WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Identification of Damage Type of Side Ditch Drainage at BenuaMelayuLaut Village, Pontianak City, West Borneo, Indonesia

Eva Ryanti[a], Pramudya Kurniawan[b], Nernawani[c], Robby M. Arif[d], Iin Arianti[e*]

[a]*Politeknik Negeri Pontianak, Jl. Jend. A.Yani, Pontianak 78124, Indonesia*
[b]*Politeknik Negeri Pontianak, Jl. Jend. A.Yani, Pontianak 78124, Indonesia*
[c]*Politeknik Negeri Pontianak, Jl. Jend. A.Yani, Pontianak 78124, Indonesia*
[d]*Politeknik Negeri Pontianak, Jl. Jend. A.Yani, Pontianak 78124, Indonesia*
[e]*Politeknik Negeri Pontianak, Jl. Jend. A.Yani, Pontianak 78124, Indonesia*

DOI: https://doi.org/10.55248/gengpi.2022.3.10.32

A B S T R A C T

One of the causes of the damage to the side ditch is the absence of a maintenance process, the absence of supporting water management for settlements on the banks of the Kapuas River, especially in the BenuaMelayuLaut (BML) Village, Pontianak, Indonesia. This area often floods during the rainy season, therefore this research needs to be done. The purpose of this study is to identify damage to the existing drainage system, how to handle it and actions to overcome flooding problems in the area caused by damage to the drainage side ditch management system.

The qualitative method of determining the types of severe, moderate and light damage is then identified and determined by the type of handling in the form of routine maintenance, periodic maintenance and rehabilitation in the form of construction of new drainage.

Based on the analysis of the type of damage, it was found that the damage was minor by 20.00%, it was necessary to carry out routine maintenance; moderately damaged 14.29%, need periodic maintenance, no drainage channel 34.29%, so it must build a new channel (rehabilitation); and 31.43% natural channels, need regular maintenance.

Keywords: Identification, Side Ditch, Type Of Damage, Drainage, Maintenance

1. Introduction

Flood or inundation is an event where water overflows from water bodies such as rivers, ditches, or drainage systems due to relatively high rainfall and high water levels, so that the flow rate cannot be accommodated by the water body or it can be said that the water level is above normal condition. This is due to changes in land function, from closed land to open land. In the past, the forest was a built-up area.Built-up areas such as dense settlements are influenced by population growth which is increasing day by day so that changes in land use cannot be avoided, including in the Benua Melayu Laut (BML) village.

Benua Melayu Laut village is a densely populated settlement, there has been an increase in development and changes in the function of buildings so that economic activity develops, becomes a commercial area and also with the construction of Water Front City as a jogging track, a place to relax and also a cafe, causing a lot of widening of roads and increasing roads from bluffing to permanent roads, but not all permanent roads are equipped with side drainage.

Side ditch drainage is a drainage made on the left and right sides of the road that functions as a reservoir and discharge of water from the road surface or from the surrounding drainage area. The objectives of this research are; to examine the maintenance of the existing drainage system on the banks of the Kapuas river, Pontianak, especially the BML village, to obtain a solution to the problem of drainage performance due to damage to the existing drainage infrastructure and whether or not treatment is needed for maintenance so that the age and benefits of the drainage infrastructure built are in accordance with the plan.

* *Corresponding Author: Iin Arianti*. Tel.: +62-896-3502-5100
E-mail address: iin_arianti@yahoo.com

2. Materials and Methods

Maintenance is an activity carried out to ensure the function of infrastructure and facilitiesUrban Drainage Facilities according to plan. (Permen PU no 12/PRT/M/2014),According to the DPU construction and building guidelines Pd-T-14-2005-B maintenance isactivities carried out to improve channel performance in accordance with the design plan,where the size of the work is based on the inspection report. Job targetmaintenance/repair is to restore drainage conditions in accordance withdesigns/plans that have been made, at least to meet the needs that occur.

Physical ditch damage is categorized as follows:
1. Minor damage, i.e. ditch damage that can be repaired at that time and nottakes a long time;
2. Moderate damage, i.e. ditch damage that could be repaired then, howeverrequires material and a long time of minor damage;
3. Serious damage, i.e. ditch damage caused by a vehicle accident or natural disasters so that repairs require special handling with a relatively long repair time.

