# Victoria Ward Redevelopment

# Sewer Master Plan Update

Kaka'ako Mauka, Honolulu, Hawai'i

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### **ACRONYMS**

CIPP Cured In Place Pipe

City City and County of Honolulu

DDC Department of Design and Construction
DPP Department of Planning and Permitting
ENV Department of Environmental Services

ESMH Existing Sewer Manhole gad Gallons per acre per day gpcd Gallon per capita per day

HCDA Hawai'i Community Development Authority

I/I Infiltration/Inflow

KCDD Kaka'ako Community Development District

LF Linear feet

mgd Million gallons per day Plan Sewer Master Plan

Project Victoria Ward Redevelopment RCP Reinforced Concrete Pipe SCA Sewer Connection Application

SMH Sewer Manhole

3010952 City sewer id number

sf Square feet
TCP Teracotta Pipe
TMK Tax Map Key
VCP Vitrified Clay Pipe
VWL Victoria Ward Limited

WWB Department of Planning and Permitting, Wastewater Branch

WWPS Wastewater Pump Station
WWTP Wastewater Treatment Plant

#### **EXECUTIVE SUMMARY**

Victoria Ward, Ltd. (VWL) is creating a master planned, mixed-use urban neighborhood on approximately 60 acres in the Kakaʻako Mauka area on the island of Oʻahu. The project will be built in five phases consisting of approximately 6,150 residential units, and approximately 1 million square feet of retail and restaurant space. Construction of the project began in 2014 and is anticipated to be completed by 2027.

VICTORIA WARD, LTD. PROJECT PHASES				
Project Phase & Block	Anticipated Completion			
Phase 1				
Block C East	2016			
Block K	2017			
Block M	2018			
Block O	2019			
Phase 2				
Block N East	2020			
Block I	2021			
Victoria Park	2021			
Block C West	2021			
Phase 3				
Block A	2022			
Block G East	2022			
Block F West	2022			
Block F East	2023			
Phase 4				
Block B East	2023			
Block B West	2024			
Block G West	2024			
Block N West	2024			
Phase 5				
Block D	2025			
Block H North	2026			
Block H South	2026			
Block E West	2027			

An analysis of the existing downstream City and County of Honolulu ("City") conveyance system was performed to evaluate the necessary improvements to support each phase of the development. The evaluation was based on three components:

- 1. The city design standard peak flows generated by each block of the proposed development programming.
- Information from the city INFIX Adjusted model that records the hydraulic capacity of the sewer system serving the Project Area. The model includes an inventory of the types and sizes of pipe segments comprising the system as well as the wastewater flow conditions of the system in 1995 (then existing condition) and projected to 2020.
- 3. Hydraulic pipe capacity of sewer main segments that could be affected by surcharge from the Project Area blocks.

It is recommended that some improvements to the existing city sewer system be made to accommodate certain blocks within the Project Area. These include replacing a portion of the East End Relief sewer main, installing new sewer mains, and installing new sewer laterals. A summarization of improvements per each block is described as follows:

	PROPOSED SEWER IMPROVEMENTS BY PHASE							
Project Phase	Block	Projected Design Sewer Peak Flow	Proposed Sewer Improvements	Anticipated Sewer Improvement Completion Date				
Phase 1	Block C East	0.300 mgd	New 10-inch lateral from block to existing Kamakee Street 48-inch main at existing SMH 3010952.	2016				
	Block K	0.412 mgd	New 12-inch lateral from block to existing Kamakee Street 36-inch main at existing SMH 4075941.	2017				
	Block M	0.962 mgd	New 16-inch lateral from block to existing Kamakee Street 36-inch main at new SMH.	2018				
	Block O	0.507 mgd	New Ward Avenue 24-inch main from upstream existing SMH 342321 to downstream existing Auahi Street 78-inch main at existing SMH 379890.  New 12-inch lateral from block to new Ward Avenue 24-inch main.	2019				

(CON	TINUED) PR	OPOSED SEWER	IMPROVEMENTS BY P	HASE
Project Phase	Block	Projected Design Sewer Peak Flow	Proposed Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 2	Block N East	0.870 mgd	New 12-inch lateral from block to existing Cummins Street 48-inch East End Relief main at existing SMH 379795.	2020
	Block I	2.146 mgd	New Auahi Street 24-inch main to existing Auahi Street 48-inch East End Relief main at existing SMH 379979.  New 12-inch lateral from block to new Auahi Street 24-inch main.	2021
	Victoria Park	0.000 mgd	None.	2021
	Block C West	0.466 mgd	New 12-inch lateral from block to new Auahi Street 24-inch main.	2021
Phase 3	Block A	0.524 mgd	New Auahi Street 12-inch main to new Phase 1 Ward Avenue 24-inch main. New 12-inch lateral from block to new Auahi Street	2022
	Block G East	1.302 mgd	12-inch main.  New Pohukaina Street 12-inch main to new Phase 1 Ward Avenue 24-inch main.  New 12-inch lateral from block to new Pohukaina Street 12-inch main.	2022
	Block F West	0.609 mgd 0.640 mgd	New Auahi Street 12-inch main extension of new Auahi Street 12-inch main. New 12-inch lateral from block to new Auahi Street 12-inch main extension. New 12-inch lateral to new	2022
Phase 4	Block B East	0.448 mgd	Auahi Street 12-inch main.  New 12-inch lateral to new Phase 2 Auahi Street 24- inch main.	2023

(CON	TINUED) PF	ROPOSED SEWER	IMPROVEMENTS BY PI	HASE
Project Phase	Block	Projected Design Sewer Peak Flow	Proposed Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 4 (continued)	Block B West	0.352 mgd	New 12-inch lateral to existing Auahi Street 48-inch main at new SMH.	2024
	Block G West	1.303 mgd	New Pohukaina Street 12- inch main extension of new Phase 3 Pohukaina Street 12-inch main.  New 12-inch lateral from block to new Pohukaina Street 12-inch main extension.	2024
	Block N West	0.876 mgd	New Ward Avenue 48-inch East End Relief main from upstream Queen Street 48-inch East End Relief main to downstream Auahi Street 48-inch East End Relief main.	2024
Phase 5	Block D	0.376 mgd	New Auahi Street 18-inch main to existing 36-inch Kamakee Street main at existing SMH 380287.  New 12-inch lateral from block to new Auahi Street 18-inch main.	2025
	Block H North	0.939 mgd	New 12-inch lateral from block to new Phase 4 Ward Avenue 48-inch East End Relief main.	2026
	Block H South	1.076 mgd	New 12-inch lateral from block to existing 48-inch East End Relief main on Auahi Street.	2026
	Block E West	0.367 mgd	New Auahi Street 18-inch main extension of new 18- inch Auahi Street main.	2027
			New 12-inch lateral from block to new Auahi Street 18-inch main.	

Individual Sewer Connection Applications will be submitted to the city Department of Planning and Permitting (DPP) for each block within each phase. This Plan serves as a guide for the overall sewer infrastructure development and will be updated as project phases are completed. VWL and its consultants will coordinate these updates with DPP Wastewater Branch (WWB) and the Department of Environmental Services (ENV).

### 1. INTRODUCTION

VWL is in the process of redeveloping approximately 60 acres in the Kaka'ako area of Honolulu on the island of Oahu. The Victoria Ward Redevelopment Project ("Project" and "Project Area") is generally bounded by Ala Moana Boulevard to the south, Queen Street to the north, Cooke Street to the west and Queen Lane to the east. Major streets through the Project Area include Ward Avenue and Kamakee Street in the north-south (mauka-makai) direction and Auahi Street and Halekauwila Street in the east-west (Diamond Head-Ewa) direction. The Project Area will be developed with uses for residential, retail, restaurant, parking and parks in five phases. Construction began in 2014 with anticipated completion in 2027.

The DPP WWB requested that the previously prepared May 2013 Sewer Master Plan ("Plan") for the Project be updated to reflect the current development programming and recommended VWL sewer system infrastructure improvements to support each phase of completion. An analysis of the estimated wastewater flows generated by each block in the Project Area in addition to the current and future capacities of the City systems were utilized to determine locations of deficiency that require improvements. Any changes to the project phase scheduling, development programming and construction start dates will require notification of WWB, which may in turn require further revision and resubmittal of this Sewer Master Plan.

