BOOK OF PROCEEDING

INTERNATIONAL CONFERENCE ON GREEN TECHNOLOGY AND DESIGN

Bandung, 4 – 5 December 2019

Bale Dayang Sumbi
Institut Teknologi Nasional Bandung
West Java - Indonesia

penerbit itenas

it's good start

ORGANIZING COMMITTEE

INTERNATIONAL CONFERENCE ON GREEN TECHNOLOGY AND DESIGN

GENERAL CHAIR : Dr. Nurtati Soewarno, Ir., MT.
CO-CHAIR : Maya R. Musadi, Ir., MT., Ph.D
SECRETARY : Lisa Kristiana, ST., MT., Ph.D.

FINANCE CHAIR
- Dian Duhita, ST., MT.

EXHIBITS COMMITTEE
- Dr. Didin Agustian Permadi, ST., M.Eng
- Dr. Soni Darmawan, ST., MT.

PROGRAMME CHAIRS
- Vibianti Dwi Pratiwi, ST., MT.
- Arsyad Ramadhan Darlis, ST., MT.

LOCAL ARRANGEMENT COMMITTEE
- Lita Lidyawati, ST., MT.

PUBLICATIONS CHAIRS
- Agung Prabowo Sulistiawan, ST., MT.
- Ardhiana Muhsin Machdi, ST.,MT.

WEB MASTER
- Agus Wardana, S.Sos.
- Bhakti Herdianto

REVIEWERS:
- Dr. Ir. Imam Aschuri, MT. (Indonesia)
- Dr. Ir. Dewi Kania Sari, MT. (Indonesia)
- Dr. Ir. Kusmaningrum, MT. (Indonesia)
- Dr. Dani Rusirawan, ST., MT. (Indonesia)
- Emma Akmalah, ST., MT., Ph.D. (Indonesia)
- Dr. Ir. Etih Hartati, MT. (Indonesia)
- Tarsisius Kristyadi, ST., MT., Ph.D. (Indonesia)
- Prof. Meilinda Nurbanasari, ST., MT., Ph.D. (Indonesia)
- Dr. Jamaludin, S.Sn., M.Sn. (Indonesia)
- Dr. Ir. Nurtati Soewarno, MT. (Indonesia)
- Dr. Waluyo, ST., MT. (Indonesia)
- Dr. Ir. Maya Ramadianti, MT. (Indonesia)
- Taufan Hidjaz, Drs., M.Sn. (Indonesia)
- Dr. Ing. M. Alexin Putra (Indonesia)
- Dr. Andri Masri, M.Sn. (Indonesia)
- Iwan Juwana, ST., M.EM., Ph.D. (Indonesia)

EDITORIAL BOARD:
- Jeark A. Principe Ph.D (Filipine)
- Dr. Ekbordin Winijkul (Thailand)
- Tanakorm Sritarapipat, Ph.D. (Thailand)
- Lisa Kristiana, ST., MT., Ph.D. (Indonesia)
- Arsyad Ramadhan Darlis, ST., MT. (Indonesia)
- Vibianti Dwi Pratiwi, ST., MT (Indonesia)
- Agus Wardana, S.Sos (Indonesia)
- Agus Rianto Amd. (Indonesia)

ISBN:
First Print: December 2019

Publisher:
Penerbit Itenas

Address:
Jl. P.K.H. Mustapha No. 23, Bandung 40124 Telp: +62 22 7272215, Fax: +62 22 7202892
Email: penerbit@itenas.ac.id

2019© All rights reserved
It is prohibited to quote and reproduce the contents of this book in any form and manner without permission from the publisher

TABLE OF CONTENT

ORGANIZING COMMITTEE i

RUNDOWN ICGTD iii

PRESENTATION SCHEDULE iv

FOREWARD ix

TABLE OF CONTENT x

Green Automation

1. **Multimode Ultrasound Cleaner Design for Green Extraction Food Processing**
   [Florentinus Budi Setiawan, Probo Y. Nugrahedi] 1