The basic principles of handling maintenance, include:
1. Maintenance of channel by digging heaps of soil/sediment, garbage, flakes, and others;
2. Transport and dispose of the excavation (item 1) to the right area and not disturbing the environment around the smooth traffic;
3. Perform channel repairs according to the level of damage that occurs with pay attention to how to store materials/flakes

According to the Minister of Public Works Regulation No. 13 of 2011, concerning Procedures for Maintenance and Surveillance, General maintenance for all road facilities including road drainage, maintenance is further divided into; routine maintenance, periodic maintenance, rehabilitation maintenance, and upgrade maintenance.

Routine maintenance of side ditch drainage is an activity to treat and repair minor damage that occurs in small-section ditch that exist on road sections with steady service conditions.Periodic maintenance of side ditch drainage is an activity to prevent the occurrence of wider damage and any damage that is taken into account in the design so that the decline in road conditions can be returned to a steady condition according to the plan. Side ditch drainage rehabilitation is an activity to prevent extensive damage and any damage that is not taken into account in the design, which results in a decrease in the stability condition in certain parts/places of a road segment with mild to moderate damage, so that the decrease in the stability condition can be returned to its original condition stability according to plan. Improved side ditch drainage is an activity to prevent extensive and permanent damage, the damage may not be taken into account in the initial design.
The research procedure conducted as follows:

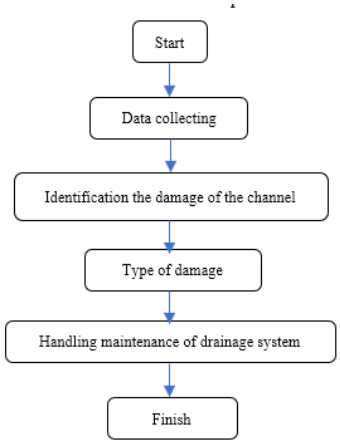

Figure 1. Research flow chart

3. Results and Discussions

The condition of the existing side ditch drainage in the,BenuaMelayuLaut village, with average of 4% channel slope.Based on identification in the field, it turns out that there are 12 locations made of concrete side ditches and 11 locations made of natural side ditches and 12 locations without side ditches drainage channels (table 1), table 2 explains that the drainage dimensions have been planned according to the location and flow rate in the area and table 3 is a treatment that must be carried out according to the type of side ditch damage, can be seen in the tables below:

Table 1
Channel existing condition

Num	Location	Ditches (Available/NA)	Street lenght (m)	Street width (m)	Ditch width (m)	Ditch Depth (m)	Construction
1	Indragiri	A	190	3.0	0.15	0.80	Concrete
2	Mahakam	A	100	6.0	0.40	0.50	Concrete
3	Pangsuma	A	100	5.0	0.40	0.40	Concrete
4	Fajar	NA	180	1.5	-	-	-
5	Kirana 2	NA	150	2.0	-	-	-
6	Barito	A	160	6.0	0.40	0.40	Concrete
7	Malaya	NA	135	1.5	-	-	-
8	Sampit	A	300	2.0	0.20	0.30	Concrete
9	Irian	A	175	3.0	0.35	0.60	Concrete
10	Thaha	NA	100	1.0	-	-	-
11	Landak	A	160	3.0	0.30	0.50	Concrete
12	Aden 1	NA	200	1.5	-	-	Natural
13	Aden 2	NA	100	1.5	-	-	-
14	Bayu	NA	130	2.0	-	-	Natural
15	Satu	NA	100	1.0	-	-	-
16	Tiga	NA	230	2.0	-	-	Natural
17	Asean	NA	260	1.5	-	-	Natural
18	Rangon	NA	270	1.0	-	-	Natural
19	Kamboja Baru	NA	190	1.5	-	-	Natural
20	Sutera	A	160	1.5	0.30	0.35	Concrete
21	Kamboja	NA	300	3.0	-	-	Natural
22	Martapura 3	NA	210	3.0	-	-	-
23	Martapura 2	NA	230	3.0	-	-	-
24	Martapura Baru	A	300	3.0	0.55	0.40	Concrete
25	Perintis 1	A	300	2.0	0.50	0.50	Concrete
26	H. Mursid 1	NA	250	2.5	-	-	-
27	H. Mursid	NA	300	1.5	-	-	-
28	Rawa Indah	A	240	2.5	0.50	0.55	Concrete
29	Garuda 1	NA	300	2.0	-	-	-
30	Garuda Baru	NA	140	2.5	-	-	-
31	Garuda II	NA	300	2.0	-	-	Natural
32	Peniti Baru	A	270	2.0	0.15	0.30	Concrete
33	Peniti 1	NA	210	3.0	-	-	Natural
34	Peniti 2	NA	240	2.5	-	-	Natural
35	Kuantan	NA	260	2.5	-	-	Natural

