POST-CONSTRUCTION BMP RETROFIT FEASIBILITY STUDY SCOPE

PREPARED FOR:

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DEPARTMENT OF TRANSPORTATION
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MĀLAMA I KE KAI - PROTECT OUR HARBOR WATERS

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LIST OF ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
CD	Consent Decree
Harbors	Harbors Division
HDOT	Hawaii Department of Transportation
KBPH	Kalaeloa Barbers Point Harbor
MS4	Municipal Separate Storm Sewer System
POPC	Pollutants of Potential Concern
SLAMM	Source Loading and Management Model
SUSTAIN	System for Urban Stormwater Treatment and Analysis Integration
TMDL	Total Maximum Daily Load
WTM	Watershed Treatment Model

1.0 INTRODUCTION

The Hawaii Department of Transportation (HDOT) Harbors Division (Harbors) received and operates under a small municipal separate storm sewer system (MS4) permit for each of Honolulu Harbor (permit# HI 03KB482) and Kalaeloa Barbers Point Harbor (KBPH) (permit# HI 03KB488). This plan details the scope of the Post-Construction BMP Retrofit Feasibility Study.

1.1 BACKGROUND

This document is created to comply fully with the Consent Decree, section VI, item 18.a.iii. (November 5, 2014). Retrofits include new installations or upgrades to existing Best Management Practices (BMPs) in developed areas if there is a lack of adequate stormwater treatment. Stormwater retrofit goals may include, among other things, the correction of prior design or performance deficiencies, flood mitigation, disconnecting impervious areas, improving recharge and infiltration performance, addressing pollutants of concern, demonstrating new technologies and supporting stream restoration activities.

1.2 OBJECTIVES

A widely accepted approach to stormwater retrofitting at the small watershed scale has been developed by the Center for Watershed Protection and is summarized below[1]:

1. Evaluate local need and capacity for retrofitting in your MS4. Determine if your jurisdiction falls within TMDL watersheds and identify your pollutant reduction requirements. If there are redevelopment projects in the planning stage, identify any federal, state and local requirements for improving on-site stormwater management.
2. Using GIS, institutional knowledge and blueprints as appropriate, identify potential retrofit locations at publicly-owned properties (e.g., parks, schools and municipal maintenance yards), street rights-of-way, culverts/outfalls and existing detention practices. Target large parking lots, rooftops or other impervious areas (public or privately-owned) that lack stormwater management and are considered directly connected to the MS4. Identify sites that are prone to flooding, chronic contamination and/or have a high maintenance burden.
3. Conduct a retrofit investigation by visiting each location to verify current conditions and identify potential retrofit treatment options and constraints. Use this opportunity to verify if impervious cover on site is or is not directly connected to the MS4. Eliminate sites where retrofitting is impractical due to existing constraints (e.g., land use, environmental conditions, presence of utilities or other limitations).
4. Develop an inventory of potential retrofit candidates with illustrative concept sketches, site photos and basic drainage calculations.

[1] Tom Shueler et al., *Urban Stormwater Retrofit Practices* (Version 1.0, July 2007).

5. Evaluate and rank retrofit concepts based on predetermined factors such as pollutant reduction requirements, BMP feasibility and performance, impervious cover disconnection, cost, visibility, property ownership and community support.
6. Model watershed treatment benefits for various implementation scenarios to help determine the most cost-effective approaches to implementation. There are a number of existing public models that could be used to assist in the evaluation of implementation scenarios, such as the Center for Watershed Protection's Watershed Treatment Model (WTM), Pitt and Voorhees' Source Loading and Management Model (SLAMM) or the EPA's new System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN). These models can be downloaded at www.cwp.org; www.winslamm.com/; and www.epa.gov/ednnrmrl/models/sustain/index.html.
7. Take the top projects to final design and construction stages. Allow additional time to complete site surveys, necessary state and local permitting, contractor bidding and specifications, and, in some cases, to generate public support. The time required to secure implementation funding will likely vary depending on the primary source of funds.
8. Provide inspection and maintenance services for the life of the retrofit. Establish a BMP tracking system to ensure long-term maintenance of existing and retrofitted facilities.