2. **Development of Digital Simulation of Intelligent Electronic Devices Operating Platform for Digital Substation: An Overview**
   [Lakshmanan Gurusamy, Yanuar Z. Arief, Mohd Hafiez Izzwan Saad] 5

3. **IoT Thingspeak for Miniature Smart Grid Monitoring System**
   [Waluyo, Charly Maulana Khafi, Febrian Hadiatna, Andre Widura] 11

Green Energy

4. **Performance Analysis of comparison the conventional and Myring blade for n = 1 on the Savonius Current Turbine By Using CFD Approach**
   [Priyo Agus Setiawan, Nopem Ariwiyono, Rini Indarti] 16

5. **Video Communication System Using LASER**
   [Lita Lidyawati, Lucia Jambola, Arsyad Ramadhan Darlis] 20

Green IT

6. **Lexicon-Based Sentiment Analysis For Analyzing Situational Variables**
   [Dewi Rosmala, Hafidz Dayu Aditya] 24

7. **Implementation of Template Matching Correlation Method in the Conversion System of Ancient Greek Letter Image into Modern Latin Letters**
   [Rifqi Finaldy, Jasman Pardede, Irma Amelia] 29

Green Transportation

8. **Production of Nano Asphalt Emulsion from Asbuton with Microemulsion Method**
   [Riny Yolandha Parapat, Imam Aschuri, Reinhard Schomäcker] 39

9. **Prioritization of Road Accident Factors in Indonesia Using Combination of Delphi Method and Analytical Hierarchy Process**
[Dwi Prasetyanto, Andrean Maulana] 45

10. **Rural Vehicle for Agricultural Community Function in information Society Era**
[Fred Soritua Rudiyanto Manurung, Agus Sachari, Setiawan Sabana] 50

11. **Analysis of Stress Against Airflow on Electric Car Bodies**
[Tarsisius Kristiyadi, Alfian Eric Oktavianto, Fery Hidayat] 55

Suistanability Environment

12. **Health Examinaton Facility Design Mobile For Elderly**
[Hendro Prassetiyo, Arditya Ash Shidiq, Arie Desrianty, Lauditta Irianti] 64

13. **Numerical Model on 3D Finite Element Method on Slope Stability with Tyre Wall System in Road Slopes Reinforcement, West Papua**
[Indra Noer Hamdhan, Desti Santi Pratiwi, Acep Reno Juniandri] 69

14. **Regional simulation of surface ozone over Southeast Asia**
[Nguyen Thi Kim Oanh, Didin Agustian Permadi] 75

15. **Cymbalum Musical Instrument Design by Using Wasted Cans as Main Material**
[Agung Pramudya Wijaya]..... 78

16. **Mapping the Potential of Green Economic Development Jakarta City Based on Green GRDP**
[Edi Wahyu Wibowo] 81

17. **The Symbolic Meaning of Mosque Architecture and Interior as Adaptation to the Residential Environment, in the Social, Economic and Cultural Contexts in Lombok**
[Taufan Hidjaz, Nurtati Soewarno, Detty Fitriany] 86

18. **Study Program Levels of Community Participation in Waste Management of Waste Bank Programs in Tani Mulya and Langensari Villages Bandung Barat District**
[Adi Yudi Pratama, Iwan Juana] 102

19. **A Study of Using Membranes Carbon Nanotubes Integrating with Ozone for Reducing Natural Organic Matter (NOM) Jatiluhur Dam**
[Jono Suhartono, Arnia Shintha, Imat Nur Alim] 108

20. **Study of Several Natural Adsorbents Performance in Ethanol Purification through Distillation Process - Continuous Dehydration**
[Ronny Kurniawan, Yulianty Pratama, F.N. Hidayah, D. Asriyanti, Salafudin] ... 114

21. **Tubular Celulotic biofilm production in double Chamber Reactor**
[Yulianty Pratama, Amira Zakia Lutfi, Salafudin] 120