#### 2. VICTORIA WARD REDEVELOPMENT

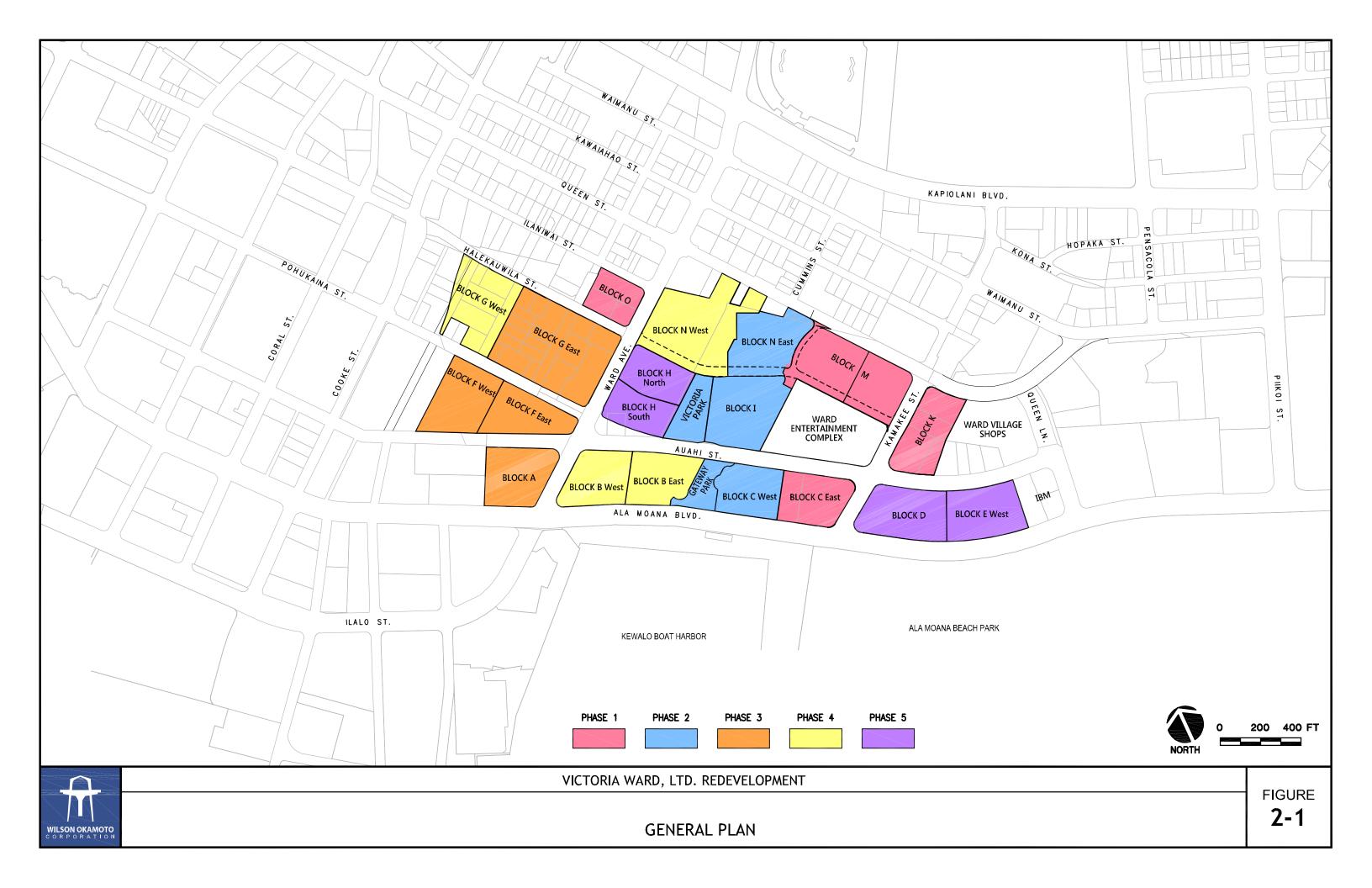
The Project Area is located within the Kaka'ako Community Development District (KCDD) of Honolulu, which is under the jurisdiction of the Hawai'i Community Development Authority (HCDA)—a State agency established to oversee the renewal and development of designated community districts. The KCDD Mauka and Makai Area Plans and Rules are the guiding documents for the redevelopment of the KCDD into a mixed-use and pedestrian-oriented urban community.

Guided by the Mauka Area Plan and the current Draft Transit Oriented Development Overlay Plan (May 20, 2013), VWL is in the process of redeveloping approximately 60 acres of the Victoria Ward properties as a mixed-use urban neighborhood that includes high-rise and low-rise residences, retail, dining, recreation and entertainment. The redevelopment plan also incorporates pedestrian-friendly and transit-oriented design elements, sustainable design strategies, and open space.

### 2.1 Phase Descriptions

The Project is currently proceeding in five phases into which various specific projects identified as blocks have been divided. Table 2-1 presents the phases, the blocks associated with each phase and the anticipated completion years. A description of each block is summarized below and illustrated in Figure 2-1.

TABLE 2-1 VICTORIA WARD DEVELOPMENT PHASE	S
	Anticipated Completion
Phase 1 – Blocks C East, K, M and O	2016-2019
Phase 2 – Blocks N East, I, Victoria Park and C West	2020-2021
Phase 3 – Blocks A, G East, F West and F East	2022-2023
Phase 4 – Blocks B East, B West, G West and N West	2023-2024
Phase 5 – Blocks D, H North, H South and E West	2025-2027



### 2.1.1 Phase 1 – Blocks C East, K, M and O

Block C East

TMK: 2-3-001: 001 & 004
Former Use: Parking lot (demolished)

Adjoining Streets/Uses: Auahi Street, Ward Warehouse Shopping Center, Ala

Moana Boulevard, and Kamakee Street

Proposed Use: 37-story condominium and ground level retail building Anticipated Completion: Under construction since 2014, anticipated

completion 2016

Sewer Connection: Auahi Street – sewer connection application approved

under No. 2015/SCA-0046 (see Appendix A)

Block K

TMK: 2-3-005: 013, 017,019 & 022

Former Use: Pier One Imports and parking (demolished)

Adjoining Streets/Uses: Queen Street, Kamakee Street, Auahi Street, and

Ward Village Shops

Proposed Use: 39-story condominium and ground level retail building

Anticipated Completion: Under construction since 2015, anticipated

completion 2017

Sewer Connection: Kamakee Street – sewer connection application

approved under No. 2015/SCA-0260 (see Appendix

A)

Block M

TMK: 2-3-002: 001

Former Use: Office Depot, Nordstrom Rack and parking

(demolished)

Adjoining Streets/Uses: Queen Street, warehouses, Ward Entertainment

Complex, and Kamakee Street

Proposed Use: 41-story condominium and ground level retail and

restaurant building

Anticipated Completion: Under construction 2016, anticipated completion 2018

Sewer Connection: Kamakee Street - sewer connection application

approved under No. 2014/SCA-0686 (see Appendix

A). Updated application currently under review.

Block O

TMK: 2-1-050: 001, 061 & 062

Current Use: Various office, retail (Pacific Home) and restaurant

(Kanpai Bar & Grill, and California Rock'n Sushi)

Adjoining Streets/Uses: Ilaniwai Street, Kauhale Kakaako Apartments,

Halekauwila Street, and Ward Avenue

Proposed Use: 44-story condominium and ground level retail building

Anticipated Completion: Anticipated construction start 2016, anticipated

completion 2019

Sewer Connection: Auahi Street – sewer connection application approved

under No. 2015/SCA-0813 (see Appendix A)

### 2.1.2 Phase 2 - Blocks N East, I, Victoria Park and C West

Block N East

TMK: 2-3-002: 001 Current Use: Warehouses

Adjoining Streets/Uses: Queen Street, Ross Dress for Less, Marukai Market

Place and warehouses, and Block M – under construction (formerly Office Depot/Nordstrom Rack

and parking)

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2019, anticipated

completion 2020

Sewer Connection: Cummins Street – sewer connection application

currently under review

Block I

TMK: 2-3-002: 001

Current Use: Marukai Market Place, parking (portion) and

warehouses (portion)

Adjoining Streets/Uses: Marukai Market Place (portion), warehouses (portion),

Auahi Street, and Ward Entertainment Complex

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2019, anticipated

completion 2021

Sewer Connection: Auahi Street – sewer connection application currently

under review

Victoria Park

TMK: 2-3-002: 001

Current Use: Marukai Market Place and parking (portion),

warehouses (portion)

Adjoining Streets/Uses: Marukai Market Place and parking (portion),

warehouses (portion), Auahi Street, Sports Authority Starbuck's Coffee, Jamba Juice, Wahoo's Fish Taco

and parking

Proposed Use: Park

Anticipated Completion: Anticipated construction start 2020, anticipated

completion 2021

Sewer Connection: None

Block C West

TMK: 2-3-001: 005

Current Use: Ward Warehouse (portion)

Adjoining Streets/Uses: Auahi Street, Ward Warehouse (portion), Ala Moana

Boulevard, and Block C East (under construction)

Proposed Use: 28-story condominium and ground level restaurant

building

Anticipated Completion: Anticipated construction start 2019, anticipated

completion 2021

Sewer Connection: Auahi Street – sewer connection application currently

under review

### 2.1.3 Phase 3 - Blocks A, G East, F West and F East

Block A

TMK: 2-1-056: 001

Current Use: Ward Plaza office building

Adjoining Streets/Uses: Auahi Street, office building and car dealership, Ala

Moana Boulevard, and Ward Avenue

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2020, anticipated

completion 2022

Sewer Connection: Auahi Street – proposed

Block G East

TMK: 2-1-052: 012, 020, 022, 024, 027, 028, 031, 032, 011,

033, 040, 052, 039, 051, 038, 034, 036, 035, and 053

Current Use: Low-rise retail and office buildings and parking

Adjoining Streets/Uses: Halekauwila Street, Ahui Street, Pohukaina Street,

and Ward Avenue

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2020, anticipated

completion 2022

Sewer Connection: Pohukaina Street - proposed

Block F West

TMK: 2-1-053: 001

Current Use: Retail and office buildings

Adjoining Streets/Uses: Pohukaina Street, UFC Gym Honolulu, Auahi Street,

and Kamani Street

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2020, anticipated

completion 2022

Sewer Connection: Auahi Street - proposed

Block F East

TMK: 2-1-053: 001, 030

Current Use: Retail and office buildings

Adjoining Streets/Uses: Pohukaina Street, retail and office buildings, Auahi

Street, and Ward Avenue

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2021, anticipated

completion 2023

Sewer Connection: Auahi Street - proposed

### 2.1.4 Phase 4 – Blocks B East, B West, G West and N West

**Block B East** 

TMK: 2-3-001: 005

Current Use: Ward Warehouse (portion)

