It is situated some 65 meters north from the road going to the Muntinlupa Sports Complex, 215 meters north from the Buendia and Arandia Street junction, 700 meters north of the corner of Arandia Street and Rodriguez Jr. Street and 1,300 meters northeast from the corner of the National Highway and Rodriguez Jr. Street. Buendia Street, the main access road to the site, is 5 meters wide and cemented.. The STP site is approximately centered by geographic coordinates 14<sup>0</sup>31'54.39" north latitude and 121<sup>0</sup>00'28.88" east longitude.

The project site consists of various lots owned by different individuals. It is situated some 65 meters north from the road going to the Muntinlupa Sports Complex, 215 meters north from the Buendia and Arandia Street junction, 700 meters north of the corner of Arandia Street and Rodriguez Jr. Street and 1,300 meters northeast from the corner of the National Highway and Rodriguez Jr. Street. Buendia Street, the main access road to the site, is 5 to 8 meters wide and cemented.

The property is partly surrounded with residential houses of middle income families as well as low income families particularly on the other side of the Buendia Street. Generally, the streets in the neighborhood are designed to accommodate light to heavy vehicular and pedestrian traffic loads. The terrain of the lot is flat with portions of lowered elevations from the road as shown in Photo No. 1.



Photo 1. Southern part of Project Site





Photo 2. A view inside the proj site with the Muntinlupa Science High School on the east



Photo 3. Frontage along Buendia St.

# 3.1.1.2 Geology, Topography and Pedology

Muntinlupa is typically underlain by Alluvium (Holocene). This underlying rock resulted from river deposition of sediment as rivers would flow into Laguna Lake. Hydrogeological properties of this formation are generally retentive of groundwater since cohesive fines form part of the alluvium.

Muntinlupa topography is hilly to moderately rolling in the western inland portion, while areas near the lake shore are moderately flat. Gradients in Muntinlupa range from 1 to 10% with 69% of the total land area, including Barangay Putatan, having gradients from 0 to 2.5 %. Sloping hills, with maximum elevations of 60 meters, occupy the western to southwestern portion of the city. Flooding is usually encountered in the lakeshore area.

The proposed STP sites is flat and open area. Whilst no development has been done of the proposed site, vacant lot, with dense grass vegetation, which may have been backfilled. Access roads where conveyance pipes will be laid are paved concrete roads.

# 3.1.1.3 Terrestial Biota

The proposed STP site is commonly grasses, agricultural crops and some tree species such as neem tree (Azadirachta indica), Ipil-ipil (Leucaena *leucocephala*), raintree (Samanea *saman*) and camachile (Pithecellobium *dulce*). These trees are not considered as rare or endangered species. Likewise, there are no exotic species of flora and fauna which will be affected

# 3.1.1.4 Seismicity

Based on historical data, there are five (5) potential seismic source zones consisting of four (4) active faults and one subduction zone identified to be the locus of major earthquakes that have significantly impacted the metropolis in the past. These are the Marikina Valley Fault System (MVFS), the Philippine Fault Zone (PFZ), the Lubang Fault, the Casiguran Fault, and the Manila Trench.

Inquiry with Phivolcs was made regarding the geologic hazard that may affect the site of the proposed STP. The most compelling earthquake generator to the site is the West Valley Fault



of the MVFS, which is the nearest active fault in the area. The STP site is located approximately 59 meters southeast and 61 meters northwest of the nearest segment of the West Valley Fault (Annex F).

#### 3.1.1.5 Geologic Hazards

#### Ground Rupture

Ground rupture can be defined as the breaking and movement of the ground along an active fault trace that may result to vertical or horizontal movement of the ground or a combination of these two types of movement.

The VFS, particularly its southeast segments can have the greatest impact to the proposed project due to its proximity to the site as shown in Figure 16a and 16b. Paleoseismic studies conducted by Nelson et.al shows that there are at least four (4) large surface-rupturing earthquakes that have occurred on the northeastern splay of the WVF since the last 1500 years. It was estimated that a recurrence interval of 200 to 400 years for magnitude 6 to 7 earthquakes was manifested along this fault.

The project has moderate to high vulnerability to this hazard since the trace of the WVFS is located approximately 59 meters southest and 61 meters northwest of the proposed site. Philvocs recommended a buffer zone against ground rupture hazard to be at least 5 meters on both sides of the mapped fault trace or from the edge of the deformation zone This hazard should be considered in the design of the structures.

#### Ground Shaking

Ground shaking is the trembling or jerking motion produced by an earthquake. Generally, the areas prone to this hazard are those underlain by thick, unconsolidated and water-saturated soil. In general, the catchment area has moderate to high susceptibility to ground shaking.

#### Liquefaction

Liquefaction is a process involving the transformation of loose, cohesion less, and watersaturated layers of soil from a solid to liquid state. One of the most obvious effects of liquefaction is differential settlement, where some portions of the soil mass underlying the foundation settle more than the other parts, thus, causing damage to the structures on the surface.

The proposed project site of the STP in Muntinlupa is underlain by thick alluvial soils, which is susceptible to liquefaction hazard. Big magnitude earthquake caused liquefaction effect particularly in the eastern part of 8 Barangays, along the shore of Laguna Lake.

#### Flood and Landslide

Unusually heavy rainfall can lead to vast amounts of water draining into the water table. As more and more of the river's tributary streams join the river, this effect is amplified until the amount of water reaches a critical level; the banks or the natural flood plain cannot hold such a volume and it spills over thus causes flooding. Flood often occurs at lower reaches of a river in



areas of habitation, causing extensive damage. Moreover, huge amounts of rainfall can also cause the land to become soft and this can make the land move and cause a landslide.

Based on the geohazard map developed by DENR-MGB, Muntinlupa City, where the project site will be situated, is highly susceptible to flooding with greater than 1 meter flood height (see Figure 17). The area is usually flooded for several hours during heavy rains, this include landforms of topographic lows and is also prone to flashfloods (DENR-MGB). These hazards should be considered in the design of the STP facility.

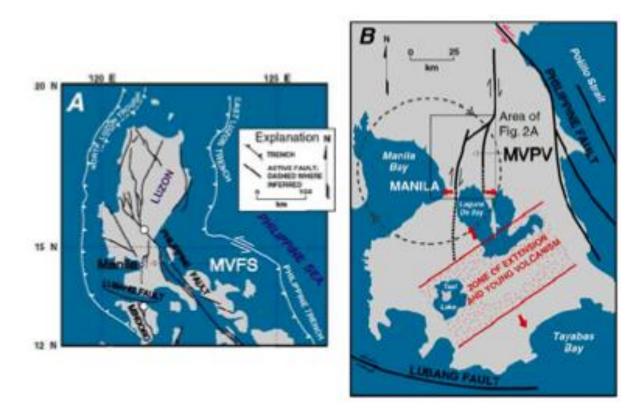
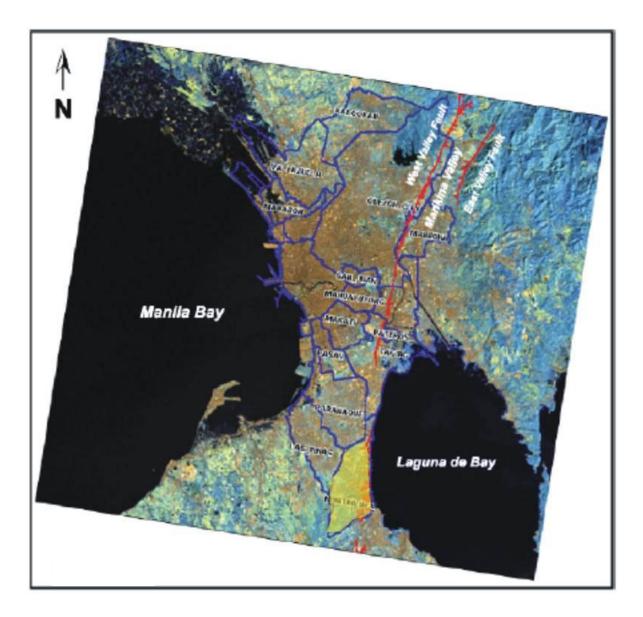


Figure 17a. A shows the tectonic setting of the Marikina Valley Fault System. B shows the right-lateral strike-slip Marikina Valley Fault System (enclosed in rectangle outline) and its trace east of Manila to Laguna de Bay (Nelson, A.R., et al., 2000)





**Figure 16.** Landsat image of Metro Manila showing the West Valley Fault System (as red traces) (modified from Pulido, N. et al. 2004). Muntinlupa City is filled in yellow.



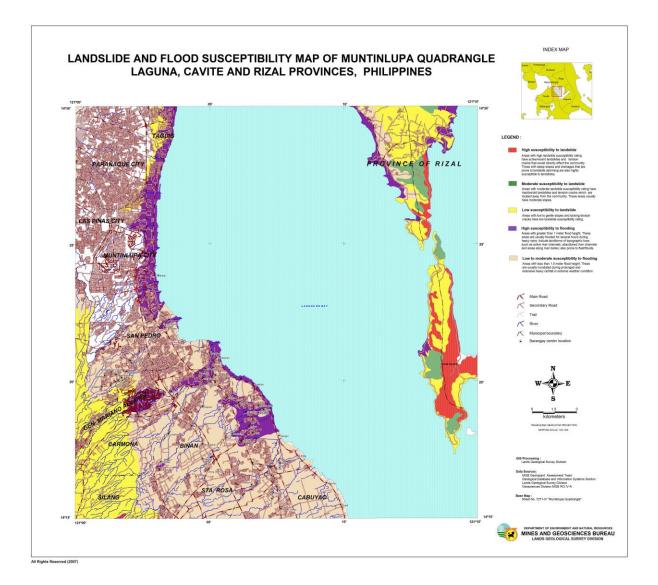


Figure 17. Landslide and Flood Susceptibility Map of Muntinlupa Quadrangle Laguna, Cavite and Rizal Provinces, Philippines (MGB-DENR and ESSC)

# 3.2 Ecological Resources

# 3.2.1 Aquatic Resources

Poor water quality and physical disturbance of the creeks and rivers in the area had led to low aquatic biodiversity values.



#### 3.2.2 Terrestrial Resources

The proposed STP site is commonly grasses, agricultural crops and some tree species such as neem tree (Azadirachta indica), Ipil-ipil (Leucaena *leucocephala*), raintree (Samanea *saman*) and camachile (Pithecellobium *dulce*). Also, these trees are not considered as rare or endangered species. The total land area of the site is approximately 8,333 square meters..

## 3.3 Water

#### 3.3.1 Hydrology and Flooding

Collectively, Muntinlupa forms a part of the Pasig-Marikina-Laguna Lake Basins. The Muntinlupa hydrological catchment is shown in Figure 18. The hydrological catchment corresponding to this study area is the sum of six sub-catchments named after the local rivers. The natural outlet of these rivers is Laguna Lake. The total land area of the hydrological catchment is approximately 4,750 ha.

The hydrological catchment has a natural extension in San Pedro, Laguna and part of the storm water in this area may drain into the river boundary between Muntinlupa and San Pedro.

Six sub-catchments form the Muntinlupa wastewater catchment, based on the topography of the inclusive river basins. These sub-catchments are:

- Buli (750 ha)
- Pasong Diablo (1,400 ha)
- Bayanan (400 ha)
- Poblacion (1,100 ha)
- Tunasan (500 ha)
- San Pedro (600 ha)

The eastern boundary of the catchment is Laguna Lake while Daanghari forms the western boundary. South of the catchment is bounded by San Pedro River, which forms the boundary between Muntinlupa and San Pedro, Laguna. The northern portion of the catchment is bounded by the Municipal boundary of Taguig.

Muntinlupa is situated in an alluvial plain developed from sediment deposit caused by river overflow. The inland portion is hilly to moderately rolling while the areas near Laguna Lake are generally flat. The elevation ranges from 0 to 60 m.

There are also a number of rivers and creeks that cross the town and ultimately drain onto the lake. In addition to this, the conversion of Muntinlupa from a municipality into a city in 1995 has brought development of commercial establishments and large subdivisions and villages in the area some of which have poor drainage facilities.

Muntinlupa is bounded by Laguna Lake to the east. It becomes a reservoir for floodwaters from Metro Manila and often experiences rising of water levels. This occurrence makes Muntinlupa vulnerable to interior flooding, especially during heavy rainfall or storms. Residents reveal that heavy rainfall often cause the nearby river that empties into Laguna Lake, to overflow. This is attributed to the small width of the river. Considering these informations, the following issues occur in Muntinlupa: 1) Sedimentation and blockage of drainage canals and pipes, 2) Susceptibility to tidal variations in Laguna Bay, 3) Poor drainage of subdivisions and



villages, 4) Regular inundation from river overflow.

Flooding usually lasts for a few hours to three days. However, anecdotal evidence suggests that some areas can be submerged in excess of 2 to 3 weeks. Areas near the Laguna Bay periodically experience this. The flood map provided by the National Disaster Coordinating Council (NDCC) shows that almost half of the city is identified as flood prone area. However, the NDCC mapping is not intended to provide depths at a particular event return period.

Over the last decade, considerable flooding in the area include Typhoon Ondoy (International Name: Ketsana, September 2009), which resulted in nearly 455mm of rainfall in a span of 24 hours. Water marks on buildings reveal that flooding in some portions of Muntinlupa reached extents of about 2 meters (UP *National Hydraulic Research Center, 2009).* After Ondoy, the area around Quezon/Ilaya Road near Laguna Lake was submerged for several weeks to in excess of one month.

Based on the information on flood levels in the area, the STP should be designed taking into consideration the highest flood levels experienced in the area. In addition, the process to be employed in the STP should consider the saline water back flowing towards the creek and interceptors.

The recorded or projected 2-meter maximum flooding in Tunasan STP site can be addressed through an acceptable engineering solution such as backfilling and raising of STP electro-mechanical devices/equipment and its control facilities above the highest recored flood level. In addition, the process to be employed in the STP should consider the saline water back flowing towards the creek and interceptors.



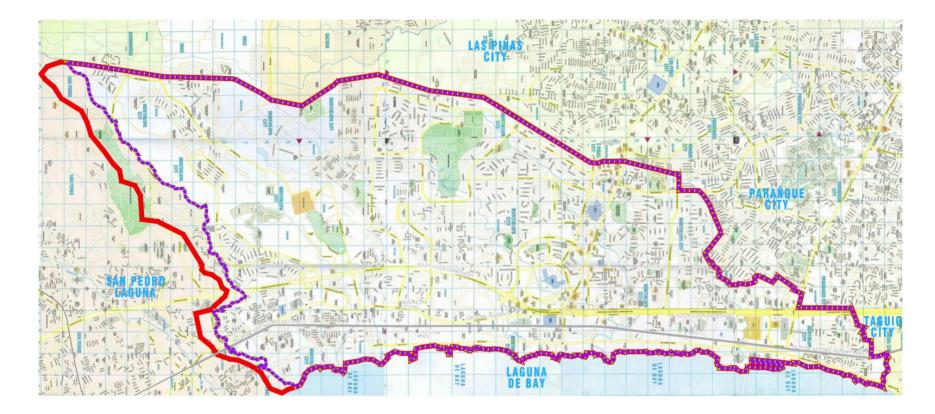


Figure 18. Muntinlupa Hydrological Catchment



## 3.3.1.1 River and Catchment Flooding and Sea Level Changes

Muntinlupa is situated in an alluvial plain developed from sediment deposit caused by river overflow. The inland portion is hilly to moderately rolling while the areas near Laguna Lake are generally flat. The elevation ranges from 0 to 60 m.

There are also a number of rivers and creeks that cross the town and ultimately drain onto the lake. In addition to this, the conversion of Muntinlupa from a municipality into a city in 1995 has brought development of commercial establishments and large subdivisions and villages in the area some of which have poor drainage facilities.

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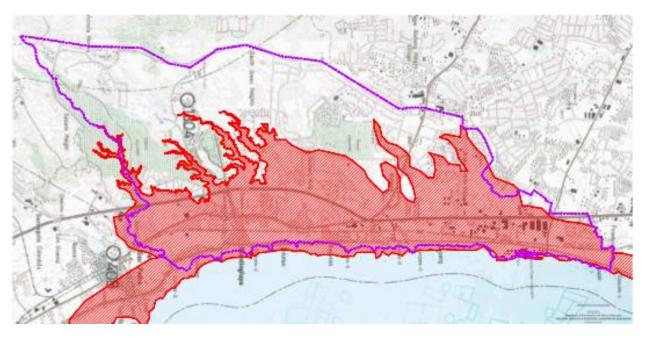


Figure 19. Muntinlupa Typical Extent of Flood Map



#### 3.3.2 Surface Water Quality

Based on the Feasibility Study of the project, baseline surface water quality were established at different sampling locations. Water sampling was carried out by flow weighted composite sampling, taken at every hour from 5:00 am to 2:00 pm and 4:00 PM to 7:00 PM.

Flow, together with dissolved oxygen (DO), electrical conductivity (EC), pH, turbidity and temperature were also measured on site. One grab sample taken at mid-day was collected for the analysis of Oil and Grease (O&G).

The parameters analysed for all composite samples are:

- Biological Oxygen Demand (BOD5)
- Chemical Oxygen Demand (COD)
- Total Suspended Solids (TSS)
- Nitrate (NO3)
- Oil & Grease
- Total Coliform (TC)
- Frcal Coliform (FC)

Table 13 show the nominated sampling point locations for Tunasan, Muntinlupa. Average water quality sampling results are shown in Table 14. Results were compared with Revised Water Usage and Classification Standards (DAO 90-34), which outlines standards for bodies of water like the Laguna Lake that fall under Class C waters. Waterbodies classified as Class C are used for fishery water; for recreational purposes, like boating; and for industrial water supply, including manufacturing.

Sampling Point	Sampling Point Location	Presumed Source of Wastewater	
SP3	M.L.QuezonAvenueBridge along Bayanan Creek	Domestic	
SP4	BayananCreekBridge along National Highway	Domestic	
SP5	Railway crossing of PoblacionRiver	Domestic	
SP6	Tunasan area in La Guerta corner Sto. Niño Street (near local vegetable stands)	Domestic	

 Table 13. Sampling Point Location Description



Sampling Point	DAO 90-34 Standard*	SP3	SP4	SP5	SP6
BOD5, mg/l	50	67	66	118	121
COD, mg/L	100	123	96	160	161
TSS, mg/L	<30mg/L increase	24	27	26	33
NO3, mg/L	10	1	1	0.4	0.4
O&G, mg/L	5	7	6	4	7
Total Coliform, MPN/100ml	5,000MPN / 100mL**	8 x10⁴	8.7 x10 <sup>6</sup>	6.3 x10 <sup>6</sup>	12.3 x10⁵
Fecal Coliform, MPN/100mL		5.7x10 <sup>4</sup>	8.7 x10 <sup>6</sup>	3.7 x10 <sup>6</sup>	12.3 x10 <sup>6</sup>

#### Table 14. Average Water Quality Sampling Results

\*Yearly average values \*\*Geometric mean within 3 months

• Biological Oxygen Demand and Chemical Oxygen Demand

Almost all sampling points have non-average BOD5 and COD concentrations greater than 50 mg/L and 100 mg/L respectively, which is the current effluent limit on Class C Waters. High BOD concentrations in sampling sites may be due to presence of denser populations upstream of the sampling sites.

• Total Suspended Solids

The relatively low TSS reading for almost all the sampling points may indicate settling of the solids prior to sampling and the use of septic tanks in the catchment.

For the parameter TSS, interpretation of results could not be made as the result needs to be compared with historical data to establish whether the measured levels are within the allowable 30 mg/L increase in TSS.

• Oil and Grease

Weak non-average and average O&G concentrations were observed in all sampling point locations and the average is below the prescribed O&G limit of 5 mg/L. This suggests that a specific O&G removal process at the STP is not required.

Nitrate concentrations were within the set limits by DAO 90-34 for the four sampled sites. On the other hand, the four sampled sites exceeded limits for TC levels set by DAO 90-34. High BOD and TC levels are attributed to the fact that at the time of sampling, untreated domestic wastewater that contain high levels of coliform from human waste and other domestic activities



are released into waterways.

# 3.4 Air

## 3.4.1 Meteorology / Climatology

The climate in the Metro Manila region belongs to the Type I classification of climates, which is characterized by a distinct dry and wet season. This type of climatic condition prevails in the western section of the Luzon Island. The wet season normally occurs from May to October while the rest of the year is relatively dry.

## **3.4.1.1 Cyclone Frequency**

The area is within a zone that can expect passage of about 5 tropical cyclones in every three years. Majority of the cyclones passing within the 50 km-radius from the bay occur in November. It is estimated that 47 percent of the annual rainfall is due to typhoons, 7 percent to the SW Monsoon (July to September), 7 percent to the Northeast (NE) Monsoon (February to May) and 39 percent to other weather systems. Compiled records of past flooding from DPWH and PAGASA between 1964 and 1990 indicate that at least 12 typhoons caused flooding within Metro Manila in conjunction with the Southwest Monsoon rains.

Rainfall in the area can be attributed to the occurrence of the Southwest (SW) Monsoon, thunderstorm activities and tropical cyclones. In addition, the Philippines is geographically located in the most cyclone-prone area of the world. From 1948 to 1978, about 325 typhoons crossed the Philippine area of responsibility, with about 20 passing within the northern and southern limits of the metropolis.

## 3.4.1.2 Rainfall

The maximum rain period occurs from June to September, which coincides with the southwest monsoon. During this period, the extremely moist air from the southwest monsoon crosses Manila Bay and enters Metro Manila with a considerable amount of rain. Regions of this climate type include those on the western part of the Islands of Luzon, Mindoro, Negros and Palawan. These areas are exposed to the southwest monsoon and get a fair share of the rainfall brought about by the tropical cyclones occurring especially during the maximum rain period. The coolest days are usually in December and January.

Maximum rainfall in Muntinlupa usually occurs from the month of June to September. The average annual of rainfall is 1822.8 millimeters with a peak of 417.0 millimeters in August and a low 3.6 millimeters in February

## 3.4.1.3 Winds

From October to May, prevailing winds in Muntinlupa City blow easterly at the rate of 9mph, while the rest of the months have winds blowing westerly.



#### 3.4.1.4 Temperature

The annual mean temperature reading for Muntinlupa is 27.92. The highest temperature occurs during the month of April and May (30°) while the lowest occurs during the months of December, January & Friday (26°).

#### 3.4.2 Air Quality and Noise

## 3.4.2.1 Air Quality

The air quality in the project area is primarily influenced by emissions from regular private and public vehicles passing through the road.

In addition, resuspended dust particulates from exposed soil surface from ongoing development activities in the community contribute to an increase in total suspended particulates (TSP).

Muntinlupa City is already experiencing a deterioration of its air quality. This may be attributed to the congestion of people and improperly maintained vehicles plying the major roads and highways. Local wind system is also an important factor in the quality of air in the project area. The thermal changes between day and night plays a major role in the diurnal wind systems. Thermal differences between the land and water surfaces are the main cause of coastal wind. Thus, the temperature affects the quality of air within the project site during daytime and nighttime, it being located near a coastal area.

During daytime in the project site, the wind blows towards the land, known as the sea breeze, since the land heats up quickly under the influence of solar radiation while water surface remain cooler because the heat is dissipated over thick layers of water by turbulence and waves. Suffice it to say that the sea breeze brings fresh air into the land making the quality of air within the project site good. During nighttime the reverse happens.

#### 3.4.2.2 Noise

Similar to air quality, during the site visits, it was observed that daily activities of nearby residences as well as noise from passing of vehicles are the significant sources that could be identified in the proposed STP site.

# **3.5 Socio-Economic Conditions**

## 3.5.1 Population

The 2010 census data indicates a projected city population of 459,941, with an annual growth rate of 0.51% from the 2007 census population of 452,943. The city's 2010 projected population density indicates 2,345 persons/sq.km. from the 2007 census population density of 11,459 persons/sq.km.



Past census population data shown in Table 15 indicates a decreasing growth trend from a high of 7.54% in 1995 to a negative growth rate of 1.05% in 2000. The city's 2000 census indicated a household population of 379,310. The city's decelerating growth trends indicates that other areas in Metro Manila are becoming more attractive as settlement areas like adjacent cities: Las Pinas and Taguig and that the catchment area has already become congested.

Year	Population*	Annual Growth Rate
1990	278,411	-
1995	399,846	7.24%
2000	379,310	-1.05%
2007	452,943	2.53%
2010	459,941	0.51%

#### Table 15. Muntinlupa Population Census

Source: National Statistics Office

## 3.5.2 Health

The leading cause of diseases (morbidity) in the city is bronchitis followed by diarrhea and hypertension as shown in Table 16. As compared with the national average, the city has a higher incidence of pulmonary tuberculosis and respiratory diseases as well as gastro-intestinal diseases, which suggests problems of pollution in the city. The leading cause of death (mortality) in the city is myocardial infarction, which is the same as the national average, see Table 17.

 Table 16. Leading Causes of Morbidity

Causes
1. Bronchitis
2. Diarrhea
3. Hypertension
4. Pneumonia
5. Tuberculosis
Source: Muntiplupe City Health Office 2006

Source: Muntinlupa City Health Office 2006



Causes
1. Myocardial Infarction
2. Cancer
3. Pneumonia
4. Tuberculosis
5. Cardiovascular Diseases including stroke
Source: Muntinlupa City Health Office 2006

#### 3.5.3 Economy

Barangay Alabang, part of the second district of Muntinlupa, has undergone tremendous growth mainly due to a development boom in the late 1990s. The development of two large scale commercial real estate projects namely; the Filinvest Corporate City and Ayala Land's Madrigal Business Park, changed the landscape of Muntinlupa City from what was once vast fields of cow pasture in the late 1980s, into a supercity that houses new residential, business, industrial and commercial establishments. It was a transformation reminiscent of Makati City's development boom some 30 years prior.

Some of the country's premier shopping centers, including the Alabang Town Center and the Festival Supermall, the towering Insular Life Towers, the Asian Hospital and Medical Center, and the Northgate Business District, which specializes in hosting information and technology industries, are important places of interest and landmarks of the city. Nightlife is still relatively staid compared to those of its neighbors, and younger residents often flock to other cities in Metro Manila, particularly Makati, Taguig, or Manila, during the weekend to enjoy the night out. This city has recently acquired the status "Most Competitive City" and the "Most Improved City" in the Philippines





Photo 4. Skyline of Alabang, Muntinlupa



Photo 5. Alabang area facing SLEX and Laguna de Bay

# 3.5.4 Health and Educational Facilities

Several hospitals and medical facilities found in Muntinlupa City are listed below:

- Alabang Medical Center
- Alabang Medical Clinic
- Asian Hospital & Medical Center
- Babaran-Echavez Medical and Psychiatric Clinic
- Beato Cauilan Hospital
- Hillside General Hospital
- KMI Specialists Hospital
- MPI-Medical Center Muntinlupa
- Muntinlupa Doctor's Clinic
- New Bilibid Prisons Hospital
- Ospital ng Muntinlupa
- Research Institute For Tropical Medicine
- San Roque Medical Clinic

Likewise, the city has good educational facilities which serve residences as well as migrants in the area. Table 18 presents the educational facilities in Muntinlupa City.

# Table 18. Educational Facility in Muntinlupa City

School Classification	Number
Public Elemetary Schools	16
Public Secondary Schools	4
Universities and Colleges	22
Private and Parochial Schools	64

Source: Official website of Muntinlupa City



#### 3.5.5 Power Supply

Electricity is provided by the Manila Electric Company (Meralco), which holds the entire Metro Manila as its franchise area. Power service is provided to all types of consumers: residential, commercial and industry. Meralco distributes the power generated from various generating plants of the National Power Corporation and private firms that are located in various points in Luzon and connected to the power transmission grid.

#### 3.5.6 Water Supply

Households in Muntinlupa City depend on deep wells, water trucks and bottled water retailers for their water needs. However in 2010, the new water treatment plant owned and operated by Maynilad Water Services Inc became operational benefitting more than 220,000 households. The treatment plant source its water from Laguna Lake and water purification is done through microfiltration and reverse osmosis (ABS-CBN, 2010).

#### 3.5.7 Transportation and Roads

Muntinlupa City is 22 km south of Metro Manila, easily accessible from all points of Metro Manila through the national highway and South Luzon Expressway (SLEX). Likewise, Philippine National Railway has two stations in the city; these are Sucat and Alabang Stations.

Muntinlupa city can also be accessed through the following roads:

- Alabang-Zapote Road
- Metro Manila Skyway
- Daang Hari
- C-6 Road

Locations and accessibility of STP potential sites are listed below.

S1 is located along ML Quezon Ave.

S2 is accessible through SLEX Sucat Exit to ML Quezon Ave and Meralco Road

S3 can be accessed through SLEX Diversion Road near Espeleta Street

S4 is accessible through the National Highway, which is parallel to SLEX

S5 is accessible through pedestrian thoroughfares branching off from M.L. Quezon Road.

S6 is located along ML Quezon Ave.

## 3.5.8 Drainage System

Drainage facilities are often open canals which are often left uncovered and retain a fair volume of solid waste. These drainage facilities often drain into outfalls that terminate in natural water bodies and streams. It is along these water bodies wherein informal settlements are often located, leading to the clogging of the canals with solid wastes.

#### 3.5.9 Sewerage System

The city has no sewerage system or a centralized sewage treatment facility. Commercial and industrial plants are required to individually put-up their own wastewater treatment facility. Similarly, households are required to provide septic tanks as primary treatment of sewage



before it drains into the creeks and rivers. Majority of the households in the city use watersealed toilet facilities with depository other than septic tank.

#### 3.5.10 Solid Waste Management

The city government of Muntinlupa is putting to good use trolleys, or railroad dump cars by turning them into rolling garbage bins to be used by residents near the tracks of PNR. The project is said to be first of its kind and part of the city's aggressive effort to comply with the national government waste segregation. Under the program, collected wastes will be brought to a transfer station and then to the material recovery facilities in Alabang or Tunasan.

#### 3.5.11 Culture and Heritage

The catchment area is a highly urbanized zone and most of its land area has been disturbed several decades ago. There are no declared cultural or heritage sites within the catchment area. The possibility of any chance finds is remote.

# 4 Key Environmental Impacts and Mitigation

The environmental assessment identified and screened a range of issues and impacts likely to arise from the execution of the project. These impact are summarized below and discussed further in the succeeding sections.



# 4.1 Summary of Predicted Impacts

## Table 19. List of Potential Impacts

Environmental	Impact Assessment				
Issues/Impacts	Classification	Reversibility	Probability	Time Scale	Magnitude
Pre-Construction Phase					
Cutting of trees	-	Reversible	Likely to occur	Short-term	Moderate
Construction Phase					
Traffic (along the access road directly along the site perimeter)	-	Reversible	Likely to occur	Short-term	Significant
Localized settlement (Solid wastes generated resulting from the transfer/removal of affected structures)	-	Reversible	Likely to occur	Short-term	Moderate
Air/Dust Pollution	-	Reversible	Likely to occur	Short-term	Insignificant
Noise	-	Reversible	Likely to occur	Short-term	Insignificant
Water pollution	-	Reversible	Likely to occur	Short-term	Insignificant
Flooding	-	Reversible	Likely to occur	Short-term	Moderate
Generation of solid wastes and construction spoils	-	Reversible	Likely to occur	Short-term	Moderate
Aesthetics	-	Reversible	Likely to occur	Short-term	Insignificant
Occupational safety and health of workers	-	Reversible	Likely to occur	Short-term	Moderate
Inconvenience to nearby community due to muddy vehicles leaving the project site	-	Reversible	Likely to occur	Short-term	Moderate
Potential increase of HIV infection and spread in	-	Reversible	Likely to occur	Long-term	Moderate



Environmental	Impact Assessment						
Issues/Impacts	Classification	Reversibility	Probability	Time Scale	Magnitude		
construction camps							
Siltation of the waterways	-	Reversible	Likely to occur	Short-term	Moderate		
Generation of domestic wastes (from temporary facilities)	-	Reversible	Likely to occur	Short-term	Moderate		
Peace and order	-	Reversible	Likely to occur	Short-term	Moderate		
Change finds from cultural or heritage sites	-		Not likely to occur		Insignificant		
Increased employment	+		Likely to occur	Short-term	Moderate		
Operational Phase							
Water quality improvement	+		Likely to occur	Long-term	Significant		
Flooding	-	Reversible	Likely to occur	Short-term	Moderate		
Air Pollution	-	Reversible	Likely to occur	Long-term	Moderate		
Odor	-	Reversible	Likely to occur	Long-term	Moderate		
Solid Wastes generation	-	Reversible	Likely to occur	Long-term	Significant		
Hazardous Waste generation	-	Reversible	Likely to occur	Long-term	Moderate		
Traffic	-	Reversible	Likely to occur	Long-term	Moderate		
Improvement of sanitation and health	+		Likely to occur	Long-term	Significant		
Increased government revenues	+		Likely to occur	Long-term	Moderate		
Increase employment opportunities	+		Likely to occur	Long-term	Moderate		
Abandonment Phase							
Waste generation	-	Reversible	Not likely to occur	Short-term	Low		

#### 4.1.1 Impacts Due to Project Location

#### 4.1.1.1 Conveyance System

Land acquisition for the conveyance system will be determined during the final design of the project. As much as possible, MAYNILAD will locate the conveyance system and related facilities at easements and ROW to limit the need for land acquisition. These ROW will be along easements of existing roads and banks of creeks. Coordination with the local government will be necessary to resolve any right-of-way issues during the construction phase. Clearances from the LGU and MMDA will be obtained to resolve any ROW issues.

At the sites of the interceptor (gravity main), conversion manhole, force main pipe, and manhole pumps, residential households and commercial enterprises will be affected along the right-of-way. Temporary disruption of commercial and business operations may result during the construction of the conveyance system

Another important consideration in the location of the conveyance system is the potential problems on traffic congestion due to the very limited capacity of the roads. During the construction of the conversion manholes, the capacity will be further limited and a need for traffic rerouting may be necessary in coordination with the local government unit. The narrow access roads, moderate to high density population and high intensity urban development in the area and along truck routes, and the limited space for the stockpiling of aggregates and parking of construction vehicles will constrain movement of vehicles/equipment as well as construction activities.

During the construction phase, there is also a possibility of causing disturbance to establishments located along the roads where the conveyance system will be installed. The affected stakeholders will be informed in advance about any possible disturbance that may be caused by the project. Access will be maintained and provided to affected businesses/establishments and construction work plan will be developed and strictly implemented to minimize adverse impacts.

Assessment on the number of affected establishments will also be made after the detailed survey and design of the conveyance system and its work program.

## 4.1.2 Impacts Relative to Process/Structural Design

The important concern resulting from inadequate design is non-sustainability of the outcome that the proposed project is intended to achieve. Aside from the appropriate technical design parameters, the institutional, environmental management, and financial capability for operation, maintenance and repair should be a fundamental consideration in the design, including the approaches and practices to employ during the construction of the project and the procedures to follow during the operation and maintenance of the facility.

The design of the facility should also consider the potential risks from climate change related disasters through the use of the projected rainfall change data, frequency of extreme events for NCR under medium and high range emission scenario, (i.e. 2020-2050),. A climate-resilient



design of the proposed facilty should be instituted to achieve environmentally sustainable result that the project is intended to attain. Another consideration during the design is the conservation of remaining trees within the proposed site of the STP and as much as possible conservation of these trees in the layout of the STP components.

## 4.1.3 Impacts During Construction

As the proposed project will be located within a densely populated area, it is anticipated that the impacts of the construction phase will be moderate to significant. During construction, significant issues and impacts are dust generation, noise, vibration, wastes and sediment runoff, disposal of construction wastes and spoils to be disposed of, traffic and access blocking, accidental damages to nearby physical resources and private properties, accidental damages to existing utility lines resulting in disruption of services, disruptions to socio-economic activities, potential local flooding due to haphazard stockpiling and blocking of surface drainage flow, community health and safety hazards and occupational/workers health and safety hazards.

During the construction phase, there is also a possibility of causing temporary income losses from establishments located along the roads where the conveyance system will be installed. The affected stakeholders will be informed in advance about any possible disturbance that may be caused by the project.

## 4.1.3.1 Traffic

Activities during construction such as installation of conveyance system, road and river crossings, manholes and fitting of pipelines and sewers and the regular passing of heavy equipment will disrupt transportation and may cause traffic congeston in the area especially since the proposed sites are located near major thoroughfares. Traffic to and from the site may increase slightly due to construction of the STP. During pipe-laying, roads where pipes will be installed, traffic may likely be more congested. Any potential impact on the existing traffic conditions is expected to be significant but temporary.

Delivery of construction materials should be done, as much as possible, during nighttime to prevent aggravating the existing traffic conditions in the area. The Contractor should provide adequate signage, including provisions for traffic rerouting if necessary, during the construction period. The Contractor shall coordinate with local police or barangay office on the issue of traffic management during the duration of the construction activities.

# 4.1.3.2 Air/Dust Pollution

During the construction stage, the expected primary impact of the project on air quality is the increase in TSP concentrations near construction areas. During the construction phase of the project, the civil works and operations will entail digging and excavation of the soil that may cause some level of dust pollution in the air. Winds may carry soil particles to nearby areas, including the adjacent built-up areas. But the magnitude of this potential impact may be insignificant since the area to be disturbed is quite small. In addition, the increased number of vehicles moving in and around the project could result to an increase of pollutants coming from motor vehicles.

## 4.1.3.3 Noise and Vibration

The expected noise sources during the construction and installation of the project components are the construction equipment such as jackhammers, bulldozers, graders, pay loaders, generators, compressors and heavy trucks. The expected noise levels at various



distances from this equipment are shown in Table 20. In work areas near communities, noise levels may exceed the DENR standards (Table 21). Along access roads, noise levels ranging from 65 to 80 dB(A) may be experienced in residential houses near the roadsides due to passage of vehicles and heavy equipment used in the project development. The noise levels may be lower if speed limits are imposed and vehicles are kept in good condition. If hauling of materials pass through communities, these activities should be limited to daytime only.

	Distance from source (m)					
Source	15	30	60	120	240	
Front Loader	75	69	63	57	51	
Backhoe	85	79	73	67	61	
Grader	88	83	78	72	66	
Truck	91	85	79	73	67	
Concrete Mixer	82	76	70	64	58	
Crane	83	77	71	65	59	
Generator	78	72	66	60	54	
Compressor	81	75	69	63	57	
Pump	76	70	64	58	52	
Pile Driver	101	95	89	83	77	
Jackhammer	88	82	76	70	64	

#### Table 20. Expected Noise Levels from Construction Equipment, dB(A)

Table 21. Environmental Quality Standards for Noise in General Areas

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Category of Area	Daytime	Morning & Evening	Nighttime			
AA	50 dB	45 dB	40 dB			
A	55 dB	50 dB	45 dB			
В	65 dB	60 dB	55 dB			
С	70 dB	65 dB	60 dB			
D	75 dB	70 dB	65 dB			

Source: Official Gazette, 1978 Implementing Rules and Regulations of P.D. 984. Notes:

Category of Area is as follows:

AA - a section or contiguous area which require quietness such as area within 100 meters from school sites, nursery schools, hospitals, and special home for the aged.

a section or contiguous area primarily used for residential purposes. Α-

в a section or contiguous area primarily used as commercial area.

Сa section primarily reserved as a light industrial area.

D a section primarily reserved as a heavy industrial area.

Division of 24-hour period is as follows:

Morning - 5:00 AM to 900 AM Daytime - 9:00 AM to 6:00 PM

Evening - 6:00 PM to 10:00 PM

Nighttime- 10:00 PM to 5:00 AM.

# 4.1.3.4 Impacts on Water Quality

## Silt Runoff from Construction

The construction works will entail some excavation and will result to the exposure of the soil surface to the forces of weathering. During periods of rainfall, sediments may become eroded and cause surface runoff into the low-lying areas. The natural drainage channel of the runoff is the receiving creeks and drainage lines. Dusts and sediments during periods of rainfall may



contribute to runoff laden with silt. This could cause sedimentation and turbidity of receiving water bodies and clogging of drainage lines.

In order to prevent the discharge of surface runoff into the drainage system and creeks, restoration of affected sections of the road is necessary.

#### Domestic Wastes from Workers' Camp

Another potential source of water pollution during the construction phase is the generation of domestic sewage from the construction camps which include among others, office quarters, sleeping quarters, and toilet facilities. This is particularly significant during the construction of the STP where a greater number of workers will be involved. If wastewater is disposed untreated, the domestic wastewater could lead to the contamination of surface water and lead to the spread of water-borne diseases. Therefore, appropriate waste management measures should be instituted during the construction phase to maintain sanitation at the construction site.

#### Potential Spill and Leakage of Oil

Potential spill and leakage of fuel, petroleum products, lubricants, solvents, and other pollutants related to vehicle and equipment fuelling, maintenance, and cleaning may cause water pollution problems. The following mitigation measures for reducing such risks are proposed: (i) all vehicles and equipment that regularly enter and leave the construction sites will be fuelled off-site; (ii) Vehicle and equipment wash areas will be properly identified by signs and located away from drainage facilities and watercourses. These will be paved with concrete or asphalt to contain runoff. All vehicles and equipment that regularly enter and leave the construction sites will be cleaned offsite; and (iii) Storage of construction materials will be away from the creek and retention areas will be provided in order to contain accidental spills of such toxic, hazardous, and harmful construction materials as acidic substances, oil and petroleum products, and asphalt materials.

## 4.1.3.5 Generation of Construction Wastes

Solid wastes generated during this phase will consist of construction spoils such as cement bags, discarded wood frames, workers' wastes, etc. and vegetation spoils from clearing, and excavation. The excavation works of the STP will also generate overburden soil. This requires the pre-identification of the disposal site for construction planning purposes. In addition, the expected volume of the materials to be transported offsite would result to the frequent movement of haulers to and from the STP sites.

Construction waste management plan will be prepared and will be made part of the project contract to be implemented by the general contractor. The plan should be able to address waste segregation and encourage the re-use, recycling and recovery of wastes. The contractor should implement proper disposal of construction spoils to designated waste disposal site. Wastes not disposed immediately will be temporarily located in a safe and secluded area at the site while awaiting transport and disposal. Waste management plan will be developed, subject to review and approval, before the start of any activity in the project site (Q1 of 2015).



## 4.1.3.6 Physical/Cultural/Heritage Sites

There are no declared historical sites within the catchment area and the possibility of any chance finds is unlikely. The area has experienced urbanization and development for several decades.

# 4.1.3.7 Community Hazards due to Open Excavations and other Construction Activities

To prevent accidents during construction, barricades and steel plate covers will be provided in open excavations during non-working time. Warning signs shall also be posted in the area.

## 4.1.3.8 Occupational Hazards

During the construction phase, the construction activities could result to hazards on the safety of workers. The contractor will be required to implement a Construction Health and Safety Plan that will include the requirement on wearing of safety gadgets, posting of safety signages, and provision of sufficient lighting in dark areas of the construction site.

# 4.1.3.9 Inconvenience to Nearby Community due to Muddy Vehicles Leaving the Project Site

The community in the immediate vicinity of the construction site will be inconvenienced by the muddy vehicles leaving the long muddy trails at the project site. This will be mitigated through the provision of a vehicle cleaning/washing facility at the exit of the construction site. This will include the use of a high pressure water hose to wash/clean the vehicles from mud.

## 4.1.3.10 Potential Increase of HIV Infections and Spread in Construction Camps

Provision of HIV prevention information education campaign (IEC) and measures.

# 4.1.3.11 Peace and Order

Issues on peace and order may be encountered because of the presence of construction workers who are not from the locality.

# 4.1.4 Impacts During Operation

## 4.1.4.1 Impact of Hydrology and Flooding

The development of the proposed conveyance system and STP may have an impact on the flow regimes of the sub-catchment basins in Muntinlupa. Currently, flooding is experienced in the vicinity during storm events.

The flows coming from the western section of the Muntinlupa catchment area naturally flows towards the downstream section of Laguna Lake. Flows will be conveyed via streams mainly



towards creek interceptors' locations, where the dry weather flow will be diverted to a main trunkline acting as the conveyance. This trunkline generally runs along the road. Flows will be ultimately conveyed to the proposed treatment facility prior to reaching Laguna Lake.

Although specific sites have not been chosen for stream crossings, in general, stream crossings may potentially induce erosion, sedimentation and scouring of the river banks. Once installed, stream crossings may potentially disrupt stream continuity, cause clogging or ponding in the stream, induce stream scouring and erosion, contribute unnatural riverbed materials and change water flow velocity (Biodrawversity, 2005). Nonetheless, if designed appropriately, the stream crossing can prevent bank erosion, provide good access to cross rivers/streams during flood events and contribute to improving aquatic habitat through promoting stream continuity (DOEP, 2000; Stratford District, n.d.).

The installation of interceptor weirs will affect water flow along creeks as it will be used to capture wastewater from various areas around Muntinlupa. The flow of water downstream of the interceptor weirs will potentially decrease or cause the creek to dry up as a result of this.

During the operation phase of the project, pumping stations are predicted to aid in preventing floods as these draw in wastewater from various points around Muntinlupa. The STP facility will have an impact on water flow in streams to which treated wastewater will be discharged to as it may increase or decrease water flow, depending on STP design. Optimum discharge volumes will be determined and will consider this information in the design of the STP facility to achieve environmentally-sustainable flows within the receiving water way.

#### 4.1.4.2 Design of Climate-Resilient STP Structure

Taking into consideration the likely impacts of climate change, with reference to the report on Climate Change in the Philippines by Pagasa, 2011, seasonal rainfall change in NCR (Metro Manila including Muntinlupa City), there is a substantial spatial difference in the projected changes in rainfall in 2020 and 2050. There is a reduction in rainfall during the summer season March, April, May (MAM) making the usually dry season drier. And during the southwest monsoon, June, July, August (JJA), and the September, October, November (SON) seasons, rainfall increases, making this seasons still wetter in NCR and thus with likelihood of both droughts and floods in the project site (see Table 22). The design and construction of the STP and its foundation structure should consider potential progressive erosion along the banks of the river bounding the STP site that would result to loss of surcharge and reduction in bearing capacity.

Concrete retaining walls to serve as dike may be installed along the banks. The project design should also consider the shallow water table since excavations may prove to be difficult and costly. Retaining walls, sheet piling, driven piles, surface and subsurface drains, and other flood control measures may be necessary to prevent damage to the STP structures and equipment.

