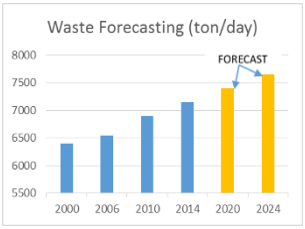
A. Project Definition

This MPMP proposes an establishment of an ITF (Integrated Treatment Facilities) in Cilincing, North Jakarta to manage the MSW (Municipal Solid Waste) in Jakarta by the second quarter of 2019.ITF is a facility to apply the 3R (Reduce, Reuse, Recycle) principle in order to minimize negative environmental impacts, such as leachate liquid and methane (greenhouse gas) from landfill. Beside of that, this new ITF will help Jakarta government overcome difficulties with Bantargebang ITF nearby citizen and manage Jakarta's MSW which is predicted to increase every year. This achieved by establishing the ITF based on the 3Rs (Reduce, Reuse, Recycle) principle.

B. Background

Nowadays, the life of people surrounding Bantargebang, Bekasi, is suffering. Bantargebang is known as one of the largest ITF in Indonesia. Historically, many landfills around the world have failed and caused human surrounding it to suffer due to the leachate and methane (greenhouse gas) produced by landfills. Greenhouse gas has been known as the cause of global warming while leachate is a hazardous liquid that contaminates soil water and pipes surrounding it. Once a landfill is built, maintenance and repair is impossible which causes leachate easily spread.



The main source of waste in Bantargebang is sent from Jakarta and is predicted to increase every year (Kompas.com, 2014). In a day, Jakarta delivers around 6500 tons to Bantargebang although around 7200 tons is generated (Kompas.com, 2016).

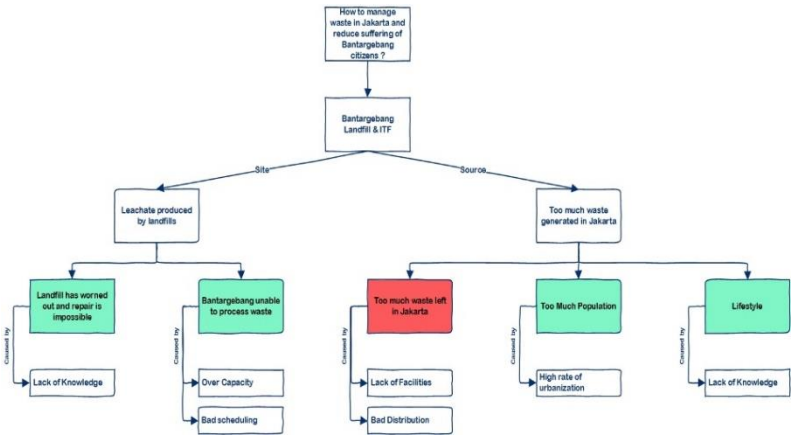
These situations is analyzed in an SCQ (Situation-Condition-Question Framework) which is continued with an issue tree analysis. This results in 5 main issues which are as landfill condition, ITF capability, waste treatment in Jakarta, population and lifestyle.

By considering the sustainability development (economic, social, and environmental) impact of each issue, waste treatment in Jakarta

Situation	Complication	Question
• Landfills produces leachate, a hazardous liquid and methane, a greenhouse gas • Once a landfill is built, maintenance is not possible • Leachate will contaminate soil and water once a landfill is worn out • Bantargebang is one of the largest landfill in Indonesia with around 80 Ha used for waste landfill and treatment facilities • The waste in Bantargebang landfill reaches 25 meters high • Bantargebang produces fertilizer from organic waste and energy by utilizing methane • The citizen near Bantargebang is suffering due to water contamination near the site • Bantagebang accepts around 6500 tons of solid waste from Jakarta everyday • Jakarta generates around 7000 tons of waste/day • The waste generated in Jakarta has an increasing trend every 5 years	1. Bantargebang has caused near citizen suffer due to the landfill's hazard 2. The biggest source of waste in Bantargebang is from Jakarta 3. In average, there is 600 tons of waste remains in Jakarta	1. How to manage waste in Jakarta and reduce suffering of Bantagebang citizens ?

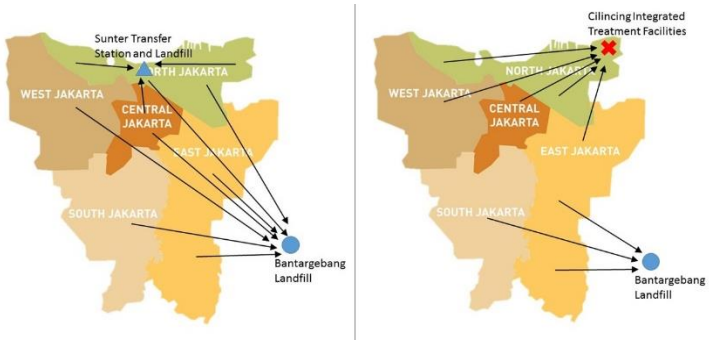
SCQ - Framework

is place as first priority to overcome. The landfill in Bantagebang is unrepairable, improving Bantargebang ITF capacity needs landfill relocation and it is not feasible, population in Jakarta follows an increasing trend every year, lifestyle change will not give significant impact, while scheduling in Bantargebang will be affected by the waste treatment in Jakarta.



Issue Tree

Better waste treatment in Jakarta means that better methods are needed. One of the better methods for Jakarta is by establishing a new ITF. In accordance with the Jakarta Development Plan for 2030 (see Appendix A), one possible place for ITF establishment is in Cilincing, North Jakarta.



Initial (Left) and Expected (Right) Distribution Map of Waste

With a new ITF in Cilincing, hopefully Jakarta can be cleaner and diminish the social burden of Jakarta in Bantargebang. Beside of that, the distribution cost may reduce, support farmers with cheaper fertilizer produced by the ITF, society can maximize reuse of recyclables, etc.

C. Project Objective

The main objective of this project is to minimize waste in DKI Jakarta, distribution cost of waste, environmental impact of landfills, and prosper the society of DKI Jakarta and Bekasi with the establishment of ITF in Cilincing. This ITF is planned to be finished on April 15th, 2019 with the support of the DKI Jakarta Government. The success of this project will be measured by reduced waste left in DKI Jakarta with lower distribution cost and processing cost than the initial condition and also reduce of landfills usage for DKI Jakarta especially in Bantargebang landfill. The project

will begin on August 2nd, 2016 with the whole process estimated to finish around 3 years and cost around 2.9 trillion Rupiahs.

D. Scope Statement

The project scope description of this project will be operating facility for Integrated Municipal Solid Waste Treatment with area of 16 Ha. The MSW processed by the company varies and also will end up various product which includes organic waste treated to be fertilizer; combustibles into energy source; recyclable will be bailed up to be sold and reused by demanding stakeholders; and other waste will be distributed to other ITFs.

E. Acceptance Criteria

The acceptance criteria before the project deliverables can be handled are as follows:

- DKI Jakarta Government must start a 3R campaign and also minimize landfills campaign to the society
- The waste from household are be presorted and kept in original state of waste
- Waste distribution schedule in DKI Jakarta has been established

F. Deliverables

Listed below are the major deliverables of this project.

1. Construction Planning
2. Construction
3. Legal and Regulatory
4. Testing
5. Reporting and Documentation

G. Project Exclusion

The exclusions of this project are as follows:

- Post facility establishment human resource procurement
- Post facility establishment maintenance and development plan

H. Constraints

Listed below are the constraints of this project is based on 6 constraints category which includes schedule, quality, budget, resources, risk, and scope.

Schedule Constraints

- Standard working time is 8 hours a day from 08:00 up to 12:00 and 13:00 up to 17:00
- Work will be done 5 days a week from Monday to Friday while Saturday and Sunday are nonworking days
- The project must finish before April 15th, 2019

Quality Constraints

- During project all activities must follow the national HSE (Health, Safety, and Environmental) regulations
- The ITF must fulfill ISO 14001 about Environmental Management
- All of the ITF components must fulfill SNI (Indonesia National Standard)

Budget Constraints

- Maximum budget usage is IDR 3,000,000,000,000.-

Resources Constraint

- Construction phase is done by 3rd party which makes the construction resources included in the corresponding work agreement/pack
- All of the resource are always available during the project

Risk Constraint

- The exchange rate for US$ 1 is initially set to be IDR 14,000.- , but with probability 0.2 to fluctuate

Scope Constraints

- The land allocation is 25 ha and at most 16 ha for building
- 8 ha land left is allocated for greenery and further development
- 16 ha of ITF is able to process 10000 tons of MSW/day

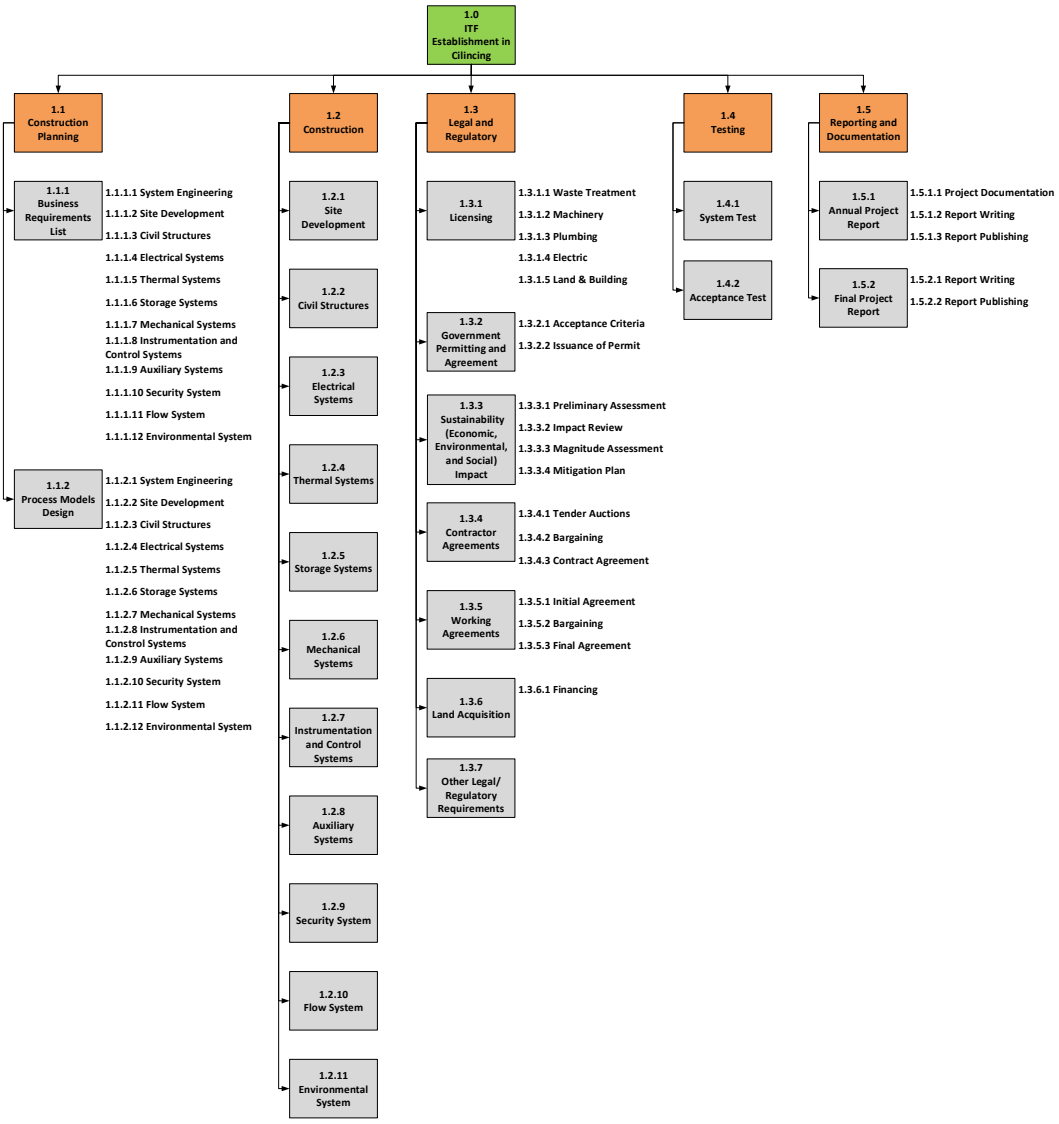
I. Assumptions

The assumptions in this project are as follows:

- The budgeting of this project is given by the Government of DKI Jakarta, Sanitary Department of DKI Jakarta, and other investors
- Feasibility study indicates that the project is feasible.
- Governance change will not affect the project plan

J. Work Breakdown Structure

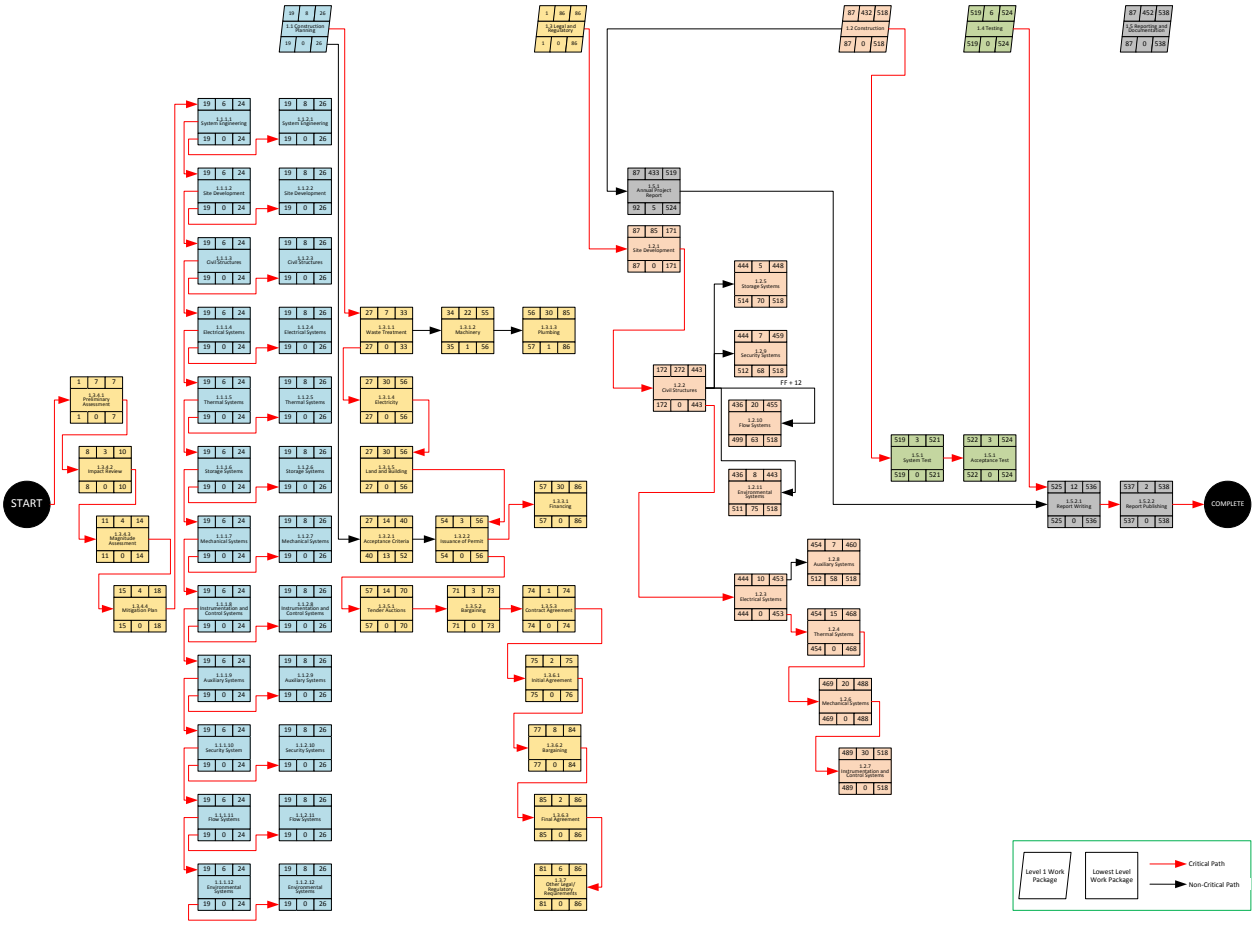
Below is the Work Breakdown Structure (WBS) of ITF Establishment in Cilincing. This WBS is built based on the decomposition of deliverables.