Adjoining Streets/Uses: Auahi Street, Ala Moana Boulevard, and Ward

Warehouse (portion)

Proposed Use: 35-story condominium and ground level restaurant

building

Anticipated Completion: Anticipated construction start 2021, anticipated

completion 2023

Sewer Connection: Auahi Street – sewer connection application currently

under review

**Block B West** 

TMK: 2-3-001: 005

Current Use: Ward Warehouse (portion)

Adjoining Streets/Uses: Auahi Street, Ward Avenue, Ala Moana Boulevard,

and Ward Warehouse (portion)

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2022, anticipated

completion 2024

Sewer Connection: Auahi Street – proposed

**Block G West** 

TMK: 2-1-052: 017, 022, 042, 043, 045, and 046 Current Use: Retail and office buildings, parking lot

Adjoining Streets/Uses: Halekauwila Street, Koula Street, Pohukaina Street,

and Ahui Street

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2022, anticipated

completion 2024

Sewer Connection: Pohukaina Street – proposed

Block N West

TMK: 2-3-002: 059, 067, 086, 087 Current Use: Ross Dress for Less, parking lot

Adjoining Streets/Uses: Queen Street and TMK 2-3-002: 057 and 58, Ward

Avenue, Sports Authority, and warehouses

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2022, anticipated

completion 2024

Sewer Connection: Ward Avenue – proposed

### 2.1.5 Phase 5 – Blocks D, H North, H South and E West

Block D

TMK: 2-3-005: 006

Current Use: Ward Centre (portion)

Adjoining Streets/Uses: Auahi Street, Kamakee Street, Ala Moana Boulevard,

and Ward Centre (portion)

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2023, anticipated

completion 2025

Sewer Connection: Ala Moana Boulevard – proposed

Block H North

TMK: 2-3-002: 002 and 059 Current Use: Sports Authority

Adjoining Streets/Uses: Ross Dress for Less, Ward Avenue, Marukai Market

Place and parking lot

Proposed Use: Condominium and ground level retail and restaurant

buildina

Anticipated Completion: Anticipated construction start 2024, anticipated

completion 2026

Sewer Connection: Ward Avenue – proposed

Block H South

TMK: 2-3-002: 002 and 059 Current Use: Sports Authority

Adjoining Streets/Uses: Ward Avenue, Auahi Street, Marukai Market Place

and parking lot

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2024, anticipated

completion 2026

Sewer Connection: Ward Avenue – proposed

Block E West

TMK: 2-3-005: 006

Current Use: Ward Centre (portion)

Adjoining Streets/Uses: Auahi Street, Ward Centre (portion), Ala Moana

Boulevard, IBM building

Proposed Use: Condominium and ground level retail and restaurant

building

Anticipated Completion: Anticipated construction start 2025, anticipated

completion 2027

Sewer Connection: Auahi Street – proposed

#### 3. EXISTING SEWER SYSTEM

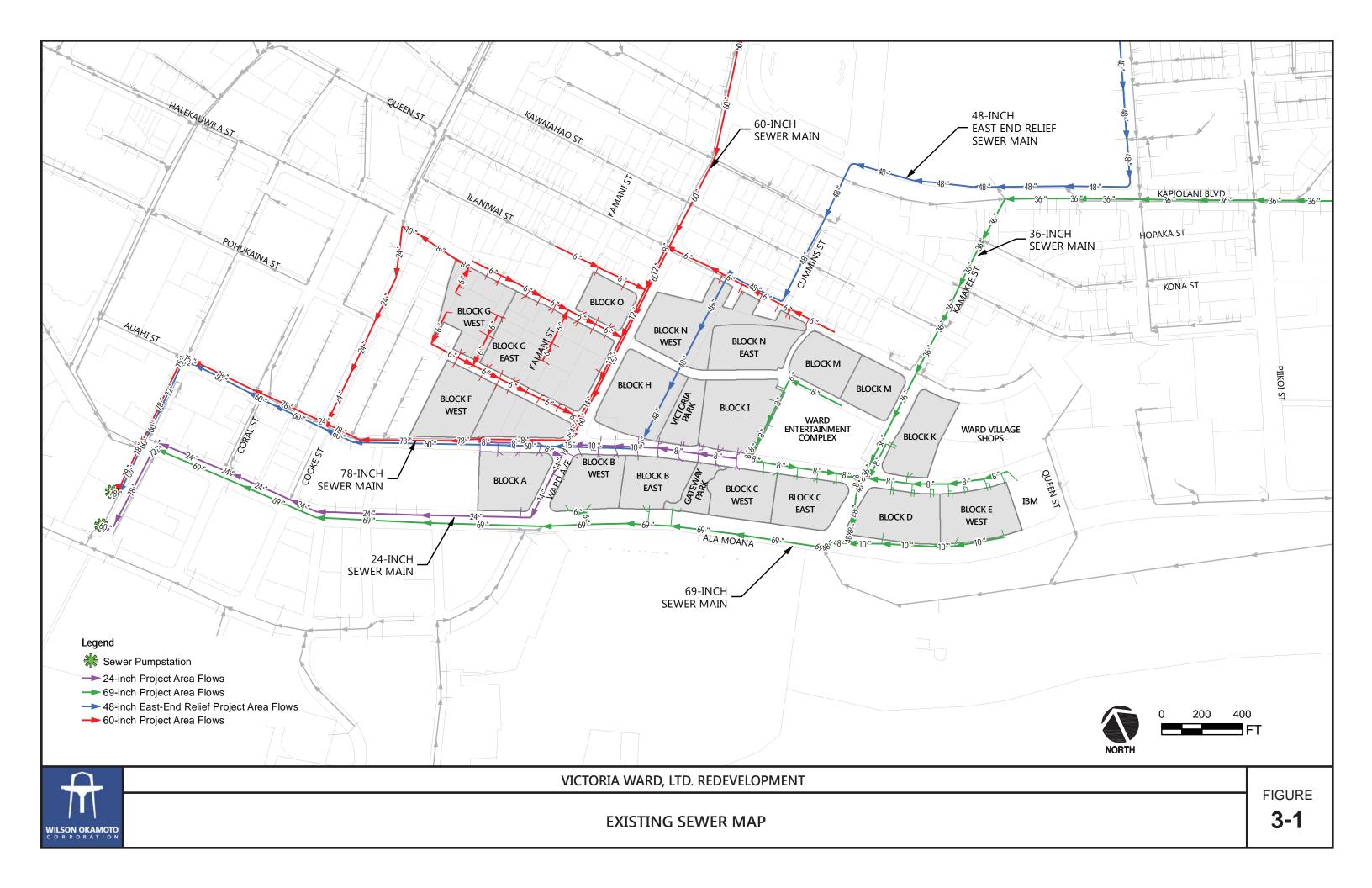
The Project Area is part of the City and County of Honolulu ENV East Mamala Bay Sewerage District, which encompasses approximately 79 square miles extending from Salt Lake/Aliamanu Crater/Red Hill area in the west to Niu Valley in the east. All wastewater within the district is served by the Sand Island Wastewater Treatment Plant (WWTP) through fifteen (15) different wastewater pump stations. The Ala Moana Wastewater Pump Station (WWPS), located on Keawe Street and makai of Ala Moana Boulevard, collects wastewater flow from the Project Area in Kaka'ako to Pauoa/Dowsett Highlands in the west to Niu Valley in the east. The Ala Moana WWPS contains two pumping stations with two force mains that operate in parallel to convey wastewater flows beneath Honolulu Harbor to the Sand Island WWTP for treatment and disposal.

### 3.1 Existing Sewer Collection System Serving Project Phase Areas

Wastewater generated from the Project Area is collected by several 6-inch sewer laterals that flow into a network of gravity collector and trunk sewer mains that convey water to the Ala Moana WWPS. The sewer mains consist of reinforced concrete pipes (RCP), vitrified clay pipes (VCP), terracotta pipes (TCP), cured in place pipes (CIPP), and slip-lined pipes that range in size from 6-inches to 78-inches in diameter. Four (4) major trunk sewer mains currently serve the Project Area downstream:

- 1. A 69-inch sewer main flowing northwest on Ala Moana Boulevard collects flows via sewer laterals and a 48-inch sewer main on Kamakee Street from the southeastern end and some makai portions of the Project Area up to Ward Avenue.
- 2. A 24-inch sewer main flowing northwest on Ala Moana Boulevard collects flows via a 14-inch sewer main on Ward Avenue from the Project Area parcels along Auahi Street, on either side of Ward Avenue.
- 3. A 78-inch sewer main flowing northwest on Auahi Street collects flows via a 14-inch sewer main and a 60-inch sewer main on Ward Avenue from the mauka and northern portion of the Project Area along Queen Street, Ward Avenue, Ilaniwai Street, Halekauwila Street and Pohukaina Street.
- 4. A sewer main referred to as the "East End Relief" traverses the Project Area, entering from the northeast mid-block east of Ward Avenue as a 48-inch sewer which then turns northwest at Auahi Street and changes in size before continuing as a 60-inch sewer main. Within the Project Area, the only development served by this main is the Sports Authority.

