7.3 Mechanical Equipment

1 Mechanical Calculation of Master plan

This chapter does a calculation about the capacity of the machine.

1.1 Lift pump

1.1.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

1.1.2 Necessary pumps units and capacity It as same as sewage pumping station

1.2 Raw sludge pump

1.2.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design raw sludge generation volume

- Solids volume 53.76 t/day
- Moisture content 98 %
- Sludge volume 2,688 m³/day

1.2.2 Necessary pump units

Facilitate 2(1) pumps per train. 8 trains are total. Therefore, 8trains * 2(1) unit/1train = 16(8) units

1.2.3 Necessary pump capacity (Q)

Operation time is 12 hours per day.

Q = Vo / (units * 12 * 60)

- = 2,688 / (8 * 12 * 60)
- $= 0.46 \rightarrow 0.5 \text{ m}^3/\text{min}$
 - Q : Necessary pump capacity (m³/min)
 - Vo : Sludge volume = 2,688 m³/day

1.2.4 Pump diameter (D)

 $D = 146\sqrt{(Q / Ve)}$

- $= 146\sqrt{(0.5/2.5)}$
- = 65.29 → 80 mm
 - D : Pump diameter (mm)
 - Q : Pump capacity = 0.5 m³/min
 - Ve : Suction flow velocity = 2.5 m/s

1.2.5 Pump head (H)

H = h1 + h2 + h3

= 2 + 11 + 1

= 14 m

- H : Pump head (m)
- h1 : Static head. = 2 m
- h2 : Pipe loss head. = 11 m
- h3: Residual velocity head. = 1 m

1.2.6 Pump input power (P)

- $P = (0.163 * Q * \gamma * H * \alpha) / \rho$
 - = (0.163 * 1.0 * 1.05 * 14 * 1.2) / 0.65

 $= 4.4 \rightarrow 5.5 \text{ kw}$

- Q : Pump capacity = 0.5 m³/min * 2units
- γ : Fluid density = 1.05
- H : Pump head = 14 m
- α : Allowance = 1.2
- ρ : Pump efficiency = 0.65

1.2.7 Spec

φ 80 mm * 0.5 m³/min * 14 m * 5.5 kw

1.3 Return sludge pump

1.3.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design return sludge volume

- rcturn sludge ratio 50~100 %
- 512,000 m³/day * 50~100 % = 256,000 ~ 512,000 m³/day
- 64,000 m³/day * 50~100 % = 32,000 ~ 64,000 m³/day

1.3.2 Necessary pump units

Facilitate $\begin{cases} 25 \% * 4 \text{ units} \\ 50 \% * 2 \text{ units} \end{cases}$ pumps per train. $32,000 \sim 64,000 \text{ m}^3/\text{day}$ $25 \% * 4 \text{ units} = 32,000 \text{ m}^3/\text{day}$ $50 \% * 2 \text{ units} = 32,000 \text{ m}^3/\text{day}$ $= 64,000 \text{ m}^3/\text{day}$

1.3.3 Necessary pump capacity (Q)

(25%)Q = Vo / (units * 24 * 60)

= 32,000 / (4 * 24 * 60)

- $= 5.55 \rightarrow 5.6 \text{ m}^3/\text{min}$
- Q : Necessary pump capacity (m³/min)

Vo : Sludge volume = 32,000 m³/day

= 32,000 / (2 * 24 * 60)

- $= 11.11 \rightarrow 11.2 \text{ m}^3/\text{min}$
- Q : Necessary pump capacity (m³/min)
- Vo : Sludge volume = 32,000 m³/day

1.3.4 Pump diameter (D)

(

 $(25\%)D = 146\sqrt{(Q / Ve)}$

$$= 146\sqrt{(5.6/2.5)}$$

 $=218 \rightarrow 250 \text{ mm}$

- D : Pump diameter (mm)
- Q : Pump capacity = 5.6 m³/min
- Ve : Suction flow velocity = 2.5 m/s

 $(50\%)D = 146\sqrt{(Q / Ve)}$

 $= 146\sqrt{(11.2/2.5)}$

= 309 → 300 mm

- D : Pump diameter (mm)
- Q : Pump capacity = 11.2 m³/min
- Ve : Suction flow velocity = 2.5 m/s

1.3.5 Pump head (H)

(25%)H = h1 + h2 + h3

$$= 1.5 + 3.5 + 1$$

= 6 m

- H : Pump head (m)
- h1 : Static head = 1.5 m
- h2 : Pipe loss head = 3.5 m
- h3 : Residual velocity head = 1 m

$$(50\%)$$
H = h1 + h2 + h3

$$= 1.5 + 4.5 + 1$$

= 7 m

- H : Pump head (m)
- h1 : Static head = 1.5 m
- h2 : Pipe loss head = 4.5 m
- h3 : residual velocity head = 1 m

1.3.6 Pump input power (P)

 $(25\%)P = (0.163 * Q * \gamma * H * \alpha) / \rho$ = (0.163 * 5.6 * 1.05 * 6 * 1.2) / 0.65 = 10.61 \rightarrow 11 kw

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- Q : Pump capacity = 5.6 m³/min
- y : Fluid density = 1.05
- H : Pump head = 6 m
- α : Allowance = 1.2
- p : Pump efficiency = 0.65

$$(50\%)P = (0.163 * Q * \gamma * H * \alpha) / \rho$$

= (0.163 * 11.2 * 1.05 * 7 * 1.2) / 0.65

- = 24.77 → 30kw
- Q : Pump capacity = 11.2 m³/min
- γ : Fluid density = 1.05
- H : Pump head = 7m
- α : Allowance = 1.2
- ρ : Pump efficiency = 0.65
- 1.3.7 Spec
 - (25%) φ 200 mm * 5.6 m³/min * 6 m * 11 kw
 - (50%) \$\phi\$ 300 mm * 11.2 m³/min * 7 m * 30 kw

1.4 Excess sludge pump

1.4.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design excess sludge generation volume

- Solids volume 38.39 t/day
- Moisture content 99.4 %
- Sludge volume 6,397.5 m³/day

1.4.2 Necessary pump units

Facilitate 2(1) pumps per train. 8 trains are total. Therefore 8train * 2(1) unit / Itrain = 16(8)units

1.4.3 Necessary pump capacity (Q)

Operation time is 12hours per day.

Q = Vo / (units * 12 * 60)

- $= 1.11 \rightarrow 1.2 \text{ m}^3/\text{min}$
 - Q : Necessary pump capacity (m³/min)
 - Vo : Sludge volume = 6,397.5 m³/day

1.4.4 Pump diameter (D)

 $D = 146\sqrt{(Q / Ve)}$ = 146\sqrt{(1.2 / 2.5)} = 101.15 → 100 mm

D : Pump diameter (mm)

Q : Pump capacity = 1.2 m³/min

Ve : Suction flow velocity = 2.5 m/s

1.4.5 Pump head (H)

H = h1 + h2 + h3

= 2 + 10 + 1

- = 13 m
 - H : Pump head (m)
 - h1 : Static head = 2 m
 - h2 : Pipe loss head = 10 m
 - h3 : Residual velocity head = 1 m

1.4.6 Pump input power (P)

 $P = (0.163 * Q * \gamma * H * \alpha) / \rho$

= (0.163 * 2.4 * 1.05 * 13 * 1.2) / 0.65

- = 9.8 → 11 kw
 - Q :Pump capacity =1.2 m³/min * 2units
 - γ :Fluid density = 1.05
 - H : Pump head = 13 (m)
 - α :Allowance = 1.2
 - ρ :Pump efficiency = 0.65

1.4.7 Spec

0.08 kgN/kgSS

1.5 Blower equipment

1.5.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

non

Influx water quality

•	BOD	;	120 mg	
	S DOD		80 ma	

•	2-BOD	au mg

SS : 105 mg

kj - N : 30 mg

33 ℃ (River average Water temp 30℃)

Temp MLSS HRT

Nitrogen content.

Water temp

E-S-C

26 °C 2,000 mg/1 6 hr 38,385 kgSS/day

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1.5.2 Actual oxygen requirements (AOR)

AOR=Od1 + Od2 + Od3 + Od4

- =110,410 (kgO2/day)
- Od1 : Amount of oxygen. That oxidizes BOD (kgO2/day)
- Od2 : Amount of oxygen. That endogenous respiration (kgO2/day)
- Od3 : Amount of oxygen. That nitrification (kgO2/day)
- Od4 : Oxygen in A/T outflow.(kgO₂/day)

① Odl = A * (Removal BOD – nitrification * K)

- $= 0.6 * (512,000 * 120 * 10^{-3})$
- = 36,864 (kgO2/day)
- A: Amount of oxygen. That removal BOD = 0.6
- K:BOD consumption by nitrifications = 2.86 %This plan is not nitrification. Therefore
- ② Od2 = B * VA * MLVSS
 - $= 0.1 * 129,360 * (0.84 * 2,000) * 0.8 * 10^{-3}$
 - = 17,386 (kgO₂/day)
 - B : Amount of oxygen. That endogenous respiration per An MLVSS = 0.1
 - VA : aerobics volume part of acration tank = (1,617m³ * 80 = 129,360 m³)
 - MLVSS / MLSS : 0.8
- ③ Od3 = C * (kj N volume nitrified)
 - $= 4.57 * (512,000 * 30 * 10^{-3} 0 3,071)$
 - = 56,160 (kgO2/day)
 - C : Amount of oxygen. That nitrification = 4.57
 - kj-N volume nitrified : (kj-N inflow volume) (kj-N outflow volume)
 (kj-N removal volume at excess sludge)
 - kj-N inflow volume = 30mg
 - kj-N outflow volume = 0mg
 - kj-N removal volume at excess sludge

= Excess sludge volume * nitrogen content

= 38,385 kgSS/day * 0.08 kgN/kgSS

④ Od4 = 0 (※As it miss out, it extremely little)

1.5.3 Standard oxygen requirements (SOR)

SOR = ((AOR * C_{sw} * γ) / (1.024^(T-20) * α (β * C_{s} * γ - C_{A})) * 760 / P

= ((110,410 * 8.84 * 1.27) / (1.024⁽³³⁻²⁰⁾ * 0.83(0.95 * 7.23 * 1.27 - 2))) * 760 / 760

- = 163,339 (kgO2/day)
- C_{sw}: Density saturated oxygen at 20°C = 8.84
- y : Aeration depth by correction of Cs.

- = 1 + (H/2) / 10.24
- = 1 + (5.5 / 2) / 10.24

- H : Aeration depth = 5.5 m
- T : Mixed sewage (Waste water and Activated sludge) temp = 33°C
- α : Correction of Kla = 0.83
- β : Correction of Density saturated oxygen.= 0.95
- C_s: Density saturated oxygen at T^{*}C = 7.23
- C_A: Average DO of mixed sewage. = 2 mg/l
- P : Atmospheric pressure. = 760 mmHg
 - = ((110,410 * 8.84 * 1.27) / (1.024⁽³³⁻²⁰⁾
 - * 0.83(0.95 * 7.23 * 1.27 2))) * 760 / 760
 - = 163,339 (kgO2/day)

1.5.4 Arithmetic of necessary air content

 $Q = SOR/E_A * 10^{-2} * \rho * O_W$

- = 163,339 / 10 * 10⁻² * 1.293 * 0.233
- = 5,421,699 (Nm³/day)
- SOR : Standard oxygen requirements. = 163,339(kgO₂/day)
- E_A : Oxygen transfer efficiency at mixed sewage. = 7.5 % ~ 15 %
- ρ : Atmospheric density. = 1.293 (kgAir/Nm³)
- O_w : Oxygen weight per atmospheric. = 0.233 (kgO₂/kgAir)

Air content / 1train = 5,421,699 / 8 = 677,712 (Nm³/day)

1.5.5 1-Blower capacity = Air content /1 train

Q1 = 677,712 (Nm³/day) = 470.3 \rightarrow 470 (Nm³/min) Q2 = Q1 * (273 + T) / 273 * α = 470 * (273 + 33) / 273 * 1.15 = 605 \rightarrow 600 (m³/min) T : 33°C α : Allowance = 15%

\$\phi\$ 700 * \$\phi\$ 600 * 600(m³/min) * 6,800mmAq * 810kw * 9(1)units

1.6 Diffuser

1.6.1 Necessary condition

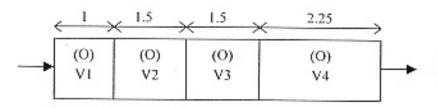
1-Blower capacity = Air content / 1train

Q1 = 600 m³/min

Air content /lunits

Q2 = 600 / 10
 = 60 m³/min

Aeration tank volume



- V1 = W10.5m * L (28m / 6.25) * 1 * H5.5m = 258.72 m³
- V2 = W10.5m * L (28m / 6.25) * 1.5 * H5.5m = 388.08 m³
- V3 = W10.5m * L (28m / 6.25) * 1.5 * H5.5m = 388.08 m³
- V4 = W10.5m * L (28m / 6.25) * 2.25 * H5.5m = 582.12 m³
- V_{alt} = V1 + V2 + V3 + V4 = 1617 m³

1.6.2 Air content / Vx

- Air content / V1 = 60 m³/min * 258.72 m³ / 1617 m³ = 9.6 m³/min
- Air content / V2 = 60 m³/min * 388.08 m³ / 1617 m³ = 14.4 m³/min
- Air content / V3 = 60 m³/min * 388.08 m³ / 1617 m³ = 14.4 m³/min
- Air content / V4 = 60 m³/min * 582.12 m³ / 1617 m³ = 21.6 m³/min

1.6.3 Diffuser air content

Diffuser = 120 l/min/unit

1.6.4 Necessary Diffuser units

- V1 = 9.6 / 0.12 = 80 units
- V2 = 14.4 / 0.12 = 120 units
- V3 = 14.4 / 0.12 = 120 units
- V4 = 21.6 / 0.12 = 180 units
- Sum = 80 + 120 + 120 + 180
 = 500 units
- Total = 500units * 10units * 8trains = 40,000 units

1.6.5 Spec

120 (l/min) * 40,000 units

1.7 Chlorination

1.7.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Chemical infuse rate.

2~4 ppm (Usually 3 ppm)

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1.7.2 Necessary chemical volume (Q1) and tank capacity (Q2) Q1 = Q * R * 10⁻⁶ * (100 / α) * (1 / β) = 512,000 * 3ppm * 10⁻⁶ * (100 / 10) * (1 / 1.1)

512,000 Sppm 10 (100710)

= 13.9 m³/day

- Q : 512,000 m³/day
- R : Chemical infuse rate. = 3 ppm
- α : Effective chlorine density. = 10 %
- β : Density = 1.1 (at 10%)

Storage days of chemical are a one-week.