Work Breakdown Structure of ITF Establishment in Cilincing

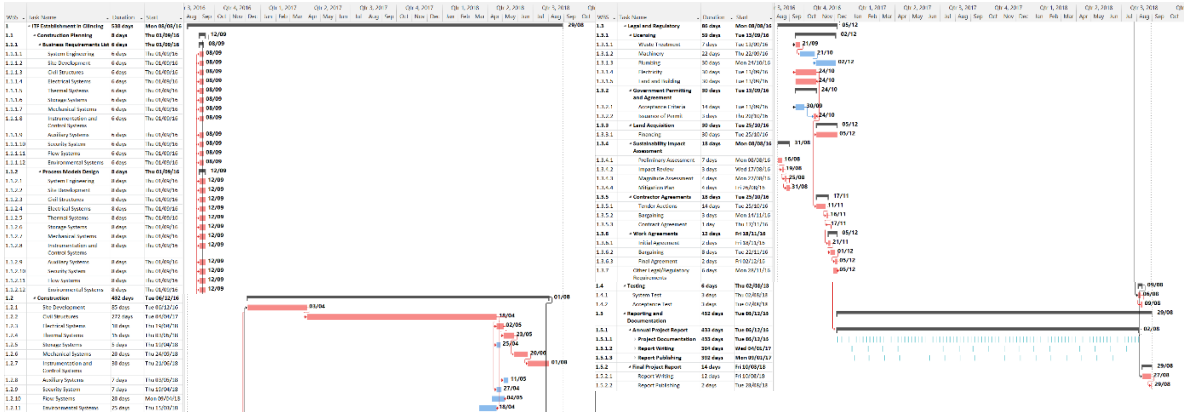
K. Project Time

This project is planned to start on August 2nd, 2016 with duration 537 days to finish on August 28th, 2018 before adding contingency reserve. This is obtained by analyzing the project deliverables dependencies and duration by drawing the precedence diagram of this project. The precedence diagram is available in the figure below.



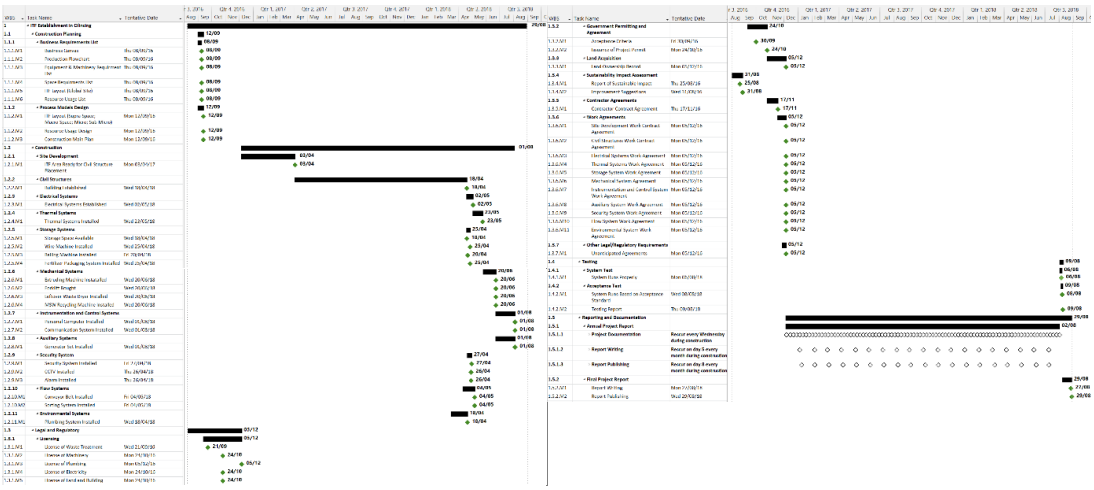
ITF Establishment in Cilincing Precedence Diagram

The image below presents the bar chart for the activities schedule of this project. This schedule is developed based on the precedence diagram above.



Project Activities Schedule Bar Chart (Larger Image in Appendix B)

Each activity in a project must always end up with specific signs. In order to present specific signs of each activities, a list of milestones is developed. Below is the list of milestones along with each milestone's tentative date.



Project Milestones List and Chart (Larger Image in Appendix C)

L. Master Budget

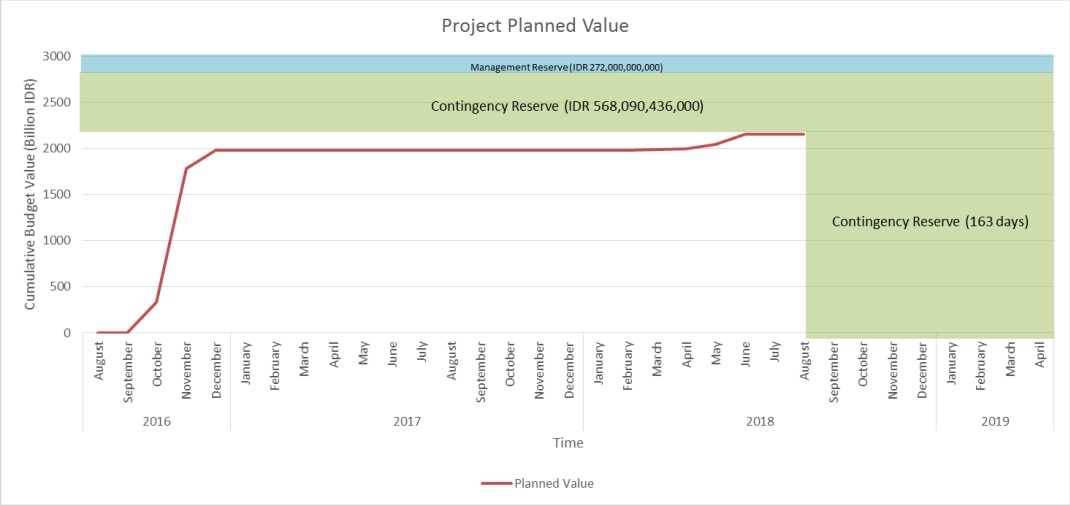
Listed below is the Project Budget Base (PBB) of this project.

WBS	Task Name	Cost	Duration	Start	Finish	Project Expenses (Million IDR)																	
Project Budget Base		2,992,000,000,000							2016											2017			
Managemene Reserve		272,000,000,000				Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Performance Measurement Baseline (PMB)		2,720,000,000,000	701																			
1	**ITF Establishment in Cilincing**	**2,151,909,564,000**	**538**	**Mon 08/08/16**	**Wed 29/08/18**	133.18	169.76	330,054.47	1,450,309.60	198,002.04	260.67	236.98	272.52	244.48	272.50	260.69	248.82	272.52	248.82	260.67	260.69	248.82
1.1	**Construction Planning**	**26,809,999**	**8**	**Thu 01/09/16**	**Mon 12/09/16**	-	26.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2	**Construction**	**169,737,816,687**	**432**	**Tue 06/12/16**	**Wed 01/08/18**	-	-	-	-	75.73	78.99	71.81	82.59	79.31	82.59	78.99	75.40	82.59	75.40	78.99	78.99	75.40
1.2.1	Site Development	227,723,996	85	Tue 06/12/16	Mon 03/04/17	-	-	-	-	56.73	56.99	51.81	59.60	2.59	-	-	-	-	-	-	-	-
1.2.2	Civil Structures	712,207,986	272	Tue 04/04/17	Wed 18/04/18	-	-	-	-	-	-	-	-	56.73	59.60	56.99	54.40	59.60	54.40	56.99	56.99	54.40
1.2.3	Electrical Systems	28,489,999	10	Thu 19/04/18	Wed 02/05/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.4	Thermal Systems	202,243,996	15	Thu 03/05/18	Wed 23/05/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.5	Storage Systems	1,876,643,963	5	Thu 19/04/18	Wed 25/04/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.6	Mechanical Systems	156,202,672,951	20	Thu 24/05/18	Wed 20/06/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.7	Instrumentation and Control Systems	159,697,997	30	Thu 21/06/18	Wed 01/08/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.8	Auxiliary Systems	893,409,983	7	Thu 03/05/18	Fri 11/05/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.9	Security System	51,449,999	7	Thu 19/04/18	Fri 27/04/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.10	Flow Systems	7,657,817,851	20	Mon 09/04/18	Fri 04/05/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.2.11	Environmental Systems	692,761,986	25	Thu 15/03/18	Wed 18/04/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.3	**Legal and Regulatory**	**1,977,850,857,397**	**86**	**Mon 08/08/16**	**Mon 05/12/16**	16.21	-	329,918.02	1,450,166.63	197,750.00	-	-	-	-	-	-	-	-	-	-	-	-
1.3.1	**Licensing**	-	**59**	**Tue 13/09/16**	**Fri 02/12/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.3.2	**Government Permitting and Agreement**	-	**30**	**Tue 13/09/16**	**Mon 24/10/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.3.3	**Land Acquisition**	**1,977,834,645,398**	**30**	**Tue 25/10/16**	**Mon 05/12/16**	-	-	329,918.02	1,450,166.63	197,750.00	-	-	-	-	-	-	-	-	-	-	-	-
1.3.4	**Sustainability Impact Assessment**	**16,212,000**	**18**	**Mon 08/08/16**	**Wed 31/08/16**	16.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.3.5	**Contractor Agreements**	-	**18**	**Tue 25/10/16**	**Thu 17/11/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.3.6	**Work Agreements**	-	**12**	**Fri 18/11/16**	**Mon 05/12/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.3.7	Other Legal/Regulatory Requirements	-	6	Mon 28/11/16	Mon 05/12/16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.4	**Testing**	**2,100,000**	**6**	**Thu 02/08/18**	**Thu 09/08/18**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.5	**Reporting and Documentation**	**795,983,984**	**452**	**Tue 06/12/16**	**Wed 29/08/18**	-	-	-	-	33.36	38.71	35.21	40.49	35.21	40.46	38.74	36.96	40.49	36.96	38.71	38.74	36.96
1.5.1	**Annual Project Report**	**4,298,000**	**433**	**Tue 06/12/16**	**Thu 02/08/18**	-	-	-	-	0.21	0.21	0.21	0.24	0.21	0.21	0.24	0.21	0.24	0.21	0.21	0.24	0.21
1.5.1.1	**Project Documentation**	**2,436,000**	**433**	**Tue 06/12/16**	**Thu 02/08/18**	-	-	-	-	0.21	0.11	0.11	0.14	0.11	0.11	0.14	0.11	0.14	0.11	0.11	0.14	0.11
1.5.1.2	**Report Writing**	**532,000**	**394**	**Wed 04/01/17**	**Mon 09/07/18**	-	-	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
1.5.1.3	**Report Publishing**	**1,330,000**	**392**	**Mon 09/01/17**	**Tue 10/07/18**	-	-	-	-	-	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1.5.2	**Final Project Report**	**686,000**	**14**	**Fri 10/08/18**	**Wed 29/08/18**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.5.2.1	Report Writing	406,000	12	Fri 10/08/18	Mon 27/08/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.5.2.2	Report Publishing	280,000	2	Tue 28/08/18	Wed 29/08/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Contingency Reserve	**568,090,436,000**	**163**	**Thu 30/08/18**	**Mon 15/04/19**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

WBS	Task Name	Cost	Duration	Start	Finish	Project Expenses (Million IDR)																
						2018												2019				
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1	**ITF Establishment in Cilincing**	**2,151,909,564,000**	**538**	**Mon 08/08/16**	**Wed 29/08/18**	272.50	236.98	597.37	8,669.47	49,726.84	109,552.27	314.02	782.88	-	-	-	-	-	-	-	-	
1.1	**Construction Planning**	**26,809,999**	**8**	**Thu 01/09/16**	**Mon 12/09/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.2	**Construction**	**169,737,816,687**	**432**	**Tue 06/12/16**	**Wed 01/08/18**	82.59	71.81	415.67	8,496.04	49,536.89	109,378.85	132.36	606.86	-	-	-	-	-	-	-	-	
1.2.1	Site Development	227,723,996	85	Tue 06/12/16	Mon 03/04/17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.2.2	Civil Structures	712,207,986	272	Tue 04/04/17	Wed 18/04/18	59.60	51.81	56.99	33.68	-	-	-	-	-	-	-	-	-	-	-	-	
1.2.3	Electrical Systems	28,489,999	10	Thu 19/04/18	Wed 02/05/18	-	-	-	24.79	3.70	-	-	-	-	-	-	-	-	-	-	-	
1.2.4	Thermal Systems	202,243,996	15	Thu 03/05/18	Wed 23/05/18	-	-	-	-	202.24	-	-	-	-	-	-	-	-	-	-	-	
1.2.5	Storage Systems	1,876,643,963	5	Thu 19/04/18	Wed 25/04/18	-	-	-	1,876.64	-	-	-	-	-	-	-	-	-	-	-	-	
1.2.6	Mechanical Systems	156,202,672,951	20	Thu 24/05/18	Wed 20/06/18	-	-	-	-	46,889.14	109,313.54	-	-	-	-	-	-	-	-	-	-	
1.2.7	Instrumentation and Control Systems	159,697,997	30	Thu 21/06/18	Wed 01/08/18	-	-	-	-	-	44.32	110.36	5.01	-	-	-	-	-	-	-	-	
1.2.8	Auxiliary Systems	893,409,983	7	Thu 03/05/18	Fri 11/05/18	-	-	-	-	893.41	-	-	-	-	-	-	-	-	-	-	-	
1.2.9	Security System	51,449,999	7	Thu 19/04/18	Fri 27/04/18	-	-	-	51.45	-	-	-	-	-	-	-	-	-	-	-	-	
1.2.10	Flow Systems	7,657,817,851	20	Mon 09/04/18	Fri 04/05/18	-	-	-	6,132.42	1,525.40	-	-	-	-	-	-	-	-	-	-	-	
1.2.11	Environmental Systems	692,761,986	25	Thu 15/03/18	Wed 18/04/18	-	-	336.69	356.08	-	-	-	-	-	-	-	-	-	-	-	-	
1.3	**Legal and Regulatory**	**1,977,850,857,397**	**86**	**Mon 08/08/16**	**Mon 05/12/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.1	**Licensing**	-	**59**	**Tue 13/09/16**	**Fri 02/12/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.2	**Government Permitting and Agreement**	-	**30**	**Tue 13/09/16**	**Mon 24/10/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.3	**Land Acquisition**	**1,977,834,645,398**	**30**	**Tue 25/10/16**	**Mon 05/12/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.4	**Sustainability Impact Assessment**	**16,212,000**	**18**	**Mon 08/08/16**	**Wed 31/08/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.5	**Contractor Agreements**	-	**18**	**Tue 25/10/16**	**Thu 17/11/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.6	**Work Agreements**	-	**12**	**Fri 18/11/16**	**Mon 05/12/16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.3.7	Other Legal/Regulatory Requirements	-	6	Mon 28/11/16	Mon 05/12/16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.4	**Testing**	**2,100,000**	**6**	**Thu 02/08/18**	**Thu 09/08/18**	-	-	-	-	-	-	-	2.10	-	-	-	-	-	-	-	-	
1.5	**Reporting and Documentation**	**795,983,984**	**452**	**Tue 06/12/16**	**Wed 29/08/18**	40.46	35.21	38.74	36.96	40.49	36.96	38.71	37.46	-	-	-	-	-	-	-	-	
1.5.1	**Annual Project Report**	**4,298,000**	**433**	**Tue 06/12/16**	**Thu 02/08/18**	0.21	0.21	0.24	0.21	0.24	0.21	0.21	0.03	-	-	-	-	-	-	-	-	
1.5.1.1	**Project Documentation**	**2,436,000**	**433**	**Tue 06/12/16**	**Thu 02/08/18**	0.11	0.11	0.14	0.11	0.14	0.11	0.11	0.03	-	-	-	-	-	-	-	-	
1.5.1.2	**Report Writing**	**532,000**	**394**	**Wed 04/01/17**	**Mon 09/07/18**	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	
1.5.1.3	**Report Publishing**	**1,330,000**	**392**	**Mon 09/01/17**	**Tue 10/07/18**	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-	-	-	-	-	-	-	-	-	
1.5.2	**Final Project Report**	**686,000**	**14**	**Fri 10/08/18**	**Wed 29/08/18**	-	-	-	-	-	-	-	0.69	-	-	-	-	-	-	-	-	
1.5.2.1	Report Writing	406,000	12	Fri 10/08/18	Mon 27/08/18	-	-	-	-	-	-	-	0.41	-	-	-	-	-	-	-	-	
1.5.2.2	Report Publishing	280,000	2	Tue 28/08/18	Wed 29/08/18	-	-	-	-	-	-	-	0.28	-	-	-	-	-	-	-	-	
	Contingency Reserve	**568,090,436,000**	**163**	**Thu 30/08/18**	**Mon 15/04/19**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	568,090