22. **Investigation of PM10 Based On Landsat 8 Over Urban Area And Correlated With Ground Measurement**
[Rika Hernawati, Soni Darnawan] 124

23. **Human Error Contributions to Potential Incident in Laboratories at Institut Teknologi Nasional**
[Caecilia Sri Wahyuning] 128

24. **Mathematical Modeling of Green Capacitated P-Centre Problem using Mixed Integer Linear Programming**
[Fifi Herni MUSTOFA, Yoanita Y. Mukti, Arief Irfan Syah Tjaja] 132

25. **Accuracy Analysis of Aerial Photography Using PhotoModeler UAS and Agisoft PhotoScan**
[Soni Darnawan, Rino Erviana, Anggun Tridawati] 136

26. **Estimation of Mangrove Biomass Parameters Using Aerial Photography**
[Soni Darnawan, B. Heriyanto Aditya Gunawan, Anggun Tridawati] 139

Green Design

27. **Eco-Design Packaging for Sustainable Farming Products**
[Maharani Dian Permanasari] 144

28. **Application of Design and Development of Pine Waste (Cone) Pine for Construction Materials Interior Building and Furniture**
[Ibrahim Hermawan] 146

29. **Utilization Of Corkwood Fabric In The Making Of "Corkseat" With Surface Mimicry Concept**
[Maugina Rizki Havier] 153

30. **Initial Design of Cisumdawu Toll Rest Area**
[Dwi Novirani, Arief Irfansyah Tjaja, Dida Firdaus] 156

31. **Parchment Skin: Alternative Materials for Manufacturing Environmentally Friendly Products**
[Mohamad Arif Waskito] 160

32. **The Souvenir of Bebegig Sukamantri for Tourism Development in West Java**
[Edi Setiadi Putra] 166

33. **The Learning Medium Design of Creative Literacy for 4-6 Years Old Kids Based on Used Oil Bottle Exploration**
[Sulistyo Setiawan] 171

34. **Optimizing learning facility on Interior Design Basic level Education**
[Edwin Widia] 175

35. **Design of Train Passenger Seat Economic Class using House of Ergonomic (HoE)**

ICGTD 2019 International Conference on Green Technology and Design

itenas

Initial Design of Cisumdawu Toll Rest Area

Dwi Novirani
Industrial Engineering
Intitut Teknologi Nasional
Bandung , Indonesia
dwinovirani@gmail.com

Arief Irfansyah Tjaja
Industrial Engineering
Intitut Teknologi Nasional
Bandung , Indonesia
ariefirfan75@gmail.com

Dida Firdaus
Industrial Engineering
Intitut Teknologi Nasional
Bandung , Indonesia
didafirdaus27@gmail.com

***Abstract*— The construction of the Cisumdawu Toll Road will increase the mobility of goods and services from the south-north of West Java that connects the Purbaleunyi Toll Road to the Cikopo-Palimanan Toll Road (Cipali), which has access to the Kertajati International Airport in Majalengka. This toll road requires the initial design of a resting facility. The design process uses the first and second stages of the Quality Function Implementation method. The first stage is product planning with the output of technical characteristics, then the second stage design is carried out starting from solving the needs of the components of the first stage technical characteristics, followed by the formation of a matrix of relationships between technical characteristics and component characteristics, generating component planning requirements, with the Activity Relation Chart (ART) method scale of component planning priority is generated for the initial design of the layout of the rest area on the Cisumdawu toll road after using the Automatic Layout Design Program (ALDEP). Keywords— rest Area, distribution of quality functions, house of quality, component characteristics, priority scale.**

I. INTRODUCTION

This research is related to the construction of the Cisumdawu (Cileunyi-Sumedang-Dawuan) toll road, which connects Bandung to Majalengka with a length of about 60.1 km. This toll road goes to Kertajati International Airport in Majalengka [1], which will shorten travel time to Central Java.