The final elevation of the STP shall consider the highest flood levels to ensure that its operations, equipment and other appurtenances are not affected during flood events. Furthermore, the control room with all the electronic devices needs to be elevated higher than the predicted flood level to ensure proper operation in the event of an unforeseen flood events.



During flood conditions, access to the STP can be addressed using with a rubber boat. In extreme case of severe flooding, Maynilad has the capability to respond to natural disasters because of the Company's adherence to its Emergency Preparedness and Response Program.

Table 22.	Seasonal Rainfall Change (in %) in 2020 and 2050 under Medium and High
	Range Emission Scenarios in Provinces in NCR

	Observed Baseline (1971- 2000)			Change in 2020 (2006- 2035)			Change in 2050 (2036- 2065)					
Medium	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Range												
NCR	NCR											
Metro	107.5	198.5	1170.2	758.7	-12.8	-33.3	8.5	00	-17.3	-38.5	21.3	3.7
Manila												
High	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Range												
Metro	107.5	198.5	1170.2	758.7	-53.2	-17.3	6.8	-19.1	-30.7	-26.8	-0.4	-2.6
Manila												

i.e. in Metro Manila, the projected values in 2020 is;

DJF rainfall= (107.5mm+107.5(-12.8%)mm) = (107.5-13.8)mm = 93.7mm

#### 4.1.4.3 Impacts of Solid Waste and Screening Wastes

Screenings and solid waste shall be generated from the operation of the interceptors and preliminary treatment system. The screening wastes shall be collected daily from the interceptors and manholes to prevent the wastes from damaging STP equipment and pumps. The current inadequacy of solid waste management in the area and the presence of floating garbage at the creeks indicate potential problems for the STP. Coordination with the Local Government Unit (LGU) relative to the implementation of the solid waste segregation and collection will be important to avoid generation of large volumes of solid waste at interceptor boxes.

#### 4.1.4.4 Odor

The treatment and biodegradation of biological wastes, in general, generates odor compounds that may cause nuisance to adjacent residential communities. Screens, equalization tanks, and sludge digester during operation are all potential sources of offensive odors that can produce adverse environmental impacts on the adjacent communities. Remedial measures such as the provision of odor control systems will be instituted by MAYNILAD to prevent such occurrence. Other measures like planting of buffer strips of vegetation also helps in preventing odor from affecting adjacent communities.

#### 4.1.4.5 Air Quality and Noise

During the operation of the STP, no significant air quality hazard is foreseen since the equipment that will be used in the plants will work on electric power. However, the use of diesel power generators during power outage will emit various air pollutants such as suspended particulates, SO<sub>2</sub>, CO and Nox. Other possible source of air pollution is leakage from chlorine



gas (a noxious gas) used for disinfection of treated water. MAYNILAD shall minimize the generation of smoke, dust, vapors and noxious fumes from the operation of power generator by only using equipment that is in good condition and well maintained at all times.

Noise generated in STP operation comes from operation of pumps and usually generate low frequency noise that is contained within the plant. The STP will be designed such that noise will be minimized. Mufflers may be fitted to gas and diesel-powerd equipment to minimized noise generation.

Working Environment Measurement (WEM) that includes noise level and air quality monitoring within the facility will be conducted by MAYNILAD periodically.

#### 4.1.4.6 Effluent and Sludge Disposal

Process and structural designs may cause impacts of mild magnitude. These impacts can be successfully mitigated by application of sound engineering design principles to adequately accommodate the volumetric flow rate and organic load. The effluent should be able to meet the Effluent Standards for Class C waters as prescribed by DENR Administrative Order No. 35.

Sludge generated at the STP will be managed through a sludge digester and dewatering system, the treated sludge will then be collected by FG Agro Industrial Development Corporation for conversion into organic fertilizer. Maynilad commissions the services of FG Agro Industrial Development Corporation, an accredited sludge waste hauler of Maynilad, that hauls and handles sludges generated by Maynilad STPs for processing into organic fertilizer for sugarcane and other similar crops farmland using the drying and composting process.

FG Agro was granted an Environmental Compliance Certificate by the DENR for their drying and composting facilities at Bgy. Telebanca, Concepcion, Tarlac (see Annex D). The said drying and composting facility has a capacity of eleven thousand (11,000) cubic meters per year in an area of twenty five thousand four hundred thirty seven (25,437) square meters with geographical coordinates of 15<sup>0</sup>17'10.7" North Latitude and 120<sup>0</sup>37'35.2" East Longitude.

#### 4.1.4.7 Generation of Hazardous Wastes

Hazardous wastes such as empty chemical containers, analytical wastes from the laboratory, used oil from the generator set, and busted lamps will be generated when the project becomes operational. These hazardous wastes shall be collected separately from the regular solid waste of the facility. A DENR-recognized treatment, storage, and disposal (TSD) facility shall be commissioned by MAYNILAD to collect and properly treat the hazardous wastes in accordance with the requirements of Republic Act 6969 (Toxic, Hazardous, and Nuclear Waste Control Act).

#### 4.1.5 Positive Impacts and Benefits

Collectively, the proposed project will bring about qualitative improvement in the sanitation and health of communities, in particular those living near the water bodies. The living and health conditions will improve and the overall attractiveness of Muntinlupa City is expected to progress in the long-term. Water quality of streams/creeks/rivers are also expected to improve



with the reduction in pollution load. MAYNILAD will conduct regular monitoring of the effluent to ensure compliance with the Effluent Standards of the DENR.

Other indirect benefits of the proposed project are increase in property values because of improvement in sewerage infrastructure, improvement of tourism potential of the area, potential return of fishing activities with improved water quality, and provision of employment opportunities.



## **5** Environmental Management and Monitoring Plan

The mitigating measures to address adverse environmental impacts consist of activities and plans that are presented in Table 23. The Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) are developed for the design, tendering, construction and operational phases of the project. The bidding documents for the project shall include the implementation of the EMP.

The EMP includes measures such as:

- implementation of treatment processes based on environmental soundness,
- specifying the construction occupational health and safety plan in the bidding documents of contractors,
- preventing loss of vegetation,
- climate-resilient measures in the design,
- traffic management,
- solid waste and sludge management,
- effluent disposal in accordance with the standards,
- siltation prevention of the waterways
- management of domestic wastewater generation from temporary facilities
- quality construction supervision and environmental monitoring by MAYNILAD,
- observance of a grievance redress mechanism and prompt action/resolution of lodged grievances,
- Full implementation of MAYNILAD's Corporate Social Responsibility policies, and
- Implementation of MAYNILAD's Safety Code consistent with IFC-World Bank's Environmental, Health, and Safety Policy.

As a follow-up to the environmental assessment, an environmental monitoring program has been designed with the objective of monitoring the changes in key environmental elements so that any long-term adverse impact cause by the project can be predicted. Some of the monitoring targets include monitoring of unit operations and processes, beneficiaries, water quality of streams/creeks/river within muntinlupa sub-catchment 1, and effluent quality.



Activity/Environmental Impact	Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation	ı
Pre-Construction Phase				
Removal of trees and other vegetation during site clearing	Avoid cutting of existing trees to the extent possible but considering these in the design and configuration of the facility Secure Permit to Earth ball/Cut Tree (for any	MAYNILAD/Contractor	Included project cost	in
	affected tree) from the DENR			
Flooding in the area	Maynilad to consider engineering intervention such as backfilling and raising the controls with all the electronic devices above the highest recorded/predicted flood level in the area in the event of an unforeseen flood event.	MAYNILAD/Designer	Included project cost	in
Public concern on environmental and social impacts of STP	Conduct IEC on the project Conduct environmental impact assessment of the proposed project	MAYNILAD	Included project cost	in
	Inform Barangay and LGU			
	Secure permits, clearances, endorsement, approval from relevant government agencies			
	MOA with land owners and affected barangays			
Construction Phase				
Siltation - erosion and surface soil runoff that could cause clogging of canals	Require contractor to install silt traps, deviation channels and trenches around stockpile of materials prone to runoff	Contractor PCO (MAYNILAD)	Included project cost	in
Collapse of river bank adjacent to STP site	Undertake riverbank protection measures such as riprapping.	Contractor PCO (MAYNILAD)	Included project cost	in

Activity/Environmental Impact	Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation
Oil spills or leaks from heavy machinery	Proper handling of liquids (i.e., used oil) and regular maintenance of construction machinery within designated area to prevent oil leaks and spillage that could result in land or water contamination	Contractor PCO (MAYNILAD)	Included in project cost
Increased noise level	Silencers or mufflers on construction equipment will be utilised and will be properly maintained during the construction program Avoid scheduling heavy noise-generating activities at nighttime. Coordinate with the barangay and adjoining establishments regarding the construction schedule. PPE's such as earplugs will be provided for construction workers	Contractor PCO (MAYNILAD)	Included in project cost
Increased dust emission	Regular watering/sprinkling of areas prone to dust emission during dry and windy conditions. The site construction gate should be cleaned regularly to prevent migration of soil and dust offsite The dusty materials stockpiled on site should be covered; Vehicles carrying dusty materials leaving athe construction site should be covered entirely by clean impervious sheeting to ensure dust	Contractor PCO (MAYNILAD)	Included in project cost

Activity/Environmental Impact	Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation
	materials do not leak from the vehicle		
Traffic congestion due to movement of construction vehicles along Buendia St.	Schedule hauling of construction materials during off-peak hours. Side street parking of construction vehicles will not be allowed	Contractor PCO (MAYNILAD)	Included in project cost
	Assign security personnel to assist vehicles coming in and out of the site.		
	Coordinate with the LGU.		
Open excavations may cause accidents	Barricades and steel plate covers will be provided in open excavations during non-working hours.	Contractor PCO (MAYNILAD)	Included in project cost
	Warning signages and flashing boards will be posted at the excavation site.		
	Provide lighting at open excavations at night.		
Generation of construction spoils and excavated materials	Excavated materials will be hauled in an area approved by the LGU.	Contractor PCO (MAYNILAD)	Included in project cost
Generation of domestic wastewater from workers' camp/ temporary facilities	Contractor will be required to set-up temporary toilet facilities or portable toilets including its proper handling and disposal of effluents.	Contractor PCO (MAYNILAD)	Included in project cost
Occupational hazards from construction activities	Prepare construction OHS plan and made it part of the project contract to be implemented by the contractor	Contractor PCO, Safety Officer (MAYNILAD)	Included in project cost
Increase in employment opportunities	Qualified workers in the area will be a priority in terms of hiring	Contractor MAYNILAD	Included in project cost

Activity/Environmental Impact	Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation	
Inconvenience to Nearby Community due to Muddy Vehicles Leaving the Project Site	Provision of a vehicle cleaning/washing facility at the exit of the construction site. This will include the use of a high pressure water hose to wash/clean the vehicles from mud.	Contractor PCO (Maynilad)	Included in project cost	
Potential Increase of HIV Infections and Spread in Construction Camps	Provision of HIV prevention information education campaign (IEC) and measures	Contractor PCO (Maynilad)	Included in project cost	
Operation Phase			Included in project cost	
Discharge of wastewater	Proper operation, regular inspection and maintenance of the STP to ensure compliance with the Effluent Standards. Regular monitoring of effluent and submission of reports of monitoring to LLDA. Secure Discharge Permit from the LLDA.	Operations Group- MAYNILAD PCO (MAYNILAD)	Included in project cost	
Flooding in the area during heavy rainfall	Implement climate-proof measures such as design of interceptor system and STP that will consider storm water runoff Planting of more trees and other vegetation Conduct further investigation of flow and carrying capacity of Pasong Diablo River, Buli River and Bayanan River and other streams/creeks within sub-catchment 1.	Operations Group- MAYNILAD PCO (MAYNILAD)	Included in project cost	
Release of effluent from STP	Coordinate with MMDA/LGU on the upstream average water elevation to guide MAYNILAD on the timing of effluent release from the STP.	Operations Group- MAYNILAD PCO (MAYNILAD)	Included in project cost	

Activity/Environmental Impact	Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation
Improvement of the water quality downstream the STP may potentially make the stream/water body suitable for freshwater biota to thrive	Proper operation, regular inspection and maintenance of the STP to ensure compliance with the Effluent Standards	Operations Group- MAYNILAD PCO (MAYNILAD)	Included in project cost
Odor	Installation of an odor control system Planting of more trees around the periphery to act as buffer. Equipment maintenance and utilization of efficient and effective treatment technologies STP layout will consider siting of potential sources of odors far from nearby residential houses as possible	Operations Group- MAYNILAD PCO (MAYNILAD)	Included in project cost
Generation of screenings and solid waste	Daily collection of screening wastes at interceptors and manholes. Coordinate with LGU on the implementation of the Ecological Solid Waste Management program to encourage households to collect solid wastes and avoid disposal on canals and creeks. Solid waste management program will be generated for the STP facility	Operations Group- MAYNILAD PCO (MAYNILAD)	Included in project cost
Generation of sludge	Sludge generated at the STP will be managed through a sludge digester and dewatering system. The treated sludge will then be collected by Maynilad accredited sludge waste hauler, FG Agro Industrial Development Corp. for conversion	PCO (MAYNILAD)	Included in project cost

Activity/Environmental Impact	Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation
	<ul> <li>into organic fertilizer by means of drying and composting process to be used for sugarcane and similar crops farm land in lahar laden areas. This is being process at its plant in Bgy Telebanca, Concepcion, Tarlac.</li> <li>Implementation of an Integrated Sludge Management Plan that will consider a waste-to-energy scheme in the design of the facility is being considered in the future.</li> </ul>		
Generation of hazardous waste (empty chemical containers, analytical wastes, used oil, busted lamps)	Segregate hazardous wastes from the regular garbage. Commission the services of a DENR-recognized TSD facility to treat and dispose properly the hazardous wastes	Operations Group – MAYNILAD PCO (MAYNILAD)	Included in project cost
Emissions from the operation of the generator set	Regular maintenance of the generator set. Secure Permit to Operate from the DENR-EMB.	Operations Group – MAYNILAD PCO (MAYNILAD)	Included in project cost
Potential for soil erosion and sedimentation due to poor design and installation of stream crossing that changes water flow	Guidelines on stream crossing design will consider maintenance of natural stream conditions during the design phase (e.g. bed materials, water velocity), wildlife access and flood prevention	Operations Group- MAYNILAD	Included in project cost
Occurrence of floods may likely decrease	During the design phase, guidelines on stream crossings design will consider flood prevention guidelines.	Operations Group- MAYNILAD	Included in project cost
Accidental release of chlorine	Provision of chlorine storage facility equipped with	Operations Group -	Included in



Activity/Environmental Impact		Mitigation/Enhancement	Institutional Commitment	Cost of Mitigation	
		chlorine gas detector, alarm system.	MAYNILAD PCO (MAYNILAD)	project cost	
		Preparation of emergency response plan for chlorine leak			
		Training of workers on safety and emergency procedures.			
Increase emp opportunities	oloyment	Priority hiring of qualified workers in the area	Operations Group – MAYNILAD	Included in project cost	
Abandonment Phase					
Waste generation		Preparation of abandonment plan for STP facility and conveyance system that will describe measures to be undertaken in case of business closure, possible demolition or transfer of the facility or due to force majeure.	Operations Group - MAYNILAD	Included in project cost	
		Proper disposal of decommissioned materials			

## 5.1 Mitigating Measures During Pre-Construction

#### 5.1.1 Conservation of Trees

In the design of the facility, cutting of trees shall be avoided. In the event that there are trees that need to be removed, earthballing and then replanting will be undertaken. Appropriate Tree Earthballing/Cutting Permit shall be secured from the DENR.

The project site is a vacant field, raw and unused hence vegetation present *in situ* is mostly weeds and some coconut trees and not endangered terrestrial fauna.

#### 5.1.2 Climate-Resilient Measures

A climate –proof measures will be designed for the project based on the following: 1) highest reported flood experienced by the residents during the Typhoon Ondoy wherein 2 m. flood occurred at the site of the proposed STP, 2) likely impacts of climate change, with reference to the report on Climate Change in the Philippines by Pagasa, 2011, seasonal rainfall change in NCR (Metro Manila including Muntinlupa City), where there is a substantial spatial difference in the projected changes in rainfall in 2020 and 2050. Reduction in rainfall during the summer season March, April, May (MAM) making the usually dry season drier. And during the southwest monsoon, June, July, August (JJA), and the September, October, November (SON) seasons, rainfall increases, making this seasons still wetter in NCR and thus with likelihood of both droughts and floods in the project site, see Table 23., 3) storm water run-off will be considered in the design of the interceptors system.

The final elevation of the STP shall consider the residents reported highest flood levels and the risks of the projected rainfall data based on climate change report to ensure that its operations, equipment and other appurtenances are not affected during flood events. The storm water runoff will also be considered in the design of the interceptor system and planting of more trees and vegetation as part of the site's landscaping.

During flood conditions, access to the STP can be addressed using with a rubber boat. In extreme case of severe flooding, Maynilad has the capability to respond to natural disasters because of the Company's adherence to its Emergency Preparedness and Response Program.

## 5.2 Mitigating Measures During Construction

#### 5.2.1 Traffic Management

The frequent movement of construction vehicles hauling materials to and from the project site might hamper the flow of traffic along M.L. Quezon St. This is particularly significant considering that some sections of the street are being used as parking area of residents or terminal of tricycles. In order to avoid causing traffic along the street, the delivery vehicles will be advised to conduct hauling during off-peak hours where vehicle and pedestrian movement along the street is not significant. In addition, security personnel will be assigned at the gate of the property to assist in the movement of vehicles going to and from the site.



In order to control the potential traffic problems caused by the construction of sewer network and the STP, prolonged side street parking shall not be allowed. Traffic rerouting scheme shall be developed in coordination with the LGU to ensure smooth flow of vehicles. The traffic management plan shall be designed once the location of the conveyance system and the design of the project are finalized. The traffic plan should be approved by the LGU. In addition, appropriate signages informing the public about the traffic rerouting plan and schedule of project construction should be posted in strategic areas. Traffic management plan must be available, subject to review and approval, before the start of construction (Q1 of 2015).

#### 5.2.2 Control of Dust and Air Pollution

Air pollutants such as dust, SOx, NOx, and particulates will be generated during dry and windy conditions. This can be prevented and minimized by regular watering/sprinkling of areas prone to dust emission. The following mitigation measures are proposed:

- During clear and windy day, the construction waste or materials should be sprayed with water or covered to prevent dust emission in the surroundings.
- The waste management plan must include prompt removal of waste, ensuring that the hauling vehicles are not overloaded and are properly covered to prevent waste/dusts from being released along the way.
- The site construction gate should be cleaned regularly to prevent migration of soil and dust offsite.

The mobile monitoring stations will be placed downwind from the work areas based on the current and forecasted wind direction as indicated in the weather forecast

#### 5.2.3 Control of Water Pollution

Sanitary wastes and domestic wastes generated by construction workers may affect hygiene and sanitation in the surrounding environment and cause issues such as presence of fetid odors and development of diseases.

The construction phase will require numerous workers at the site. The contractor will have to make sure that domestic wastes are cleaned-up promptly from the site. Portable toilets should be provided at the construction site. No random dumping of domestic waste should be allowed by the contractor to guarantee good hygiene and health conditions for the construction workers.

During the construction period, natural surface runoff into the drainage system will be disrupted by the construction of temporary works such as barriers, trenches, deviation channels mounting around the stockpiles of materials. Furthermore, good housekeeping will be maintained at all times during the construction process.

#### 5.2.4 Protection of Riverbanks alongside STP Site

To ensure that loose soil from river banks will not contribute to deterioration of the river due to siltation and obstruction of normal flow of river, riverbank protection measures such as riprapping shall be undertaken to reinforce the side of the river adjacent to the STP site. The shoring works on the riverbanks should be designed in such as way that this will not alter the configuration of the river or produce siltation due to soil erosion. It is important that the final



alignment of the riverbanks will maintain the original width of the river and will not encroach or reduce the width of the river through reclamation.

#### 5.2.5 Control of Noise Nuisance

The construction works will be located in a central urban district and any heavy noise generating activities will be prohibited at night, unless, a special authorization has been obtained at the local barangay level or from the local government unit. Mufflers may be fitted to gas and diesel-powered equipment to minimize noise generation.

#### 5.2.6 Management of Construction Wastes

Construction wastes consists mainly of excavated spoils produced during construction of gravity mains, conversion manholes, and STP components. The transportation and handling of construction waste will require frequent movement of hauling vehicles and could affect local traffic. In addition, dust in the air or mud on the ground may be generated from spill of these materials. In order to minimize these impacts, the excavated soil may be used for backfilling and restoration of affected areas.

Construction waste management plan will be developed and will be included in the project contract for adoption and compliance by the general contractor. The plan will address the proper segregation, re-use, recycling and recovery of wastes. Waste management plan will be developed, subject to review and approval, before the start of any activity in the project site (Q1 of 2015).

#### 5.2.7 Community Health and Safety

Community health and safety during the construction of the proposed project will be considered. Any potential risks to community health and safety such as risks from uncontrolled access to construction sites, exposure to waterborne, water-washed, and water-associated diseases resulting from excavation and water impoundments and exposure to increased traffic due to movement of construction materials will be addressed through the implementation of a community health and safety procedures through the project's general contractor.

Excavation works at roads may result to accidents and hazards for the community. To prevent accidents during construction, barricades and steel plate covers will be provided in open excavations during non-working time. Concrete barriers may be used for the separation of traffic and protection of workers in high-speed areas or in vulnerable situations where the lateral clearance between workers and moving traffic would be insufficient for adequate safety. Concrete barriers may also be used for protection for deep excavation. Warning signs shall also be posted in the area.

The contractor will be required to strictly implement MAYNILAD's Safety Code and IFC-World Bank's Environmental, Health, and Safety Guidelines.

#### 5.2.8 Occupational Health and Safety

During the construction phase, the construction activities could result to hazards on the safety of workers. The contractor will be required to implement a Construction Health and



Safety Plan, which will be made part of the contract that will include the requirement on wearing of Personal Protective Equipments (PPEs), posting of safety signages, and provision of sufficient lighting in dark areas of the construction site.

An Emergency Action Plan should also embody the necessary steps that should be undertaken by the contractor when an accident occurs. Medical assistance as well as first aid kit shall always be available at the site.

These plans are all included in the Maynilad Safety Code (Annex E).

## 5.3 Mitigating Measures During Operation

#### 5.3.1 Management of Collected Solid Waste and Screenings

The interceptor boxes with screens shall be designed to collect the solid wastes and silt. At the STP, the screening of solids may be affected using bar racks or mechanical bar screens. Fine screens may remove inert materials. Grit removal may be accomplished after bar screens and before the equalization tank in order to protect mechanical equipment from abrasion and accelerated wear. The system will remove sand, gravel or any other heavy non-putrescible materials in the sewage.

The solid waste, screenings, and grits shall be 1) collected by the garbage collector of the local government and 2) hauled and disposed to designated landfill. The LGU and service provider provides the landfill/disposal site.

In coordination with the LGU, MAYNILAD will assist in the strengthening of the solid waste management program of the locality through information and education campaign programs aimed at instituting behavioral changes among the residents on solid waste segregation and management. The IEC program will be implemented starting at the early stage of project planning and shall continue up to the operational phase. The program aims to reduce the volume of solid waste that is uncollected and end up in the waterways in Pasay City.

#### 5.3.2 Release of Effluent to Laguna Lake

The STP is estimated to release about 5.55 cum/sec of treated wastewater into the Laguna Lake during dry weather flow based on calculations. During the design phase, the most appropriate location of the discharge outfall will be studied thoroughly to ensure that the release of effluent into the lake will not result to flooding at the downstream areas.

During the operational phase, MAYNILAD shall coordinate closely with the MMDA/LGU to monitor the average upstream water elevation at the pumping station. This will allow Maynilad to determine the appropriate regulation and timing of wastewater releases from the STP.

#### 5.3.3 Odor Control

Odor emission from the STP will be managed through an odor control system that will be integrated in the design of the facility. Mitigation measures will also include the planting of green



belt at the site boundary and the preservation of the existing large trees at the periphery, which can serve as protective buffer.

#### 5.3.4 Management of Sludge

FG Agro Industrial Development Corporation, is the third party hauler and treater of the treated sludge generated at Maynilad STPs. FG Agro was granted an Environmental Compliance Certificate by the DENR for their drying and composting facilities at Bgy. Telebanca, Concepcion, Tarlac (see attached ECC). The said drying and composting facility has a capacity of eleven thousand (11,000) cubic meters per year in an area of twenty five thousand four hundred thirty seven (25,437) square meters with geographical coordinates of 15<sup>0</sup>17'10.7" North Latitude and 120<sup>0</sup>37'35.2" East Longitude.

Sludge generated at the STP will be managed through a sludge digester and dewatering system. The treated sludge from the sewage treatment plant will be collected and hauled by FG Agro and will be brought to their drying and composting facilities in Concepcion, Tarlac. It will be dumped on the drying beds for 20 to 30 days for sun and air-drying under dry weather condition. Then, the dried sludge will be gathered from the drying beds for composting. Composting process is done by spraying the dried sludge with Indigeneous Microorganism (IMO) /Effective Microorganism (EM) for fast decomposition and mixing with Carbonized Rice Hull (CRH) to increase water retention. Composting period is within 30-45 days, the resulting composted product, which is called "Biosolids", will be bagged for land application to sugarcane and similar crops farm land in lahar-laden areas. Biosolids application may either be through an injector type applicator or manual surface spreading. Figure 21 describes the process flow diagram of drying and composting for sludge management.



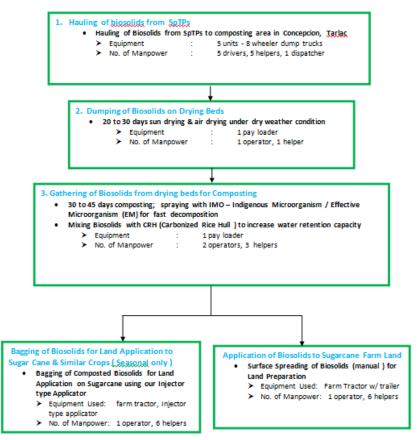


Figure 20. Process Flow of FG Agro Industrial Development Corporation

#### 5.3.5 Air Pollution Control

To control any adverse effect on the air quality in the vicinity caused by the generator set, regular maintenance shall be undertaken on the said equipment. Regular testing shall be undertaken and Permit to Operate from DENR shall be secured.

#### 5.3.6 Traffic Management

During the STP's operational phase, adequate parking spaces are available by the site for its workers and guests. Trained security personnel will be assigned to direct the flow of vehicles coming in and out of the area. Vehicles hauling sludge from the site will also observe the implementation of truck ban.

#### 5.3.7 Physical and Cultural Resources

According to the site assessment, there are no historical and heritage sites and structures that may be affected by the project. If chance finds are encountered during excavation, the National Museum shall be informed immediately to determine the importance of the discovery and whether or not the construction works can carry on.



Measures shall also be undertaken to include physical protection, overfill protection, and tank integrity. Access to the STP site and its facilities will be restricted by implementing security measures such as perimeter fencing of adequate height and of suitable material.

### 5.4 Mitigating Measures During Abandonment Phase

The lifespan of an STP is estimated at 60-80 years while the conveyance and interceptor works are estimated at 50-70 years assuming proper operations and maintenance are observed. During the decommissioning phase, necessary rehabilitation measures will be implemented by Maynilad. All structures such as conveyance and STP components will be decommissioned. An abandonment plan will be prepared and it will be implemented once a decision to abandon the project has been made. The plan will describe measures to be taken in case of business closure, possible demolition or transfer of the facility or due to force majeure.

## 5.5 Environmental Monitoring Plan

Environmental monitoring reports shall be submitted by Maynilad to LBP and WB during the pre-construction up to the construction phase of the project. Compliance Monitoring Reports (CMRs) shall also be submitted to DENR on a semi-annual basis following the requirements of DENR Administrative Order 2003-30.

The monitoring reports shall be prepared by the PCO of MAYNILAD. During the construction phase, the PCO shall make sure that the contractor submits its Environmental Compliance Report to MAYNILAD and that the PCO shall verify the findings presented in the report of the contractor. The monitoring reports should also contain the results of implementation of the environment, health, and safety program of the project.

In addition, an annual Third Party Audit (TPA) of the environmental performance of the project shall be commissioned by MAYNILAD. The result of the TPA shall be submitted to LBP and WB. Table 24 presents environmental monitoring plan.



Table 24.    Environmental Monitoring	Plan
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Parameters	Location	Frequency	Estimated Cost (per annum)
Pre-Construction Phase			
Inventory of trees	STP site	Once, prior to construction	Php 10,000.00
Construction Phase			
Volume of overburden soils and construction wastes	STP site, manhole stations, etc.	During transport of wastes	Part of construction cost
Visual monitoring of storm water runoff		Rain events	Part of construction cost
Noise	STP site, construction site (Monitoring at sensitive receivers downwind from the work areas or major site activities based on the current and forecasted wind direction as indicated in the weather forecast )	Daily when noise generating activities are underway (sound level meter is used)	Part of construction cost
Dust (TSP)	STP site, construction site (Monitoring at sensitive receivers downwind from the work areas or major site activities based on the current and forecasted wind direction as indicated in the weather forecast)	Daily real time TSP monitoring will be performed when potential dust generating activities are underway, otherwise daily visual monitoring will be performed to evaluate the effectiveness of dust suppression measures within or adjacent to construction areas.	Part of construction cost

Parameters	Location	Frequency	Estimated Cost (per annum)
Siltation of the waterways	Waterways – river, manhole stns.	Weekly – TSS	Part of construction cost
Solid wastes and construction spolis	STP site, construction site	Daily	Part of construction cost
Domestic wastewater generation (from temporary facilities)	STP site, construction site	P site, construction site Daily	
Vehicular Traffic	Along access roads	Daily	Part of construction cost
Occupational health and safety	STP site, construction site	Daily	Part of construction cost
Operational Phase			
Water Quality: 1. Influent Quality			
pH, Color, Temperature, Transparency	Grit Chamber	Daily	Php 100,000.00
Total Suspended Solids, Oil and Grease, BOD, COD, Total Coliform, pH, Color, Temperature, DO		Weekly	Php 300,000.00
2. Effluent Quality Temperature, color/odor, transparency, pH	Discharge Point	Daily	Php 80,000.00
Total Suspended Solids, Oil and Grease, BOD, COD, Total Coliform, pH, Color, Temperature, DO		Weekly	Php 300,000.00

Parameters	Location	Frequency	Estimated Cost (per annum)
3. Receiving Water Quality Temperature, Color, Conductivity, pH, BOD, TSS, TS, TDS, Total/Fecal Coliform (including signs of fish kill and eutrophication)	Upstream and Downstream of Creek	Monthly	Php 80,000.00
Sludge TS, TVS	Sludge treatment facility	Annually	Php 300,000.00
Air Emission SO2, NO2, TSP	Generator set	Depending on the frequency stated in the permit	Php100,000.00
Air Quality PM, TSP	Monitoring at sensitive receivers downwind from the work areas based on the current and forecasted wind direction	Annually	Php 100,000.00
Solid Wastes Office, domestic and demolition wastes except sludge	omestic and demolition		
Noise Three stations within the pe of the STP site		Annually	
Hazardous Wastes			
Freshwater biota (Biological indices)	Directly affected waterways	Annually	Php 100,000.00
Abandonment Phase			
Solid waste generation STP site and conveyance system		Once decision has been made for business closure/ possible demolition or transfer of the facility or due to force majeure	200,000.00

### 5.6 Information, Education and Communication Plan

Plans for public involvement during the construction and operational phases of the project will be developed, once the construction program is better defined. These plans will provide forums for updating stakeholders periodically on project progress and the implementation of mitigation measures. These plans will be incorporated into an IEC plan.

The Information, Education and Communication Plan of MAYNILAD aim to foster active participation by the communities and generate support for the project. It also aims to inform the people about the details of the project. Information should be provided as needed so that the people will decide, not only on the basis of the economic benefits that they may derive from the project, but also after taking into consideration the environmental risks that the project may entail. Full disclosure of information enables a community to consider the options open to them and to make informed decisions.

The IEC framework shall consist of advisories and IEC programs designed to inform the LGU and adjoining establishments regarding activities that will affect smooth operation of the project. Table 25 below outlines the proposed IEC program of the project during the pre-construction/construction and operational phases.

Target Sector Identified as Needing Project IEC	Major Topic/s of Concern in Relation to Project	IEC Scheme/Strategy / Methods	Information Medium	Indicative Timelines and Frequency	Indicative Cost
LGU Project stakeholder s	Job posting and requirements	Individual and group methods	Announcement s Meetings with LGU	One month prior to construction Operational phase (as necessary	Part of const. cost Part of managemen t cost
Workers, community	Emergency preparednes s	Emergency drill and seminar	Announcement s Meetings with BFD and LGU	Annually	Php50,000
Barangay	Support to barangay/ community projects	To be identified by barangay	Meeting, announcement s	Constructio n / operation	To be determined

#### Table 25. Information and Education Campaign (IEC) Program



### 5.7 Grievance Redress Mechanism

Maynila created a Grievance Redress Mechanism and has appointed Engr. John Emmanuel B. Martinez as the Grievance Officer of the project who can be contacted at 981-3484. Engr. Martinez shall coordinate with the responsible units/departments about any possible complaints lodged on the project.

The Grievance Redress Mechanism is divided into complaints lodged during the construction and operation of the project. During the construction phase, an affected person or complainant can approach or call the Maynilad or contractor to raise his/her complaints or concerns. Complaints will be immediately relayed to the responsible party for prompt action. If the complaint is not acted on promptly, or if the affected person is not satisfied with the resolution undertaken, he/she can then avail of the formal mechanism, as follows:

Step 1: Affected person lodges the complaint.

**Step 2:** The General Contractor (during construction) and the Sewerage Operations Department (during operation) will document and register received complaints.

**Step 3:** A meeting will be called between the affected person and the General Contractor (during construction) and the Sewerage Operations Department (during operation). The affected person will be immediately informed if the grievance is within, or outside, the purview of the mechanism. If the scope is outside, the affected person will be referred to the proper institution and/or proper mechanism for the complaint.

If the complaint is within the scope of the project, the resolution of the complaint shall be discussed during the meeting. Investigation will be immediately scheduled for proper resolution of the complaint. The contractor/Sewerage Operations Department will immediately provide the most suitable interim measure to reduce the magnitude of the impact and to start work on the final measure not later than 5 days from the day of the discussion meeting.

**Step 4:** If the affected person is satisfied with the resolution of the complaint, MAYNILAD shall obtain a written confirmation of satisfaction from the affected person.

**Step 5:** For at least a week after closure of grievance, MAYNILAD through the Grievance Officer shall monitor the effectiveness of the resolution.

**Step 6:** In the event that the issue/impact persists, the affected person can lodge an appeal to the Barangay. The Barangay Chairman shall immediately record the appeal, contact the Grievance Officer and contractor of Maynilad, and call for a meeting to review the history of the grievance to discuss the immediate resolution of the issue. If the issue still persists despite the second action, the affected person can seek assistance from the City Government.

### 5.8 Institutional Plan for EMP Implementation

During construction phase, the Contractor shall fully implement the mitigation and enhancement measures presented. In addition to the task of Maynilad or its duly authorized representative in supervising the construction of the proposed STP facilities, it shall ensure that the recommended measures as well as suggestions concerning environmental protection from



DENR/LLDA are followed and applied. The Terms of Reference (TOR) of the contractor shall stipulate compliance of the project with the requirements in the EMP and EMoP.

The Maynilad shall closely coordinate with the Contractor to ensure that provisions in the environmental program are effectively implemented. Regular inspection of the working area shall be conducted focusing not only on technical aspect but also on environmental considerations.

The implementation of the EMP and EMoP starting from the planning, design, construction, and operation shall be supervised by the Environmental Management Department of Maynilad.

When the project is turned-over to the Operations Department during completion and commissioning, the facility shall designate a Pollution Control Officer (PCO) to assume the responsibilities related to environmental management of the project. All matters relating to pollution control should be the main concern of the PCO. The appointed PCO shall closely coordinate with the Environmental Management Department on matters relating to EMP and EMoP.

Environmental monitoring reports shall be submitted by MAYNILAD to LBP and WB throughout the project cycle, beginning from the preparation of the bid documents and at the onset of the pre-construction phase.



## 6 Social Assessment

The acquisition of large areas of land is needed for the physical component of the project. It is expected that environmental impacts, positive and/or negative, would arise because alterations will be made in the area. The project is also likely to induce irreversible social changes on the immediate community.

The total land area to be acquired for the proposed STP covers **8,333 sq. meters**. The properties being acquired for the proposed STP are owned by four (4) persons. They are relatives. The four (4) owners are as follow: Dominador Almendrala with area of 2,000 sq. meters; Fe Almendrala with area of 3,000 sq. meters; Pedro Aman with an area of 3,000 sq. meters; and Consuelo Casacop with an area of 333 sq. meters.

The land acquisition of the four (4) lots is through a "willing seller-willing buyer" approach. Appraisal documents showed that the lots are free of encumbrances. The zonal value of the property as provided by the Bureau of Internal Revenue (BIR) on their official website is **Php 2**, **500** per sq. meter. While, the appraised value provided by the Maynilad accredited broker, Cuervo Valuers & Advisory Inc., is **Php 1,220.63** per sq.m. Based from the same report, the average market value is **Php 10,171,000.00** for the gross land area of **8, 333** sq. meters in the area. The appraisal of the properties was done on May 21, 2012 and offer to sell was submitted to Maynilad by seller's broker on June 13, 2012. Contracts to Sell (CTS) and Deeds of Absolute Sale (DAS) with the sellers were already signed. The sellers have also signed Acknowledgment Receipts upon receiving the partial and full payment of their sold properties.

At present, only Consuelo Casacop and Dominador Almendrala received full payment for the sale of their respective properties. The full payment for Pablo Aman will be released upon submission of documents necessary to complete the registration of the sale and the transfer of title of the land to Maynilad. While, the full payment for the sale of the lot owned by Fe Almendrala will be released upon completion of the transfer of the 15 PAPs to their relocation site, removal of any improvements / structures and submission of important certificates/documents for the complete transfer of title to Maynilad.

Although the purchase of the land is through a "willing-seller-willing-buyer" method, there are fifteen (15) informal settlers (IS) residing at Fe Almendras property that will be affected by the project. They have to be relocated.

Maynilad establishes the number of the Project Affected Persons (PAPs) and determined that fifteen informal settler households were covered by the entitlements as defined in the Resettlement Policy Framework (RSF).

For the fifteen (15) informal settler households identified to be affected by the land acquisition, entitlements are as follows:

a) The lot owner has provided a site for the relocation of the PAPs. The site is along Buendia Street and is just 40 meters away from the PAPs previously inhabited lot. The PAPs relocation site would cause no significant socio-economic disruptions or physical adjustments to the present activities of the PAPs owing to its proximity to the present land they occupy. The 15 families will be relocated together as a group and maintain the same neighborhood.



- b) The relocation site is a land of 3,333 square meters, which belongs to the estate of the family of the sellers. The plan is to subdivide this land into parcels of lot of **32 sq. m each** and sell them to the PAPs at a discounted price. There would be 47 parcels of lot in the relocation site that would be available for purchase. A portion of the land will be dedicated for the PAPs while the rest of the lots will be sold to other prospective buyers. Each PAP families will be allocated with 32 sq. m. of lot at a cost of Php 2,000/ sq. m. (present zonal value) or for a total cost of Php 64,000. This will be paid in an installment basis. The owner is also willing to sell more than one parcel to any PAP household willing to purchase more lots.
- c) The project-affected families will be allowed to use the lot for two (2) years rent-free before they start paying for the monthly amortization of the lot in the succeeding 10year period. This is to direct the use of their resources in rebuilding their house/structures. The corresponding savings the PAPs can have for the given 2-year grace period/rent-free will be calculated as an additional entitlement of the owner for the PAPs.

The annual cost associated with land lease/rental is normally ten percent (10%) of the selling price of the lot, thus the 32 sq. m lot, which costs Php 64,000, could have an annual rental of Php 6,400. This would translate in a 2-year rental cost of Php 12,800 or an equivalent monthly rental of Php 530. Each PAP families will save **Php 12,800** amount as an entitlement for the 2-year grace period/rental-free given by the owner before the monthly amortization for the lot commence.

Assuming they will not avail of the relocation site offered by the owner and just rent somewhere near the area, the 2-year rental for a house can be costly for them. The prevailing cost of house rental near the area is shown below.

Type of house	15 sq. m., concrete, 1 bedroom with small kitchen & toilet	25 sq. m., concrete, 1 bedroom with small kitchen & toilet	
Monthly rental fee -	Php 2,500	Php 3,500	
After two (2) years -	Php 60,000	Php 84,000	

Prevailing cost of house rental near the area

d) The PAP families will have the option to have an outright purchase or fully pay the same in a period of twelve (12) years (2-year rent-free + 10-year installment period) with no interest. Based on the CTS, Php 500 and Php 1,000 pesos will be the monthly amortizations for the 32 sq.m. and 64 sq.m. lots, respectively.

The owner has offered the installment-based purchase to be interest free as an additional assistance/entitlement for the PAPs. Considering the net present value of the lot which is Php 64, 000 – if fully paid after 10 years, the lot would have a future value of **Php 114,614.25** if a compounded annual interest of 6% (prevailing market interest) is included in the purchase. The interest, which amounts to Php 50,614.25, is offered by the owner as a discount to the cost of the land and is considered as part of the assistance to the PAP families.



e) On top of this, the owner will shoulder the associated cost of relocation, the capital gains, documentary stamps tax, development cost and all other costs associated with the preparation of individual titles for the lot for a total amount of Php 15,900.00.

All in all, each PAP family will get the following assistance/discount from the lot owner for the ownership of a 32 sq. m. lot;

TOTAL -	Php 82,514
Ten (10) years of interest free	- Php 50,614
Free use of land for two (2) years	- Php 16,000
Cost of the Transfer of Title	`- Php 15,900
Coot of the Trencher of Title	

These are all on top of the financial transfer assistance per household given by the lot owner to PAP families.

- f) Every PAP household received financial assistance last May 17, 2013 from the owner to facilitate their transfer. Edmon Naeg & Ramon Bontog, owners of 2-storey combined concrete & wood houses were given twenty-thousand pesos (Php 20, 000) each in consideration for their structures. While, Mark Aaron Ramos received five thousand pesos (Php 5,000) from the owner since his house is just shanty. The rest received ten thousand pesos (Php 10,000) each, as what they have recently agreed with the owner
- g) The lot owner would also allow them to salvage any materials from their houses. The transfer of their properties and salvage materials to the relocation site will be easy because it is just a walking distance from their present location. The owner will also assist them.
- h) All PAPs were properly informed as to the plan of the owner to sell the lot to Maynilad. They received Notice to vacate as early as November 07, 2012. They were given at least 90 days upon receipt of the notice to vacate the land they are occupying. However, after this 90-day period, the PAPs still remained in the owner's land. They were requested by the owner to voluntarily remove their structures as soon as they received the agreed financial assistance

## 6.1 The Project Affected Persons

#### 6.1.1 Displacement of 15 Informal Settlers Households

Based on the survey conducted on March 2013 fifteen (15) informal settler (IS) households or a total of seventy (70) project affected persons will be displaced due to Maynilad acquisition of the Fe Almendras property needed for the construction of the Tunasan Sewage Treatment Plant.

The 15 informal settlers were properly informed on the plan of the lot owners to sell the property. They were given notice to vacate the area as of November 2012. Each of the informal settlers were given financial assistance for their relocation and for the affected structures and other investment made on the land.



Luz Almendrala, a relative of the property sellers, Fe Almendras, offered her idle land to the PAPs to be their relocation site. The lot is approximately 40 meters away from PAPs present location and is planted with vegetables, root crops and coconut tree. She is willing to sell the lot at a low price at an installment payment scheme. Payment period depends on how big the area they want to occupy. She is willing to give PAPs two (2) years grace period to enable them to rebuild their houses

#### 6.1.1.1 Resettlement Status of Fifteen (15) Informal Settler Households

The clearing operation started on December 10, 2013. One (1) IS household, the family of Edmon Naeg, signified not to transfer to the relocation site. They chose to dwell near their relative's residence. However, he handover his allotted lot to his brother and will be the one to occupy his portion.

The socio-economic profile of Naeg household appears he is capable of paying the monthly amortization (Php 500) of the lot and is economically favored than other IS households, owing to the regular remittances he receive from his wife working abroad. Also, his previous concrete dwelling implies that he is capable of building a decent house.

Seven (7) of the 15 PAP households have already transferred and started to rebuild their homes on their soon-to-be-owned lots. Two (2) households are starting to put skeletal structures for their houses but are not yet transferring. The other four (4) households have not yet put up any structures but signified an interest to transfer. Table below shows the summary of the resettlement status.

Generally, they signified contentment on their entitlement received. Maynilad interviewed some of the resettled PAPs during the Due Diligence on Jan. 01, 2014. Mrs. Letty Isturis and Ramon Bontog said that they are relieved by the idea of having a lot to call their own and start a new life free from fear of being ejected.

The Barangay committed to provide backfills and electric post in the area. Some of the PAPs have already water connections. Maynilad committed to help other resettled families have water connection through its Muntinlupa Business Area.