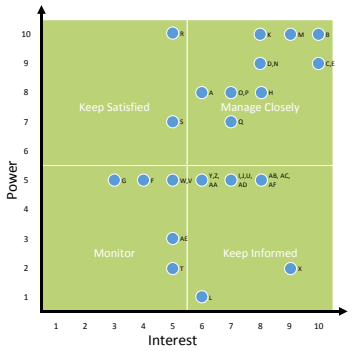
The PBB above is made based on several budget list which are activity, usage, and undistributed cost of this project (available in Appendix D). The PBB for this project is IDR

2,992,000,000,000. Below is the planned value chart of the project obtained from project time and budget.



M. Stakeholder Analysis

Below is the stakeholder analysis for selected stakeholders. The full list is available in Appendix E. From the stakeholders analysis a stakeholder matrix is developed (available on the image in the right).



ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
B	DKI Jakarta Government	Main authority owner	**Very High (10)** 1. Have a right to change project plan 2. Responsible for agreement	**Very High (10)** 1. Project Plan 2. Project Progress and Report 3. Cleaner Jakarta 4. Project Objectives	**Whole Project Phase** Will be engage at the beginning of the project due to the importance of waste management, regulatory, and also given annual reports until project finish.	**Interactive Communication** Media: Meetings, video conference, e-mail, cloud storage, fax annual report
L	Citizen of DKI Jakarta	Society who lives in DKI Jakarta and mainly generates waste	**Very Low (1)** 1. Affect Political Decisions	**Moderate (6)** 1. Cleaner Jakarta 2. Project Progress and Report	**Whole Project Phase** Will be engage at the beginning until	**Push Communication** Media: Television, radio, newspaper,

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					the end of the project due to the project information transparency.	websites, annual reports
M	Main Contractors	Person responsible for the whole construction site activity	**Very High (10)** 1. Responsible for the whole construction phase	**Very High (9)** 1. Project Plan 2. Project Progress and Report 3. Project Objective	**1. Contractor** Agreements Engage before agreement due to contract negotiation. **2.Construction** Engage when the project begin due to the importance of contribution in construction. **3. Reporting and** Documentation Engage because of information known by contractor.	**Interactive Communication** Media: Meetings, information board, video call, phone call, instant messaging, e-mail, cloud storage, fax, annual report

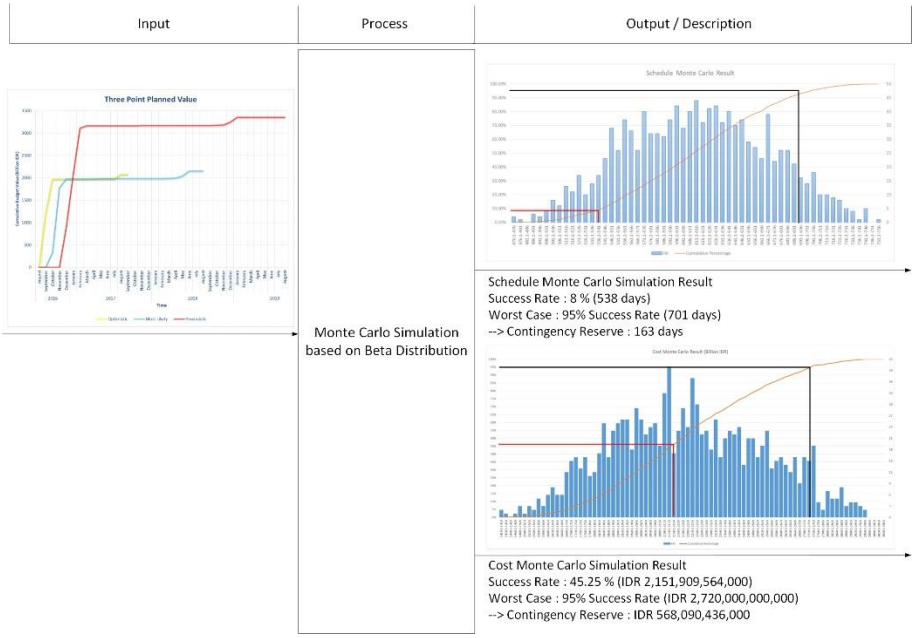
N. Risk Analysis

Risk analysis is developed qualitatively and quantitatively. Below is the list of selected qualitative risk analysis and response plan (Full list and explanation in Appendix F).

Risk Identification				Qualitative Analysis				Response Plan
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	
RG08	Whole Project in General	Stakeholders Conflict	Bad Communication Plan, Information Misunderstanding	0.20	0.20	0.06	Threat	Mitigate, Avoid
RG09		Low on Budget	Bad Project Plan, Bad Project Process, Bad Investors Plan, Unexpected Events, Higher Budget Expenses	0.70	0.30	0.56/High	Threat	Transfer, Mitigate, Avoid
RP01	Planning	Mistake in developing requirements list	Bad Survey Process	0.50	0.80	0.4/High	Threat	Mitigate
RC03	Construction	Work Accident	Bad HSE Implementation	0.50	0.40	0.2/High	Threat	Avoid
RC06		Defect material	Bad Procurement Planning, Bad Supplier, Bad Distribution, Bad Material Handling	0.50	0.80	0.4/High	Threat	Transfer, Mitigate, Avoid
RL 02	Legal & Regulation	Resent Workers (Demonstration)	Unaware of Workers Wants & Needs	0.30	0.40	0.12/Medium	Threat	Avoid
RT01	Testing	System Test Failure	Incompatible Process Design, Bad Construction Process	0.50	0.80	0.4/High	Threat	Accept, Mitigate

From the qualitative risk analysis, a three point estimation schedule and cost is developed (respectively available in Appendix G and Appendix H). The three point estimation is analyzed

further in a Monte Carlo Simulation. The result of Monte Carlo Simulation is available in the figures below.



Based on the Monte Carlo simulation results, with expectation for likelihood of project success 95% the contingency reserve for this project should be 163 days and IDR 568,090,436,000

O. References

Aziza, K. S. (2014, February 8). *Pengelolaan Sampah Merugi, DKI Putus Kontrak dengan Swasta* . Retrieved from Kompas.com: http://megapolitan.kompas.com/read/2014/02/08/1213426/Pengelolaan.Sampah.Merugi.DKI.Putus.Kontrak.dengan.Swasta

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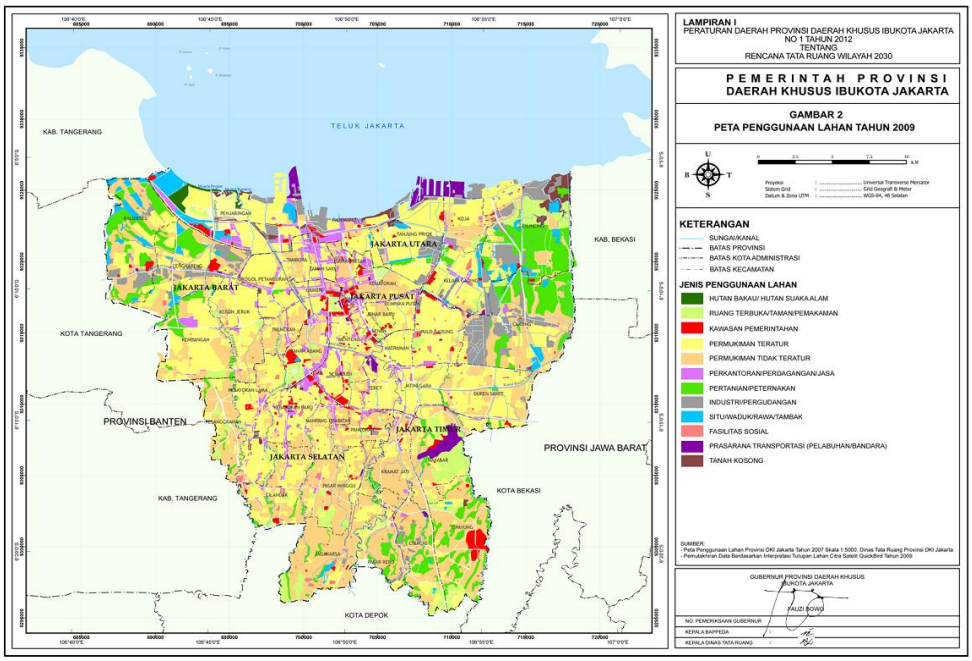
Appendix A. Jakarta Development Plan Map



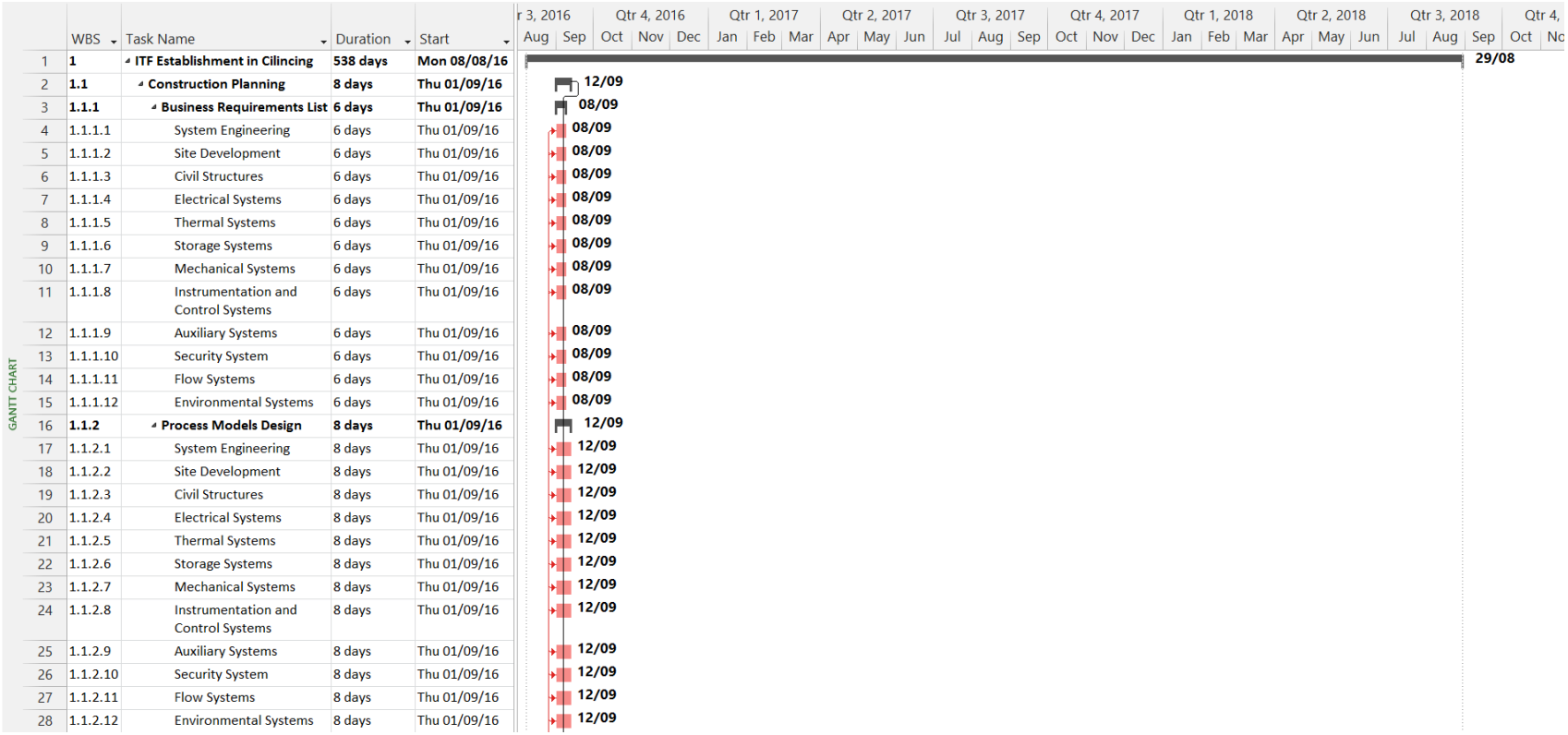
Jakarta Development Map (Retrieved from: Regulation for Daerah Provinsi Daerah Khusus Ibukota Jakarta Number 1 Year 2012 about Layout Plan 2030)

Legend of Jakarta Development Map

Shading	Land Usage	Shading	Land Usage
	Mangrove/ Preserved Forrest		Agriculture/ Livestock
	Cleared Space/ Graveyard		Industry/ Warehousing
	Governmental Area		Lake/ Swamp/ Pond
	Organized Residence		Social Facility
	Unorganized Residence		Transportation Ports (Harbor/Airport)
	Offices/ Service Commerce		Free Space

[Back to Chapter B. Background]