Units are 8 units

 $Q2 = 13.9 \text{ m}^3/\text{day} * 7 \text{ days} * (1 / 8)$

 $= 12.16 \rightarrow 13 \text{ m}^3$

1.7.3 Necessary pump capacity (Q3)

 $Q3 = Q * R * 10^{-6} * (1/24) * (100/\alpha) * (1/\beta) * (1/unit)$

 $= 512,000 * 2 \sim 4 \text{ ppm} * 10^{-6} * (1/24) * (100/10) * (1/1.1) * (1/8)$

- $= 0.049 \sim 0.097 \text{ m}^3/\text{h} \rightarrow 0.81 \sim 1.62 \text{ l/min}$
 - Q : 512,000 m³/day
 - R : Chemical infuse rate. = 2 ~ 4 ppm (Usually 3 ppm)
 - α : Effective chlorine density. = 10 %
 - β : Density = 1.1 (at 10 %)
 - Unit : 8units

1.7.4 Spec

- Sodium Hypochlorite tank : 13 m³
- Sodium hypo chlorite pump : φ 25 * 0.81 ~ 1.62 l/min

1.8 Sand filtration

 1.8.1 Necessary condition Secondary effluent.

Name	Use pressure	Use volume
	(Mpa)	(L/min)
Sprinkling nozzle	1.96	1,000
Antifoaming nozzle:	1.96	320
(Gravity type thickened)		
Antifoaming nozzle	0.98	26,320
(Aeration tank)		
Cyclone separator: 6units		
(Washing) Iunits	1.47	500
Centrifugal: 6units		2
(Washing) Lunits	1.47	500
Total		28,640

Sand filtration effluent

Name	Use pressure	Use volume
Halle	(Mpa)	(L/min)
Sprinkling nozzle	1.96	(1,000)
Main pump: 6units	1.96	105
Blower: 9units		
(Coolant): 8units	0.98	774
Cyclone separator: 6units		
(Coolant) 4units	0.98	400
Centrifugal: 6units		
(Coolant) 4units	0.98	400
Chemical dissolution water	0.98	670
Total		2,349 (3,349)

Design of sand filtration effluent volume $Q = 2.4 \text{ m}^3/\text{min} (2,349 \text{ 1}/\text{min}) * 24 * 60$

= 3,456 m³/day Filtration rate V = 200 m/day Filtration area. D = Q / V = 3,456 / 200 = 17.28 \rightarrow 20 m²

1.8.2 Necessary sand filtration units

A one unit is Maximum filtration area of $5m^2$. $20m^2 / 5m^2 = 4$ units

- 4 units
- 1.8.3 Sand filtration charges pump capacity. 5m² * 200 m/day = 1,000 m³/day

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0.7 m³/min

1.8.4 Spec

- Sand filtration : 5 m² * 4 units
- Charge pump : φ 80 * 0.7 m³/min * 4 units

1.9 Thickened sludge pump

1.9.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design thickened sludge generation volume

- Solids volume 53.76 t/day
- Moisture content 97 %
- Sludge volume 1,792 m³/day

1.9.2 Necessary pump units

Facilitate 2(1) pumps per a thickened tank. 4 Thickened tank are total. Therefore

4 tank * 2(1) pumps = 8(4) units

1.9.3 Necessary pump capacity (Q)

Operation time is 12 hours per day.

Q = Vo / (units * 12 * 60)

= 1,792 / (4 * 12 * 60)

 $= 0.62 \rightarrow 0.7 \text{ m}^3/\text{min}$

- Q : Necessary pump capacity (m³/min)
- Vo : Sludge volume = 1,792 m³/day

1.9.4 Pump diameter (D)

 $D = 146\sqrt{(Q / Ve)}$

 $= 146\sqrt{(0.2/2.5)}$

- = 77.2 → 80 mm
 - D : Pump diameter mm
 - Q : Pump capacity = 0.7 m³/min
 - Ve : Suction flow velocity = 2.5 m/s

1.9.5 Pump head (H)

- H = h1 + h2 + h3
 - = 1 + 8 + 1

= 10 m

- H : Pump head (m)
- h1 : Static head = 1 m
- h2 : Pipe loss head = 8 m
- h3: Residual velocity head = 1 m

1.9.6 Pump input power (P)

- $P = (0.163 * Q * \gamma * H * \alpha) / \rho$
 - = (0.163 * 1.4 * 1.05 * 10 * 1.2) / 0.65
 - = 4.4 → 5.5 kw
 - Q : Pump capacity = 0.7 m³/min * 2units
 - y : Fluid density = 1.05
 - H : Pump head = 10 m
 - α : Allowance = 1.2
 - p : Pump efficiency = 0.65

1.9.7 Spec

φ 80 mm * 0.7 m³/min * 10 m * 5.5 kw

1.10 Centrifugal thickener

1.10.1 Necessary condition

Design maximum daily wastewater flow

512,000m³/day

Design excess sludge generation volume

- Solids volume 38.39 t/day
- Moisture content 99.4 %
- Sludge volume 6,397.5 m³/day

1.10.2 Necessary Centrifugal thickener units

Facilitate (2trains of WWTP = 1trains of STP) 8 trains / 2 trains = 4 trains

1 train = 1 unit, + 2 unit stand-by

4 trains * 1 unit = 4 units + 2 units stand-by.

1.10.3 Necessary Centrifugal thickener capacity (Q)

Operation time is 24hours per day.

- Q = Vo / (units * 24)
 - = 6,397.5 / (4 * 24)
 - $= 66.6 \rightarrow 70 \text{ m}^3/\text{h}$
 - Q : Necessary Centrifugal thickener capacity (m³/h)
 - Vo : Sludge volume = 6,397.5 m³/day

1.10.4 spec

70 m³/h * 112.75 kw

1.11 Centrifugal thickener charge pump

1.11.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design thickened sludge generation volume

- Solids volume 38.39 t/day
- Moisture content 99.4 %
- Sludge volume 6,387.5 m³/day

1.11.2 Necessary pump units

Take into consideration centrifugal thickener lunit = charge pump lunit

- Centrifugal thickener 6(2) units = Charge pump 6(2) units
- 1.11.3 Necessary pump capacity (Q)

Centrifugal thickener 70m3/h

Facilitate pump capacity is 0.5~1.5 times as Centrifugal thickener capacity.

- Q = Vo * 0.5~1.5
- = 70 * 0.5~1.5
 - $= 35 \sim 105 \text{ m}^3/\text{min} (70 \text{ m}^3/\text{h})$
 - Q : Necessary pump capacity (m³/min)
 - Vo : Centrifugal thickener capacity = 70 m³/h

1.11.4 Spec

φ 250 mm * 35 ~ 105 m³/min * 10 m * 30 kw

1.12 Centrifugal dehydrator

1.12.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design thickened sludge generation volume

- Solids volume 92.16 t/day
- Moisture content 96.65 %
- Sludge volume 2,752 m³/day

Operation days / week

7days / 1week

Operation hours / day

24hours / Iday

1.12.2 Necessary centrifugal dehydrator units

4 units

1.12.3 Necessary centrifugal dehydrator capacity (Q)

Operation days are 7days / week.

Operation hours are 24h / day.

 $Q = (V_0 * 7 / 7) / (U * T)$

= (2,752 * 7 / 7) / (4 * 24)

 $= 28.6 \rightarrow 30 \text{ m}^3/\text{h}$

Q : Necessary centrifugal dehydrator (m³/h)

- Vo : Sludge volume = 2,752m³/day
- T : Operation hours = 24h
- U : units = 4
- 1.12.4 spec
- 30 m³/h * 147.4 kw
- 1.13 Centrifugal dehydrator charge pump

1.13.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Design thickened sludge generation volume

- Solids volume 92.16 t/day
- Moisture content 96.65 %
- Sludge volume 2,752 m³/day

1.13.2 Necessary pump units

Take into consideration centrifugal dehydrator 1unit = charge pump 1 unit

Centrifugal dehydrator 6(2)units = Charge pump 6(2) units

1.13.3 Necessary pump capacity (Q)

Centrifugal dehydrator 30 m3/h

Facilitate pump capacity is 0.5~1.5 times as centrifugal dehydrator capacity.

Q = Vo * 0.5 ~ 1.5

 $= 30 * 0.5 \sim 1.5$

 $= 15 \sim 45 \text{ m}^3/\text{h} (10 \text{ m}^3/\text{h})$

- Q : Necessary pump capacity (m³/h)
- Vo : Centrifugal dehydrator capacity = 30 m³/h

1.13.4 Spec

φ 125 mm * 15 ~ 45 m³/min * 10 m * 11 kw

1.14 Drainage pump

1.14.1 Necessary condition

Design maximum daily wastewater flow

512,000 m³/day

Flow rate of extracted

- From Cyclone Separators : about 5,200 m³/day
- From Centrifugal Separators : about 2,100 m³/day

Grand total : 7,300 m³/day

1.14.2 Necessary pump units

Facilitate 2(1) pumps for 1 Drainage Tank; there are 2 Tanks in total, therefore: 2 tanks * 2(1) unit/ltanks = 4(2) units

1.14.3 Necessary pump capacity (Q)

Operation time is 24 hours per day.

Q = Vo / (24 * 60)

= 7,300 / (24 * 60)

 $= 5.06 \rightarrow 5.1 \text{ m}^3/\text{min}$

- Q : Necessary pump capacity (m³/min)
- Vo : Total amount of Drainage Water = 7,300 m³/day

1.14.4 Pump diameter (D)

- $D = 146\sqrt{(Q / Ve)}$
 - = 146 \(\sqrt{(5.1 / 2.5)}\)
 - = 208 → 200 mm
 - D : Pump diameter (mm)
 - Q : Pump capacity = 5.1 m³/min
 - Ve : Suction flow velocity = 2.5 m/s

1.14.5 Pump head (H)

- H = h1 + h2 + h3
 - = 1 + 13 + 1
 - = 15 m
 - H : Pump head (m)
 - h1 : Static head. = 1 m
 - h2 : Pipe loss head. =13 m
 - h3: Residual velocity head. = 1 m

1.14.6 Pump input power (P)

 $P = (0.163 * Q * H * \alpha) / \rho$

= (0.163 * 5.1 * 1.05 * 15 * 1.2) / 0.65

- $= 24.17 \rightarrow 30 \text{ kw}$
 - Q : Pump capacity = 5.1 m³/min
 - γ : Fluid density = 1.05
 - H : Pump head = 15 m
 - α : Allowance = 1.2
 - p : Pump efficiency = 0.65

1.14.7 Spec

\$\overline{200}\$ mm * 5.1 m³/min * 15 m * 30 kw

2 Mechanical calculation of Phase 1

This chapter does a calculation about the capacity of the machine.

2.1 Lift pump

2.1.1 Necessary condition

Design maximum daily wastewater flow of Phase1.

- 141,000 m³/day
- 2.1.2 Necessary pumps units and capacity This pump equipment is as same as intermediate pumping station.
- 2.2 Raw sludge pump

2.2.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Design raw sludge generation volume

- Solids volume 10.36 t/day
- Moisture content 98 %
- Sludge volume 518.2 m³/day

2.2.2 Necessary pump units

Facilitate 2 pumps per train. Phase1 are 1 train. Therefore, 1trains * 2 unit / 1train = 2 units+1stand-by

2.2.3 Necessary pump capacity (Q)

Operation time is 12 hours per day.

 $Q = V_0 / (units * 12 * 60)$

= 518.2 / (2 * 12 * 60)

- $= 0.36 \rightarrow 0.5 \text{ m}^3/\text{min}$
 - Q : Necessary pump capacity (m³/min)
 - Vo : Sludge volume = 518.2 m³/day

2.2.4 Pump diameter (D)

- $D = 146\sqrt{(Q / Ve)}$
 - $= 146\sqrt{(0.5/2.5)}$
 - = 65.29 → 80 mm
 - D : Pump diameter (mm)
 - Q : Pump capacity = 0.5 m³/min
 - Ve : Suction flow velocity = 2.5 m/s

2.2.5 Pump head (H)

h1 : Static head. = 2m

 Final Report

h2 : Pipe loss head. = 11m h3 : Residual velocity head = 1m H = h1 + h2 + h3= 2 +11 + 1 = 14 \rightarrow 14 m

2.2.6 Pump input power (P)

 $P = (0.163 * Q * \gamma * H * \alpha) / \rho$

= (0.163 * 0.5 * 1.05 * 14 * 1.2) / 0.3

= 4.79 → 5.5 kw

- Q : Pump capacity = 0.5 m³/min
- γ : Fluid density = 1.05
- H : Pump head = 14 m
- α : Allowance = 1.2
- ρ : Pump efficiency = 0.3
- 2.2.7 Spec
 - φ 80 mm * 0.5 m³/min * 14 m * 5.5 kw
 - 2units+1stand-by

2.3 Return sludge pump

2.3.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

- Design return sludge volume
 - return sludge ratio 5~10 %
 - 141,000 m³/day * 5∼10 % = 7,050 ~ 14,100 m³/day

2.3.2 Necessary pump units

Facilitate 10 % * 2 units pumps per train. 7,050 m³ * 2units = 14,100 m³

2.3.3 Necessary pump capacity (Q)

Q = Vo / (units * 24 * 60)

 $= 4.89 \rightarrow 5.6 \text{ m}^3/\text{min}$

- It is made the thing of the capacity which is the same as the pump for the future so that it can use it in the future.
 - Q : Necessary pump capacity (m³/min)
 - Vo : Sludge volume = 7,050 m³/day
- 2.3.4 Pump diameter (D)

 $D = 146\sqrt{(Q / Ve)}$

Final Report

 $= 146\sqrt{(5.6/2.5)}$

= 218 → 250 mm

D : Pump diameter (mm)

- Q : Pump capacity = 5.6 m³/min
- Ve : Suction flow velocity = 2.5 m/s

2.3.5 Pump head (H)

h1 : Static head. = 1.5m

h2 : Pipe loss head. = 3.5m

h3 : Residual velocity head = 1m

 $\mathbf{H} = \mathbf{h}\mathbf{1} + \mathbf{h}\mathbf{2} + \mathbf{h}\mathbf{3}$

$$= 1.5 + 3.5 + 1$$

= 6 m

2.3.6 Pump input power (P)

 $P = (0.163 * Q * \gamma * H * \alpha) / \rho$

= (0.163 * 5.6 * 1.05 * 6 * 1.2) / 0.65

 $= 10.61 \rightarrow 11 \text{ kw}$

Q : Pump capacity = 5.6 m³/min

- γ : Fluid density = 1.5
- H : Pump head = 6 m

α : Allowance = 1.2

ρ : Pump efficiency = 0.65

2.3.7 Spec

2units+2stand-by

2.4 Excess sludge pump

2.4.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Design excess sludge generation volume

- Solids volume 10.778 t/day
- Moisture content 99.4 %
- Sludge volume 1,796.3 m³/day

2.4.2 Necessary pump units

Facilitate 2 pumps per train. Phase 1 are 1 train. Therefore 1 train * 2 unit / 1train = 2 units

2.4.3 Necessary pump capacity (Q)

Operation time is 12hours per day.