A map of the overall existing sewer system is illustrated in Figure 3-1. A more detailed description of the existing sewer system and the Project blocks they serve is provided in the following sections.



#### 3.1.1 69-inch Sewer Main on Ala Moana Boulevard

Wastewater flows from the southeastern end and some makai portions of the Project Area are collected by a 69-inch RCP sewer main that conveys wastewater northwest along Ala Moana Boulevard to the Ala Moana WWPS. The 69-inch RCP sewer main receives flows directly from sewer laterals located on the makai portion of Ward Centre and from a 48-inch RCP sewer main flowing in the makai direction along Kamakee Street. Downstream, the 69-inch RCP sewer main converges with a 24-inch CIPP sewer main near the intersection of Ala Moana Boulevard and Keawe Street. At this point, the combined wastewater flow is discharged into a 78-inch RCP sewer main on Keawe Street that conveys it directly to the WWPS.

The 48-inch RCP sewer main flowing in the makai direction on Kamakee Street receives wastewater from three 8-inch VCP collector sewer mains near the intersection of Kamakee Street and Auahi Street. The 8-inch main running along the interior northern and northeastern edge of the Ward Entertainment Center collects flows from Blocks M, I (Ward Industrial Gateway), C West (portion of Ward Warehouse), and C East before turning southeast and discharging into the 48-inch main on Kamakee Street. The 8-inch VCP sewer main flowing northwest on Auahi Street collects flows from the former IBM Building, and Blocks D, E West (Ward Centre) and Block K before discharging into the 48-inch main on Kamakee Street. The 8-inch VCP sewer main extending a short distance in the mauka direction on Kamakee Street from the 48-inch sewer main only serves Block K. A 36-inch CIPP sewer main on Kamakee Street also discharges into the 48-inch RCP sewer main, but it does not currently serve parcels the existing Project Area.

The 48-inch RCP sewer main also receives wastewater from a 10-inch CIPP sewer main on Ala Moana Boulevard that serves the makai portions of Block D and E West (Ward Centre). The 10-inch CIPP sewer main discharges into the 48-inch RCP sewer main near the intersection of Kamakee Street and Ala Moana Boulevard.

After receiving flows from the 48-inch RCP sewer main, the 69-inch sewer main continues northwest along Ala Moana Boulevard and receives wastewater from three laterals serving the Ward Warehouse complex, which comprises Blocks C West, Gateway Park and Blocks B East, and B West, all of which are currently occupied by the Ward Warehouse.

#### 3.1.2 24-inch Sewer Main on Ala Moana Boulevard

Wastewater flows from the parcels along Auahi Street, on either side of Ward Avenue, are collected by a 24-inch CIPP sewer main that conveys wastewater northwest along Ala Moana Boulevard to the Ala Moana WWPS. The 24-inch CIPP sewer main receives flows directly from a sewer lateral located on the makai side of Block A (Ward Plaza) and from a 14-inch CIPP sewer main extending in the mauka direction along Ward Avenue. Downstream, the 24-inch CIPP sewer main collects

wastewater from additional sewer mains outside of the Project Area before converging with the 69-inch RCP sewer main near the intersection of Ala Moana Boulevard and Keawe Street, as discussed previously. At this point wastewater is discharged into a larger 78-inch RCP sewer main on Keawe Street that conveys wastewater directly to the WWPS.

The 14-inch CIPP sewer main extending in the mauka direction on Ward Avenue accepts wastewater from an 8-inch VCP sewer main from the northwest and a short segment of a 15-inch VCP sewer main that immediately transitions to a 10-inch VCP sewer main from the southeast along Auahi Street. The 8-inch VCP sewer main from the northwest serves the mauka side of Block A (Ward Plaza) while the 10-inch VCP sewer main collects flows from the mauka side of Blocks B West, and B East (portion of Ward Warehouse) and Block H (Sports Authority and Wahoo's Fish Taco/Starbuck's Coffee/Jamba Juice). Continuing southeast on Auahi, the 10-inch VCP sewer main further reduces into an 8-inch VCP sewer main collecting flows from the mauka side of Blocks B East and B West (portion of Ward Warehouse) and Block I and Victoria Park (Ward Industrial Gateway).

#### 3.1.3 78-inch Sewer Main on Auahi Street

Wastewater flows from the mauka and northern portion of the Project Area along Queen Street, Ward Avenue, Ilaniwai Street, Halekauwila Street and Pohukaina Street are collected by a 78-inch RCP sewer main that conveys wastewater northwest along Auahi Street to the Ala Moana WWPS. The 78-inch RCP sewer main receives flows from a short segment of a 15-inch VCP sewer main that immediately transitions to a 14-inch TCP sewer main that receives flows between Queen Street and Auahi Street on Ward Avenue. A 60-inch RCP sewer main on Ward Avenue also discharges into the 78-inch RCP sewer main, but it does not currently serve parcels in the existing Project Area.

At the upstream end of the Project Area, a 12-inch TCP sewer main on Ward Avenue receives flows from a 6-inch TCP sewer main extending southeast on Queen Street to serve Blocks N West and N East. Farther downstream on the 12-inch TCP sewer main, a 6-inch TCP extending northwest on Ilaniwai Street serves the mauka side of Block O. Continuing downstream of the 12-inch TCP sewer main, a 6-inch TCP sewer main extending northwest on Halekauwila Street serves the mauka side of Blocks G East and G West, and the makai side of Block O. Even farther downstream, the 12-inch TCP sewer main enlarges to the 14-inch TCP midway to the Pohukaina Street intersection. At the intersection, it receives flows from a 6-inch TCP sewer main extending northwest to collect flows from various office, retail and restaurant buildings on the makai side of Blocks G East, G West, and the mauka side of Blocks F East and F West.

The Block G West site is additionally served by a 6-inch TCP sewer main that conveys wastewater northwest, beyond the Project Area, along Halekauwila Street

through an 8-inch sewer main and a 10-inch VCP sewer main to a 24-inch VCP sewer main located along Cooke Street. The 24-inch sewer main discharges into the 78-inch RCP sewer main near the intersection of Cooke Street and Auahi Street.

#### 3.1.4 East End Relief Sewer Main

The East End Relief sewer main enters the Project Area crossing Queen Street mid-block east of Ward Avenue as a 48-Inch RCP sewer main. It continues in the makai direction to collect wastewater flows from the Sports Authority complex in Block H before turning northwest on Auahi Street where it becomes a 42-inch slip-lined sewer main. After crossing Ward Avenue, it becomes a 60-inch slip-lined sewer main and continues toward the Ala Moana WWPS.

It should be noted that the existing 60-inch sewer main was originally a 72-inch box sewer main that was scheduled to be slip-lined with a 60-inch pipe in 2013. The project name is Ala Moana Boulevard/Auahi Street Sewer Rehabilitation Phase 2, Job No. W10-11. The slip-line sewer rehabilitation project started on Keawe Street and ended on Auahi Street at existing sewer manhole SMH 684051.

### 3.2 INFIX Adjusted Flow Model

In December 1999, the City, Department of Design and Construction (DDC), completed the *Final Sewer Infiltration and Inflow Plan (I/I Plan)* which describes the rehabilitation program that the City will be implementing over the next 20 years to address deficiencies in the City's sewer collection system. In the *Final Sewer I/I Plan,* hydraulic capacity of the sewer collection system was evaluated using numerical models that identified hydraulic deficiencies. The City developed modeling program such as XP-SWMM and a simpler static modeling program (INFIX Adjusted) available and could be utilized to evaluate the critical trunk sewers, and the less critical sewers. Results of the modeling were used to prioritize implementation of recommended improvements based on the severity of the hydraulic deficiencies in the sewer system.

Existing sewer mains serving the Project Area were evaluated by the INFIX Adjusted flow model as part of the I/I Plan for the 1995 existing condition, when it was prepared, as well as for the 2020 future condition based on projected flows. INFIX Adjusted existing and future model output runs including pipe size, peak design flow, pipe capacity and pipe surcharge percentage for the sewer systems serving the Project Area are shown in Appendix B and summarized in Tables 3-1 and 3-2. These results do not include the proposed design peak flows from the Project.