Househo	Will	Lot area to	Remarks
ld	transfer to the	occupy (sq. m.)	
	relocation site?		
Jonalyn	Yes	64	They have completely transferred
Viesca			in their new house at the relocation
			site. (See Photo 1)
Enrico	Yes	96	They have completely transferred
Moldez			in their new house at the relocation
			site. (See Photo 2)
Angelito	Yes	64	They have completely transferred
Naeg			in their new house at the relocation
			site. (See Photo 3)
Edmon Naeg	No	-	He has another residence and
_			will hand over the portion allotted to
			him to his brother. (See Photo 4)
Ramon	Yes	64	They have completely transferred
Bontog			in their new house at the relocation
			site. (See Photo 5)

Resettlement status of the 15 informal settler households



Hipolito	Yes	32	They have completely transferred
Balingasa	105	52	in their new house at the relocation
Dannyasa			site. (See Photo 6)
Patrick	Yes	64	They have not yet completely
Arciaga	163	04	transferred but starting to build a new
Albiaya			house. They are renting near the
			place. (See Photo 7)
Jose Mar	Yes	32	They have completely transferred
Nicolas	163	52	in their new house at the relocation
INICOIDS			site. (See Photo 8)
Erlinda	Yes	32	They have completely transferred
Claudel	165	52	in their new house at the relocation
Claudel			site. (See. Photo 9)
Richard	Yes	64	They have completely transferred
Isturis	165	04	in their new house at the relocation
ISLUIIS			site. (See Photo 10)
Mark Aaron	Yes	32	The family has not yet started
Ramos	165	52	constructing a new house. They are
Nallius			temporarily living with Mark's mother
			near the area.
Eluminada	Yes	32	The family has not yet started
Villarin	163	52	constructing a new house.
Rey Ciabal	Yes	32	The family has not yet started
Rey Clabal	165	52	constructing a new house.
Francisco	Yes	32	The family has not yet started
Villareal	res	32	
villaleal			constructing a new house. They are
			currently leaving near their relative's
Clan	Vaa	22	residence in Muntinlupa.
Glen	Yes	32	The family has not yet started
Magramo			constructing a new house.



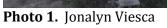




Photo 2. Enrico Moldez





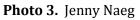




Photo 4. Edmon Naeg



Photo 5. Ramon Bontog



Photo 6. Hipolito Balingasa



**Photo 7.** Rhodora Lopez (wife of Patrick Arciaga)

Photo 8. Jose Mar Nicolas





Photo 9. Erlinda Claudel

Photo 10. Richard Isturis

## 6.2 The Project Affected Structures

#### 6.2.1 Loss of Houses of Informal Settlers

House structures of the 15 IS are made up of wood, concrete and combination of both. Majority of these houses were built in a permanent structure. Based on the survey conducted on March 2013, all of these informal settlers were amenable to be displaced and be relocated. They were given financial assistance to compensate for the affected structures and other investment made on the land and for their relocation.

## 6.3 Other Potential Social Impacts

#### 6.3.1 Noise and Air Pollution

The expected noise sources during the construction and installation of the project components are the construction equipment such as jackhammers, bulldozers, graders, pay loaders, generators, compressors and heavy trucks. Along access roads, noise levels ranging from 65 to 80 dB(A) may be experienced in residential houses near the roadsides due to passage of vehicles and heavy equipment used in the project development. The noise levels may be lower if speed limits are imposed and vehicles are kept in good condition. If hauling of materials pass through communities, these activities should be limited to daytime only

During the operation of the STP, no significant air quality hazard is foreseen since the equipment that will be used in the plants will work on electric power. However, the use of diesel power generators during power outage will emit various air pollutants such as suspended particulates, SO<sub>2</sub>, CO and Nox. Other possible source of air pollution is leakage from chlorine gas (a noxious gas) used for disinfection of treated water. Maynilad shall minimize the generation of smoke, dust, vapors and noxious fumes from the operation of power generator by only using equipment that is in good condition and well maintained at all times.



Noise generated in STP operation comes from operation of pumps and usually generate low frequency noise that is contained within the plant. Working Environment Measurement (WEM) that includes noise level monitoring within the facility will be conducted by MAYNILAD

#### 6.3.1 Odor Emission from the Sewage Treatment Plant

Odor emission from the STP will be managed through an odor control system that will be integrated in the design of the facility. Mitigation measures will also include the planting of green belt at the site boundary and the preservation of the existing large trees at the periphery, which can serve as protective buffer.



## 7 Bibliography

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## **8** ANNEXES

- A. Environmental Screening ChecklistB. Minutes of Public Consultation Meetings
- C. Phivolcs Certification
- D. ECC of FG Agro Industrial Development Corporation
   E. MAYNILAD Safety Code



Annex A

# **Environmental Screening Checklist**



# Initial Screening Form for Potential Environmental & Social Safeguards Issues

This form is to be used by the Sub-Borrowers for initial screening of potential environmental and social safeguards issues. It is meant to facilitate the determination of applicable World Bank safeguards policies, as well as those relevant to Philippines legislation. The completed form will be submitted to the Borrower and World Bank task team for confirmation.

Sub-project Name	MUNTINLUPA WATER QUALITY IMPROVEMENT PROJECT
Sub-project Location	Barangay Tunasan, Muntinlupa City, Metro Manila
Sub-project Proponent	Maynilad Water Services, Inc.
Sub-project Type/Sector	Wastewater management
Estimated Investment	₽ 12,918,180.00
Start/Completion Date	

#### **Screening for Philippines Environmental Regulations**

A full/detailed EIA is required:	Yes	√ No
Permit granted with conditions:	Yes	√ No
Rejected:	Yes	No

#### Screening Checklist for World Bank Environmental and Social Safeguards

Questions	Answer		If Yes	
	Yes	No	WB Policy triggered	
Are the sub-project impacts likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented? Please provide brief description:		V	OP 4.01 Category B	
The sub-project impacts are not considered sensitive, diverse or unprecedented. The environmental impacts during the construction phase which include generation of dust, noise, traffic, can be readily mitigated. Impacts to occur during the operational phase such as traffic on existing roads, discharge of wastewater into Laguna de Bay, odor pollution, changes in flow regime, disposal of sludge, among others, can be controlled by instituting appropriate mitigating measures in the design of the project.				
Is the proposed sub-project likely to have minimal or no adverse environmental impacts? Please provide brief justification: <i>The sub-project is projected to cause minimal</i> <i>adverse environmental impacts, which can be</i>		V	OP 4.01 Category B	
readily mitigated. Is the sub-project neither a Category A nor Category C as defined above? Please provide brief iustification:			OP 4.01 Category B	



The sub-project is considered as a Category B		
project because the impacts are less adverse as		
compared to Category A projects.		
Will the sub-project involve potential conversion or	N	OP 4.04
degradation of natural habitats? Please provide brief		
justification:		(Rejected in case of
		significant conversion or
The project site used to be occupied by a paint		degradation)
manufacturing plant and a vinyl manufacturing plant.		
Current industrial zoning is compatible with the		
	N	OP 4.12
		Resettlement Action Plan
Please provide brief justification:		
The STR site is a private property. Eifteen ISa		
0		
low price. There are no resettlement issues		
involved along the conveyance system. An		
Abbreviated Resettlement Plan (ARAP) has been		
prepared.		
	N	OP 4.01
unprecedented? Please provide brief description:		Social Assessment
There were no sensitive social impacts of the project		
affected families financial assistance for their		
affected structures and relocation. Furthermore a		
relative of the land seller offered her available lot, 40		
meters away from the PAPs present location, to be		
the relocation site of the PAPs and is willing to sell		
the lot to them at a low price.		
intended use of the project. There are a few trees within the site but tree cutting could be avoided by retaining these for landscaping purposes or through tree earth-balling and replanting of affected trees. Does the sub-project involve involuntary land acquisition, loss of assets or access to assets, or loss of income sources of means of livelihood? Please provide brief justification: The STP site is a private property. Fifteen ISs families were properly informed as to the plan of the land owner to sell the lot they are occupying. They are willing to vacate their present location of residence and be relocated. Each of the IS were given financial assistance for their affected structures and relocation. A relative of the land seller offered her available lot, 40 meters away from the PAPs present location, to be the relocation site of the PAPs and is willing to sell the lot to them at a low price. There are no resettlement issues involved along the conveyance system. An Abbreviated Resettlement Plan (ARAP) has been prepared. Are the sub-project impacts likely to have adverse social impacts that are sensitive, diverse, or unprecedented? Please provide brief description: There were no sensitive social impacts of the project since ISs were willing to be relocated There were 15 ISs that were properly informed as to the plan of the landowner to sell the land that they were occupying. ISs were amenable to vacate and be relocated The land owner as per seller of the property will give affected families financial assistance for their affected structures and relocation. Furthermore a relative of the land seller offered her available lot, 40 meters away from the PAPs present location, to be the relocation site of the PAPs and is willing to sell		Resettlement Action Plan

#### Safeguards Instruments Required:

1. Initial Environmental Examination (IEE) report and EMP



#### 2. Deed of Sale of property

Initial Screening Completed by (Sub-Borrower)	(Date)
FRANCISCO ARELLANO Senior Vice President Maynilad Water Services, Inc.	



Annex B

# **Minutes of Public Consultation Meeting**



#### Minutes of Public Consultation, Muntinlupa South Catchment

Venue: Barangay Hall Lobby, Tunasan, Muntinlupa City Date: August 31, 2012

Attendees of the Public Consultation:

Agency	Attendance
Barangay Council of Tunasan, Muntinlupa City	7
Local Residents	15
Home Owners Association Representatives	3
Maynilad Water Representatives	5
TOTAL	30

Maynilad's Wastewater Management Division presented the proposed wastewater treatment project in the community. Business Area representatives were also present during the Public Consultation. Business Area representatives will be the ones to work closely with the community and ensure good reception of the project in the area. After the presentation, the public/community and leaders were encouraged to raise questions and issues concerning the project.

The issues and concerns raised:

- a. Conveyance route
- b. Project schedule
- c. Sewer network
- d. Effluent water to be used for water distribution
- e. Residual chlorine
- f. Water quality
- g. Solid waste management
- h. Role of LGU in the project
- i. Tariff implications

Proceedings of the Public Consultation Meeting

Engr. Reynaldo C. Angeles, Head of Maynilad's Wastewater Catchment Management, presented the proposed Muntinlupa-Tunasan STP project. He opened his presentation by showing the present condition of the Manila Bay. He further emphasized the benefits of the project to the community as well as to the major receiving bodies of water; the Manila Bay and Laguna Lake. He discussed the components of the plant, treatment processes and the catchment design.

One of the relevant questions raised during the public consultation was regarding the locations of pipelaying for the conveyance system of the proposed STP. Mr. Franklin Tating, President of Park Homes Village HOA, asked if the conveyance will be laid in the different HOA subdivisions in Tunasan and will the project timeline consist of ROW acquisition in those areas. Michael Jay Fajardo, a Maynilad-WMD Officer, answered the question by presenting the scheme to be used in Muntinlupa South Catchment. Maynilad will be implementing a creek



interception (as discussed by Engr. Angeles in his presentation) and pipelaying will be implemented along Buendia S.t in Tunasan. Engr. Angeles added that the said scheme was chosen in accordance to the Feasibility Study (FS) conducted. Pipelaying will consume more time especially in acquiring Right of Way. The scheme will eliminate pipelaying in subdivisions and villages therefore avoiding inconvenience for both Maynilad and the HOA.

Another question asked was about the roles and responsibilities of the LGU in the project. Mr. Pablo Aman, United Homeowners Association of Tunasan, asked the LGU role in this project. Engr. Angeles explained that the LGU will play a vital role especially in Solid Waste Management. Dumping of solid wastes are the main factor causing clogs in the drainages and rivers, he added. Maynilad's mandate is to treat the wastewater but we cannot take out the fact that solid waste will still flow to the conveyance line. Maynilad will provide screens in the conveyance manholes and interceptor box. But once these screens will be obstructed with solid waste, wastewater flow to the STP will be lesser. The obstructed wastewater might be diverted to the nearest manhole and will cause flooding on the streets. For this reason, the proper management of solid waste is very important to the success of the project, Engr. Angeles emphasized.

The meeting was adjourned at 11:30 AM.





## Photographs of the Public Consultation

Photo 1. Presentation of the proposed project by MAYNILAD representative



Photo 2. Question and answer portion on issues regarding the proposed project



Annex C

# **Phivolcs Certification**





REPUBLIC OF THE PHILIPPINES DEPARTMENT OF SCIENCE AND TECHNOLOGY PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY PHIVOLCS Bldg., C.P. Garcia Ave., University of the Philippines Campus, Diliman, Quezon City Tels. (+632) 426-1468 to 79 loc 112, 129; (+632) 926-2611, (+632) 920-7058 Fax: (+632) 929-8366 Website: www.phivolcs.dost.gov.ph



PHIVOLCS

FC-Apr-13-166

03 April 2013

#### CERTIFICATION

#### TO WHOM IT MAY CONCERN:

This is to certify that the proposed Tunasan Sewage Treatment Plant located along Buendia St., Brgy. Tunasan, Muntinlupa City, as indicated in the vicinity map provided, is approximately 256 meters northeast of the nearest mapped segment of the West Valley Fault (WVF). The WVF is the nearest known active fault in the area, based on the maps available in PHIVOLCS. The buffer zone against ground rupture hazard recommended by this office is at least 5 meters on both sides of the mapped fault trace or from the edge of the deformation zone.

This certification is being issued upon the request of **MAYNILAD WATER SERVICES**, **INC.** for whatever purpose it may serve and supersedes any previous certification issued by this office regarding the area. Furthermore, this assessment and certification is applicable only for ground rupture hazard and not to other hazards related to earthquake occurrences.

RENATO U. SOLIDUM, JR. Director

rbi\rjg\\TUFF\Volume\_1\SERVICES\_DATABASE\CERTIFICATIONS\FAULT\_Certifications\FC\_2013\Abril 2013\FC-Apr-13-165\_Maynilad\_Water\_Services\_Inc.



Annex D

# ECC of F.G. Agro Industrial Development Corporation





Republic of the Philippines DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES ENVIRONMENTAL MANAGEMENT BUREAU Regional Office No. III, 4/F Mel-Vi Bidg., Olosgapo-Gapan Road Dolores, City of San Fernando, Pampanga Telefax (045) 861-2361 \* 961-5208 \* 961-5206

#### ENVIRONMENTAL COMPLIANCE CERTIFICATE (Issued Under Presidential Decree 1586) R03-1003-0129

THIS IS TO CERTIFY THAT F.G. AGRO INDUSTRIAL DEVELOPMENT CORPORATION is granted this Environmental Compliance Certificate (ECC) for the proposed F.G. Agro Drying and Composting Facilities to be located at Brgy. Telabanca, Concepcion, Tarlac, by the Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau, Region III.

SUBJECT ONLY to the conditions and restrictions set-out in this ECC and in the attached document labeled as Annex A. Recommendations have been provided in Annex B as guidance to concerned government agencies and local government units for consideration in their decision making.

It shall cover the operation of a drying and composting facility (Group II-R.1) with capacity of eleven thousand (11,000) cubic meters per year in an area of twenty five thousand four hundred thirty seven (25,437) square meters the boundary of which is defined under TCT No. 11461.

Project Geographical Coordinates/Location: North Latitude - 15<sup>0</sup>17'10.7" East Longitude - 120<sup>0</sup>37'35.2"

This certification is issued in compliance to the requirements of Presidential Decree No. 1586, in accordance to Department Administrative Order No.30-2003. The Bureau, however, is not precluded from reevaluating, adding, removing, and correcting any deficiencies or errors that may be found after issuance of this certificate.

Issued at City of San Fernando, Pampanga, this

8 4 MAY 2018

Recommending Approval:

DENNIS O. CELESTIAL Chief, Environmental Impact Assessment & Management Division Approved by:

LORMELYN E. CLAUDIO Regional Director



1.9	
- I.	CONDITIONS Annex A
	A. ENVIRONMENTAL MANAGEMENT and MONITORING PLAN (EMMoP)
	<ol> <li>All mitigating measures in the submitted Initial Environmental Examination (IEE) Checklist shall be implemented;</li> </ol>
	<ol><li>Planting of trees shall be undertaken either within the project site and/or in other areas as part of the proponent's social and environmental program;</li></ol>
	B. GENERAL CONDITIONS
	<ol> <li>The proponent shall comply with the requirements of other environmental laws, i.e. Republic Act (RA) 8749 or "The Clean Air Act of 1999", RA 6969 or "Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990", RA 9003 or "Ecological Solid Waste Management Act of 2000" and RA 9275 or "Clean Water Act of 2004", among which are:</li> </ol>
	<ul> <li>Secure Permit to Operate Air Pollution Source Control Installations (APSCI) and Discharge Permit Water Pollution Source Control Facilities (WPSCF)</li> <li>Designate Pollution Control Officer (PCO)</li> <li>Submit quarterly Self Monitoring Report</li> <li>Submit semi-annual Compliance Monitoring Report</li> </ul>
	4. An Abandonment Plan shall be submitted to this Office ninety (90) days prior to the project's abandonment. The plan shall include remediation, clean-up and rehabilitation measures of contaminated areas and proposed alternative project of activity suitable in the area.
	<ol> <li>Copy of Environmental Compliance Certificate (ECC) shall be posted in a conspicuous area in the administrative building;</li> </ol>
	<ol> <li>The proponent shall formulate and implement information Education Campaign (IEC) programs incorporating recommended environmental management practices through but shall not be limited to various advertising media (i.e., posters, billboards, etc).</li> </ol>
/	<ol> <li>Adequate measures shall be instituted to prevent spillage/leakage and possible generation of obnoxious odor during transport of dried sludge/sewage;</li> </ol>
a	<ol> <li>That should there be any complaint from the community related to environmental sanitation problem brought about by the facility's operation, the proponent shall be held responsible to address such problem;</li> </ol>
	<ol> <li>The proponent shall allow inspection or monitoring that will be conducted by this Office anytime in coordination with concerned groups;</li> </ol>
П.	RESTRICTIONS
	<ol> <li>Any expansion or modification of the approved project shall be subject to new EIA. requirement; and</li> </ol>
	11. In case of transfer of ownership of this project, these same conditions and restrictions shall apply and the transferee shall be required to notify this Office within fifteen (15) days as regards to the transfer of ownership.
	Non-compliance with any of the provisions of this certificate shall be a sufficient cause for the cancellation or suspension of this certificate and/or imposition of a fine in an amount not to exceed Fifty Thousand Pesos (50,000.00) for every violation thereof.
	OR No. : 1493090 C

Annex B

## PROJECT ASSESSMENT PLANNING TOOL

For the assistance of the Proponent and government agencies concerned in the management of the project and for better coordination in mitigation on the impact of the project on its surrounding areas and to the environment.

By way of recommendation, the following have been taken notice by the undersigned and are forwarding these recommendations to the parties and authorities concerned for proper appreciation and action.

RECOMMENDATIONS TO CONCERNED GOVERNMENT AGENCY/LGUs	CONCERNED GOVERNMENT
<ol> <li>That proper storm drainage canal, concrete culverts, and other flood control measures needs to be provided to adequately receive and channel the run-off of silt- laden rain water to the nearby receiving body of water.</li> </ol>	AGENCIES/ENTITIES City/Municipalities Engineers Office
<ol> <li>Need for the provision of a segregation, collection, recycling, and disposal mechanism for solid waste.</li> </ol>	LGU
<ol> <li>Comply with the Sanitation Code of the Philippines, Labor Code of the Philippines including Occupational Health and Safety Standards and Building Code of the Philippines</li> </ol>	DOH, DOLE- Bureau of Working Condition, Municipal Planning & Dev't, Office/LGU
ENVIRONMENTAL PLANNING RECOMMENDATIONS FOR The following are recommendations for the Proponent for the area and the affected environment. It is strongly recomme strictly complied by the Proponents.	THE PROPONENT protection of the project ended that the same be
<ol> <li>Close monitoring of the project should be undertaken by the high level of safety and efficiently and immediately add hazard that may take place</li> </ol>	proponent to maintain a tress any environmental
<ol><li>Donate collectible recyclables to the LGU concerned.</li></ol>	
<ol> <li>Ensure efficient use of energy, water and other resources or dissemination and proper action of the action</li> </ol>	

For dissemination and proper action of the parties concerned.

Olin m DENNIS O. CELESTIAL Chief, EIAMD

LORMELYN E. CLAUDIO Regional Director



Annex E

# **MAYNILAD Safety Code**





# EMS Environment Management and Safety







# **MAYNILAD WATER SERVICES, INC.** Quezon City, Philippines



# EMS Environment Management and Safety







# **MAYNILAD WATER SERVICES, INC. Quezon City, Philippines**



#### **MEMORANDUM:**

FOR	:	MWSI	PRESIDENT

**MWSI SAFETY CODE Series 2005** SUBJECT:

DATE 1 July 21, 2005

Submitted herewith is the MWSI SAFETY CODE Series 2005. This is in compliance with the requirements of Occupational Safety and Health Standard (OSHS), Bureau of Working Conditions (BWC), Department of Labor and Employment (DOLE). The established safety and health standards will guide our employees, contractors and suppliers in attaining and maintaining safe and conducive working environment in all MWSI areas.

This document is a compendium of materials from the water industry and related utility sector. Members of MWSI Central Safety Committee (CSC) have discussed/ approved the contents of these code after series of meetings.

For your approval.

Submitted by CONRADO P SORIANO Chief Safety, MWSI

SAVP. EMD

LUCÍA & MAGNO President, MWSU-PTGWO

President, MV

FRANCISCO A ARELLANO CARI

Recommended by:

FO'R RAMIREZ VP. CCPRM

GA VP. Administration

Approved: FIOREILO R ES President

i

#### FOREWORD

Maynilad Water is committed to excellence and leadership in the protection of the environment and in the promotion of health and safety in all its workplaces. Consistent with this environment, safety and health policy, Maynilad Water has formulated this Safety Code (2005). This Safety Code is anchored on the following:

- Recognition of safety as one of the highest corporate priorities
- Adoption of safety performance as an integral part of business management
- Incorporation of all safety considerations at the earliest stages of any project development
- Demonstration of responsible corporate citizenship by adhering to all safety regulations and laws and anticipation of charges thereof
- Assurance that all its operations comply with established international guidelines and requirements on safety

This Code will also apply to all accredited contractors/ service providers and their workers who perform their activities within all MWSI premises and designated work areas.

I encourage everyone to participate in all programs to be adopted in pursuit of this Code. We will religiously monitor our safety performance and continuously review this Code to institute changes in response to emerging concerns and other requirements of the company.

I enjoin all officers and employees of MWSI to adhere to the provisions of this Code.

Let us strive to make Maynilad Water as one of the best water utility firms in the world.

FIOREL/L **ORESTUAR** President

## ACKNOWLEDGEMENT

This code was developed through the joint effort of the following Central Safety Committee members:

Ruben L. Carandang Conrado P Soriano Rogelio D. Del Rosario Jr. Orlando T. Tabula Carlos Angeles Gil O. Matias Rolando Maileg Myrna Padron Leandro Dela Rosa Noel D. Villanueva Teresita S.A. Lim Benjamin C. Reyes Normen P. Kahulugan Dominador A. Roxas Jr Amante C. Peralta Jose P. Gahol Gilbert R. Reyes Dexter Alister V. Bacani Emerson B Mendoza Roberta F. Estimo Ruben Diaz Bonifacio De Guzman	SOBA Corp. Com. Legal Department PMG PMG Corp. Logistics RED HR/ Administration CEBA NEBA NWBA Corp. Logistics Corp. Logistics Corp. Logistics Safety Dept. Safety Dept. Safety Dept. Safety Dept. MWSA KKMK
	-

This is also to acknowledge the comments and inputs from SAVP Francisco A. Arellano of Environment Management Department, AVP Eric O. Montilla of Administration and to Col. Arnulfo R. Ramirez, VP- Customer Care and Public Relations Management for his untiring support.

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## **CHAPTER I**

#### **GENERAL RULES**

#### SECTION 1 STATEMENTOF POLICY

#### 1.01 COMPANY MISSION/ VISION

We are a water utility firm committed to service excellence, improving quality of life of the Filipino and becoming one of the world's best.

#### **1.02 MISSION STATEMENT**

We will provide reliable and high quality water and wastewater services at a fair price to meet the needs and expectations of our customers.

We will protect the environment to conserve our natural resources for future operations.

We will promote efficiency and productivity to enhance shareholder value.

We will enhance the personal and professional well being of our employer.

We will treat our service providers as valued partners to achieve our business objectives.

We will conduct ourselves in accordance with the highest ethical standards because our reason for being is to serve the public.

#### 1.03 ENVIRONMENT, SAFETY AND HEALTH POLICY

**MAYNILAD WATER SERVICES, INC.** is committed to excellence and leadership in the protection of the environment and in the promotion of health and safety in the workplace.

We will create a work culture that will encourage all our employees, contractors, suppliers and shareholders to support this commitment.

We will protect the environment by minimizing and managing the impact of our operations on the environment, optimizing the use of our resources and increasing operating efficiencies.

We will establish an environmental management system to ensure that protection and sustainability is an integral part of our business management.

We will design and execute systematic programs that eliminate all hazardous acts and conditions to prevent work related injuries, illnesses and accidents at the workplace. We will pursue the establishment of high standards on safety and occupational health awareness, practice and discipline.

In keeping with this policy we will comply with all the regulatory requirements and international standards on environment, health and safety. We will achieve this through the use of appropriate technology and best practice in the pursuit of growth and viability.

We call on all employees to ensure that there is consistency in the implementation of this policy.

#### SAFETY POLICY

**MAYNILAD WATER SERVICES, INC**., a private utility in the service of the public, is committed to protect the life and well being of its people by providing a safe working environment.

The company recognizes people as its most valuable asset. To enable the company to attain its goals, it will rely on every individual's positive contribution. These goals are best achieved when each individual is healthy in body and mind.

In fulfilling this commitment, the Company will guarantee a safe and healthy work environment in accordance with industrial standards and practices. It will also initiate proactive efforts to eliminate potential causes of accidents in the work place that may result in fire, property damage, injury or illness. Part of the effort is to educate and involve all employees on safety.

The Group Head or Area Manager will guarantee a safe working environment and will be responsible for implementing an effective program on safety.

Each manager/ supervisor will be directly responsible for ensuring safety. It is his duty to inspect the workplace, investigate all accidents, correct unsafe conditions and practices, and promote consciousness on the importance of safety in the workplace.

The Central Safety Committee, with the support of management, will provide guidance and logistical support to all operating units for functions and activities related to safety, health and protection of the environment.

It will be the responsibility of each individual to look after his safety and that of his co-workers and general public and to report situations that compromise safety conditions in the workplace.

#### 1.04

#### 1.05 POLICY ON THE CREATION OF CENTRAL SAFETY COMMITTEE

#### 1.5.1 POLICY

It is the policy of Maynilad Water to ensure the health, safety and welfare of its employees at work and the communities it serves either directly or indirectly. The discharge of this responsibility shall be accorded equal priority with those of its statutory duties and commercial objectives.

#### 1.5.2 OBJECTIVES

It is the objective of this policy to organize a Safety Committee to establish and adopt in writing the MWSI Safety Code and other administrative policies on Safety to guide its employees and contractors on how to maintain a safe, accident free and healthy working environment and system of work.

#### 1.05.03 MEMBERSHIP

A representative from the hereunder operating units will be members of the committee:

- 1. Customer Care and Public Relations Management
- 2. Customer Services
- 3. Operations Division
- 4. Project Management Group
- 5. Business Areas (CEBA, SOBA, NEBA and NWBA)
- 6. Administration
- 7. Customer Management Services
- 8. Revenue Enhancement Directorate
- 9. Corporate Logistics
- 10. Corporate Financial Services
- 11.MWSA
- 12.MWSU-PTGWO

#### 1.05.04 DUTIES AND RESPONSIBILITIES OF THE COMMITTEE

- 1. Assist in developing effective organization responsible for the employees' safety, health and protection of our company's assets and properties.
- 2. Assist in conducting monthly scheduled meetings to assist and review company's Safety Program and its implementations.

- 3. Notify the Safety Department of any accidents and incidents in the area of concern immediately. Coordinate with the supervisor concerned and gather all vehicular, personal accidents reports and other data, for submission to the Safety Department.
- 4. Assist in investigating major accidents and causes and recommends measures to prevent their recurrence.
- 5. Assist in supervising Safety awards and contest.
- 6. Assist in establishing safety standards and operating methods for the company.
- 7. Assist in instituting internal programs to disseminate safety policies and regulations in your workplace.
- 8. Assist in spearheading mobilization works in case of emergency in their respective area and coordinate said works with Safety Department.
- 9. Perform other functions assigned or in accordance with the safety policy.

#### 1.06 POLICY ON THE CREATION OF SAFETY SUB-COMMITTEE

#### 1.06.01 OBJECTIVE

The objective of this policy is to strengthen and support the execution of all safety programs, objectives and functions conferred to the CSC.

#### 1.06.02 RULES & REGULATIONS TITLE

This policy shall be known as the policy on the creation of MWSI Safety Sub-Committees.

#### 1.6.3 DEFINITION OF TERM

Safety Sub-Committee Member – refers to an MWSI employee who is duly selected or appointed by the CSC as Sub-Committee Member, representing his/her Business Area, Division or Department, where he/she is currently assigned.

#### 1.06.04 FUNCTIONS OF A SAFETY SUB-COMMITTEE MEMBER

- 1. Coordinate with the supervisor concerned to gather all vehicular, personal accidents reports and other needed data and be submitted to CSC member/s in the area.
- 2. Provide assistance and render support in pursuit to the objectives of CSC on the following:
  - a) Planning what has to be done
  - b) Organizing the resources
  - c) Leading employees towards the set goals
  - d) Controlling process efficiency
- 3. Support CSC directives in the area on all safety related activities and programs.
- 4. Shall be an advocator in coordination with CSC, in the regulations and enforcement of safety policies in all workplaces.
- 5. Readily available for mobilization in cases of emergency in coordination with the CSC member in his respective area.
- 6. Perform other functions assigned or in accordance with the safety policy.

#### 1.06.05 REPRESENTATION

All Divisions or Departments shall be represented by at least two (2) Sub-Committee Members. However, it shall be increased depending on the magnitude of the activities prone to accidents and the number of personnel in the area or department represented.

Medical personnel shall automatically be either CSC members or Sub-Committee members.

#### 1.06.06 SELECTION PROCESS

The incumbent CSC member in the Area, Department or Division in coordination with Area Business Manager/ Department Manager shall be responsible in the submission of at least five (5) candidates from their respective offices, from which CSC members may choose qualified Sub-Committee Members.

#### 1.06.07 OATHTAKING AND EFFECTIVITY OF TASK AS A SUB-COMMITTEE MEMBER

- a.) The selected Sub-Committee member shall be inducted by the chairman of CSC, preferably on the occasion of monthly CSC meeting.
- b.) Effectivity of membership shall be effective upon receipt of notice duly signed by the CSC chairman, even without oath-taking yet.

#### 1.06.08 DISQUALIFICATON

- a.) Disqualification of a Sub-Committee member shall be in coordination with his immediate CSC member with the latter's verbal or written recommendation/s based on legal grounds. Disqualification or expulsion of a sub-committee member shall by a vote of the majority of all the members who are present during the meeting. Fifty (50) percent of the total CSC members present shall constitute a quorum to validate a vote of disqualification. In case of tie, the CSC chairman shall render a vote in order to break the deadlock. In case the latter is absent or unavailable, the vice-chairman shall take his post.
- b.) Any written recommendation/s by CSC member or manager for disqualification or replacement of Sub-Committee member shall be taken by CSC in a meeting called for the purpose.

#### 1.06.09 RESIGNATIONS AND REPLACEMENT

Any voluntary written resignation by a Sub-Committee member shall be resolved immediately. Replacement shall be in accordance with Rule 1.06.06.

#### 1.6.10 SAFETY POLICY VIOLATIONS & PERFORMANCE INEFFICIENCY

#### a) SAFETY POLICY VIOLATION:

Safety violations committed by a Sub-Committee member shall be taken during the meeting. If found guilty, a disqualification letter shall immediately be executed.

#### b) NEGLECT OR NON-PERFORMANCE

Negligence of duty or non-performance by a Sub-Committee member is a ground for disqualification but it shall be confirmed or tried by CSC members.

For inefficiency, CSC members by a majority vote shall determine causes and grounds and render appropriate measures.

#### SECTION 2 APPLICATION AND RESPONSIBILITY

- 2.01 These rules and regulations shall be known as the MWSI Safety Code.
- 2.2 Every section/ unit shall be given a copy of this Code by Safety Department.
- 2.3 Each employee shall carefully study and observe the rules embodied in this Code, more particularly those performing safety duties. Safety rules shall be strictly observed and ignorance will not be accepted as an excuse for their infractions.
- 2.4 All employees are encouraged to make suggestions for changes in the rules or working conditions to promote safety in the company. Suggestions should be submitted to Safety or through the Central Safety Committee and Sub-Committee member in your area/ division.

#### SECTION 3 MANAGER'S/ SUPERVISOR'S RESPONSIBILITY

- 3.1 Managers/ supervisors are responsible in enforcing and implementing this Code. Each manager/ supervisor shall see to it that employees under his direct supervision are aware of the safety rules and its proper observance. (Penalty of managers/ supervisors equivalent to the penalty of the rule violated by subordinate)
- 3.2 The supervisor or the employee acting as such shall undertake other safety precautions as necessary in the performance of a job. He shall ensure safe work operations. Qualifications and competence shall always be observed in assigning workers to a delicate work operation.
- 3.3 The manager/ supervisor, in case of doubt of any employee as the meaning and intent of any part of this Code, shall explain the same to the latter. In case of further doubt, the case maybe referred to the Group Head/ Area Manager who may resolve the question or refer same to Safety Department.

#### SECTION 4 REPORTING PERSONAL ACCIDENTS AND INJURIES

#### 4.1 ON-DUTY ACCIDENTS

- a. Any injury sustained by an employee, regardless of gravity, must be reported at once to the employee's immediate supervisor. In case of major or serious injuries, the manager/ supervisor shall promptly report the same to MWSI Call Center (MCC)/ Administration-HR which in turn shall notify the following:
  - 1. During Regular Office Hours: Administration-HR, Safety Department, Legal Department.
  - 2. During Off Office Hour, Saturdays, Sundays and Holidays: Safety Engineer on call, personnel on call of Legal Department.

b. The employee, or his immediate superior in case of the former incapacity, should then formally report the accident or injury by accomplishing and submitting to Section Head the Personnel Accident Report Form (Exh. I) within twenty four (24) hours from the time the accident occurred. However when the event occurs on a weekend or holiday, such report should be submitted on the next working day. (A)

#### 4.2 OFF-DUTY ACCIDENTS

- a. In case of major or serious injury, the employee shall promptly advice or cause to be advised his immediate superior or Administration-HR.
- b. For both serious and minor injuries, the employee or his immediate supervisor/ manager, should then formally report the accident or injury by accomplishing and submitting to the Section Head the Personnel Accident Report Form (Exh. I) within twenty four (24) hours from the time of the accident. (However if in the event occurred on weekend or holidays, such report maybe submitted on the next working day.) (A)

#### 4.3 PUBLIC ACCIDENTS

- a. In case of injuries sustained by the public occasioned by the employee's performance of his assigned work, the latter or his immediate supervisor shall immediately notify about the accident to the MCC which shall in turn, informed the following (A)
  - 1. During regular Office Hours:
    - Safety Department, Legal Dept., Administration-HR
  - 2. During Off-Office Hours; Saturdays, Sundays, Holidays Safety Engineer on Call, Legal investigation Staff on Call
- b. The employee and his immediate supervisor shall jointly prepare a report of the accident through Personnel Accident Report Form (Exh. I) within twenty four (24) hours from the time of the incident. (A)

#### SECTION 5 PENALTIES

5.01 For purposes of this Code, any employee of the MAYNILAD WATER found to have violated any of the provisions of this Code shall be administratively dealt with and shall be punished in accordance with the schedule of penalties.

The code letter "A", "B", "C", "D" is affixed to each rule to indicate the category of the offense for purposes of applying the appropriate penalty. The penalty or penalties for safety rule violations are as follows:

#### 5.2.1 SCHEDULE OF PENALTIES FOR MWSI EMPLOYEES (See table # 1)

Gravity of Offense	First Offense	Second Offense	Third Offense	Fourth Offense
Offense "A"	Written reprimand	1 – Working Day Suspension	2 – Working Days Suspension	3 – Working Days Suspension
Offense "B"	1- Working Day Suspension	2 – Working Days Suspension	4 – Working Days Suspension	8 – Working Days Suspension
Offense "C"	10 - Working Days Suspension	15 – Working Days Suspension	30 – Working Days Suspension	Dismissal
Offense "D"	30 - Working Days Suspension	Dismissal		

#### SCHEDULE OF PENALTIES FOR MWSI EMPLOYEES (Table # 1)

#### 5.02.02 IMPOSITION OF PENALTIES MWSI EMPLOYEES

- I. The penalties for succeeding violation are progressively more severe than the penalty for a first violation. However, this "cumulative" rule applies only when the violations occur within a single 12-month period counted from date of first offense. Any other or further violation occurring after this period shall be considered as first offense.
- II. If at the time of the commission of the last offense, the employee shall also have previously committed at least two other violations of a safety rule or rules other than the rule involved in this last offense, all committed within a 12 month period, such last offense shall be punishable by the next higher step of the penalty prescribed thereof.
- Where the fourth violation of the same rule is punishable by a penalty less than dismissal the fifth and subsequent violations, if committed within a 12
   month period, shall be meted out the same penalty as that provided for the fourth violation.

- IV. When a single act constitutes two or more offenses under this policy, or when an offense is a necessary means for committing the other, the penalty for the most serious offense shall be imposed.
- V. All penalties to be imposed, including reprimand, shall be in writing, and shall include a warning (except in case of dismissal) that subsequent violations will be dealt with more severely. Copies thereof shall be furnished.
  - a. Safety Department
  - b. Administration-HR
  - c. Respective Manager
  - d. Legal Department
- VI. Department Managers shall impose the penalties provided for in this policy after conducting the required investigation. However, where the offense is punishable by dismissal, the Department Manager shall elevate the case to the Legal Department for proper disposition.
- VII. Management may impose a penalty graver in degree than what is provided in this code, particularly when the violation resulted to injury upon persons or damage to property, or both, and when the violator/s is habitually delinquent, in which case, it shall be adjudged in accordance with applicable provisions of Maynilad Water Services, Inc. (MWSI) Safety Code and Human Resources and Organization Development (Administration-HR) Policies on Disciplinary Action, and Criminal and Civil Law, if necessary.
- VIII. This Code supercedes the **Table of Penalties** for Safety Violation stated under the **MWSI Code of Conduct**.

#### 5.02.03 IMPOSITION OF PENALTIES MWSI CONTRACTORS

#### **5.02.03.01 DEFINITION OF TERMS:**

- a. Written Reprimand a first notice for immediate compliance issued to contractor for violation of Safety requirements of a particular project, stating therein all the circumstances or jurisdictional facts of every violations. Contractor, upon receipt, must comply immediately with the Safety requirement deficiencies without need of further notice. This is a strong categorical reprimand that confirmation of further violation of any Safety requirements for second time, or oftener, on the same or different project would results to Monetary Penalty.
- b. Monetary Penalty a penalty in the amount of Six Thousand Pesos (P 6,000.00) for every confirmed Minor Safety Violation per day and Twenty Thousand Pesos (P 20,000.00) for every confirmed Major Safety Violation per day for contracts. These

penalties shall be deducted from their project billings. Certified violation refers to the second discovery of Safety Violation of the same project.

c. Severance Of Contract – this is a hostile act by MWSI against violating contractor/s that the latter's ties being a contractor of the former is terminated by reason of complete disregard or noncompliance to MWSI Safety provisions and directives.

#### 5.2.3.2 SCHEDULE OF PENALTIES (MWSI CONTRACTORS) (See table # 2)

Item	Description of Violations	First Offense	Second Offense	Third Offense	Classification of Violation
1.0	[EARLY WARNING DEVICE SIGNAGES]				
	<ul> <li>Failure to install at strategic locations of the construction site/s warning sign/s or Early Warning Device (EWD) which state that the "Work Is Going On" or "Excavation Ahead" or any informative danger signs. (Rule-21.01.a)</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	b. Failure to install sufficient (with, but insufficient) wooden/ steel/ concrete barricades at strategic locations visible or around the construction site/s, with the prescribed distance between each other. (Rule 21.01.b)	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
2.0	Failure to install any single barricade or E.W.D. (completely zero) within the construction area. (Rule 21.01.e)	Monetary Penalty	Severance of contract		Major Violation
3.0	a. If reduction of passable road lane is involved rubber/concrete cones/blocks, painted with black and yellow, shall be used along major thoroughfares and national roads, so as to guide motorists of lane changes and the excavation work being undertaken. (Rule 21.01.e)	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation

#### SCHEDULE OF PENALTIES (MWSI CONTRACTORS) (Table # 2)

Item	Description of Violations	First Offense	Second Offense	Third Offense	Classification of Violation
	<ul> <li>b. If reduction of passable road line is involved boards-ups painted black and yellow strips, 2.4</li> <li>m. in length and 1.5 meter in total height shall be placed to enclosed excavation area along major thoroughfares and national road. (Rule 21.01d.)</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	c. Failure to install amber (Red) flashing lights, or in case of breakdown of flashing lights, E.W.D. with reflectorized surface, at equipment parking sites within the motorist passable way.(Rule 21.01.e)	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	d. If reduction of passable lane is involved, flagman/ traffic man equipped with reflectorized vest and other appropriate safety gadgets must be provided along major thoroughfares and national roads/ busy streets, so as to guide motorists of lane changes and the excavation work being undertaken. *	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
	e. Failure to install ample (with, but insufficient) working lights within the construction area during night works. *	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
4.0	[EXCAVATION]				
	a. Road right- of – way to vehicle use, failure to excavate at a time portion by portion of not more than 50% of the road width leaving the remaining 50% satisfactorily passable, except for compelling reason.( Rule 21.02.b )	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	<ul> <li>b. Non- observance to excavation by sections of not more than 150 meters at a time measured longitudinally, except for compelling reason. (Rule 21.02.a)</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	<ul> <li>c. Unfinished excavation crossing road shall be provided with temporary steel plates with sufficient thickness to allow safe passage of vehicles and pedestrians. (Rule 21.03.b)</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
5.0	[CONSTRUCTION EQUIPMENT AND VEHICLES] Failure to provide central storage site for all construction equipment and vehicles. (Rule 4.a) Contractors shall ensure that temporary storage and parking sites, if there were any, would not affect traffic flows. (Rule 21.04.b)	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation

Item	Description of Violations	First Offense	Second Offense	Third Offense	Classification of Violation
6.0	[MATERIAL STORAGE]				
	a. Failure to provide construction material storage site (if necessary) which pose problems on traffic and pedestrian in the construction area. (Rule 21.05.a)	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
	b. Violation of Guidelines on Dumping of waste and excess materials, posing danger to public safety. (Rule 21.05.b)	Severance of contract	Monetary Penalty	Severance of contract	Major Violation
7.0	[MAINTENANCE AND CLEANLINESS IN WORK AREAS]	Written Reprimand	Monetary Penalty	Severance of contract	
	Failure to maintain housekeeping along roadway or passageway (Construction Area), which may pose hazards to the riding public and pedestrians. (Rule 21.06.a)				Major Violation
8.0	[DAMAGE TO ADJOINING UTILITY LINES]				
	Failure of Contractor to make written report to company concerned of accidental damages to water main lines. (Rule 21.07.a)	Severance of contract.			Major Violation
9.0	[GAS LEAK]				
	Detection by Contractor of Gas leakages on occasion or by reason of the construction shall be immediately reported to the Gas Company while the same (Contractor) is undertaking measures, if appropriate, to prevent ignition of any kind. (Rule 21.08.a)	Written notice for compliance (2 <sup>nd</sup> Notice)	Monetary Penalty	Severance of contract	Major Violation
10.0	{DAYTIME WORK STOPPAGE]				
	a. Failure of contractors to place sufficient steel plates of sufficient thickness for cover of open trenches, when traffic conditions call for a Mgmt. Work schedule. (Rule 21.09.a)	Severance of contract	Monetary Penalty	Severance of contract	Major Violation
	b. During non-working time, contractor/s must ensure that no materials, equipment and tools shall be parked along roadway that poses problems or danger to the public. (Rule 9-d)	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation

Item	Description of Violations	First Offense	Second Offense	Third Offense	Classification of Violation
11.0	[EXCAVATION & SHORING]				
	a. To prevent possibility of excavation cave-in, sheet piling, cribbing, shoring and other support systems, if necessary, shall be built- in in accordance with Engineering Standards. (Rule 21.10)	Monetary Penalty	Severance of contract		Major Violation
	b. Failure of Contractor to frequently inspect installed bracing or shoring after heavy rain or typhoon and failure to do necessary repair or adjustment if necessary. (Rule 21.13)	Written notice for immediate Compliance	Monetary Penalty	Severance of contract	Major Violation
	c. Failure of Contractors to sufficiently install barricades and Early Warning Devices on open excavations. (Rule 21.18)	Severance of contract			Major Violation
12.0	[MACHINE EXCAVATION]				
	a. No digging, using heavy equipment machines, shall be allowed close to underground water facilities. Proximity of limits for machine operation must be established then completes the excavation by labour digging. (Rule 21. 20a)	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	<ul> <li>Failure of contractors to warn workmen about existence of underground water line facilities such that excavation-using driving picks or any other powered tools is done carefully. (Rule 21.20.b)</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
13.0	(TEMPORARY WALKWAYS)				
	Failure of Contractors to provide temporary walkways to construction area needing the same to prevent accident of any kind on occasion or by reason of the on-going project. (Rule 21.22.a)	Severance of contract			Major Violation
14.0	[GOOD HOUSEKEEPING]				
	Non-observance by contractors of the operating standard procedures in Good Housekeeping in construction sites which greatly affects the image of the company resulting from poor housekeeping. (Rule 21.23.a)	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation

Item	Description of Violations	First Offense	Second Offense	Third Offense	Classification of Violation
15.0	(PERSONAL PROTECTIVE EQUIPMENT AND DEVICES) Non-wearing of personal protective equipment (PPE) appropriate for the exposure and the work to be performed.	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
16.0	(SAFETY PERSONNEL)				
	To ensure that a Construction Safety and Health Program is duly followed and enforced at the construction project site, each construction project site is required to have the minimum required Safety Personnel to oversee full time the overall management of the Construction Safety and Health Program as described in Section 7 of Department Order # 13 (Guidelines Governing Occupational Safety and Health in the Construction Industry) of Department of Labor and Employment (DOLE).	Written Reprimand	Monetary Penalty	Severance of Contract	Major Violation
17.0	(MEANS OF ACCESS AND ESCAPE)				
	a. Every excavation over 1 m. (3 ft.) deep shall be provided with ladder as an access and egress in case of flooding or collapse of the excavation work.	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
	<ul> <li>Every excavation shall have at least one (1) ladder in every 16.6 m. (50 ft.) of length or fraction thereof, of a length, which shall extend at least 0.83 m. (2'6") above the top of the excavation to provide a firm handhold when stepping on or off the ladder.</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
18.0	(SAFETY CHECKLIST)				
	Contractor is required to submit the Safety Checklist on a daily basis fully accomplished by the contractor's Safety Officer/Representative and conformed by PMG Project Engineer of MWSI.	Replinatio	Monetary Penalty	Severance of contract	Minor Violation
19.0	(UNSAFE ACT)				
	Reporting for and or rendering work in a state of intoxication of liquor and/or under the influence of prohibited drugs or narcotics.	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation

Item	Description of Violations	First Offense	Second Offense	Third Offense	Classification of Violation
20.0	(WELDING AND CUTTING OPERATIONS)				
	a. Welding or cutting operations shall not be permitted in areas containing combustible materials or in proximity to explosives or flammable liquids, dusts, gases or vapors, until all fire and explosion hazards are eliminated.	Written Reprimand	Monetary Penalty	Severance of contract	Major Violation
	<ul> <li>b. A portable fire extinguisher shall be provided at the place where welding and cutting operations are being undertaken.</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
	<ul> <li>c. All workers or persons directly engaged in welding or cutting operations shall be provided with the appropriate personal protective equipment.</li> </ul>	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation
	d. Welding or cutting in confined spaces shall be prevented by the provision of local exhaust and general ventilation system to keep fumes, gases or dusts within allowable concentrations or threshold limit values.	Written Reprimand	Monetary Penalty	Severance of contract	Minor Violation

#### 5.2.3.3 SUBMISSION OF CONTRACTOR'S SAFETY PROGRAM

The Construction Safety and Health Program to be submitted by the Contractor before the start of the project must be approved by BWC, DOLE / MWSI Safety, shall state the following:

- a. Composition of the Construction Safety and Health committee, if one has been formed, otherwise, an understanding to organize such committee and appoint its members before the start of construction work at the project site;
- Specific safety policies which the General Constructor undertakes to observe and maintain in its construction site, including the frequency of and persons responsible for conducting toolbox and gang meetings;
- c. Penalties and sanctions for violations of the Construction Safety and Health Program;
- d. Frequency, content and persons responsible for orienting, instructing, training and supervising all workers at the site with regard to the Construction Safety and Health Program under which they operate;
- e. The manner of disposing waste arising from the construction.

f. Validity of Construction Safety and Health Program will depend on the duration of every contracted project.