Appendix B. Project Schedule



	WBS	Task Name	Duration	Start
1	**1**	**ITF Establishment in Cilincing**	**538 days**	**Mon 08/08/16**
2	**1.1**	**Construction Planning**	**8 days**	**Thu 01/09/16**
3	**1.1.1**	**Business Requirements List**	**6 days**	**Thu 01/09/16**
4	1.1.1.1	System Engineering	6 days	Thu 01/09/16
5	1.1.1.2	Site Development	6 days	Thu 01/09/16
6	1.1.1.3	Civil Structures	6 days	Thu 01/09/16
7	1.1.1.4	Electrical Systems	6 days	Thu 01/09/16
8	1.1.1.5	Thermal Systems	6 days	Thu 01/09/16
9	1.1.1.6	Storage Systems	6 days	Thu 01/09/16
10	1.1.1.7	Mechanical Systems	6 days	Thu 01/09/16
11	1.1.1.8	Instrumentation and Control Systems	6 days	Thu 01/09/16
12	1.1.1.9	Auxiliary Systems	6 days	Thu 01/09/16
13	1.1.1.10	Security System	6 days	Thu 01/09/16
14	1.1.1.11	Flow Systems	6 days	Thu 01/09/16
15	1.1.1.12	Environmental Systems	6 days	Thu 01/09/16
16	**1.1.2**	**Process Models Design**	**8 days**	**Thu 01/09/16**
17	1.1.2.1	System Engineering	8 days	Thu 01/09/16
18	1.1.2.2	Site Development	8 days	Thu 01/09/16
19	1.1.2.3	Civil Structures	8 days	Thu 01/09/16
20	1.1.2.4	Electrical Systems	8 days	Thu 01/09/16
21	1.1.2.5	Thermal Systems	8 days	Thu 01/09/16
22	1.1.2.6	Storage Systems	8 days	Thu 01/09/16
23	1.1.2.7	Mechanical Systems	8 days	Thu 01/09/16
24	1.1.2.8	Instrumentation and Control Systems	8 days	Thu 01/09/16
25	1.1.2.9	Auxiliary Systems	8 days	Thu 01/09/16
26	1.1.2.10	Security System	8 days	Thu 01/09/16
27	1.1.2.11	Flow Systems	8 days	Thu 01/09/16
28	1.1.2.12	Environmental Systems	8 days	Thu 01/09/16

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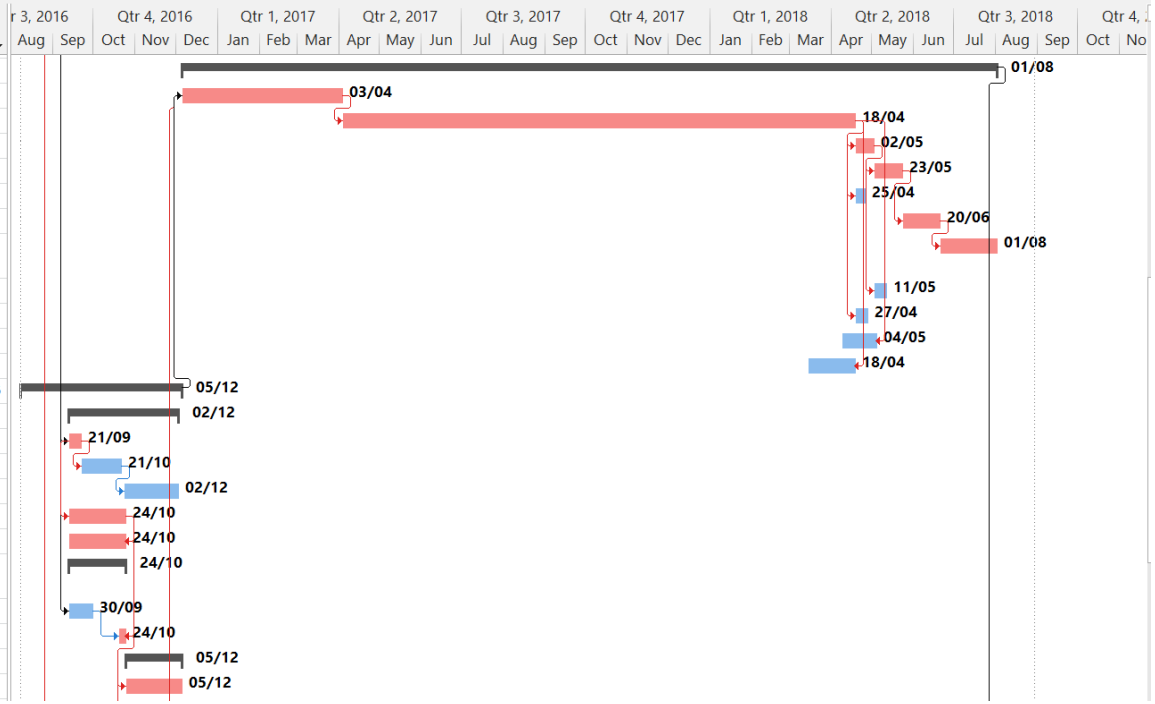
	WBS	Task Name	Duration	Start
29	**1.2**	**Construction**	**432 days**	**Tue 06/12/16**
30	1.2.1	Site Development	85 days	Tue 06/12/16
31	1.2.2	Civil Structures	272 days	Tue 04/04/17
32	1.2.3	Electrical Systems	10 days	Thu 19/04/18
33	1.2.4	Thermal Systems	15 days	Thu 03/05/18
34	1.2.5	Storage Systems	5 days	Thu 19/04/18
35	1.2.6	Mechanical Systems	20 days	Thu 24/05/18
36	1.2.7	Instrumentation and Control Systems	30 days	Thu 21/06/18
37	1.2.8	Auxiliary Systems	7 days	Thu 03/05/18
38	1.2.9	Security System	7 days	Thu 19/04/18
39	1.2.10	Flow Systems	20 days	Mon 09/04/18
40	1.2.11	Environmental Systems	25 days	Thu 15/03/18
41	**1.3**	**Legal and Regulatory**	**86 days**	**Mon 08/08/16**
42	**1.3.1**	**Licensing**	**59 days**	**Tue 13/09/16**
43	1.3.1.1	Waste Treatment	7 days	Tue 13/09/16
44	1.3.1.2	Machinery	22 days	Thu 22/09/16
45	1.3.1.3	Plumbing	30 days	Mon 24/10/16
46	1.3.1.4	Electricity	30 days	Tue 13/09/16
47	1.3.1.5	Land and Building	30 days	Tue 13/09/16
48	**1.3.2**	**Government Permitting and Agreement**	**30 days**	**Tue 13/09/16**
49	1.3.2.1	Acceptance Criteria	14 days	Tue 13/09/16
50	1.3.2.2	Issuance of Permit	3 days	Thu 20/10/16
51	**1.3.3**	**Land Acquisition**	**30 days**	**Tue 25/10/16**
52	1.3.3.1	Financing	30 days	Tue 25/10/16



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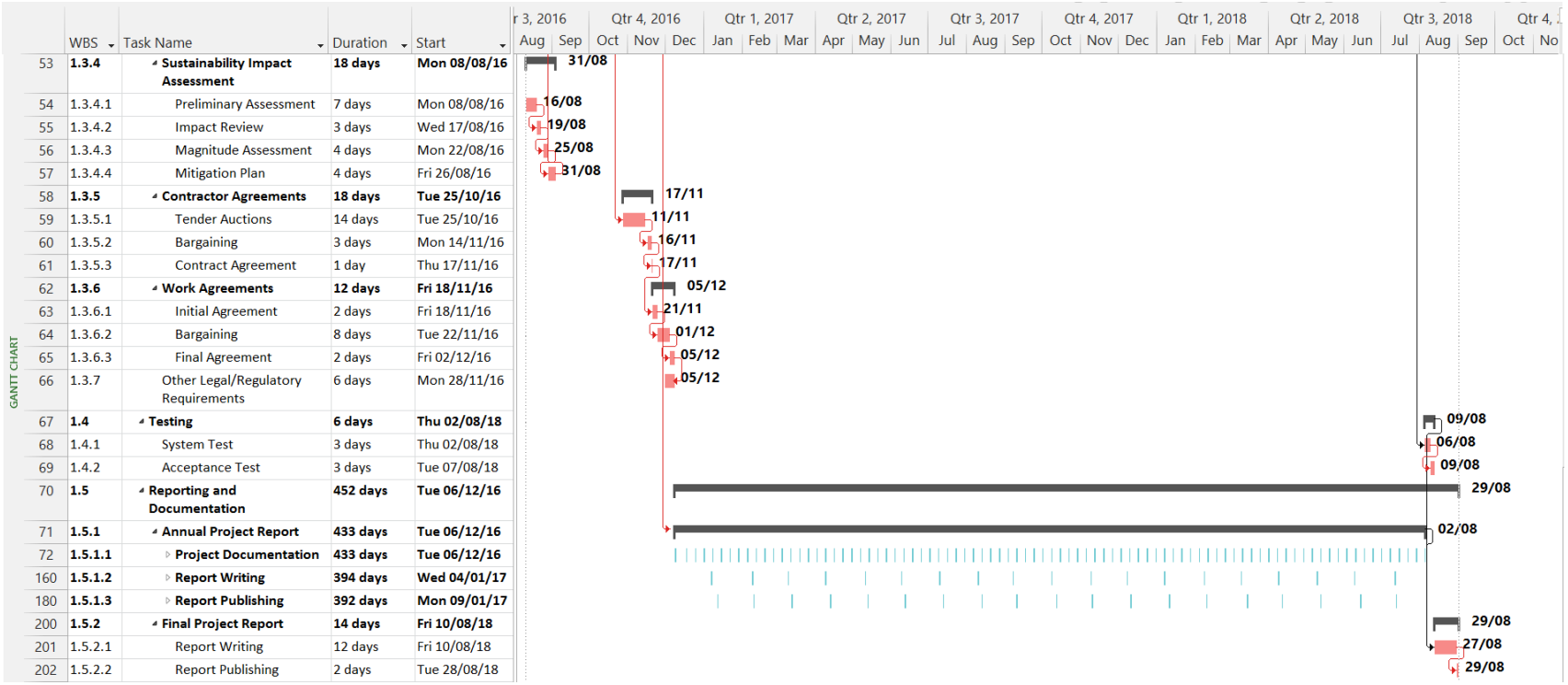

	WBS	Task Name	Duration	Start
53	**1.3.4**	**Sustainability Impact Assessment**	**18 days**	**Mon 08/08/16**
54	1.3.4.1	Preliminary Assessment	7 days	Mon 08/08/16
55	1.3.4.2	Impact Review	3 days	Wed 17/08/16
56	1.3.4.3	Magnitude Assessment	4 days	Mon 22/08/16
57	1.3.4.4	Mitigation Plan	4 days	Fri 26/08/16
58	**1.3.5**	**Contractor Agreements**	**18 days**	**Tue 25/10/16**
59	1.3.5.1	Tender Auctions	14 days	Tue 25/10/16
60	1.3.5.2	Bargaining	3 days	Mon 14/11/16
61	1.3.5.3	Contract Agreement	1 day	Thu 17/11/16
62	**1.3.6**	**Work Agreements**	**12 days**	**Fri 18/11/16**
63	1.3.6.1	Initial Agreement	2 days	Fri 18/11/16
64	1.3.6.2	Bargaining	8 days	Tue 22/11/16
65	1.3.6.3	Final Agreement	2 days	Fri 02/12/16
66	1.3.7	Other Legal/Regulatory Requirements	6 days	Mon 28/11/16
67	**1.4**	**Testing**	**6 days**	**Thu 02/08/18**
68	1.4.1	System Test	3 days	Thu 02/08/18
69	1.4.2	Acceptance Test	3 days	Tue 07/08/18
70	**1.5**	**Reporting and Documentation**	**452 days**	**Tue 06/12/16**
71	**1.5.1**	**Annual Project Report**	**433 days**	**Tue 06/12/16**
72	**1.5.1.1**	**Project Documentation**	**433 days**	**Tue 06/12/16**
160	**1.5.1.2**	**Report Writing**	**394 days**	**Wed 04/01/17**
180	**1.5.1.3**	**Report Publishing**	**392 days**	**Mon 09/01/17**
200	**1.5.2**	**Final Project Report**	**14 days**	**Fri 10/08/18**
201	1.5.2.1	Report Writing	12 days	Fri 10/08/18
202	1.5.2.2	Report Publishing	2 days	Tue 28/08/18

[Back to Chapter K. Project Time](#)