Method of Quality Function Deployment (QFD) [2] is a method of planning and product development based on the needs and desires of consumers, which have four stages in its manufacture, with details namely: the first stage is product planning, the second stage is component planning, the third stage is process planning , and the last stage is production planning, in this study only reached the second stage.

Product planning in the first stage is the process of distributing preliminary questionnaires to determine the level of importance of attributes that will produce a proposed rest area concept based on consumer voices through technical characteristics, based on the calculation of concept screening and concept scoring. The second stage is component planning (part deployment), namely the development of the product component planning stage in the form of a matrix that explains the critical factors in product development to make a proposed rest area design by explaining the required component facilities. Furthermore, the Tamplate proposal is made for visualization, to see the proposed design of the initial rest area used the Activity Relationship Chart (ARC) approach [3] after using the Automated Layout Design Program (ALDEP) [4].

II. LITERATURE REVIEW

Quality Function Deployment [5] is a method for structured product planning and development that enables the development team to clearly define customer wants and needs, then evaluate each product or service capability proposed systematically in terms of their impact on meeting those needs.

The deployment of quality functions (QFD) is a well-known technique used to design products and services to reflect customer needs. The first phase of QFD, usually called the house of quality (HOQ), is very important and strategic in the QFD process. Although traditional HOQ has been used successfully for decades, it is often faced with a number of problems in the case of real applications [6]

In applying the Quality Function Deployment methodology as a whole includes four levels of matrix compilation according to [5], namely: House of Quality, Part Deployment, Process Planning, and Production Planning. The following is a chart of the design stages of the quality function deployment method which can be seen in Figures 1,2,3 and 4.

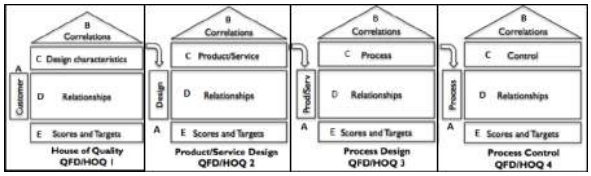

Fig 1 House Of Quality 1, 2, 3 and 4 [5]

House of Quality (HOQ) [5] is the first matrix in developing the Quality Function Deployment method. House of Quality displays the desires and needs of the consumer (the voice of customer) on the left and the technical response (relationship of technical characteristics) of the development team to meet the wants and needs on the matrix. The matrix in HOQ consists of several parts which are combined

together in various ways, each of which provides interrelated information.

Kano Model [7, 8], is one of the ways that can be used to identify customer satisfaction, where this model aims to categorize the attributes of a product or service based on how well the product or service is able to satisfy customer needs, developed by Dr.Noriaki Kano In his model Kano distinguishes three types of desired products that affect customer satisfaction.

Toll Road [9] Road is one of land transportation infrastructure which has an important role for human life. In addition to geometric planning of roads, road pavement is part of road planning that must be planned effectively and efficiently, because the need for higher level of road service. The construction of this toll road uses rigid pavement, so that pavement is resistant to its service life, it needs the right design methods in its planning. There are many methods to design the thickness of this concrete plate, including using the 2002 Bina Marga method and AASHTO. In the toll road there are several supporting elements that can provide comfort and safety for its users. These elements include:
Toll Gate, Toll Gate, Reversible Lane, Ramp, Entry Card, Vehicle Group, Rest area, Emergency Calling Tool, Toll Road Information, Road Shoulder, Lane, Lane, Road Markings, Traffic Signs, Reversible Substations, and Lane Reversible.

Rest area [10] is a means of supporting the operation of toll roads in the area owned by the toll road in the form of certain public service facilities provided for toll road users to rest and service travel needs, the most important thing in a rest area is to be able to accommodate all the physical and psychological needs of the toll road users and meet the needs of vehicles when crossing the toll road.

Technical characteristics or also called technical response is the next step of the Quality Function Deployment (QFD) process [11] that is by identifying what the customer wants and what must be achieved or fulfilled by the product to fulfill these desires. Technical response consists of characteristics that describe the service design and application of the product being designed.