#### 5.2.3.4 SAFETY SEMINAR

Every MWSI Contractors are required to have at least two (2) personnel that have attended/ completed the seminar on Basic Occupational Safety and Health (Forty Hours).

#### 5.2.3.5 FABRICATION OF SAFETY SIGNAGES AND BARRICADES

Every MWSI Contractors are obliged to secure their safety signages and barricades from MWSI designated official fabricator.

#### 5.2.3.6 SEPARABILITY PROVISIONS

- a. All applicable provisions of this Code shall apply to all MWSI Accredited Contractors and be a part of their Project Contract with Maynilad Water.
- b. In cases where the Safety Violations committed by any Contractor is not defined and penalized under this Code, the Safety provisions appearing in the executed Project Contract with Maynilad Water shall control. If a Safety violation is both penalized by this Code and the Executed Project Contract, the violation with graver penalty shall be imposed.
- c. It is incumbent upon every Accredited MWSI Contractor to comply with the requirements being imposed by DOLE Department Order # 13, series 1998: re; Guidelines Governing Occupational Safety and Health in the Construction Industry.

#### SECTION 6 SAFETY ORGANIZATION

6.1 There shall be a Safety Department, which will be created to oversee the deployment of this code. This department will be composed of the following;

#### a. Chief Safety Functions:

- 1. Determines the safety requirements of MWSI.
- 2. Drafts and recommends the safety policies and reviews safety code for revisions and amendments.
- 3. Plans, develops and recommends safety programs.
- 4. Oversees the implementations of all safety programs.
- Monitors compliance of all operating units and their activities on established safety code and policies through inspections and investigations and submits recommendations, sanctions on violations.
- 6. Conducts safety meetings of the company.
- 7. Develops and maintains disaster contingency plan.
- 8. Plans and develops accident prevention program.
- 9. Oversees the activities of the Central Safety Committee.
- 10. Attends to all the safety requirements BWC-DOLE and other government agencies.
- 11. Undertakes safety contests and awards distinction for outstanding accomplishments.
  - b. There will be three (3) units on this department with the following functions:

# b.1) POLICIES AND DOCUMENTATION UNIT Functions:

- 1. Plans, develops and maintains accident prevention program.
- 2. Formulates safety and other administrative policies in coordination with the CSC and other safety units.
- 3. Serves as the secretariat of the Central Safety Committee.
- 4. Initiates, submits and supervises safety and health training for employees.
- 5. Maintains records and reports covering all aspects of the Safety programs.
- 6. Represents MWSI on safety seminars, trainings, meetings as required by DOLE- BWC and Government Safety Regulations.
- 7. Evaluates safety gadgets/equipment of every area/division.
- 8. Convenes the review committee for accidents and incidents.
- 9. Oversees the conducts of awards and contests on safety

# b.2) EMERGENCY PREPAREDNESS RESPONSE UNIT Functions:

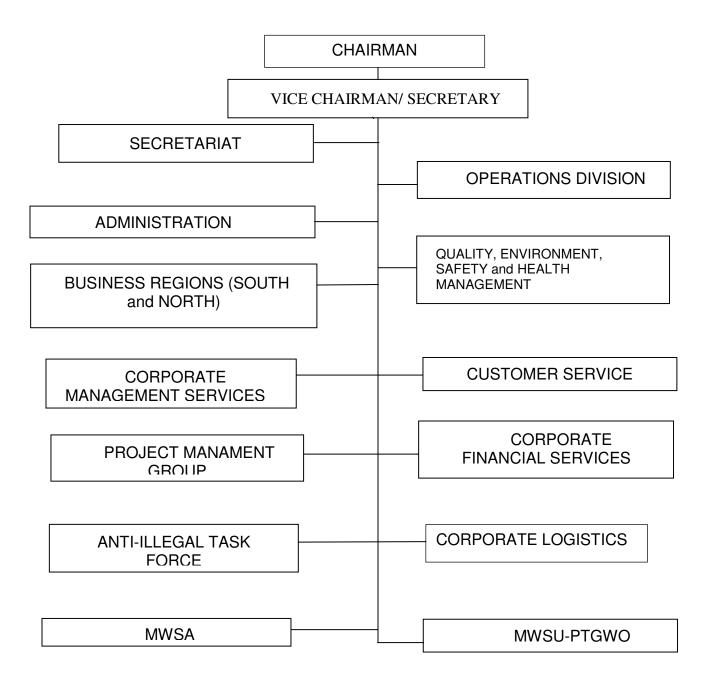
- 1. Plans, develops and maintains disaster contingency plan.
- 2. Prepares programs for Safety implementation during Confined Space Works, Water Service Interruptions, Energization and the like.
- 3. Conducts safety training for CSC/ Employees and Contractors as needed.
- 4. Conducts annual emergency preparedness program and other risks management activities.
- 5. Mobilizes needed resources for disaster relief, evacuation activities and acts as the lead unit in this undertakings. Links the same with establish networks.
- 6. Liaises with government and other agencies regarding company emergency preparedness programs.
- 7. Assists in the conduct of awards and contests on safety.

# b.3) INSPECTION/ INVESTIGATION MONITORING UNIT Functions:

- 1. Plans, develops and maintains safety programs on workplaces.
- 2. Conducts regular safety inspection on all MWSI areas including constructions activities.
- 3. Reports violations on safety policies and recommends sanctions for erring violators.
- 4. Issue non-compliance order and recommends works stoppage.
- 5. Checks safety and health programs of contractors.
- 6. Assists in the developing and planning of safety program.
- 7. Prepares monitoring compliance reports and recommend action programs to enhance performance of the respective units.
- 8. Identifies training gaps and recommends needed trainings
- 9. Attends Safety Seminars/Training as required by DOLE-BWC and other foreign regulatory bodies.
- 10. Assists in the conduct of awards and contests on safety.

#### SECTION 7 CENTRAL SAFETY COMMITTEE (CSC)

# CENTRAL SAFETY COMMITTEE ORGANIZATIONAL CHART



# 7.01.05 GROUPINGS OF CENTRAL SAFETY COMMITTEE

# 1. MANAGEMENT GROUP

To advise and assist the Management in implementing a well-organized Safety Program and to recommend as appropriate all changes in the overall program to improve efficiency and encourage employees to increase their safety efforts.

# **FUNCTIONS:**

- 1. Regular meetings-planned and instructive- for passing on information to other employees.
- 2. Action of the committee as a clearinghouse for ideas, activities, and follow-ups.
- 3. Investigation of major accidents and causes, and recommendations to prevent their occurrence.
- 4. Supervision of Safety Awards and Contests.
- 5. Assistance in establishing Safety Standards and Operating Methods on engineering works.
- 6. Suggestion for a Safety Education Program.
- 7. Inspection and suggestions for specific job practices.

# 2. WORKING GROUP

To create interest in Safety within the work force and to emphasize employee responsibility for the prevention of accidents.

# FUNCTIONS:

- 1. Reporting to Central Safety Committee on unsafe conditions and practices.
- 2. Instructing and warning fellow workers of dangerous practices.
- 3. Assisting in the investigation of accidents and making recommendations for accidents prevention.
- 4. Improving a cooperative spirit between employees and management.
- 5. Functioning an opportunity for workers to take an active interest in the Safety program.
- 6. Maintaining interest of all employees in the Safety Program.

#### 3. ACCIDENT REVIEW GROUP FUNCTIONS:

To review and determine the causes of accidents. Determines the extent of an employee's responsibility in an accident and makes effective recommendations to prevent occurrence of similar accidents.

# CHAPTER II

# **BASIC SAFETY RULES**

# FIRE LOSS PREVENTION AND CONTROL

#### SECTION 8 FIRE LOSS PREVENTION

- 8.01 The Safety Department/ Facilities Management Department shall check for fire hazards at regular intervals-electrical such as equipment, machinery and processing equipment, housekeeping conditions and other possible sources of fire. (A)
- 8.02 The Safety Engineer shall regularly check fire fighting equipment to be sure that they are ready for any emergency. Each designated employee must become proficient in handling fire Fighting equipment installed at the area or station where he works. (A)
- 8.03 All concerned employees shall handle gasoline, gases and volatile (low flash point) oils with great care. Open flames, lighted cigars, cigarettes or pipes shall be kept away from them.
- 8.04 Employees shall eliminate or immediately put out small fires or report to their immediate supervisor any fire hazard, particularly in their work area, which may cause the loss of life or destruction of the System's property. (A)

#### 8.06 FIRE EXITS

- a. All approaches to fire exits shall be cleared of any obstruction and properly marked to make the direction of egress clear. (B)
- b. Doors leading into or out of any building or floor shall not be locked or fastened during working/office hours. (B)
- c. All doors, in or leading to exits shall be maintained open from the inside without the use of a key or any special knowledge or effort at all times when the building or area served thereby is occupied. (A)
- d. Relevant rules and regulations on fire protection and control regarding exits, stairways and fire doors shall be obeyed as per provisions of Rule 1940, OSHS of DOLE and Rule 3, Division 4 of the Philippine Fire Code. (B)
- e. Fire exit drills shall be conducted at least once every six (6) months to maintain an orderly evacuation of buildings for major installations. It shall only include evacuation of persons and shall not include salvage operations. (B)

# 8.07 HOUSEKEEPING

- a. Oil-soaked and paint –saturated rags, papers, waste and other combustible refuse shall be deposited in non-combustible receptacles having self-closing covers, and thereafter removed daily from the work areas for proper disposal. (B)
- b. A procedure on safe collection and disposal of all combustible waste and rubbish shall be a part of the fire prevention-training program. (A)
- c. Accumulation of all type of dust shall be cleaned at regular intervals from overhead pipes, beams and machines, particularly from bearings and other heated surfaces. (A)
- d. Roofs shall be kept free from sawdust, shavings, and other combustible refuse. No such materials shall be stored or allowed to accumulate inside air shafts, or elevator and stair shafts, tunnels, out-of-the-way corners, near electric motors or machinery, around steam pipes, or within three meters of any stove, furnace or boiler. (A)

# 8.08 **RUBBISH DISPOSAL**

- a. Combustible rubbish, dried weeds and grass shall not be allowed to accumulate in plant yards, particularly near buildings, other combustible materials, or storage tanks containing flammable liquid and gases. (B)
- B. Rubbish shall be burned only in designated areas away from buildings, sheds, lumber piles, fences and dried grass or other combustible materials. (B)
- c. Wind and weather conditions shall be considered before fires are started. Only controllable quantity of rubbish shall be burned at one time. No fire shall be started on a windy day where there is a possibility of igniting nearby combustible materials. It is required to have a fire hose or other suitable fire fighting equipment near the fire site. (B)

# 8.09 ELECTRICAL

- a. Only approved equipment shall be used where flammable gases or vapors are present. (B)
- b. Temporary makeshift wiring shall be used unless absolutely necessary, in which case, it shall be adequately protected and properly barricaded, and shall be removed as soon as possible. In no instance shall defective wires be used. (B)
- c. Portable electrical tools and extension cords shall be inspected at frequent intervals and repaired or replaced promptly when found defective. (A)
- d. Waterproof cords and sockets shall be used in damp places and explosion-proof fixtures and lamps shall be used in the presence of highly flammable gases and vapors. (B)

- e. Portable lamp bulbs shall be protected by heavy lamp guards or by adequately sealed transparent enclosures, and left away from sharp objects and kept from falling. Bare bulbs shall never be used when exposed to flammable dusts or vapors. Lamp bulbs shall be considered as potential hazards in areas where flammable dusts or vapors exist; they shall be safeguarded accordingly. (B)
- f. All electrical machines/equipment shall be unplugged during lunch hours and at the end of the working day. (B)
- g. The use of electrical octopus connections shall be avoided. (B)
- Employees shall be instructed in the proper use of electrical equipment and shall be prohibited from tampering and blocking circuit breakers and from using improperly rated fuses or bypass wires. (B)
- i. Personally owned electrical cooking appliances such as percolators, stoves and the like shall not be plugged into the System's building electric facilities. (B)
- j. Electrical installations and all electrical equipment shall be periodically inspected and tested to ensure continued satisfactory performance and to detect deficiencies. (A)

#### 8.10 SMOKING

- a. All areas where smoking is prohibited shall be provided with "No Smoking" signs. (B)
- Employees are prohibited from carrying matches, lighters and other spark-producing devices to areas where flammable and combustible liquids, chemicals, gases and the like are stored or handled. (B)
- c. Wastebaskets shall never be used for cigarette disposal. (B)
- d. Lighted cigarette butts shall always be totally put out and left n non-combustible ashtrays. (B)
- e. Before leaving the office for coffee break, lunch or after office hours, floors, tables, chairs and top of cabinets shall be checked by a designated employee for lighted cigarette inadvertently left behind. (B)

# 8.11 OPEN FLAMES

- a. Open flames using kerosene, liquefied petroleum gas, acetylene or alcohol and other torches shall be placed at least 0.50 meters from wood surfaces. These should not be used close to flammable liquids, papers, excelsior or similar materials. (B)
- b. When portable furnaces, blowtorches and the like are used, there shall be an overhead clearance of at least 1.2 meters. Combustible materials shall be removed or protected by a noncombustible insulating board or sheet metal and preferably by a natural draft hood and flue of non-combustible material. (B)

#### SECTION 9 PORTABLE AND MANUAL FIRE CONTROL

#### 9.01 SELECTION OF EXTINGUISHERS

Extinguishers shall be selected for the specific class or classes or hazards to be protected against in accordance with the following:

- a. Extinguishers for Class "A" hazards, such as wood, cloth, paper, rubber and other similar ordinary materials, shall be selected from foam, loaded stream, multi-purpose dry chemical and water types.
- b. Extinguishers for Class "B" hazards, fires in flammable liquids, gases and greases, shall be selected from carbon dioxide, dry chemicals, foam loaded stream and multi-purpose dry chemicals.
- c. Extinguishers for Class "C" hazards, fires which involve energized electrical equipment where the electrical nonconductivity of the extinguishing media if of importance, shall be selected from carbon dioxide, with non-metallic horn, dry chemicals and multi-purpose dry chemicals.

Before any dry chemical extinguishing equipment is considered for use to protect electronic equipment or delicate electrical relays, the effect of residual deposits of dry chemical on the performance of this equipment shall be evaluated.

#### 9.2 **INSPECTION AND MAINTENANCE**

- a. Fire extinguishers shall be maintained in a fully charged and operable condition, and kept in their designated places at all times except when being used, tested, repaired or replaced. (B)
- b. Fire extinguishers removed from the premises where they are regularly installed for recharging or repair shall be replaced by spare extinguishers of the same type and capacity, during the period they are serviced. (A)
- c. Fire extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require to ensure that they are operable and in their designated places, that they have not been tampered with and are fully charged and pressurized, and to detect any physical damage, corrosions, or other impairments. Extinguishers or parts thereof, which are not in good operating condition, shall be immediately recharged, repaired or replaced by qualified suppliers. (A)
- d. Each fire extinguisher shall have a durable identification tag securely attached to show the maintenance of recharge date and the initial or signature of the person who performed this service. (A)
- e. Caps shall always be replaced on the same shell from which they were removed to prevent mismatching of threads. A small amount of Vaseline or any other acceptable substitute shall be

applied to cap threads. Caps shall be screwed on tightly, making sure that the threads are properly engaged. (A)

#### 9.03 **INSTALLATION**

- a. Fire extinguishers shall not be obstructed or obscured from view. In large rooms and in certain locations where visual obstructions cannot be completely avoided, the location of extinguishers shall be indicated conspicuously with a red arrow. (A)
- b. If fire extinguishers intended for different classes of fires are grouped, their intended use shall be marked conspicuously or color-coded to ensure use of the proper extinguisher for the class of fire that occurs. (A)
- c. In situations where fire extinguishers shall be temporarily provided, they shall be installed on portable stands, consisting of a horizontal bar or uprights with feet, or set on shelves unless the extinguishers are of the wheeled type. (A)
- d. Fire extinguishers mounted in cabinets or wall recesses, or set on shelves shall be placed in a position such that the extinguisher operating instructions face outward. The location of such extinguishers shall be marked conspicuously. (A)

#### 9.04 HYDROSTATIC TEST

Inspection, maintenance, hydrostatic test and recharging of portable fire extinguishers shall be in accordance with the provisions of NFPA No. 10. (B)

#### 9.05 CARE OF FIRE HOSES AND ACCESSORIES

The care of fire hoses, nozzles, couplings and gaskets shall be in accordance with the provisions of NFPA No. 198. (B)

#### SECTION 10 VEHICULAR AND TRAFFIC SAFETY GUIDE

#### **GENERAL RULES**

- 10.01 National and local traffic laws and regulations shall be observed at all times. (B)
- 10.02 When driving along public or private roads, prescribed speed limits and regulations shall be observed. (B)
- 10.03 No employee shall operate any System's vehicle unless he is duly licensed, and has been examined and authorized by proper authorities.
   (B)
- 10.04 Authority to drive is not transferable. (D)

- 10.05 No driver shall allow another person to drive the vehicle assigned to him, unless the latter is duly authorized by the System. (B)
- 10.06 No passenger shall be allowed to ride on the running board, fender, tailboard and/or any other part of the System's vehicle, except on seats provided or inside the body of walls. (B)
- 10.07 No part of the human body shall extend outside the vehicle. (A)
- 10.08 No passenger shall be allowed to board or alight from a moving vehicle or from a stopped vehicle at the traffic side of the road. (A)
- 10.09 No driver shall drive a vehicle while under the influence of liquor, narcotics, or sleep-inducing drugs, or the like. (D)
- 10.10 No employee shall drive any private vehicle inside the MWSI compound while under the influence of liquor, narcotics or sleep-inducing drugs, or the like. (C)
- 10.11 The driver shall conduct daily checks on the following: (A)
  - B rake
  - E lectricity
  - W ater
  - A ir
  - G as
  - O il
  - N oise (steering)
  - S teering
- 10.12 Regular, contractual and casual MWSI drivers, for purposes of monitoring driving competence and psychophysical fitness, shall undergo the Psycho Physical Test once a year. (B)
- 10.13 Drivers with test results below the set standards for the Psycho Physical Test shall be reassigned to non-driving assignments to be identified by the Fleet Management. (B)

#### SECTION 11 LOADING AND UNLOADING

11.01 Overloading the vehicle shall not be allowed. The load shall be properly distributed, secured in place and not piled too high in order to maintain stability and to satisfy required overhead clearances. (A)

- 11.02 Tailgates and all detachable equipment in the vehicle shall be properly secured before traveling. (A)
- 11.03 Loads shall be handled at the curbside of the vehicle. Where this cannot be avoided, flagmen should be stationed and/or appropriate warning signs shall be placed at all traffic approaches. (A)
- 11.04 Trailers shall be provided with proper stop and taillights. (A)
- 11.05 Vehicles and trailers with loads projecting beyond body lines shall have the extreme projections provided with fully secured red flags and stop lights in the daytime and with red lights and stop lights at night time. When practicable, a marker shall be attached halfway between the truck and end of load projection, such as when poles are being handled. (A)

#### SECTION 12 PARKING AREA AND GARAGE

- 12.01 Before moving a vehicle from a parked position, the driver shall check around and under the vehicle for possible hazards. (B)
- 12.02 The driver shall conduct a brake test before operating a vehicle from the MWSI parking area and garage. In case of any indication of a faulty brake, he shall stop the vehicle, park it properly and report the condition immediately to the MWSI Motor Pool.

#### SECTION 13 PARKING IN PUBLIC PLACE

- 13.01 Whenever a driver has to leave his vehicle unattended along a highway, he shall move his vehicle entirely off the traveled portion of the road, turn off the ignition switch, notch effectively the hand brake and keep the ignition key with him. He shall place the early warning device (EWD) at the required distance in front of and behind the vehicle, check traffic before opening the door to get in and out of the vehicle and keep doors securely closed at all times. (B)
- 13.02 When parking downhill, he shall slightly turn the front wheels to the right towards the curb or side of the road, leave the vehicle in reverse gear and hand brake notched effectively. When parking uphill, he shall turn front wheels towards the curb or side of road and leave the vehicle in low gear and hand brake notched effectively. Wheel chucks shall be used to lock the wheels when parking downhill or uphill and most especially when it is necessary to keep the motor running. (B)

#### SECTION 14 SAFE DRIVING

- 14.01 In addition to the provisions of the Land Transportation and Traffic Code, every employee who is authorized to drive the MWSI vehicles shall observe and practice the following defensive and safe driving habits:
  - a. Signal intentions well in advance at all times regardless of the traffic conditions. (A)
  - b. To avoid hitting a vehicle being followed, maintain a safe distance of at least one vehicle length for every ten (10) KPH of speed. This required distance should be doubled at night or when road is slippery. (A)
  - c. To avoid being hit by a vehicle from behind, the driver shall:
    - 1. Make every stop or reduced speed in a smooth and gradual manner. (A)
    - 2. Signal intentions well in advance. (A)
    - 3. Try to keep the vehicle behind from riding your tail, e.g., find means of preventing the vehicle behind from staying too close to your bumper. (A)
  - d. To avoid head-on or sideswipe collisions, the driver shall:
    - 1. Always drive as far to the right of the center of the centerline of a highway as much as possible. (A)
    - 2. Reduce speed and slow down before entering a curve. (A)
  - e. To avoid angle collisions, the driver shall:
    - Approach all intersections with the right foot off the accelerator and step on the brake pedal, ready for any eventuality such as pedestrians and other drivers who do not obey the traffic rules. (A)
    - 2. Bring the vehicle to full stop before entering any through street, highway or railroad crossing. (B)
    - 3. Check traffic to the left, then to the right, to see if there are vehicles crossing the street. Proceed only when traffic is clear. Do not rely on your having the right-of-way. (A)
    - 4. Signal well in advance and proceed to the correct turning lane from a reasonable distance. Let approaching traffic clear first before making a left turn. (A)
  - f. To avoid a sideswipe collision, the driver shall:
    - 1. Slow down when being overtaken on left or right to make it easy for the other vehicle to pass. (Do not race the other vehicle.) (A)
    - Check your rear side mirror; make a signal and change lane only when it is safe to do so without disrupting the flow of traffic. (A)
    - 3. Signal well in advance, slow down gradually and keep as close to the right or curb when making a right turn. (A)

- 4. Check the rear, signal intentions and wait for a break in traffic before pulling out of a curb or parking space. (A)
- g. To avoid head-on-sideswipe and angle collisions, the driver:
  - 1. Shall not drive to the left side of the centerline of the highway in overtaking or passing another vehicle preceding in the same direction unless the left side is clearly visible and is free of incoming traffic. This is to allow for a sufficient distance ahead to permit such overtaking or passing to be made safely. (A)
  - 2. Shall not overtake when he himself is being overtaken or when another vehicle tries to tail him in his attempt to overtake another vehicle.
  - 3. Shall not overtake or pass another vehicle proceeding in the same direction when approaching a crest of a grade, upon a curve in the highway, at any railway grade crossing, at any intersection of highways and at all "no passing or overtaking zones." (B)
  - 4. Shall not pass a car that has stopped to permit pedestrians or other vehicles to cross. (B)
- 14.02 He shall always slow down and be ready to step on the brakes when passing through any busy streets where long lines of cars are parked and where pedestrians may dart across at any moment. (B)
- 14.03 Vehicles shall always descend steep grades at low gear. (B)
- 14.04 The driver shall always devote his full attention to driving, anticipating danger in time to avoid it. (A)
- 14.05 The driver shall be alert for signals from traffic police officers and other drivers, traffic signals signs, etc. (A)
- 14.06 The driver shall avoid beating traffic stop signals. (A)
- 14.07 The sounding of horns does not give anyone of the right-of-way. The driver shall use it only as a warning and shall proceed cautiously.
- 14.08 He shall slow down upon approaching school zones, parks, playgrounds, crowded streets and thickly populated areas and be always on the alert for children. The law gives the right-of-way to pedestrians. (B)
- 14.09 Headlights shall be put on not later than one half-hour after sunset and until at least one half hour before sunrise and whenever weather conditions so require. Parking lights shall not be used in lieu of headlights. (A)

- 14.10 At night, the driver shall always dim his light when within 150 meters of oncoming vehicles and when following another vehicle within 60 meters. Glare may cause the other vehicle to swerve his oncoming vehicle toward the other lane. The same rule shall be observed when driving along well-lighted and thickly populated areas. (A)
- 14.11 After passing through flooded streets, the driver shall check his brakes to make sure that they are working properly before proceeding to normal speed. To dry the brake linings, he shall press his foot brakes slightly several times while his vehicle is in low motion until assured that the brakes are functioning normally before proceeding the normal speed. (B)
- 14.12 In case of sudden tire blowout, the driver shall not step hard and abruptly on his brakes. This will cause his vehicle to turn turtle or swerve suddenly when driving at high speed. Instead, steer straight and gradually bring the vehicle to a stop by applying slight on and off pressure (fanning) on the foot brakes. (A)
- 14.13 For trucks with or without trailers, enclosed vans and similar vehicles where the rear view of the driver is limited, a signalman shall be assigned. The foreman, leadman, supervisor, as the case may be, shall designate a signalman for the day. (A)

Any backing motion of the vehicle shall be done slowly with extra care and under the direction of the signalman on the ground that has an unobstructed view of the intended path of the vehicle. The same shall be observed when there is difficulty in maneuvering the vehicle by reason of its position or location. (A)

If backing is to be done, he shall personally make sure that all is clear behind at the time. He shall never assume that the other vehicle has not driven up behind or that pedestrians have cleared off the back area since he last looked. (A)

- 14.14 The driver shall stay on his own lane of the road at intersections, railroad crossings, no passing zones, hills and curves where his view is obstructed. Right-of-way is better than sight-of-way. (B)
- 14.15 The driver shall not straddle lane lines. This is inconsiderate and constitutes "hugging". (A)
- 14.16 The driver shall not drive a vehicle with his hands and soles of shoes wet and/or greasy. (A)
- 14.17 The driver shall not be allowed to smoke when looking into the fuel tanks, the cooling water of radiator or the battery. (B)

- 14.18 The driver shall not keep oil, rags, waste or other flammable objects under the hood or elsewhere inside the vehicle where combustion might occur. (B)
- 14.19 Safety containers used for fuel handling shall be checked for leaks, excessive rusting and weak spots. (B)

#### SECTION 15 MOTOR WORKS

- 15.01 Vehicles jacked-up or hung-on chain hoists shall always be blocked under with stanchions, pyramid, jacks or wood blocks (which have first been carefully inspected). (B)
- 15.02 When a man is working under a vehicle that is blocked up, other workers shall not work on the car in such a manner that the car will be knocked off from its support blocks. (B)
- 15.03 Use electric lamps with extension cords, portable electric tools with cords and fittings and safety guards that are all in good condition. (B)
- 15.04 Always wear goggles or face shields when operating sandblast spark plug cleaners. (A)
- 15.05 Concrete or clay hollow blocks and other brittle/weak materials shall not be used to support jacked-up vehicles. (B)
- 15.06 Vehicles with more than three (3) wheels that are jacked-up on two wheels shall be provided with wheel stops on both ends of the other wheels. No chassis repair shall be allowed unless effective wheel stops are provided on these wheels. (B)
- 15.07 Vehicles under chassis repair shall be provided on all sides with adequate barricades and warning signs to protect protruding legs of workers. (B)
- 15.08 Never operate an engine in an enclosed room without adequate ventilation. Carbon monoxide is poisonous and may cause death.
- 15.09 Do not leave gasoline standing around in open containers. Use kerosene or other suitable safe preparations to clean parts whenever possible. (B)
- 15.10 Keep a pair of safety goggles handy and wear them when performing work in which eye protection is needed. (A)

- 15.11 Be on guard against flashes or explosion of gasoline vapors and hydrogen from storage batteries. Keep flames and sparks away. (B)
- 15.12 If your clothes soaked with oil or gasoline, better changed them. Do not take the risk to be caught by fire. (B)
- 15.13 Make sure all the lock washers and cotter pins are properly in-place. (C)
- 15.14 Grease and oil spilled on the floor shall immediately remove in order to prevent accidents. (B)

#### SECTION 16 TIRE OPERATIONS

- 16.01 Only workmen thoroughly familiar with the hazards and safe methods involved in handling tire equipment shall inspect, install, repair and replace tires and rims. (B)
- 16.02 Keep in safety cans rubber cement and flammable solvents used for patching inner tubes and casing compounds used for filling tire cuts. (B)
- 16.03 Tiremen shall inflate tires in steel "cages" or similar devices that shall restrain flying objects during the inflation process. A locking ring shall be seated properly and shall not be yanked free by being twisted. Defective locking rings shall be replaced. (B)
- 16.04 Electric heating elements used for vulcanizing or branding tires shall be inspected regularly, and defective rings shall be replaced. (B)

#### SECTION 17 WASHRACKS OPERATION

- 17.01 The concrete floor of washracks shall have a rough trawled finish to produce a non-slip surface. (A)
- 17.02 While washing vehicles, workers shall wear rubber boots with non-slip soles and heels, gloves and eye goggles. (A)
- 17.03 Keep working area clean and free from stray tools and parts. Place tools in their tool box when not in use. (B)
- 17.04 Washrack water hoses are high-pressured and shall not be directed at persons while in use. (B)
- 17.05 Workmen shall use the hose carefully in such a way as to avoid being struck by a backlashing stream of water and dirt. (A)

#### SECTION 18 TOWING

- 18.01 No person shall be allowed to stay between the towing truck and the towed vehicle whether at stop or in motion. When at stop and work is to be done the towing truck driver shall be warned not to move the vehicle until such work is completed, after-which he shall be given the go signal to move the vehicle. (C)
- 18.02 The towing vehicle and the vehicles being towed shall be properly fixed before moving them. (C)

#### SECTION 19 HEAVY EQUIPMENT AND TOOLS

# A. HEAVY EQUIPMENT

- 19.01 Only duly authorized personnel shall operate heavy equipment. (B)
- 19.02 Drivers of mobile heavy equipment and trainers shall be duly licensed and also authorized by MWSI. (B)
- 19.03 Operators shall be responsible for the proper condition and cleanliness of the heavy equipment assigned to them, and for making reports of any defect or unusual condition found therein. (A)
- 19.04 At no time shall the operator allow anybody under a boom except the rigger doing rigging work. (B)
- 19.05 Booms, forkholders, payloaders and the like shall be kept at a safe distance from overhead-energized lines. If it should be absolutely necessary to cross or work in close proximity with energized lines, the electric company shall be requested for appropriate assistance in the provision of safety measures. (C)
- 19.06 The operator shall not allow unauthorized persons to operate the equipment assigned to him nor allow such persons to ride on the equipment while same is in motion. (B)
- 19.07 No operator shall operate any equipment unless he is physically able and mentally sound. He shall not operate a vehicle if he is under the influence of liquor and/or prohibited drugs or any drug that causes drowsiness. (C)

- 19.08 Operators shall receive directional signs only from duly authorized persons designated for the purpose. (B)
- 19.09 No operator shall move his equipment with his suspended load except when authorized by the superior. (B)
- 19.10 All booms shall be lowered after each work shift, except when otherwise authorized by the superior. (B)
- 19.11 The operator shall determine the safe clearance of overhead obstructions and building openings, and shall proceed only when such clearances meet the requirement. (B)
- 19.12 Detailed regular inspection of all hoists with special attention to load hooks, ropes, brakes and limit switches, shall be scheduled. (A)
- 19.13 The safe load capacity of each hoist shall be shown in conspicuous figures on the hoist body of the machine. (B)
- 19.14 Flanges and hoist drums with single-layer grooves shall be free of projections that will damage the cable. (B)
- 19.15 All hoists shall be attached to their support (fixed member of trolley) with shacklers, or support hooks shall be placed properly or have safety latches. Latches are recommended also for load hooks. Hoist supports shall also have an adequate safety factor for the maximum loads to be imposed. (B)
- 19.16 Travelling hoists operating on rails, tracks or trolleys shall have positive stops or limiting devices either on the equipment, rails, tracks or trolleys to prevent over running safe limits, and shall be equipped with over-speed control devices. (B)
- 19.17 A load shall be picked up only when it is directly under the hoist; otherwise, stresses for which the hoist was not designed shall be imposed upon it. If the load is not properly centered, it will swing (upon being hoisted), and injury could result. Everyone shall stay away from under raised loads. (C)

# 19.18 **AIR HOISTS**

a. After a piston-type air hoist has been in operation for a time, the locknut that holds the piston on its rod may become loose so that the rod will pull out of the piston, thus letting the load drop. It is recommended that the locknut be secured to the piston rod by a castellated nut and cotter pin. Whenever an air hoist is overhauled, a check shall be made to see that the piston is well secured to the rod. (B)

- b. If an ordinary hook is used to hold the hoist from its support, the cylinder may come unhooked if the piston rod comes in contact with an obstruction when lowering. A clevis or other device should be used to prevent the hook from being detached from the hoist support. (B)
- c. To prevent the hoist from rising or lowering too rapidly, a choke such as a washer with the correct opening shall be placed in the airline coupling. (B)
- d. It is recommended that a rotary air hoist be provided with a closed loadline guide. (B)

# 19.19 ELECTRIC HOISTS

- a. An electric hoist shall have a non-conducting control cord unless a grounding device is provided. Control cords shall have handles of distinctly different contours so that even without looking, the operator shall know which is the hoisting and which is the lowering handle. (A)
- b. Each control cord shall be clearly marked "hoist" or "lower". (A)
- c. Control cords, usually made of fiber or light wire ropes, shall be inspected periodically for wear and other defects. (A)
- d. On pendant-controlled electric hoists, means for effecting automatic return to the "off" position shall be provided on the control so that a constant pull on the control rope or push on the control button shall be maintained to raise or lower the load. (B)
- e. A limit stop should be installed on the hoist motion, and at least two turns of rope shall remain on the drum when the load block is on the floor. (B)

#### 19.20 HAND-OPERATED CHAIN HOISTS

- a. Chain hoists shall be of larger capacity than the regular work requires. (B)
- b. Supports for the hoists shall be strong enough to carry the load imposed on them. (B)

#### 19.21 CRANES (MOBILE)

a. Open hooks shall not be used to support human loads, loads that pass over workmen or loads where there is danger of relieving the tension on the hook, due to the load or hook catching or fouling. (B)

- b. Outside cranes shall be provided with secure fastenings adequate enough to hold the crane against strong winds. When necessary, provide special anchorage. (B)
- c. Structural members of the crane shall never be made of cast iron or other brittle material. In the fabrication and assembly of structural work such as girders and frames, operator's cages, booms and bracket, hot driven rivets or welding shall be used instead of bolts. Where bolts shall be used, they shall be of the "through" type with locknuts or conventional nuts and lock washers. (B)
- d. Each controller and operating lever shall be marked with the motion it controls and its direction. These levers shall have spring returns so that they will move automatically into the "off" position and latch themselves there as the operator releases the handle. (B)
- e. Operating a crane on soft or sloping ground or close to the sides of trenches or excavation is dangerous. The crane shall always be level before it is put into operation. Outriggers can be relied upon to provide stability on the soil upon which the crane is operated. (C)
- f. The use of any makeshift methods to increase the capacity of a crane, such as timbers with blocking or adding counter-weight, is not permitted. (C)
- g. If the crane tends to tip when hoisting or lowering a load, the operator shall lower the load as quickly as possible by snubbing it lightly with the brakes. Workers, therefore, are not allowed to ride a load that is being hoisted, swung or transported. (B)
- h. Never move the load or the crane unless you are sure you understand the floor signal. (B)
- i. When there are several riggers, obey the signal given by the head rigger only. (Obey an emergency stop signal given by anyone.) (A)
- j. When filling the fuel tank of a crane, always provide a metallic contact between the fuel container and the tank. (B)
- k. Before starting the crane engine, the engine clutch shall be disengaged. Also, before engaging the clutch, all operating levers shall be placed in neutral position. The clutch shall be engaged slowly with the engine idling. (B)
- I. The swing brake shall be properly set when traveling the crane. (B)

- m. Before the operator leaves the crane, the engine clutch shall be disengaged and the boom hoist pawl engaged. (B)
- n. Warm up engine before attempting to operate the crane under load. (A)
- Brake and clutch linings shall be kept free of oil, grease or water. The operator shall not operate the crane in case of any indication that these linings have been contaminated with such foreign matters. (B)
- p. The load shall be lowered to the ground before leaving the crane. (B)
- q. Never lift a load with a weight greater than the operating capacity for a given boom angle and radius. Keep lift heights to a minimum when handling close to a maximum load. (B)
- r. Start and stop the swinging of the boom smoothly when the load is near or at operating capacity. Fast swinging causes load to extend beyond the boom point, increasing the radius beyond the crane's capacity that might eventually tip the crane over. (C)
- s. The crane shall be kept stationary when lifting loads close to maximum, operating capacity. (C)
- t. Be sure there is adequate overhead clearance before attempting to move machine under overpass bridges, power lines, or other low overhead objects. When traveling the mobile crane along highways or streets, the boom shall rest on its rack. (C)
- u. The crane shall never be positioned nor left unattended near embankments, deep excavations, banks, bridges, etc. or any place where there exists danger of materials falling on it or earth slides. (C)
- v. Be sure that the carrier service brakes and outriggers are properly set. (C)
- w. Crane boom in operation shall have the minimum clearance of 3.5 meters from high-tension wires. (C)

#### 19.22 CRANES (OVERHEAD)

a. Each crane shall have its safe load capacity indicated on both sides in conspicuous figures readable from the floor or ground. If a crane has hoist blocks, each block shall have its safe load capacity indicated on both sides. The crane shall not be loaded beyond its rated capacity, except, for testing. (B)

- b. Workmen near cranes or those who assist in hooking on or arranging loads shall be instructed to keep out from under loads. (B)
- c. All crane machinery, apparatus, and appliances including ropes, chains and slings shall be inspected regularly by a qualified person assigned to this task and the date, findings and action taken must be recorded on a special report form. (A)
- d. A crane operator shall never attempt to make repairs himself but shall report to his foreman any condition that will make the crane unsafe to operate. (A)
- e. When not in use, the crane shall be parked with the load hook (and the slings if they remain on the hook) raised high enough to clear the heads of the men at work on the floor below, and the operator shall throw all controls into "off" positions and open the main switch. (B)
- f. A light or a pilot lamp must be visible from the floor to indicate that the main switch is on. The controller shall be of the spring-return type or momentary contact push button. (A)
- g. Precautions shall be taken to prevent other overhead cranes from colliding with a crane under repair. Safety ropes shall be installed.
   (A)
- h. Loads being hoisted shall not be allowed to swing against the rigger or other floor men. (C)
- i. When raising or lowering the load, see that it safely clears adjacent stockpiles or machinery. (B)

#### 19.23 **MOTOR GRADES**

- a. Only the operator is allowed to ride a motorized grader. (B)
- b. Graders shall be operated at a safe speed under all road and traffic conditions. When obstructions such as roots, large rocks or structures are encountered, speed must be reduced to prevent the grader from being thrown out of control or damaged. (B)
- c. When blading a road, the grader shall be operated on the right-hand side in the same direction as traffic. The end of the blade toward the opposite traffic must be marked by a red flag visible to motorists. (B)

- d. Blading gravel roads shall be so planned that the blading on a particular section will be completed at the end of the day. Where a stockpile shall be left overnight on the traveled way, appropriate warning signs far ahead, barricades and lights shall be placed to warn motorists. (B)
- e. When a motor grader is traveling, the operator shall pull in the blade and locked in place. (B)
- f. No one shall get on or off a motor grader unless it is stopped. (C)

#### 19.24 **TRACTORS**

- a. Because of the power, the noise, the necessity of frequent backing and turning movements and the speed of operation, the operator of this type of equipment shall be constantly alert to see that his path is clear of workmen, obstructions and other vehicles. (A)
- b. When the machine is left unattended during break time, or overnight, it shall be parked on level ground with the blade landed, ignition locked and brakes set. (B)
- c. Bulldozer blades shall be kept close to the ground in going up steep slopes. It shall not be used to brake the tractor by digging into the ground when the tractor is going down steep grades. (B)
- d. When attachments are hooked to the dozer, a bar shall be used to steer the eye over the hook to avoid pinching the hands. Safety chains shall be attached in addition to the drawbar. (A)
- e. When tractors are used in clearing operations, a canopy shall be installed to protect the operator if there is a hazard from falling tree limbs or branches. (C)
- f. Operators shall not wear loose or flowing clothing that might get entangled with machine moving parts. Shoes with hobnails or spike shall not be worn as they enhance the danger of slips and falls. (B)
- g. When the tractor is stopped with the engine idling, the transmission shall be in neutral with the clutch disc engaged so the tractor cannot be jarred into motion. Before the engine is started, the tractor shall be out of gear, the master clutch disengaged and the blade down. (A)

#### 19.25 CONCRETE MIXERS, PUMPS AND PAVERS

a. Operators and other men working around mixers and pavers shall wear dust respirators. Goggles shall be worn when chipping hardened concrete from the machine. (A)

- b. Only men in good physical condition shall be employed to operate mechanical concrete vibrators. Lowering of vibrators from one level to another by use of air hose or electric cable is not allowed. (A)
- c. Skips on large mixers and pavers shall be protected by guardrails on both sides to prevent men from walking into or under the skip. (B)
- d. When a truck is backing in to charge a skip, a signalman shall be posted to direct the driver to see that the way is clear and to signal the operator when to raise the skip. (B)
- e. Shell-mounted mixers shall be blocked especially when being operated on a grade. (B)
- f. Operators shall always be at the control when the skip is being raised or lowered. No one shall ride the skip. (B)
- g. When the operator leaves the machine, either temporarily or overnight, brakes shall be set and the skip shall be on the ground.
   (C)
- h. The clutch shall be disengaged before the engine is started. The engine shall be fully warmed up before the clutch is engaged. The mixers shall be checked to see that they are stable and on the level footing. (A)
- i. If the pump-concrete method of placing concrete is used, careful consideration shall be given to the design of the scaffold supporting the pipelines. A safety factor of four (4) shall be used in the scaffold design. (A)
- j. If and when it is necessary to open a pipe under pressure to clear an obstruction, the work shall be carefully done with precaution so those workmen shall not be injured by concrete when the pipe become clogged. The towers and chutes shall be substantially constructed on sound foundations. (B)
- k. Concrete buckets used with cableways or cranes shall be constructed without frames or other projections that may collect concrete which might be dislodged and fall on workmen. (A)
- I. No person shall ride a bucket for any reason. When it is necessary to drift a bucket to a place not accessible by the cableway or crane, the drifting shall be done by some mechanical means and not by men pushing or pulling the bucket. (B)

#### 19.26 CONVEYORS

- a. Only authorized persons shall operate material conveyors. No person shall be allowed to ride on the conveyor. (B)
- b. Material conveyor operators shall wear working gloves to protect their hands. (B)
- c. Material elevators shall be provided with cages and properly guarded, and shall not be operated without a signalman. (B)
- d. The material elevator shall be regularly inspected and properly maintained. (A)
- e. The material elevator shall not be loaded beyond its rated capacity and no part of the load carried therein allowed to extend its cage. (B)

#### 19.27 **FORKLIFT**

- a. The operator shall exercise extreme caution when approaching areas where his view is obstructed or where pedestrians or other vehicles may have difficulty in noticing the approaching forklift. (A)
- b. Inspect all loads to be moved to determine proper load position, to maintain stability and to avoid overloading. When moving loads, keep fork or load as close as possible to the ground floor. (B)
- c. The load shall be kept below eye level. Where this is impracticable, drive the forklift backward so that the operator can see any obstructions along its way. (B)
- d. Do not drive with wet or greasy hands. (A)
- e. Slow down on wet and slippery riding surfaces. (B)
- f. Never drive high-lift trucks with an elevated platform. (B)
- g. Workmen shall not be permitted to ride or work on the platform of high-lift trucks. Where possible, materials shall be unloaded mechanically from a raised platform. (B)

# 19.28 LIFTING WITH JACKS

Good judgment is required both in selecting and using jacks on any given job.

a. Make sure that the base of the jack is on stable footing. Use boards or blocks placed at right angle to the lift. (A)

- b. Center the jack properly for the lift; if there is danger of the head slipping, use board or the wedge on top of the jack to keep it in position. (A)
- c. Place the jack so there will be an unobstructed swing of the handle, thus protecting your knuckles. (A)
- d. Do not lean over a jack handle or handle socket under the load; the handle might fly up and strike you. (B)
- e. Never rely on jacks alone to support any load you have to work under. Use sufficient blocks as an additional support of the load at two or more points. (B)
- f. Never leave a jack standing under the load with the handle in the socket; something might strike the handle and knock the jack out of position. (B)

#### 19.29 **POWER MOWER EQUIPMENT**

- a. When operating power mower equipment, the operator shall use extra caution to prevent flying objects from striking himself and other persons in the vicinity. Pick up loose objects when this is practical and clear the area of other people when possible. (A)
- b. Keep handle and feet from under the machine and away of discharge chute while engine is running. (A)
- c. When mowing a terrace, slope or incline, mow lengthwise (across the face of the slope) instead of up and down. (A)
- d. Stop engine (or motor) and disconnect spark plug wire(s) on power mowers before adjusting, repairing, or replacing cutting blade(s). If the equipment being used is of the rotary type, the blade mounting bolt or nut shall be always inspected to prevent its loosening and removal of the blade. (A)
- e. Mower engines shall be allowed to cool off before the unit is refueled. (A)

#### 19.30 MACHINE GUARDING

Guarding is necessary to prevent injuries on or around machines. Specifically, machine guarding prevents injury from the following sources:

- a. Direct contact with the moving parts of the machine.
- b. Work in process (kickbacks on a circular ripsaw, metal chips from a machine tool, splashing of not metal or chemicals, etc.)
- c. Mechanical failure.