Appendix C. Project Milestone

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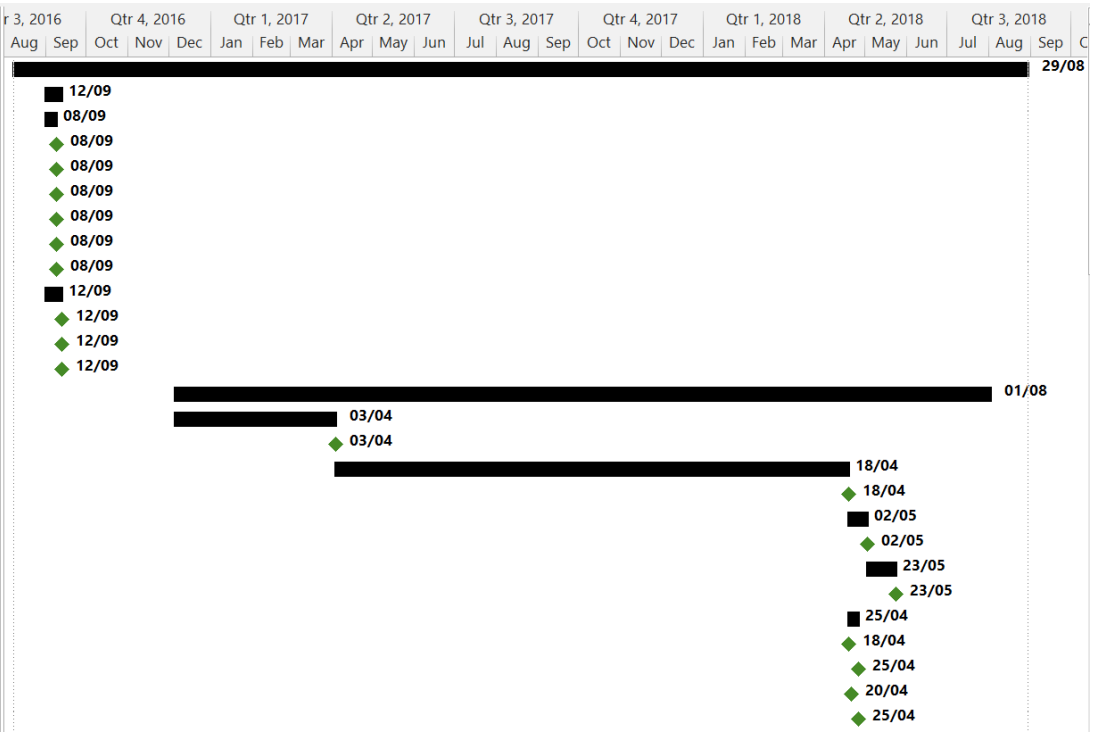
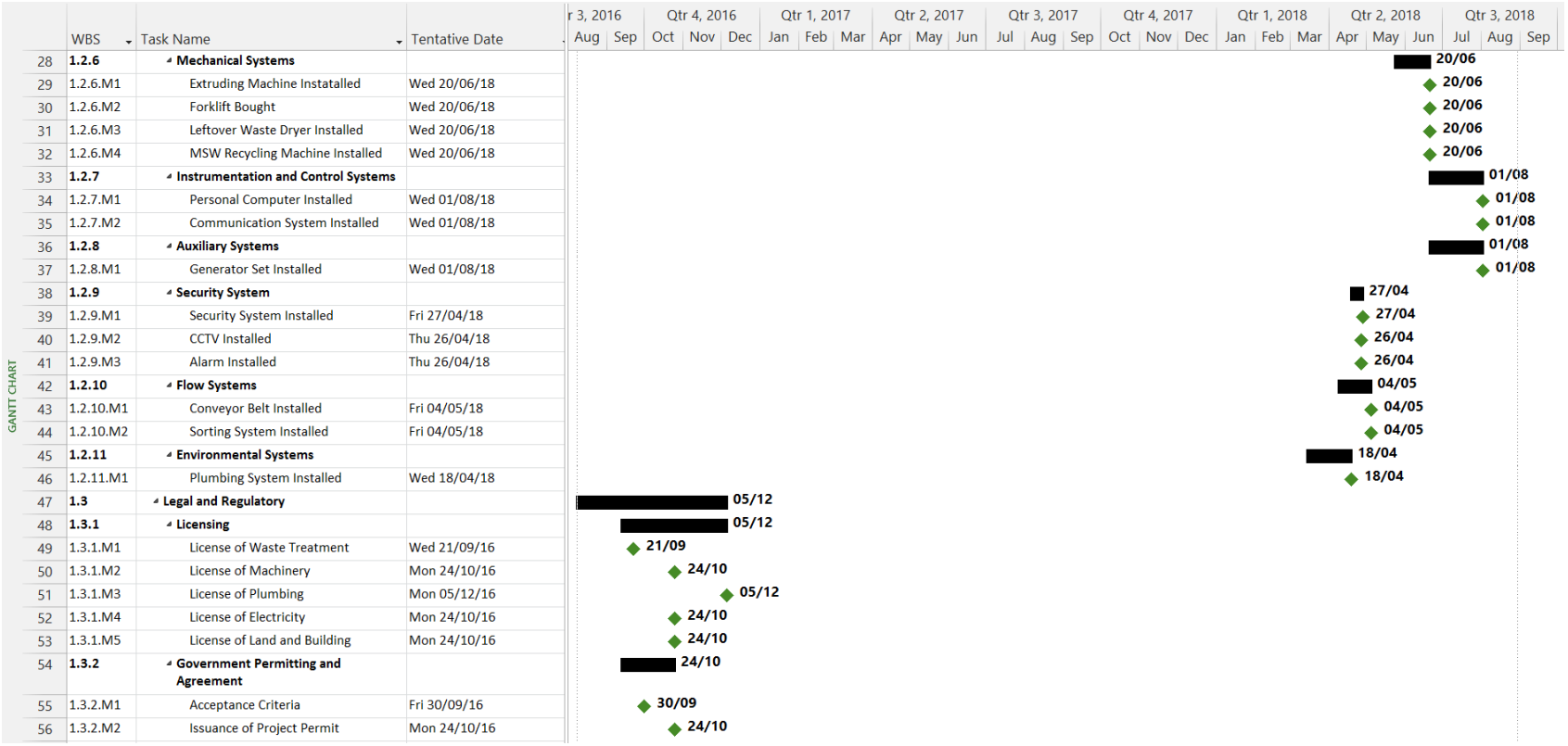
	WBS	Task Name	Tentative Date
1	**1**	**ITF Establishment in Cilincing**	
2	**1.1**	**Construction Planning**	
3	**1.1.1**	**Business Requirements List**	
4	1.1.1.M1	Business Canvas	Thu 08/09/16
5	1.1.1.M2	Production Flowchart	Thu 08/09/16
6	1.1.1.M3	Equipment & Machinery Requirment	Thu 08/09/16
7	1.1.1.M4	Space Requirments List	Thu 08/09/16
8	1.1.1.M5	ITF Layout (Global Site)	Thu 08/09/16
9	1.1.1.M6	Resource Usage List	Thu 08/09/16
10	**1.1.2**	**Process Models Design**	
11	1.1.2.M1	ITF Layout (Supra-Space; Macro-Spac	Mon 12/09/16
12	1.1.2.M2	Resource Usage Design	Mon 12/09/16
13	1.1.2.M3	Construction Main Plan	Mon 12/09/16
14	**1.2**	**Construction**	
15	**1.2.1**	**Site Development**	
16	1.2.1.M1	ITF Area Ready for Civil Structure Plac	Mon 03/04/17
17	**1.2.2**	**Civil Structures**	
18	1.2.2.M1	Building Established	Wed 18/04/18
19	**1.2.3**	**Electrical Systems**	
20	1.2.3.M1	Electrical Systems Established	Wed 02/05/18
21	**1.2.4**	**Thermal Systems**	
22	1.2.4.M1	Thermal Systems Installed	Wed 23/05/18
23	**1.2.5**	**Storage Systems**	
24	1.2.5.M1	Storage Space Available	Wed 18/04/18
25	1.2.5.M2	Wire Machine Installed	Wed 25/04/18
26	1.2.5.M3	Bailing Machine Installed	Fri 20/04/18
27	1.2.5.M4	Fertilizer Packaging System Installed	Wed 25/04/18

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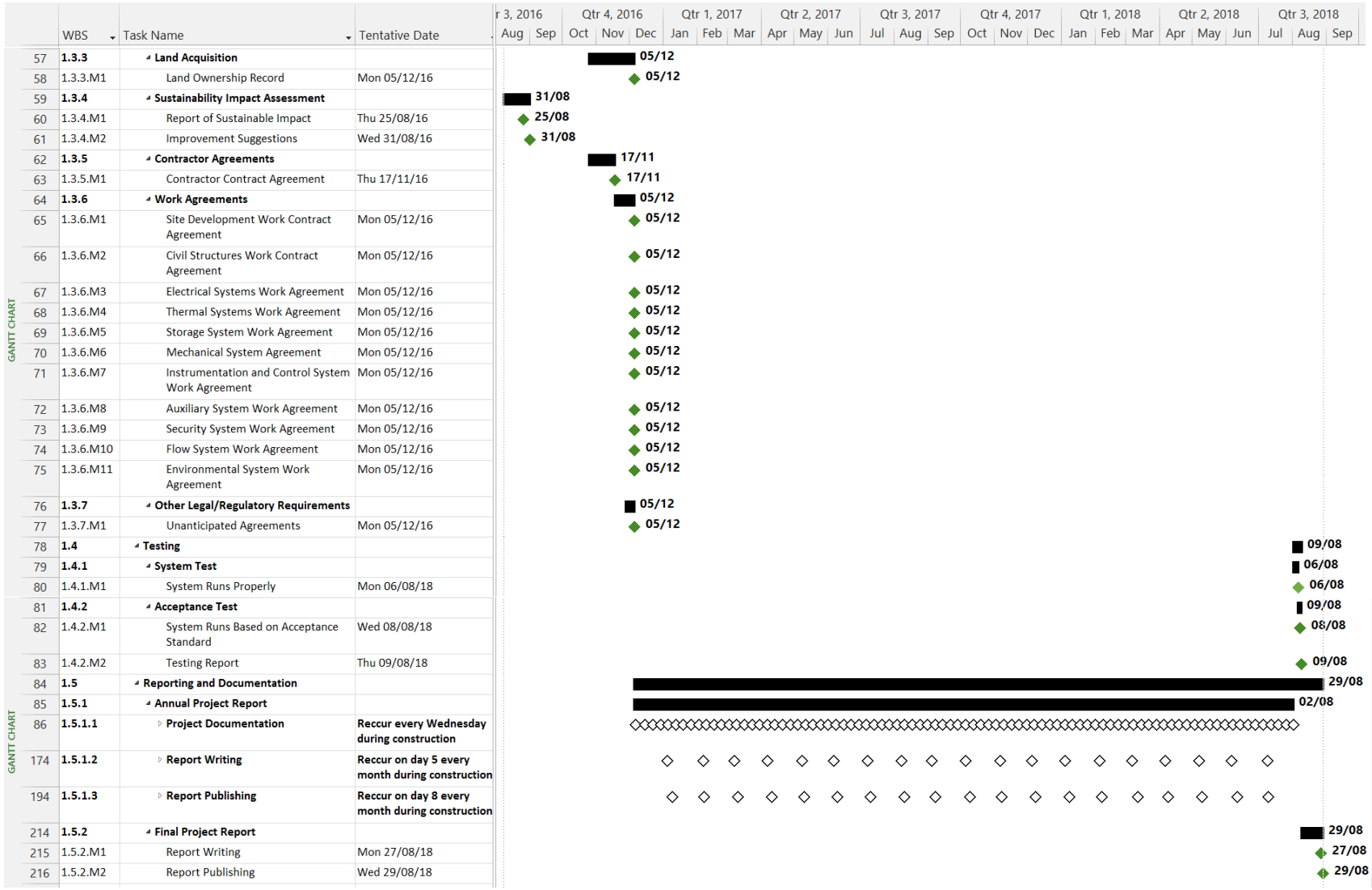
WBS
Task Name
Tentative Date
r 3, 2016
Qtr 4, 2016
Qtr 1, 2017
Qtr 2, 2017
Qtr 3, 2017
Qtr 4, 2017
Qtr 1, 2018
Qtr 2, 2018
Qtr 3, 2018
Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
28 1.2.6 Mechanical Systems
29 1.2.6.M1 Extruding Machine Instatalled Wed 20/06/18
30 1.2.6.M2 Forklift Bought Wed 20/06/18
31 1.2.6.M3 Leftover Waste Dryer Installed Wed 20/06/18
32 1.2.6.M4 MSW Recycling Machine Installed Wed 20/06/18
33 1.2.7 Instrumentation and Control Systems
34 1.2.7.M1 Personal Computer Installed Wed 01/08/18
35 1.2.7.M2 Communication System Installed Wed 01/08/18
36 1.2.8 Auxiliary Systems
37 1.2.8.M1 Generator Set Installed Wed 01/08/18
38 1.2.9 Security System
39 1.2.9.M1 Security System Installed Fri 27/04/18
40 1.2.9.M2 CCTV Installed Thu 26/04/18
41 1.2.9.M3 Alarm Installed Thu 26/04/18
42 1.2.10 Flow Systems
43 1.2.10.M1 Conveyor Belt Installed Fri 04/05/18
44 1.2.10.M2 Sorting System Installed Fri 04/05/18
45 1.2.11 Environmental Systems
46 1.2.11.M1 Plumbing System Installed Wed 18/04/18
47 1.3 Legal and Regulatory
48 1.3.1 Licensing
49 1.3.1.M1 License of Waste Treatment Wed 21/09/16
50 1.3.1.M2 License of Machinery Mon 24/10/16
51 1.3.1.M3 License of Plumbing Mon 05/12/16
52 1.3.1.M4 License of Electricity Mon 24/10/16
53 1.3.1.M5 License of Land and Building Mon 24/10/16
54 1.3.2 Government Permitting and Agreement
55 1.3.2.M1 Acceptance Criteria Fri 30/09/16
56 1.3.2.M2 Issuance of Project Permit Mon 24/10/16
20/06
01/08
27/04
04/05
18/04
05/12
24/10



	WBS	Task Name	Tentative Date
57	**1.3.3**	**Land Acquisition**	
58	1.3.3.M1	Land Ownership Record	Mon 05/12/16
59	**1.3.4**	**Sustainability Impact Assessment**	
60	1.3.4.M1	Report of Sustainable Impact	Thu 25/08/16
61	1.3.4.M2	Improvement Suggestions	Wed 31/08/16
62	**1.3.5**	**Contractor Agreements**	
63	1.3.5.M1	Contractor Contract Agreement	Thu 17/11/16
64	**1.3.6**	**Work Agreements**	
65	1.3.6.M1	Site Development Work Contract Agreement	Mon 05/12/16
66	1.3.6.M2	Civil Structures Work Contract Agreement	Mon 05/12/16
67	1.3.6.M3	Electrical Systems Work Agreement	Mon 05/12/16
68	1.3.6.M4	Thermal Systems Work Agreement	Mon 05/12/16
69	1.3.6.M5	Storage System Work Agreement	Mon 05/12/16
70	1.3.6.M6	Mechanical System Agreement	Mon 05/12/16
71	1.3.6.M7	Instrumentation and Control System Work Agreement	Mon 05/12/16
72	1.3.6.M8	Auxiliary System Work Agreement	Mon 05/12/16
73	1.3.6.M9	Security System Work Agreement	Mon 05/12/16
74	1.3.6.M10	Flow System Work Agreement	Mon 05/12/16
75	1.3.6.M11	Environmental System Work Agreement	Mon 05/12/16
76	**1.3.7**	**Other Legal/Regulatory Requirements**	
77	1.3.7.M1	Unanticipated Agreements	Mon 05/12/16
78	**1.4**	**Testing**	
79	**1.4.1**	**System Test**	
80	1.4.1.M1	System Runs Properly	Mon 06/08/18
81	**1.4.2**	**Acceptance Test**	
82	1.4.2.M1	System Runs Based on Acceptance Standard	Wed 08/08/18
83	1.4.2.M2	Testing Report	Thu 09/08/18
84	**1.5**	**Reporting and Documentation**	
85	**1.5.1**	**Annual Project Report**	
86	**1.5.1.1**	**Project Documentation**	**Reccur every Wednesday during construction**
174	**1.5.1.2**	**Report Writing**	**Reccur on day 5 every month during construction**
194	**1.5.1.3**	**Report Publishing**	**Reccur on day 8 every month during construction**
214	**1.5.2**	**Final Project Report**	
215	1.5.2.M1	Report Writing	Mon 27/08/18
216	1.5.2.M2	Report Publishing	Wed 29/08/18

[Back to Chapter K. Project Time](#)

Appendix D. Budget List

Activity Based Cost Budget					
Resource Name	Max. Units	Standard Rate (IDR/mon)	Overtime Rate (IDR/hour)	Usage Time (hour)	Total Cost (IDR)
Project Manager	1	44,996,000	336,000	4,304	1,210,398,000
Project Engineer	3	14,994,000	112,000	12,912	1,210,020,000
Main Contractor	1	9,996,000	70,000	3,456	215,908,000
Sub-Contractor	10	7,000,000	56,000	3,968	173,600,000
Finance and Administration	4	9,996,000	70,000	17,216	1,075,564,000
Surveyor	3	6,006,000	42,000	624	23,422,000
Procurement	2	9,996,000	70,000	3,456	215,908,000
Architect	2	7,000,000	56,000	7,360	322,000,000
Engineer	5	7,000,000	56,000	11,216	490,700,000
Sub-Total					4,937,520,000

Usage Based Cost Budget				
Resource Name	Cost/Unit (IDR)	Supporting Cost (IDR)	Units Needed	Total Cost (IDR)
MSW Recycling Package	150,000,004,000	24,654,000	1 Pack	150,024,658,000
Extruding Machine	1,999,998,000	6,160,000	1 Pack	2,006,158,000
Leftover Waste Dryer	1,999,998,000	6,160,000	1 Pack	2,006,158,000
Forklift	538,804,000	3,500,000	4 Unit	2,158,702,000
Building Material (Site Development)	190,470,000	7,504,000	1 Pack	197,974,000
Building Material (Civil Structures)	609,518,000	7,504,000	1 Pack	617,022,000
Bailing Machine	140,000,000	6,160,000	5 Unit	706,160,000
Wire Machine	168,000,000	6,160,000	5 Unit	846,160,000
Fertilizer Packaging System	316,400,000	6,160,000	1 Pack	322,560,000
Fix Fence	294,000	798,000	2,000 m	600,838,000
CCTV	994,000	504,000	25 Unit	25,508,000
Personal Computer	4,998,000	1,204,000	24 Unit	121,198,000
Security System	20,006,000	3,500,000	1 Pack	23,506,000
Electricity Installment	14,994,000	9,996,000	1 Pack	25,004,000
Generator Set	884,800,000	6,160,000	1	890,960,000
Communication Package	20,006,000	7,994,000	1 Pack	28,000,000
Conveyor	1,400,000	6,160,000	800 m	1,126,160,000
Sorting System Installment	6,500,004,000	24,654,000	1 Pack	6,524,644,000
Plumbing System	676,004,000	7,994,000	1 Pack	684,012,000
Smart Thermal System	67,004,000	130,004,000	1 Pack	196,994,000
Land and Land Acquisition	7,910,000	334,684,000	250,000 m^2	1,977,834,684,000
Sub-Total				2,146,967,060,000