1.3 RETROFIT STUDY DETAILS

While all retrofit sites are unique and no single solution fits all, in general, preferred practices are those that provide for increased infiltration, evapotranspiration and rainwater harvesting because these practices reduce stormwater runoff volume while also providing water quality benefits.

Retrofits that provide for infiltration (e.g., infiltration basins and trenches, bioretention systems, rain gardens and swales) where little or no infiltration currently exists are likely to improve site hydrology.

The study will consider retrofitting existing BMPs to maximize pollutant removal. The retrofitting of dry detention ponds, for instance, may provide the most cost-effective approach to capture and treat large drainage areas.

2.0 RETROFIT FEASIBILITY STUDY RANKING SYSTEM

"HDOT-Harbors shall develop a ranking system based on water quality improvements, suitability (e.g., land area), economic value, and cost analysis for all projects identified in the inventory." – Consent Decree (November 05, 2014).

It is important to rank the potential retrofits identified during the retrofit feasibility study in order to achieve the greatest return on investment during the implementation phase. To realize this goal the following criteria are proposed:

2.1 WATER QUALITY IMPROVEMENTS

Two major water bodies within Harbors jurisdiction are Honolulu Harbor and KBPH. The Hawaii Department of Health (HDOH) lists Honolulu Harbor as impaired water for nutrients, trash, turbidity and NH4 (HDOH, 2013).

Currently, the KBPH has not been fully assessed. No state Total Maximum Daily Loads (TMDL) have been established for either harbor. Urban runoff from a developed site has the potential to contribute pollutants, including trash, oil and grease, suspended solids, metals, gasoline, pesticides and pathogens to the stormwater conveyance system and receiving waters.

The pollutants that may be generated at a site are related to land use. Pollutants of potential concern (POPC) include sediment, trash and debris, metals, organic compounds, nutrients, oxygen demanding substances, oil and grease, bacteria and viruses, and pesticides. The retrofit study will include these POPCs and recommend BMPs to reduce their impact with a focus on the identified impairments to Honolulu Harbor and KBPH.

The water quality volume will be quantified for each proposed BMP to determine the theoretical impact on water quality. Pre and post retrofit calculations will be compared to determine the net effect of the retrofit. Each evaluated BMP will be compared against each other and ranked based on calculated water quality improvement potential.

2.2 SUITABILITY (E.G., LAND AREA)

The suitability of post-construction BMPs is essential to ensure functionality once the feature is implemented. The follow are some of the criteria to be used to determine suitability:

- Infiltration rates of the soils in the area;
- Groundwater elevation (including tidal and seasonal maximums if known);
- Known man-made plumes or contaminated soils;
- A site with high potential for concentrated pollutant/chemical spills based on previous utilization or other such indicators;
- Availability of hydraulic head to support BMP operation by gravity;
- Site is up-gradient of known shallow landslide-prone area;
- Proximity to groundwater well;
- Proximity to septic system;

- Proximity to building foundation;
- Proximity to retaining wall;
- Proximity to property line;
- Proximity to underground utilities;
- Proximity to iwi kupuna or other known archaeological resources.

2.3 ECONOMIC VALUE AND COST ANALYSIS

The economic value of post-construction BMPs will be calculated using a cost-benefit analysis. Estimates for the installed cost including operations and maintenance of each evaluated BMP will be weighed against the potential benefits. The benefits are more difficult to quantify. The following criteria will be used in an attempt to quantify the economic benefits:

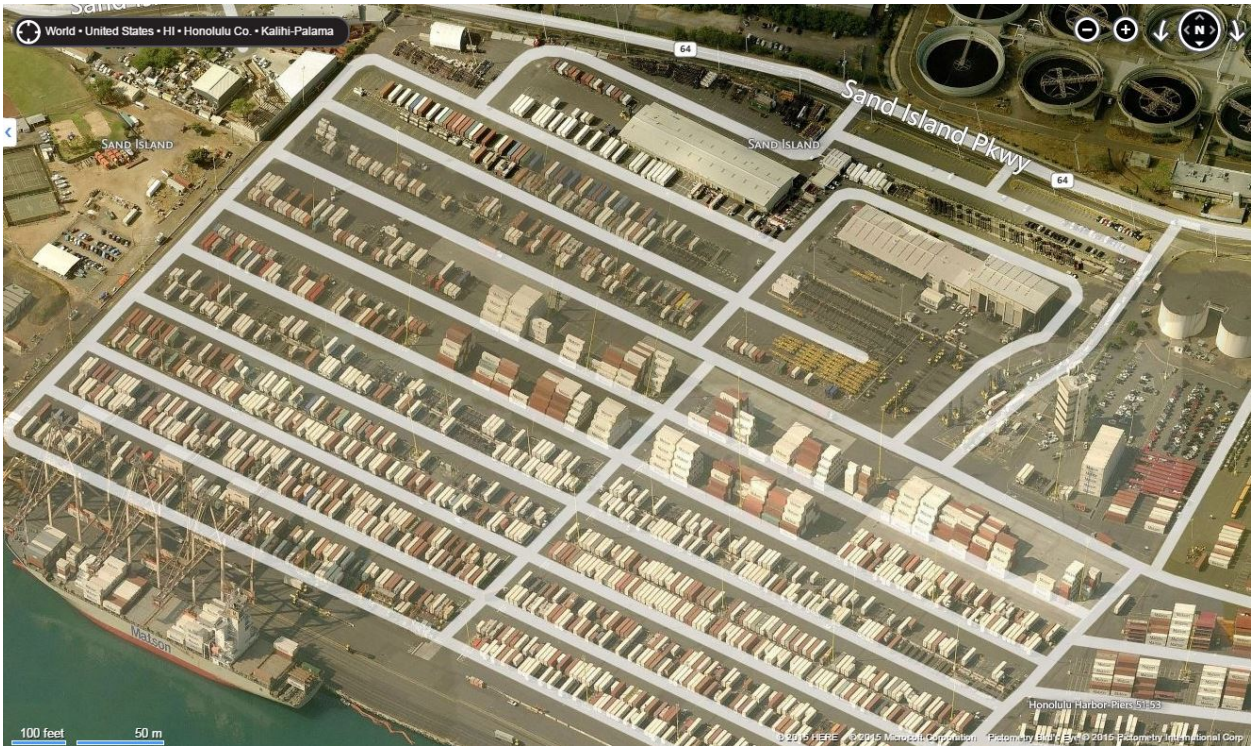
- The value of reduced flooding;
- The value of reduced cooling costs (some BMPs provide direct shade and/or reduced heat island effects);
- Value of increased amenity values;
- Value of the improvement in water quality;
- Value of increased property value.

3.0 RETROFIT STUDY CANDIDATES

3.1 PIER 52&53 CONTAINER YARD REPLACEMENT

Pavement and drainage system renovations were conducted to modernize Pier 52 and Pier 53 container yards. Figure 3-1 presents the area overview of the project location.

Figure 3-1 Pier 52&53 Container Yard Overview



The current tenant for this area is Matson, Inc. The total cost of the construction project was $23.9 Million and the 58.6 acre site is almost completely paved as is typical of an operating container yard. The stormwater flows via sheet flow to the existing MS4 drainage system which consists of trench drains and drain inlets leading to an underground piping system.

Some challenges to post-construction BMP retrofits include the low elevation of site and the requirement for high load capacity pavement thereby reducing the hydraulic gradient available for installation of treatment devices. Typical pollutants include sediment and trash.

3.2 PIER 51B CONTAINER YARD REDEVELOPMENT

Pavement and drainage system renovations were conducted to modernize Pier 51B container yard. Figure 3-2 presents the area overview of the project location.

Figure 3-2 Pier 51B Container Yard Overview

Currently, Pier 5B is operated by Pasha Hawaii. The total cost of the construction project was $22.96 Million and the 13.27 acre site is also almost completely paved as is typical of an operating container yard. The stormwater flows via sheet flow to the existing MS4 drainage system which consists of trench drains and drain inlets leading to an underground piping system.

Similar challenges to post-construction BMP retrofits include the low elevation of site and the requirement for high load capacity pavement thereby reducing the hydraulic gradient available for installation of treatment devices. Typical pollutants in this area also include sediment and trash.