Q = Vo / (units * 12 * 60)

= 1,796.3 / (2 * 12 * 60)

 $= 1.24 \rightarrow 1.2 \text{ m}^3/\text{min}$

Q : Necessary pump capacity (m³/min)

Vo : Sludge volume = 1,796.3 m³/day

2.4.4 Pump diameter (D)

 $D = 146\sqrt{(Q / Ve)}$

 $= 146\sqrt{(1.2/2.5)}$

= 101.15 → 100 mm

D : Pump diameter (mm)

Q : Pump capacity = 1.2 m³/min

Ve : Suction flow velocity = 2.5 m/s

2.4.5 Pump head (H)

h1 : Static head. = 2m

h2 : Pipe loss head. = 10m

h3 : Residual velocity head = 1m

H = h1 + h2 + h3

- = 2 + 10 + 1
- = 13 m

2.4.6 Pump input power (P)

 $P = (0.163 * Q * \gamma * H * \alpha) / \rho$

= (0.163 * 2.4 * 1.05 * 13 * 1.2) / 0.65

 $= 9.8 \rightarrow 11 \text{ kw}$

- Q :Pump capacity =1.2 m³/min*2units
- γ :Fluid density = 1.05
- H : Pump head = 13 (m)
- α : Allowance = 1.2
- ρ : Pump efficiency = 0.65

2.4.7 Spec

- φ 100mm * 1.2 m³/min * 13 m * 11 kw
- 2units+1stand-by

2.5 Blower equipment

2.5.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Air Feeding rate

2 ~ 4 times of wastewater volume

- 2.5.2 1-Blower capacity = Air content /1 train
 Q1 = 141,000 * 2 ~ 4 times
 = 282,000 ~ 564,000
 = 195.8 ~ 391.6 → 360 m3/min
- 2.5.3 Spec

 - lunits+lstand-by
- 2.6 Diffuser

2.6.1 Necessary condition

1-Blower capacity = Air content / 1train

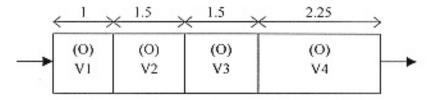
Q1 = 360 m³/min

Air content /1 units

$$Q2 = 360 / 10$$

= 36 m³/min

Aeration tank volume



- V1 = W10.5m * L (28m / 6.25) * 1 * H5.5m = 258.72 m³
- V2 = W10.5m * L (28m / 6.25) * 1.5 * H5.5m = 388.08 m³
- V3 = W10.5m * L (28m / 6.25) * 1.5 * H5.5m = 388.08 m³
- V4 = W10.5m * L (28m / 6.25) * 2.25 * H5.5m = 582.12 m³
- V_{all} = V1 + V2 + V3 + V4 = 1617 m³

2.6.2 Air content / Vx

- Air content / V1 = 36 m³/min * 258.72 m³ / 1617 m³ = 5.76 m³/min
- Air content / V2 = 36 m³/min * 388.08 m³ / 1617 m³ = 8.64 m³/min
- Air content / V3 = 36 m³/min * 388.08 m³ / 1617 m³ = 8.64 m³/min
- Air content / V4 = 36 m³/min * 582.12 m³ / 1617 m³ = 12.96 m³/min

2.6.3 Diffuser air content

Diffuser = 120 l/min/unit

2.6.4 Necessary Diffuser units

- V1 = 5.76 / 0.12 = 48 units
- V2 = 8.64 / 0.12 = 72 units
- V3 = 8.64 / 0.12 = 72 units

Final Report

V4 = 12.96 / 0.12 = 108 units

Sum = 48 + 72 + 72 + 108 = 300 units

- Total = 300units * 10units * 1trains
 = 3,000 units
- 2.6.5 Spec

120 (l/min) * 3,000 units

- 2.7 Chlorination
- 2.7.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Chemical infuse rate.

2~4 ppm (Usually 3 ppm)

 $Q1 = Q * R * 10^{-6} * (100 / \alpha) * (1 / \beta)$

= 141,000 * 3ppm * 10⁻⁶ * (100 / 10) * (1 / 1.1)

= 3.85 m³/day

Q : 141,000 m³/day

R : Chemical infuse rate. = 3 ppm

- α : Effective chlorine density. = 10 %
 - β : Density = 1.1 (at 10%)

Storage days of chemical are a one-week.

Units are 8 units

 $Q2 = 3.85 \text{ m}^3/\text{day} * 7 \text{ days}$

 $= 26.9 \rightarrow 13 \text{ m}^3 * 2 \text{ units}$

- 2.7.3 Necessary pump capacity (Q3)
 - $Q3 = Q * R * 10^{-6} * (1 / 24) * (100 / \alpha) * (1 / \beta) * (1 / unit)$
 - = $141,000 * 2 \sim 4 \text{ ppm} * 10^{-6} * (1/24) * (100/10) * (1/1.1) * (1/2)$
 - $= 0.054 \sim 0.107 \text{ m}^3/\text{h} \rightarrow 0.92 \sim 1.78 \text{ l/min}$
 - It is made the thing of the capacity which is the same as the pump for the future so that it can use it in the future. Therefore, 0.82 ~ 1.62 l/min
 - Q : 141,000 m³/day
 - R : Chemical infuse rate. = 2 ~ 4 ppm (Usually 3 ppm)
 - α : Effective chlorine density. = 10 % -
 - β : Density = 1.1 (at 10 %)
 - Unit : 2 units
- 2.7.4 Spec
- Sodium hypochlorite tank: 13 m³ * 2units

Final Report

Sodium hypochlorite pump

: \$\$\phi 25 * 0.82 \sim 1.62 \l/min * 2units+2 stand-by

2.8 Sand filtration

2.8.1 Necessary condition

Secondary effluent.

Norma	Use pressure	Use volume
Name	(Mpa)	(L/min)
Sprinkling nozzle	1.96	(1,000)
Antifoaming nozzle:	1.96	440
(Gravity type thickened)		
Antifoaming nozzle	0.98	1,600
(Aeration tank)		
Centrifugal type thickener: 2 units		
(Washing) Lunits	1.47	850
Centrifugal type dehydrator: 2 units		
(Washing) Lunits	1.47	460
Total		3,350(4,350)

Sand filtration effluent

Manua	Use pressure	Use volume
Name	(Mpa)	(L/min)
Sprinkling nozzle	1.96	(1,000)
Blower: 2 units		
(Coolant): 1 units	0.98	230
Chemical dissolution water	0.98	230
Total		460 (1,460)

Design of sand filtration effluent volume

Q = 0.46 m³/min (460 l / min) * 24 * 60

= 662 m³/day

Filtration rate

V = 200 m/day

Filtration area.

D = Q / V= 662 / 200

 $= 3.31 \rightarrow 4 \text{ m}^2$

2.8.2 Necessary sand filtration units

Though this necessary treatment area is 4m2, it is made 5m2 based on the plan in the future.

2 units (include 1 stand-by)

JIAA A CO

- 2.8.3 Sand filtration charges pump capacity. 5m² * 200 m/day = 1,000 m³/day
 - 0.7 m³/min
- 2.8.4 Spec
 - Sand filtration: 5 m²*
 - : 1 units+1stand-by
 - Charge pump : φ 80 * 0.7 m³/min * 10m
 : 1 units+1stand-by
- 2.9 Thickened sludge pump

2.9.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Design thickened sludge generation volume

- Solids volume 10.364 t/day
- Moisture content 97 %
- Sludge volume 345.5 m³/day

2.9.2 Necessary pump units

Facilitate 2(1) pumps per a thickened tank. 1 Thickened tank are this time.

1 tank * 2(1) pumps = 2(1) units

2.9.3 Necessary pump capacity (Q)

Operation time is 12 hours per day.

Q = Vo / (units * 12 * 60)

= 345.5 / (1 * 12 * 60)

 $= 0.48 \rightarrow 0.7 \text{ m}^3/\text{min}$

- It is made the thing of the capacity which is the same as the pump for the future so that it can use it in the future. Therefore, 0.7 m3/min
 - Q : Necessary pump capacity (m³/min)
 - Vo : Sludge volume = 345.5 m³/day

2.9.4 Pump diameter (D)

 $D = 146\sqrt{(Q/Ve)}$

- $= 146\sqrt{(0.2/2.5)}$
- = 77.2 → 80 mm
 - D : Pump diameter mm
 - Q : Pump capacity = 0.7 m³/min
 - Ve : Suction flow velocity = 2.5 m/s

2.9.5 Pump head (H)

h1 : Static head.

h1 = (+8,000) - (+3,200)

= 4.8 m

h2 : Pipe loss head.

h2' = (10.666 * Q^1.85) * L/(110^1.85 * D^4.87)

= (10.666 * 0.011^1.85) *60 / (110^1.85 * 0.10^4.87)

= 1.88 m

h2': Pipe loss in the clear water

Q : The amount of total flow = 0.7 m3/min * 1units

= 0.7 m3/min → 0.011 m3/sec

L : length of pipe = 60 m

 $h2 = \alpha * h2$

= 1.9 * 1.88

 $= 3.58 \rightarrow 4 \text{ m}$

α : Sludge factor = 1.9

h3: Residual velocity head

h3 = Im

H = h1 + h2 + h3

= 4.8 + 4 + 1

 $= 9.8 \rightarrow 10 \text{ m}$

2.9.6 Pump input power (P)

 $P = (0.163 + Q + \gamma + H + \alpha) / \rho$

= (0.163 * 1.4 * 1.05 * 10 * 1.2) / 0.65

 $= 4.4 \rightarrow 5.5 \text{ kw}$

- Q : Pump capacity = 0.7 m³/min*2units
- γ : Fluid density = 1.05
- H : Pump head = 10 m
- α : Allowance = 1.2
- ρ : Pump efficiency = 0.65

2.9.7 Spec

\$\$\phi 80 mm * 0.7 m³/min * 10 m * 5.5 kw

2.10 Centrifugal thickener

2.10.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Design excess sludge generation volume

- Solids volume 10.778 t/day
- Moisture content 99.4 %
- Sludge volume 1,796.3 m³/day

2.10.2 Necessary centrifugal thickener units Facilitate (2trains of WWTP = 1trains of STP) 8 trains / 2 trains = 4 trains 2 trains = 3 units, (include 1 stand-by) Therefore, 4 trains = 6 units, (Include 2 stand-by) 2.10.3 Necessary centrifugal thickener capacity (Q) Operation time is 24hours per day. Q = Vo / (units * 24)= 1,796.3 / (1 * 24) $= 74.8 \rightarrow 70 \text{ m}^3/\text{h}$ Q : Necessary centrifugal thickener capacity (m3/h) Vo : Sludge volume = 1,796.3 m³/day 2.10.4 spec 70 m³/h * 112.75 kw * 2units (Include 1 stand-by) 2.11 centrifugal thickener charge pump 2.11.1 Necessary condition Design maximum daily wastewater flow 141,000 m³/day Design thickened sludge generation volume

ign unekened studge generation von

- Solids volume 10.778 t/day
- Moisture content 99.4 %
- Sludge volume 1,796.3 m³/day

2.11.2 Necessary pump units

Take into consideration centrifugal thickener lunit = charge pump lunit

Centrifugal thickener 6(2) units = Charge pump 6(2) units

2.11.3 Necessary pump capacity (Q)

Centrifugal thickener 70m3/h

Facilitate pump capacity is 0.5~1.5 times as cyclone separator capacity.

$$= 70 * 0.5 \sim 1.5$$

 $= 35 \sim 105 \text{ m}^3/\text{h}$

- Q : Necessary pump capacity (m³/min)
- Vo : Cyclone separator capacity = 70 m²/h

2.11.4 Pump spec

Spec of Progress cavity pump is no calculation. So had to refer to Product catalog. Therefore, φ 250 mm * 35 ~ 105 m³/h * 10mAq * 30 kw

2.12 Centrifugal dehydrator

2.12.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Design thickened sludge generation volume

- Solids volume 21.142 t/day
- Moisture content 96.56 %

Sludge volume 615 m³/day

Operation days / week

7 days / 1 week

Operation hours / day

24 hours / Iday

2.12.2 Necessary Centrifugal dehydrator units

I unit

2.12.3 Necessary centrifugal separator capacity (Q) Operation days are 7 days / week.

Operation hours are 24 h / day.

 $Q = (V_0 * 7 / 7) / (U * T)$

$$=(615 * 7 / 7) / (1 * 24)$$

 $= 25.6 \rightarrow 30 \text{ m}^3/\text{h}$

- Q : Necessary Centrifugal dehydrator capacity (m³/h)
- Vo : Sludge volume = 615 m³/day
- T : Operation hours = 24 h
- U : units = 1

2.12.4 spec

30 m³/h * 147.4 kw * 2 units (Include 1 stand-by)

2.13 Centrifugal dehydrator charge pump

2.13.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Design thickened sludge generation volume

- Solids volume 21.142 t/day
- Moisture content 96.56 %
- Sludge volume 615 m³/day

2.13.2 Necessary pump units

7 - 3 - 26

Take into consideration centrifugal separator lunit = charge pumps 1 unit

Centrifugal dehydrator 6(2)units = Charge pump 6(2) units

2.13.3 Necessary pump capacity (Q)

Centrifugal dehydrator 30 m3/h .

Facilitate pump capacity is 0.5~1.5 times as Centrifugal dehydrator capacity.

$$= 30 * 0.5 \sim 1.5$$

 $= 15 \sim 45 \text{ m}^3/\text{h}$

- Q : Necessary pump capacity (m³/min)
- Vo : Centrifugal dehydrator capacity = 30 m³/h

2.13.4 Pump spec

Spec of Progress cavity pump is not calculation. So had to refer to Product catalog. Therefore,

2.14 Drainage pump

2.14.1 Necessary condition

Design maximum daily wastewater flow

141,000 m³/day

Flow rate of extracted

- From Centrifugal thickener 5,200 m³/day
- From Centrifugal dehydrator 2,100 m³/day
- Grand total : 7,300 m³/day

2.14.2 Necessary pump units

Facilitate 2(1) pumps for 1 Drainage Tank; there are 2 Tanks in total, therefore: 2 tanks * 2(1) unit/Itanks = 4(2) units

2.14.3 Necessary pump capacity (Q)

Operation time is 24 hours per day.