- d. Electrical failure.
- e. Human failure resulting from such things as curiosity, zeal, distraction, fatigue, worry, anger, illness and deliberate chance-taking.
- 19.31 Mechanical guards, which must be made use of by the workmen at all times, shall be provided for the following:
  - a. Rotating mechanism
  - b. Cutting or shearing mechanism
  - c. Screw or worm mechanism
  - d. Compressing and tensioning mechanism
- 19.32 Interlocking devices may be mechanical, electrical pneumatic or a combination of these types. The operator of the machine shall be sure that the interlocking device:
  - a. Acts to guard the dangerous part before the machine is operated. (B)
  - b. Keeps the guard closed until the dangerous part is at rest, or stops the machine when the guard is opened. (B)
  - c. Prevents the operation of the machine if the interlocking mechanism is not in place. (B)

The machine shall never be operated when the interlocking device is not working. (B)

- 19.33 Machine guards shall not be adjusted or removed for any reason by anyone unless. (B)
  - a. The supervisor gives specific permission.
  - b. The person concerned is specifically trained.
  - c. Machine adjustment is considered a normal part of his job. (B)
- 19.34 Machines shall not be started unless the guards are in place and in good condition. Defective or missing guards shall be reported to the foreman immediately. (B)
- 19.35 Where oiling shall be done while a machine is in operation, extension fittings shall be used to place the operator out of danger. (B)

19.36 Whenever safeguards or devices are removed for repair, adjustment, or servicing of equipment (lubrication and maintenance), the power for the equipment shall be turned off and the main switch locked and tagged. (B)

#### 19.37 SCAFFOLDS AND LADDERS

Scaffolds and ladders shall be inspected as required. Loose or missing parts, cracks, splinters, or knots in uprights, braces, steps or rungs shall be noted and repaired. (A)

- 19.38 Scaffolding shall be constructed of sound materials, securely fastened and supported. Wooden materials called for in the plans for scaffolds shall be free of knots and other imperfections of not less than five (5) cms. In thickness, painted red on both ends for identification and shall not be used for any other purpose. (B)
- 19.39 Never use a substandard scaffold. (B)
- 19.40 Only experienced employees shall erect or construct and dismantle scaffolds. Scaffolds shall be dismantled and returned to stock when not in use. Nails shall not be left in dismantled scaffolds. (B)
- 19.41 Scaffolds and ladders built by others shall be carefully inspected before use. (B)
- 19.42 Scaffolds shall not be overloaded beyond their working capacity. (B)
- 19.43 Timber supports or braces of scaffolds erected and in use shall not be removed unless permitted by the supervisor. (B)
- 19.44 Scaffolds shall be provided with a protective roofing made of light lumber, heavy canvass or heavy wire screen, when other men are working overhead. (B)
- 19.45 Do not allow men to jump on or to, or hang tools on any part of, nor heavy materials to be dropped on, or anything to be thrown from, the scaffold. (B)
- 19.46 Workmen shall be provided shall not work on a scaffold installed outdoors during a storm or high wind. (A)
- 19.47 A safe means of access to the scaffold, either by stairs or permanent ladder, shall be provided. If a ladder is used, it shall be in good condition and its upper end securely fastened to prevent tipping or slipping. (A)

- 19.48 Scaffold shall be protected from being struck by trucks or wagons or from materials being dumped. (B)
- 19.49 When hoisting a load, do not let it swing against or catch on scaffolds. (B)
- 19.50 Good housekeeping shall be observed on scaffolds at all times. (A)

#### 19.51 BUILT-IN SCAFFOLDS

- a. Uprights of built-in scaffolds shall rest on a solid foundation to prevent settling and shall be plumbed and securely fixed at the bottom to prevent shifting. (A)
- b. Toeboards of a least 50 mm in height shall be installed at the outer edges of the platform to prevent tools and other materials from falling off. In spite of this protection, however, precautions shall be taken especially during the process of raising the platform to a new elevation, to prevent objects from falling on the men below. (B)

#### 19.52 OUTRIGGERS SCAFFOLDS

- a. Outrigger scaffolds shall not be used if another type of scaffolds can be utilized. When used, they shall be limited only to cornices and light work and shall be carefully inspected before such use by the superintendent or his duly authorized representative. (B)
- b. When used at heights of over three stories, outrigger scaffolds shall be at least one meter wide. (C)

#### 19.53 **PIPE SCAFFOLD**

- Pipe members shall be of GI pipe, painted and kept free of scales. Use only appropriate joints such as bolts, clamps, welded joints and quick openings. (B)
- b. Pipes of not less than 80 mm. diameter shall be used where the scaffold has a span of not more than 3.6 m. and with a width not exceeding 1.8 m. For a longer span, the size of the pipe shall be determined by design. Hangers shall be provided for the pipe beam at least every 2.5 m. interval.
- c. Supporting ropes shall be securely fastened to prevent slip-off in the ends of the pipes. (B)

#### 19.54 STRUCTURAL STEEL SCAFOLDS

a. Flooring, made of solid 75 mm. thick planks, shall cover the entire floor area of the building under construction at most within two stories below the riveter and four stories below the erectors. (B)

b. Permanent gratings, where required, and forms for concrete flooring, shall be installed without delay. (C)

#### 19.55 SUSPENDED SCAFFOLDS

- a. Outriggers of suspended scaffolds shall be well secured to the frame or structure with clamps or "U" bolts of good condition. (B)
- b. Shackles or beam clamps holding the cable shall be well fastened to the outrigger and a stop shall be placed on the outside end of the outrigger. (B)
- c. Only experienced men shall be assigned to operate the winches controlling the scaffold; they shall also see to it that the scaffold platform is kept well. (C)
- Guardrails, toeboards, overhead roofs and other protections shall be inspected daily and made sure to be in good condition before use.
   (A)

# 19.56 SWINGING SCAFFOLDS

- a. Blocks, anchors and outriggers of swinging scaffolds shall be securely fastened. (B)
- b. Before going on or off a swinging scaffold, the workmen shall lower it to the ground or securely leashed to the building or structure. (B)
- c. A platform used on swinging scaffolds shall be provided with ample guards and where necessary, with safety lines. (B)
- d. Ropes used for swinging scaffolds shall be protected from acid and other substances, which might affect their strength and usability. When scaffolds are taken down, the ropes shall be properly rolled and tagged to indicate that they are for swinging scaffold use only. (B)

# 19.57 **LADDERS**

- a. Ladders shall be built of strong materials and fillers shall be nailed between rungs. (A)
- b. If ladders are used for two-way traffic, provide one for ascending and another one for descending. (A)
- c. The upper ends of the side rails of ladders shall project no more than 1.2 m. above the point where it is resting and with lower ends set on stable footing. (B)

- d. When using a ladder mounted or placed on a vehicle, the brake of the vehicle should be engaged and the vehicle properly chucked. (B)
- e. In placing a ladder, the distance from the foot of the ladder to the building against which it is leaning, shall be approximately one-fourth the length of the ladder. In other words, the foot of a 12-foot ladder shall be placed about three feet away from the building. (B)
- f. Wooden ladders with across-grained members or weak rungs shall not be used. (A)
- g. Whenever possible, grip side rails while using ladder. If it is not practical to grip side rails, then grip rungs securely with both hands while descending or ascending. (B)
- h. Do not work on a high ladder in a strong wind. (B)
- i. When using a folding ladder, make sure it is fully spread before climbing. (B)
- j. Always carry a ladder with the anti-slip device (rubber) towards the rear and the front and pointing upward. Be extra careful when approaching doorways and corners. When two men are carrying a long ladder, each man shall be close to his end of the ladder. (A)
- k. Never place a ladder in front of a door without first locking the door or placing a man on guard. (A)
- I. Keep both hands free for climbing or descending. (B)
- m. Do not carry tools in your hands. (B)
- n. Always face a ladder when climbing or descending. (B)
- o. Keep eyes on rungs while climbing. There might be a broken rung. (B)
- p. If shoes are slippery, clean them before you climb. (A)
- q. Use ladders with an anti-slip device to prevent slipping. On extra slippery surfaces, or insecure contact at top or bottom of the ladder, tie the ladder at the base or have a man hold it. (A)
- r. Do not permit more than one person on a ladder at one time. (B)
- s. Never lean too far to one side of the ladder. (B)
- t. Do not paint ladders as paint may conceal defects. Use linseed oil, clear varnish or white shellac instead. (A)

- u. Defective ladders shall be repaired or otherwise destroyed. (A)
- v. Untreated portable ladders shall not be left exposed to the elements when in use, but shall be kept in a sheltered place to avoid warps and cracks. (A)
- w. Ladders stored horizontally shall be supported at both ends and in between to prevent sagging of the middle section, which tends to loosen rungs or cleats and warp the rails. (A)

# CHAPTER III SAFETY IN THE OFFICE

#### SECTION 20 OFFICE BEHAVIOUR

- 20.01 Running and horseplaying in work area are prohibited. (A)
- 20.2 Doors should not be pushed abruptly when opening or slammed when closing. Do not stay within the path of the door swing. (A)
- 20.3 When carrying a stack of materials, be sure you can see over and around it when walking through the office. Employees should not carry stacks of materials on stairs; they should use the elevator. When the elevator is not available, employees carrying such materials shall not have both arms loaded when using the stairs; one hand should be free to use the handrails. (A)
- 20.04 Employees shall not crowd or indulge in horseplay on stairs. Falls on stairs commonly occur when the person is talking, laughing and turning to friends while going downstairs. (B)
- 20.5 Do not congregate on stairs or landings and do not stand outside doors at the head or foot of stairs. (A)
- 20.06 Scooting across the floor while sitting on a chair is prohibited. Avoid leaning out from the chair to pick up objects on the floors. (A)
- 20.07 When a floor-mounted telephone or electrical outlet box is exposed after moving furniture, mark the box with tripping hazard sign until it is removed. The outlet shall be removed and if needed relocated. An authorized person such as one from Facilities Management –

Electrical Unit should be called to fix such thing. It is far cheaper to do this than to pay for a fall. (A)

- 20.08 Do not read while walking. (A)
- 20.09 Do not place pencils in any container with point's outward. (A)
- 20.10 Keep in a safe place any pointed or bladed instrument immediately after use. Do not hand any such instruments to someone with the point towards him. (A)
- 20.11 Do not leave the knife blade of the paper cutter in the raised position. Do not leave breakable objects on the edge of desks or tables where they can easily be pushed off. (A)
- 20.12 Office machines and equipment must be operated only by authorized persons. Nobody shall be allowed to tinker with interlocks on the guards. Machines or equipment shall not be cleaned or serviced while they are in operation. (B)
- 20.13 Dart playing in all offices and work areas at all times, is prohibited. Dart playing shall be allowed only in places specifically designated for the game at the Company's recreational facilities/ areas. (B)
- 20.14 Employees must wear goggles or Personal Protective Equipment issued, if there is any, suited for the job to be performed to protect their eyes from the following hazards:
  - a. Flying objects and hot metals.
  - b. Injurious light and heat rays.
  - c. Gases, fumes or chemicals.
  - d. Dust and wind, as when boring a hole on a piece of brick. (B)
- 20.15 Corrective spectacles or eyeglasses may never be used as a substitute for safety goggles. (B)
- 20.16 A prescribed face shield shall be worn by the workers as required. (B)

# CHAPTER IV

## **GENERAL CONSTRUCTION AND SAFETY GUIDELINES**

#### SECTION 21 SAFETY GUIDES ON EXCAVATION ALONG HIGHWAYS

#### 21.01 INFORMATIVE/WARNING SIGNS

- a. Informative warning signs, including danger signs, shall be install at strategic locations around the construction site. Warning signs which states "*Work is Going On*" or "*Excavation Ahead*" shall be located at sidewalks and center islands along the major thoroughfares and national roads, 350 meters and 150 meters respectively, before the actual construction site. (B)
- b. Standard wooden/steel barricades, painted striped black and yellow and 0.80 meter in height and 1.20 meter in length, shall be placed at strategic locations visible or around the construction site to separate the construction area from the passable areas of the right-of-ways. Along or parallel to the stretch of the excavation area with a maximum distance of 3.00 meters between each other. (B).
- c. All major thoroughfares and national roads, Board-ups painted with black and yellow, 2.4meters in length and 1.5meters in total height shall be placed to enclose the stretch of the excavation area when reduction of passable road lanes is involved. (B)
- d. Rubber cones, painted black and yellow, shall be used along major thoroughfares and national roads, particularly when reduction of passable road lanes is involved, so as to properly guide motorists of lane changes and the excavation work being undertaken. (B)
- e. Red and/or amber flashing lights shall be installed at a height of 1.20 meters and spaced at 3.00 meters around the construction area during nighttime. These flashing lights shall be provided at material storage areas and equipment parking sites within the motorist's passable way. Early warning devices with reflectorized surfaces may also be used as warning signs in case of breakdown of flashing lights. (B)
- f. Failure to install any single barricade or EWD (completely zero) within the construction areas is a grave violation.

#### 21.02 **EXCAVATION**

a. Excavations shall be done in sections of not more than one hundred fifty (150) meters at a time measured longitudinally. The remaining sections shall at all times be made passable to vehicles and pedestrians. (B)

b. No excavations shall be done which will completely close the rightof- way to vehicle use. Excavations shall be done portion by portion of not more than 50 percent of the road width at a time, leaving the remaining portion satisfactorily passable. Complete closure to vehicular passage may only be resorted to if there is a compelling reason. (A)

c. Before another section is excavated, the excavated portion (with completed utility installation) shall have been properly backfilled with appropriate filling materials, the sub-base leveled and graded, the surfaced covered with steel plates, the work area clean or loose soil or dirty stones and passable to vehicles and pedestrians prior to surface restoration. (A)

#### 21.03 EXCAVATION CROSSINGS

a. Excavation in crossing alleys, streets, roads and passageways shall be done in half-sections; on major thoroughfares, highways and national roads, work shall be done during nighttime. (A)

b. Unfinished excavation crossings shall be provided with temporary steel plates with minimum thickness of  $\frac{3}{4}$ " or sufficient thickness depending on the expected traffic loads to allow safe passage of vehicles and pedestrians. (B)

#### 21.4 CONSTRUCTION EQUIPMENT AND VEHICLES

a. There shall be specific contractors central storage site for all construction equipments and vehicles. (A)

- b. Temporary storage and parking sites shall be located at the most appropriate areas in such a way that they do not affect excavation work and traffic flows. (A)
- c. Work requiring the use of large equipment which may obstruct or interfere with the safe and normal flow of traffic, like concrete pouring by transit mixers and hauling/transport of materials, shall be done preferably during nighttime from 9:00 P.M. to 4:00 A. M. or when traffic volume is at light. (A)
- d. Survey construction areas for existing overhead electric wires. (B)
- e. Keep booms and cables of crane from power lines by at least 3.5 meters. (C)
- f. Any crane or truck using a boom or derrick near electric wire shall have the chassis grounded before the boom or derrick is raised. (C)

#### 21.05 **MATERIAL STORAGE**

a. Construction materials shall be piled, stored or parked in strategic places designated on the worksite in such a way that passage of

vehicles along the road and pedestrians on the sidewalks are not constricted or closed. (A)

b. Excess materials, excavated or otherwise, shall be transported immediately by the excavators to a specified or designated dumping site. No excess materials are to be dumped into adjacent areas without the approval of authorities concerned. (B)

c. Construction materials, whether excavated or otherwise, shall be stored and prevented from causing to roll, flow or wash upon passable road pavements. If and when the same are caused to roll, flow or wash upon passable road pavements, they shall be removed from the street within twenty-four (24) hours, preferably during least traffic volume or nighttime. (B)

#### 21.06 MAINTENANCE AND CLEANLINESS IN WORK AREAS

a. The roadway or passageway shall always be maintained clean and clear of loose stones and earth materials from the excavation work which may pose hazards to the riding public and pedestrians. (A)

b. Storage location of construction materials, equipment, parking and depot shall not obstruct or block passageways unless otherwise permitted. (A)

c. No materials shall be stored that may block free passage of surface water to the storm drainage. (A)

d. Water from excavations shall be discharged to the nearest gutters and canals. Drainage pipes and canals shall be properly maintained and unclogged during construction period. (A)

#### 21.07 DAMAGE TO ADJOINING UTILITY LINES

Accidental damage to adjoining utility lines shall be reported immediately to the agency concerned for prompt repairs to minimize service interruption and to avoid construction time delays. (A)

#### 21.08 GAS LEAKAGE

- a. Gas leakage shall be reported immediately to the gas company while measures are undertaken by the excavator to prevent ignition of any kind. (B)
- b. Upon confirmation of any gas leakage, construction work shall be stopped until such time that the leakage has been properly corrected, sealed, and tested. Construction work shall be resumed only after official notification from the Gas Company concerned has been received. (B)

#### 21.09 DAYTIME WORK STOPPAGE

a. When traffic conditions call for a night schedule, flat steel plates with minimum thickness of <sup>3</sup>/<sub>4</sub>" or sufficient thickness depending on expected traffic load shall be placed to cover the trenches or the excavated portions of the right-of-way during non working time in

order to make the areas passable to pedestrian and vehicular traffic. Steel ribs shall be welded on under the steel plates if necessary. (B)

b. Roadways and sideways shall be cleared of any debris and/or earth materials so as to ensure safe vehicular and pedestrian use. (B)

c. Before the resumption of the excavation work, necessary signs, barricades, electric flashing lights, etc. shall be installed at strategic locations at all times. (B)

d. No materials, equipment and tools shall be stored, parked, or piled along the roadway during non-working time, which pose problems or danger to the public. (B)

#### **EXCAVATION AND SHORING**

- 21.10 Excavations 1.20 meters or more in depth, unless in a stable soil, rock, shale or cemented sand and gravel, shall either be sloped to the angle of repose and be supported by sheeting, sheet piling, cribbing, shoring or other support systems built in accordance with engineering standards to prevent the possibility of a cave-in. (C)
- 21.11 Conduct of study on pre-excavation conditions in order to evaluate changes that might occur, or situations that might develop, and in order to plan the job ahead based on these findings shall be done accordingly. (C)
- 21.12 Determine the location of underground water pipes using existing plans. When the excavation approaches the estimated level of such an installation, careful probing and digging shall be observed. (B)
- 21.13 Bracing or shoring shall be inspected frequently particularly after heavy rain or typhoon and any necessary adjustments shall be made immediately. (A)
- 21.14 Men who work in ditches are in danger of being hit by objects thrown into the ditch. Tools and materials lying near it shall be moved back several feet away. (B)
- 21.15 Use closely placed plank shoring to guard against a cave-in by soil that is saturated with water, subject to vibration, in a refill area or excavated to a depth of over 1.8 meters. (A)
- 21.16 In hard clay, rock or stable soil, use vertical planking braced at intervals against the walls to shore the trenches. (B)
- 21.17 Shoring built in accordance with standard engineering practice or procedure shall be provided on an excavation where the possibility of a cave-in exists. (B)

- 21.18 All open excavations shall be barricaded to warn the public and to prevent anyone from falling into them. When an excavation shall remain open for the duration of the construction work, barricades, fences and warning signs are necessary. In cases where watchmen and flagmen are needed, flares, lanterns or flashing lights at night, shall always guard the construction or working areas. (C)
- 21.19 Unless the men working underground are protected by roof, materials or tools shall not be passed over their heads. (A)

#### 21.20 MACHINE EXCAVATION

- a. No digging machines shall be allowed to excavate close to underground water facilities. Establish proximity limits for machine operation and complete the excavation by hand digging. (C)
- b. When excavation is being done, workmen shall be warned of underground waterline facilities, for a careful operation of driving picks, pavement breakers or other powered tools. (C)
- c. Materials excavated by machine shall be thrown at least 60 cms. from the edge of the excavation. (A)
- d. Pick and shovel men working in an excavation shall be kept far apart enough to prevent injury to one another. (B)
- e. Excavated materials shall be placed at least 35 cms. from the wall of the excavation unless boards are installed to prevent fallback. (A)

#### 21.21 TRENCH EXCAVATION

a. A trench of 1.2 meters deep or more shall be provided with portable ladders to facilitate safe entrance and exit. The ladders extend from the bottom of the trench to at least 0.90

The ladders extend from the bottom of the trench to at least 0.90 meters above the surface of the ground. The horizontal distance in between ladders shall be eight (8) meters. (A)

- In hand-excavated trenches, the end of braces to stringers shall be secured to prevent the braces from being knocked out of place. (A)
- c. Workers shall wear hard hats when they are inside a trench. (B)
- d. Workers shall wear eye and foot protection when they are using a jackhammer or when they are exposed to flying particles or falling objects. (B)
- e. Employees shall not go under an overhanging bank when working near one. (B)

## 21.22 TEMPORARY WALKWAYS

- a. Temporary walkways at least two planks wide, shall be created to construction areas, if necessary, to prevent any hazard or accident to passing public. (B)
- b. The span between bearing points of two (2) planks, 5 cms. thick and 20 cms. wide, shall be over 2.5 meters and the planks shall be tested before being placed in use. (B)
- c. Aisles and walkways shall be kept clear of obstructions. (A)

## 21.23 GOOD HOUSEKEEPING

- a. Materials shall be piled and stored in an orderly manner and properly secured from falling over. Employees and/or contractors shall observe the standard operating procedures on materials handling and good housekeeping applicable to the job or type of work in the construction site, which procedures affect the image of the company. (B)
- b. Materials shall be stored in such a way as not to obstruct fire exits, fire protection systems, vehicular traffic, electrical boxes and stairways. (B)
- c. Remove or bend all protruding nails. Cracks, splinters, ruts and breaks in the floor shall be reported and / or repaired as soon as they are discovered. (A)
- d. It shall be the responsibility of the Safety Engineer/Authorized representative to see to it that the working place is kept clean and orderly. (A)
- e. Oil, grease or other slippery substances on floors, rumps, pathways, shower rooms, etc., shall be wiped off or removed. (B)
- f. Leftovers or cuttings on the job, such as lumber, rebar, steel, welding butts, etc., shall not be left around where they will pose as tripping and falling hazards. They shall properly dispose of or stored if still usable. (A)
- g. Waste or trash drums/cans shall be placed in strategic places in the work areas. (A)
- h. Aisles and passageways shall be properly lighted, marked and kept clean of obstructions. (B)
- i. Lockers shall be cleaned out and inspected periodically to prevent unhealthful or unsanitary accumulation. (A)

#### 21.24 MATERIALS HANDLING AND STORING

- **a.** Gas cylinders shall be transported in a special handcart. A cylinder cage shall be used when hoisting or lowering oxyacetylene or any other compressed gas cylinders. (A)
- **b.** When using compressed gas, see to it that the cylinder tank is upright position, properly secured and well protected from any falling objects and slag. (B)

- **c.** Cylinders shall not be allowed to come in contact with energized conductors or ground wires from electrical equipment. (B)
- **d.** Special wrenches of non-sparkling materials shall be used to remove cylinder bungs. Steel chisels and hammers shall never be used to remove bungs. (A)
- e. Employees shall never tamper the safety relief devices of cylinders nor shall they force connections that do not fit. (B)
- **f.** Oil or grease shall not be used for lubricating valve gauge connections or other parts of the oxygen system. (B)
- g. All oxygen and acetylene cylinder shall be closed when the cylinders are empty. (A)
- **h.** Workmen with greasy hands shall never change pressure regulators. (A)
- i. A leaking cylinder shall never be used. (B)
- j. A flame shall not be used to detect flammable gas leaks. Use soapsuds. (D)
- **k.** The recessed top of cylinder shall not be used as a place for tools. (A)

## 21.25 MANUAL HANDLING

- **a.** the safe limits for frequent lifting is fifty (50) pounds for the average male worker and twenty-five (25) pounds for the average female worker with the object in compact form. If the worker is in doubt as to the weight of an object, test lift will indicate whether or not it is within the workmen's lifting power. (A)
- b. When lifting heavy objects, make sure that your footing is secure. Assume a squatting position with your back erect and raise the object by straightening the legs. This method brings leg muscles into use and lessens back strain. (A)
- c. Get firm grip of the object to be lifted. It is important before lifting to have the hands as well as the object free of oil, grease or other slippery substances. (A)
- **d.** When one man has to handle long materials, such as pipes, lumber or ladders, he shall keep the prong end high and the rear end low especially at corners or other places where vision is obstructed. (A)
- e. When a worker is to lift a heavy or bulky object and carry it to another point, he shall first inspect the route to be taken, making sure that there is no obstruction or spilled substance on the floor that might cause him to trip or slip. Make sure clearance is sufficient. If there are obstructions, look for a safe route. (A)
- f. When moving heavy objects, including tanks, pipes or steel drums in an inclined direction, ropes or other tackles shall be used to control their motion. In no case shall anyone be permitted to stay on the downhill side. (B)

- **g.** Before an object is taken from a pile of stock, see to it that the object is not supporting another that might fall when the support is removed. (A)
- Wear prescribed leather working gloves when lifting or handling materials with rough surfaces, sharp edges and those with sliver (A)
- i. Wear chemical gloves or their equivalent when handling corrosive chemicals such as acids, alkaline, etc. Have plenty of clean water close at hand. ( B )
- j. Wear prescribed asbestos hand gloves when handling hot objects or materials. (B)
- k. When storing and handling pressurized gases such as oxygen acetylene, hydrogen, etc., the cylinder tank shall be properly and tightly capped, placed in an upright position and stored away from heat and firmly fastened to prevent it from falling or tripping over. (B)
- I. When handling pipes with the use of winch or cable, be sure that the pipes are securely tied and balanced to avoid slippage. Taglines shall be used when maneuvering or positioning the pipes. When it becomes necessary to use the hands directly to maneuver the pipes, extra care shall be exercised to prevent them from being pinched. Also, when setting materials down, keep fingers away from points. (B)

## 21.26 MECHANICAL HANDLING

- **a.** For lifting heavy loads, wire rope slings are preferable than chains. Either chain or wire rope, the working capacity shall not be exceeded. At points where rope slings passes around sharp corners of steel, padding shall be provided. (A)
- **b.** A steel member shall not be hoisted to its structural position until it is ready to fasten in place. (B)
- c. Suspended loads shall be controlled by a tagline. (B)
- **d.** Each piece of steel shall be securely bolted before the hoist line is removed. (C)

#### e. CABLE

- 1. Inspect all cables regularly and replace those that are worn out, frayed or with broken strands. Kinking and twisting of the cable shall be carefully avoided. (B)
- 2. A separate wire rope shall be used to secure coiled cables.(A)
- 3. Cables shall be lubricated only with the prescribed lubricants. (A)
- 4. All cables strung less than three (3) meters from the floor shall be properly guarded. ( A )
- 5. In attaching cable clamps, it is important to have the "U" bolt over the short end of the cable. (B)

- 6. In determining the number and sizes of "U " bolts to be used, refer to standard instructions. (A)
- 7. Cables and slings shall not be stored in an open area. (A)
- 8. Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for use. (A)

#### f. CHAINS

- Chains shall be carefully and regularly inspected for cracks or flaws. Chains break is without warning. The competent shop shall only do heat-treatment and repair of chain link. (B)
- 2. Check for elongation and shearing out of chain links. If a chain has been stretched three percent or more or found with defects, it shall never be used. (B)
- 3. Engine drive chains shall have a steel guard extending from headboard following contour of line-shaft sprocket to derrick floor behind drum. The guard shall be fitted to allow not more than ten (10) centimeters. Clearance between sprocket and guard. (B)
- Chains shall not be subject to sudden shock while in use. Loads shall not be lifted with a kinked or knotted chain. (C)

## g. HOOKS

1. Hooks shall be inspected regularly. Those found straightened or deformed shall never be used. (B)

2. The hook's working capacity shall not be exceeded. (B)

3.In the absence of the spring action claw lock, hook opening shall be properly tied to prevent cable slings from slipping or jumping out of the hook. (B)

## h. PULLEYS

- Sheaves of the largest practical diameter shall be used for all cable installations, regularly inspected, particularly there pins and kept well maintained. Worn-out sheaves shall not be used. (A)
- 2. Maintain proper alignment of sheaves and drums to avoid wear and tear of their sides as well as of the cable. (A)
- 3. Blocks or pulleys intended for hemp ropes shall not be used for cables. (B)
- 4. Blocks or pulleys shall be well anchored. When located near the floor or in other exposed places, they shall be properly guarded. (A)

#### i. ROPES

- 1. Rope shall not be used beyond their working capacity. (B)
- 2. Wet ropes shall be properly dried before use. (A)

- Ropes shall not be dragged over sharp-edged objects, rough surfaces, or over other ropes lying on the ground. ( A)
- 4. Ropes shall be regularly inspected for kinks, and weak portions, such as worn-out fibers, cuts, burns, etc. Defective ropes shall be turned in for replacement. (A)
- 5. When load does not ride "ride" properly when being raised with a rope, lower the load and readjust the sling. ( A )
- 6. No person shall ride on the load or hook while it is being moved. (C)
- 7. Loads being raised with ropes shall never be swung over the heads of people. (C)

## 21.27 TEAM LIFTING AND CARRYING

- **a.** When two (2) or more men shall carry a single object, they shall adjust the load in such a way that each person has an equal share of the weight. Test lifts shall be made before proceeding. (A)
- **b.** When two men carry long sections of pipes or lumber, they shall carry this on the same shoulder and walk in step. Shoulder pads will prevent cutting of the shoulders and help reduce fatigue. (A)
- c. When a gang of men carries a heavy object like a beam or pipe, the foreman shall direct the work and special tools such as tongs shall be used. (B)

## 21.28 STORAGE

- Both temporary and permanent storage areas shall be neat and orderly. (A)
- **b.** When planning materials storage, make sure that materials do not obstruct fire alarm boxes, fire extinguishers, first aid equipment, light, and electric switches and fuse boxes. All exit and aisles shall be kept clear at all times. (B)
- **c.** There shall be at least a half-meter clearance below sprinkler heads to reduce interference with water distribution. This clearance shall be increased if the material being stored is very flammable. (A)
- **d.** Highly toxic substances, such as cyanides and soluble exalates, shall be kept in containers of distinctive shapes if they shall be handled manually. (A)
- e. Storage of flammable liquids in containers shall not be permitted. Approved containers for flammable liquids shall be closed after each use and when empty. Warning levels shall be removed from flammable liquid containers when empty. (B)
- f. Stocks of gaseous materials shall always be stored in bottle racks. (B)

- **g.** Smoking is strictly prohibited inside or within the vicinity of the storeroom containing flammable liquids or gases. (C)
- h. Barrels and kegs shall be piled one atop the other. A plan shall be laid on top of each row of kegs or barrels before others are placed above them. (A)
- i. Safe floor load capacity and maximum heights to which specific materials may be piled shall be posted conspicuously. (A)
- j. Aisles and unloading areas shall be clearly marked in accordance with the National Standard Safety Color Code. (A)
- **k.** Aisles leading to fire-extinguishing equipment and electrical panel boards shall be kept clear. (B)

## 21.29 CLEANING STORAGE TANKS

- **a.** A tank shall be gas-freed before any work is performed inside it. (B)
- **b.** A worker shall not be allowed to enter a gas or oxygen deficient tank unless absolutely necessary with the appropriate respiratory protective attire. Another worker shall be assigned outside the tank for possible assistance to the man inside the tank. (B)
- c. To have an accurate estimate of amount of flammable or toxic vapor present in the tank, a gas detector shall always be used.
   (B)
- **d.** Workers shall always have a clear path of escape from a tank and shall bear in mind that they may have to use it in a hurry. A ladder shall always be used when a tank shall be entered from above and it shall be left secured in place until the last man is out of the tank. Under severe conditions, a lifeline is recommended to assist with the rescue work. (B)
- e. Burning, welding, cutting and spark-producing operations shall not be permitted in a tank until the area has been thoroughly cleaned and its atmosphere has been determined free from flammable or toxic vapors. Where any vapor is present, further ventilation will be required to remove the vapor from the tank. (C)
- f. Gas tests shall be made frequently if the presence of gas is suspected. (C)

#### 21.30 STORAGE OF CYLINDERS

- a. Cylinders shall not be placed or stored in a place where sparks from welding or cutting operations could reach them. (B)
- b. Cylinders containing acetylene or oxygen shall not be stored in a general storeroom. They shall be stored separately in a wellventilated fireproof area. (B)
- c. Compressed gas cylinders shall be stored vertically with the shipping or protection caps on. All cylinders shall be chained or otherwise fastened firmly against a wall, post or other solid objects. (B)

- **d.** Extremely corrosive gases like chlorine shall be stored in small quantities only, unless it is used in a relatively short time. (B)
- e. Empty cylinders shall be stored apart from full or loaded cylinders. (B)

## 21.31 **PIPE WORK**

- a. When opening a pipe joint, either to disconnect a section or to insert a "blind", loosen the bolt and crack joint slightly first to make sure there is no pressure on the line. Be careful to keep yourself clear on escaping gas or liquid. (B)
- b. If there is a possibility that liquid or acid might escape due to pressure when the flange is opened, a chisel (or an effective tool to open) shall be used first. Drive the chisel in small sheet of lead or rubber that shall be allowed to remain on the chisel to shield the worker from any emission. (B)
- c. Consult the supervisor on the right material to be used for gaskets or packing for various temperatures, chemicals and pressures. (A)
- d. Do not stand on pipelines. If there is a need for a worker to work overhead where the footing is insecure, a scaffold or ladder shall be provided. Use safety belts and lifelines if necessary. (B)
- e. To avoid getting your fingers mashed or your hand cut by frayed thread projections, avoid handling pipes or other materials inside it. (B)
- f. When several men carry pipes or other materials, lifting and lowering shall be done at a given signal and their feet in clear. (B)
- **g.** When unloading pipes from trucks, lower individual pieces by snubs all the way down the skids. Do not stand between the skids while the pipes are being lowered. (B)

Tanks, towers or vessels shall not be entered unless there is an instruction from the supervisor. (B)

- h. Push pipe tools away from your face or head. If it is necessary to pull on the tools, pull it gradually so that your face will not be struck if the wrench slips. (A)
- i. Use a wire brush or rage to remove cut off pipes. Do not wipe them with your bare hands or jar loose with a hammer. ( A )
- **j.** Pipelines shall not be left suspended in the air as there is danger of dropping or someone might walk on them. All incomplete lines shall be properly braced and capped. (C)
- **k.** If lines are laid down close to the ground, ramp shall be built over the pipe to serve as a makeshift runway. (B)
- When aligning a pipe in the trench with either manual or mechanical power, keep hands and fingers away from the ends of the pipe and other substructures that may cause injury by crushing. (B)

- m. Rubber gloves, goggles and suitable clothing shall be worn while working near and other toxic chemicals. Have plenty of clean water nearby. (B)
- n. If tongs (*panipit*) are temporarily left on a pipe, one man shall hold them so they will not fall. Falling tongs have caused many foot injuries. (A)
- **o.** Place pipe supports firmly under the line so a heavy weight cannot be easily thrown to one of several workmen as this may cause sprained backs or mashed feet if the pipe falls. (B)
- **p.** Bolt holes in flanges shall be lined up with a drift pin. Keep fingers off flange holes as they might be cut off. When connected line pipe is being lined with a drift pin with the use of pry holes, the pipe shall be pushed and not lifted to avoid sprained back.
- q. If tongs are used as back-ups while fittings are being set or while coupling is being pulled, operators and other persons shall stay away from the area. (A)
- **r.** Be alert to unsafe conditions of trench sides when measuring, testing or inspecting pipes in place on a trench bottom. (B)
- **s.** When cutting sections of a pipe, keep your feet off the danger zone, and use adequate blockings, chocks or pipe vises to prevent pipe movement during the process. (B)
- t. No attempt shall be made to weld on a line with oil by the use of the oxyacetylene method. (D)
- **u.** Never make electric welds on gravity lines. The lines might contain air and gas with explosive properties. (D)
- v. Air should never be used in clearing or testing pipelines that contain oil or gas, unless the contents have been completely displaced with water. Before water is introduced, nevertheless, a swapper or rubber plug shall be placed between the water and the gas or oil which is being displaced. (D)
- w. Anytime a line is being constructed, reconditioned or repaired and is left open to the atmosphere, one end shall remain open when oil or gas is injected into the line so that the air inside the pipe may be blown out to prevent excessive pressure of the combustible mixture. (B)
- x. Keep tools and appliances in good condition for the handling, cutting, threading or treatment of pipes. Always be sure the tool for the right job. (B)

#### 21.32 **PIPE STORING**

- a. Small pipes shall be stored in racks according to lengths and sizes. (A)
- b. Pipes shall always be blocked to prevent it from rolling or falling.
   (B)
- **c.** Threaded pipes shall be handled with care for threads are sharp and can cause injury. (A)

- **d.** Pipes larger than 5 cm., in diameter, shall be stocked in storage with spacing strips placed between each row. (B)
- e. Each row of stock pipes shall be arranged by block to prevent rolling from the pile. (A)
- f. Pipes shall never be withdrawn from a lower row. (B)
- **g.** Pipe yards and walkways shall be maintained in a clean and orderly manner at all times. (A)
- **h.** In pipe storage areas or where a crane handles allied pipe materials, men shall be conversant with the signals used by the operator and shall stay clear of the load/s path. Standard signals shall be used only. (A)

#### 21.33 **PAINTING**

- **a.** No smoking on an open flame shall be permitted in the immediate area of the paint of operation. (B)
- **b.** When painting indoors or in closed areas, care shall be taken and necessary provides sufficient ventilation. (A)
- c. Paint-soaked rags shall not be left in lockers. They shall be spread out in proper place to dry or be placed in a metal container. (A)
- **d.** Workers shall wash paint off their hands before handling food to avoid poisoning. They shall never eat in workrooms or other places where food may be exposed to lead dust fumes or toxic chemicals. (A)
- e. Paint in which turpentine has been used, as thinner shall not be applied on hot surfaces as this might cause vapor to ignite or worker might be suffocated by the fumes emitted (B)
- **f.** Provide grounding devices for paint guns when painting an area where flammable gas is present. (B)
- **g.** Spray hoses shall be securely fastened to a scaffold so it cannot come loose and drag the man off. (B)
- **h.** Never used suds or caustic solutions in spray-painting equipment. (A)
- i. Reenergize switchboards, transformers and electric equipment before painting them. (C)
- j. Spray painting shall not be done around lights that are not vapor-proof unless current is cut off. (B)
- **k.** Never exceeds the pressure on spray-painting equipment as prescribed by its manufacturer. (A)
- **I.** When using pressurized containers, see that release valves are functioning and equipped with pressure gauges. (B)
- **m.** Workers shall wear the prescribed air respirators or gas masks, as their work requires. (A)
- Norkers shall cleanse their skin thoroughly of any coating materials. Do not use thinner to remove paint from hands or skin. Use only the recommended creams and cleansers. (A)

## 21.34 **WOODWORK**

- **a.** Only experienced and authorized workmen shall operate woodworking machines that have the responsibility for their proper care and of reporting any defect or damage thereto.
- **b.** The supervisor or foreman-in-charge of the unit shall conduct periodic inspection of woodworking machines, tools and other equipment and to see to it that such tools, machines and equipment are in good working condition. (A)
- **c.** Good housekeeping shall be practiced in and around the working area. (A)
- d. Smoking is strictly prohibited inside the woodworking shop. (B)
- e. Under no circumstances shall machine guards, gauges or guides be adjusted while the machine is running. (B)
- f. Never leave a woodworking machine with power on. (B)
- **g.** All portable electrically driven tools shall be provided with grounding devices before use. (B)
- **h.** Workmen shall wear prescribed and issued (if there is any) personal protective equipment while at work. (B)
- i. Never reach anything over a power saw. ( B )
- j. When operating a power saw, do not stand in line with it. Stand on one side to avoid being hit by a possible kickback. (A)
- **k.** When sawing board with a handsaw, hold board with your hand on the long end. Your body shall be perpendicular to the motion of the saw. Do not crowd or twist saw. (A)
- I. Discontinue using a warped or dented saw. Do not use a saw having its teeth filed to a backward pitch. (A)
- m. Do not allow sawdust to accumulate on the floor. (A)
- **n.** Shut off power saw when not in use. (B)
- Avoid using saw facing the direction of the wind or with head below the level of the board. Sawdust will get into your eyes. (A)
- p. Drill a hole with an awl, auger, drill, boring bit or drive a nail when starting a screw. On rough work, it is advisable to drive a screw halfway with a hammer. (A)
- **q.** When carrying a window glass, it shall be outside of your arm with palm of one hand facing outwards and the other reaching across the body grasping the glass top. Keep sleeves rolled down and cuffs buttoned around wrists. (A)
- **r.** When a large amount of glasswork is being done, protect fingers and wrists by wearing leather gloves and cuffs. (B)
- **s.** When one blade is removed from planner spindle for sharpening or for some purpose, all other blades shall also be removed at the same time. This is to prevent blades from being hurled from the spindle when the machine is started accidentally. (B)
- t. Woodworking machines shall have a master switch that can be locked. (A)

- **u.** Every machine shall have a "stop" switch conveniently located within easy reach so the operator can shut off the power in case of emergency. (A)
- V. Conversation shall be avoided while an operator is running the woodworking machine. Employees shall not interfere with or distract the operator's attention. (A)
- w. Saw shall not be stopped too quickly, so that not a piece of wood shall be thrust against the cutting edges when power is shut off. (B)
- x. When fabricating pieces where several kinds of wood are to make up the same piece, that is both soft and hard wood tendon together, care shall be taken when forming a circle or making a deep cut. Stock is likely to jerk away from the operator. Unless held firmly, this might cause serious injury. (B)

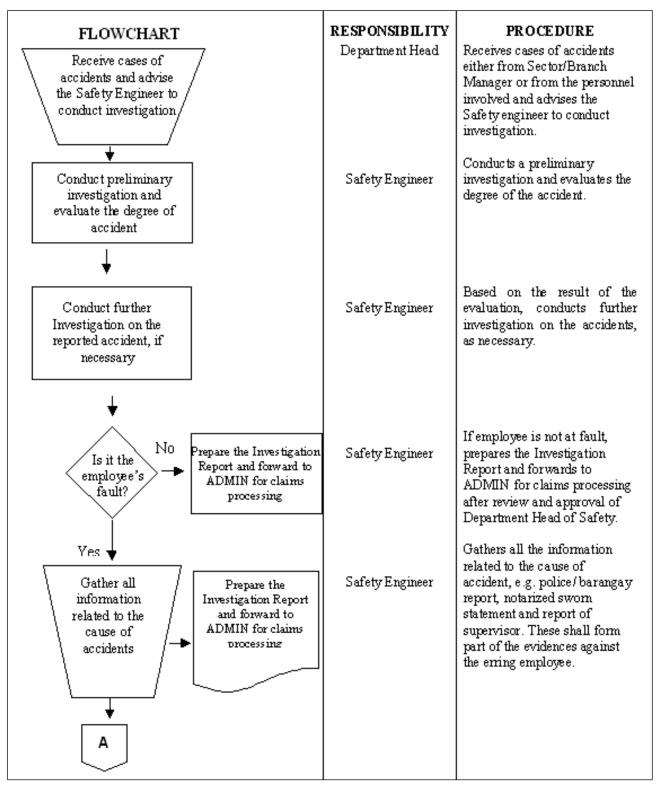
#### 21.35 **MASONRY**

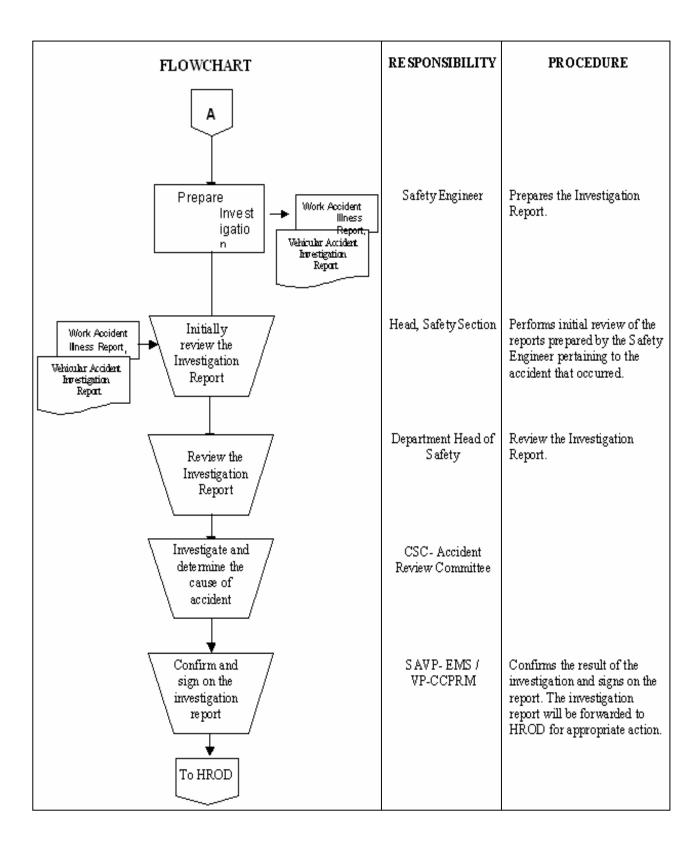
- a. If concrete is being chipped in an area where combustible gas is present, that part of the slab being chipped shall be kept under a constant stream of water or the slab itself shall be kept underwater. (B)
- **b.** Do not backfill against newly constructed walls. (A)
- c. Never put guys or stays through brickwork until they have set firmly. (B)

## 21.36 DEMOLITION OF STRUCTURES

- a. Keep the public and unauthorized personnel at a safe distance away from structure by the use of barricades and signs, or protective temporary walls as the case may be. A watchman may be assigned when necessary. (D)
- b. Disconnect utility services (gas, steam, electricity) outside the building. Maintain water lines as long as possible, or install a temporary water source for fire protection and for wetting down the site to reduce dust. (C)
- c. Before start of demolition, all stored materials and all glass doors and windows throughout the structure should first be removed.
   (B)
- d. Structure being supported by part of the building to be demolished should first be temporarily supported before demolition work commences. (D)
- e. When demolishing walls, workmen shall use scaffolds supported independently of the walls. (C)
- f. Debris should be removed promptly. (A)
- g. Barricade any area where material is being dumped, and place screens where necessary to protect workmen from flying pieces.
   (B)
- h. Employees shall not work below each others. (C)

## CHAPTER V GUIDELINES ON HANDLING OF VEHICULAR, PERSONNEL ACCIDENTS AND DAMAGES





#### SECTION 22 GUIDELINES COVERAGE

- 22.01 The guidelines shall cover the following:
  - 1. Identification of responsibilities and functions of all concerned in the timely and thorough on-site investigation of the accident or incident.
  - 2. The review of the accident or incident and the rendition of decision and recommendation by the Central Safety Committee and its Sub-Committees.
  - 3. The preparation of various reports pertinent to the accident, i.e., Accident report, Decision and Memorandum, etc.
  - The imposition of corresponding penalties shall be in accordance with the provisions of the Safety Code, and Human Resources and Organizational Development (Administration-HR) Policies on Disciplinary Action, whichever is applicable,
  - 5. including Labor Code of the Philippines, Civil and Criminal Law, if necessary.