3.3 KALAELOA BARBERS POINT HARBOR ACCESS ROAD

An access road was built at KBPH connecting the existing road on the south side of the Harbor to the facilities on the north side. Figure 3-3 presents the area overview of the project location.

Figure 3-3 Kalaeloa Barbers Point Harbor Access Road

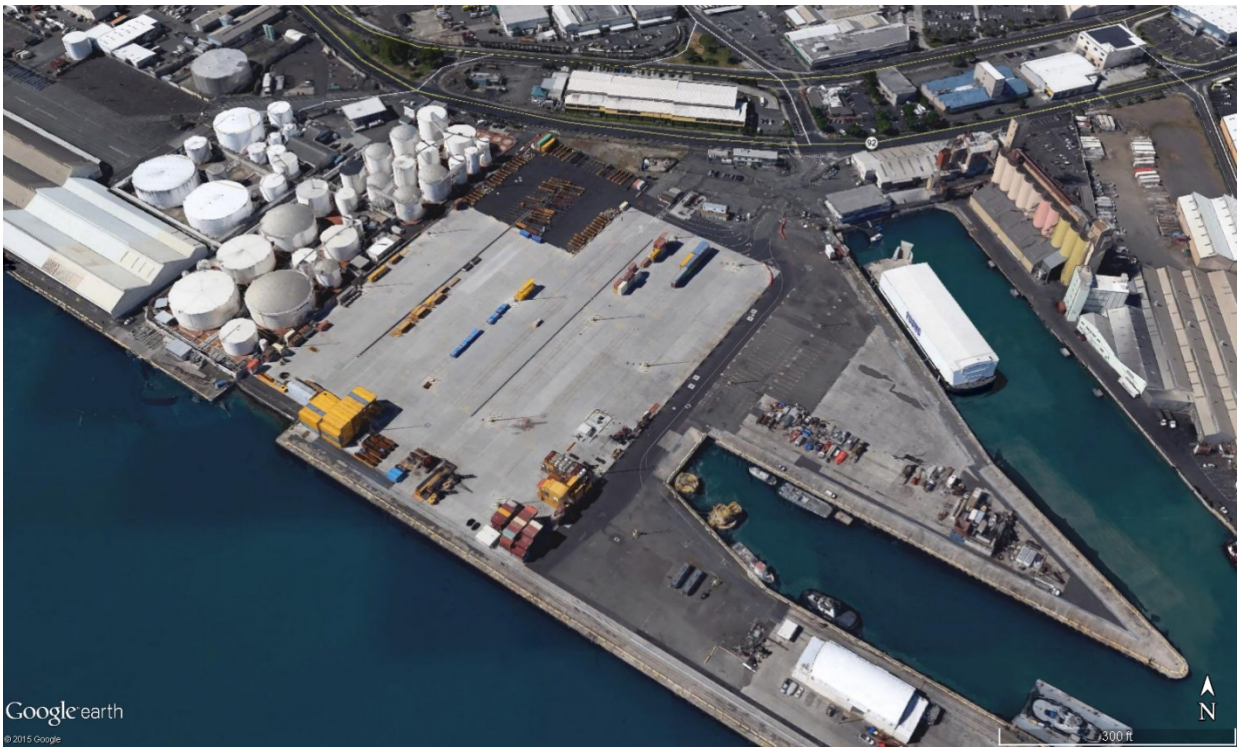
The construction area for the access road does not currently host a tenant. The total cost of the construction project was $1.66 Million and the 5.75 acre site includes 1.9 acres of impervious pavement. The stormwater flows via sheet flow to Harbor. There is currently no underground drainage system in the area.

Challenges to post-construction BMP retrofits include the low elevation of site and the groundwater elevation. Annual rainfall in the area is only 19.34” (Campbell Ind Pk 702.5, 1971-2006). There are typically only seven rainfall days per year which tend to occur during the winter months. This limits the type of vegetation that can be anticipated to survive without irrigation. There are also currently no utilities in the area including supplied water.

3.4 PIER 29 CONTAINER YARD

Renovations were conducted to convert Pier 29 into a functional container yard. Figure 3-4 presents the area overview of the project location.