Undistributed Cost Budget		
Resource Name	Accrue at	Cost (IDR)
Documentation	Documentation	2,436,000
Report Writing	Report Writing	938,000
Report Publishing	Report Publishing	1,610,000
	Sub-Total	4,984,000
	Performance Measurement Baseline (701 days)	2,151,909,564,000

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Appendix E. Stakeholder Analysis

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
A	Investor	Peoples who invest money in this project	**High (8)** 1. Have a right to change project plan due to funding 2. Responsible for financial support	**Moderate (6)** 1. Project Objectives	**Whole Project Phase** Will be engage at the beginning of the project due to the importance of investment and also given annual reports until project finish.	**Interactive Communication** Media: Meetings, video conference, e-mail, cloud storage, fax, annual report
B	DKI Jakarta Government	Main authority owner	**Very High (10)** 3. Have a right to change project plan 4. Responsible for agreement	**Very High (10)** 5. Project Plan 6. Project Progress and Report 7. Cleaner Jakarta 8. Project Objectives	**Whole Project Phase** Will be engage at the beginning of the project due to the importance of waste management , regulatory, and also given annual reports until project finish.	**Interactive Communication** Media: Meetings, video conference, e-mail, cloud storage, fax annual report
C	Sanitary Department of DKI Jakarta	Authority owner for all waste activities in DKI Jakarta	**Very High (9)** 1. Have a right to change project plan 2. Responsible for waste management	**Very High (10)** 1. Project Plan 2. Project Progress and Report 3. Cleaner Jakarta 4. Better waste managemen t system	**Whole Project Phase** Will be engage at the beginning of the project due to the importance of waste management , the process of treatment, and also the	**Interactive Communication** Media: Meetings, video conference, e-mail, cloud storage, fax, annual report

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					output treatment.	
D	Regional Development Agency of DKI Jakarta	Authority owner for the development of DKI Jakarta	**Very High (9)** 1. Have a right to change project plan regarding to location and ITF size 2. Responsible for waste management	**High (8)** 1. Project Plan 2. Project Progress and Report 3. Project Objectives	**Whole Project Phase** Will be engage at the beginning of the project due to the importance all of building and land regulation.	**Interactive Communication** Media: Meetings, video conference, e-mail, cloud storage, fax, annual report
E	Environment Department of DKI Jakarta	Authority owner who evaluate and control environmental and pollution issues in DKI Jakarta	**Very High (9)** 1. Have a right to change project plan 2. Responsible for waste management	**Very High (10)** 1. Project Plan 2. Project Progress and Report 3. Cleaner Jakarta 4. Better waste managemen t system	**Whole Project Phase** Will be engage at the beginning of the project due to the importance of sustainability development in the city.	**Interactive Communication** Media: Meetings, video conference, e-mail, cloud storage, fax, annual report
F	Transportation Department of DKI Jakarta	Authority owner for transportation modes in DKI Jakarta	**Moderate (5)** 1. Have a right to change project plan due to transportation methods of materials	**Low (4)** 1. Project Schedule 2. Material List	**Distribution Activity** The engagement at the beginning tools, equipment, materials, in the before, during, and after the project.	**Pull Communication** Media: Meetings, instant messaging, e-mail, fax, phone
G	Ministry of Labor	Highest institution authorized for labor in Indonesia	**Moderate (5)** 1. Have a right to change project plan due to labor usage, rate, safety, and health	**Low (3)** 1. Project Labor Usage	**Whole project phase** Will be engage at the beginning of	**Push Communication** Media: e-mail, fax, phone

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					the project due to the contractor agreements and work agreements	
H	Ministry of Environment	Highest institution authorized for environmental, waste, and pollution issues in Indonesia	**High (8)** 1. Have a right to change project plan 2. Responsible for waste management	**High (8)** 1. Project Plan 2. Project Progress and Report 3. Better waste management system	**Whole project phase** Will be engage at the beginning and at the middle of the project due to the legal and regulatory, testing, reporting and documentation	**Pull Communication** Media: Meetings, e-mail, fax, phone
I	Ministry of Coordination for Economy	Highest institution authorized for the economic growth in Indonesia	**Moderate (5)** 1. Responsible for economic impact of the project	**High (7)** 1. Project Plan 2. Project Progress and Report 3. Cleaner Jakarta 4. Project Objectives	**Whole project phase** Will be engage at the beginning, the process, and the end of the project due to the legal and regulatory, testing, reporting and documentation	**Pull Communication** Media: Meetings, e-mail, fax, phone
J	Ministry of Energy and Mineral Resources	Highest Institution authorized for the energy and mineral resource usage in Indonesia	**Moderate (5)** 1. Responsible for energy regulation of the facility	**High (7)** 1. Project Plan 2. ITF Partnership due to energy production	**Whole Project Phase** Will be engage at the beginning of the project due to the	**Pull Communication** Media: Meetings, e-mail, fax, phone

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					Licensing, Testing, and also Reporting and Documentation	
K	PembangkitListrik Negara (PLN)	Institution responsible for the generating electricity in Indonesia	**Very High (10)** 1. Responsible for electrical installation and usage in the facility	**High (8)** 1. Project Plan 2. Project Schedule 3. ITF Partnership due to electrical energy production	**1. Licensing** Engage in the beginning of the project due to obtain power plant permission. **2. Cooperation** Engage when the power plant already established for electricity business purpose.	**Pull Communication** Media: Meetings, e-mail, fax, phone
L	Citizen of DKI Jakarta	Society who lives in DKI Jakarta and mainly generates waste	**Very Low (1)** 2. Affect Political Decisions	**Moderate (6)** 3. Cleaner Jakarta 4. Project Progress and Report	**Whole Project Phase** Will be engage at the beginning until the end of the project due to the project information transparency.	**Push Communication** Media: Television, radio, newspaper, websites, annual reports
M	Main Contractors	Person responsible for the whole construction site activity	**Very High (10)** 2. Responsible for the whole construction phase	**Very High (9)** 4. Project Plan 5. Project Progress and Report 6. Project Objective	1. **Contractor Agreements** Engage before agreement due to contract negotiation. **2. Construction**	**Interactive Communication** Media: Meetings, information board, video call,phone call, instant messaging, e-mail,

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					Engage when the project begin due to the importance of contribution in construction. **3. Reporting and Documentation** Engage because of information known by contractor.	cloud storage, fax, annual report
N	Subsidiary Contractors	People hired by main contractor to handle specialized activity in the construction site	**Very High (9)** 1. Responsible for the specialized construction phase	**High (8)** 1. Project Plan 2. Project Progress and Report 3. Project Objective	**1. Contractor Agreements** Engage before agreement due to contract negotiation. **2. Construction** Engage when the project begin due to the importance of contribution in construction. **3. Reporting and Documentation** Engage because of information known by contractor.	**Interactive Communication** Media: Meetings, information board, video call, phone call, instant messaging, e-mail, cloud storage, fax, annual report

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
O	Architect	Person responsible for the architectural design of facility	**High (8)** 1. Responsible for the grand design of the facility	**High (7)** 1. Project Plan 2. Project Progress and Report 3. Project Objective	**1. Construction Planning** Engage before the project due to the building design. **2. Construction** Engage during the project due to the importance of the project progress and synchronization design and the actual construction. **3. Reporting and Documentation** Engage because of the importance of writing.	**Interactive Communication** Media: Meetings, information board, video call, phone call, instant messaging, e-mail, cloud storage, fax, annual report
P	Engineers	People responsible for particular technical activities such as software installations, drainage system, work SOP, electricity system, communications system, etc.	**High (8)** 1. Responsible for the technical aspects of the facility	**High (7)** 1. Project Plan 2. Project Progress and Report 3. Project Objective	**1. Construction Planning** Engage before the project due to the technical design. **2. Construction** Engage during the project due to the	**Interactive Communication** Media: Meetings, information board, video call, phone call, instant messaging, e-mail, cloud storage, fax,

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					importance of the project progress and synchronization technical requirements and the actual construction. **3. Reporting and Documentation** Engage because of the importance of writing.	annual report
Q	Construction Workers	People who are directly working for the construction	**High (7)** 1. Responsible for the construction activity of the facility	**Moderate (6)** 1. Project Plan 2. Project Progress and Report	**1. Work Agreements** Engage before the agreement due to the negotiation. **2. Construction** Engage during the construction due to the construction work.	**Pull Communication** Media: Meetings, information board, e-mail, phone call
R	Material Suppliers	Source of material	**Very High (10)** 1. Responsible for construction material procurement	**Moderate (5)** 1. Project Schedule 2. Material List	**1. Construction Planning** Engage before construction due to material supply agreements. **2. Construction**	**Interactive Communication** Media: Meetings, video call, phone call, instant messaging, e-mail, fax, bill of material

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					Engage during the construction due to the importance of material arrival and quality.	
S	Customs	Institution responsible to handle distribution tax and customs from oversea countries	**High (7)** 1. Responsible for construction material distribution from overseas	**Moderate (5)** 1. Project Schedule 2. Material List	**Construction** Engage before the construction due to the tax and material importance.	**Pull Communication** Media: Meetings, e-mail, fax, phone
T	Nearby Private ITFs	Institutes in the ITF business which aren't owned by the government	**Very Low (2)** 1. Support/hamper ITF development	**Moderate (5)** 1. ITF Partnership	**Partnership** Engage if interested in cooperation of the project construction or product.	**Push Communication** Media: website
U	United Nations Environment Programme (UNEP)	Institution owned by The UN related to chemical and waste management	**Moderate (5)** 1. Responsible for policy advice, technical guidance related to waste management	**High (7)** 1. Promotes chemical safety and waste management	**1. Construction Planning** Engage before the project due to sustainability. **2. Legal and Regulatory** Engage before the project due to the policy and regulatory importance. **3. Reporting and Documentation** Engage if invest funding in	**Pull Communication** Media: Meetings, e-mail, fax, phone, progress report

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					the project. Thus, will be given project progress and information.	
W	Other Countries (Malaysia, Singapore, Japan, Germany, etc.)	Possible stakeholders who may be involved in the project from outside of Indonesia	**Moderate (5)** 1. Provide aid 2. Affect political decisions	**Moderate (5)** 1. ITF Partnership 2. Project partnership	**Partnership** Engage if interested in cooperation of the project construction or product.	**Push Communication** Media: website
V	Other Districts around Jakarta (Banten and West Java)	Nearby districts that may be involved in the projects	**Moderate (5)** 1. Provide aid 2. Affect political decisions	**Moderate (5)** 1. ITF Partnership 2. Project partnership	**Partnership** Engage if interested in cooperation of the project construction or product.	**Push Communication** Media: website
X	Future Cilincing ITF Managers	Future team of people who will manage ITF in Cilincing	**Very Low (2)** 1. Future Project Team 2. Future Operation Team	**Very High (9)** 1. Project Objectives 2. ITF system 3. Project Progress and Report	**Reporting and Documentation** Engage during the project due to the start of ITF operation date.	**Push Communication** Media: Phone, e-mail, fax, website, progress report
Y	Regional Police Station	Regional police station in case of extra security is needed	**Moderate (5)** 1. Provide security	**Moderate (6)** 1. Project Progress 2. Project Schedule	**Whole Project Phase** Engage before and during the project due to the activity permit and security.	**Push Communication** Media: Phone, e-mail, fax
Z	Nearby Hospitals	Nearby hospitals in case of emergency	**Moderate (5)** 1. Take care of labor when they are not in a good condition	**Moderate (6)** 1. Project Objective	**Whole Project Phase** Engage before and	**Push Communication** Media:

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					during the project due to the HSE importance.	Phone, e-mail, fax
AA	Nearby Firefighter Station	Nearby firefighter case of fire emergency	**Moderate (5)** 1. Responsible for firefighting emergency	**Moderate (6)** 1. Project Objective	**Whole Project Phase** Engage before project due to the HSE importance and also emergency accident.	**Push Communication** Media: Phone, e-mail, fax
AB	Merak Port	Nearby port which could possibly the material distribution channel via ship	**Moderate (5)** 1. Responsible for material distribution via ship	**High (8)** 1. Project Schedule 2. Material List	**Construction** Engage before and during the project due to the material distribution.	**Push Communication** Media: Phone, e-mail, fax
AC	Halimperdana Kusuma Airport	Nearby airport which could possibly the material distribution channel via airplane	**Moderate (5)** 1. Responsible for material distribution via airplane	**High (8)** 1. Project Schedule 2. Material List	**Construction** Engage before and during the project due to the material distribution.	**Push Communication** Media: Phone, e-mail, fax
AD	Local Labor Insurance Institution	Institution responsible for labor insurance	**Moderate (5)** 1. Responsible for labor insurance	**High (8)** 1. Project Schedule 2. Material List	**1. Work Agreements** **2. Construction** Engage before and during the project due to HSE importance.	**Push Communication** Media: Phone, e-mail, fax
AE	Citizen nearby Bantargebang	Citizens who live near Bantargebang	**Low (3)** 1. Affect political decisions	**Moderate (5)** 1. Project Objective	**Whole Project Phase** Will be engage at the beginning	**Push Communication** Media: website

ID	Stakeholder	Description	Power (Level 1-10)	Interest (Level 1-10)	Engagement Phase	Communication Plan
					until the end of the project due to the project information transparency.	
AF	Journalist	Journalist who makes news for TV, radio, newspaper, etc.	**Moderate (5)** 1. Publish the information about ITF to society	**High (8)** 1. Project Schedule	**Whole Project Phase** Engage during and after the project due to the reporting and documentation.	**Push Communication** Media: Electronic and printed
AG	Notary	Third-party who is responsible in giving land acquisition certifications.	**Very High (9)** 1. Land acquisition must not be late	**Moderate (6)** 1. Money 2. Fame	**Land acquisition** Engage before and during land acquisition due to the land acquisition importance.	**Pull Communication** Media: e-Mail, direct meeting and printed documents

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Appendix F. Qualitative Risk Analysis

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
RG01	Whole Project in General	Higher Budget Expenses	Dollar Price Against Rupiah Increase, Failure in Bargaining	0.50	0.80	0.4 /High	Threat	Accept	Accept Price Increase when crucial	Higher Budget Expenses	Project Manager, Project Engineer, Finance and Administration	Define new cost baseline	0.90	0.80	0.72 /High	0.03	Very Low (4)
								Mitigate	Reduce Human Resource Usage	Stable Cost, Late Schedule	Project Manager, Project Engineer, Contractor	Define subcontract schedule and resource plan	0.10	0.20	0.02 /Low	0.97	Very High (2)
											Finance and Administration	Prepare updated budget baseline					
								Avoid	Subcontract work before cost occur	Stable cost expenses	Project Manager, Project Engineer, Contractor	Define subcontract schedule and resource plan	0.10	0.10	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
									Change product scope	Project plan change	Project Manager	Hold meeting with stakeholders to inform and discuss plan change	0.30	0.40	0.12 /Medium	0.72	High (3)
RG02		Resource Usage Increase	Schedule Change, Project Plan Change	0.50	0.80	0.4 /High	Threat	Avoid	Subcontract work based on task quality, not duration	Stable schedule, Stable Resource Usage	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.10	0.01 /Low	1.00	Top Priority (1)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
											Finance and Administration	Prepare updated budget baseline					
								Accept	Accept Usage Increase	Resource usage increase	Project Manager, Project Engineer, Engineer, Contractor	Define new cost, schedule, and resource baseline	0.90	0.80	0.72 /High	0.03	Very Low (2)
											Finance and Administration	Prepare updated budget baseline					
RG03		Lower Budget Expenses	Dollar Price Against Rupiah Decrease, Successful Bargaining	0.30	0.40	0.12 /Medium	Opportunity	Share	Hire more workers to balance with cost budget	Early schedule	Project Manager, Project Engineer, Contractor	Define updated schedule and resource, and cost plan	0.50	0.80	0.4 /High	0.47	Low (2)
											Finance and Administration	Prepare updated budget baseline					
								Exploit	Subcontract Work when cost decrease occur	Lower Budget Expenses	Project Manager, Project Engineer, Contractor	Define subcontract schedule and resource plan	0.90	0.80	0.72 /High	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
RG04		Resource Usage Decrease	Schedule Change, Project Plan Change, Better Technology, Better Method, Better Human Resources	0.30	0.40	0.12 /Medium	Opportunity	Exploit	Subcontract work based on task quality, not duration	Stable schedule	Project Manager, Project Engineer, Contractor	Define subcontract schedule and resource plan	0.70	0.80	0.56 /High	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
								Enhance	Balancing activity	Schedule change	Project Manager,	Define updated	0.30	0.40		0.02	