Table 2
Channel planning after analysis in BML village

Num	Location	Q (m^3/detik)	Fd (m^2)	d (m)	b (m)	w (m)	h (m)	P (m)
1	Indragiri	0.177	0.118	0.243	0.486	0.343	0.586	0.971
2	Mahakam	0.122	0.081	0.201	0.403	0.285	0.486	0.806
3	Pangsuma	0.119	0.079	0.199	0.399	0.282	0.481	0.797
4	Fajar	0.050	0.033	0.129	0.259	0.183	0.312	0.517
5	Kirana 2	0.064	0.042	0.146	0.291	0.206	0.352	0.582
6	Barito	0.104	0.069	0.186	0.372	0.263	0.448	0.743
7	Malaya	0.100	0.067	0.182	0.365	0.258	0.440	0.730
8	Sampit	0.057	0.038	0.138	0.276	0.195	0.333	0.552
9	Irian	0.113	0.075	0.194	0.388	0.274	0.468	0.776
10	Thaha	0.124	0.083	0.204	0.407	0.288	0.491	0.814
11	Landak	0.113	0.075	0.194	0.388	0.274	0.468	0.776
12	Aden 1	0.125	0.083	0.204	0.408	0.289	0.493	0.816
13	Aden 2	0.103	0.069	0.186	0.371	0.263	0.448	0.743

14	Bayu	0.118	0.079	0.198	0.396	0.280	0.478	0.792
15	Satu	0.124	0.083	0.204	0.407	0.288	0.491	0.814
16	Tiga	0.100	0.067	0.183	0.365	0.258	0.441	0.730
17	Asean	0.095	0.063	0.178	0.356	0.252	0.430	0.712
18	Rangon	0.093	0.062	0.176	0.352	0.249	0.425	0.704
19	Kamboja Baru	0.128	0.085	0.206	0.413	0.292	0.498	0.826
20	Sutera	0.064	0.042	0.146	0.291	0.206	0.351	0.582
21	Kamboja	0.126	0.084	0.205	0.410	0.290	0.495	0.820
22	Martapura 3	0.131	0.087	0.209	0.417	0.295	0.504	0.835
23	Martapura 2	0.137	0.091	0.214	0.427	0.302	0.516	0.855
24	Martapura Baru	0.156	0.104	0.228	0.457	0.323	0.551	0.913
25	Perintis 1	0.155	0.103	0.227	0.454	0.321	0.548	0.909
26	H. Mursid 1	0.142	0.095	0.218	0.435	0.308	0.526	0.871
27	H. Mursid	0.156	0.104	0.228	0.455	0.322	0.550	0.911
28	Rawa Indah	0.139	0.093	0.215	0.431	0.305	0.520	0.862
29	Garuda 1	0.155	0.103	0.227	0.454	0.321	0.548	0.909
30	Garuda Baru	0.105	0.070	0.187	0.373	0.264	0.451	0.746
31	Garuda II	0.155	0.103	0.227	0.454	0.321	0.548	0.909
32	Peniti Baru	0.147	0.098	0.221	0.443	0.313	0.534	0.886
33	Peniti 1	0.131	0.087	0.209	0.417	0.295	0.504	0.835
34	Peniti 2	0.139	0.093	0.215	0.431	0.305	0.520	0.862
35	Kuantan	0.145	0.097	0.220	0.440	0.311	0.531	0.879

Table 3
Determination of the type of damage and analysis of handling maintenance of the drainage system