Figure 3-4 Pier 29 Container Yard



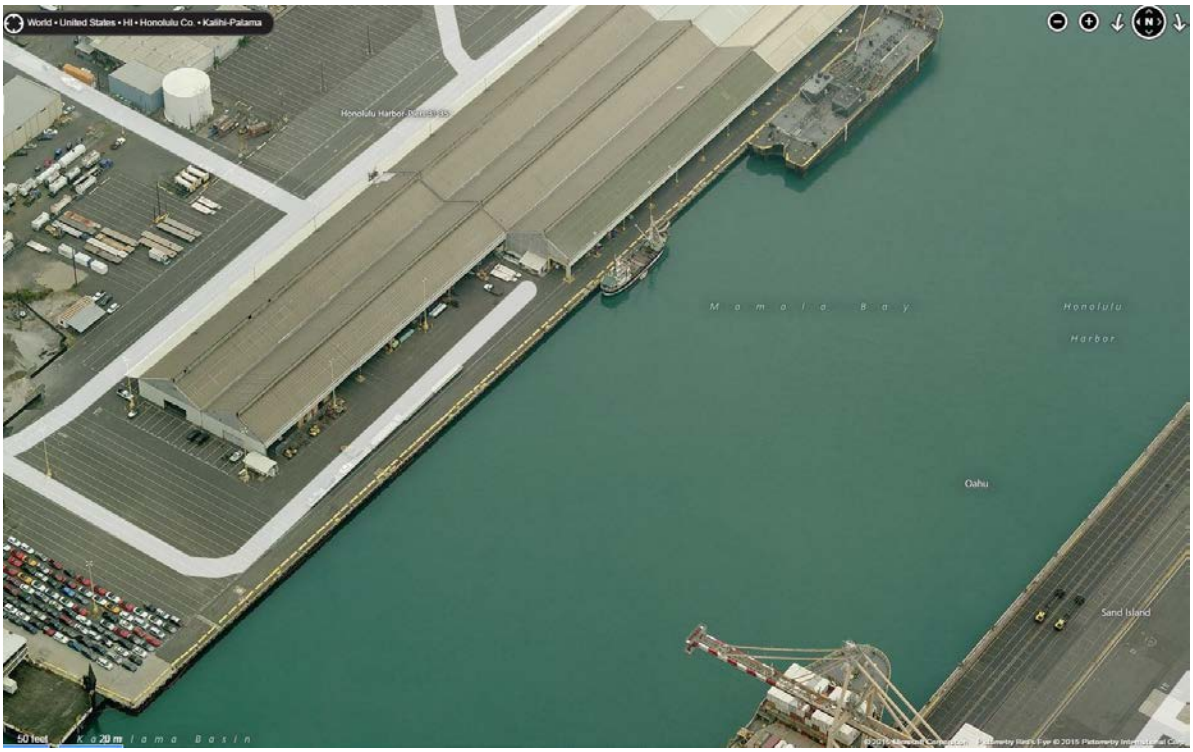
Aloha Marine Lines (formerly Aloha Cargo Transport) is the current tenant at the Pier 29 facility. The total cost of the site renovation was $30.1 Million and the 12.21 acre container yard includes about 10.12 acres of impervious pavement. The stormwater flows via sheet flow to a drainage system consisting of trench drains and drain inlets. The trench drains and several drain inlets have an existing post-construction BMP which filters sediment and trash from the runoff. Maintenance of the filtration system has been identified as a labor intensive process in part due to the trench drain grating anchoring system.

Challenges in this area include the low elevation of the site and groundwater elevation. Pavement capacity requirements also limit the available hydraulic elevation for filtration. Portions of the area are impacted by underground petroleum contamination. Documentation of the site conditions will be requested from lwilei District Participating Parties, LLC (IDPP) and the Hawaii Department of Health (HDOH) as part of the retrofit analysis.

3.5 PIER 31 SHED DEMOLITION

A building structure was demolished and pavement installed along the Pier 31 waterfront. Figure 3-5 presents the area overview of the project location. The photo in Figure 3-5 was taken prior to the demolition. An updated photo of the location was not available at the time of this report.