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
									duration with reource usage		Project Engineer, Contractor	schedule and resource, and cost plan			0.12 /Medium		Very Low (2)
											Finance and Administration	Prepare updated budget baseline					
			Low on Budget	0.70	0.40	0.28 /High	Threat	Accept	Keep working on project	Reduced resources usage, late schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.90	0.40	0.36 /High	0.04	Very Low (6)
											Finance and Administration	Prepare updated budget baseline					
								Transfer	Search for new investors	Extra capital, new stakeholder	Project Manager	Search for new investors	0.50	0.20	0.1 /Medium	0.72	High (2)
								Mitigate	Ask for extra capital funding from current stakeholders	Extra capital	Project Manager	Hold meeting with current stakeholders for extra capital funding	0.30	0.10	0.03 /Low	1.00	Top Priority (1)
								Avoid	Cancel project	Project fail	Project Manager	Cancel project	0.10	0.80	0.08 /Medium	0.01	Very Low (7)
									Temporary project shut down	Late schedule	Project Manager, Project Engineer, Contractor	Define new schedule, resource, and cost baseline	0.50	0.40	0.2 /High	0.32	Low (4)
											Finance and Administration	Prepare updated budget baseline					
									Activity postpone	Late schedule	Project Manager, Project Engineer, Contractor	Define new schedule, resource, and cost baseline	0.50	0.20	0.1 /Medium	0.72	High (2)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
											Finance and Administration	Prepare updated budget baseline					
									Project Scope Change	Project plan change	Project Manager	Hold meeting with stakeholders to inform and discuss plan change	0.50	0.40	0.2 /High	0.32	Low (4)
RG05		Early Schedule	Bad Planning	0.10	0.80	0.08 /Medium	Threat	Avoid	Subcontract work	Stable schedule	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.20	0.02 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
			Technology Development, High Quality Resource	0.30	0.40	0.12 /Medium	Opportunity	Enhance	Balance upcoming activity duration and resource	Stable schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.50	0.80	0.4 /High	0.64	Medium (2)
											Finance and Administration	Prepare updated budget baseline					
								Exploit	Use new technology and/ or high quality resource when available	Satisfied stakeholders due to faster schedule, human resource usage decrease	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.70	0.80	0.56 /High	1.00	Top Priority (1)
											Procurement	Ensure new technology is available					
											Finance and Administration	Prepare updated budget baseline					
RG06		Late Schedule	Bad Weather, Low Budget, Bad Project	0.70	0.40	0.28 /High	Threat	Avoid	Subcontract work	Stable schedule	Project Manager, Project	Define subcontract schedule	0.10	0.05	0.01 /Low	1.00	Top Priorit

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
			Plan, Temporary shutdown, Activity postpone								Engineer, Engineer, Procurement, Contractor	and resource plan					y (1)
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Overtime to balance schedule	Extra cost, unsatisfied worker	Project Manager, Project Engineer, Contractor	Define overtime schedule and resource plan	0.30	0.20	0.06 /Medium	0.81	High (4)
											Finance and Administration	Prepare updated budget baseline					
									Ask for extra capital funding from current stakeholders	Extra capital	Project Manager	Hold meeting with current stakeholders for extra capital funding	0.50	0.10	0.05 /Low	0.85	High (3)
								Transfer	Search for new investors	Extra capital, new stakeholder	Project Manager	Search for new investors	0.70	0.40	0.28 /High	0.04	Very Low (5)
									Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define outsourcing schedule and resource plan	0.10	0.20	0.02 /Low	0.96	Very High (2)
											Finance and Administration	Prepare updated budget baseline					
								Accept	Accept the late schedule	Late schedule, human resource usage increase	Project Manager, Project Engineer, Contractor	Define late schedule and resource plan	0.90	0.40	0.36 /High	0.01	Very Low (6)
											Finance and Administration	Prepare updated					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
												budget baseline					
RG07		Project Plan Change	External Influence (Politics, Society, Competitors, Investors), Low on Budget, Late Schedule, Early Schedule, Scope Change	0.50	0.80	0.4 /High	Threat	Avoid	Urge stakeholders to cancel plan change by informing about the loss from the change	Schedule change and/ or stakeholder conflict	Project Manager	Hold stakeholder meeting	0.30	0.40	0.12 /Medium	0.76	High (2)
									Determine important milestones of the project	Clear project plan	Project Manager, Project Engineer, Engineers, Contractors	Set project milestones	0.30	0.10	0.03 /Low	1.00	Top Priority (1)
				0.30	0.40	0.12 /Medium	Opportunity	Exploit	If profitable directly inform stakeholders to ensure plan change occur	Better technology usage, better human resource, faster schedule, less expenses, etc.	Project Manager	Hold stakeholder meeting to implement the better technology in the project	0.70	0.40	0.28 /High	1.00	Top Priority (1)
RG08		Stakeholders Conflict	Bad Communication Plan, Information Misunderstanding	0.30	0.20	0.06	Threat	Mitigate	Directly communicate with the conflicting stakeholders to solve the conflict	Postponed project or late schedule in order to solve conflict	Project Manager	Hold stakeholder meeting	0.30	0.10	0.03 /Low	0.60	Medium (2)
								Avoid	Ensure the stakeholders understands clearly the information given	Reduced stakeholder conflict probability	Project Manager, Project Engineer	Utilize the best communication method with each stakeholders	0.10	0.10	0.01 /Low	1.00	Top Priority (1)
RG09		Low on Budget	Bad Project Plan, Bad Project Process, Bad Investors Plan, Unexpected Events, Higher	0.70	0.80	0.56 /High	Threat	Transfer	Search for new investors	Extra capital, new stakeholder	Project Manager	Search for new investors	0.50	0.20	0.1 /Medium	0.87	High (2)
								Mitigate	Ask for extra capital funding from	Extra capital	Project Manager	Hold meeting with current stakeholders	0.30	0.10	0.03 /Low	1.00	Top Priority (1)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
			Budget Expenses						current stakeholders			for extra capital funding					
								Avoid	Cancel project	Project fail	Project Manager	Cancel project	0.10	0.80	0.08 /Medium	0.02	Very Low (6)
									Temporary project shut down	Late schedule	Project Manager, Project Engineer, Contractor	Define new schedule, resource, and cost baseline	0.50	0.40	0.2 /High	0.68	Medium (4)
											Finance and Administration	Prepare updated budget baseline					
									Activity postpone	Late schedule	Project Manager, Project Engineer, Contractor	Define new schedule, resource, and cost baseline	0.50	0.20	0.1 /Medium	0.87	High (2)
											Finance and Administration	Prepare updated budget baseline					
									Project Scope Change	Project plan change	Project Manager	Hold meeting with stakeholders to inform and discuss plan change	0.50	0.40	0.2 /High	0.68	Medium (4)
RP01	Planning	Mistake in developing requirements list	Bad Survey Process	0.50	0.80	0.4 /High	Threat	Mitigate	Simulate the system based on existing ITFs	Better construction planning	Project Manager, Project Engineer, Engineer, Contractor, Surveyor, Architect	Do simulation and plan based on simulation result	0.30	0.10	0.03 /Low	1.00	Top Priority (1)
RP02		Mistake in developing process modeling	Bad Requirements List	0.50	0.80	0.4 /High	Threat	Mitigate	Build process model based on simulation result	Better construction planning	Project Manager, Project Engineer, Engineer, Contractor, Surveyor, Architect	Do simulation and plan based on simulation result	0.30	0.10	0.03 /Low	1.00	Top Priority (1)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
RC01	Construction	Faster Construction Process	Bad Planning, Technology Development	0.10	0.80	0.08 /Medium	Threat	Avoid	Subcontract work carefully	Stable schedule	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.20	0.02 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Revise work schedule	Stable schedule	Project Manager, Project Engineer, Contractor	Define revised schedule and resource plan	0.30	0.20	0.06 /Medium	0.33	Low (2)
											Finance and Administration	Prepare updated budget baseline					
								Accept	Accept the faster construction process	Extra activity based cost due to unused human resources	Finance and Administration	Prepare updated budget baseline	0.90	0.40	0.36 /High	0.17	Very Low (3)
			Technology Development, High Quality Resource	0.30	0.40	0.12 /Medium	Opportunity	Enhance	Balance upcoming activity duration and resource	Stable schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.50	0.80	0.4 /High	0.64	Medium (2)
											Finance and Administration	Prepare updated budget baseline					
								Exploit	Use new technology and/ or high quality resource when available	Satisfied stakeholders due to faster schedule, human resource	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.70	0.80	0.56 /High	1.00	Top Priority (1)
											Procurement	Ensure new technology is available					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
										usage decrease	Finance and Administration	Prepare updated budget baseline					
RC02		Late Construction Process	Bad Weather, Low Budget, Bad Project Plan, Temporary shutdown, Activity postpone, Bad Procurement	0.70	0.80	0.56 /High	Threat	Avoid	Subcontract work	Stable schedule	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.05	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Overtime to balance schedule	Extra cost, unsatisfied worker	Project Manager, Project Engineer, Contractor	Define overtime schedule and resource plan	0.30	0.20	0.06 /Medium	0.91	Very High (4)
											Finance and Administration	Prepare updated budget baseline					
									Ask for extra capital funding from current stakeholders	Extra capital	Project Manager	Hold meeting with current stakeholders for extra capital funding	0.50	0.10	0.05 /Low	0.93	Very High (3)
								Transfer	Search for new investors	Extra capital, new stakeholder	Project Manager	Search for new investors	0.70	0.40	0.28 /High	0.51	Medium (5)
									Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define outsourcing schedule and resource plan	0.10	0.20	0.02 /Low	0.98	Very High (2)
											Finance and Administration	Prepare updated budget baseline					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
								Accept	Accept the late schedule	Late schedule, human resource usage increase	Project Manager, Project Engineer, Contractor	Define late schedule and resource plan	0.90	0.40	0.36 /High	0.01	Very Low (6)
											Finance and Administration	Prepare updated budget baseline					
RC03		Work Accident	Bad HSE Implementation	0.50	0.40	0.2 /High	Threat	Avoid	Remind every stakeholders about the importance of HSE, ensure HSE equipment is in good condition during the project	Safety work, satisfied stakeholders	All stakeholders	Remind each other about the importance of HSE, ensure HSE equipment is in good condition to use	0.30	0.20	0.06 /Medium	1.00	Top Priority (1)
											Project Manager, Project Engineer, Contractor	Do daily briefing to remind everybody about the daily goal and HSE goals					
									Give work insurance and do routine medical checkup for every worker in the project (included in work contract)	Safety work, satisfied stakeholders	Project Manager, Project Engineer	Prepare the work insurance and medical checkup schedule\	0.30	0.20	0.06 /Medium	1.00	Top Priority (1)
RC04		Late Material Delivery	Bad Procurement Planning	0.50	0.80	0.4 /High	Threat	Accept	Accept the late material delivery	Late schedule, lower expenses (price cur due to late delivery)	Project Manager, Project Engineer, Contractor	Define late schedule and resource plan	0.90	0.80	0.72 /High	0.01	Very Low (5)
											Finance and Administration	Prepare updated					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
												budget baseline					
								Transfer	Search for new suppliers	New stakeholder, extra cost, task replanning, late schedule	Procurement	Search for new suppliers	0.50	0.80	0.4 /High	0.03	Very Low (4)
											Project Manager, Project Engineer, Contractor	Define late schedule and resource plan					
											Finance and Administration	Prepare updated budget baseline					
									Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define outsourcing schedule and resource plan	0.50	0.20	0.1 /Medium	0.77	High (2)
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Overtime to balance schedule	Extra cost, unsatisfied worker	Project Manager, Project Engineer, Contractor	Define overtime schedule and resource plan	0.50	0.40	0.2 /High	0.51	Medium (3)
											Finance and Administration	Prepare updated budget baseline					
								Avoid	Subcontract material delivery	Stable schedule	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.05	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
RC05		Early Material Delivery	Bad Procurement Planning	0.30	0.40	0.12 /Medium	Threat	Accept	Accept the early material arrival and ensure it is in good condition	Extra cost to keep the material in good condition	Project Manager, Project Engineer, Contractor, Engineer	Provide inventory space for the material and ensure it is in good condition to be used when needed	0.90	0.80	0.72 /High	0.09	Very Low (5)
								Transfer	Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define outsourcing schedule and resource plan	0.30	0.10	0.03 /Low	0.82	High (3)
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Overtime to balance schedule	Extra cost, unsatisfied worker	Project Manager, Project Engineer, Contractor	Define overtime schedule and resource plan	0.30	0.20	0.01 /Low	0.55	Medium (4)
											Finance and Administration	Prepare updated budget baseline					
								Avoid	Subcontract material delivery	Stable schedule	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.05	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
									Select the best supplier available	On time delivery	Procurement	Select the best supplier available	0.10	0.05	0.03 /Low	1.00	Top Priority (1)
											Project Manager,	Define late schedule					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
											Project Engineer, Contractor	and resource plan					
											Finance and Administration	Prepare updated budget baseline					
			Faster Construction Process, High on Budget	0.30	0.40	0.12 /Medium	Opportunity	Enhance	Balance upcoming activity duration and resource	Stable schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.50	0.80	0.4 /High	0.64	Medium (2)
											Finance and Administration	Prepare updated budget baseline					
								Exploit	Fast forward upcoming activity schedule	Satisfied stakeholders due to faster schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.70	0.80	0.56 /High	1.00	Top Priority (1)
											Procurement	Ensure material is available on time					
											Finance and Administration	Prepare updated budget baseline					
RC06		Defect Material	Bad Procurement Planning, Bad Supplier, Bad Distribution, Bad Material Handling	0.50	0.80	0.4 /High	Threat	Transfer	Replace defect material from different supplier	New stakeholder, extra cost, task replanning, late schedule	Procurement	Search for new suppliers	0.50	0.80	0.4 /High	0.03	Very Low (5)
											Project Manager, Project Engineer, Contractor	Define late schedule and resource plan					
											Finance and Administration	Prepare updated budget baseline					
									Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define outsourcing schedule and resource plan	0.30	0.20	0.06 /Medium	0.87	High (2)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Replace defect material from current supplier	New stakeholder, extra cost, task replanning, late schedule	Procurement	Ask supplier to replace defect material immediately	0.30	0.40	0.12 /Medium	0.72	High (3)
											Project Manager, Project Engineer, Contractor	Define late schedule and resource plan					
											Finance and Administration	Prepare updated budget baseline					
									Overtime to balance schedule	Extra cost, unsatisfied worker	Project Manager, Project Engineer, Contractor	Define overtime schedule and resource plan	0.30	0.40	0.08 /Medium	0.72	High (3)
											Finance and Administration	Prepare updated budget baseline					
								Avoid	Subcontract the best supplier available	Best supply of material available	Project Manager, Project Engineer, Procurement	Select the best supplier available	0.10	0.10	0.01 /Low	1.00	Top Priority (1)
RL01	Legal and Regulatory	Contract Fraud	Bad Process and Human Resource	0.50	0.80	0.4 /High	Threat	Avoid	Cancel project	Project fail	Project Manager	Cancel project	0.10	0.80	0.08 /Medium	0.03	Very Low (4)
									Temporary project shut down	Late schedule	Project Manager, Project Engineer, Contractor	Define new schedule, resource, and cost baseline	0.50	0.40	0.2 /High	0.53	Medium (3)
											Finance and Administration	Prepare updated budget baseline					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
									Activity postpone	Late schedule	Project Manager, Project Engineer, Contractor	Define new schedule, resource, and cost baseline	0.50	0.20	0.1 /Medium	0.79	High (2)
											Finance and Administration	Prepare updated budget baseline					
									Do work contract work carefully	Reduced probability of contract fraud	Project Manager, Project Engineer, Engineer, Procurement, Contractor, Finance and Administration	Read contract carefully before agreement	0.10	0.20	0.02 /Low	1.00	Top Priority (1)
RL02		Resent Workers (Demonstration)	Unaware of Workers Wants & Needs	0.30	0.40	0.12 /Medium	Threat	Avoid	Provide facilities and human resource to ensure worker satisfaction	Reduce probability of resent worker	Project Manager, Project Engineer	Provide the facilities and human resources	0.10	0.10	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Ensure worker salary is satisfying for every individual					
									Always appreciate workers achievement and give reward for certain milestones from the worker	Reduce probability of resent worker	Project Manager, Project Engineer, Contractor	Appreciate worker and prepare reward for the milestones	0.10	0.10	0.01 /Low	1.00	Top Priority (1)
RL03		Late Land Financing & Acquisition	Bad Process, Low on Budget	0.70	0.80	0.56 /High	Threat	Mitigate	Overtime to balance schedule once land is available	Extra cost	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.50	0.40	0.2 /High	0.71	High (3)
											Procurement	Ensure material is					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
												available on time					
											Finance and Administration	Prepare updated budget baseline					
									Postpone activity and ask for extra capital funding from current stakeholders	Extra capital	Project Manager	Hold meeting with current stakeholders for extra capital funding	0.50	0.20	0.1 /Medium	0.90	Top Priority (1)
								Transfer	Postpone activity and search for new investors	Extra capital, new stakeholder	Project Manager	Postpone activity and search for new investors	0.70	0.40	0.28 /High	0.55	Medium (4)
									Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.50	0.20	0.1 /Medium	0.90	Top Priority (1)
											Procurement	Ensure material is available on time					
											Finance and Administration	Prepare updated budget baseline					
								Avoid	Cancel project	Project fail	Project Manager	Cancel project	0.70	0.80	0.56 /High	0.02	Very Low (5)
RL04		Early Land Financing & Acquisition	Unexpected process	0.50	0.10	0.05 /Low	Opportunity	Exploit	Fast forward upcoming activity schedule	Satisfied stakeholders due to faster schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.70	0.80	0.56 /High	1.00	Top Priority (1)
											Procurement	Ensure material is available on time					
											Finance and Administration	Prepare updated					