Q = Vo / (24 * 60)

$$= 7,300 / (24 * 60)$$

 $= 5.06 \rightarrow 5.1 \text{ m}^3/\text{min}$

- Q : Necessary pump capacity (m³/min)
- Vo : Total amount of Drainage Water =-7,300 m³/day

2.14.4 Pump diameter (D)

 $D = 146\sqrt{(Q / Ve)}$

- = 146√(5.1/2.5)
- = 208 → 200 mm

- D : Pump diameter (mm)
- Q : Pump capacity = 5.1 m³/min
- Ve : Suction flow velocity = 2.5 m/s

2.14.5 Pump head (H)

- H = h1 + h2 + h3
 - = 1 + 13 + 1
 - = 15 m
 - H : Pump head (m)
 - h1 : Static head. = 1 m
 - h2 : Pipe loss head. = 13 m
 - h3: Residual velocity head. = 1 m

2.14.6 Pump input power (P)

- $P = (0.163 * Q * H * \alpha) / \rho$
 - = (0.163 * 5.1 * 1.05 * 15 * 1.2) / 0.65

 $= 24.17 \rightarrow 30 \text{ kw}$

- Q : Pump capacity = 5.1 m³/min
- y : Fluid density = 1.05
- H : Pump head = 15 m
- α : Allowance = 1.2
- ρ : Pump efficiency = 0.65

2.14.7 Spec

\$\$\phi\$200mm * 5.1 m³/min * 15 m * 30 kw

7.4 Electrical Equipment

HO CHI MINH CITY, VIETNAM WATER ENVIRONMENT IMPROVEMENT PROJECT

Calculation Sheet

for

MCCB Capacity

Package : E

Plant : Wastewater Treatment Plant

D Direct start Lift Pump Blower 300

100

Sedimenta C Aux Auto TR start Olderinatio SR Secondary Resistor 400-500

Devestaring SD Star-Dolta

000

Ventilation Compast 300

CUSTOMER VIETNAM/HOMD E - 99H0067

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				Current C	Current Calo, Ratio	ſ				
		Required Capacity	Capacity			Rated	MCCD	Control		
Phase-1		Pliase-2		TOTAL		Currant	Site	Center	Part	Ph-2
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-		1,350,00		1,380.00						
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400-500 Chlorinatio SR Secondary Resistor

d00 Dewatarini SD Star-Delta 300 Compost

E - 99H0067

CUSTOMER VIETNAM/HCMC 200

MOTORS AND AUXILIARIES LIST

Ventilation

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		BLOWER EQUIPMENT TOTAL											
		CWATER TREATMENT FACILITYS	_										

				Current 0	Current Calc. Ratio	8				
		Raquired	Roquired Capacity			Rated	MCCB	Control		
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312 SLUDGE SCRAPER

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314 SCUM PUMP

Lift Pump

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Blowar D Diract start

Sadimenta C Aue. Auto TR start

300

400-500 Chlorinatio SR Secondary Resistor

600 Dewaterini SD Star-Delta 700 Compost

E - 99H0087

CUSTOMER VIETNAM/HOMO 200

Ventilation

MOTORS AND AUXILIARIES LIST

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215	RAW SLUDDE PUMP	04	-	e	-	22	5.5	340		a			
010	RAW SLUDGE VALVE	2		8		9	0.2	340	œ	a			
317	COMMINUTER	-		-		64	0.75	360	02	0			
	AERATION TANK					1							
324	AIR FLOW CONTROL VALVE	2		8		9	0.4	380	œ	0			
	FINAL SEDIMENTATION TAXK												
332	SLUDGE SCRAPER	2		8		40	22	383	œ	0			
334	SCUM PUMP	-		~	м	-00	22	380		0			
335	RETURN SLUDGE PUMP (25%)	~		<u>e4</u>		9	=	380		٥			
336	RETURN SLUDGE PUMP (50K)						30	380	1	6			
	FINAL SEOMENTATION TANK												

				Current (Current Cals. Ratio	P				
		Required	Required Capacity			Rated	MCCB	Control		
Phase-1		Phase-2		TOTAL		Current	Size	Center	Pi-1	Ph-2
Duty	Stand-by	Duty	Stand-by	Duty	Stand by			Unit Size	do Unit	CC Unit
(KW)	(844)	(W)-	(MM)	(KW)	(00)	(4)	(AT)	(mm)	(unit)	(unit)
11.00	550	33.00	18.50	44.00	22.00	2	100	360	e	6
200		6.00		8.00		2	30	240	0	30
0.05		0.75		1.50		~	8	240	-	-
4 00	_	12.00		16.00		-	P	240	2	8
22.00		66,00		66.00		22	30	240	2	30
6.50	6.50	16.50	16.50	22.00	22.00	2	001	300	5	g
44.00		132.00		176,00		501	150	480	4	12
						230	400	1200		

Lift Pump Blover D Dire

Blover D Diract start Sedmonter C Aux. Auto TR start

200

100

400-500 Chlorinatio SR Secondary Resistor

600 Dewatering SD Star-Delta

300 Gempost 800 Ventilation

MOTORS AND AUXILIARIES LIST

CUSTOMER VIETNAM/HOMC

E - 99H0067

			Q'TY					POW	VOL	Rave	STAF	POLE	GENE			
	^o N		Phase-1	1.	Phase=2	0=0	TOT	ER	TAG	rsibk	RTIN	E	RAT	Phase-1	-	
		EOUIPMENT NAME	OUTY	STAND BY	OUTY	STAND BY	AL		ε	e Operation	G METHOD		OR REQ. LO	Duty		Stand
								(FW)	3				AD	(KW)	0	(KW)
7.	337	RETURN SLUDGE VALVE	0		8		05	64	380	82	0			*	4 00	
1.5	336	EXCESS SLUDGE PUMP	~	-	æ	0	24		380	1	0			0.0	22.00	11,0
	339	EXDESS SLUDGE VALVE	2		30		\$	0.2	080	~	a			~	2.00	
	36	340 COMMINUTER	-		-		04	5	380	æ	0			с,	3.70	
-	351	FLOOR DRAINAGE PUMP			8		ź	2.2	360		0			30.	30.80	
		WATER TREATMENT FACULTY TOTAL			-									172.25	2	27.5
		COISINFECTION FACILITY>														
	4	SODIUM HYPOCHLORITE PUMP	~	-	-0	-1		40	380	1	0			0	0.00	0.4
		WATER SUPPLY FACILITY>													-	
	12	512 TREATED WATER SUPPLY PUMP(1)	-	-	n		-	8	380	1	gs			30.	30.00	30.6

				Currant C	Corrent Cale, Ratio	-				
		Required Capacity	Capacity			Bated	MCCB	Control		
Phase-1		Phase-2		TOTAL		Current	Size	Center	P21-1	Ph-2
Duty	Stand-by	Duty	Stand-by	Duty	Stand-by			Unit Size	CO Unit	CC Unit
(KW)	(KM)	(MM)	(ws)	(944)	(990)	(V)	(11)	(000)	(tinu)	(init)
4.00		12.00		16.00		ч	30	240	0	30
22.00	11,00	66.00	33.00	88.00	44.00	601	150	430	~	6
2.00		ā.00		8.00		04	00	2.40	10	30
3.70		3.70		7.40		33	50	240	-	-
30.80		66,00		96.80		22	8	180		30
172.25	27.50	481.45	32.50	653.70	110.00			lag	8	254
0.00	0.40	2.40	8	3.20	1 60	4	8	190		a.
30.00	30.00	90,00		120.00	00 GC	66	100	600	N	

7-4-5

Lift Pump

8

D Direct start Blower

200

Chlorinatio SR Secondary Resistor Sedimenta C Aux, Auto TR start

Dowatering SD Star-Delta 400-500 009

Compost 000 800 CUSTOMER VIETNAM/HOMD

E - 99H0067

Ventilation

MOTORS AND AUXILIARIES LIST

		Q.TY					POW	VOL	Flave	STAF	POL	GENE			Reg
		å,	Phase-1	P	Phása-2	тот	ER	TAGS	rsible	RTIN	Ξ	RAT	Phase-1		ii.
	EQUIPMENT NAME	DUTY	STAND BY	OUTY	STAND BY	AL,		£	• Operation	S METHOO		OR REG. LO	Duty	Stand-by	2
		_	((WN)	Ξ				AD	(KM)	(NV0)	
213	TREATED WATER STRAIMER(1)			-		-	0.4	380	1	0			0.40		
4	FLOOR DRAINAGE PUMP	-	Ŧ			93	2.2	380		0			0.60	8.50	0
010	TREATED WATER SUPPLY PUMP(2)	-	-	~		4	22	380	1	۵			22.00	22.00	-
22	TREATED WATER STRAINER(2)	-				-	0.4	360		0			0.40		
	521 FRUTRATION SUPPLY PUMP	-	-			~	3.7	350	1	a			9.70	C	2
522	FILTRATION SUPPLY STRAMER	-	-			**	04	380	1	۵			0.40	0	40
523	SAND FILTER	-		_		5		220							
524	FILTERED WATER SUPPLY PUMP	-	-	-			=	380	- 1	0			8/11	0011	0
222	BADKWASH PUMP	-	-	_		04	3.5	360	1	0			7,50		750
528	AIR WASH BLOWER	-	-		_	04	7.5	380	'	c			7.60		7.50
1.0	527 BACKWASH WASYEWATER PUMP	-	-	_		04	3.7	360		0			3.70		3.70

		Ph=2	g iji	(inni)			04					-			
		-10-	8 (ili	(timi)	-		2	-	04	14	-	-14	64	64	2
	Control	Cantar	Unit Sire	(mm)	180	160	600	160	240	160	180	480	090	360	240
	MCCB	Size		(AT)	8	22	225	8	00	30	30	150	100	100	20
5	Rated	Current		(V)	4	22	21)	4	37	4	1	109	74	74	37
ale. Ratio			Stand-br	(999)		8.00	22.00		3.70	0.40		11.00	3.50	7.50	3.70
Currant Cale. Ratio		TOTAL	Duty	(W)	0.60	8.80	66 00	0.40	3.70	0.40		22.00	7.50	7.50	0.10
	Supacity		Stand-by	(WN)											
	Required Capacity	Phasa-2	Duty	(NN)	0.40		44.00					11 60			
			Stand-by	(KW)		8.50	22.00		0.0	0,40		11 00	7.50	7.50	3.70
		Phase-1	Duty	(KW)	0.40	8.60	22.00	0:40	3.70	0.40		811	7,50	3.60	3.70

WW1P MOB

- Lift Pump 100 200
- D Droot start Blower
- Sedmonta C Aur. Auto TR start

300

- Chlorinatia SR Secondary Resistor 400-500
 - Dewatering SD Star-Delta

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Vontilation Compost 200 33

CUSTOMER VIETNAM/HOMD

E - 99H0057

MOTORS AND AUXILIARIES LIST

		YT'O					POW	VOL	Reve	STAF	POL	GENE		
eN.		Phie	Phase-1	Phas	Phase-2	тот	ER	TAGE	rsibk	RTIN	c	RAT	Phase-1	-
	EQUIPMENT NAME	DUTY	STAND BY	DUTY	STAND BY	AL		5	o Operation	G METHOD		OR REQ. LO	Duty	Stand-b
		-					(MM)	S				AD	(N/M)	(040)
528	AIR COMPRESSOR	-	-			2	3.7	380		0		Т	3.70	-
529	DEHUMIDIFIER	-				-	0.25	220	-			T	0.25	
220	SOLENDIO VALVE BOX	-	-			2	01	220	1	1			2.00	0
	DISINFECTION FACILITY TOTAL											1	102.15	5 100.7
	<sludge fadility="" treatment=""></sludge>													
611	511 GRAVITY THICKENER	-				~	1.5	360	œ	0	-		1.50	0
513	THICKENED SLUDGE PUMP	-		en	e9	οg	5	380	1	0			5.50	
614	THICKENER EFFLUENT PUMP	-	-	0	5	-	55	380	1	۵			5.50	0
615	FLOOR DRAINAGE PUMP		-	e	-	- 03	2.2	380	1	0			2.20	0
821	621 EXCESS SLUDGE MIXER					- 24	Ξ	360	- 1	0			0711	- 0

		Desided		CURREN V	Current Caro, Natio	2				
- 1		Required Gapacity	Capacity			Rated	MCCB	Control		
Phase-1		Phase-2		TOTAL.		Current	Size	Centor	Pi-1	Ph-2
	Stand-by	Duty	Stand-by	Duty	Stand-by			Uest. Size	8 5	00 Unit
(NN)	(140)	(KW)	(898)	(NN)	(ww)	(V)	(AT)	(mm)	(seed)	(inve)
3.70	3.70			3.70	3.70	22	50	240	14	
0.25				0.75		4	ac	180	-	
2.00	2.00			2.00	2.00	34	50	180	2	
102.15	100.70	147.80	120	249.95	101.90				8	9
1.50		4.50		6.00		15	30	240	-	c
5.50	6.50	16.50	15.50	22.00	22.00	54	100	360	64	9
5.50	5.50	16.50	16.50	22.00	22.00	54	100	360	~	90
2.20	2.20	6 60	660	8.80	8 50	62	20	150	04	ų
811		11 00		22,00		103	150	480	-	-

WWTP MCB

Lift Pump

100

200

- D Direct start Biomar
- Sedimenta C Aux, Auto TR start

300

- Chlorinatio SR Secondary Resinter 400-500
 - Dewatering SD Star-Delta 800
 - Ventilation Compost
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CUSTOMER VIETNAM/HCMC E - 99H0067

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		λL.0					POW	VOL	Have	STAF	POLE	GENE		
No		Pha	Phase-1	Pha	Phasa-2	TOT	ER	TAG	rsibk	RTIN	E	TARE	t.	Fhase-1
2	EQUIPMENT NAME	DUTY	STAND BY	DUTY	STAND BY	AL		5	• Operation	G METHOD		GR REG. LO.		Duty
							(MM)	S				AD		(KW)
622	EXCESS SLUDGE FEED PUMP	-	-	~	-	÷	30	360	1	68				30,00
623A	GENTRIFUGAL THICKENER DRIVE MOTOR	-	-	~	-	- 20	90	360	œ	SD				90,00
623B	CENTRIFUGAL THICKENER BACKDRIVE MDTOR	-	-		-	60	22	000	œ	0				22.00
6210	CENTRIFUGAL THICKENER LUBRICATION PUMP	-	-	-		10	0.75	000	1	0				0.75
624	624 CRANE (201)	-				-	15.25	380	1	0				15.25
1031	631 MIXED SLUDGE MIXER	~		6		-	1	080	4	0				22.00
632	032 MIXED SLUDGE FEED PUMP	-	-	0	-	-00	=	380	1	c				11.00
ACC3	CENTRIFUGAL DEHYDRATOR DRIVE MOTOR		-		-	-07	110	330	œ	50				110.00
6338	CENTRIFUGAL DEHYDRATOR BACK DRIVE MOTOR	-	-	3	-	-	3)	360	œ	9				37.00
6330	CENTRIFUGAL DEHYDRATOR LUBRICATION PUMP	-	-	-	-	10	0.4	360	'	٥				0.40
5344	534A CAKE HOPPER	-	-	e	-		2	380	22	a				0.50

		Required Capacity	Capacity			Rated	MCCB	Cantrol		
Fhase-1		Phase-2		TOTAL		Current	Site	Conter	P ₁₁ =1	Ph-2
Duty	Stand-by	Duty	Stand-by	Duty	Stand-by			Unit Size	DC DC	8 3
(KW)	(99)	(W)	(NW)	(NW)	(MM)	(¥)	(AT)	(um)	(unit)	(unit)
30,00	30,00	00.00	30.00	120.00	00.09	3	100	600	5	47
90,00	00'06	270.00	00.00	360.00	180.00	286	400	1200	64	47
22.00	22.00	65.00	22.00	88.00	44.00	217	225	840	1	17
0.75	0.75	2.25	0.75	3,00	150	2	30	180	14	4
16.25				15.25		150	200	009	-	
22.00		65.00		66.00		601	150	450	14	0
11.00	11,00	33.00	11 00	44.00	22.00	109	150	420	5	4
110.00	110.00	330.00	110.00	440.00	220.00	362	400	1200	~	T
37.00	37.00	0111	37.00	148.00	74.00	122	150	480	2	4
0.40	0.40	120	0,40	1,60	0.80	a.	99	180	2	41
1.50	0 <u>5</u> '1	4,50	1.50	6.00	3.00	5	30	240	2	4