Figure 3-5 Pier 31 Shed Demolition



Matson, Inc. is the current tenant at the Pier 31 facility. The total cost of the site renovation was $4.5 Million and the 1.5 acre site is completely paved. The stormwater flows via sheet flow to a drainage system consisting of trench drains. The trench drains run through underground piping to outfalls at the bulkheads.

Challenges in this area include the low elevation of the site and groundwater elevation. Pavement capacity requirements also limit the available hydraulic elevation for filtration. Significant square footage of roofing still exists with exposed piping running along the support structure.

3.6 UNITED FISHING AGENCY

United Fishing Agency leased the land at Pier 38 and has since developed the site to accommodate their fish auction business. Figure 3-6 presents the area overview of the project location.

Figure 3-6 United Fishing Agency

United Fishing Agency developed the 1.69 acre site for a total cost of $2.42 Million. The site is completely paved or covered with the building footprint except for a few small strips of vegetation along the southeast side of the building. The stormwater flows via sheet flow to a drainage system consisting of trench drains along three sides of the building. The northeast side of the building does not have significant operations and drains to a single drain inlet. The concrete paved shipping bays on the northwest side of the building drain via trench drains to two scale interceptors which are house underground.

Challenges in this area include the low elevation of the site and groundwater elevation. Environmental impacts in the area will be evaluated. The existing scale interceptor system will also be evaluated during the retrofit study.

3.7 GLP ASPHALT

An asphalt terminal facility was installed at KBPH. Figure 3-7 presents the area overview of the project location.

Figure 3-7 GLP Asphalt

GLP Asphalt leases a site at KBPH on which a 4.3 acre asphalt terminal facility was constructed for $2.42 Million. 3.8 acres of the site is paved or otherwise impervious. Drainage at the site is retained in a containment basin with an approximate capacity of 1.4 Million cubic feet of water.

The containment basin has a capacity of over 10 Million gallons. The drainage at the site will be evaluated during the retrofit study. If there are any areas outside of the containment basin, retrofit recommendations will likely focus on those areas. Source control will also be evaluated.

3.8 AMERON FACILITY

Pier 60 is the location of the Ameron facility which includes loading, unloading, stockpiling, storage, transfer and distribution of rock aggregates and sand. Figure 3-8 presents the area overview of the project location.

Figure 3-8 Pier 52&53 Container Yard Overview

Ameron leases a 6.5 acre site at Pier 60 near Honolulu Harbor for their rock aggregate and sand operations. The cost of renovations to the site was approximately $2.42 Million. Drainage at the site sheet flows to retention ponds at the northwest and southwest corners of the facility.

Challenges in this area include the low elevation of the site and groundwater elevation. The location, drainage patterns and volume of the retention ponds will be evaluated during the retrofit study. There is also a perimeter berm at the site which will be measured and evaluated.

4.0 IMPLEMENTATION SCHEDULE

"A final feasibility study shall be submitted no later than 240 days after EPA's and HDOH's approval of the scope of the feasibility study." – Consent Decree (November 05, 2014)

Upon receipt of approval of the scope of the feasibility study by the EPA and HDOH, HDOT Harbors will initiate the study and submit to EPA and HDOH within 240 days. Upon approval of the final feasibility study by the EPA, Harbors will start budgeting for the construction of the three highest ranked projects. If there are delays beyond Harbors control that prevent the start of construction of any of the projects, Harbors will submit a revised schedule to EPA and HDOH.

APPENDIX A
INVENTORY OF NEW DEVELOPMENT AND REDEVELOPMENT PROJECTS

INVENTORY OF NEW DEVELOPMENT AND REDEVELOPMENT PROJECTS
HAWAII DEPARTMENT OF TRANSPORTATION - HARBORS DIVSION
TENANT PROJECTS

