



DRAINAGE REPORT

APPENDIX

J

REF-473



DRAINAGE REPORT - FINAL

Project: Miki Basin Industrial Park Drainage Study
Lanai City, Lanai
TMK: (2)4-9-002: 061

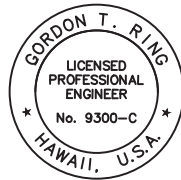
Owner: Pulama Lanai

Consultant: R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

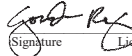
Prepared by: Gordon Ring

Checked by: Gordon Ring

Date: July 9, 2021



This work was prepared by me or under my supervision. Construction of this project will be under my observation.

 4/30/22
Signature License Expiration

1.0 PURPOSE

To determine the offsite and onsite drainage system requirements for the proposed Miki Basin Industrial Park that meets the County of Maui Storm Drainage Standards. The Miki Basin Industrial Park project is located adjacent to Miki Road, within a portion of a large parcel (TMK (2)4-9-002: 061). The project site will consist of light and heavy industrial uses. For the location of the proposed site, see Figure 1.

2.0 REFERENCES

- 2.1 *Rules for the Design of Storm Drainage Facilities in the County of Maui*, Department of Public Works and Waste Management, County of Maui, July 14, 1995.
- 2.2 LIDAR Countour Maps provided by Pulama Lanai dated December 2006.
- 2.3 Hydraflow Hydrographs Extensions for AutoCAD Program by Auto Desk dated August 2017 to February 2018.
- 2.4 *Grading and Drainage Report for Miki Basin Heavy Industrial Site*, Austin Tsutsumi & Associates, October 2015.

3.0 EXISTING SITE CONDITIONS

The proposed project site is mostly undeveloped and adjacent to the existing Miki Basin Industrial Condominium site and MECO facility. Existing improvements bordering the project site include the Miki Basin Industrial Condominium project and MECO facility. The existing onsite terrain is covered with vegetation and slopes at about 5% from Miki Road toward the southeast. There is no existing storm drain system within the project area. Runoff collected in Drain Area (DA) 1 and 2 of the project site flows into existing natural drainage ways and discharges into the existing Miki Basin sump, located approximately 2000 feet away (see Figure 2). Runoff collected in Drain Area 3 flows to the existing Palawai Basin.

Southeast of the proposed 100 acre heavy industrial area are the Miki Basin Industrial CPR and an existing MECO facility (see Figure 2). Runoff generated within the existing Miki Basin Industrial CPR site is collected by an onsite drainage system and is discharged offsite. Runoff from the Miki Basin Industrial CPR site will not impact the proposed development since it has a separate discharge point, located south of the heavy industrial area. See "Grading and Drainage Report for Miki Basin Heavy Industrial Site" by Austin Tsutsumi & Associates, Inc. for drainage calculations. Offsite runoff, including runoff generated from the MECO facility, is diverted around the Miki Basin Industrial CPR site (within the heavy industrial area) and is discharged into the existing drainage way. These existing offsite flows will need to be addressed by the development of the heavy industrial area.

Offsite runoff generated from the area north of Miki Road sheet flows and is intercepted by an unlined ditch along Miki Road (see Figure 2). Once in the unlined ditch, the runoff flows towards the southeast direction to a low point in Miki Road, near the existing MECO facility.

4.0 PROPOSED SITE CONDITIONS

The proposed 200 acre industrial development will consist of a 65-acre light industrial area (Drain Area 1), 100-acre heavy industrial area (Drain Area 2), and a 35-acre light industrial area (Drain Area 3). The proposed development breakdown is as follows:

Proposed Use	Area (acres)
Renewable Energy Projects	127
Concrete Crushing Facility	14.5
Asphalt Plant	12.5
Other Industrial Uses	26
Infrastructure	20
Total	200

The proposed development will increase the amount of impervious area within the project. Offsite runoff will be intercepted before entering the project site by proposed drainage ditches. The drainage ditches will divert runoff around the perimeter of the project site to an

offsite discharge point downstream. Onsite runoff will be collected by a proposed underground storm drain system consisting of pipes and inlets. Runoff from 65-acre light industrial area, 100-acre heavy industrial area, and DA Offsite 1 through 3 will be discharged to the existing drainageway that drains to Miki Basin (see Figure 4). Runoff generated from the 35-acre light industrial area and DA Offsite 4 drain to the existing Palawai Basin.

5.0 CALCULATIONS FOR RUNOFF INCREASE

Onsite

Runoff flow rates for areas less than 100 acres were calculated for a 10-year, 1-hour storm event using the rational method for the existing and proposed site conditions of Drain Area 1 and Drain Area 3. The runoff flow rate for a 100-year, 24-hour storm event were calculated using the SCS method for the existing and proposed site conditions of Drain Area 2 since the drainage area is 100 acres. See Tables 1 and 2 for a summary of the existing and proposed runoff quantities. The proposed industrial park will increase the runoff generated within the project site by 141.36 cfs (see Table 3).

Offsite

Runoff flow rates for a 100-year, 24-hour storm event were calculated using the SCS method for the existing site conditions of DA Offsite 1 and DA Offsite 2, since these offsite areas are greater than 100 acres. Runoff flow rates for a 10-year, 1-hour storm event were calculated using the rational method for the existing and proposed site conditions of DA Offsite 3 and DA Offsite 4, since these offsite areas are less than 100 acres. See Tables 1 and 2 for the existing and proposed runoff quantities.