TABLE 3-1							
SEWER SYSTEM HYDRAULIC PIPE SURCHARGE % FOR INFIX ADJUSTED (1995) MODEL FLOW FOR EXISTING CONDITION							
Pipe Location	Pipe Size (inch)	INFIX (1995) Flow (mgd)*	Total Pipe Capacity (mgd)	Surcharge (%)			
Auahi St east of Kamakee St	8	0.20	0.42	48			
Auahi St west of Kamakee St	8	0.20	0.51	39			
Kamakee St	8	0.06	0.42	15			
Kamakee St	36	13.35	9.89	135- Inadequate**			
Queen Lane	30	NA	NA	NA .			
Ala Moana Blvd	10	0.44	1.00	44			
Queen St	6	0.03	0.19	16			
Ward Ave	14	0.92	2.41	38			
Ward Ave	60	83.35	67.61	123- Inadequate			
Easement under Sports Auth	48	15.89	57.00	28			
Pohukaina St	6	0.20	0.24	80			
Auahi St – East of Ward Ave	10	0.09	0.57	22			
Halekauwila St	6	0.08	0.24	34			
Ilaniwai St	6	0.08	0.24	33			
Kamani St	6	0.02	0.24	9			
Ahui St	6	0.03	0.22	12			
Ohe St	6	0.06	0.24	27			
Ala Moana Blvd	69	38.31	59.47	64			
Ala Moana Blvd	24	0.36	4.35	8			
Auahi/Keawe St	78	110.63	73.88	150- Inadequate**			
Auahi/Keawe St	72	33.77	82.72	41			
Cooke St	24	6.22	9.98	62			
Ala Moana Blvd	36	13.35	55.14	24			
Ala Moana Blvd	6	NA	NA	NA			
Queen St	10	NA	NA	NA			

NOTE: Refer to Figure 3-2 for location of inadequate sewer mains. Information for 48-inch on Kamakee Street was not available at the time.

<sup>\*</sup>Does not include proposed design peak flows from Project.

<sup>\*\*</sup>Based on INFIX Adjusted Model Run; City DPP (see 3.2.1 INFIX Adjusted Flow Model Results).

	TABLE 3-2								
SEWER SYSTEM HYDRAULIC PIPE SURCHARGE % FOR INFIX ADJUSTED									
(2020)	(2020) MODEL FLOW FOR FUTURE CONDITION								
Pipe Location	Pipe Size	INFIX (2020)	Total Pipe	Surcharge					
	(inch)	Flow (mgd)*	Capacity (mgd)	(%)					
Auahi St east of Kamakee St	8	0.24	0.42	57					
Auahi St west of Kamakee St	8	0.24	0.42	47					
Kamakee St	8	0.09	0.42	21					
Kamakee St	36	15.05	9.89	158- Inadequate**					
Queen Lane	30	15.05 NA	9.69 NA	NA					
-,		0.40	1.00	NA 40					
Ala Moana Blvd	10								
Queen St	6	0.04	0.19	21					
Ward Ave	14	0.85	2.41	23					
Ward Ave	60	83.35	67.61	123- Inadequate					
Easement under Sports Auth	48	16.56	57.00	29					
Pohukaina St	6	0.23	0.24	96					
Auahi St – East of Ward Ave	10	0.28	0.57	49					
Halekauwila St	6	0.12	0.24	50					
Ilaniwai St	6	0.09	0.24	38					
Kamani St	6	0.03	0.24	13					
Ahui St	6	0.03	0.22	14					
Ohe St	6	0.09	0.24	38					
Ala Moana Blvd	69	41.61	59.47	70					
Ala Moana Blvd	24	0.38	4.35	9					
Auahi/Keawe St	78	113.01	73.88	153- Inadequate**					
Auahi/Keawe St	72	36.87	82.72	45					
Cooke St	24	6.78	9.98	68					
Ala Moana Blvd	36	15.05	55.14	27					
Ala Moana Blvd	6	NA	NA	NA					
Queen St	10	NA	NA	NA					

NOTE: Refer to Figure 3-2 for location of inadequate sewer mains. Information for 48-inch on Kamakee Street was not available at the time.

<sup>\*</sup>Does not include proposed design peak flows from Project.

\*\* Based on INFIX Adjusted Model Run; City DPP (see 3.2.1 INFIX Adjusted Flow Model Results).

### 3.2.1 INFIX Adjusted Flow Model Results

There were three (3) sewer mains determined to be hydraulically inadequate (surcharge percentage greater than 100%) for both existing and future conditions within the Project area and downstream of the sewer system based on INFIX Adjusted model results that did not include the proposed design peak flows from the Project.

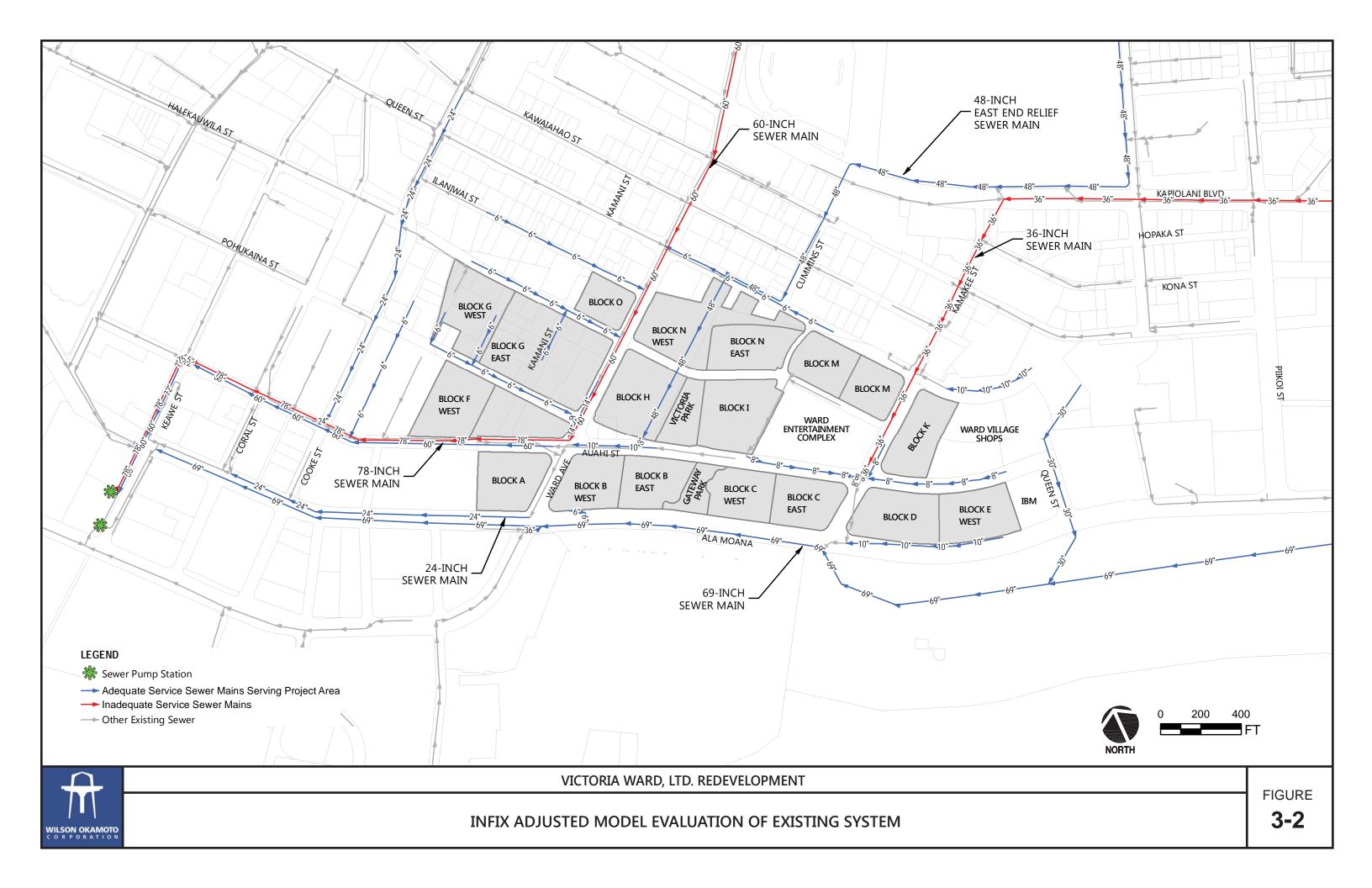
1. The existing 36-inch sewer main on Kamakee Street has a 135% and 158% surcharge under the existing and future condition, respectively. This sewer main discharges into the 69-inch sewer main on Ala Moana Boulevard and the Ala Moana WWPS. Since the existing 36-inch sewer main on Kamakee Street is surcharged, the upstream 8-inch collector sewer mains on Auahi Street and Kamakee Street and the 36-inch sewer main will not be used to accommodate future project flow.

NOTE: The DPP, Wastewater Branch using its internal flow model and calculations has determined the 36-inch and 48-inch sewer mains on Kamakee Street as having adequate pipe capacity for existing and future sewer flows. The pipe analysis used pipe capacity as-built information from a recent reconstruction project.

2. The existing 78-inch sewer main on Auahi Street and Keawe Street has a 150% and 153% surcharge under the existing and future condition, respectively. This sewer main conveys flows to the Ala Moana WWPS.

NOTE: The DPP, Wastewater Branch using its internal flow model and calculations has determined the 78-inch sewer main on Auahi Street as having adequate pipe capacity for existing and future sewer flows.

3. The existing 60-inch sewer main on Ward Avenue has a 123% surcharge under the existing and future condition. This sewer main discharges flow into the 78-inch sewer main and then to the Ala Moana WWPS. The existing 14-inch sewer main on Ward Avenue between Beretania Street and Auahi Street feeds into the 78-inch sewer main.



### 4. SEWER SYSTEM EVALUATION

An analysis of the existing wastewater collection system was done to evaluate the accommodation of the Project at full completion.

Projected design peak flows from each Project Area block were added to the INFIX Adjusted 2020 model flows at the locations where they would be received by the sewer system. The increase in total flow was then evaluated against the hydraulic pipe capacities of the sewer system for adequacy.