Lift Pump

Blawer D Direct start

200

100

Sedimenta C. Aux. Auto TR start

400-500 Chlorinatio SR Secondary Resistor

600 Dewatering SD Star-Delta 700 Compost

E = 99h10087

CUSTOMER VIETNAM/HCMC 700 800

Ventilation

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POWER S 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	POWER 23 1 0 3 8 91 91 9 99 99	ADDRES ADDRES<
	Hard And Chester	STARTING METHOD O O O O O O O O O O O O O O O O O O

				Current C	Current Calo Ratio	3				
		Required Capacity	Capacity			Rated	MCCB	Control		
Phása-I		Phase-2		TOTAL		Currant	Size	Center	Ph-1	Ph-2
Duty	Stand-by	Duty	Stand-by	Duty	Stard-by			Unit Site	00 Unit	CC Unit
(KM)	(MM)	(NW)	(W)	(W)	(W)	(V)	(11)	(mm)	(timi)	(iiiii)
1.50	1.50	450	1,50	â,00	3.00	15	30	240	\$	4
0.40	0.40	1.20	0.40	1.60	0.80	4	8	150	04	-
5.50	550	16.50	5,50	22,00	00/11	20	100	360	2	-
3.70	3.70	11.10	3.70	14.60	7.40	37	50	240	24	4
18.60		18.60		37,00		163	200	600	-	_
18.50		16.50		37,00		183	200	009	-	-
5.50	5.50	5.50		11.00	5.50	54	100	092	-	
0.25		0.25		0.50		*	30	DB3	-	-
15.25				15.25		150	200	840	-	
0.10				D.10		-	30	240	-	
11.00		11.00		22.00		601	150	480	-	-

WWYP MCD

Lift Pump Blawer 200 8

D Direct start

Sedimenta C Aux. Auto TR start

Chlorinatio SR Secondary Resistor Dewatering SD Star-Delta 400-500

Composit 603

E - 99H006)

Ventilation 200 CUSTOMER VIETNAM/HCMC

		λ1.0					POW	VOL	Reve	STA	POL	GENE			
ž		Phie	Phása-1	Phas	Phase-2	TOT	/ER	TAG	vsible	RTIN	E	ERAT	Phase-1		
	EOUIPMENT NAME	DUTY	STAND BY	DUTY	STAND BY	AL		E	e Operation	G METHOO		OR REQ. LO	Duty	Stand-by	
		-					(140)	Ξ			-	AD	0000	(MM)	
652	RECYCLE FLOW PUMP	-	-	-	-	4	8	380	1	ß		-	30.00	30.00	
g 4 - 10	DEODORIZATION FAN			-		-	7.5	380							
	<u>SLUDGE TREATMENT FAOUITY</u> <u>TOTAL</u>												475.80	362.45	
	COMPOST FACILITY>														
311	MIXING MACHINE	~				2	3	380	1	09			160.00		
312	E SUCKING FAN	-1				-	5	380		-			22.00		
212	713 HUMORING PUMP	54				64	5	380		-		T	3 00		
735	232 DEODORIZATION FAH	~				04	30	350	1	Ģ		T	60.00		
ŝ	733 SPRAY WATER PUMP	-				-	5	380	1	0			W. F		

	24		9	04	-	gg					
	51-10-	S H	(unit)								
	Ph-1	C C	(inni)	2		47	2	4	~	2	
Control	Center	Unit Size	(uuu)	1200	360	8	1200	360	180	600	240
MDCB	Site		(AT)	400	100		400	100	30	100	8
Rated	Current.		(A)	296	74		296	54	15	66	17
		Stand-by	(W)	60.03		345.60					
	TOTAL	Duty	(80)	60,00	7,50	383.35 1 629 40	180.00	22.00	3 00	60.00	0.00
Capacity		Stand-by	(94)	30,00		SE COL					
Required Capacity	Phase-2	Duty	(MM)	30.00	750	362.45 1,153.60					
		Stand-by	(MM)	30.00		362.45					
	Pliase-1	Duty	0000	30.00		475.80	160.00	22.00	3 00	60.00	3.70

WWIP MCU

7-4-10

Lift Pump

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D Direct start Blaver

Sedimenta C Aux Auto TR start

Chlorinatio SR Secondary Resistor 400-500

Dewatering SD Star-Delta Compost 603

Vantilation 700

MOTORS AND AUXILIARIES LIST

CUSTOMER VIETNAM/HOMO E - 99940067

		λ1.0	Ī		Ì	ŀ	POWE	VOLT	Raver	STAR	POLE	GENE		
No.		Phása-I	ī,	Phase-2	14	тот	ER	AGE	sible	TIN		RAT	Phása-I	-
	EQUIPMENT NAME	DUTY	STAND BY	DUTY	STAND BY	AL.	1000	1	• Operation	а метноо		OR REQ. LOA	Duty	
							(WA)	8				o	(MM)	_
734	FLOOR DRAINAGE PUMP	-				-	6	380	1	٥			3.70	-
	COMPOST EACULTY TOTAL												272.40	91
	CVENTILATION FACILITYS													
102	501 AIR EXHAUST FAN	v		4			0.4	380	1	0			1,60	9
602	602 AIR EXHAUST FAN	-		-			0.4	350	1	0			1.60	
803	AIR EXHAUST FAN	0		8		2	0.4	360		0			1.20	2
804	AIR EXHAUST FAN	0				2	0.4	380	•	٥			1.20	
805	AIR EXHAUST FAN	T		12		2	0.3	380	1	٥			1.20	2
806	806 AIR EXHAUST FAN	4		12		2	0.3	380	1	a			1.20	91
503	203 AIR EXHAUST FAN	-		19			0.3	380	I	c			0.20	9

	Ph-2	CC Unit	(unit)				+	4	6	01	12		
	1-16	Curit Unit	(tinu)	-	12		4	4		-	*	-1	-
Control	Cantar	Unia Size	(mm)	240			180	180	181	180	180	160	160
wccB	Size		(VD)	50			30	00	06	8	20	30	8
Rated	Current		(V)	33			ч .	4	π	7		0	r
		Stand-by	(MA)										
	TOTAL	Duty		3.70	272.40		3.20	3.20	4.80	4.80	4.80	4,60	1,20
Capacity		Stand-by	(14/1)										
Required Capacity	Phase-2	Duty					1,60	1.60	3.60	3.60	3.60	3.60	0.90
		Stand-by	(KM)										
	Phase-1	Duty	(MM)	3.70	272.40		1,60	1.60	1.20	1.20	1.20	1.20	0.20
GENE	ENERATOR REQ. LOAD												
POU													
STA	RTIN	G METHOO		٥					0	0	0	0	C
Rave	rsible	• Operation	_	'	_		 1	1	1	•	'	'	'
VOL	TAGE	1	8	380			380	350	360	090	380	380	180
POW	ER		(kW)	3)			0.4	0.4	0.4	0.4	10	0.3	6.0
	тот	AL.		-				-0	21	12	9	16	7
	Phase-2	STAND BY					 						
		DUTY	_			_	 -	*	8	8	12	12	19
¥1.0	Plukse-1	STAND BY		-			 			6	4	4	-
	0	DUTY		_			-17	-	~ ~	~~			_

WATP MCB

Lift Pump

100 200

Direct s à Blower

C Aux. Au Sedimentar

Chlorinatio SR Second 400-500

Dewatering SD StarDelta Compost

CUSTOMER VIETNAM/HOMO

E - 99H0067

Reve	rsibl	e Operatio			1	. 1			
VOL	TAG	E	ε	380	000	300	360	300	360
POW			(WN)	0.0	7.5	12	0.75	0.75	1.5
			3					6	
	TOT			*	*	~	-		
	Phase-2	STAND B	BY						
	ž	DUTY			~			T	-
	ī	STAND I	37						
ΥT'Ω	Phase-1	DUTY		-	2	-	-	-	
		EQUIPMENT MAME		AIR EXHAUST FAN	AIR INTAKE FAN	AIR INTAKE FAN	AIR EXHAUST FAN	AIR INTAKE FAN	AIR INTAKE FAN
				-	803	810		312	812

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313 AIR INTAKE FAN

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815 AIR EXHAUST FAN

B14 AIR EXHAUST FAN

GENERATOR REQ. LOAD

STARTING METHOD

POLE

	start	sistor	
ť	£	å	
star	Suto	dary	1

		Required Capacity	Capacity.			Hated	MCCB	Control		
Phase-1		Phase-2		TOTAL		Current	Site	Center	Ph-1	Ph-2
Duty	Stand-by	Duty	Stand-by	Duty	Stand-by			Unit Site	DC Unit	DC
(KM)	(KW)	(KM)	(MN)	(9%)	(94)	(V)	(AT)	(uuu)	(unit)	(unit)
0.00		0.90		1.20		m	30	150	-	
15.00		15 00		30.00		74	100	340	~	
15.00		15.00		30.00		14.0	150	480	-	
0.75				0.75		14	00	180	-	
0.75		-0,75				-	30	160	-	-
		0.75		0.75		15	30	190		
3.60				3.60		σ	30	150	4	
1.50				1.50		n	CC	180	10	
11.00				11,00		103	150	460	-	
1.50				1.50		2	30	180	-	
2.20				2.20		22	30	180	-	

WWITP MOD

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2.2 330

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817 AIR EXHAUST FAN

BIG AIR INTAKE FAN

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380

15

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Lift Pump Blower

100

Sedimentar C Aux Auto TR start D Direct start

Chlorinatio 'SR Secondary Resistor 400-500 300

Dewatering SO Star-Delta 8

Compast

E - 99H0067

Ventilation 200 CUSTOMER VIETNAM/HOMO

-													1			
			Q'TY					POW	VOL	Reve	STA	POL	GENE			Requi
	¢ X		d.	Phase-1	Phase-	10	TOT	ER	TAG	rable	RTIN	E.	ERAT	Please-1		Phase
	1	EOUIPMENT NAME	DUTY	STAND BY	DUTY	STAND BY	AL		2	Operation	G METHOD		OR REQ. LO	Vind	Stand-bre	å
								(KW)	8			-	AD	(NOI)	(99)	(NA)
	10	AIR INTAKE FAN	-					0.75	360	1	0		T	0.75		
4 13	610	818 AIR INTAKE FAM	-				-	3.75	380	1	0			3.75		
	820	820 AIR EXHAUST FAN	-		-		~	55	380	1	0		Ī	5.60		4.
	821	621 AIR EXHAUST FAN	-				-	0.4	380	1	۵			5.50		
	822	AIR EXHAUST FAN	~				2	0.75	380	1	0			11.00		
	823	AIR EXHAUST FAN	-				-	0.5	330	1	0			5.50		
	824	AIR INTAKE FAN	-				-	3.7	350	1	a			6.50		
	825	ALR INTAKE FAN	~				e.	0.28	360	1	۵			00'11		
	826	AIR EXHAUST FAN	04				64	0.75	380	1	0		T	51.00		
	22.7	AIR INTAKE FAN	-				-	0.28	380	1	a		Τ	5.50		
	828	828 AIR EXHAUST FAN	2				~	0.4	360	1	a			11.00		

				Current Calo. Ratio	alo. Ratio	0				
		Required Capacity				Rated	MCCB	Cantrol		
Please-1		Phase-2		TOTAL		Currant	Sira	Center	Ph-1	Ph-2
Duty	Stand-br	Duty	Stand-by	Cuty	Stand-by			Unit Siza	00 Unit	Doit Unit
(100)	(000)	(MM)	(89)	(MM)	(344)	(4)	(AT)	(mm)	(mit)	(unik)
0.75				0.75		2	30	180	-	
3.75				3.75		37	50	240	-	
5.60		5.50		00'11		54	100	360	-	1
5.50				6.50		4	30	180	-	
11.00				11.00		2	00	180	2	
5.50				6.50		9	30	180	-	
5.50				5,50		33	50	160	-	
00'11				11,00		61	30	180	-64	
11.00				11.00		1	30	180	~	
5.60				5.50		E	DE	180	-	
11.00				11.00		4	30	180	2	

7 - 4 - 13

100 Lift Pump 200 Blower D Direct start 300 Sadimenta C Aua. Auto TR start 400-500 Chileinatio SR Secondary Resistor 600 Dewaterin₁ SD Star-Delta

E - <u>99H0067</u> 600 Dewateriny CUSTOMER VIETNAM/HOMO 700 Compart 200 Vanitation

MD YORS AND AUXILIARIES LIST

TAGE		λL.D					POW	VOL	Reve	STA	POU	GEN
G METHOD G G G G G G G G G G G G G G G G G G G		Phas	1=05	Phas	5-5	тот	ER	TAG	rsable	HTIN	E	ERAT
VENTILATION FACULTY TOTAL	EQUIPMENT NAME	DUTY	STAND BY	OUTY	STAND BY	AL	(NW)	ε 8	• Operation	G METHOD		OR REQ. LOAD
	VENTRATION FACELTY TOTAL											

60 Ph-2 (unit) CO Deal 56 (min) -11-1 C Unit Control Center Unit Size (mm) MOCE (TA) Size Current Rated 3 ė9 0uty Stard-by Duty Stand-by Duty Stand-by Stan Current Cale Ratio 190.80 TOTAL Required Capacity 54.50 Phase-2 35.90 1-011