#### SECTION 23 DEFINITION OF TERMS

- 23.01 Vehicular Accident- an accident in which a company vehicle and/or mobile equipment is involved.
- 23.2 On-duty Personnel Accident- an accident in which an employee sustains injury while in the performance of his duty.
- 23.03 Off-Duty Personnel Accident- an accident in which an employee sustains injury while off-duty .
- 23.4 Major Personnel Accident- an accident which is fatal or which results to severe injury as determined by the attending physician / hospital. Or the patient is advised to rest or recuperate for more than seventy-two (72) hours.
- 23.5 Minor Personnel Accident- an accident, which results to superficial injury as, determined by the attending physician/hospital. Or the patient is advised to rest/recuperate for not more than seventy-two (72) hours.
- 23.6 Public Accident-an accident involving Company personnel and /or facilities and the public wherein injury is sustained or property is damaged.
- 23.09 Fire Incident- an incident in which Company property is endangered or damaged due to fire.

23.10 **Vehicle Damage** – is any harm or injury to company (MAYNILAD WATER) vehicle or equipment that lessens value or usefulness done either intentionally or unintentionally and by accident or negligence.

#### SECTION 24 GENERAL RESPONSIBILITIES

- 24.01 The Safety Engineer/ authorized representative shall conduct a thorough safety investigation of an accident or incident that involves a company vehicle or personnel of an organization. He shall ensure that the required Vehicular Accident or Personnel Accident Report and Investigation Report is prepared and submitted within the prescribed period. For expediency, concerned Department Manager or supervisor shall also conduct initial investigation of vehicular accidents within his jurisdiction.
- 24.02 Central Safety Committee Base Radio stationed in Safety Department Office shall serve as coordination/communication link during the incident and its immediate aftermath. On duty personnel manning the base radio shall coordinate with MAYNILAD WATER Call Center from time to time to verify any report of accident coursed through them.
- 24.03 Legal Department shall attend to all legal aspects of the incident.
- 24.04 MAYNILAD WATER medical clinics shall attend to the medical or first aid needs of the employee involved in the accident, as appropriate. They shall also supply the necessary medical information on the accident reports.
- 24.05 The Central Safety Committee shall review the cause of the accident/incident, render a decision and recommend appropriate action to management.
- 24.06 Employee involved in the incident/accident shall be responsible for informing the concerned offices, preparing the necessary reports and cooperating with the personnel handling the investigation.
- 24.07 The Department Head or Division Head of the employee involved in the accident/incident shall ensure that the accident/incident is reported and investigated as prescribed in these guidelines. The enforcement of corresponding penalty must be imposed in accordance with the provisions of the Safety Code or Administration-HR policy on Disciplinary Action whichever is applicable.

- 24.08 The Safety Department and/or Central Safety Committee and its Sub-Committees shall follow up all decisions on accidents/incidents to ensure its implementation. They shall keep a file of the accident reports and analyze the possible causes of the accident and make the recommendations when advisable.
- 24.09 The immediate Supervisor and/or Team Leader shall prepare the Accident Report, if the employee concerned is incapacitated, or an investigation report on the accident in the absence of the Safety Engineer.
- 24.10 Division Head/Line Manager and Supervisor shall check compliance or implementation of this policy.
- 24.11 Central Safety Committee, under concurrent authority, shall oversee implementation of the penalties and the corresponding compensation/assistance in rehabilitation to be accorded to our employees who suffered injuries in accordance with existing policy or law.
- 24.12 Administration/ HR shall update the employee's 201 file to reflect the penalty/ commendation due him.
- 24.13 Fleet Management Department shall ensure that all MAYNILAD WATER company Vehicles have at all times their xeroxed current Car Registration (CR), Official Receipts (OR), and copy of certificate of insurance.

All types of report of company vehicle damages of any kind shall be documented by Fleet Management, copy furnished SaSD or the Central Safety Committee.

#### SECTION 25 GUIDELINES AND PROCEDURES

- 25.1 The following are the guidelines and procedures in handling Vehicular, Personal Accidents and damages to company vehicle. A.) Vehicular Accident
  - 1. Vehicular Accident Reporting
    - 1.1 In cases of accident involving Company Vehicles, the employee-driver should report the accident at once to his supervisor and to MAYNILAD WATER Call Center giving details of the accident. MCC, in turn, shall

advise the Safety Department or Central Safety Committee and the Legal Department regarding the matter. The property Management Section, Treasury Department and the Fleet Management should also be informed immediately by the supervisor with regard to company vehicles involving accidents for insurance coverages. The Fleet Management shall document, after inquiry or investigation, any damages to the company vehicle/s, copy furnished Safety Department or Central Safety Committee for the latter to determine violations of company policy of erring employee.

- 1.2 Any company vehicle/equipment damage report from Security Agency (e.g. Goldlink) shall be forwarded to Administration-HR for Adhoc investigation, copy furnished Fleet Management for documentation or further inquiry, then the latter will copy furnished Safety Department or the Central Safety Committee for review and evaluation.
- 1.3 The employee-driver should ensure that the Company vehicle is equipped with updated Car Registration (CR)/ Official Receipt (OR) at all times, including copy of Certificate of Insurance.

#### 25.2 VEHICULAR ACCIDENT INVESTIGATION

a.) As a general rule, the concerned Safety Engineer or Legal Investigator shall investigate any vehicular accident/s. In the absence of the Safety Engineer or Legal Investigator, the immediate supervisor of the latter involved in the accident shall conduct the investigation furnished Division/Area copy Manager, Safety Department, and Central Safety Committee. However, after the initial investigation conducted, he shall then coordinate with and turn over the responsibility to the concerned Safety Engineer or Legal Investigator for final disposition and render/submit investigation report. CC: Division/Area Manager, Safety Department and Central Safety Committee.

When proceeding to the scene of accident, the Safety Engineer/Legal Investigator shall always make available the necessary forms; such as Undertaking, Waiver, other pertinent documents for the said purpose.

b.) In case the Legal Investigator is not available at the scene of the accident and the third party admits fault for the accident or waives claim for damage, the Safety

Engineer and/or supervisor may, after proper clearance from Legal Department, have an Undertaking or Waiver (as the case maybe) accomplished and signed by the third party c.) In case the Legal Investigator cannot respond within reasonable time, and neither the employee nor the third party admit fault, then the Safety Engineer and/or supervisor shall, upon clearance from Legal Department, bring the matter to the nearest police headquarters/precinct to file a police report.

- c.) In case the accident caused no damage to Company property but a third party suffered minor injuries/damage and the third party agrees not to claim for damage, the employee-driver, in the absence of both the Safety Engineer and Legal Investigator and upon proper clearance from Legal Department, may have a Waiver accomplished and signed by the third party.
- d.) Any report (documented or undocumented) of any source of damages to company vehicle, the Administration-HR, Safety Department or Central Safety Committee shall have a copy for further conduct of thorough inquiry, if necessary, to determine the following;
  - 1. Cause of accident.
  - 2. Determination of culpability and appropriate penalty.
  - 3. Remedial step to avoid future occurrences.
  - 4. As an aid of policy making.

#### 25.3 PREPARATION OF VEHICULAR ACCIDENT REPORT

- 1. The employee concerned shall accomplish the Vehicular Accident Report (VAR, See Exhibit II) accurately and completely within 48 hours from the time the accident occurs. The VAR shall be signed by the employee and noted by his immediate supervisor and Department Head.
- 2. The available Safety Engineer or Legal Investigator, after conducting investigation of the accident, shall accomplish the Vehicular Accident Investigation Report (See Exhibit II). This report shall be routed to the concerned Department and Division Heads within 24 hours (or the next working day) from the time the accident was reported to him.
- 3. In the absence of the Safety Engineer or Legal Investigator, the employee's Supervisor who conducted the investigation shall prepare the investigation report.

#### 25.4 REVIEW OF ACCIDENT/ RENDERING OF DECISION

1. The Central Safety Committee Chairman shall create the Accident Review Committee and schedule their reviews for decision/action. This committee shall consist of the Chairman or vice Chairman, the concerned Safety Engineer, two other members of the Central Safety Committee and the Department Head of the employee involved. The Department Head shall remain with the Committee only during the review of the accident involving the employee under him.

- 2. The presence of at least three members, namely, the Chairman or Vice-Chairman, the Safety Engineer and the Department Head of the employee involved shall constitute a quorum and may proceed with the deliberation of the case.
- 3. The Safety Engineer shall furnish each member of the Accident Review Committee a copy of the Vehicular Accident Report/s and his Investigation report/s <u>before the scheduled date of</u> <u>deliberation.</u>
- 3. The Accident Review Committee shall complete the review of the accident and render decision within 15 calendar days from the date of its occurrence. The committee members shall indicate their remarks and individual decision on the Vehicular Accident Decision Form (Exhibit III). The decision of the Accident Review Committee shall be final and executory.
- 5. The available/assigned Safety Engineer shall then prepare a Decision Memorandum containing pertinent information regarding the accident (see sample, Exhibit IV) addressed to the concerned Department Head. A copy of each of the Vehicular Accident Report, Vehicular Accident Decision form and Decision memorandum shall be furnished to Safety Department.
- 6. The Department Head concerned shall impose, if applicable, the corresponding penalty in accordance with the provision of the Safety Code, within three (3) working days from the receipt of the Decision memorandum. The Department head shall furnish Safety Department, Fleet Management Department, Administration-HR and Legal Department with copies of the memo-imposing penalty.

#### SECTION 26 PERSONNEL ACCIDENTS

#### 26.01 MAJOR PERSONNEL ACCIDENTS

#### 1. Accident Reporting

Any major injury sustained by an employee must be reported at once to the employee's immediate supervisor or superior who shall promptly report it to MAYNILAD WATER Call Center. MCC, in turn, shall notify the following: Division/Business Area Manager, Safety Department, Legal Department, Administration-HR, and Fleet Management Department.

#### 26.02 ACCIDENT INVESTIGATION

- 1. The supervisor may conduct an initial investigation of the accident and prepare a preliminary report citing the employee involved and circumstances surrounding the accident. He shall submit the report to the Division/Business Area Manager within 24 hours from the time of accident.
- 2. The available/assigned Safety Engineer shall further conduct a detailed investigation and prepare a final report indicating his findings and conclusion. The report shall be routed to the Division/Business Area Head and Department Head within 15 calendar days, copy furnished the chairman, Accident Review Committee.
- 3. The Legal Investigator shall proceed to the scene if a third party is involved or if the accident caused serious physical injury to the employee.
- 4. In the absence of the Safety Engineer, the immediate Supervisor of the employee involved shall conduct the investigation and prepare the report.

#### 26.03 PREPARATION OF PERSONNEL ACCIDENT REPORT

1. The employee concerned, or in his incapacity, his immediate supervisor, shall accomplish the personnel Accident Report (PAR, Exhibit I) citing the account of the accident. The employee concerned and noted by his immediate Supervisor shall sign the report. If the personnel accident is the result of a vehicular accident, a VAR shall also be prepared as prescribed in these guidelines (Item V-A.3)

# 26.4 REVIEW OF MAJOR ACCIDENT/ RENDERING OF DECISION

- 1. The Accident Review Committee shall review the circumstances surrounding the accident and render a decision within 24 hours from the time the accident occurred.
- 2. The Accident Review Committee may also recommend a penalty for other company employee/s or contractor's employee/s who may be involved in the accident based on its findings.
- 3. The available/assigned Safety Engineer shall route a copy of the Decision to the Division/Business Area and Department Heads. A copy of the decision report shall be furnished to Safety Department, Legal Department, Administration-HR and Fleet Management Department.
- 4. The Department Head shall impose the penalty /give commendation whichever is applicable, to employee/s involved in the accident within three (3) working days from the receipt of the decision by preparing a memo which shall be signed by the employee/s involved, a copy

furnished to Safety Department, Administration-HR and Legal Department and Fleet Management Department.

#### 26.05 MINOR ACCIDENT

1.Accident Reporting

The employee shall report minor accidents to his supervisor and the concerned Safety Engineer, particularly if the cause of the accident represents a potential safety hazard for prompt action.

#### 2. Accident Investigation.

Investigations on minor accidents shall be undertaken by the concerned Safety Engineer.

- 3. Preparation of Personal Accident Report
  - 3.1 The employee concerned shall, after seeking medication from MAYNILAD WATER Clinic or nearest hospital, accomplish the Personnel Accident Report.
  - 3.2 The attending doctor/nurse shall fill-up the medical report portion indicated in Personnel Accident Report.
  - 1.3 The employee concerned shall then submit the Personnel Accident Report to the Safety Engineer.
  - 1.4 The Safety Engineer shall indicate the pertinent information in the report, including his recommendation. A copy of the report shall be routed to the Division/Business Area and Department Heads, copy furnished to Administration-HR, Safety Department, Legal Department and Fleet Management Department.

#### **SECTION 27**

#### 27.1 OFF-DUTY PERSONNEL ACCIDENT

Follow the same procedures applied to Minor Accident.

#### 27.02 ACCIDENTS TO PUBLIC

- 1.) Accident Investigation
  - 1.1 The Legal Investigator shall respond in due time and immediately proceed to the scene, conduct an investigation and submit the report to management (Administration-HR).
  - 1.2The Safety Engineer may also conduct his own investigation, as required, to check compliance with existing safety rules and regulations.

#### 27.3 PREPARATION OF ACCIDENT REPORT

- a.) The employee concerned shall prepare a report citing the circumstances of the accident. The report shall be submitted to the Department Head through his immediate supervisor.
- b.) The Safety Engineer shall prepare an investigation report.

27.4 Review of Public Accident/Rendering of Decisions, Guidelines, and Procedures No. 26.04 (1-4) shall be followed, except the decision shall be rendered within 24 working days.

#### SECTION 28 CRITERIA FOR COMMITTEE INVESTIGATION (ACCIDENT REVIEW GROUP)

Representation at the committee hearings should include the CSC member in the area and his/her superior representing the employee involved in the accident. Generally, the Committee convenes and acts on the accidents in the following categories.

- Review existing policies based on accident investigation.

1. Where the employee has had two or more occupational accidents in any twelve months period recon from the first accident. Succeeding accidents shall be investigated as necessary.

2. Where the employee has been involved in an occupational injury requiring hospitalization.

3. Where the employee has been charged by the Police Department.

4. When the employee has been involved in a vehicular accident in the damage exceeded P50, 000.00. The committee uses information from Police reports, employee statements, witnesses and supervisors and prepares reports its findings and recommendations.

# CHAPTER VI

## SAFETY MEASURES IN THE WORKPLACE

#### SECTION 29 A. METAL WORKS

#### MACHINE SHOPS

- 28.01 Follow accordingly the operational specifications of the machine to avoid both accidents and improper machine wears or trouble. (B)
- 28.02 All necessary precautions shall be undertaken before the machine will be placed in operation. (B)
- 28.3 Machines shall never be left running unattended. (B)

- 28.04 No repair shall be done while the machine is running. (B)
- 28.05 Observe the regular inspection for lubrication and maintenance of machine.
- Before a repair starts working on a machine, make sure that the power is off and the main switch is properly blocked and tagged.(B)
- 28.07 Machine operators shall wear the prescribed personal protective equipment and shall not wear jewelry or loose clothing, especially loose sleeves, cuff of shirts or jackets and neckties as required in the work area to avoid any accidents or physical injuries. (A)
- 28.08 Stop the machine, if necessary, before doing any gauging work, use the prescribed tools not the hand. (A)
- 28.09 Operators shall not wear jewelry or loose clothing, especially loose sleeves, cuff of shirts or jackets and neckties. (A)

#### WELDING:

- 28.10 Welders-cutters and welders-helpers shall wear the prescribed personal protective equipment on the job. (B)
- 28.10.1 Hot Work Permit must be issued and a Fire Watcher must be available on site. (B) (See exhibit # VII)
- 28.11 Flammable and matches/ combustible materials shall be removed from the welding areas. (C)
- 28.12 Be sure that the place of work is adequately ventilated. Tin, Brass and Lead fumes are particularly dangerous and shall be ventilated. (B)
- 28.13 Welders and cutters shall not weld or cut any container, tank, plate or pipe before its status or content is ascertained. (A)
- 28.14 When doing electric and arc welding works, stand on a dry floor ground, platform or rubber mat. Wet gloves shall not be used in any case. (A)
- 28.15 Electric Welding machines shall be placed in a safe area. Commutator sparks are dangerous. Welding cables shall be regularly inspected for defects or insulation damage, and those found defective or damaged should be turned in for repair or replacement. (A)

28.16 For Gas Welding and Cutting, extreme care shall be taken to protect oxygen and acetylene from mixing in the hose, as it will explode. Always purge both hoses before lighting. Never attempt to transfer oxygen or acetylene from one cylinder to another or mix different gases in a cylinder. (B)

#### SECTION 30 B. CHEMICALS AND GASES

#### LABORATORY WORKS

- 29.01 HOUSEKEEPING: The chemical laboratory shall be kept clear, orderly and well maintained. (A)
- 29.02 Know the materials or chemicals you are handling. Anticipate results; do not proceed without caution and fore thought. (B)
- 29.03 Always read labels and directions on bottles or containers of chemicals before handling. (A)
- 29.04 Never open bottles or containers of highly volatile flammable chemicals, liquids or gases in a room where there are open flames. (B)
- 29.05 Never tastes any chemical. Smell a chemical only when necessary and then only by wafting a small amount of vapor with the hand toward the nose. (B)
- 29.06 Learn the location of fire hoses, fire extinguishers, fire blankets and stretchers. (A)
- 29.07 STORAGE: Laboratory heavy items shall be stored on or as near the floor as possible. Apparatus and glass tubing shall not project beyond front shelf limits. (A)
- 29.08 Chemicals which might react together to produce dangerous fumes, fire and explosion demand storage space remote from each other. Volatile liquids shall be kept away from heat sources, sunlight and electrical switches. (C)
- 29.09 Flammable liquids not mixable with water, corrosive chemicals or compounds which are likely to give off toxic vapors (and as hydrochloric acid) shall never be poured into the sink. (B)
- 29.10 In handling of chemicals always wash your hands and face before drinking after you have handled any industrial chemical. Containers

and bottles containing hazardous chemicals shall be properly labeled. Highly poisonous ones shall carry the standard poison label. (A)

- 29.11 BULK CHEMICALS: Bulk chemicals such as those in the category of liquid chlorine, sodium carbonate, aluminum sulfate, sodium hydroxide and sodium sulfate primarily shall be stored in a clean, dry and well-ventilated section of the store room or preferably in a chemical storage room if available. (B)
- 29.12 CHLORINE: Keep chlorine cylinders away from heat or open flames. Store in a safe, dry and well-ventilated place. (A)

Store chlorine containers and cylinder in a cool place and protect them from exposure to external heat sources. Never permit the temperature of the contents to approach 140 °F. (B)

#### SECTION 31 HANDLING OF CHEMICALS

- 30.01 In jobs where industrial and laboratory chemicals are used, the following safety and health measures shall be observed:
  - a. Workers shall be fully instructed on the hazards of chemicals and the necessary precautionary measures required in handling them. (A)
  - b. Work forms, floors and machinery's shall be properly cleaned daily. (A)
  - c. Obtain prompt first aid medical treatment in case of any kind of body contact with acids. (A)
  - d. Always wash your hands and face before drinking after you have handled any industrial chemical. (A)
  - e. Containers and bottles containing hazardous chemicals shall be properly labeled. Highly poisonous ones shall carry the standard POISON label. (B)

#### 30.02 BULK CHEMICALS

a. Bulk chemicals such as those in the category of liquid chlorine, sodium carbonate, aluminum sulfate, sodium hydroxide and sodium phosphate primarily shall be stored in a clean, dry and wellventilated section of the storeroom or preferably in a chemical storage room if available. All containers shall be kept closed and any containers such as bags that have been broken shall be discarded. (B)

- b. Breakage or spillage shall be avoided and any chemical deposited on the floor shall be removed. (B)
- c. When handling sodium carbonate and aluminum sulfate during the process of charging chemical feeders, wear goggles, proper filters, respirators and prescribed gloves. (B)
- d. Alkali burns can be of a serious nature; hence, when handling large quantities of caustic soda or slightly milder alkalies, rubber gloves shall supplement the use of goggles. (B)

#### 30.03 **CHLORINE**

- a. Keep chlorine cylinders away from heat or open flames. Store in a safe, dry and well-ventilated place. (A)
- b. Only experienced and properly trained persons shall handle chlorine. (B)
- c. Chlorine and small tanks shall be transported on special handcarts. If possible, hoisting shall be avoided. If necessary, clamps or girdles are more preferable than slings. Magnetic lifting devices shall never be used. Chlorine containers shall never be dragged or handled roughly. (A)
- d. Store cylinders weighing up to 70 kg. (150 lbs.) in an upright position where heavy materials cannot fall on or against them. See that the cylinders are supported so that they cannot fall over. Select storage places where containers shall be shielded from mechanical disturbances especially by moving objects. Do not store containers below ground level or in the chlorine feeding room. Store 1-ton cylinders on their sides on a level rack or platform with adequate safety blocks to prevent rolling. (B)
- e. Always keep protective caps in place when the cylinders or containers are not in use and are being handled, because the discharged valves and fusible plugs are not designed to take shocks. As soon as a cylinder or container is empty and disconnected, replace the protective caps. Always tag or mark empty cylinders or containers at once. It is advisable to store full and empty containers or cylinders in different sections of the storage area to avoid confusion in handling. (B)
- f. Store chlorine containers and cylinders in a cool place and protect them from exposure to external heat sources. Never permit the temperature of the contents to approach 140 °F. Keep containers and cylinders that are stored outdoors away from direct exposure to the sun and the weather. Maintain them in a clean condition and inspect them regularly for leakage. (B)
- g. Do not store containers or cylinders near flammable materials or where continuous exposure to dampness will result. (C)

- h. Make certain that the storage area is well ventilated and that containers or cylinders are so arranged that a leaking unit could be removed with the least possible handling of other containers. Arrange to use a fireproof or storage room equipped with an exhaust ventilating system. (B)
- i. Place containers and cylinders in the order, which they are received so that the oldest can be used first. (A)

#### 30.04 CHLORINE LEAKS AND CONTROL

- a. The slightest odor of chlorine may indicate a leak and shall receive immediate attention because small leaks can grow rapidly. (A)
- b. Two men shall be assigned to the repair of a chlorine leak, one acting as a safety observer. (A)
- c. Connections to the cylinder valve shall be made carefully. When threaded connections are used, it shall be ascertained that the threads on appliances and unions are the same as those on the container valve outlets. (B)
- d. Containers or valves shall never be altered or repaired by the consumer, except for stopping gas leaks around valve stems by tightening the packing nut. The safety devices on containers shall never be tampered with. The valve cannot control the fusible plug on cylinders below the valve seat. (A)
- e. Container valves shall be opened slowly. No wrench longer than 6 in. shall be used as the employment of large wrenches or pipe wrenches will damage the valves. One complete turn of the valve sufficiently to permit maximum discharge. (A)
- f. To test for chlorine leaks, a small cloth or swab shall be attached to one end of a stick and the material must be soaked with ammonia water (10 percent NH3) and applied to the suspected area. A white cloud of ammonium chloride will result if there is any leakage. (A)
- g. When a leak develops on chlorine lines and containers, the area subject to contamination shall be first cleared of personnel until the danger is removed. Only highly trained and equipped men shall be permitted in the area. All personnel shall keep upwind of and on higher elevation than the chlorine leak. (B)
- h. If the container has a chlorine leak, turn it, if possible, so that gas instead of liquid can escape. Water shall not be sprayed on a chlorine leak to reduce the amount of chlorine gas. (A)
- i. Emergency leak kits shall be on hand at all times and kept in good condition. (B)
- j. The chlorine supplier shall be contacted immediately if the leak cannot be controlled. (A)
- k. Employees who handle chlorine shall be provided with gas masks especially designed for chlorine-contaminated atmosphere and shall use them. (B)
- I. Workers who find themselves in a contaminated area without masks shall try not to breathe until they reach safety. If this is

impossible, they should be taught to breathe only with the top of the lungs (short, shallow breaths). This will lessen any lung damage.

- m. When chlorine leaks occurs the chlorine room ventilating system shall be turned on immediately. (B)
- N. When a leak occurs in equipment in which chlorine is being used, the chlorine container valves shall be closed first. Then the cylinder is taken outdoors and the gas released slowly until the tank is empty. (A)
- o. Water shall never be applied to a chlorine leak because this creates a hazardous condition with the leak being made worse by the corrosive action of chlorine and water. (B)
- p. Grease or oil shall never be used on fittings that will be in contact with chlorine. Certain types of silicone greases may be used sparingly on valve stems and hard-rubber fittings. (B)
- q. Before disconnecting the flexible leads from container to gas headers, the cylinder valve shall be closed first and then the gas under pressure shall be drawn from the header and flexible leads before the header valve is closed. The exhaust system shall be turned on and operated while the cylinders are being disconnected and repairs are being made on the chlorine lines and equipment. (A)
- r. If fire breaks out, every effort shall be made to protect the chlorine cylinders or containers or to remove them from the danger area. Firemen shall be informed of their location and poisonous nature.
   (A)
- s. An adequate supply of ammonia solution (10 percent) shall be kept on hand at all times to test for chlorine leaks. (A)
- t. The chlorinating plant or room shall be provided with an adequate ventilating system that is designed for the removal of chlorine gas resulting from leakage. (A)
- u. If the chlorine scale room is separate from the chlorine feeder room, the air temperature in the latter shall be about 5 °F higher than that in the former. (A)
- v. Temperatures in the chlorine equipment rooms or buildings shall be maintained between 70 °F and 80 °F. (B)

#### 30.05 **FIELD CHLORINATION**

- a. Know the rules and regulations for the safe handling of chlorine and first aid treatment for chlorine gassing. (B)
- b. Check and make sure that the gas masks and all other safety equipment are present. (B)
- c. If possible, set up equipment for water main disinfections at a safe distance at least 100 m. from the nearest occupied building. (A)
- d. Observe all safety precautions in connecting apparatus and equipment and use approved fittings. (B)

- e. Make certain that hoses are in good condition before connecting them to the cylinder and the main. (B)
- f. Be sure that the water in the main is flushing before the chlorine is added. (B)
- g. After the equipment is connected, open the chlorine valve of the cylinder and test for leaks. (B)
- h. Open the Rota meter or gas header valves and again tests for leaks. (A)
- i. To avoid water backup into the chlorine apparatus and the cylinder when a vacuum chlorinator is not being used, make sure that the chlorine tank pressure is approximately 25 psi more than the operating pressured desired. Be certain that the operating pressure is approximately 5 psi more than the backpressure from the water main. (B)
- j. After all equipment has been tested for pressure and leaks, proceed to open the discharge valve and adjust the feed for proper operation. Continue testing for leaks while disinfecting. (B)
- k. Never attempt to repair a chlorine hose with tapes or clamps. Always use a new replacement. The hose shall be pressure-tested with CO2 and kept dry. Obstructions or kinks in a hose line may cause it to burst. (B)
- I. Make sure that field-chlorinating equipment have the proper pressure gauges so that hose lines and lightweight connections are not subjected to excessive pressures. The procedure of connecting a chlorine cylinder directly to a chlorinating cock is very unsafe. (B)
- m. During chlorinating, check a hydrant or a suitable sampling place ahead of the point of chlorinating for possible backup of chlorinated water in the main. (A)
- N. When using high-test hypo chlorites for solution feeding, wear rubber gloves and aprons, a dust mask and goggles or a face shield. If a considerable amount of dust arises, wear a chlorine gas mask. (A)
- Use caution in handling high-test hypo chlorites, both dry and liquid. Protect the eyes and do not breathe in hypochlorite dust. Remove clothing immediately if it becomes contaminated with these materials. (B)
- p. Use proper warning devices to keep unauthorized persons away from the area. (A)

#### ALUM AND FERROUS SULFATE

30.6

- a. Workmen shall wear dust masks and chemical-resistant goggles when they are handling or are exposed to aluminum sulfate or ferrous sulfate dust. (B)
- b. The material shall be stored in a clean, dry place because moisture has a tendency to cause caking. (A)
- c. Electric equipment subject to exposure to ferrous sulfate dust shall of dust proof construction. (B)

- d. Compressed air shall not be used to clean dry-feed machines and appurtenances. An industrial water chamber vacuum is much safer.
   (A)
- e. A mechanical dust-collecting apparatus shall be used at handling points to minimize dust. Covers on equipment and connection shall be as tight as possible. (A)
- f. Solutions (chemicals) shall be equipped with anti-splatter shields around the stuffing box for protecting personnel against splashes.
   (B)

#### 30.07 ANHYDROUS AMMONIA

- a. Handle cylinders and containers carefully. Never drop cylinders or permit them to collide with each other. Move cylinders on light handcarts equipped with safety chains. (A)
- Avoid hoisting containers. If lifting is necessary, do so with safetytested clamps or cradles. Do not use rope, cables and chain slings. (B)
- c. Store cylinders where heavy articles cannot fall on them and cause damage. Shield the containers from mechanical disturbance or contact with moving objects. (B)
- d. Do not store ammonia near chlorine or in the same room with chlorine cylinders. (B)
- e. Place cylinders in an upright position with the valve end up and support them by clamps on guard chains to prevent falling. (A)
- f. Store cylinders and containers in a cool dry place away from heat and protect them from continued dampness. Do not keep them outdoors in the direct sunlight where they may become overheated. (B)
- g. Always keep the cylinders and container caps in place until they are ready to be connected because the unloading valves are not designed to withstand accidental shocks. (B)
- h. Ventilate the storage room and arrange the cylinders so that a leaking container can be removed with a minimum of handling. Use fireproof storage and equipment rooms that are equipped with an exhaust ventilating system. (B)
- i. The exact location of a leak may be detected by the application of soapsuds on the suspected area. (B)
- j. Only authorized persons equipped with ammonia gas masks shall investigate leaks and make repairs. All others shall be kept away from the affected area. Such work shall be done by at least two employees, with one acting as a safetyman in case of an accident. (B)
- k. Self-contained oxygen respirators shall be used in instances of serious leaks where oxygen may be deficient. (B)
- I. Use extra heavy steel piping and ammonia valves for service lines. Copper and copper alloys shall never be used. (A)

## 30.08 AMMONIUM SULFATE

- a. Ammonium sulfate shall not be stored in damp or humid places because ammonia fumes will evolve and the material will cake. (A)
- b. Ammonium sulfate shall not be stored near stream pipes, hot walls and other sources of heat. The chemical shall not be placed where it can come in contact with chlorine. (B)
- c. Ammonium sulfate shall never be allowed to mix with quicklime or lime dust because such combinations can produce sufficient heat to explode. Ammonium sulfate by itself is not explosive. (B)
- d. Persons allergic to ammonia compounds shall wear sufficient protective clothing to avoid bodily contact and shall apply an ointment or petroleum jelly to exposed skin surfaces. (B)
- e. Eyes shall be protected against splashes of ammonium sulfate solutions. If the dust or liquid gets into the eyes they shall be washed immediately with a large amount of water. Ammonium sulfate is mildly acidic and a strong solution can cause skin irritation. (B)

## 30.09 MATERIALS TESTING LABORATORY

- a. Only trained laboratory technicians who have learned the applications and limitations as well as the specific potential hazards peculiar to the laboratory apparatus, specimens and test procedures, shall be assigned to perform the laboratory tests. (B)
- b. Technicians selected to operate or use laboratory equipment shall be free from physical defects that might interfere with their duties. They shall be mentally alert, not easily excited and capable of carrying out instructions in compliance with standard test procedures and safety measures. (B)
- c. All electrical equipment and appliances shall have proper grounding and shall be verified that they are in place before starting. (B)
- d. Provide suitable enclosures for moving parts of machines. Like gears, belts and vibrating screens. (B)
- e. Keep wearing apparels, gloves, rags or hands out of moving machine parts like gears, belts or shafts, etc. (B)
- f. A protective screen or curved shield of perforated metal shall be used to surround concrete test specimens that are expected to shatter under increasing heavy loads. (B)
- g. Use safety goggles when chipping caps used at the ends of concrete cylinder specimens to recover the capping compound.
   (B)
- h. Use respirators to avoid inhaling toxic vapors produced during melting coal tars and sulfur capping compounds. (C)
- i. Follow proper hand lifting procedures in moving cylindrical concrete specimens, aggregate in boxes, bags of cement and other heavy loads encountered during testing. (B)

- j. Proper ventilation shall be provided to remove dust, toxic vapors from sulfur compounds or bituminous heating humidity, etc. (C)
- k. First aid kits shall be made available. Also, there shall be a trained person to apply first aid in case of emergency. (C)
- I. A telephone shall always be available and in working order, particularly when any operator is working alone in the laboratory. The phone numbers of the fire department, medical office and police shall be posted conspicuously. (B)
- m. Practice good housekeeping, tool and equipment maintenance and calibration and safety-device maintenance. (B)
- n. An occasional inspection of the laboratory by an appropriate member of the staff shall learn whether additional hazards exist that need to be remedied. (B)

## 30.10 COMBUSTIBLE GASES

- a. Keep sparks and flames away from cylinders. (B)
- b. Connections to piping, regulators and other appliances shall always be kept tight to prevent leakage. Where a hose is used, it shall be kept in good condition. (A)
- c. When cylinders are not in use, keep valves tightly closed and valve caps installed. (B)
- d. Do not use a cylinder of compressed gas without the pressurereducing regulator attached to the cylinder valve except when cylinders are attached to manifold, in which case, the regulator will be attached to the manifold header. (A)
- e. After removing the valve cap, slightly open the valve an instant to clear its opening of particles of dust or dirt, except in the case of a cylinder of hydrogen. (A)
- f. If the valve is difficult to open, point the valve opening away from you and use greater force. (Do not, however, use a wrench on valves equipped with hand wheels nor hammer the valve wheels in attempting to open or close the valve). If it still cannot be opened, return the cylinder to the suppliers for replacement. (B)
- g. After attaching the regulator and before opening the cylinder valve, see to it that the adjusting screw of the regulator is released. (A)
- h. Never permit the gas to enter the regulator suddenly. Open the cylinder valve slowly. (A)
- i. Before a regulator is removed from the cylinder, close the cylinder valve and release all gas from the regulator. (A)
- j. Never interchange combustible gas regulators, hose or other appliances with similar equipment intended for use with other gases. (B)
- k. Store all cylinders containing combustible gases in a well-ventilated place. (B)
- I. Do not store reserve stock of cylinders containing combustible gases with cylinders containing oxygen. They shall be grouped separately. (B)

## 30.12 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- a. Accidental mixture of flammable liquids shall be prevented. Warning devices shall be installed or posted in areas where potentially explosive/flammable liquids are kept. (B)
- b. Smoking and carrying of "strike anywhere" matches, lighters and other spark-producing devices shall be prohibited in a building or area where flammable liquids are stored, handled or used or where loading and unloading operations are performed. (B) Appropriate prohibition signs to this effect shall be posted

conspicuously in such a building or area. (A)

- c. Above ground tank installation used for storage of flammable liquids shall be properly grounded. Ground wire shall be bare so it can be easily inspected for mechanical damage. (B)
- d. Only an experienced person shall use a combustible gas indicator and the operator shall follow the manufacturer's instructions on balancing the unit. (B)
- e. Storage of gasoline or other flammable liquids in glass or open containers is prohibited except for laboratory use or in obtaining samples for laboratory use or in testing at operating units. Gasoline shall be stored in closed metal containers painted red. If gasoline is used, it shall be in approved cans. (B)

# CHAPTER VII

# PERSONAL PROTECTIVE EQUIPMENT

## SECTION 32 HEAD PROTECTION

- 32.01 Prescribed safety helmets shall be worn while on duty as required. In trench operations with more than 1.80 meters depth and in vertical constructions where workers assigned to work under the crane boom, such protective aids are required. (A)
- 32.02 Before each use, helmets should be inspected for cracks, signs of impact or rough treatment and wear that might reduce the degree of safety originally provided. Those found damaged should be replaced. (A)

## SECTION 33 FACE AND EYES PROTECTION

- 33.01 Employees shall wear goggles suited for the job to be performed to protect their eyes from the following hazards:
  - a. Flying objects and hot metals.
  - b. Injurious light and heat rays.
  - c. Gases, fumes or chemicals.
  - d. Dust and wind, as when boring a hole on a piece of brick or concrete. (B)
  - e. Dirty/infectious water from septic tanks sewerage facilities, manholes,
  - f. particularly during illegal connections excavations. (B)
- 33.02 Corrective spectacles or eyeglasses shall never be used as a substitute for safety goggles. (B)
- 33.03 A prescribed face shield shall be worn by the workers as required. (B)

#### SECTION 34 RESPIRATORS

- 34.01 Respirators of the prescribed type should always be worn when handling or coming near toxic materials like gases, dusts, paints, etc. (B)
- 34.02 Anyone who is physically weak should be prevented from entering areas with respiratory hazards unless he wears the approved emergency Breathing Apparatus for protection. (B)
- 34.03 Knitted face lets and dirty or oily elastic bands should be washed in warm soapy water, rinsed and dried before reuse. The water should be warm to remove perspiration and hair oil from the elastic fabric. (A)
- 34.04 If a canister is used, it should not be left attached to the mask. It should be removed every after use. When the respirator is worn in a toxic atmosphere containing gas or vapor that has little or no warning properties, like carbon monoxide, it is recommended that a fresh canister be used. (A)
- 34.05 Canisters should be replaced not more than one year after the date when the seal is removed. Canisters stored with seals intact should be replaced on or before "use before date" stamped on each canister. (A)
- 34.06 Gas masks shall be kept easily available for emergencies. (B)
- 34.07 Gas masks shall be stored away from moisture, heat and direct sunlight and shall be regularly inspected. (A)

- 34.08 A card shall be set up for each mask to indicate the date of the latest inspection and replacement of the canister. (A)
- 34.09 Supervisors shall be responsible for making daily inspections, particularly of functional parts such as exhalation valves and filter elements. They shall see that the edges of the valves are smooth and clean. Inhalation and exhalation valves shall be replaced periodically. (A)
- 34.10 Respirators shall be marked to indicate whom they are assigned. The method of identification shall be permanent so that the marking cannot be changed inadvertently nor without effort. (B)
- 34.11 Before being stored, a respirator shall be carefully wiped with a damp cloth and dried. It shall be stored without sharp folds or creases. It shall never be hung by the elastic headband or put down in a position that will stretch the face piece. (A)
- 34.12 Since heat, air, light and oil cause rubber to deteriorate; respirators shall be stored in cool, dry place and protected from light and air as much as possible. (A)

## SECTION 35 SAFETY SHOES

- 35.01 Safety shoes shall be worn while on duty as required. When doing concrete pouring work, however, safety rubber boots may be used. (A)
- 35.02 If shoes are greasy or muddy do not attempt to climb a ladder etc. Clean them first. (A)

## SECTION 36 SAFETY BELTS, HARNESS, LIFELINES AND SAFETY NETS

- 36.01 All persons working on elevated structures without permanent scaffolding (steel erectors, painters, masons etc.) shall always wear safety harness and lifelines required. (C)
- 36.02 Harness and lifelines shall be securely fastened on rigid and firm braces, framing and the like. (C)
- 36.03 Carefully inspects safety harness and lifelines before using. Those that are defective must not be used. (A)

- 36.04 Foremen shall schedule the regular inspection of safety harness and lifelines.
- 36.05 Lifelines shall not be less than 9 cm. (3/4 in) diameter made of good quality Manila rope or its equivalent material and shall be of sufficient strength to support a weight of 1140 kgs. and shall be free from cuts and fiber defects. (B)
- 36.06 Steel cable shall not be used as lifelines where a free fall is possible, unless some shock absorbing devices are also used because the rigidity (of steel cables) greatly magnifies the impact loading. Cables are dangerous when used around electrical wirings. (C)
- 36.07 Lifelines shall be tied so as to permit little slackening as possible, thus allowing a minimum freefall. (B)
- 36.08 Leather belts shall be cleaned and oiled with neat's-foot, castor, soybean or an oil compound. Never use mineral oil. (A)
- 36.09 Leather belts shall not be exposed to excessive heat, such as from radiator. Any heat harmful to man can damage leather. (A)
- 36.10 Body belt is use only as positioning device. (B)
- 36.11 Steel cable lines shall be kept clean and dry. They shall be lubricated frequently. Before using in acidic atmosphere, steel cables shall be washed thoroughly and recoated with oil. (A)
- 36.12 Rope lifelines shall not be used for any other purpose. These ropes shall be properly marked or labeled as such. Store them properly. (B)
- 36.13 Safety nets shall not be less than .94 cm. (3/8 in.) diameter mesh ropes and not less than 1.90 cm. (3/4 in) diameter border ropes (perimeter) made of manila rope or other materials that can absorb the impact of falling body. The mesh shall be arranged not to exceed 15.25 cm. (6 in.) on centers positively and securely attached to avoid wear at each crossing point and at points of contact with the border. (B)
- 36.14 Safety nets must be installed as close as practicable under the walking/working surface in which employees are working and never more than 30 feet (9.1 meters) below.

## SECTION 37 WELDING ATTIRE

- 37.01 In addition to the abovementioned safety equipment/clothing, for employees performing welding jobs, shall wear:
  a. Flameproof gauntlet, aprons and leggings. (A)
  - b. Welder's mask. (B)

## SECTION 38 WORKING ATTIRE

- 38.01 Wear the proper protective shields for a particular job. Neckties, scarves bracelets and the like shall not be worn when working on or near moving machines or energized lines of equipment. On duty Fieldsman shall always wear duly prescribed/issued MWSI Fieldsmen's attire. This is not only for safety reasons but also to generate general public's positive impression and respect for our every fieldsman. (A)
- 38.02 Clothing saturated with oil shall be removed at once and affected parts of the body should be washed with soap and water. Oil irritates the skin and is dangerous in case of fire. (B)
- 38.03 Sewer divers shall be equipped with the appropriate diving gear, which consists of a diving suit and a diving headgear to which a waterproof radio is attached for a direct communication with the other person on ground level. (B)

## SECTION 39 HAND AND ARM PROTECTION

- 39.01 Working gloves shall be worn as required. (A)
- 39.02 Wear prescribed leather gloves when lifting or handling materials with rough surfaces, sharp edges and those with slivers. (A)
- 39.03 Wear chemical gloves or their equivalent when handling corrosive chemicals such as acids, alkaline, etc. Have plenty of clean water close at hand. (B)
- 39.04 Wear protective asbestos gloves when handling hot objects or materials. (B)
- 39.5.1 Gloves torn during use shall be replaced immediately. (A)

#### SECTION 40 EVALUATION AND INSPECTION OF REQUESTED SAFETY GADGETS

- 40.01 All Purchase Request (PR) of safety gadgets coming from various MWSI offices/ department must be evaluated by Safety Department to verify if it is based on the MWSI Standard Specification of Safety Gadgets before its procurement.
- 40.02 Upon delivery of requested safety gadgets at the MWSI Main Warehouse, Safety personnel should conduct random inspection of delivered items coming from accredited supplier to verify if the said items were based on the specifications indicated in the Purchase Order.