Four steps were involved in the evaluation process:

- 1. <u>Average Daily Flow</u>: An average daily flow, based on City design standards, was calculated for each block using the proposed block programming and assumed per capita flow generation.
- 2. <u>Design Peak Flow</u>: A design peak flow, based on City design standards, was calculated for each block by incorporating a max flow factor as well as dry and wet weather infiltration to the average daily flow.
- 3. <u>Pipe Capacity</u>: An analysis of pipe capacity was conducted using the Manning's Formula and information from the City INFIX Adjusted 2020 computer model program of the sewer systems serving the Project Area.
- 4. <u>Hydraulic Adequacy Evaluation</u>: The hydraulic capacities of pipe segments affected by surcharge from the Project Area blocks were determined based on the capacity of each affected pipe segment to convey the wastewater at a minimum flow velocity standard. A hydraulic capacity deficiency was identified when the surcharged flow exceeded the capacity of a pipe segment(s).

### 4.1 Average Daily Flow

Wastewater flows for the Project are based on the proposed development program for uses that generate wastewater. For the Project, these uses include residences, retail, and restaurants. An overview of the proposed development program, by phase and block, for these uses is shown in Table 4-1.

	TABLE 4-1 VICTORIA WARD DEVELOPMENT PROGRAM										
			Res	sidential	Units by	Bedroo	m Coun	t		Retail	Restaurant
Phase	Block	Studio	1BR	2BR	3BR	4BR	5BR	6BR	7BR	Sq. Ft.	Sq. Ft.
Phase 1	Block C East	_	26	50	84	10	5	_	_	8,505	_
Phase 1	Block K	20	93	132	67	4	2	_	_	17,000	_
Phase 1	Block M	47	182	177	60	_	_	_	_	72,073	9,326
Phase 1	Block O	_	161	187	76	_	_	_	_	30,000	_
Phase 2	Block N East	300	300	128	23	_	_	_	ı	15,000	5,000
Phase 2	Block I	240	240	96	24	_	_	_	1	37,500	37,500
Phase 2	Victoria Park	ı	ı	_	ı	_	_	_	1	ı	_
Phase 2	Block C West	ı	19	71	24	8	3	_	1	5,000	5,000
Phase 3	Block A	45	91	68	23	_	_	_	_	15,000	5,000
Phase 3	Block G East	48	72	40	_	_	_	_	_	67,500	22,500
Phase 3	Block F West	105	140	88	18	_	_	_	_	15,000	5,000
Phase 3	Block F East	93	124	78	16	_	_	_	_	18,750	6,250
Phase 4	Block B East	_	_	71	32	6	_	2		4,865	4,865
Phase 4	Block B West	35	70	52	17	_	_	_	_	7,657	2,553
Phase 4	Block G West	49	73	41		_	_	_	_	67,500	22,500
Phase 4	Block N West	240	240	120	_	_	_	_	_	22,500	7,500
Phase 5	Block D	_	54	99	27	_	_	_	_	7,500	2,500
Phase 5	Block H North	175	200	100	25	_	_	_		30,000	10,000
Phase 5	Block H South	66	132	99	33	_	_	_	_	45,000	15,000
Phase 5	Block E West	_	56	102	28	_	_	_	_	6,696	2,232

The average daily flow for each block is calculated as the sum of average daily per capita flow and all other average flows. Based on the City's *Design Standards of the Department of Wastewater Management Volume 1*, July 1993 ("Design Standards"), the calculation of average flows were based on the following assumptions:

a.	Retail	1 capita per 150 sf
		25 gallons per capita per day

b.	Restaurant	9 seatings per 20 sf
		25 gallons per capita per day

c. Residential

Jiillai	
Studio	2.0 capita per unit
One-Bedroom	2.0 capita per unit
Two-Bedroom	2.8 capita per unit
Three-Bedroom	4.0 capita per unit
Four-Bedroom	5.0 capita per unit
Five-Bedroom	6.0 capita per unit

Six-Bedroom 7.0 capita per unit Seven-Bedroom 8.0 capita per unit

80 gallons per capita per day

The resulting average daily flow for the proposed development program is summarized in Table 4-2. Detailed calculations of the average daily flow are shown in Appendix C Table 1.

### 4.2 Design Peak Flow

The design peak flow is derived from the average daily flow for each phase of the Project. As referenced from the City's Design Standards, the following factors are considered in calculating the design peak flow:

- a) Average sum of average daily per capita flow and all other average flows
- b) Maximum average flow multiplied by a maximum flow factor.
- c) Design Average average flow plus dry weather infiltration/inflow rate.
- d) Design Maximum maximum flow plus dry weather infiltration/inflow rate.
- e) Design Peak design maximum flow plus wet weather infiltration/inflow rate.

The maximum flow factor is determined by Babbit's Curve, Figure 22.2.4 of the City's Design Standards; the dry weather infiltration/inflow rate is equal to 5 gallons per capita per day (gpcd) above and 35 gpcd below normal ground water table; and the wet weather infiltration/inflow rate is equal to 1,250 gallons per acre per day (gad) above and 2,750 gad below normal ground water table.

The resulting design peak flow for the proposed development program is summarized in Table 4-2. Detailed calculations of the design peak flow are shown in Appendix C Table 2.

TABLE 4-2 WASTEWATER FLOW SUMMARY			
117.10		Average Daily Flow (mgd)	Design Peak Flow (mgd)
Phase 1 Block C East		0.050	0.300
Phase 1 Block K		0.074	0.412
Phase 1 Block M		0.212	0.962
Phase 1 Block O		0.097	0.507
	Subtotal	0.434	2.181
Phase 2 Block N East		0.191	0.870
Phase 2 Block I		0.534	2.146
Phase 2 Victoria Park		0.000	0.000
Phase 2 Block C West		0.089	0.466
	Subtotal	0.814	3.482
Phase 3 Block A		0.103	0.524
Phase 3 Block G East		0.293	1.302
Phase 3 Block F West		0.123	0.609
Phase 3 Block F East		0.131	0.640
	Subtotal	0.650	3.074
Phase 4 Block B East		0.085	0.448
Phase 4 Block B West		0.064	0.352
Phase 4 Block G West		0.293	1.303
Phase 4 Block N West		0.192	0.876
	Subtotal	0.634	2.980
Phase 5 Block D		0.069	0.376
Phase 5 Block H North		0.208	0.939
Phase 5 Block H South		0.241	1.076
Phase 5 Block E West		0.067	0.367
	Subtotal	0.584	2.758
	Total	3.116	14.475

### 4.3 Pipe Capacity

Pipe capacity is determined by multiplying the cross-sectional pipe area by the flow velocity,

$$Q = v A$$

where, Q is the pipe capacity in cubic feet per second

A is the pipe area in square feet

v is the velocity in feet per second (fps)

Velocity is determined by the Manning's Formula,

v (velocity) = 
$$\frac{1.486 \text{ R}^{\frac{2}{3}} \text{ S}^{\frac{1}{2}}}{\text{n}}$$

where, R is the hydraulic radius

S is the pipe slope in feet per feet (determined from as-built information)

n is the Manning's friction coefficient (0.013 for pipes larger than 18 inches in diameter, and 0.015 for pipes 18 inches and smaller in diameter in addition to cast in place reinforced concrete conduit)

The Design Standards stipulate that the minimum flow velocity shall not be less than 2.0 fps (feet per second) at full flow.

### 4.4 Hydraulic Adequacy Evaluation

An evaluation of hydraulic adequacy is determined by dividing the total design peak flow by the pipe capacity to calculate a surcharge percentage. The total design peak flow is the sum of the Project flows and the INFIX Adjusted 2020 model flows. Sewer mains with surcharge percentages greater than 100% are considered hydraulically inadequate, however, further evaluation by WWB and ENV in the past has led to conclusions of adequacy. See Evaluation of Existing Sewer Systems in Appendix C Table 3.

### 5. RECOMMENDATIONS

It was determined that portions of the existing sewer system are both hydraulically adequate and inadequate to convey the project flows. Therefore, it is recommended that new mains be installed to replace hydraulically inadequate parts of the system and existing mains be maintained in hydraulically adequate parts of the system; see Table 5-1 Recommended Sewer Improvements by Phase. These preliminary recommendations are based on past coordination with WWB and ENV, thus final recommendations are contingent upon current WWB and ENV review and approval in addition to field conditions as detailed in the future connection construction plans.

Sewer Connection Applications for permits will be submitted for each phase of the Project to WWB for review and approval. Completion dates and sequence order of phase development are subject to possible change by VWL. As Project phasing or programming changes are proposed by VWL, WWB shall be consulted and this Plan shall be updated by VWL when deemed necessary by the city.