Layout planning [12] [13] plays an important role in the safety performance inherent in the process plant because this design feature controls the likelihood of accidental chain events and the magnitude of the consequences that may occur. The lack of suitable methods to promote the implementation of inherently effective safety in layout design requires the development of new techniques and methods. A safety assessment approach suitable for layout design in the critical initial phase is proposed. The inherent safety concept is applied in this safety assessment; this approach is based on an integrated assessment of the application of innate safety guidelines in the constraints that usually exist in layout design.

Activity relationship map or Activity Relationship Chart [14] is a simple method or technique in planning the layout of a facility or department based on the degree of activity relationship that is often expressed in qualitative assessments and tends to be based on subjective considerations from each facility / department.

(Automated Layout Design Program) ALDEP [15] The Automatic Layout Design Program (ALDEP) is a tool to assist installation designers in developing optimal layouts for organizational units (functions) within the limits of space availability. Using this technique, the layout planner eliminates the repetitive task of building and evaluating various block layouts. The program considers thousands of possibilities, assesses them, chooses better outcomes for further study by planners and produces outputs, if requested, in graphic form. [16] which is an automatic layout design program with the same basic data input and destination requirements as CORELAP. ALDEP is included in the construction method with qualitative data. ALDEP was first developed by Seehof and Evans in 1967. The next development was carried out by the company at IBM. ALDEP uses values at each level of relationship in numbers.

III. DATA AND DISCUSSION

This type of research is a field survey to find out the voice of consumers and find out the distance and area of the area that will be made in the rest area. This research was conducted in several stages, namely the manufacture of attribute questionnaires needed for the rest area, then the results of the selected concepts were entered into the first stage of QFD to produce technical characteristics which were the input for the second stage. Land survey was also conducted to see the position of the rest area with google map and drone tools to make a map of the land, this info is also for the QFD second stage input.

TABLE 1. **Technical Characteristics**

No.	Technical Characteristics	Priority
1.	Standardization	1
2.	Location	2
3.	Choice of technology and tools	3
4.	Clarity of information	4
5.	The design	5
6.	Recruitment of employees	6
7.	Theme	7
8.	Employee training	8
9.	Parking area	9
10.	Information center service time	10
11.	Service time (cleaning, salesperson, waitress)	11
12.	Building area of service	12
13.	Commercial building area	13
14.	Airplane ticket service time	14
15.	Selection of types of food and drinks	15
16.	Selection of type of game	16

The need for component characteristics is obtained from the translation of parts on the technical characteristics according to each of the technical characteristics and the results of the technical characteristics can be seen in Figure 2

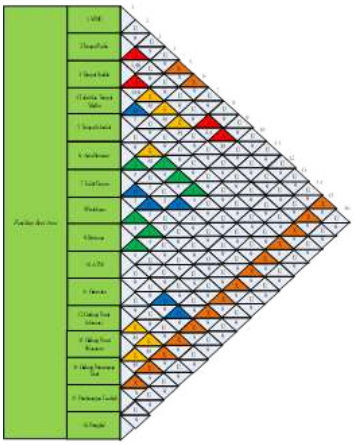

Fig 2 **Technical Characteristics**

Layout selection is based on the calculation of the position using the (Automated Layout Design Program) ALDEP [16] the program provides various alternative facility positions by calculating the total closeness rating of the three alternatives, with each value alternative 1 with a value of 456, alternative 2 with a value of 474 and alternative 3 with a value of 496. So that was chosen as the proposed layout for the design of the rest area. The total closeness rating is influenced by the closeness of each facility based on the activity relationship chart [17]. The following are the results of the selected alternatives.