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
												budget baseline					
								Accept	Stick to initial plan	Stable schedule	Project Manager, Project Engineer, Contractor	Stick to initial plan	0.50	0.40	0.2 /High	0.29	Low (2)
											Procurement	Ensure material is available on time					
RT01	Testing	System Test Failure	Incompatible Process Design, Bad Construction Phase	0.50	0.80	0.4 /High	Threat	Accept	Rework after failure	Extra Cost, late schedule	Project Manager, Project Engineer, Contractor	Define rework schedule and resource plan	0.70	0.80	0.56 /High	0.03	Very Low (3)
											Engineer	Responsible for system failure					
											Procurement	Responsible for material problems in the system failure					
											Finance and Administration	Prepare extra budget for rework					
									Minor repairment after failure	Late schedule	Engineer	Do repairment	0.90	0.40	0.36 /High	0.10	Very Low (2)
											Procurement	Responsible for material problems in the system failure					
											Finance and Administration	Prepare extra budget for repairment					
								Mitigate	Do mini test when system installed	Reduced probability of system test failure	Engineer	Do the mini test and report result to project manager	0.10	0.10	0.01 /Low	1.00	Top Priority (1)
RT02		Acceptance Test Failure	Unaware of Quality Constraints	0.30	0.80	0.24 /High	Threat	Accept	Rework after failure	Extra Cost, late schedule	Project Manager, Project	Define rework schedule	0.30	0.80	0.24 /High	0.25	Low (3)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
											Engineer, Contractor	and resource plan					
											Engineer	Responsible for system failure					
											Procurement	Responsible for material problems in the system failure					
											Finance and Administration	Prepare extra budget for rework					
									Minor repairment after failure	Late schedule	Engineer	Do repairment	0.50	0.40	0.2 /High	1.00	Top Priority (1)
											Procurement	Responsible for material problems in the system failure					
											Finance and Administration	Prepare extra budget for repairment					
RR01	Reporting and Documentation	Annual Project Report Cost Decrease	Faster Construction Process	0.10	0.05	0.01 /Low	Opportunity	Enhance	Balance upcoming activity duration and resource	Stable schedule	Project Manager, Project Engineer, Contractor	Define new schedule and resource plan	0.50	0.10	0.05 /Low	0.40	Low (3)
											Finance and Administration	Prepare updated budget baseline					
								Exploit	Cancel documentation for one or several periods	Reduced documentation cost	Project Manager, Project Engineer, Engineer, Architect	Define documentation schedule and resource plan	0.90	0.10	0.09 /Medium	0.50	Medium (2)
											Finance and Administration	Prepare updated budget baseline					
									Use new technology and/ or high	Satisfied stakeholders due to	Project Manager, Project	Define new schedule and	0.70	0.20	0.14 /Medium	1.00	Top Priorit

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
									quality resource when available	faster schedule, human resource usage decrease	Engineer, Contractor	resource plan					y (1)
											Procurement	Ensure new technology is available					
											Finance and Administration	Prepare updated budget baseline					
RR02		Annual Project Report Cost Increase	Late Construction Process	0.70	0.05	0.04 /Low	Threat	Avoid	Subcontract work	Stable schedule	Project Manager, Project Engineer, Engineer, Procurement, Contractor	Define subcontract schedule and resource plan	0.10	0.05	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
									Cancel documentation for one or several periods	Reduced documentation cost	Project Manager, Project Engineer, Engineer, Architect	Define documentation schedule and resource plan	0.10	0.05	0.01 /Low	1.00	Top Priority (1)
											Finance and Administration	Prepare updated budget baseline					
								Mitigate	Overtime to balance schedule	Extra cost, unsatisfied worker	Project Manager, Project Engineer, Contractor	Define overtime schedule and resource plan	0.50	0.05	0.03 /Low	0.33	Low (3)
											Finance and Administration	Prepare updated budget baseline					
								Transfer	Outsourcing to balance schedule	Extra cost	Project Manager, Project Engineer, Contractor	Define outsourcing schedule and resource plan	0.30	0.20	0.06 /Medium	0.33	Low (4)

Risk Identification				Qualitative Analysis				Response Plan					Risk Residual			Response Plan Priority	
Code	Impacted Phase	Risk	Cause	P	I	Risk Rate	Threat/ Opportunity	Possible Risk Response	Response Application Plan	Response Plan Impact	PIC of Response Plan	Expected Actions from PIC	P	I	Risk Residual Rate	Priority Rate	Priority Level
											Finance and Administration	Prepare updated budget baseline					
								Accept	Accept the late schedule	Late schedule, human resource usage increase	Project Manager, Project Engineer, Contractor	Define late schedule and resource plan	0.90	0.05	0.36 /High	0.01	Very Low (5)
											Finance and Administration	Prepare updated budget baseline					

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Appendix G. Schedule Three Point Estimation

WBS	Task Name	Duration		
		Optimistic	Most-Likely	Pessimistic
1	**ITF Establishment in Cilincing**	**296**	**538**	**795**
1.1	**Construction Planning**	**4**	**8**	**11**
1.1.1	**Business Requirements List**	**2**	**6**	**7**
1.1.1.1	System Engineering	2	6	7
1.1.1.2	Site Development	2	6	7
1.1.1.3	Civil Structures	2	6	7
1.1.1.4	Electrical Systems	2	6	7
1.1.1.5	Thermal Systems	2	6	7
1.1.1.6	Storage Systems	2	6	7
1.1.1.7	Mechanical Systems	2	6	7
1.1.1.8	Instrumentation and Control Systems	2	6	7
1.1.1.9	Auxiliary Systems	2	6	7
1.1.1.10	Security System	2	6	7
1.1.1.11	Flow Systems	2	6	7
1.1.1.12	Environmental Systems	2	6	7
1.1.2	**Process Models Design**	**4**	**8**	**11**
1.1.2.1	System Engineering	4	8	11
1.1.2.2	Site Development	4	8	11
1.1.2.3	Civil Structures	4	8	11
1.1.2.4	Electrical Systems	4	8	11
1.1.2.5	Thermal Systems	4	8	11

WBS	Task Name	Duration		
		Optimistic	Most-Likely	Pessimistic
1.1.2.6	Storage Systems	4	8	11
1.1.2.7	Mechanical Systems	4	8	11
1.1.2.8	Instrumentation and Control Systems	4	8	11
1.1.2.9	Auxiliary Systems	4	8	11
1.1.2.10	Security System	4	8	11
1.1.2.11	Flow Systems	4	8	11
1.1.2.12	Environmental Systems	4	8	11
1.2	**Construction**	**244**	**432**	**518**
1.2.1	Site Development	45	85	102
1.2.2	Civil Structures	162	272	326
1.2.3	Electrical Systems	4	10	12
1.2.4	Thermal Systems	5	15	18
1.2.5	Storage Systems	3	5	6
1.2.6	Mechanical Systems	10	20	24
1.2.7	Instrumentation and Control Systems	18	30	36
1.2.8	Auxiliary Systems	5	7	8
1.2.9	Security System	5	7	8
1.2.10	Flow Systems	10	20	24
1.2.11	Environmental Systems	15	25	30
1.3	**Legal and Regulatory**	**46**	**86**	**159**
1.3.1	**Licensing**	**30**	**59**	**69**
1.3.1.1	Waste Treatment	5	7	9

WBS	Task Name	Duration		
		Optimistic	Most-Likely	Pessimistic
1.3.1.2	Machinery	11	22	25
1.3.1.3	Plumbing	14	30	35
1.3.1.4	Electricity	14	30	35
1.3.1.5	Land and Building	14	30	35
1.3.2	**Government Permitting and Agreement**	**14**	**30**	**40**
1.3.2.1	Acceptance Criteria	5	14	30
1.3.2.2	Issuance of Permit	1	3	10
1.3.3	**Land Acquisition**	15	30	60
1.3.3.1	Financing	15	30	60
1.3.4	**Sustainability Impact Assessment**	**13**	**18**	**37**
1.3.4.1	Preliminary Assessment	5	7	12
1.3.4.2	Impact Review	2	3	5
1.3.4.3	Magnitude Assessment	3	4	10
1.3.4.4	Mitigation Plan	3	4	10
1.3.5	**Contractor Agreements**	**7**	**18**	**37**
1.3.5.1	Tender Auctions	5	14	25
1.3.5.2	Bargaining	1	3	10
1.3.5.3	Contract Agreement	1	1	2
1.3.6	**Work Agreements**	**4**	**12**	**34**
1.3.6.1	Initial Agreement	1	2	10
1.3.6.2	Bargaining	2	8	14
1.3.6.3	Final Agreement	1	2	10

WBS	Task Name	Duration		
		Optimistic	Most-Likely	Pessimistic
1.3.7	Other Legal/Regulatory Requirements	5	6	20
1.4	**Testing**	**2**	**6**	**100**
1.4.1	System Test	1	3	50
1.4.2	Acceptance Test	1	3	50
1.5	**Reporting and Documentation**	**250**	**452**	**636**
1.5.1	**Annual Project Report**	**Repetitive during construction**		
1.5.1.1	**Project Documentation**			
1.5.1.2	**Report Writing**			
1.5.1.3	**Report Publishing**			
1.5.2	**Final Project Report**	**4**	**14**	**18**
1.5.2.1	Report Writing	3	12	15
1.5.2.2	Report Publishing	1	2	3

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Appendix H. Cost Three Point Estimation

Resource Name	Cost		
	Optimistic	Most-likely	Pessimistic
Total	**1,291,739,716,400.00**	**2,151,909,564,000.00**	**3,353,393,912,400.00**
Project Manager	871,486,560.00	1,210,398,000.00	1,267,924,000.00
Project Engineer	871,214,400.00	1,210,020,000.00	1,229,200,000.00
Main Contractor	155,453,760.00	215,908,000.00	227,892,000.00
Sub-Contractor	124,992,000.00	173,600,000.00	183,190,000.00
Finance and Administration	774,406,080.00	1,075,564,000.00	1,087,548,000.00
Surveyor	16,863,840.00	23,422,000.00	30,618,000.00
Procurement	155,453,760.00	215,908,000.00	227,892,000.00
Architect	231,840,000.00	322,000,000.00	331,590,000.00
Engineer	353,304,000.00	490,700,000.00	500,290,000.00
MSW Recycling Package	90,014,794,800.00	150,024,658,000.00	162,879,990,000.00
Extruding Machine	1,203,694,800.00	2,006,158,000.00	2,102,044,000.00
Leftover Waste Dryer	1,203,694,800.00	2,006,158,000.00	2,234,554,000.00
Forklift	1,295,221,200.00	2,158,702,000.00	2,213,666,000.00
Building Material (Site Development)	118,784,400.00	197,974,000.00	203,014,000.00
Building Material (Civil Structures)	370,213,200.00	617,022,000.00	696,136,000.00
Bailing Machine	423,696,000.00	706,160,000.00	725,662,000.00
Wire Machine	507,696,000.00	846,160,000.00	942,914,000.00
Fertilizer Packaging System	193,536,000.00	322,560,000.00	368,788,000.00
Fix Fence	360,502,800.00	600,838,000.00	616,434,000.00

Resource Name	Cost		
	Optimistic	Most-likely	Pessimistic
CCTV	15,304,800.00	25,508,000.00	29,218,000.00
Personal Computer	72,718,800.00	121,198,000.00	138,488,000.00
Security System	14,103,600.00	23,506,000.00	25,102,000.00
Electricity Installment	15,002,400.00	25,004,000.00	26,096,000.00
Generator Set	534,576,000.00	890,960,000.00	955,444,000.00
Communicatio n Package	16,800,000.00	28,000,000.00	32,172,000.00
Conveyor	675,696,000.00	1,126,160,000.00	1,241,506,000.00
Sorting Machine Package	3,914,786,400.00	6,524,644,000.00	7,419,650,000.00
Plumbing System	410,407,200.00	684,012,000.00	713,258,000.00
Smart Thermal System	118,196,400.00	196,994,000.00	202,020,000.00
Land and Land Acquisition	1,186,700,810,400.00	1,977,834,684,000.00	3,164,535,494,400.00
Documentation	2,156,000.00	2,436,000.00	3,024,000.00
Report Writing	868,000.00	938,000.00	1,092,000.00
Report Publishing	1,442,000.00	1,610,000.00	2,002,000.00

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