# CHAPTER VIII

## TOOLS AND EQUIPMENT

## **SECTION 41**

## 41.01 **HAND TOOLS**

- a. Select the right tool required for the job and used it properly. (A)
- b. Regularly inspect tools, and use only those are in good condition. (A)
- c. Keep keen-edged tools and use only those are in good condition. (A)
- d. Use wrenches of the right size for the job. Face the jaws on an adjustable wrench in the direction of the pull. (A)
- e. Never use a hand tool on or very close to any moving part of a machine. Stop the machine first and remove all the tools before restarting. (B)
- f. Never place or leave tools where they might fall on persons or properties, trip or otherwise cause injuries to someone. Tools shall be stored properly. (B)
- g. Exercise care when handling or transporting tools, particularly pointed or sharp-edged ones, to prevent damage to them or other properties, as well as injuries to persons. (B)

h. Carry sharp or pointed tools in covers, or be sure they are pointed away from the body in case of a fall. (B)

## 41.02 **PNEUMATIC TOOLS**

- a. Only the right pneumatic tool, which is in good condition, shall be used for the job. (A)
- b. Use protective equipment as required. (A)
- c. Make sure that the air hose is properly connected to the tool before opening the pressure valve. Connectors shall be properly secured when air hoses of more than one length are used. (A)
- d. Grip the handle firmly with both hands when operating the tool. Never lean your body against it. When using a heavy pneumatic tool (such as jackhammer, clay digger, etc.) in a horizontal position, vertically suspended ropes shall support the tool. (B)
- e. If the tool bit sticks, do not try to forcibly pull it out. Loosen it out by a steady rocking movement of the tool. (A)
- f. When laying the pneumatic tool down, it shall always be placed in a position such that it can do no harm in case the tool is accidentally started. Do not leave the pneumatic tool standing when not in use.
   (B)
- g. If the tool is detached from the air hose under pressure, turn off the air by closing the base control valve, never by kinking the hose. (A)
- h. After using the pneumatic tool, turn off the air valve. (A)
- i. Compressed air when misused can be extremely dangerous. Under no circumstances shall a worker aim an air hose at anyone. (C)

## 41.03 **TOOL KEEPERS**

- a. Permit no tool with a mushroomed head to leave the tool room. Have all cold chisels, chisel bars, cutters or shock tools with bad heads dressed before they are issued. (B)
- b. Keep the jaws of wrenches in good condition. Warn workers against misusing them. (A)
- c. Keep all sharp-edged tools sharp. Keep the edges protected while in storage. (A)
- d. If any tools show signs of being improperly tampered with, withdraw it from service. Try to find the trouble and have it corrected. (A)
- e. Portable electric and pneumatic tools shall be kept in the best possible condition. Check frequently the condition of switches and control valves, electric cords and hose connections. (A)

## 41.04 **REPAIRS**

- a. All "out of order" equipment shall be shut down for repairs. Suitable signs shall be posted and not removed until repairs have been completed. Mobile equipment shall, if possible, be move to a safe location where operations will not interfere with the repair work. Equipment suspended in slings or supported by hoists or jacks for repairs shall be blocked or cribbed before men are permitted to work underneath. (B)
- b. When repairs on equipment such as conveyors and cableways are made remote from the sources of power, use chains, blocking or similar devices to prevent injury in case of accidental starting. (B)
- c. Before repairing electrically powered equipment, lock the main switch in the open position. The repairman shall retain the key to the switch lock. If there is more than one repairman on a circuit, each shall lock the main switch, the key of which shall be retained by only one repairman. Switch boxes shall have this provision. (C)

# CHAPTER IX

## ELECTRICAL AND UNDERGROUND WORKS

## **SECTION 42**

## 42.01 ELECTRICAL SAFETY

- a. Safety inspection of all electrical installations shall be done regularly. (C)
- b. Warning signs shall be displayed near exposed current carrying parts, especially high-voltage transformer installations. (C)
- c. Barriers, like metal covers, guard rails, etc. shall be maintained to prevent accidental contact with electrical equipment like booster or well pump motors, high voltage equipment, and installations. (C)
- d. Explosion-proof motors shall be used in hazardous locations where possible fires due to flammable gas or liquids are handled or stored. Switches shall also be of the enclosed type design. (B)
- e. Metal frames of electrical equipment operating at more than 150 volts shall be properly grounded. (B)
- f. Ground for personnel protection shall be installed in the receptacles supplying current to cord connected appliances or equipment specially ungrounded equipment use out of doors and wet places, etc. (B)
- g. Worn-out electrical insulation become porous, brittle and absorbs moisture. They shall be replaced immediately when discovered. (C)

## 42.02 BATTERY SHOP

- a. Battery charging installations shall be done in a well-ventilated area and shall be performed by trained and authorized personnel. (B)
- b. When it is necessary to do work in battery rooms, which require an open flame, the battery shall not be on charge and the room shall have adequate ventilation. (C)
- c. Smoking is strictly prohibited inside battery-charging rooms. (C)
- d. When making up an electrolyte for storage batteries, employees shall always pour the acid into the water. Reverse method of pouring may cause spattering. (C)
- e. Provisions shall be made for flushing and neutralizing spilled electrolytes. (A)
- f. Acid-proof gloves, sleeves, aprons, face shields and/or goggles shall be used when working on batteries. (B)
- g. Battery terminals shall be clean and connections shall be tight. (A)
- h. Tools or metal parts shall never be laid on a battery.
- i. Wood slate floorboards shall be used and kept in good condition to prevent slips and falls and to protect against electric shocks from charging equipment. (A)
- j. Battery charging rooms shall be isolated preferably with fire doors from other areas, particularly where flammable liquids are handled or stored. (A)
- k. Workers shall always lift and carry batteries vertically to prevent spillage. Proper lifting procedures should be followed to prevent back injury and hernia. (B)

## 42.03 **GROUNDING LINES**

- a. After an electrical line or equipment has been de-energized for the purpose of working thereon, it shall be checked as being "dead" by testing it with the use of an approved potential indicator. (D)
- b. Before any work is done on a line, which is to be worked "dead", it shall be grounded and short-circuited on at least each side of the location where the work is to be done. (D)
- c. The grounding conductor shall first be attached to the ground connection and then securely attached to the line or equipment to be worked on. (C)
- d. The use of chains for grounding lines on equipment shall not be permitted. Standard grounding conductors shall be used. (C)
- e. The removal of grounding devices shall be handled in the reverse order of Item c. (C)
- f. The combined resistance of the grounding wire and the connection with the ground should not exceed 3 ohms for water pipe connections or 25 ohms for artificial ground. (C)
- g. Sizes of grounding wires shall comply with the National Electrical Code recommendations. (B)

## 42.04 WORKING IN MANHOLES/VAULTS

Manholes/chambers/vaults – refer to water/drainage septic tank chambers and other vaults where the only access through it is a manhole.

## 42.05 SAFEGUARDING MANHOLES/VAULTS

- a. Before the manhole covers or gratings are removed or before work or operation begins, warning devices, barricades or guardrails shall be installed to protect the work area from traffic hazards. (C)
- b. Defective manholes/service box covers/frames and covers should be replaced with that of Maynilad Water approved design and specifications. (A)
- c. Trucks and other equipment shall be placed before the work area along the traffic line to prevent the least impediment or hazard to the work. (B)
- d. Proper shoring and bracing shall be used to prevent cave-in while vaults or similar excavations are under construction. (B)

## 42.06 ENTERING MANHOLES OR VAULTS/ CONFINED SPACES

- a. Manhole and service box covers should always be removed and replaced by means of approved hooks or hoists to prevent foot and back injuries. (C)
- b. Mechanical lifting aids should be raised, lower or suspend heavy or bulky materials to men working in manholes or vaults. (A)
- c. A ladder should always be used for entering or leaving a manhole, vault or pit. (A)
- d. Smoking shall not be allowed inside the manhole unless it is definitely known to be free from flammable gases. (B)
- e. A helper should be stationed at the manhole entrance at all times. (B)
- f. The helper should know how to apply artificial respiration. He must have an immediate access to such reserve apparatus as respiratory equipment and a lifeline of three meters longer than twice the depth of the manhole and strong enough to support the weight of two (2) men. (B)
- g. Suitable measures shall be taken to prevent surface water or debris from accidentally entering the vaults or subsurface area while work is in progress. Subsurface workers shall always wear hard hats. (B)
- h. Do not enter any confined space unless it is tested for oxygen deficiency or gas content. The following shall be observed:
  - 1. In compliance with the Occupational Safety and Health Administration guidelines for oxygen deficiencies, at 19.5% oxygen level, no person is allowed to enter any manhole

unless he is provided/wearing a SCBA or the manhole is ventilated thoroughly to bring the oxygen levels within the acceptable range of 21%. To determine the acceptable range, testing is again required. (B)

- 2. When concentration of flammable or poisonous gas exceeds 15% in air, the mixture is over the upper explosive limit (UEL) and too rich to support combustion. At this point, no person shall be allowed to enter the manhole unless ventilation is applied to displace the gases. When using a blower, circulate the flammable or poisonous gas back into the manhole or vault. A blower driven by gasoline or diesel engine shall be placed at distance of three (3) meters away from the manhole and the discharge end shall be placed near the bottom of the manhole to force the air up and out. (B)
- 3. In extreme emergency cases when it is necessary for a person to enter a manhole or vault where poisonous vapors and gases are present, he shall wear an approved gas mask/SCBA and safety harness to which a lifeline is attached, attended by another person wearing a gas mask/SCBA stationed at the manhole or vault opening. (B)
- 4. Gases in very low concentration, such as sulfur dioxide (SO2) or hydrogen sulfide (H2S), are mildly irritating to the respiratory and nervous systems. In high concentration, it causes inflammation of the mucous membranes. It causes death in a very short time. (B)
- 5. Do not enter until a proper entry permit is completed. (See exhibit # VI)

## 42.07 DISPOSAL OF SLUDGE AND MAINTENANCE OF WET PITS

## DISPOSAL OF SLUDGE

- a. Sludge removed from sewer manhole/septic tank/ Imhoff tank or any digesting changer tank shall be disposed in any of the following areas after stabilization: (A)
  - 1. Sanitary land fill site
  - 2. Isolated lagoons
  - 3. Spread on cultivated field
  - 4. Drying beds
- b. Tank trucks equipped with a vacuum pump and sludge tank trucks shall be used for transporting wet sludge. For dried sludge, dump trucks shall be used to the point of disposal. (A)
- c. Chlorination facilities used in treating sewage shall be operated on a continuous basis with sufficient chlorine dosages to maintain residual chlorine content of 0.5 mg/1 in the plant effluent.

Application of chlorine may be suspended only during periods of high stream flow. (A)

d. Composite samples from influent and effluent shall be taken monthly and laboratory analysis for BOD, Suspended Solids, PH, DO and other parameters shall be performed. Chlorine residual tests shall be performed daily by the operator. Record of flow, reversal of flow, level of sludge blanket, chlorine residual and other data shall be properly logged. The physical plant and its surroundings shall be kept clean at all times. (B)

## MAINTENANCE OF WET PITS/IMHOFF TANKS/ SEDIMENTATION TANKS/COMPARTMENTS, ETC.

- a. Bar screens shall be either cleaned by means of screening machines or by hard-raking method. (A)
- b. When a wet pit is about to be dewatered, the exhaust blower shall be operated to disperse accumulated fumes and flammable gases.
   (B)
- c. Plastic bags shall be used in storing scum and debris taken from the wet pit/Imhoff tank. (A)
- d. Debris and scum shall be removed from scum chambers several times each day as accumulation arises. (B)
- e. Debris and scum shall be treated with lime when needed.

## 42.08 SAFETY RULES FOR BOOSTER AND DEEPWELL PUMPING STATIONS

- a. The fence around the substation shall always be kept in good condition to prevent access of unauthorized persons and stray animals from the high voltage equipment. (B)
- b. Two or more warning signboards "Danger: High Voltage" shall be conspicuously displayed at the enclosure of the substation. (C)
- c. Large plants and trees shall not be allowed to grow near the periphery of the substation. Grasses and weeds shall not be allowed to flourish inside the substation area. (C)
- d. The substation shall not be used as storage for lubricating oil, diesel fuel and other flammable materials. (C)
- e. Batteries of the rectifier kept in an enclosed area shall be properly ventilated to prevent accumulation of hydrogen gas. Smoking and use of open flame and electric tools producing sparks shall be avoided in such enclosed areas to prevent explosion of hydrogen gas. (B)
- f. Capacitors shall be safely enclosed or protected so that persons cannot come into accidental contact or bring conducting materials into accidental contact with exposed energized parts. (C)
- g. Motor control panel boards shall always be secured to prevent accidental contact with live electrical conductors and exposure to arcing contacts and circuit breakers. (B)

- h. The panel board shall not be used as support for any heavy object and its interior shall not be utilized as storage. (B)
- i. Only qualified persons are allowed to open the panel board for inspection and maintenance. (C)
- j. Clothes and other flammable materials shall not be hanged/placed at the enclosure of the panel board. (B)
- k. Guards of rotating parts of electrical and mechanical equipment shall not be removed except for repair or inspection. Guards shall be placed back after completion or repair work. (B)
- I. Maintain working area, equipment floor space clean and clear from obstructions and free from grease and oil spills. (B)
- m. All manholes within the pumping stations shall always be kept closed. (C)
- n. Operators shall observe extreme caution and wear the recommended protective equipment in handling acid and chlorine used for treating water wells. (B)
- Operators of the deep well pumping stations shall always operate the chlorinators and apply the correct dosage of chlorine to ensure the portability of water sent to their respective areas of influence. (C)
- p. Operational multipurpose fire extinguishers of appropriate capacity shall always be available. (C)
- q. Rules for the Pumping Station Operators:
  - 1. Operators shall be provided an enclosed noise-reducing room to minimize their exposure to noise. (B)
  - 2. Operators shall wear all necessary personal protective equipment while on duty. (B)
  - 3. Threshold Limit Values for noise are as follows:

## PERMISSIBLE EXPOSURE

Duration Per Day (Hour)	Sound Level (decibels)
8 6	90 92
4	95
2	100
1	105

# **CHAPTER X**

## FIRE AND OTHER NATURAL CALAMITIES

## SECTION 43 OBJECTIVE AND PURPOSE

The objective of this policy is to ensure the Security and Safety of all MWSI personnel in case of fire and other related calamity accidents. To protect the company property against destruction and damages before, during and after fire, earthquake, floods and other natural calamities.

#### SECTION 44 DEFINITION OF TERMS

- FIRE BRIGADE TEAM a team organized by MWSI management, with strong manpower of 45-50 members, from Safety Department, Central Safety Committee Members, Security and Auxiliary personnel. This team is readily available at all times in cases of Fire, Earthquake and other severe convective storms, with the following missions:
  - 1. To secure the Security and Safety of MWSI personnel in case of Fire, Flood, Earthquake and other natural calamities.
  - 2. To protect the company property against destruction and damages before, during and after the above-mentioned calamities.
- FIRE DRILL an execution exercise adopted by the Team aimed to instil and maintain fire awareness and preparedness in case of fire. Personnel are being taught of proper and safe manner in exit and evacuation procedures.
- **FIRE EXIT** portion of the structure, which can be utilized for a safe egress & ingress during fire. It is a fire proof and enclosed portion that is the safest to exit in case of fire.
- **EVACUATION AREA** an area or compound away from the scene of fire, the place where employees are directed to stay during the fire and wherein body counting is to be done by the Fire Brigade Team.
- **FIRE ALARM** is a distress sound, which is heard throughout the building indicating that a smoke of fire was detected posing the building, properties and personnel in danger of fire.

## SECTION 45 SAFETY RULES AND GUIDELINES

## FIRE:

- 45.01 When the Fire Alarm sounds, it means fire was detected. Under such situation, all employees, under "No Exemption Rule", are directed to immediately evacuate the building and proceed immediately to the designated evacuation area. See attached Annex E.M. Only the Fire Brigade Team, Bureau of Fire Protection personnel, MWSI Security, CSC / Sub Committee members, or employees allowed by the President, are allowed to stay in the building during the drill. (C)
- 45.02 Employees shall obey all the commands of the Fire Brigade team members and the deputies in the execution of the drill, from the time the Fire Alarm sounded up to the time of declaration of completion. (A)
- 45.03 Exiting employees are required to pass through the designated exit lanes and door without panic. (A) See attachment A D
- 45.04 While exiting, observe discipline and conduct one by helping one another. (A)
- 45.05 All employees must exit and be at the evacuation area within 3-8 minutes from the time the Fire Alarm sounds. (A)
- 45.06 Members of the MWSI Fire Brigade Team are oblige to perform all their defined functions in times of drills and other emergencies. (C)
- 45.07 The Fire Brigade Team, Safety Department personnel and CSC/Sub-Committee members shall be in active participation in the resolution of the aftermath of the fire and other calamities. (A) See chart No. 1 & 2

## EARTHQUAKE:

- 45.08 Felt of mild tremor (earthquake) every MWSI employee is required to vacate the building carefully, in accordance with the given instructions and without panic. With or without alarm no one is allowed to stay in the building. (A)
- 45.09 At the evacuation area, employees are enjoined to stay therein and wait for the instruction by Chairman of CSC, his assistant or the MWSI President. (A)
- 45.10 When necessity requires, every employee has the duty to make proper coordination with proper offices regarding the aftermath of the tremor. (A)

- 45.11 During disaster situation, MWSI different Departments or Section Heads, which have the capability to render assistance of any kind, shall render service and logistical support. (C)
- 45.12 The CSC/Sub-Committee member in the involved area shall be in active participation or cooperation in addressing the calamity. (B)

## FLOOD:

- 45.13 In times of floods which post danger or loss to MWSI properties and employees, every office or Department/Division Heads is responsible to oversee the welfare of his/her subordinates and make coordination with proper MWSI office or government agency for a centralized or Departmental management of such crisis. (C)
- 45.14 Every employee or office, thru the leadership of the head, is responsible to perform Departmental defined functions, which are related to and in connection with the effective solution for the given situation. (B)
- 45.15 The CSC/Sub-Committee member in the involved area shall be in active participation or cooperation in addressing the calamity. (A)
- 45.16 In times of fire, earthquake, flood and other calamities, all members of the CSC shall be activated or mobilized to perform all defined functions for easy address of the problematic situation. (A) See Section 8, for CSC composition and functions.

## SECTION 46 MWSI FIRE BRIGADE & FIRE EXIT DRILL CHART

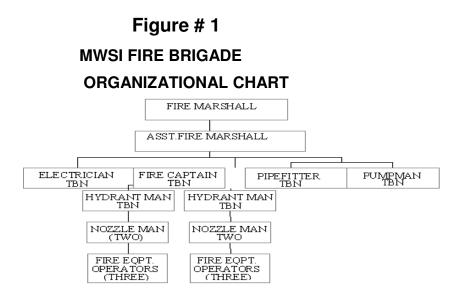
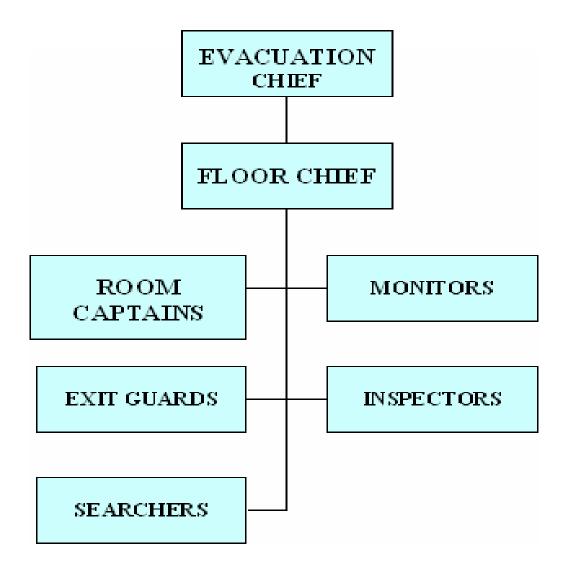


Figure # 2

FIRE EXIT DRILL CHART



## **SECTION 47**

## DUTIES AND RESPONSIBILITIES OF MWSI FIRE BRIGADE TEAM

## FIRE MARSHAL

- 1. Responsible in maintaining the Brigade roster and the recruitment of new members whenever necessary.
- 2. Conduct Fire Drill Training.
- 3. Coordinate with the Fire Brigade Department as regards to related activities.
- 4. Personally direct fire-fighting force until the arrival of the Fire Fighting Departments.
- 5. Direct Security and Safety Management.
- 6. Direct Salvage Operation on company assets after fire.

## **ASSISTANT FIRE MARSHAL**

- 1. Assist the fire Marshal (or shall act as Fire Marshal in case the latter is not around) in the conduct of training, recruitment, fire drill, etc.
- 2. Make certain that gate guards are notified for them to direct fire Trucks to the Scene of fire.

## PIPEFITTER

1. Must be familiar with the operation of Automatic Sprinkler, piping, flammable gas and liquid control valves system. To fully open fire-fighting control valves and shut-off flammable gas and liquid control valves when fire occurs.

## ELECTRICIAN

- 1. Shut-off electrical power on areas affected by fire.
- 2. Provide emergency lightings, and introduce repairs on faulty electrical wirings.

## PUMPMAN

- 1. Ensure that the Fire Pump is of top condition at all times.
- 2. Start the Fire Pump at the first blaze of fire.

## **FIRE CAPTAIN**

- 1. Provide effective methods and techniques in the fire fighting execution.
- 2. To lead the fire fighters in the proper and diligent fire fighting techniques.
- 3. Make assessment and evaluation on the progress of fire fighting management.

## **EVACUATION CHIEF**

He must be a responsible, competent and with leadership ability in order to insure compliance with all orders and instructions to exit drills to wit:

1.In charge in all matters pertaining to exit drill organization.

- 2. Schedule exit drills at least twice a year.
- 3. Supervises the building Fire Alarm/Fire Detectors as to workability.

- 4. Notify members of his organization and the employees of their assignments and duties.
- 5. Enforces disciplinary measures for uncooperative employees pursuant to MWSI policies.
- 6. Determines the list of employees and average number of visitors in the building.
- 7. Assigns at least a two-way exit for use of employees in each room during exercise/emergencies.

## FLOOR CHIEF

Floor Chiefs must be able to communicate to all occupants/employees in his assigned floor and performs the following:

- 1. Responsible for the enforcement of Fire Exit Drill and report infractions to The Evacuation Chief.
- 2. Personally supervises the sounding of alarm on his floor.
- 3. Supervises the movement on his floor for prompt and proper execution.
- 4. Designates the exits to be used by the occupants on his floor.

5. Responsible for the condition of aisles and passageways.

## **ROOM CAPTAINS**

He must insure that movement in his room is properly executed correspondingly with the signal. He shall report and coordinate with the Floor Chief.

## EXIT GUARDS

He shall oversee that the march from rooms to stairways, corridors, aisles, etc. is already without overcrowding and at uniform speed while observing spacing between files.

He shall be positioned:

1.At the room, side of exit doors until occupants have left the room.

2.At the horizontal exit doors, in corridors and on stairway landing or turn.

3.To follow the rear of the exit column.

## SEARCHERS

Shall be a combination of man and woman searchers on each floor/room and shall be strong and cool-headed and shall perform the following:

1. Visit toilets of each sex where there may be occupants who cannot hear the alarm.

2. Look for people who may have fainted or become hysterical.

3. Leave as soon as possible after the last squad leaves.

## MONITORS

In charge of the squads of occupants and shall be leaders or disciplinarians. He shall oversee that the squad is quickly formed and maintained in line, two abreast and lead the march through corridors, stairways etc, as directed by exit guards, to safe distance away from the building.

## INSPECTORS

Shall be Technical personnel knowledgeable about buildings and its Fire Fighting Equipment attached to it for ensuring the worthiness of the following

1. Doors

2. Stairways

3. Fire Escape

- 5. Fire Alarm System
- 6. Fire Equipment
  - 7. Floor Exit Layout, Exit signs
  - 8. Room Exits

## FIRST AID EQUIPMENT OPERATORS

1. "Fire Squad" utilizing fire extinguishers and small hoses for immediate action.

## SECURITY SUPERVISOR

- 1. Inform the different Fire Departments and lead the Fire Brigade to use the available Fire Fighting Equipment.
- 2. Instruct the Detachment Commander to deploy guards around the perimeter as well as to the gates or area of interest.

## DETACHMENT COMMANDER

- 1. Deploy guards around the perimeter of the building as well as the gates or company premises.
- 2. Personally supervise that all guards are utilized during the fire.

## COMPANY DOCTOR/NURSE

1. Render medical attention to all victims of the disaster and assist in the transfer/evacuation of the same to the nearest hospital if necessary.

## SECTION 48 DRILL INSTRUCTIONS

During drills, the following are the significant instructions to be familiar with;

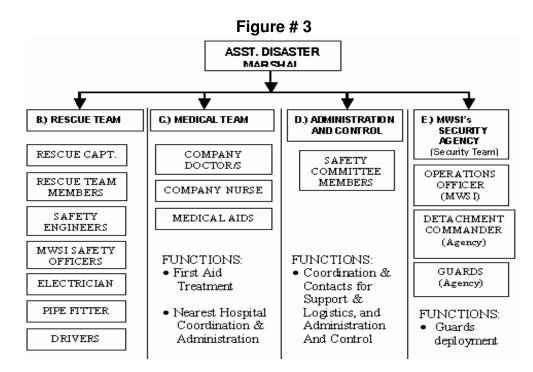
- 1. Know at least two ways out (exits) of the building.
- 2. Do not use elevators.
- 3. Monitors shall take charge in forming and leading occupants into line. Form a squad of thirty (30) persons or less, two abreast or double line.
- 4. All visitors shall join the squad.
- 5. Floor Chiefs shall designate the exits to be used by the occupants/employees on his floor and shall give instruction to march.
- 6. Exit guards shall maintain orderly march at uniform speed and spacing between files.
- 7. Marching speed shall not exceed two (2) steps per second.
- 8. Attempting to salvage property during fire exit is forbidden.
- 9. ARM SIGNALS; to be given by respective monitors.
- **FORWARD** right hand vertically raised above head.
- MARCH right hand lowered in the direction to be followed by the line
- **HALT** both hands extended horizontally across the line of march.

## SECTION 49 EXECUTION

## A. EXECUTION (In Case of Fire)

- 1. In case of Fire, the **Fire Marshal** shall automatically act as the Head and in case of his absence his Assistant shall automatically assume the responsibilities. If both are absent, the Evacuation Chief shall assume the responsibilities. See Charts 1 & 2.
- 2. Fire Marshal shall immediately access and assess the situation if necessary and inform the Security Supervisor that a Fire is in progress. The Security Supervisor, with his Detachment Commanders, shall call the different Fire Stations and lead the Fire Brigade to use the available Fire Fighting Equipment. Immediately coordinate to the Electrician/Maintenance Engineer of the building to shut off the Main Breaker to avoid spreading of fire in order to minimize damages.
- 3. The **Detachment Commander** shall deploy guards around the perimeter of the building as well as to the gates in order to prohibit entry of looters and to clear all entrances for the route of **Fire Trucks**.
- 4. The **Evacuation Chief** in coordination with the **Security Supervisor** to give the order to vacate the area and to ensure that all employees must leave their places of work. Other occupants of the building will join the exit movement of the employees and will be instructed to stay outside MWSS fence near Katipunan Road.
- 5. **Medical Team/First Aid Team** will render first aid /medical attention to victims affected prior to their evacuation to the nearest hospital.
- Upon arrival of responding Fire Trucks, the Security Supervisor/Detachment Commander will accompany them to where the Fire is in progress.
- After the Fire, **Earthquake or Flood**, the Fire Marshal and the Security Supervisor shall assist the Arson Investigation Team in the collection of Evidences in determining the cause of fire. Photographs should be taken from the fire scene for future references.
- 6. The opening of the building or its normal operation shall be the discretion of the **Management**.

**B.) EXECUTION** (In case of Earthquake, Flood and other Natural Calamities)



1. ORGANIZATIONAL CHART (Groupings)

## b.) GROUP FUNCTIONS:

Α.	DISASTER MARSHAL	COMMAND CONTROL CENTER: <u>Safety Departmen</u> LOCATION: Ground Floor Main Office	<u>t</u>
	ASST. DISASTER MARSHAL	CHAIN OF COMMAND: ① Disaster Marshal (or the Assistant in case Dis Marshal is not around) is the overall Head of the for teams (Rescue Team, Medical Team, Administr and Control Team and Security Team.	ur (4)
		<sup>②</sup> Direct instructs, thru the Team Head, all teams on the on- going disaster what to do, or as needed	
		③ Assess situation, based on respective reports give Teams' Head, and communicate to manage (MWSI)	•
В.	RESCUE TEAM & CO.	① The Rescue Captain shall act as head of the rescue To	eam.

- <sup>②</sup> Lead/head the Team for all types of Rescue Operations.
- ③ Instructs/Directs all group members to execute their respective duties and responsibilities.
- ④ Performs other acts relative to Disaster Rescue Operations.
- ① Administers needed first aid treatment to victims, especially MWSI personnel and interests.

<sup>②</sup> Make reports on all medical matters.

D. ADMINISTRA-TION & CONTROLTEAM

MEDICAL

TEAM & CO.

C.

Ε.	SECURITY
	TEAM

- ① All Safety Committee Members are mobilized and to execute all administration works including support and logistics, etc.
- <sup>(2)</sup> The most senior member shall act as the Team Leader, responsible to lead the Team's functions.
- ③ Assessment and report on the situation.
- ① The Chief Security Officer shall head the Security Team, in coordination with Detachment Commander of Security Agency.
- ② Tasks to undertake all security matters in the areas and interests affected by the Tropical Cyclones or Storms.

#### SECTION – 50 ATTACHMENTS

- 1. Map of Route to Nearest hospital (See Annex H)
- 2. MWSI-Assembly Point (See Annex E. M.)
- 3. Engineering Building Floor Plans (Basement to Third Floor) showing the Fire Exit Points. See Attachment annexes A to D.

## SECTION – 51 ADMINISTRATIVE CONTROLS

1. The Evacuation Chief shall document what transpired during the Drill, and submit it to the Fire Marshal.

- 2. Concerned employee/s will be issued corresponding memorandum regarding lapses or errors committed by them during drills. Constructive advises will be contained in these letters. Succeeding drills will indicate application of corrections on previous errors.
- 3. In case of employee's failure to attend the drill/training despite confirmation of attendance, he/she shall be required to submit a written valid explanation duly signed by the immediate supervisor explaining the reason/s for such failure and the following penalties shall be accorded to him/her:

First Offence	Written Reprimand
Second Offence	five (5) days Suspension

4. The Internal Audit, Administration-HR, Safety Department and the Safety Committee in general shall from time to time review/update the applicability of this policy.

# CHAPTER XI

## FIRST AID TREATMENT

## **SECTION 52**

- 52.01 Training and re-training of an eight (8) hour course conducted at least once a year on First Aid is highly recommended for updates on new methods/skills focusing more on frequently encountered cases.
- 52.2 First Aider should be properly identified and employees in general are made aware of work shift schedule and site assignment.
- 52.3 Emergency services by at least one well trained first aiders for every work shift is a must.
- 52.4 A complete First Aid Kit should be strategically distributed in all MWSI satellite offices.
- 52.5 A regularly replenished kit should contain a properly labeled and segregated medicines and paraphernalia.
- 52.6 First Aid Pocket Manual should:
  - a. be understandable to the layman/users.

b. include first aid procedures of frequently encountered illnesses/ accidents.

- c. specifically be on hand all the time by the first aider and strategically accessible to everyone.
- 52.7 First Aider should keep on record of all the incidents encountered for monitoring and documentation purposes.

<ul> <li>52.08 Ideally the First Aid Kit should contain the following <ol> <li>70 % Isopropyl Alcohol (Green Cross)</li> <li>Hydrogen Peroxide</li> <li>Betadine Antiseptic Solution</li> <li>Normal Saline Solution</li> <li>Cotton Balls</li> <li>Sterile Gauze Pads</li> </ol> </li> <li>7) Roller Gauze <ol> <li>Adhesive Strips/Band aids</li> <li>Elastic Bandage</li> </ol> </li> </ul>	60 ml 120 ml 15 ml 250 ml 50pcs/pk. 2 x 2 3 x 3 51.75 100pcs./box 2 x 5
10) Triangular Bandage 11)Sterile Rubber Gloves 12)Ice Packs (gel type) (ice bag) 13)Forceps 14)O.R. Scissors 15)Bandage Scissors 16)Tongue Depressors 17)OTC drugs	3 x 5 100 pcs./box
<ul> <li>a) Biogesic</li> <li>b) Diatabs</li> <li>c) Dolfenal 500mg</li> <li>d) Plasil</li> <li>e) Bonamine (Adult)</li> <li>f) Buscupan</li> <li>g) Histacort</li> <li>h) Cohistan</li> <li>i) Kremil-S</li> <li>j) Neozep No Drowse</li> <li>k) Decolgen No Drowse</li> <li>l) Mucosolvan 30mg</li> <li>m) Tuseran Forte</li> <li>18)Salbutamol (Ventollin) Metered Dose Inhaler</li> </ul>	

#### **SECTION 53**

First aid is the immediate temporary treatment given in case of accident or sudden illness before the services of a physician can be secured. After first aid is given, the injured or sick employee should be brought to the medical unit. General Instructions:

- 1. A first aid kit, which should be readily available at all, times. First aid kits must be properly maintained and inspected at frequent intervals by the foremen or others in charge.
- 2. Stop and think, Keep calm in all emergencies. If you are familiar with first aid methods, do not hesitate to take charge of the situation. Direct

the action of others and do everything in your power to preserve the life and comfort of the injured. If you are not familiar with first aid methods, ask someone.

- 3. In any case, except very minor injuries, lay the patient down in a comfortable position, examine for all injuries and see that a doctor is called for at once. Do not excite or frighten the patient- a word of encouragement is always helpful.
- 4. If alone, treat first for stoppage of breathing needing artificial respiration; second, severe bleeding; third, for internal poisoning; fourth, for open wounds; fifth, for burns; sixth, for fractures and dislocation. Other less serious injuries can be taken care of.
- 5. If patient is unconscious and is not breathing or if you are uncertain of his action, start artificial resuscitation at once.
- 6. Handle patient gently but firmly.
- 7. Loosen tight clothing at neck and waist.
- 8. Do not slip clothing over injured part. Rip it at the seams with knife or scissors.
- 9. If the patient is vomiting, turn his head to one side so he will no choke.
- 10. Patient should always be kept warm.
- 11. Never give unconscious person water or any liquids to drink.
- 12. Do not move an injured person unless absolutely necessary. Do not be in a hurry to transport the patient. Much harm may be done when jarring and shaking the patient.

## SHOCK OR FAINTING

This condition is present in many cases of minor or major injury. Fainting is a mild form of shock.

- 1. Lay the patient flat on his back with his head low.
- 2. Keep the patient comfortably warm with blankets, robes, coats, etc. External heat, such as hot water bottles, hot pads, etc., should not be applied unless the covering appears to be inadequate or the patient complains of being cold. In applying heat to the body, great care must be exercised to prevent burning the patient.
- 3. Provide plenty of fresh air,
- 4. Have the patient inhale aromatic fumes from ammonia ampule. If patient is conscious, give him a glass of water or a hot drink (tea, coffee or water) as a stimulant. Administer frequently in small doses. (Inhalants must be carefully used. Do not hold too close to nose. Try them on yourself first. )

## WOUNDS

1. Any break in the skin is a wound and is likely to become infected. All wounds, no matter how small, must receive first aid attention.

## A. Wounds Without Severe Bleeding:

1. Wash the wound with soap or water.

- 2. Dry it with cotton balls or let it dry.
- 3. Apply antiseptic solution, e.g. alcohol etc.
- 4. Cover it with sterile gauze compress and bandage.
- 5. Puncture wounds from nails, long sprinters, etc. should receive the immediate attention of a physician.
- 6. Do not disturb blood clots or scabs.
- 7. Do not remove foreign bodies, except small splinters from wounds. These maybe carefully remove from tweezers, the points of which have been scorched in a flame sterilized with antiseptic.

## B. Wounds With Severe Bleeding:

- 1. Secure medical aid at once. Apply direct pressure by using compress or bare hand.
- 2. Place patient in a lying position and elevate the injured part if possible, above the heart.
- 3. Apply pressure with fingers on arterial pressure points, if known. Apply digital pressure by pressuring the artery that supplies blood to the wounds.
- 4. Place large scales gauze compress over wound and bandage tightly in place.
- 5. As a last resort to check bleeding from an injured limb, a tourniquet may be applied close to the wound. There should be unbroken skin between the tourniquet and the wound. If the wound is near a joint, make the wrap at the nearest point above the joint. Attached a note on the victim's body indicating the hour of tourniquet application. The tourniquet should not be released except by a physician who is prepared to control the hemorrhage and replace blood volume adequately. Improvised tourniquets should be made of flat material about two inches wide (i.e., cravat bandage, stocking or a belt). Do not use rope, wire, or sash cord: they may cause injuries to the underlying tissues and blood vessels.
- 6. Do not give stimulants in case of severe bleeding. Cold water may be given in small doses.

## **INFECTED WOUNDS**

There is no first aid treatment for infection. A physician must always be consulted promptly.

## **BURNS:**

- 1. Do not break blisters.
- 2. Carefully cut away clothing from the burned area and apply sterile burnt solution or ointment. Never use iodine.
- 3. Cover lightly with several thickness of sterile gauze and bandage. Never use cotton for burns.

- 4. In all cases of chemical burns on the skin, thoroughly flush the burned area with plenty of clean water. Then treat as directed above.
- 5. For chemical burns to the eye, see section on Eye Injuries.
- 6. Creosote burns-when skin surfaces contact with creosoted poles, wash parts thoroughly with soap and hot water. Apply Isopropyl Alcohol (Creosote burn solution). Never use this solution in or near the eyes.

#### **INJURIES TO BONES**

Injuries to bones are sometimes difficult to detect. If a fracture or dislocation is suspected, treat as such.

Falls or other accidents involving injury to the neck or back may result in very serious after-effects if the spinal cord is injured.

Unless there is an imperative need to move an individual suspected of having a spinal cord injury to a zone of safety, the injured is best not moved or lifted, until medical aid is obtained.

## **FRACTURES:**

- 1. Avoid unnecessary handling of patient and injured part. (Great damage may be done by sharp edges of bone puncturing blood vessels and tissues).
- 2. Place the patient at rest in a comfortable position. Call a doctor at once. It is not necessary to splint broken bones unless the patient must be move. However, never move the patient until the broken bone is splinted.
- 3. When to splint;

Cover the joints above and below the fractured member. Splints must be thoroughly padded and carefully applied.

4. In compound fractures where bone protrudes through skin, treat the wound first as directed under the section on WOUNDS.

## DISLOCATION:

A bone out of position at a joint is called a dislocation.

- 1. Treat dislocation by the application of cold or hot compresses.
- 2. Secure medical aid promptly. It is always advisable to have a doctor to put the dislocated joint back in place.

## **SPINAL CORD INJURIES**

Never lift an injured person or his head until he is sure he can move his legs or fingers. If the victim cannot move his legs, his back may be broken. In both cases, the spinal cord is injured.

If the patient must be moved, proceed as follows:

#### **BROKEN BACK**

In case of a broken back, fold a blanket lengthwise and place it beside the patient. Hold him at the shoulders and hips and gently roll the patient over into the blanket with the head turned to one side. One arm may be folded so as to lie beneath the patient's head. By pulling at the shoulders and hips, the trunk is moved as a unit. The blankets should be lifted by grasping it at the level of the patient's shoulders and knees. This permits the patient's back to sag slightly downward on a stretcher or a similar support and must be transported in this position.

Do not permit the patient to sit up.

#### **BROKEN NECK**

If a person with a broken neck must be moved, a board or shutter should be placed lengthwise beside the patient so that it is at least four (4) inches beyond the patient's head. The board should be five (5) feet or more in length and at least (15) inches wide.

The neck is steadied by holding the head between the two hands. One or more persons shall slide the patient onto the board so that he rests with his face upward, arms at side, head, trunk and extremities on the board. The body, head and neck are moved as one.

Fold and secure the arms over the chest. Strap the patient to the board to prevent him from falling off during transportation. No pillow shall be placed under the head or neck.

Under no circumstances shall the head be tilted forward or sideways.

If the injured person is found lying face downward, the board shall be placed beside the patient in the same manner as described above. The head and neck are then steadied between the two hands while another person gently rolls the patient onto the board, holding the patient at the shoulders and hips so that he lies face up. The head and trunk must be turned at the same time.

Although there may be no symptoms, if a broken back or neck is suspected, transport as if the back or neck were broken. When the victim is unconscious, handle him as though his neck is broken.

#### **POISONING:**

FOR NON-CORROSIVE POISONING (WITHOUT ACID CONTENT)

- 1. Dilute the poison with water. Let the victim drink as much water as he can.
- 2. Induce vomiting.

- 3. Administer antidote (anti-poison) or milk to neutralize the poison inside.
- 4. If breathing stops, give artificial respiration.

# FOR CORROSIVE POISONING (POISON WITH ACID CONTENT, E.G. MURIATIC ACID)

1. Dilute with water.

Note: Don't let the victim vomit. It can enhance further tissue damage.

- 2. Administer antidote:
  - 1 part strong tea
  - 1 part milk
  - 2 parts charcoal

## POISON VINES-IVY, SUMAC, OAK, ETC.:

Learn to identify these plants and avoid contact with them.

- 1. If portions of the skin are exposed, wash thoroughly several times with hot water and soap and then apply rubbing alcohol liberally.
- 2. If rash develops, wash again, apply rubbing alcohol and saturate with 5% solution of ferric chloride, calamine or other approved poison ivy lotion. Cover lightly with sterile gauze.
- 3. Always consult a doctor if the wound is severe.

## **BRUISES, SPRAINS AND STRAINS**

- 1. Bruises are not usually serious. However, other internal injuries should be suspected. Apply cold or hot applications which will reduce swelling and pain.
- 2. Sprains are injuries to joints. Place the patient at rest and elevate the injured limb. Cold applications will reduce pain and swelling.
- 3. Strains are injuries to muscles. Rest injured muscles. Cold application and gentle massage of the injured part will help ease the pain. If strain is in the abdominal region, rupture should be suspected and a doctor consulted.

## EYE INJURIES:

All cases except the most trivial ones MUST BE ATTENDED BY A DOCTOR

## FOREIGN BODY IN THE AREA

1. Never probe or dig the eye for removal of embedded particles. If an object is floating on the surface, it may be brushed off with a clean cotton application or the corner of a sterile gauze compress.

- 2. Do not allow the patient to rub his eye. This will cause great irritation and do little good.
- 3. If the particle cannot be readily removed or if irritation continues, the eye should be flooded with a 10% solution of boric acid ointment. A couple of drops of clean olive oil or castor oil should then be applied.
- 4. Do not remove splinters from the eye.

## **BURNS TO EYE**

In all cases of burns to the eye, the patient must be sent to a doctor.

- 1. Chemical burns-Never neutralizes chemical burns of the eye. It is too risky for a novice to attempt this. Thoroughly flush the eye with clean water, then drop olive oil, castor or boric acid ointment into the eye.
- 2. Electric flush burns or fire burns of the eye should be treated with clean olive oil, castor or boric acid ointment. Do not use water.
- 3. Cover eye with a soft gauze compress. lodine must never be used in or near the eye.

## BITES

Dog or Cat Bites

- 1. Wash the wound thoroughly with soap and water. (This is the only exception where the use of soap and water on a wound is permissible.) This is done to eliminate the animal's saliva.
- 2. Treat as any open wound.
- 3. Always consult a doctor. (If possible, identify the owner of the animal).

## **INSECT BITES**

- 1. Treat as an open wound.
- 2. Watch closely for the development of infection.

## SNAKE BITES

If you work in a snake-infested area, insist on a special snake first aid packet for your use and familiarize yourself with the special instructions on the treatment of snakebites found in the packet.

## FIRST AID FOR NON-VENOMOUS SNAKE BITES:

Treat as an ordinary wound.

## FIRST AID FOR VENOMOUS SNAKE BITES:

- 1. Immobilize the injured patient.
- 2. Apply a constricting band.
- 3. Make an incision on the bitten part. Note: Incision should be along the vein, not across the vein.

- 4. Suck the incised area to remove the venom.
- 5. Transport the victim to the hospital.

## **GENERAL INSTRUCTIONS:**

- 1. Don't get excited. Keep quiet or don't move to avoid increase in the circulation of the venom.
- 2. Don't take a slug of whisky.
- 3. If bitten on a limb, let it hang down. Don't do more harm to yourself than the bite would have done if you hadn't treated it, particularly if you are not sure you have been bitten by a poisonous snake. Some have been so slash-happy with the knife, tied the lymph constrictor so tight, or left it on so long that infections, ulcers, gangrene and other complication result.
- 4. Sit where you are and carry out the first part of this treatment.
- 5. If you think you are bitten by a rattlesnake but can find no fang marks and have no pain or swelling within fifteen (15) minutes of the bite, you are probably mistaken in the identity of the snake or the snake injected very little venom.
- 6. Make no incisions but get to a doctor promptly.
- 7. Kill the snake, if possible, without undue excitement or exercise, to know whether it is really a poisonous snake. If practical, take the dead snake to your doctor so that he may know its size and identity.
- 8. Paint knife blade and fang marks with antiseptic. Make cross (x) incisions at the fang marks ¼ ″ long and 1/8 ″ to ¼ ″ deep. (Do not make incisions if the bite is on fingers, toes or over large visible veins). Squeeze air out of the cup and place over incisions. Steady gentle suction is better than strong suction. The cups hold on best if the skin is moistened with antiseptic (alcoholic beverages may be used but antiseptics from first aid bites are much preferred.) If the patient can be taken to a hospital within fifteen (15) minutes, don't do anything-just get to the hospital and have someone call ahead so that they can be prepared and have anti venom ready.

## **CONVULSIONS OR FITS:**

- 1. Place the patient flat on his back and insert a padded stick between teeth to prevent the patient from biting tongue.
- 2. Do not restrict convulsion action but try to prevent the patient from inflicting self-injury, especially to the head.
- 3. After a convulsion, the patient must be kept warm and quiet. A doctor must be called.

## SUNSTROKE:

Sunstroke is caused by prolonged exposure to the direct rays of the sun. Condition comes on rapidly. Face is flushed, skin is dry and hot and

breathing is heavy. A high fever is present. Treat this condition by reducing fever as quickly as possible by sponging head and the entire body with cold water. Never give patient stimulants (cool water may be given). Keep patient lying down with head and shoulders slightly elevated. Get medical help at once. Quick action is important. Do not use ordinary treatment for shock.

## **HEAT EXHAUSTION:**

Heat exhaustion usually occurs in hot places where the circulation of air is not good. It is entirely different from sunstroke. It causes collapse from the effect of heat. The patient is very pale, skin is covered with clammy perspiration, pulse is weak and breathing is shallow. Treat by moving the patient to a cool place with good air circulation. Place the patient on his back with head low and then cover him with blankets or coats. If the patient is unconscious, give him aromatic spirit of ammonia dipped in a cotton ball as stimulant. Get medical aid at once and keep the patient quiet. Treat for shock.