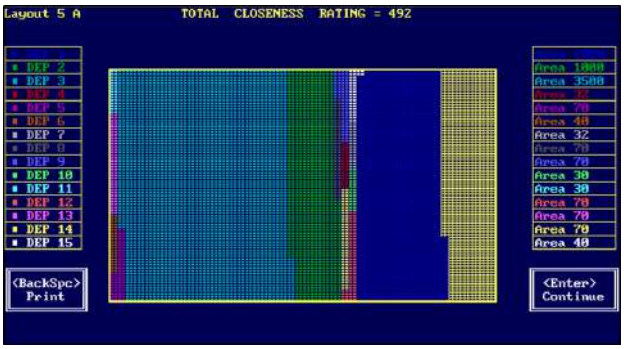

Fig 3. Alternative 3

The template created is the result of the approach of existing facilities adapted to the category of each facility to other facilities, the closeness is based on the function of the facility itself and from relationships with other facilities, for example, parking spaces are made in such a way as to maintain traffic management from the rest the area, in addition to the parking lot is crucial to the activities in the rest area itself, where the parakeet needs to be able to accommodate all the facilities that exist in the rest area both in terms of distance, position and so forth. The shape of the rest area is a standard rectangular shape in general because of easy access so there are not too many maneuvers. The tempate was made as a proposed rest area design in the Quality Function Deployment (QFD) then there are also improvements to the design proposal that can be done at the next stage of research namely process planning and production planning.

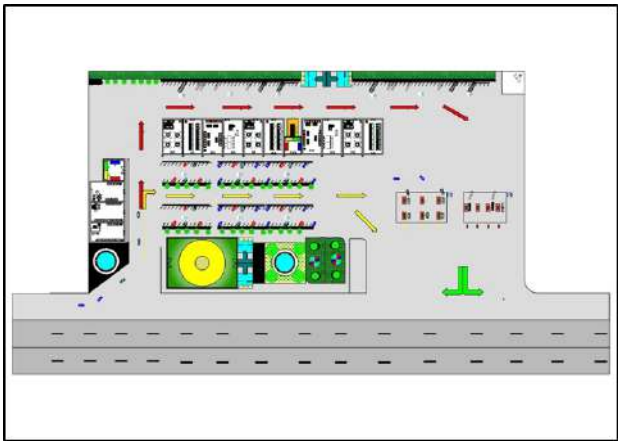

Fig 4. 2-dimensional template

Fig 4. 3-dimensional template

IV. CONCLUSION

1. The facility consists of 8 facilities, namely gas stations, parking lots, places of worship, toilets, rest areas, ATMs, shops and restaurants. For the facilities that were added to the study amounted to 8 namely play areas, workshops, generators, service center buildings, information center warehouses, airplane booking buildings, and waste.

2. Layout selection based on position calculation using (Automated Layout Design Program) The ALDEP program provides various alternative facility positions by calculating the total closeness rating of the three alternatives, with each alternative value 1 with a value of 456, alternative 2 with a value of 474 and alternative 3 with a value of 496. So that was chosen as a proposed layout for the design of the rest area. The total closeness rating is influenced by the closeness of each facility based on the activity relationship chart.

3. The designed template shows the location of all existing facilities within the rest area on the CISUMDAWU toll road. The designed template shows the proximity of various facilities available in the rest area, various facilities are close to their respective functions, the draft template is made to provide the appropriate facility design for the CISUMDAWU rest area viewed from the aesthetics of the placement of the facility also did not reduce the effectiveness and efficiency of the facility, the design was also made in order to find out the actual distance between the facilities The vacant land contained in the design would be used as a green open space for the company.

V. SUGGESTIONS

Suggestions for further research is to use advanced stages of the house of quality matrix such as the formation of process planning and even production planning, can consider cost estimates.

ACKNOWLEDGMENT

Thank you to Itenas Bandung especially to LP2M for giving us the opportunity to do this research, hopefully it will be useful for all of us.

REFERENCES

[1] Syafarudin, A. and B. Mulyana, Formulation *Strategy of PT. Bandara Internasional Jawa Barat Bandung Indonesia, Kertajati in Business Aerocity (Aerotropolis).* International Review of Management and Marketing, 2019. **9**(3): p. 106.