HO CHI MINH CITY, VIETNAM WATER ENVIRONMENT IMPROVEMENT PROJECT

Calculation Sheet

for

Power Cable Capacity

Package : E

Plant : Wastewater Treatment Plant

Pacaze E		Wastewater Treatment Plant Phase-1									
						起動方式	起動電流		上部工師	超動電道	
区分	Motor No.	植器名称	数	ead (注)	部日	Starting	Starting		2	S/current	Final
pcation	Location Motor No.	Name of Equipment	Q'ty	WM		Method	Current	Pf		3	Cabla Siza
IFT PU	CLIFT PUMP EQUIPMENTS										
	121-1	LIFT PUMP (1-1)	-	220	0	0	loi			ici	io
	121-2	LIFT PUMP (1-2)	1	220	380	0	4342.10	0.8			800.0
	121-3	LIFT PUMP (1-3)	-	220	0	0	104			lai	lo
	124-1	HOIST	-	6.55	(CD)	a			-	100	i cri
	125-1	FLOOR DRAINAGE PUMP(D-1)	-	2.2	113	a	43,40		8		. '8.0
	125-2	FLOOR DRAINAGE PUMP(D-2)		2.2	100	0	43.40		4		14.0
	125-3	FLOOR DRAINAGE PUMP(D-3)	-	2.2	0	0	43.40		22		22.0
	125-4	FLOOR DRAINAGE PUMP(D-4)	-	2.2	(C)	٥	43.40		36		33.0
	125-5	FLOOR DRAINAGE PUMP(D-5)	-	2.2	- 433	D	43.40		36		38.0
	125-6	FLOOR DRAINAGE PUMP(D-6)		2.2	-CD	a	43.40		3.6		38.0
	125-7	FLOOR DRAINAGE PUMP(S-1)		2.2	- 40 (Q	43.40		0		8.0
	125-6	FLOOR DRAINAGE PUMP(S-2)	-	2.2	-CC 1	٥	43.40		4		14.0
	125-9	FLOOR DRAINAGE PUMP(S-3)		2.2	123	۵	43,40		22.		22.0
	125-10	FLOOR DRAINAGE PUMP(S-4)	-	2.2	123	٥	43.40		38.		38.0
	125-11	FLOOR DRAINAGE PUMP(S-5)		2.2	0	٥	43.40		38		38.0
	125-12	FLOOR DRAINAGE PUMP(S-6)	-	2.2	-023	0	43.40	0.8	38.0	5.5	38.0
(BLOWER	R EQUIPMENTS	VT>									
		BLOWER (1-1)		480	3300	SR SR	150.00		22.0		607
	211-2	BLOWER (1-2)		480	3300	827	13		22.0		60.0
	211A-1	BLOWER (1-1) Aux. Equipment	-	4.15	380	0	5	0.6	100.0	22.0	18
	211A-2	BLOWER (1-2) Aux. Equipment	-	4.15	380	0	81.90		100.0		100.0
	213-1	DISCHARGE VALVE (1-1)	-	0.75	380	٥	1.00		14.0		14.0
	213-2	DISCHARGE VALVE (1-2)	-	0.75	380	0	12		14.0		14.0
	215-1	AIR FILTER	-	0.2	380	0	3.90		5.5		5.5
	215-2	AIR FILTER	-	0.2	380	a	3.90		3.5		3.5
	216-1	FLOOR DRAINAGE PUMP	-	2.2	380	a	43,40		60.0		60.0
	216-2	FLOOR DRAINAGE PUMP	-	2.2	330	٥	43.40		60.0		60,0
	217-1	ORANE	-	8.05	380	0	26.50		38.0		36.0
WATER	TREATME	<pre><water facility="" treatment=""></water></pre>									
PRIMARY	SEDIMENT	SEDIMENTATION TANK									
	312-1	SLUDGE SCRAPER	-	1.5	100	0	29.60		38.0	3.5	
	312-2	SLUDGE SCRAPER	-	1.5	380	٥	29,60	0.6	38.0	3.5	38.0
	312-3	SLUDGE SCRAPER	-	1.5	123	0	29,60		38.0	3.5	
	0.0	011000 0001010									

WWTP (Ph-1)

Pacage E]	Wastewater Treatment Plant Phase-1				訪問新方式	能酸油油		工物工業	超動電道	
区分 Motor No	機器名称	数量	中心	散任	tartir	Starting		2	18	
5	Name of Eq.	Vt/O			Method	Current	βf	Cable Size	Ő.	ŝ
÷	SLUDGE SCRAPE	-	-	360	۵	29.60	0.6	36.		38
312-6	SLUDGE SCRAPER	-	-	380	٥	29.60	0.0	38.		80
312-7	SLUDGE SCRAPER	-	1.5	380	٥	29.60	0,0	B 38.0		
312-8	SLUDGE		-	380	a	29.60	0.0	36		38
312-9	SLUDGE	-	-	380	٥	29,60	0.6	22		22
312-10		-	-	380	a	29.60	0.0	22.		23
314-1	SOUM PUMP	-	ŝ	380	٥	108.60	0.0	150.	_	3
314-2	:	-	2	380	0	108,60	0.0	150.		50
315-1	1		20	380	٥	108.60	0.8	150.		50
315-2	RAW SLUDGE	-	20	380	a	108.60	0.6	150		3
315-3	1	-	0	380	0	108.60	0.0	150		3
316-1	1		0	380	0	3.90	0	1173		20
316-2	RAW SLUDGE	-	0	300	a	3.90	0.0	uri		ŝ
316-3	RAW SLUDGE		0	380	0	3.90	0	(c)		ŝ
316-4	1	-	0	380	٥	3.90	0	2		S
316-5	1		0	380	٥	3.90	0	ei		2
316-6		-	0	380	٩	3.90	0	C	_	0
316-7	1	-	0.2	380	٥	3.90	0.1	e		9
316-8			0.2	380	٥	06.0	0	ci		~
316-9			D.2	380	a	3.90	0	C		7
316-10	RAW SLUDGE VALVE		0.2	380	٥	0.60	0	3	1	2
317-1	1		10.4	380	٥	7.90	0	3	1	10
AERATION TANK										
324-1	AIR FLOW CONTROL VALVE	-	Ö	380	٥			14	3.5	
324-2	AIR FLOW CONTROL VALVE	-	0.4	380	٥	7.90	0.0	3 8.0	Ċ,	8.0
324-3	AIR FLOW CONTROL VALVE		0	380	٥			8	9	
324-4	AIR FLOW CONTROL VALVE	-	0	380	٥			8	3.	
324-5	AIR FLOW CONTROL	-	0	380	٥			B	0	
324-6	AIR FLOW CONTROL VALVE		0	380	٥			0	0	
324-7	AIR FLOW CONTROL VALVE.	-	0	380	٥			8	0	
324-8	AIR FLOW CONTROL VALVE	-	Ö	380	0			.0	3	
324-9	AIR	-	0	380	٥			aj	3.	
324-10	AIR FLOW	-	0	380	۵			5	C	
CINAL CENTRENTA	TOAL TANK									
								and the second s		

WWTP (Ph-1)

7 - 4 - 17

Pacage 6	E	Wastewater Treatment Plant Phase-1									
						起勤方式	起勤當派		小型工程	記斷燈造	
図		康器伯容	単位	画谷	部任	artir	Starting		V/drop	S/ourrent	Final
Location	2			kW	>	Mathod	Current	đ	Cable Size	Cable S	9
	332-2	SORAPE	-	2.2	380	0	43.40	10		5.5	38
	332-3	SLUDGE SCRAPER	1	2.2	380	0	43.40	0.8			38.0
	332-4	SLUDGE SCRAPER	-	2.2	380	0	43.40	0.8			36.0
		SLUDGE SORAPER	-	2.2	380	a	43.40	0.8			38.0
	332-6	SLUDGE SCRAPER	-	2.2	380	0	43.40	0.6	Ŀ		38.0
		SLUDGE SCRAPER	-	2.2	380	0	43.40	0.6			CHL
		SLUDGE SORAPER		64	380		43.40	0.8			C UC
		SLUDGE SCRAPER		2.2	380	a	43.40	0.8			20.00
		SLUDGE SORAPER	-	2.2	380	0	43.40	0.8	İ.		0.00
		SCUM PUMP	-	2.2	380	0	108.60	20		100	0.001
		SOUM PUMP	-	5.5	380	d	108.60	10	ļ	200	0001
		RETURN SLUDGE PUMP (25%)	-	=	360	0	217.10	80		100	0 00V
and the second se		RETURN SLUDGE PUMP (25%)	-	=	380	0	217 10	8.0		100	0000
	005-3	RETURN SLUDGE PUMP (25%)	1	=	380	0	217.10	60		100	2000
		RETURN SLUDGE PUMP (25%)	-	=	380	0	217.10	0.0		100	0000
	- 1	RETURN SLUDGE VALVE		0.4	180	0	7.90	0.8			6.0
	- 1	RETURN SLUDGE VALVE	***	0.4	380	0	1,90	0.8		i ca	8.0
	337-3	RETURN SLUDGE VALVE		0.4	380	0	7.90	0.6			6.0
	- 1	RETURN SLUDGE VALVE	-	0,4	380	a	1.90	0.0			8.0
	337-5	RETURN SLUDGE VALVE	-	0.4	380	0	7.90	0.0		103	0.0
	337-6	RETURN SLUDGE VALVE	-	0.4	380	0	7.90	0.8		C	47
	337-7	RETURN SLUDGE VALVE	-	0.4	380	a	7.90	0.8	0	3.5	2.42
	337-8	RETURN SLUDGE VALVE	-	D.4	380	0	7.90	0.8	1	(C)	1.00
	337-9	RETURN SLUDGE VALVE	-	0.4	380	0	7.90	0.8		0	2.5
	01-120	SLUDGE	1	0.4	360	٥	7.90	0.8		C	5.5
	338-1	EXCESS SLUDGE PUMP	-	11	380	0		0.8		100	250.0
	338-2	SLUDGE	1	11	380	٥	217.10	0.8		100	250.0
	338-3		1	=	380	0		0.8		100	250.0
	339-1	EXCESS SLUDGE VALVE	-	0.2	380	0		0.8		C	3.6
	339-2			0.2	380	a	3.90	0.8		C	3.5
	339-3		-	0.2	380	0	3.90	0.8		e	10
	339-4	SLUDGE	-	0.2	330	0	3.90	0.6		(C)	100
	339-5	ESS SLUDGE	-	0.2	330	0	3.90	0.6		C	35
	339-6	SLUDGE	1	0.2	380	a	3.90	0.6		C	A C
	339-7		-	0.2	380	a	3.90	0.6		0	10
	339-B	on Li	-	0.2	380	a	3.90	0.8		0	3.5
	8-855	EXCESS SLUDGE VALVE									

WMTP (Ph-1)

13

Pacage [E)	Wastewater Treatment Plant Phase-1									
						起動方式	記録は		上 悠 世 皐	42.85.48.14	
気			数量	dal Sto	毎日	artir	Starting		/droc	Surge of	Final
Location	Motor No.	Name of Equipment		KW/		Method	Current	jd	Cable Size) ĉ	
	339-10	EXCESS SLUDGE VALVE	-	0.2	380	d	3.90	C		0 01000	200
	340-1	COMMINUTER	-	3.7	360	d	73.00		0.0	12	V 00
	351-1	FLOOR DRAINAGE PUMP(D-1)		2.2	360	0	43.40		60.0	-	2009
	351-2	FLOOR DRAINAGE PUMP(D-2)	-	22	380	G	43.40		60.0		0.08
	351-3	FLOOR DRAINAGE PUMP(D-3)	-	22	380	0	43.40		80.0	1	0.00
	351-4	FLOOR DRAINAGE PUMP(D-4)		2.2	380	0	07.07		80.08	14	0.00
	351-5	FLOOR DRAINAGE PUMP(D-5)	-	22	380	0	43.40		80.0		0.09
	351-6	FLOOR DRAINAGE PUMP(D-6)		2.2	380	0	01 dD		60.0		0.09
	351-7	FLOOR DRAINAGE PUMP(D-7)	-	0.0	380	G	00 00		0.04	2 4	0.00
	351-8	FLOOR DRAINAGE PUMP(D-8)		2 2	380	0	up up		0.04	2.4	0.00
	351-9	FLOOR DRAINAGE PUMP(D-9)	-	2.2	380	0	00 00		000	214	0.00
	351-10	DRAINAGE	-	2.2	380	0	43.40		60.0	2.4	0.08
	351-11	FLOOR DRAINAGE PUMP(D-11)	-	2.2	380	0	00 00		0.09	5 4	
	351-12	DRAINAGE	-	61	380		43.40		0.09	2	0.08
	351-13	FLOOR DRAINAGE PUMP(D-13)		66	380	-	42.40		0.00		0.00
	351-14		-	2.2	380		07.55		0000		00.0
				2		2			0.00	2	00.00
DISINFE	CDISINFECTION FACILITY>	SILITY>								The local data and the second second	
	414-1	SODIUM HYPOCHLORITE PUMP	-		380	0	0				
	414-2	SODIUM HYPOCHLORITE PUMP	-	0.4	380	d	i a				
	414-3	SODIUM HYPOCHLORITE PUMP	-		380	0	1.90	0.8	2 40	200	1 1 1
			10 first in drawn war war war war								
WALER	SUPPLI F	FAGILITY									
	512-1	TREATED WATER SUPPLY PUMP (1)	-	30	380	SD	0	0.8	100	18	100.0
	512-2	TREATED WATER SUPPLY PUMP (1)	-	30	380	SD	197.40	0.8	38.0	100.0	18
	1-210	IREALED WATER STRAINER (1)	1	0.4	380	٥		0.8	107	10	3.5
	1.5	FLUUK URAINAGE PUMP(D-1)	-	2.2	380	Q	м,	0.8	5.5	5.5	5.5
	1 1 1 1 1	FLOOR DRAINAGE PUMP(D-Z)	-	2.2	380	0	43.40	0.0	5.5	5.5	5.5
	2 1 1	FLOUR DRAINAGE PUMP(D-3)	-	2.2	380	0	33	0.8	5.5	5.5	5.5
	1-1-10	FLOUR URAINAGE PUMP(D-4)	-	2.2	380	٥	য	0.8	5,5	5.5	5,5
	2 2 2 2	FLOOD OPTIMAGE PUMP(S=1)	-	2.2	380	a	43.40	0.8	5.5	5.5	5.5
	0 - + 10	FLUOK DRAINAGE PUMP(S-2)		2.2	380	0	43.40	0,6	5.5	5.5	2.5
	1-610	FLOOR DRAINAGE PUMP(S-3)	1	2.2	380	0	ci.	0.8	5.5	5.5	5.5
	9-410	FLUOK DRAINAGE PUMP(S=4)		2.2	380	٥	43.40	0.6	5.5	5.5	5.5
	1-010	TREATED WATER SUPPLY PUMP (2)	-	22	380	٥	04	0.8	100.0	10	13
	2-010	TREATED WATER SUPPLY FUMP (2)		22	380	٥	2	0.0	100.0	250.0	250.0
	1-110	IRCALED WALER STRAINER (2)	-	0.4	380	0	00 P	A A	12 4	Ŀ	ŀ

WWTP (Ph-1)