TABLE 5-1 RECOMMENDED SEWER IMPROVEMENTS BY PHASE				
Project Phase	Block	Existing Sewers Initially Discharged to	Recommended Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 1	Block C East	8-inch on Auahi / 48- inch on Kamakee / 69- inch on Ala Moana	New 10-inch lateral from block to existing Kamakee Street 48-inch main at existing SMH 3010952.	2016
	Block K	8-inch on Kamakee / 48-inch on Kamakee / 69-inch on Ala Moana	New 12-inch lateral from block to existing Kamakee Street 36-inch main at existing SMH 4075941.	2017
	Block M	8-inch along NW edge of Victoria Ward Entertainment Center property / 8-inch on Auahi / 48-inch on Kamakee / 69-inch on Ala Moana	New 16-inch lateral from block to existing Kamakee Street 36-inch main at new SMH.	2018
	Block O	6-inch on Ilaniwai and 6-inch on Halekauwila / 12-inch on Ward / 14- inch on Ward / 15-inch on Ward / 78-inch on Auahi	New Ward Avenue 24- inch main from upstream existing SMH 342321 to downstream existing Auahi Street 78-inch main at existing SMH 379890.	2019

TABLE 5-1 (CONTINUED) RECOMMENDED SEWER IMPROVEMENTS BY PHASE				
Project Phase	Block	Existing Sewers Initially Discharged to	Recommended Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 1 (continued)	Block O (continued)		New 12-inch lateral from block to new Ward Avenue 24-inch main.	
Phase 2	Block N East	6-inch on Queen / 12- inch on Ward / 14-inch on Ward / 15-inch on Ward / 78-inch on Auahi	New 12-inch lateral from block to existing Cummins Street 48-inch East End Relief main at existing SMH 379795.	2020
	Block I	8-inch on Auahi / 10- inch on Auahi / 15-inch on Auahi / 14-inch on Ward / 24-inch on Ala Moana	New Auahi Street 24- inch main to existing Auahi Street 48-inch East End Relief main at existing SMH 379979. New 12-inch lateral	2021
			from block to new Auahi Street 24-inch main.	
	Victoria Park	8-inch on Auahi / 10- inch on Auahi / 15-inch on Auahi / 14-inch on Ward / 24-inch on Ala Moana	None.	2021
	Block C West	8-inch on Auahi / 48-inch on Kamakee / 69-inch on Ala Moana 8-inch on Auahi / 10-inch on Auahi / 15-inch on Auahi / 14-inch on Ward / 24-inch on Ala Moana	New 12-inch lateral from block to new Auahi Street 24-inch main.	2021
Phase 3	Block A	8-inch on Auahi / 14- inch on Ward / 24-inch on Ala Moana	New Auahi Street 12-inch main to new Phase 1 Ward Avenue 24-inch main.  New 12-inch lateral	2022
			from block to new Auahi Street 12-inch main.	

TABLE 5-1 (CONTINUED) RECOMMENDED SEWER IMPROVEMENTS BY PHASE				
Project Phase	Block	Existing Sewers Initially Discharged to	Recommended Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 3 (continued)	Block G East	6-inch that bisects property / 6-inch on Halekauwila / 12-inch on Ward / 14-inch on Ward / 15-inch on Ward / 78-inch on Auahi 6-inch on G West property / 6-inch on Pohukaina / 14-inch on Ward / 15-inch on Ward / 78-inch on Auahi	New Pohukaina Street 12-inch main to new Phase 1 Ward Avenue 24-inch main.  New 12-inch lateral from block to new Pohukaina Street 12- inch main.	2022
	Block F West	6-inch on Pohukaina / 14-inch on Ward / 15- inch on Ward / 78-inch on Auahi	New Auahi Street 12- inch main extension of new Auahi Street 12- inch main.  New 12-inch lateral from block to new Auahi Street 12-inch main extension.	2022
	Block F East	6-inch on Pohukaina / 14-inch on Ward / 15- inch on Ward / 78-inch on Auahi	New 12-inch lateral to new Auahi Street 12- inch main.	2023
Phase 4	Block B East	8-inch on Auahi / 10- inch on Auahi / 15-inch on Auahi / 14-inch on Ward / 24-inch on Ala Moana	New 12-inch lateral to new Phase 2 Auahi Street 24-inch main.	2023
	Block B West	10-inch on Auahi / 15-inch on Auahi / 14-inch on Ward / 24-inch on Ala Moana 6-inch on Ala Moana / 69-inch on Ala Moana	New 12-inch lateral to existing Auahi Street 48-inch main at new SMH.	2024

	RECOMME	TABLE 5-1 (CONT	TINUED) OVEMENTS BY PHASI	E
Project Phase	Block	Existing Sewers Initially Discharged to	Recommended Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 4 (continued)	Block G West	6-inch on Halekauwila / 12-inch on Ward / 14- inch on Ward / 15-inch on Ward / 78-inch on Auahi  Two (2) 6-inch on makai portion of G West property / 6-inch on Pohukaina / 14- inch on Ward / 15-inch on Ward / 78-inch on Auahi  6-inch on mauka portion of property / 8- inch on Halekauwila / 10-inch on	New Pohukaina Street 12-inch main extension of new Phase 3 Pohukaina Street 12- inch main.  New 12-inch lateral from block to new Pohukaina Street 12- inch main extension.	2024
	Block N West	Halekauwila / 24-inch on Cooke / 78-inch on Auahi  6-inch on Queen / 12-inch on Ward / 15-inch on Ward / 78-inch on Auahi  48-inch on property / 42-inch on Auahi / 60-inch on Auahi	New Ward Avenue 48- inch East End Relief sewer main from upstream Queen Street 48-inch East End Relief main to downstream Auahi Street 48-inch East End Relief main.	2024
Phase 5	Block D	(East End Relief)  8-inch on Auahi / 48- inch on Kamakee / 69- inch on Ala Moana  10-inch on Ala Moana / 48-inch on Ala Moana / 69-inch on Ala Moana	New Auahi Street 18- inch main to existing 36- inch Kamakee Street main at existing SMH 380287.  New 12-inch lateral from block to new Auahi Street 18-inch main.	2025
	Block H North	48-inch on property / 42-inch on Auahi / 60- inch on Auahi (East End Relief)	New 12-inch lateral from block to new Phase 4 Ward Avenue 48-inch East End Relief main.	2026

	RECOMMEN	TABLE 5-1 (CONTIDED SEWER IMPRO	TINUED) OVEMENTS BY PHASI	E
Project Phase	Block	Existing Sewers Initially Discharged to	Recommended Sewer Improvements	Anticipated Sewer Improvement Completion Date
Phase 5 (continued)	Block H South	10-inch on Auahi / 15-inch on Ward / 14-inch on Ward / 24-inch on Ala Moana  48-inch on property / 42-inch on Auahi / 60-inch on Auahi (East End Relief)	New 12-inch lateral from block to existing 48-inch East End Relief main on Auahi Street.	2026
	Block E West	8-inch on Auahi / 48- inch on Kamakee / 69- inch on Ala Moana 10-inch on Ala Moana / 48-inch on Ala Moana / 69-inch on Ala Moana	New Auahi Street 18- inch main extension of new 18-inch Auahi Street main.  New 12-inch lateral from block to new Auahi Street 18-inch main.	2027

#### 5.1 Phase Recommendations

Recommended sewer improvements for the VWL Development involve installing new connections and laterals to the existing City sewer system, replacing a portion of an existing 48-inch sewer main (East End Relief sewer main) with a new 48-inch sewer main on Ward Avenue, constructing new sewer mains, and installing new connections and laterals to those mains. Improvements will be installed in phases to meet projected wastewater design peak flows within the Project Area as development progresses towards completion.

### 5.1.1 Phase 1 – Blocks C East, K, M and O

Phase 1 involves installing a new 10-inch sewer lateral from Block C East that will connect to the existing 48-inch sewer main on Kamakee Street at existing SMH 3010952 (see Figure 5-1). A 12-inch sewer lateral originating from Block K will also be installed and connect to the exisiting 36-inch sewer main on Kamakee Street at existing SMH 4075941 (see Figure 5-2). Wastewater from both lines is collected downstream by the existing 69-inch sewer main that flows northwest along Ala Moana Boulevard. A new 16-inch sewer lateral will also be installed originating from the Block M property. The new 16-inch lateral will extend in the mauka direction and continue southeast on Queen Street until Kamakee Street. From this point, it will extend in the mauka direction and discharge to the existing 36-inch sewer main on Kamakee Street (see Figure 5-3).

Phase 1 will also involve installing a new 24-inch sewer main on Ward Avenue between Ilaniwai Street and Auahi Street. The new 24-inch sewer main will connect to the existing 78-inch sewer main that flows northwest along Auahi Street. A new 12-inch sewer lateral from Block O will be installed along Halekauwila Street and connect to the new 24-inch sewer main on Ward Avenue (see Figure 5-4).

### 5.1.2 Phase 2 – Blocks N East, I, Victoria Park and C West

Phase 2 involves installing a new 12-inch sewer lateral in the northeast corner of Block N East (warehouses) that will cross Queen Street in the mauka direction and continue northwest across Cummins Street to discharge to the existing 48-inch sewer main of the East End Relief on Cummins Street at existing SMH 379795 (see Figure 5-5).

Phase 2 will also involve installing a new 24-inch relief sewer main on Auahi Street between Ward Avenue and Kamakee Street. The 24-inch relief sewer main will discharge to the existing 48-inch sewer main of the East End Relief on Auahi Street at existing SMH 379979. Wastewater from this main is collected downstream by the existing 60-inch sewer main that flows northwest along Auahi Street to the Ala Moana WWPS. Connection to the new 24-inch main will be by new 12-inch laterals originating from Block I (Ward Industrial and Gateway), Victoria Park and Block C West (portion of Ward Warehouse) (see Figure 5-6 and 5-7).