## **HEAD INJURIES**

Every head injury should have the attention of a doctor. Fractured skull or concussion should be suspected and treated for.

- 1. Lay the patient down.
- 2. Give no stimulants.
- 3. Keep the head slightly raised and apply cold compresses to forehead and back of neck and heat to the rest of the body.
- 4. Treat any wound if present.
- 5. Transport these cases very carefully.

## ARTIFICIAL RESUSCITATION:

In case of accident involving electric shock, the following action shall be taken immediately:

- 1. Breaking the contact- the victim must be freed from contact with the live conductors as promptly as possible. Use a long dry stick or pole or another non-conductor. Interrupt the current supply if this can be done safely and quickly.
- 2. Begin rescue breathing (mouth to mouth to nose method) at the earliest possible second after the action under Item I has been taken. Remember: the brain has only 4 minutes to live without oxygen.
- 3. While rescue breathing is in progress, have someone examine the heartbeat of the injured by feeling the pulse on his wrist or on his neck, just at the side of the Adam's apple.
- 4. (a) If the heart of the injured is still beating, rescue breathing should be continued uninterrupted until normal breathing of the injured is restored or rigor mortis has begun. This may be four

(4) to six (6) hours longer or place for care and treatment until after normal breathing has been restored. He may be lowered from the pole, but must not be otherwise moved.

- 5. If the heartbeat of the injured has stopped, the injured should be lowered as soon as possible and both the rescue breathing and the closed chest heart massage performed simultaneously.
  - (a) As soon as possible, an ambulance should be called. Continue an uninterrupted artificial respiration and closed chest heart massage until normal breathing and normal heartbeats are restored.
  - (b) If a second person is not available, the rescuer may interrupt massage every thirty (30) seconds to fill the chest two (2) or three (3) times (rescue breathing). Mouth to mouth ventilation and chest massage do not have to follow the same rhythm.
  - (c) As soon as the ambulance arrives, the injured shall be taken to the nearest hospital that has facilities for cardiac treatment.

During the trip to the hospital, artificial respiration and heart massage shall be continued in the ambulance. At the hospital, the injured shall be turned over to the attendants of the Medical Staff who must be immediately informed that the injured was a victim of electric shock and that his heartbeat has stopped.

- 6. Keep the injured warm at all times during treatment and during the trip to the hospital.
- 7. (a) These rules should be called to the attention of a doctor in attendance whose order is not in agreement, the doctor should be requested to assume full responsibility.

(b) A doctor in attendance may give the injured an injection of adrenalin, render first aid treatment for surface wounds and burns and take such action as he may deem necessary. All the while, artificial respiration must never be used in cases of electric shock.

The MWSI employee present who is senior in position shall be held responsible for complying with these instructions. In case of an accident involving a non-employee, he should not insist that these instructions are followed, but it shall be his duty to recommend and urge that the instructions be followed.

## CLOSED CHEST HEART MASSAGE:

In an accident such as drowning, suffocation, gas poisoning, heart attack, overdose of drugs or electric shocks, one or two things can happen. Breathing may stop while the heart still beats or both breathing and heartbeat may stop. In either case, death is just a matter of minutes if no decisive and immediate action is taken. Rescue breathing and closed chest heart massage should be given immediately as the case may be. The following actions should be taken immediately when the heartbeat of the victim has stopped:

- 1. Lay the victim on his back (supine position) on a firm or rigid surface.
- 2. Locate the breastbone by feeling the notch where the collarbones meet at the top end and the cartilage located in the middle of the breast below the ribs at the bottom.
- 3. Place the heel of the palm of one hand on the lower third of the breastbone and the other hand on top of the first. Palms should be parallel to and not touching the ribs.
- 4. Pressure is applied vertically downward and forcefully at least once per second. Pressure must be strong enough to move the breastbone 11/2 "-2" toward the spinal column.
- 5. At the end of each stroke, the hands are completely relaxed to permit full expansion of the chest.
- 6. Repeat operation continuously at one (1) second intervals until normal beating is restored.
- 7. If beating has been restored, the patient must be watched, and if natural beating stops, closed chest heart massage should be resumed at once.
- 8. While the closed chest massage is in progress, send for an ambulance.
- 9. The injured shall be taken to the nearest hospital. During the trip to the hospital., artificial respiration and closed chest heart massage shall be continued in the ambulance.

### MOUTH TO NOSE METHOD OF ARTIFICIAL RESPIRATION:

- 1. The victim should be laid on his back with his head tilted as far as possible so that his neck is extended. If there is a slope, placing the victim's body with the head slightly downhill is advisable.
- 2. The operator closes the victim's mouth by placing the palm of one hand on the victim's jaw with continued pressure applied.
- 3. After taking a deep breath, the operator places his mouth completely over the victim's nose with airtight contact.
- 4. The operator then breathes or blows into the victim's nose forcefully for adults and gently for children. The victim's chest should be watched and as soon as it rises, the blowing should be stopped and the operator's mouth quickly removed from the nose of the victim, allowing him to inhale passively.
- 5. If the chest does not rise, the position of the head should be improved and the blowing done more forcefully. If the victim's lungs are still not ventilated, his airways may be obstructed. He should be placed in a face down, head down position, his

tongue pulled forward and patted firmly on the back to dislodge any foreign object.

6. The cycle of inflation and exhalation should be repeated approximately 12 times per minute for infants and small children.

The mouth to nose method is recommended for use on pole top resuscitation.

#### MOUTH-TO-MOUTH ARTIFICIAL RESPIRATION (Rescue Breathing)

Basic steps: a) Opening the airways b) Restoring breath

Causes of Stoppage of Breathing:

- 1. Anatomical Obstruction- e.g. the tongue falls backward due to unconsciousness; tonsillitis.
- 2. Mechanical Obstruction- presence of foreign materials in the airway passage, e.g. choking, cave-in, electrocution.

Proper Steps in Giving Artificial Respiration:

- 1. Check for unconsciousness (5 sec.)
- 2. If unconscious, tilt the head (5 sec.) While tilting, check the mouth for the presence of any obstruction like un-chewed food or any prosthesis.
- Look, listen and feel for breathing in order to recognize respiratory arrest. (5 sec.)
   Look- at the rise and fall of the chest
   Listen- for air escape during exhalation by placing your cheek near the victim's nose

Feel for the carotid pulse at the side of the Adam's apple.

- 4. If the victim is not breathing, give full, slow breaths.
- 5. Check again for pulse and breathing.
- 6. If still not breathing, give one (1) per five (5) seconds until the victim has revived.

Ratio: I blow per five seconds

Normal respiration-16-20 respiration per minute

#### POLE TOP RESUSCITATION:

After a person has received an electric shock, it is very important that he receives the application of resuscitation immediately.

The time elapsed between the electric shock and the application of resuscitation may make the difference between life and death.

The pole top method of resuscitation was developed with the sole purpose to cut down this elapsed time to give the victim a greater chance for survival.

# POLE TOP RESUSCITATION RESCUE BREATHING (MOUTH TO NOSE METHOD):

Calling Alarm:

- 1. Anybody who sees the victim first should call the alarm.
- 2. He should call out the location of the victim and his name.
- 3. He should give out noticeable details as to the victim's position.
- A. Going to the Rescue:
  - 1. The man nearest the victim should immediately start to go to the rescue of the victim.
  - 2. The rescuer should take all necessary precautions to prevent injury to himself.
  - 3. He should have his rubber gloves on and must not rush to the scene of the accident without quickly planning a safe means of rescuing the victim as quickly as possible.
- B. Releasing the Victim from Contact:

The rescuer, after reaching the victim, should immediately release the victim from all contact with live parts, taking caution not to make any body contact with the victim or the live parts except with rubber gloved hands.

Administering Resuscitation:

- 1. The person who will administer artificial respiration takes a position on the pole a little higher than the victim.
- 2. The head of the victim is tilted backward, as far back as possible, in a face-up position. The rescuer's rubber gloves should not be removed.
- 3. The operator closes the victim's mouth by placing the palm of one hand on the victim's jaw with continued pressure applied.
- 4. After taking deep breath, the operator places his mouth completely over the victim's nose and blows forcefully. The victim's chest should be watched and as soon as it rises, the blowing should be stopped and the operator's mouth quickly removed from the nose of the victim, allowing him to exhale passively.
- 5. If the chest does not rise, the position of the head should be improved and the blowing done more forcefully. If the victim's lungs are still not ventilated, his airway may be obstructed. He should be placed in a face down position, his tongue pulled forward and patted firmly on the back to dislodge any foreign object.
- 6. The cycle of inhalation and exhalation should be replaced 12 times per minute.

- C. Rescuer's Assistant:
  - 1. Another man should go up to the pole to aid the rescuer. He should bring with him a hand line with a diameter of not less than ½ inch.
  - 2. After reaching the victim, the second man shall immediately determine whether the heartbeat of the victim has stopped. He can do this by feeling the pulse at the victim's wrist or at the neck alongside the Adam's apple. Another check would be to open the victim" eyes. If the pupils of the eyes are dilated (wide open), it indicates that no blood is reaching the victim's brain.
- D. The following actions should be taken after the examination of the heartbeat of the victim:

Heart Still Beating:

- 1. The rescue breathing shall be continued uninterruptedly until normal breathing is restored.
- 2. The second man shall look carefully for hazards and use additional protective rubber equipment as necessary to make certain that the lives of both rescuer and the victim are not endangered by live conductors.
- 3. He should remove the victim's climbers to prevent possible injury to him and his rescuers.
- 4. The second man then places his safety straps between the legs of the victim and moves up the pole. He then lets the victim's back rest on his breast to relieve the victim's waist from strain caused by his body belt.
- 5. Rescue breathing shall be continued as long as necessary on the pole or structure.

The second man shall assist in lowering the victim to the ground when the need arises to wit:

- a. Where artificial respiration is impossible to perform on the pole.
- b. When the victim has been revived or rigor mortis has set in.

Note: the second man should be very careful in doing his job so that it will not interrupt the artificial respiration being performed by the rescuer.

Heartbeat Stopped:

- 1. The rescuer shall announce to the men below that the heartbeat of the victim has stopped. The foremen shall then assign one of his men to call an ambulance.
- 2. The second man shall then prepare, as quickly as possible, the hand line for lowering victim and shall stand by to assist in the lowering operation.

- 3. The victim shall be lowered as soon as possible.
- 4. As soon as the victim reaches the ground, he shall be held on his back on a firm and rigid surface.
- 5. Mouth to nose or mouth-to-mouth resuscitation and closed chest heart massage shall be administered immediately and simultaneously.
- 6. As soon as the ambulance arrives, the injured shall be taken to a hospital with cardiac defibrillators. During the trip to the hospital, artificial respiration and heart massage shall be continued in the ambulance. At the hospital, the injured shall be turned over to the attention of the medical staff who must be immediately informed that the injured was a victim of electric shock and that his heartbeat has stopped.
- F. Should there be any difficulty in administering the mouth to nose method, then the mouth-to-mouth method shall be administered.

#### SECTION 54 LIST OF CHEMICALS INCLUDED IN MATERIAL SAFETY DATA SHEET

### 1. Acetic Acid Glacial

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- C. Inhalation: Expose to fresh air, give oxygen or artificial respiration, preferably mouth to mouth
- D. Ingestion: (Antidote) Do not give emetics, give tap water, milk or milk of magnesia, give whites of egg beaten with water

## 2. Acetone

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- C. Inhalation: Expose to fresh air, give oxygen or artificial respiration

D. Ingestion: (Antidote) Induce vomiting immediately by giving 2 glasses of water and sticking finger down throat

### 3. Ammonium Chloride

First Aid measures:

- A. Eyes: Flush eyes or skin with plenty of water
- B. Skin: Wash thoroughly with plenty of water for at least 15 minutes
- C. Inhalation: Get plenty of fresh air
- D. Ingestion: (Antidote) Give large amount of water

### 4. Ammonium Hydroxide

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing
- C. Inhalation: Expose to fresh air, give oxygen or artificial respiration
- D. Ingestion: (Antidote) Do not give emetics, give tap water, milk or milk of magnesia, give whites of egg beaten with water

### 5. Ammonium Iron (II) Sulfate

First Aid measures:

- A. Eyes: Not classified as hazardous
- B. Skin: Not classified as hazardous
- C. Inhalation: Not classified as hazardous
- D. Ingestion: Not classified as hazardous

## 6. Barium Chloride Dehydrate

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes
- C. Inhalation: Expose to fresh air. If not breathing, give artificial respiration
- D. Ingestion: Call Physician, if swallowed, induce vomiting

### 7. Calcium Chloride Dehydrate

First Aid measures:

A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes

- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes
- C. Inhalation:
- D. Ingestion:

### 8. DPD Frea Chlorine Reagent

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes. Call physician. Remove contaminated clothing.
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes. Call physician. Remove contaminated clothing. Wash skin with soap and plenty of water.
- C. Inhalation: Remove to fresh air.
- D. Ingestion: Give large quantities of water. Call physician immediately.

### 9. Ethanol, absolute

First Aid measures:

- A. Eyes: Data not available
- B. Skin: Data not available
- C. Inhalation: Data not available
- D. Ingestion: Data not available

### **10. Ferrover Iron Reagent**

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes. Call physician.
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes. Call physician. Remove contaminated clothing. Wash skin with soap and plenty of water.
- C. Inhalation: Remove to fresh air. Give artificial respiration. If necessary, call physician.
- D. Ingestion: Do not induce vomiting. Give large quantities of water and at least 1 ounce of milk of magnesia in 1 ounce of water. Call physician immediately.

## 11. Hydrochloric Acid

First Aid measures:

- A. Eyes: Rinse immediately with plenty of water and contact doctor.
- B. Skin: Rinse immediately with plenty of water and contact doctor.

- C. Inhalation: Get plenty of fresh air, give oxygen if there is difficulty in breathing
- D. Ingestion: (Antidote)

## 12. Hydrozine Sulate

First Aid measures:

- A. Eyes: Flush eyes including under eyelids with large amount of water
- B. Skin: Flush skin with plenty of water while removing contaminated clothing
- C. Inhalation: Move to fresh air, if not breathing give artificial respiration
- D. Ingestion: (Antidote) Induce vomiting, give large amount of water, call physician

## 13. Isopropyl Alcohol

First Aid measures:

- A. Eyes: Immediately flush eyes or skin with plenty of water for at least 15 minutes
- B. Skin: Immediately flush eyes or skin with plenty of water for at least 15 minutes
- C. Inhalation: Remove to fresh air. Give artificial respiration or oxygen
- D. Ingestion: Give water to drink, induce vomiting, seek medical help

## 14. Lauryl Tryptose Broth

First Aid measures:

- A. Eyes: Rinse immediately with plenty of water and seek medical help
- B. Skin: Rinse immediately with plenty of water and seek medical help
- C. Inhalation: Victim must be exposed to fresh air or given CPR if breathing stops
- D. Ingestion: (Antidote) No data

## 15. Methanol (Methyl Alcohol)

First Aid measures:

- A. Eyes: Immediately flush with plenty of water for at least 15 minutes
- B. Skin: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing/ shoes

- C. Inhalation: Expose victim to fresh air or oxygen/ artificial respiration
- D. Ingestion: (Antidote) In conscious, give large amount of water, induce vomiting

### 16. Nitric Acid

First Aid measures:

- A. Eyes: Holds eyes open, flood with water for at least 15 minutes and see a doctor
- B. Skin: Remove contaminated clothing/ shoes and wash thoroughly
- C. Inhalation: Get plenty of fresh air
- D. Ingestion: (Antidote) Do not induce vomiting, give a glass of water, contact a doctor

### **17. Phosphoric Acid**

First Aid measures:

- A. Eyes: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing/ shoes
- B. Skin: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing/ shoes
- C. Inhalation: Expose victim to fresh air, give oxygen/ artificial respiration if there is difficulty in breathing
- D. Ingestion: (Antidote) Do not induce vomiting, give a glass of water, call a physician

## 18. Sulfaver

First Aid measures:

- A. Eyes: Immediately flush with plenty of water for at least 15 minutes. Call physician. Flush skin with plenty of water.
- B. Skin: Immediately flush with plenty of water for at least 15 minutes. Call physician. Flush skin with plenty of water.
- C. Inhalation: Remove to fresh air. Give artificial respiration if necessary.
- D. Ingestion: (Antidote) Induce vomiting by sticking finger down throat, then give 1 tablespoon of Epsom salt in a glass of water. Call physician immediately. Never give anything by mouth to an unconscious person.

## 19. Sulfuric Acid

First Aid measures:

A. Eyes: Immediately flush with plenty of water for at least 15 minutes.

- B. Skin: Immediately flush with plenty of water for at least 15 minutes. Remove contaminated clothing.
- C. Inhalation: Remove to fresh air. Give artificial respiration if necessary.
- D. Ingestion: (Antidote) Do not induce vomiting, give large amount of water

## 20. Triethanolamine

First Aid measures:

- A. Eyes: Wash with plenty of water
- B. Skin: Wash with plenty of water
- C. Inhalation: Remove to fresh air. Give artificial respiration if necessary.
- D. Ingestion: (Antidote)

#### SECTION 55 EFFECTIVITY CLAUSE

This Code shall take effect immediately from date of approval.

## **EXHIBIT FORMS**

EXHIBIT I.	Personal Accident Report
EXHIBIT II.	Vehicular Accident Report
EXHIBIT III.	Vehicular Accident Decision Form
EXHIBIT IV.	Decision Memorandum
EXHIBIT V.	Vehicular Accident Investigation Report
EXHIBIT VI.	Work Permit (Confined Space)
EXHIBIT VII.	Hot Work Permit
EXHIBIT VIII.	Work Accident/ Illness Report
EXHIBIT IX.	Contractor's Project Safety Checklist
EXHIBIT X.	Pre-Departure Checklist
EXHIBIT XI.	Working Area on Two-way Lane Traffic
	(Day Time with Caution Tapes)
EXHIBIT XII.	Working Area on Two-way Lane Traffic
	(Night Time with Caution Tapes)
EXHIBIT XIII.	Working Area on Two-way Lane Traffic
	(Day Time with Board-Ups)
EXHIBIT XIV.	Working Area on Two-way Lane Traffic
	(Night Time with Board-Ups)
EXHIBIT XV.	Working Area on Intersection
	(Night Time with Caution Tapes)
EXHIBIT XVI.	Working Area on Intersection (Day Time with Caution Tapes)
EXHIBIT XVII.	Working Area on Intersection (Night Time with Board-Ups)
EXHIBIT XVIII.	Working Area on Intersection (Day Time with Board-Ups)
EXHIBIT XIX.	Environment, Safety and Health Policy
EXHIBIT XX.	Safety Policy
EXHIBIT XXI.	Policy on the Creation of Central Safety Committee and
	Safety Sub-Committee



#### **MEMORANDUM:**

FOR	:	FEDERICO C ALLUSO JR. Manager, Safety Department
SUBJEC	T:	ACCIDENT REPORT re: EARL C OCAMPO
DATE	:	March 10, 2001

This is to inform you that Mr. Earl C. Ocampo, Mechanic Driver, under Work and Resource Management Section, met an accident yesterday, March 11, 2001 at around 11:00 AM on his way for work. He resides at Calamba, Laguna and uses a motorcycle as his service to and from work.

According to him, while traversing the left service road of the South Super Hiway (going to Makati somewhere in Bicutan), he was sideswiped by a 20 footer closed van and was thrown from his motorcycle that resulted to bruises and bone fractures. He is now confined at the South Super Hiway Medical Center room 434 for proper medical treatment and possibly an operation.

ARNEL M. CABANGAN Manager, Novaliches Sector





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## MAYNILAD WATER SERVICES, INC. MWSS Complex, Katipunan Road, Balara, Quezon City Tel. No. 433-69-58 to 59 or 920-55-21 loc. 3031 / 3032

## **VEHICULAR ACCIDENT REPORT**

				DATE:	IIME:
NAME				EMPL	OYEE NO
	(MWS	I Authorized Driv		ESIGNATION_	
ADDRESS			MARITA	L STATUS	AGE
LICENSE NO	·	EXPIRY D	DATE (mm/dd/yy)		
******	******	******	*******	******	******
DRIVER'S NA	ME	(ond <b>D</b> ())		TYP	E OF ACCIDENT
ADDRESS		(2 Party)		F	IXED OBJECT
LICENSE NO.	. <u> </u>	EXPIR	Y DATE	VE	HICLE TO VEHICLE
OWNER'S NA	ME			V	EHICLE-PEDESTRIAN
ADDRESS				0	THERS (SPECIFY)
	IPANY VEHICLE (\				++++++++++++++++++++++++++++++++++++++
					. ,
MAKE	PLATE NO	MAKE	PLATE NO	_ MAKE	PLATE NO
C.R #	DATE	C.R. #	DATE	C.R. #	DATE
PLACE		PLACE		PLACE	
DAMAGES:					
-					

INJUF V-1	RED NAME	ADDRESS	INJURIES
INJUF V-2	RED NAME INJURIES	ADDRESS	
WITNI	ESSES: NAME		ADDRESS
LEGA	L:		
POLIC			
URIVE Draw	R'S ACCOUNT OF ACCIDENT: sketch of accident at back page)	(Use Separate sheet if neede	d) DATE OF ACCIDENT: TIME OF ACCIDENT:
Prepa	red by:		NOTED:
	MWSI Employee	Ir	nmediate Supervisor/ Dept. Head





MAYNILAD WATER SERVICES INC. MWSS Complex, Katipunan Road, Balara, Quezon City Tel. No. 433-69-58 to 59 or 920-55-21 loc. 3031 / 3032

## **VEHICULAR ACCIDENT DECISION FORM**

NAME OF DRIVER:		EMPLOYE	E NO
DESIGNATION:		DIVISION/BUSIN	IESS AREA:
VEHICLE NO	EXPIRATION DATE:	_ DATE OF AC	CIDENT:
TYPE OF ACCIDENT:	PLACE OF ACCI	DENT: TI	ME OF ACCIDENT:
	ANALYSES/REMARKS		DECISION
			() PREVENTABLE () NON-PREVENTABLE () REPORTABLE
			COMMITTEE MEMBER
	ANALYSES/REMARKS		DECISION
			() PREVENTABLE () NON-PREVENTABLE () REPORTABLE
			COMMITTEE MEMBER
	ANALYSES/REMARKS		DECISION
			()PREVENTABLE ()NON-PREVENTABLE ()REPORTABLE
			COMMITTEE MEMBER

	ANALYSES/REMA	RKS	DECISION
			() PREVENTABLE () NON-PREVENTABLE () REPORTABLE
			COMMITTEE MEMBER
	ANALYSES/REMA	RKS	DECISION
			() PREVENTABLE () NON-PREVENTABLE () REPORTABLE
FINAL DECISION: VIOLATION/S:			COMMITTEE MEMBER
PAST ACC	IDENTS		
DATE DECISION	VEHICLE NO.	TYPE OF ACCIDE	NT
PENALTY:			

ATTESTED BY:

CHAIRMAN , ACCIDENT REVIEW COMMITTEE



MEMORANDUM

FOR:	MR. ALBERT V VALOGO Manager, Sampaloc Sector	
THRU:	MR. JULIUS C TAN Manager, Central Business Area	
FROM:	MR. RAMMEL BOCOBOC CHAIRMAN, Accident Review Co	DATE: March 10, 2004 ommittee
SUBJECT:	Vehicular Accident of Antonio S	erapio

This refers to the vehicular accident of <u>Mr. Antonio Serapio</u>, driver of Vehicle No. <u>A-114</u> which happened last February 28, 2004 at/along <u>Sampaloc</u> <u>Sector</u>. The accident was adjudged PREVENTABLE by the Accident Review Committee.

Type of Accident: BACKING ACCIDENT Violation/s: Rule 10.1, p. 45 Chapter V of Safety Code

DAMAGES INCURRED/INJURIES: V-I Broken left taillight lens.

He has had accident/s in the past as listed below:

DATE	VEH. NO	TYPE OF ACCIDENT	DECISION
8-1-97	A-113	COLLISION	NON-
PREVEN	TABLE		
1-2-98	A-128	BACKING ACCIDENT	PREVENTABLE

#### REMARKS/COMMENTS:

V-1 DRIVER FAILED TO PROPERLY CHECK CLEARANCE WHILE BACKING. He should have requested the help of a signalman who has an unobstructed view of the rear.

For your appropriate action.

MR. RAMMEL BOCOBOC CHAIRMAN, ARC



## **VEHICULAR ACCIDENT INVESTIGATION REPORT**

		DATE: TIME:
NAME		
DIVISION/BUSINESS AREA	DESIGNATI	ON
ADDRESS	MARITAL STATUS	AGE
LICENSE NO	EXPIRY DATE (mm/dd/yy)	
DRIVER'S NAME		TYPE OF ACCIDENT
ADDRESS		FIXED OBJECT
LICENSE NO	EXPIRY DATE	VEHICLE TO VEHICLE
OWNER'S NAME		VEHICLE-PEDESTRIAN
ADDRESS		OTHERS (SPECIFY)
INJURED PERSONS		
NAME: ADDRESS: NATURE AND EXTENT OF		
INJURY		
NATURE AND EXTENT OF		
WITNESSES:		
NAME	ADDRESS:	
NAME	ADDRESS:	

DAMAGED TO VEHICLES:

V-1	
V-2	

\_\_\_\_\_

SAFETY INSTRUCTION OR RULE VIOLATED: (IF ANY)

BRIEF DESCRIPTION OF THE ACCIDENT:

REMARKS/FINDINGS:

INVESTIGATING OFFICER/SAFETY ENGINEER

## • PERMIT TO WORK •

	Permit No.: Date:	
LOCATION OF WORK AREA:		
PURPOSE OF ENTRY/WORK:		
EMPLOYEES ASSIGNED:NAME & DESIGNA	TION	
ESTIMATED TIME & DATE TO START WORI ESTIMATED TIME & DATE OF COMPLETION	K: N:	
<ul> <li>ISOLATION CHECKLIST <ol> <li>Disconnection/Blanking</li> <li>Electrical</li> <li>Mechanical</li> </ol> </li> <li>HAZARDOUS WORK <ol> <li>Burning</li> <li>Welding</li> <li>Open Flame</li> <li>Other</li> </ol> </li> <li>HAZARDS EXPECTED <ol> <li>Corrosive Materials</li> <li>Hot Equipment</li> <li>Flammable Materials</li> <li>Toxic materials</li> <li>Drains Open</li> <li>Spark Producing Operations</li> <li>Spilled Liquids</li> <li>Pressure Systems</li> <li>Other</li> </ol> </li> <li>VESSEL CLEANED <ol> <li>Deposits</li> <li>Method</li> <li>Inspection</li> </ol> </li> </ul>	YES	

2. Respira 3. Clothing 4. Head, H 5. Shields 6. Lifeline 7. Lighting 8. Commu 9. Employ 10. Buddy	tion Requirements tors Hand & Foot Protection s and Harness unications ree Qualified r System gency Egress Procedur			
ATMOSPHERIC	GAS TESTS ST PERFORMED	LOCATION		READING
EXAMPLE	(Oxygen)			
TEST PERFORM		Signature		TIME:
AUTHORIZATIO	NS:			
SUPERVISOR _				
SAFETY SUPEF	VISOR/ENGINEER			
ENTRY & EMERGENCY PROCEDURES UNDERSTOOD:				
STANDBY PERS	SON			
RESCUE				<u></u>
TELEPHONE				
PERMIT EXPIRE	ES			

• HOT WORK PERMIT •

	Date:
	HWP No.:
ISSUED TO	
	Designation of Worker, Foreman, Welder)
WORK DESCRIPTION:	
WORK LOCATION:	
ESTIMATED DURATION OF WO	
DATE/TIME ISSUED:	_ DATE/TIME COMPLETED:
REQUESTED BY:	APPROVED & ISSUED BY:
SUPERVISOR	SAFETY OFFICER
(Print Name & Signature)	(Print Name & Signature)
	Fire Watcher
CLEARING HOTWORK	PERMIT
REQUESTED BY:	CLEARED BY:
Supervisor	Safety Engineer
·	, , ,

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## MAYNILAD WATER SERVICES, INC.

MWSS Complex, Katipunan Road, Balara, Quezon City Tel. No. 433-69-58 to 59 or 920-55-21 loc. 3031 / 3032

## WORK ACCIDENT / ILLNESS REPORT

1.	Name of injured		Age			
2.	Unit					
3.	Date Hired	Employee No				
4.	Length of service prior to accident or illness Occupation / trade Experienced at trade WORK SHIFT 1 <sup>ST</sup> 2 <sup>ND</sup> 3 <sup>RD</sup> Date of Accident / illness Time					
5.	Occupation / trade	Experienced at trade _				
6.	WORK SHIFT 1 <sup>S1</sup>	2 <sup>ND</sup>	3 <sup>RD</sup>			
7.	Date of Accident / illness	Time				
ð.	The accident involved: Pers	sonal injury Prop	openy damage			
	Description of accident / occurred):	illness (Give full detai	Is on how the accident			
10.	Was injured doing regular p	part of job at the time of a	ccident? If not, why?			
11.	Extent of disability: Fatal	Permanent Total	Permanent Partial			
	Temporary Total Ter					
	Nature of injury / illness					
13.	Date disability began	Date returned	to work			
14.	Days lost	or Days charged				
15.	The Agency Involved					
16.	The Agency Part Involved _					
17.	Accident type					
18.	Unsafe Condition					
19.	The Unsate Act					
20.	Contributory factor					
21. Mechanical guards, Personal Protective Equipment provided						
22. Are all safeguards in use? If not, why?						
23.	Preventive measures taken	or recommended	·····			

I hereby certify on my honor to the accuracy of the foregoing information.

INVESTIGATING OFFICER

DATE

EMPLOYER

### CONTRACTOR'S PROJECT SAFETY CHECKLIST

General Contractor:				
Authorized Sub-Contractor:		Date:		
Project No./ Contract No:		Description of Work:		
Location/s:		-		
ITEMS	PROVIDED	NOT PROVIDED	REMARKS	
1. SAFETY SIGNS				
a.) Conspicuously installed all safety				
signages				
b.) Barricades/Bollards				
c.) Traffic Cones				
d.) Lights (flasher)				
e.) Caution Tapes				
f.) Board-ups				
g.) Others (specify)				
2. PUBLIC SAFETY	COMPLIANCE	NON- COMPLIANCE	REMARKS	
a.) Walkways cleared				
<ul> <li>b.) No construction debris on site</li> </ul>				
c.) Materials stockpile proper				
d.) Signages installed				
e.) Others (specify)				
f.) Traffic Man/ Flag Man				
3. EXCAVATION AND OTHERS	PROVIDED	NOT PROVIDED	REMARKS	
a.) Excavation w/ safety requirement				
b.) Open excavation w/ steel plate/s				
c.) Shoring -necessary -not				
d.) Ladder -necessary -not				
e.) Sandbagging				
4. HOUSEKEEPING	GOOD	POOR	REMARKS	
a.) Construction Debris				
b.) Materials Storage/ Stockpiling				
c.) Walkway and Aisles				
d.) Presence of Unwanted Materials				
e.) Field Office and Bunkhouse				
f.) Others (specify)				
5. PERSONAL PROTECTIVE	COMPLIANCE	NON-	REMARKS	
EQIUPMENT		COMPLIANCE		
a.) Hard Hat or Safety Helmet				
b.) Safety Shoes/Foot Protection				
c.) Safety Belts with lanyard				
d.) Respiratory Protection				
e.) Face Protection				
f.) Hands Protection				
g.) Hearing Protection				
h.) Fall Protection/Lifeline/ Safety				
Harness				
i.) Reflectorized Traffic Vest and				
Gloves				

j.) Uniform and I.D.				
k.) Others (specify)				
6. FIRE PROTECTION & CONTROL	PROVIDED	NOT PROVIDED	REMARKS	
a.) Fire Extinguishers/Equipment				
b.) No Smoking Signs				
c.) Designated Smoking Area				
d.) Fire watching Activity				
e.) Others (specify)				
7. EQUIPMENT FOUND AT PROJECT	COMPLIANCE	NON-	REMARKS	
SITE		COMPLIANCE		
a.) Truck/s properly parked				
<ul> <li>b.) Dump truck/s safe operation</li> </ul>				
c.) Backhoe at safe operation				
d.) Compressor parked/placed properly				
e.) Pay loader properly				
placed/operational				
f.) Others (specify)				
8. MEDICAL/EMERGENCY CAPABILITIES	PROVIDED	NOT PROVIDED	REMARKS	
a.) First Aid Kit				
b.) First Aider on Site				
c.) Others				
9. NUMBER OF EMPLOYEES ON SITE				
a.) Engineer				
b.) Foreman/Lead-man				
c.) Laborers				
CONTRACTORS REPRESENTATIVE		MWSI INSPECTOR		
Acknowledgement:		Acknowledgement:		
Signature, Name and Designa	Name & Signature/CSC Member/Sub-Committee			

### MAYNILAD WATER SERVICES, INC.

## **PRE-DEPARTURE INSPECTION CHECKLIST**

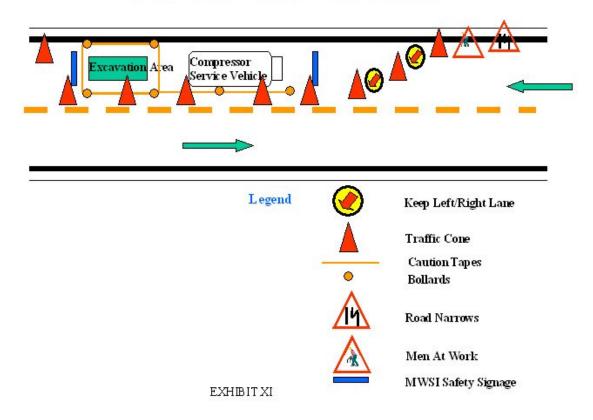
Driver's Name:				Date:				
Vehicle Type/ Model:					Plate No			
ETD: ETA:								
Cargo Description:								
TIRES:	Condi	tions:	Poor _		Mild	<u> </u>	Good	
FLUIDS:	Level:		Low _		Mild		High	
BELTS:	Condi	tions:	Poor _		Mild		Good	
BATTERY:	Condi	tions:	Poor _		Mild		Good	
RADIATOR:	Level:		Low_		Mild		High	
WIPER:	Condi	tions:	Poor _		Mild		Good	
OIL:	Level:		Low_		Mild		High	
INSTRUMENT PANEL: Condition			ns:	Poor	M	lild	Good _	
BRAKES:		Condi	tions:	Poor	Mil	d	Good	
ACCESSORIES:		Condi	tions:	Poor	Mil	d	Good	
LIGHTS:		Condi	tions:	Poor	Mil	d	Good	
SEAT BELTS:		Condi	tions:	Poor	N	lild	Good _	

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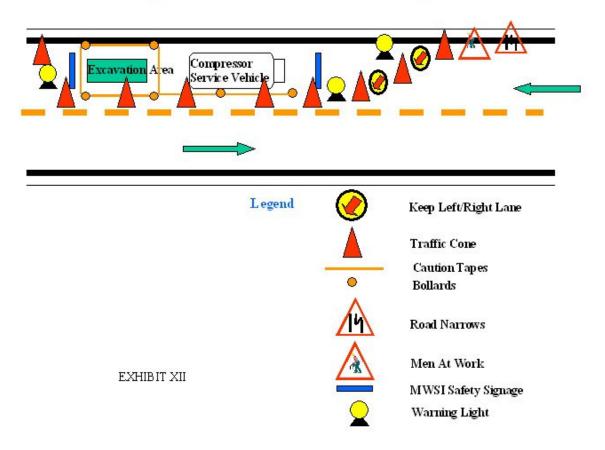
Others: (Specify)

Remarks:

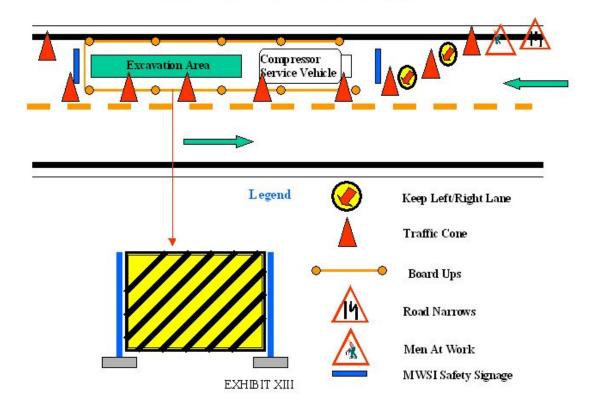
## Working Area on Two-way Lane Day Time with Caution Tapes



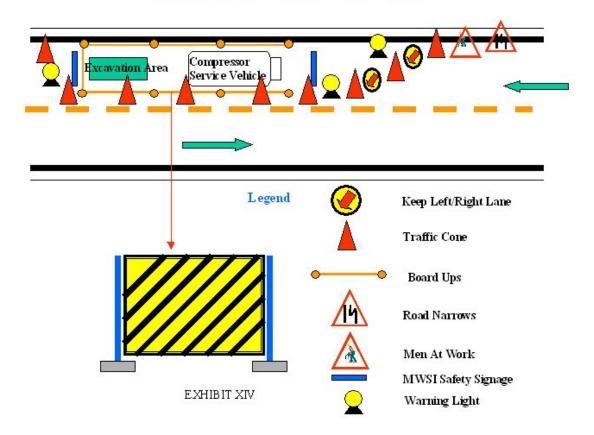
## Working Area on Two-way Lane Night Time with Caution Tapes

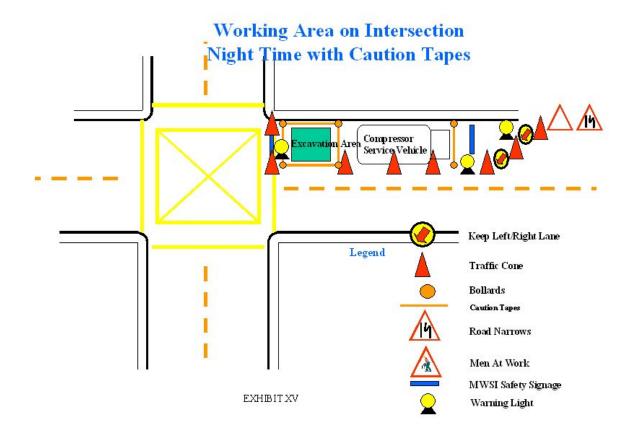


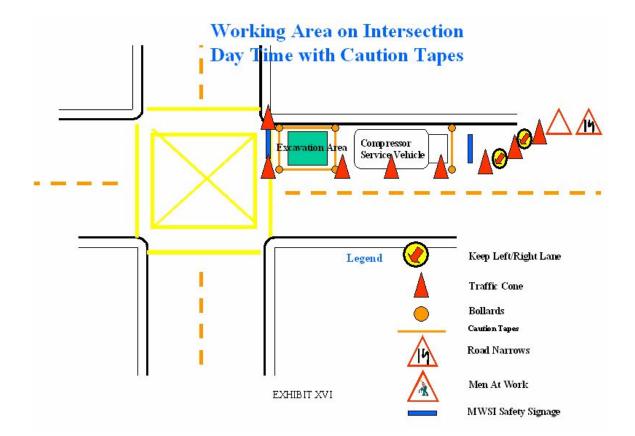
## Working Area on Two-way Lane Day Time with Board-ups

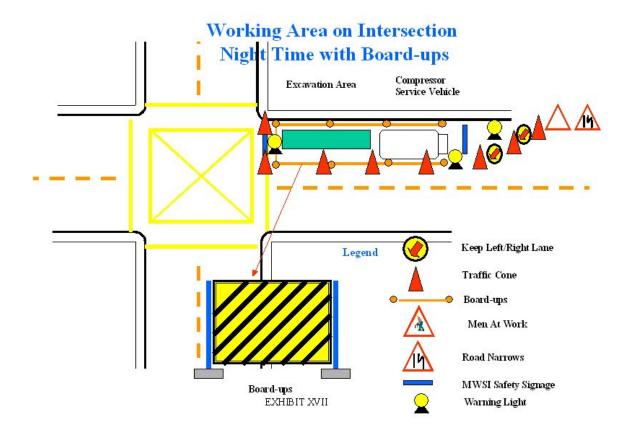


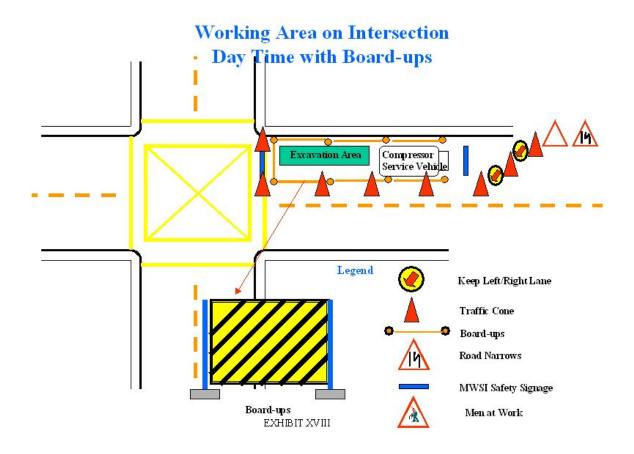
## Working Area on Two-way Lane Night Time with Board-ups











#### ENVIRONMENT, SAFETY AND HEALTH POLICY

**MAYNILAD WATER SERVICES, INC.** is committed to excellence and leadership in the protection of the environment and in the promotion of health and safety in the workplace.

We will create a work culture that will encourage all our employees, contractors, suppliers and shareholders to support this commitment.

We will protect the environment by minimizing and managing the impact of our operations on the environment, optimizing the use of our resources and increasing operating efficiencies.

We will establish an environmental management system to ensure that protection and sustainability is an integral part of our business management.

We will design and execute systematic programs that eliminate all hazardous acts and conditions to prevent work related injuries, illnesses and accidents at the workplace. We will pursue the establishment of high standards on safety and occupational health awareness, practice and discipline.

In keeping with this policy we will comply with all the regulatory requirements and international standards on environment, health and safety. We will achieve this through the use of appropriate technology and best practice in the pursuit of growth and viability.

We call on all employees to ensure that there is consistency in the implementation of this policy.

(Original Signed) **RAFAEL M ALUNAN III** President

#### SAFETY POLICY

**MAYNILAD WATER SERVICES, INC**., a private utility in the service of the public, is committed to protect the life and well being of its people by providing a safe working environment.

The company recognizes people as its most valuable asset. To enable the company to attain its goals, it will rely on every individual's positive contribution. These goals are best achieved when each individual is healthy in body and mind.

In fulfilling this commitment, the Company will guarantee a safe and healthy work environment in accordance with industrial standards and practices. It will also initiate proactive efforts to eliminate potential causes of accidents in the work place that may result in fire, property damage, injury or illness. Part of the effort is to educate and involve all employees on safety.

The Group Head or Area Manager will guarantee a safe working environment and will be responsible for implementing an effective program on safety.

Each manager/ supervisor will be directly responsible for ensuring safety. It is his duty to inspect the workplace, investigate all accidents, correct unsafe conditions and practices, and promote consciousness on the importance of safety in the workplace.

The Central Safety Committee, with the support of management, will provide guidance and logistical support to all operating units for functions and activities related to safety, health and protection of the environment.

It will be the responsibility of each individual to look after his safety and that of his co-workers and general public and to report situations that compromise safety conditions in the workplace.

> (Original Signed) RAFAEL M ALUNAN III President

#### POLICY ON THE CREATION OF CSC AND SAFETY SUB-COMMITTEES

#### CREATION OF SAFETY COMMITTEE POLICY NO. A-503-99 I. POLICY

#### DATE: JUNE 28, 1999

It is the policy of Maynilad Water to ensure the health, safety and welfare of its employees at work and the communities it serves either directly or indirectly. The discharge of this responsibility shall be accorded equal priority with those of its statutory duties and commercial objectives.

#### II. OBJECTIVES

It is the objective of this policy to organize a Safety Committee to establish and adopt in writing the MWSI Safety Code and other administrative policies on Safety to guide its employees and contractors on how to maintain a safe, accident free and healthy working environment and system of work.

#### **III. PROCEDURES/ GUIDELINES**

In compliance to Occupational Safety and Health Standards (Rule 1040), a Health and Safety Committee shall be organized within one (1) month upon approval at MWSI Main Office to draft the MWSI Safety Code and other Administrative Policies on Safety with the following composition to wit:

Chairman:

Co-chairman/ Secretary:

A representative from the hereunder operating units will be members of the working committee:

- 1. Office of the President
- 2. Business Areas
- 3. Engineering Division
- 4. Corporate Services Division
- 6. Operations Division
- 7. Comptrollership
- 8. HROD
- 9. Corporate Logistics Division

5. Finance

#### DUTIES AND RESPONSIBILITIES OF THE COMMITTEE

- 1. Recommends the adoption of the MWSI Safety Code and other administrative policies and procedures on Safety in conformity with the provisions of the OSHS.
- 2. Monitors and evaluates the accident prevention efforts of the establishment in accordance with the safety programs, safety performance and government regulations in order to prevent accidents from occurring in the workplace.
- 3. Conducts safety meetings at least once a month to promote, implement its project.
- 4. Review reports on inspection, accident investigations and implementation of program.
- 5. Develops and maintain a disaster contingency plan and organizes such emergency service units as maybe necessary to handle any disaster situation.

APPROVED: (Original Signed) JOSE GABRIEL D. OLIVES President, MWSI

#### REFERENCES

- Occupational Safety and Health Standards (OSHS) As Amended. Third Publication, Bureau of Working Conditions, Department of Labor and Employment (BWC-DOLE), Intramuros, Manila, 1992.
- 2. MWSS Safety Code, 1986 Edition, Balara, Quezon City
- 3. Safety Practices for Water Utilities, AWWA Manual M3, fifth Edition, American Water Works Association (AWWA), 6666 West Quincy Avenue, Denver, CO, 1990
- 4. **MERALCO Safety Code**, 1983 Edition, Ortigas Avenue, Pasig, Metro Manila
- 5. Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, 2004
- 6. Philippine Fire Code



**Quezon City, Philippines**