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Pacage E		Wastewater Treatment Plant Phase-1									
1						起勤方式	起動電流		上数団様	記録協議	
分区		微器名称	御祭	del Gip	韓田	artin	tartir		V/drop	S/current	Final
Location.	Σ	Name of Equipment	O'ty	KW.	>	Method	Current	ö.	Cable Size	Cable	Cable Size
	521-1	FILTRATION SUPPLY PUMP	1	3.7	- 62	0	73.00		8		4
	521-2	FILTRATION SUPPLY PUMP	-	3.7		٥	73.00		=		14.0
	522-1	FILTRATION SUPPLY STRAINER	-	0.4	380	a	7,90		3		3.5
	522-2	FILTRATION SUPPLY STRAINER	1	0.4	380	q	1.90		0		3.5
	523-1	SAND FILTER	-	22	220	1	11.40		C	35	35
	523-2	SAND FILTER	1	2	220	1	11.40		3		
	524-1	FILTERED WATER SUPPLY PUMP	1	11	380	a			22		13
	524-2	FILTERED WATER SUPPLY PUMP		11	380	0	217.10		22		100.0
	525-1	BACKWASH PUMP	-	7.5	380	٥	1.72		22		109
	525-2	BACKWASH PUMP	10.11	7.5	380	Q			22		60.0
The later second s	526-1	AIR WASH BLOWER		7.5	380	٥	148.00		22		60.0
and the second second	528-2	AIR WASH BLOWER	-	7.5	380	٥	1.25		22		60.0
	527-1	BACKWASH WASTEWATER PUMP		3.7	380	0	73.00		1		14.0
	527-2	BACKWASH WASTEWATER PUMP	-	3.7	380	0	73.00		4		14.0
	528-1	AIR COMPRESSOR	1.4	3.7	380	٥	73.00		4		14.0
	528-2	AIR COMPRESSOR	-	3.7	380	٥	73,00		1	14.	14.0
	529-1	DEHUMIDIFIER	yes.	0.25	220	1	0.50		e3		3.5
	530-1	SOLENOID VALVE BOX	-	2	220		11.40	0.6		.0	3.5
	530-2	SOLENOID VALVE BOX	-	2	220	E	11.40		ei		3.5
SLUDGE	_	TREATMENT FACILITY>									
	611-1	GRAVITY THICKENER	-	1.5	380	0	29.60	0.8	14.0	35	14.0
	613-1	THICKENED SLUDGE PUMP	-	5.5	380	0	108.60	0.8	60.0	38.0	60.0
	613-2	THICKENED SLUDGE PUMP	1	5.5	380	0	108.60	0.6	60.0	38.0	60.0
	614-1	THICKENER EFFLUENT PUMP	-	5.5	380	a	108,60	0.0	60.0	1 - 22	60.0
	614-2	THICKENER EFFLUENT PUMP	-	5.5	380	0	08	0.8	60.0	0	60.0
	615-1	FLOOR DRAINAGE PUMP(D-1)	-	54	380	٥	43.40	0.0	22.0	: 100	22.0
	615-2	FLOOR DRAINAGE PUMP(S-1)	-	2.2	380	a	43.40	0.8	22.0	5.5	22.0
	621-1	EXCESS SLUDGE MIXER	-	Ξ	380	D		0.8	38.0	100.0	100.0
	622-1	EXCESS SLUDGE FEED PUMP	-	30	380	SD	197.40	0.6	38.0	8	100.0
	622-2	GE FEED PUMP	-	30	380	SD.	197.40	0.8	38.0	8	100.0
	623A-1	THICKENER-	-	06	380	SD	592.10	0.6	12	153	325.0
	623A-2	THICKENER- DRIVE MOTOR	-	06	380	SD	592.10	0.0	S	325.0	400.0
	623B-1	THICKENER · BACKDRIVE MOT	-	22	380	٥	434.20	0.8	8	12	250.0
	623B-2	BACKDRIVE MOT	-	22	380	a	434.20	0.0	250.0	3	250.0
	6230-1	THICKENER- LUBRICATION P	-	0.75	380	D	14.80	0.8	uri	3.5	5.5
	6-01C4	ICENTRIFICAL TURCENED, THERICATION BIND	-	ĉ							

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(1-H4) 4TWW

Pacage E		Wastewater Treatment Plant Phase-1									
20	11.1.1					范勤方式	詰動観道		上弦田軽	起動電流	
AN	MOTOR ND.		数曲	国谷	部日	Starting	Lartin		V/drap	S/current	Final
1000M000	RDCDT ND	COANE food	0'ty	31	>	Method	Current	Ρį	Cable Size	Cable	Cable Size
	1 1 1 2 2	URANE (ZUU)	-	15.25	380	0	a	0.6	150.		150.
	1-120	MIXED SLUDGE MIXER	-	H	380	٥	217.10	0.8			100
	2-12g	MIXED SLUDGE MIXER	-	=	380	٥	_	0.0			100
	032-1	MIXED SLUDGE FEED PUMP	1	II	380	0		0.8			1001
	632-2	- 1	-	Ξ	380	0	1	0.8			1001
	633A-1	CENTRIFUGAL DEHYDRATOR- DRIVE MOTOR		110	380	SD	1.0%	0.3			400
	633A-2	DEHYDRATOR- DRIVE MOTO	-	110	380	SD	II CM	0.8			4001
-	1-9700	DEHYDRATOR-	1	37	380	SD	243.40	0.8			100.0
	7-9770	UEHYDRATOR BACK DRIVE	-	37	380	SD	22	0.8			100.0
	0-0009	CENTRIFICAL DENTIDRALOR- LUBRICATION PUMP	-	0.4	380	a	7.90	0.8			63
	6344-1	CAKE HORDER	-	40	380	a	7.90	0.8			e
	6344-2			9.9	380	a	29.60	0.8			14.1
	6348-1	CAKE HODDED	-	2	380	0	29.60	0.8			14.0
	6148-9	CAKE HOPPED	-	9	380	0	29.60	B.0			14.0
	635-1	POLYMER FEEDER		210	380	-	29.60	0,0		3.5	14.0
	635-2	POLYMER FEEDER		E V	000	0	DR'S	0.0	1		C.
	636-1	POLYMER DISSOLUTION TANK	-	14	non		067	0.8			3.6
	636-2	POLYMER DISSOLUTION TANK		2.4	2002	2	108.60	0.8			38.0
	637-1	POLYMER FEED PUMP		0 0	300	2	108.60	0.8			38.0
	637-2	POLYMER FEED PUMP	-	10	280	-	13.00	0.8			22.0
	638A-1	WATER SUPPLY PUMP UNIT		3 6	000		/3.00	0.8			22.0
	6388-1	WATER SUPPLY PUMP UNIT		2.0	000		200.10	0.8			200/0
	639-1	AIR COMPRESSOR	-	0 4	000		365.10	0.8			200.0
	639-2	AIR COMPRESSOR	-	2 2 2	280	0	100.001	0.0	ł	38	36.0
	640-1	DEHUMIDIFIER	-	12	0000		0 50	0.0			39.0
	641-1	CRANE (20t)	-	15.25	380	0	201 00				0.0
	643-1	TREATED WATER INFLOW VALVE	-		380		-1.5	0.0		nei	0.001
	651-1	RECYCLE FLOW MIXER	-	-	380		01710	0.0	1	1001	0.001
		RECYCLE FLOW PUMP	-	30	380	SD	197.40	0.0		1001	0,001
	652-2	RECYCLE FLOW PUMP	-	30	380	30	5 G9	0.8	38.0		100.0
<compost< td=""><td>T FACILITYS</td><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></compost<>	T FACILITYS	8									
	711-1	MIXING MACHINE	-	00	- C	Ca	500 I.O		12	15	
		MIXING MACHINE	-	06	1 12	000	-1-		0.004	0.025	400.0
	-	SUCKING FAN	-	12.5	380	20	108.60	0.9	39.0		100.0
	6-612	SHOKINO PAN			ŧ		١.		2.222		1000

WMTP (Ph-1)

Pacage E		Wastewater Treatment Plant Phase-1									
						記憶方式	記録が		工物土板	作業業品	
京区	Motor No.		資産	酮你	郡田	Starting	Starting		V/drop	S/current	Final
Location.	Matar Na.	Name of Equipment		kW		Method	Current	bł	Cable Size	1.1	Cabla Siz
	712-3		-	5.5	380	0	108.60	0	38	000	100
	712-4	SUCKING FAN	-	55	380	0	100.60		o c	200	0.00
	713-1	HUMIDIFING PUMP	-	- 12	380		38		00	0,00	100
	713-2	HUMIDIFING PUMP	-	31	380	6	00.04		0	3 6	0.0
		DEODORIZATION FAN	-	30	380		2 2		007	300	5
	732-2	DEODORIZATION FAN		30	380	0	502.10		100	200	1004
		SPRAY WATER PUMP		3.7	160	0	3 5		004	07P	318
	734-1	FLOOR DRAINAGE PUMP		3.7	380	0	73.00	0.8	36.0		38.0
VENTILA	VENTILATION FACILITYS										
	801-1	AIR EXHAUST FAN (8 E/R)	-	0.4	006	4	00 F	0.0			
	801-2	9	-	100	000		DR'S	0.0	-		14.0
	801-3	AIR EXHAUST FAN (A F/R)	-	T NO	2000		08'5	0.0			B.0
	801-4	9	-	t s o	200	0	1,30	0.0			8,0
	802-1	AIR EXHAUST FAN (B E/B)	-	r o	2000		08.1	2.0			8.0
	802-2	9	-	70	380		00.1	200		-1 6	8.0
	BD2-3	AIR EXHAUST FAN (B E/R)	-	0.4	380		001	0.0		-	0.0
	802-4	AIR EXHAUST FAN (B E/R)	-	0.4	380		00 0	0.0			0.0
	803-1	AIR EXHAUST FAN (B E/R)	-	0.4	380		00 0				
	803-2	AIR EXHAUST FAN (B E/R)	-	0.4	380	0	06.2	0.8		16	0.0
	803-3	AIR EXHAUST FAN (B E/R)	-	0.4	380	0	190	0.80		2 6	0.0
	804-1	AIR EXHAUST FAN (B E/R)		0.4	380	0	7.90	0.80	5.5	2.5	6.6
	804-2	AIR EXHAUST FAN (B E/R)	-	0.4	380	0	7.90	0.6			0.0
	804-3	AIR EXHAUST FAN (B E/R)	-	0.4	380	0	7.90	0.8		1 67	8.0
	805-1		-	0.3	380	a	5.90	0.8		100	100
	B05-2		-	0.3	380	٥	5.90	0.0	5	0	5.5
	E-008	AIR EXHAUST FAN (B E/R)	-	0.3	380	٥	5,90	0.8	5	C	5.5
	t-000	AIK EXHAUST FAN (B E/R)	-	0.3	380	a	5.90	0.8	2	0	12.2
	1-000	AIR EXHAUST FAN (C E/R)	-	0.3	360	0	5.90	0.8		0	3.5
	2-000	AIR EXHAUST FAN (C E/R)	-	0.3	380	٥	5.90	0.6	e	3	3.5
	P-000	MIK EAHAUST FAN (G E/K)	-	0.3	380	٥	5.90	0.8	e	c	3.5
	9-000	AIK EXHAUST FAN (C E/R)	-	0.3	380	0	5.90	0.0	c	0	3.5
	1-100	AIR EXHAUST FAN (C E/R)	-	0.3	380	٥	5.90	0.8	8	3	B.0
	1-000	AIR EXHAUST FAN (G E/H)	-	0.3	380	0	5.90	0.8	0	e	3.5
	1-400	MINIMAR FAN (BIE/K)	-	1.5	380	a	-	0.0	36	60	0
		MINIAKE FAN (BIE/H)		7.5	380	0	148.00	0.3	38	60	60.0
		AR IN ARE FAR IC FUEL		1.	1000	-					

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WWTP (Ph-1)

Pacage E		Wastewater Treatment Plant Phase-1									
11 11						起動方式	起動電流		上位世紀	起動電流	
K X	Mptar Na.		風	啣	部日		10		P	S/ourrent	Final
Location	Motor No.	Name of Equipment	Q'ty'	kW	V	Method	Current	Pf		Cable Si	12
	811-1	AIR INTAKE FAN (C E/R)		0.75	380	0	14.80	19	9		100
	812-1	AIR INTAKE FAN (A E/R)		0.75	380	0	1.1	10	14.0	100	14(
	813-1	AIR INTAKE FAN (A E/R)	-	0.9	380	d	17.80	0.6	22	0 00	22.0
	B13-2	AIR INTAKE FAN (A E/R)	-	0.9	380	0	10-	0.5	14	e	1 3
	813-3	AIR INTAKE FAN (A E/R)	-	0.9	380	0	17.80	0.6			140
	B13-4	AIR INTAKE FAN (A E/R)	-	0.0	380	0	-11-	0.8	2	e	173
	B14-1	AIR EXHAUST FAN (C E/R)	-	0.3	380	0	- j. uni	0.5			2.5
	014-2	AIR EXHAUST FAN (C E/R)	-	0.3	380	0	5.90	0.6			
	814-3		-	0.3	380	0	5.90	0.6		e e	i u
	014-4	AIR EXHAUST FAN (C E/R)	-	0.3	380	0	5.90	0.6	1.67		- u
	814-5	EXHAUST FAN (C	-	0.3	380	0	5.90	0.0			5 113
	815-1	AIR EXHAUST FAN (A E/R)	-	-	380	0	10-	0.0	150	100	150.1
	816-1	AIR INTAKE FAN (A E/R)	-	1.5	380	a	20	0.6	22	-	2
	817-1	AIR EXHAUST FAN (A E/R)	-	02	380	۵	0	0.0	22	47	22.
	818-1	FAN (D	-	0.75	380	a	12	0.B	22	C	5.6
	819-1	AIR INTAKE FAN (E E/R)	-	3.75	380	a	74.00	0.8	36	14	38.
	820-1	EXHAUST FAN (D	-	5.5	360	۵	108.60	0.8	60	38	60.
	821-1	EXHAUST FAN (D		0.4	380	a	7.90	0.8	40	C	5.
	822-I	EXHAUST FAN (D	-	0.75	380	d	1.57	0.0	0	3	G
	822-2	FAN (D	***	0.75	380	Q	14.80	0.8	14	0	14.
1. In	823-1	AIR EXHAUST FAN (E E/R)	-	0.3	380	0	5.90	0.8	2	0	3
	824-1	EXHAUST FAN (E		3.7	380	a	73.00	0.6	100	4	1001
	825-1	EXHAUST FAN (E	-	0.28	380	0	140	0.0	0	1	3.0
	825-2	EXHAUST FAN (E E/	-	0.28	380	a	5.50	0.8	20	3	2.5
	826-1	EXHAUST FAN (E	-	0.75	380	0	14.80	0.8	22	0	22 C
-	B26-2	EXHAUST FAN (E	-	0.75	380	a	14.80	0.8	22	C	22.0
and the second second	827-1	EXHAUST FAN (A	-	0.28	380	0	5.50	0.6	5	0	5.5
	828-1	EXHAUST FAN (A	F	0.4	360	٥	7.90	0.0	8	C	0.0
	828-2	AIR EXHAUST FAN (A E/R)	1	0.4	380	0		0.0	8.0		8.0
					1						

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HO CHI MINH CITY, VIETNAM Sheet : 1 of 1 WATER ENVIRONMENT IMPROVEMENT PROJECT Issue date Rev.1 : 13-Jan-01

Calculation Sheet

for

Receiving Power Capacity for WWTP

1. Introduction ;

The receiving power capacity of the plant is decided from the result of the following study.

- 1) The classification of all electrical equipments and a character are examined.
- 2) Total electrical capacity is computed in search of rated capacity of every item.
- Maximum demand power is calculated by using demand factor of each electrical equipments.
- 2. Calculation ;
 - 1) The result of the above item 1) and 2) is shown in the Table: WWTP Ph-1 & 2.
 - Total maximum demand power can be looked for by using rated capacity and demand factor from the following formula;

(Receiving power capaci = (Maximum demand power) / (Efficency x Power factor)

			[Unit : KVV]
	Rated capacity	Demand factor	Max, demand power
Phase-1	2,301.3	0.8	1,841.0
Phase-2	5,964.7	0.8	4,771.8
Total	8,266.0	0.8	6,612.8

3. Selection ;

Receiving power capacity was decided from the above result from the following reason.