Num	Location	Type of damage	Handling maintenance
1	Indragiri	Minor	Routine
2	Mahakam	Minor	Routine
3	Pangsuma	Minor	Routine
4	Fajar	-	Rehabilitation
5	Kirana 2	-	Rehabilitation
6	Barito	Moderate	Periodic
7	Malaya	-	Rehabilitation
8	Sampit	Minor	Routine
9	Irian	Minor	Routine
10	Thaha	-	Rehabilitation
11	Landak	Moderate	Periodic
12	Aden 1	-	Routine
13	Aden 2	-	Rehabilitation
14	Bayu	-	Routine
15	Satu	-	Rehabilitation
16	Tiga	-	Routine
17	Asean	-	Routine
18	Rangon	-	Routine
19	Kamboja Baru	-	Routine
20	Sutera	Minor	Routine
21	Kamboja	-	Routine
22	Martapura 3	-	Rehabilitation
23	Martapura 2	-	Rehabilitation
24	Martapura Baru	Moderate	Periodic
25	Perintis 1	Moderate	Periodic
26	H. Mursid 1	-	Rehabilitation
27	H. Mursid	-	Rehabilitation
28	Rawa Indah	Minor	Routine
29	Garuda 1	-	Rehabilitation
30	Garuda Baru	-	Rehabilitation
31	Garuda II	-	Routine

32	Peniti Baru	Moderate	Periodic
33	Peniti 1	-	Routine
34	Peniti 2	-	Routine
35	Kuantan	-	Routine

4 . Conclusion

Based on the analysis of the type of damage, obtained minor damage 20.00%, need a routine maintenance; moderate damage 14.29%, need a periodic maintenance, no channel drainage 34.29%, so it must to build a new channel (rehabilitation); and natural channel 31.43%, need a routine maintenance. The construction of new channels is very necessary because in the 12 locations where there are no channels, floods often occur when it rains or due to the tide of the Kapuas River.

Acknowledgments

We express our gratitude to the Pontianak State Polytechnic. This research was supported by the Pontianak State Polytechnic (Polnep). The assistance is under the 2021 Polnep DIPA research grant.

REFERENCES

Andi Nahrisa, et al. (2021). Analisis Kapasitas Drainase Sinrijala Terhadap Operasi dan pemeliharaan. *Jurnal of Applied Civil and Environmental Engineering*, 1 (1), 43-57, 2021. Politeknik Negeri Ujung Pandang, Makasar, Sulawesi Selatan.

Anonim. (2005). *Pedoman Konstruksi dan bangunan.* Pd T-14-2005-B tentang Inspeksi dan pemeliharaan drainase jalan, Departemen Pekerjaan Umum, Jakarta.

Anonim. (2015). *Peraturan Menteri Pekerjaan Umum Republik Indonesia*. No 12/PRT/M/2014 tentang penyelenggaraan system drainase perkotaan, Kementerian Pekerjaan Umum, Jakarta

Bernades H. Sitohang. (2017). Pengelolaan Sistem Drainase di Kecamatan Sungai Pinang oleh Dinas Bina Marga dan Pengairan Kota Samarinda (Studi Pemeliharaan Sistem Drainase). *Jurnal Ilmu Pemerintahan*, 5(4): 1399-1408, Fakultas Ilmu Sosial dan Ilmu Pemerintahan Universitas Mulawarman, Samarinda, Kalimantan Timur.

Erwin Kusnandar. (2016) Modul 7: *Inspeksi dan Pemeliharaan Drainase Jalan*. Diklat Penanganan Drainase jalan, Kementerian Pekerjaan Umum dan Perumahan Rakyat, Jakarta

Eva Ryanti. (2021). Kajian Analisa Konsep Penanganan drainase dalam menunjang Pengelolaan Air Pada Permukiman Tepian Sungai Kapuas Pontianak. *Jurnal Vokasi* Desember 2020, Volume XV, Nomor 2, Unit Penelitian dan Pengabdian Kepada Masyarakat Politeknik Negeri Pontianak, Pontianak.

Anfebrianita. (2019). Analisis Strategi Operasi Pemeliharaan Drainase. *Prosiding Simposium Nasional Magister* (SINMAG), Universitas Bung Hatta, Padang, Sumatra Barat.

Suripin. (2004). *Sistem Drainase Perkotaan yang Berkelanjutan*. Yogyakarta. Andi Offset.