Runoff generated from areas DA Offsite 1, 2, and 4 will be collected by interceptor ditches located along the project site exterior boundary and will ultimately discharge into the existing drainageway south of the project site and to Miki Basin per existing conditions. Offsite runoff for DA Offsite 3 will be diverted under Miki Road by a culvert and around the existing Miki Basin Warehouse area. Runoff from DA Offsite 3 will be discharged into an existing offsite drainageway adjacent to the industrial CPR site. Therefore, the offsite runoff will not affect the design of the onsite drain systems.

At a depth of 10 feet, the existing Miki Basin has a capacity of 891 ac-ft. Since the increase in runoff from Drain Area 1 and Drain Area 2 only contributes 8.7 acre-feet, the increase in runoff depth and flow rate will be contained within the existing basin. See Table 4 for the volume summary.

At a depth of 10 feet, the existing Palawai Basin has a capacity of 3010 ac-ft. Since the increase in runoff from Drain Area 3 contributes only 2.5 acre-feet, the increase in runoff depth and flow rate will be contained within the existing basin. See Table 4 for the volume summary.

Table 1 – Existing Runoff Quantities

Drainage Area Name	Area (Acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
DA 1*	65.0	87.36	-
DA 2**	100.0	-	529.9
DA 3*	32.6	25.56	-
DA OFFSITE 1**	165.8	-	337.7
DA OFFSITE 2**	78.2	-	159.4
DA OFFSITE 3*	88.5	71.86	-
DA OFFSITE 4*	8.6	11.56	-
Total		196.34	1027.0

* Calculated using Rational Method

**Calculated using SCS Method

Table 2 – Proposed Runoff Quantities

Drainage Area Name	Area (Acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
DA 1*	65.0	106.1	-
DA 2**	100.0	-	566.1
DA 3*	35.0	112.00	-
DA OFFSITE 1**	165.8	-	337.7
DA OFFSITE 2**	78.2	-	159.4
DA OFFSITE 3*	86.1	69.9	-
DA OFFSITE 4*	8.6	11.6	-
Total		299.6	1063.20

* Calculated using Rational Method

**Calculated using SCS Method

Table 3 – Runoff Summary

Drainage Area Name	Existing Q (cfs)	Proposed Q (cfs)	Increase in Q (cfs)
DA 1	87.36	106.1	18.72
DA 2	529.9	566.10	36.2
DA 3	25.56	112.00	86.44
		Total	141.36

Table 4 – Volume Summary

Drainage Area Name	Existing Volume (ac-ft)	Proposed Volume (ac-ft)	Increase in Volume (ac-ft)
DA 1 + DA 2 (to Miki Basin)	74.9	83.6	8.7
DA 3 (to Palawai Basin)	3.2	5.7	2.5

6.0 STORM WATER MANAGEMENT

Existing drainage patterns will be maintained by discharging intercepted offsite runoff to its original flow path. Offsite runoff will be collected by interceptor ditches located on the perimeter of the site that discharge to existing drainage way and ultimately to Miki Basin (see Figure 4). The proposed concrete rectangular drainage ditches vary in size from 8 feet by 8 feet to 2 feet by 3 feet. The ditches are sized to accommodate the peak runoff flow from the 100-yr, 24-hour storm and 10-yr, 1-hour storm where necessary and provide a minimum 2-foot freeboard.

Runoff from the proposed 65-acre light industrial area (Drain Area 1) will be discharged to the interceptor ditch at the southwest corner of the area (see Figure 4). Runoff flow for this area is 106.1 cfs and ultimately flows to Miki Basin. Offsite runoff from DA Offsite 1 flowing towards the 65-acre area is 337.70 cfs and will be intercepted by a 6 ft. by 6 ft. interceptor ditch on the north perimeter of the area.

Runoff from the proposed 100-acre heavy industrial area (Drain Area 2) will be discharged at the south end of the area (see Figure 4). Runoff flow for this area is 566.1 cfs. The runoff from DA Offsite 3 that is diverted around the existing Miki Basin Industrial site is also discharged at the south end of the area. Runoff flow for DA Offsite 3 is 69.91 cfs. Both the runoff flow from the proposed 100-acre site and the DA Offsite 3 flow to Miki Basin. Design of the drainage system for the 100-acre site should consider the impacts of incorporating the existing flows into the proposed drainage system versus keeping them separate. Offsite runoff from DA Offsite 2 flowing towards the 100-acre area is 159.35 cfs and will be intercepted an 8 ft. by 8 ft. interceptor ditch on the west perimeter of the area.

Runoff from the proposed 35-acre light industrial area (Drain Area 3) will be discharged at the eastern side of the area (see Figure 4). Onsite runoff flow for this area is 112.00 cfs and ultimately flows to Palawai Basin. Offsite runoff south of the 35-acre area from DA Offsite 4 will be intercepted by a 2 ft. by 3ft. interceptor ditch on the south perimeter of the area and will discharge to Palawai Basin. Runoff flow for the offsite area is 11.56 cfs.

The increase in onsite runoff volume from Drain Area 1 and Drain Area 2 will be conveyed to the existing drainage way and can be easily accommodated in the existing Miki Basin. The additional runoff volume is negligible compared to the available basin capacity. The increase in onsite runoff volume from Drain Area 3 will be conveyed to the existing Palawai Basin. The additional runoff volume is negligible compared to the available basin capacity.

Storm water treatment will not be provided for this project since the runoff flows into an existing offsite sump with no outlet to the ocean.

7.0 CONCLUSION

The development of the proposed industrial park will increase the runoff onsite by 141.36 cfs (see Table 3). The additional flow generated within the proposed project can be accommodated by the existing Miki Basin and Palawai Basin. Therefore, the proposed 200-acre industrial development will not have an adverse impact on any existing downstream properties.