- When the operation which become stable is done, paralell operation of receiving transformer is necessary.
- 2) Future expansion shall be cosidered.

4. Attachment ;

- 1) Electrical Equipment List for WWTP Phase-1
- 2) Electrical Equipment List for WWTP Phase-2

SOCIALIST REPUBLIC OF VIETNAM Independence-Freedom-Happiness

Sheet: 1 of 4

ELECTRICAL EQUIPMENT LIST

:

:

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 1

Name of electric consumer Address Working table-time

Schedule of electric consumer:

Issue date Rev.1

13-Jan-01

No.	Electrical equipment name	Q'ty	Capa	city	Total	Remarks
			(HB)	(kW)	(kW)	(Demand Factor
	LIFT PUMP EQUIPMENT					
121	Lift pump (1)	2	-	220.00	440.00	0.6
123	Floor drainage pump	1		2.20	2.20	0.6
124	Crane	1	-	16.00	16.00	0.3
	BLOWER EQUIPMENT					
211	Blower (1)	1		480.00	480.00	1.0
211A	Aux. Equipment for Blower (1)	1		4.15	4.15	1.0
213	Discharge valve (1)	1		0.75	0.75	0.6
215	Air filter	1		3.70	3.70	0.6
216	Floor drainage pump	1		2.20	2.20	0.6
217	Crane	1		8.25	8.25	0.3
	WATER TREATMENT FACILITY					
	(Primary sedimentation tank)					
312	Sludge scraper	10	-	1.50	15.00	1.0
314	Scum pump	1		5.50	5.50	0.6
315	Raw sludge pump	2		5.50	11.00	0.6
316	Raw sludge valve	10		0.20	2.00	0.6
317	Comminuter	1		0.75	0.75	1.0
	(Aeration tank)					
324	Air flow control valve	10		0.40	4.00	0.6
021	(Final sedimentation tank)				1	
332	Sludge scraper	10	-	2.20	22.00	1.0
334	Scum pump	1		5.50	5.50	0.6
335	Return sludge pump (25%)	4		11.00	44.00	1.0
337	Return sludge valve	10		0.40	4.00	0.6
338	Excess sludge pump	2		11.00	22.00	0.6
339	Excess sludge valve	10	-	0.20	2.00	0.6
340	Comminuter	1		3.70	3.70	1.0
351	Floor drainage pump	10	-	2.20	22.00	0.6
	DISINFECTION FACILITY					
411	Sodium hypochlorite pump	2	-	0.40	0.80	1.0
	WATER SUPPLY FACILITY					
512	Treated water supply pump (1)	1	-	30.00	30.00	1.0
513	Treated water strainer	1		0.40	0.40	0.6

Independence-Freedom-Happiness

Sheet : 2 of 4

ELECTRICAL EQUIPMENT LIST

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 1

Address

Working table-time

637

Polymer feed pump

Schedule of electric consumer:

Electrical equipment name Capacity No. Q'ty Total Remarks (HB) (kW) (kW) (Demand Factor) 514 Floor drainage pump 2.20 0.6 1 2.20 -516 Treated water supply pump (2) 1 22.00 22.00 0.8 -517 1 Treated water strainer (2) 0.40 0.40 0.6 -521 Filtration supply pump 1 3.70 3.70 0.6 -522 Filtration supply strainer 0.40 0.40 0.6 1 -523 Sand filter 1 2.20 2.20 0.4 ... 524 Fitered water supply pump 1 1.0 11.00 11.00 525 Backwash pump 1 0.4 7.50 7.50 526 Air wash blower 1 7.50 7.50 0.4 _ Backwash wastewater pump 3.70 0.4 527 3.70 1 -0.5 528 Air compressor 1 3.70 3.70 _ 529 Dehumidifier 1 0.25 0.5 0.25 530 Solenoid valve box 1 1.50 1.50 0.5 _ SLUDGE TREATMENT FACILITY 611 Gravity thickener 1 1.50 1.50 1.0 5.50 5.50 0.6 613 Thickened sludge pump 1 -1 5.50 0.6 614 Thickened sffiuent pump 5.50 -615 Floor drainage pump 1 2.20 2.20 0.6 -621 Excess sludge mixer 1 11.00 11.00 1.0 14 1.0 30.00 622 Excess sludge feed pump 1 30.00 1 1.0 623A Centrifugal thickener drive motor 90.00 90.00 623B Centrifugal thickener backdrive moto 1 22.00 22.00 1.0 -1.0 623C Centrifugal thickener lubrication pum 1 0.75 0.75 _ 624 16.00 16.00 0.3 Crane (20t) 1 -1.0 22.00 631 2 Mixed sludge mixer 11.00 -1.0 632 Mixed sludge feed pump 11.00 11.00 1 1 110.00 1.0 633A Centrifugal thickener drive motor 110.00 37.00 633B Centrifugal thickener backdrive moto 1.0 37.00 1 -1.0 633C Centrifugal thickener lubrication pum 1 0.40 0.40 -1.50 0.3 634A Cake hopper 1.50 1 . 0.3 1.50 1.50 6348 Cake hopper 1 -635 Polymer feeder 1 0.40 0.40 1.0 5.50 1.0 636 Polymer dissolution tank 1 5.50 .

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Issue date

Rev.1

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13-Jan-01

Independence-Freedom-Happiness

ELECTRICAL EQUIPMENT LIST

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 1 Address : Working table-time :

Schedule of electric consumer:

Issue date Rev.1

13-Jan-01

No.	Electrical equipment name	Q'ty	Capa	city	Total	Remarks
	80.00		(HB)	(kW)	(kW)	(Demand Factor
638A	Water supply pump unit	1	-	18.50	18.50	0.6
638B	Water supply pump unit	1	-	18.50	18.50	0.6
639	Air compressor	1		5.50	5.50	0.5
640	Dehumidifier	1		0.25	0.25	0.5
641	Crane (20t)	1		16.00	16.00	0.3
643	Treatment water inflow valve	1	-	0.10	0.10	0.6
651	Recycle flow mixer	1	-	11.00	11.00	1.0
652	Recycle flow pump	1	-	30.00	30.00	0.6
671	Floor drainage pump	3		2.20	6.60	0.6
	COMPOST FACILITY					
721	Mixing machine	2		90.00	180.00	1.0
722	Sucking fan	2	-	5.50	11.00	1.0
723	Mumidifing pump	2	-	1.50	3.00	1.0
742	Deodorization fan	5	-	22.00	110.00	1.0
744	Spray water pump	1	-	2.20	2.20	0.5
745	Floor drainage pump	2	-	2.20	4.40	0.5
	VENTILATION FACILITY					1
801	Air exhaust fan	8	-	0.40	3.20	1.0
802	Air exhaust fan	6	-	0.40	2.40	1.0
803	Air exhaust fan	8	-	0.30	2.40	1.0
804	Air exhaust fan	1	-	0.30	0.30	1.0
805	Air exhaust fan	1	-	0.30	0.30	1.0
806	Air exhaust fan	2	-	15.00	30.00	1.0
807	Air exhaust fan	2	-	7.50	15.00	1.0
808	Air exhaust fan	2	-	2.20	4.40	1.0
809	Air exhaust fan	3	-	0.40	1.20	1.0
810	Air exhaust fan	2	-	0.75	1.50	1.0
811	Air exhaust fan	1	-	7.50	7.50	1.0
812	Air exhaust fan	3	-	0.75	2.25	1.0
813	Air exhaust fan	1	-	0.25	0.25	1.0
814	Air exhaust fan	1	-	7.50	7.50	1.0
815	Air exhaust fan	1	-	2.20	2.20	1.0
816	Air exhaust fan	2	-	0.60	1.20	1.0

Sheet: 3 of 4

Independence-Freedom-Happiness

Sheet: 4 of 4

13-Jan-01

ELECTRICAL EQUIPMENT LIST

Issue date

Rev.1

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 1 Address :

Working table-time

Schedule of electric consumer:

No. Electrical equipment name Q'ty Capacity Total Remarks (HB) (kW) (kW) (Demand Factor) 817 Air exhaust fan 1 -0.30 0.30 1.0 818 Air exhaust fan 1 3.70 3.70 -1.0 819 Air exhaust fan 1 -0.30 0.30 1.0 820 Air exhaust fan 3 0.30 0.90 1.0 -901 Miscellaneous 1 -20.00 20.00 0.6 902 Lighting 1 70.00 70.00 0.9 -903 Ventilation 1 82.00 82.00 1.0 -904 Air conditioning unit 1 30.00 30.00 1.0 _ TOTAL 2,301.25 0.8

Independence-Freedom-Happiness

Sheet: 1 of 3

ELECTRICAL EQUIPMENT LIST

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 2 Address : Working table-time : Schedule of electric consumer: Issue date Rev.1 13-Jan-01

No.	Electrical equipment name	Q'ty	Capa	city	Total	Remarks
			(HB)	(kW)	(kW)	(Demand Factor
	LIFT PUMP EQUIPMENT					
122	Lift pump (2)	3	-	460.00	1,380.00	0.6
	BLOWER EQUIPMENT					
212	Blower (1)	2	-	810.00	1,620.00	1.0
212A	Aux. Equipment for Blower (1)	2	-	6.00	12.00	1.0
214	Discharge valve (1)	2	-	0.75	1.50	0.6
215	Air filter	2	-	3.70	7.40	0.6
216	Floor drainage pump	3	-	2.20	6.60	0.6
	WATER TREATMENT FACILITY					
	(Primary sedimentation tank)					
312	Sludge scraper	30	-	1.50	45.00	1.0
314	Scum pump	3	-	5.50	16.50	0.6
315	Raw sludge pump	6	-	5.50	33.00	0.6
316	Raw sludge valve	30	-	0.20	6.00	0.6
317	Comminuter	1	-	0.75	0.75	1.0
	(Aeration tank)					
324	Air flow control valve	30	-	0.40	12.00	0.6
	(Final sedimentation tank)					
332	Sludge scraper	30		2.20	66.00	1.0
334	Scum pump	3		5.50	16.50	0.6
335	Return sludge pump (25%)	12	-	11.00	132.00	1.0
337	Return sludge valve	30	-	0.40	12.00	0.6
338	Excess sludge pump	6	-	11.00	66.00	0.6
339	Excess sludge valve	30	-	0.20	6.00	0.6
340	Comminuter	1	-	3.70	3.70	1.0
351	Floor drainage pump	30	-	2.20	66.00	0.6
	DISINFECTION FACILITY					
414	Sodium hypochlorite pump	6	-	0.40	2.40	1.0
	WATER SUPPLY FACILITY					
512	Treated water supply pump (1)	3	-	30.00	90.00	1.0
513	Treated water strainer (1)	1	-	0.40	0.40	0.6
516	Treated water strainer (1)	2		22.00	44.00	0.8
524	Fitered water supply pump	1	-	11.00	11.00	0.6
264	ritered mater suppry partip					

Independence-Freedom-Happiness

ELECTRICAL EQUIPMENT LIST

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 2 Address : Working table-time : Schedule of electric consumer:

Issue date Rev.1 13-Jan-01

No.	Electrical equipment name	Q'ty	Capacity		Total	Remarks
			(HB)	(kW)	(kW)	(Demand Factor
	SLUDGE TREATMENT FACILITY					
611	Gravity thickener	3	-	1.50	4.50	1.0
613	Thickened sludge pump	3	-	5.50	16.50	0.6
614	Thickened sffiuent pump	3	-	5.50	16.50	0.6
615	Floor drainage pump	3	-	2.20	6.60	0.6
621	Excess sludge mixer	1	-	11.00	11.00	1.0
622	Excess sludge feed pump	3	-	30.00	90.00	1.0
623A	Centrifugal thickener drive motor	3	-	90.00	270.00	1.0
623B	Centrifugal thickener backdrive moto	3	-	22.00	66.00	1.0
623C	Centrifugal thickener lubrication pum	3		0.75	2.25	1.0
631	Mixed sludge mixer	6	-	11.00	66.00	1.0
632	Mixed sludge feed pump	3	-	11.00	33.00	1.0
633A	Centrifugal thickener drive motor	3	-	110.00	330.00	1.0
633B	Centrifugal thickener backdrive moto	3	-	37.00	111.00	1.0 .
633C	Centrifugal thickener lubrication pum	3	-	0.40	1.20	. 1.0
634A	Cake hopper	3	-	1.50	4.50	0.3
634B	Cake hopper	3	-	1.50	4.50	0.3
635	Polymer feeder	3	-	0.40	1.20	1.0
636	Polymer dissolution tank	3	-	5.50	16.50	1.0
637	Polymer feed pump	3	-	3.70	11.10	1.0
638A	Water suooly pump unit	1	-	18.50	18.50	0.6
638B	Water sucoly pump unit	1	-	18.50	18.50	0.6
639	Air compressor	1	-	5.50	5.50	0.5
640	Dehumidifier	1		0.25	0.25	0.5
651	Recycle flow mixer	1	-	11.00	11.00	1.0
652	Recycle flow pump	1	-	30.00	30.00	0.6
662	Deodorization fan	1	-	7.50	7.50	1.0
671	Floor drainage pump	2	-	2.20	4.40	0.6
	COMPOST FACILITY					
721	Mixing machine	6		90.00	540.00	1.0
722	Sucking fan	6	-	5.50	33.00	1.0
723	Humidifing pump	6		1.50	9.00	0.5
742	Deodorization fan	15	-	22.00	330.00	1.0
744	Spray water fan	3		2.20	6.60	0.5
745	Floor drainage pump	6	-	2.20	13.20	0.5
	aromogo pomp			6.60	10.20	0.0

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Independence-Freedom-Happiness

ELECTRICAL EQUIPMENT LIST

Name of electric consumer : Wastewater Treatment Plant (WWTP) - Phase 2 Address ; Working table-time :

Schedule of electric consumer:

Issue date Rev.1 13-Jan-01

No.	Electrical equipment name	Q'ty	Capa	city	Total	Remarks
			(HB)	(kW)	(kW)	(Demand Factor
	VENTILATION FACILITY					
801	Air exhaust fan	8	-	0.40	3.20	1.0
802	Air exhaust fan	18	-	0.40	7.20	1.0
803	Air exhaust fan	24	-	0.30	7.20	1.0
804	Air exhaust fan	3	-	0.30	0.90	1.0
805	Air exhaust fan	3	-	0.30	0.90	1.0
806	Air exhaust fan	6	-	15.00	90.00	1.0
807	Air exhaust fan	6	-	7.50	45.00	1.0
812	Air exhaust fan	3	-	0.75	2.25	1.0
814	Air exhaust fan	1	-	7.50	7.50	1.0
818	Air exhaust fan	1	-	3.70	3.70	1.0
820	Air exhaust fan	1	-	0.30	0.30	1.0
901	Miscellaneous	1	-	10.00	10.00	0.6 -
902	Lighting	1		20.00	20.00	0.9
903	Ventilation	1	-	10.00	10.00	1.0
904	Air conditioning unit	1	-	10.00	10.00	1.0
						1
	TOTAL				5,964.70	0.8

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