[2] Kazemzadeh, R., et al., *Integration of marketing research techniques into house of quality and product family design.* International Journal of Advanced Manufacturing Technology, 2009. **41**.

[3] Durmusoglu, Z.D., *A TOPSIS-based approach for sustainable layout design: activity relation chart evaluation.* Kybernetes, 2018. **47**(10): p. 2012-2024.

[4] Kumalasari, E., et al. *ACTIVITY RELATIONSHIP CHART SEBAGAI PERANCANGAN TATA LETAK FASILITAS MINIPLANT PADA PRODUKSI CHIPS PORANG DI DESA JEMBUL*. in *Prosiding SNP2M (Seminar Nasional Penelitian dan Pengabdian Masyarakat) UNIM*. 2019.

[5] Singh, A.K. and A. Rawani, *Application of QFD in Education Sector: A Review.* Technology, 2018. **9**(3): p. 592-599.

[6] Kazemzadeh, R., et al., *Integration of marketing research techniques into house of quality and product family design.* The International Journal of Advanced Manufacturing Technology, 2009. **41**(9-10): p. 1019.

[7] Bilgili, B., A. Erciş, and S. Ünal, *Kano model* application *in new product development and customer satisfaction (adaptation of traditional art of tile making to jewelries).* Procedia-Social and Behavioral Sciences, 2011. **24**: p. 829-846.

[8] Bayraktaroğlu, G. and Ö. Özgen, *Integrating the Kano model, AHP and planning matrix: QFD application in library services.* Library Management, 2008. **29**(4/5): p. 327-351.

[9] Fitriana, R., *Studi Komparasi Perencanaan Tebal Perkerasan Kaku Jalan Tol Menggunakan Metode Bina Marga 2002 Dan AASHTO 1993 (Studi Kasus: Ruas Jalan Tol Solo–Kertosono)*. 2014, Universitas Muhammadiyah Surakarta.

[10] Permata Anggriawan, J., I. Indriastjario, and A. Dwiyanto, *Rest Area KM 22 Jalan Tol Semarang Solo*. 2013, Universitas Diponegoro.

[11] Edwin, B., *Quality function deployment for large systems.* 1992.

[12] Tugnoli, A., et al., *Safety assessment in plant layout design using indexing approach: Implementing inherent safety perspective: Part 1–Guideword applicability and method description.* Journal of hazardous materials, 2008. **160**(1): p. 100-109.

[13] Smutkupt, U. and S. Wimonkasame. *Plant layout design with simulation*. in *Proceedings of the International MultiConference of Engineers and Computer Scientists*. 2009.

[14] Nahmias, S. and Y. Cheng, *Production and operations analysis*. Vol. 6. 2005: McGraw-hill New York.

[15] Cho, Y.E., A. Korenjak, and D.E. Stockton. *FLOSS: An approach to automated layout for high-volume designs*. in *DAC*. 1977.

[16] Seehof, J.M., et al. *Automated facilities layout programs*. in *Proceedings of the 1966 21st national conference*. 1966. ACM.

[17] Pradana, E. and C.B. Nurcahyo, *Analisis Tata Letak Fasilitas Proyek Menggunakan Activity Relationship Chart dan Multi-Objectives Function pada Proyek Pembangunan Apartemen De Papilio Surabaya.* Jurnal Teknik ITS, 2014. **3**(2): p. D131-D136.

Initial Design of Cisumdawu Toll Rest Area

By Dwi Novirani

WORD COUNT 2128
TIME SUBMITTED 28-OCT-2024 03:56PM
PAPER ID 112598070

Initial Design of Cisumdawu Toll Rest Area

ORIGINALITY REPORT

2%
SIMILARITY INDEX

PRIMARY SOURCES

1	bpjt.pu.go.id Internet	28 words — 1%
2	eprints.itenas.ac.id Internet	14 words — 1%

EXCLUDE QUOTES	OFF	EXCLUDE SOURCES	< 1%
EXCLUDE BIBLIOGRAPHY	OFF	EXCLUDE MATCHES	OFF