Identifier	Name	Location	Acreage	Impervious Area	Total Cost	Flow Pathway	Associated Outfall	Current Tenant (if applicable)	Description of Activity	Post-Construction BMPs (if none, must state "none")
H-03-17 HIR10E214 HIR10A870	United Fishing Agency (Leased land developed by tenant)	Pier 38	1.69	1.69	$2.42 Million	Sheet flow to trench drains; flow through existing storm sewer to Honolulu Harbor	LAT:21deg19min01sec N LONG:157deg52min35sec W, LAT:21deg18min54.9sec N LONG:157deg52min38.2sec W, LAT:21deg18min55.3sec N LONG:157deg52min37.7sec W, LAT:21deg18min56sec N LONG:157deg52min38sec W, LAT:21deg18min56sec N LONG:157deg52min37sec W, LAT:21deg18min57sec N LONG:157deg52min37sec W, LAT:21deg19min00sec N LONG:157deg52min35sec W, LAT:21deg19min01sec N LONG:157deg52min35sec W	United Fishing Agency	Building Space. For the construction, installation, operation, use, maintenance, and repair of improvements necessary for the fish auction, seafood diner and ancillary uses and products.	Grate inlet skimmer boxes and trench drain filters; used during construction, none in post-construction.
HIR21A117 HI0021075	GLP Asphalt	KBPH	4.3	3.8	$6.6 Million	Sheet flow to onsite storage; overflow to Kalaeloa Harbor	LAT:21deg18min54sec N LONG:158deg07min08sec W	GLP Asphalt	Asphalt Terminal Facility	Containment basin with a retention volume of approximately 1.4 million cubic feet of water.
HIR10C904	Ameron Facility	Pier 60	6.5	0	$2.42 Million	Sheet flow to onsite storage; overflow to Honolulu Harbor	LAT:21deg19min30sec N LONG:157deg53min41sec W	Ameron	Loading, unloading, stockpiling, storage, transfer and distribution of rock aggregates and sand	Retention Ponds

INVENTORY OF NEW DEVELOPMENT AND REDEVELOPMENT PROJECTS
HAWAII DEPARTMENT OF TRANSPORTATION - HARBORS DIVSION
HARBORS PROJECTS

Identifier	Name	Location	Acreage	Impervious Area	Total Cost	Flow Pathway	Associated Outfall	Current Tenant (if applicable)	Description of Activity	Post-Construction BMPs (if none, must state "none")
HC 1971	Pier 52&53 Container Yard Redevelopment	Pier 52&53	58.6	58.6	$23.9 Million	Sheet flow to existing HDOT drainage system	LAT:21deg18min59sec N LONG:157deg53min01sec W, LAT:21deg18min57sec N LONG:157deg52min57sec W	Matson	Container Yard Redevelopment	None identified; Drain inlet geofabric treatment controls per NPDES (temporary).
HC 10185	Pier 51B Container Yard Redevelopment	Pier 51B	13.27	13.27	$22.96 Million	Sheet flow to existing HDOT drainage system	LAT:21deg19min00sec N LONG:157deg53min07sec W, LAT:21deg19min00sec N LONG:157deg53min09sec W, LAT:21deg19min00sec N LONG:157deg53min12sec W, LAT:21deg19min00sec N LONG:157deg13min53sec W,	Pasha Hawaii	Container Yard Redevelopment	None identified.
HC 10340	Kalaeloa Bar Point Harbor Access Road	KBPH Access Road	5.75	1.9	$1.66 Million	Sheet flow to Kalaeloa Harbor	LAT:21deg19min43sec N LONG:158deg06min58sec W	None	Access Road Paving	None identified.
HC 10354	Pier 29	Pier 29	12.21	10.12	$30.1 Million	Sheet flow to existing HDOT drainage system	LAT:21deg18min55sec N LONG:157deg52min23sec W, LAT:21deg18min51sec N LONG:157deg52min34sec W, LAT:21deg18min50sec N LONG:157deg52min27sec W	Aloha Marine Lines (formerly Aloha Cargo Transport, ACT)	Container Yard Redevelopment	Filter soxx and inlet/outlet protectors identified as treatment control with recurring replacement requirements.
HC 10515	Pier 31	Pier 31	1.5	1.5	$4.5 Million	Sheet flow to Honolulu Harbor	LAT:21deg18min42sec N LONG:157deg52min28sec W	Matson	Building Redevelopment	None identified; dry sweeping of the lot per NPDES identified as preventative control.