### 5.1.3 Phase 3 – Blocks A, G East, F West and F East

Phase 3 involves installing a new 12-inch sewer lateral from Block A that extends southeast along Auahi Street (see Figure 5-8). A new 12-inch sewer lateral from Block G East will also be installed and extend southeast along Pohukaina Street (see Figure 5-9). Both mains will discharge to the new 24-inch sewer main on Ward Avenue that was constructed in Phase 1 of the Project. The 24-inch sewer main discharges downstream to the existing 78-inch sewer main that flows northwest along Auahi Street to the Ala Moana WWPS.

Phase 3 also involves installing an extension of the new 12-inch sewer main on Auahi Street in the northwest direction. Connection to the extension will be by a new 12-inch lateral from Block F West (see Figure 5-10). Block F East will also connect to the 12-inch sewer main with a new 12-inch lateral (see Figure 5-11).

### 5.1.4 Phase 4 – Blocks B East, B West, G West and N West

Phase 4 involves installing a new 12-inch sewer lateral from Block B East that will discharge to the new 24-inch sewer main on Auahi Street built in Phase 2 of the Project (see Figure 5-12). A 12-inch lateral from Block B West will also be installed and discharged to the existing 48-inch main on Auahi Street (see Figure 5-13).

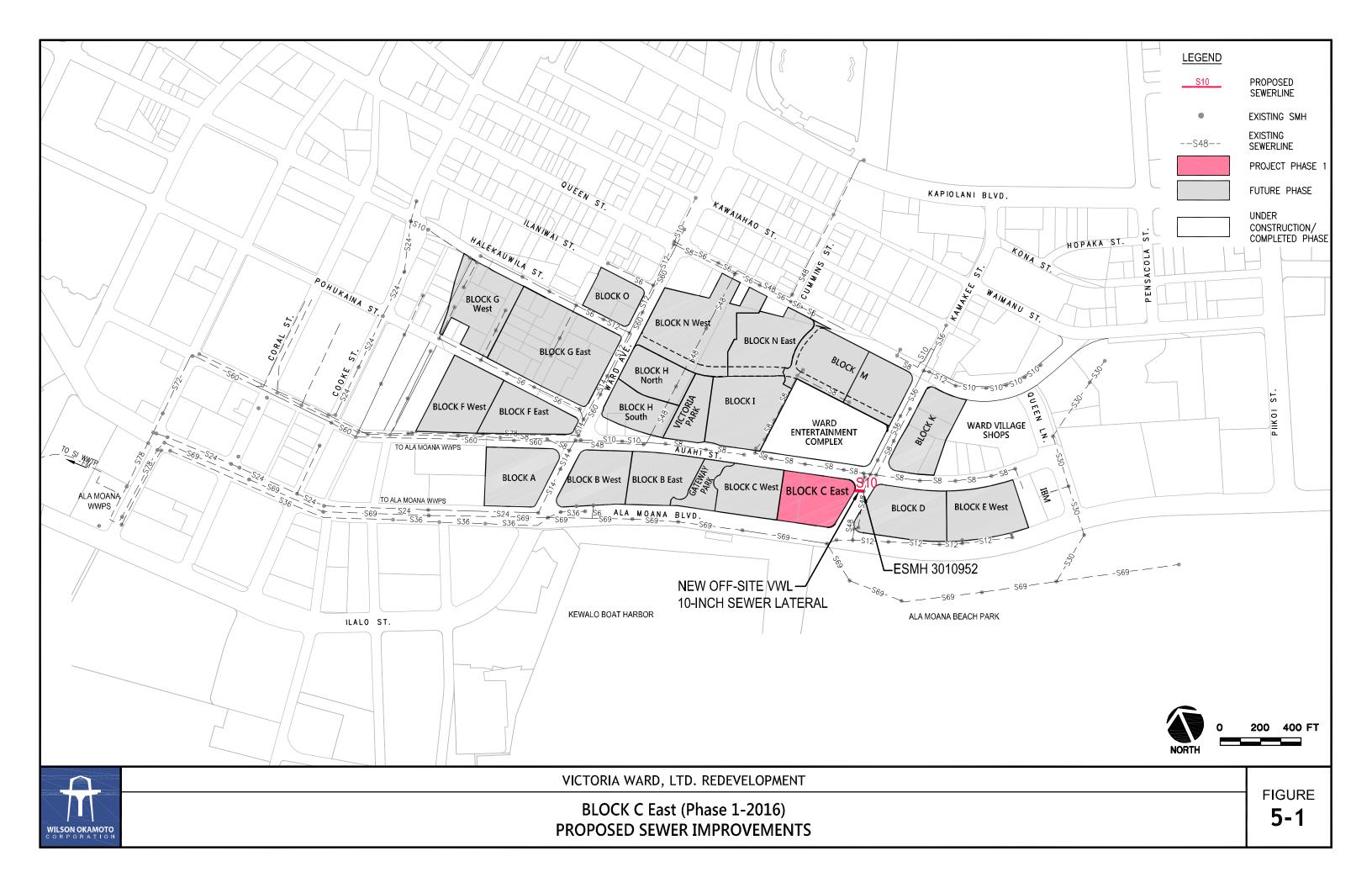
An extension of the new 12-inch sewer main on Pohukaina Street in the northwest direction, built in Phase 3 of the project, will also be installed. Connection to the extension will be by a new 12-inch lateral from Block G West (see Figure 5-14).

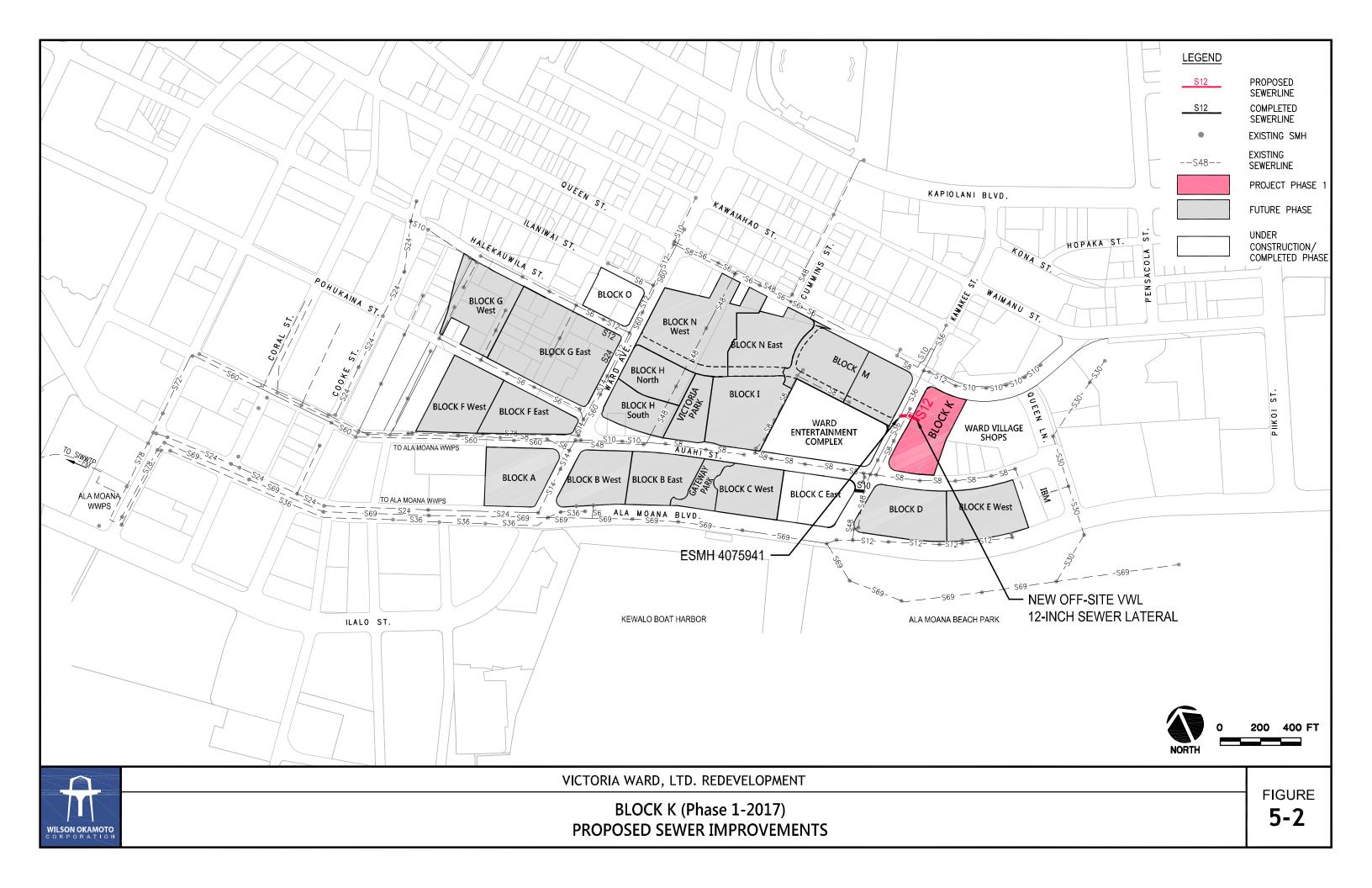
Phase 4 also involves installing a new 48-inch sewer main beginning at Queen Street, east of Ward Avenue, which will turn southwest at Ward Avenue until it reaches Auahi Street. The new main will discharge near the intersection of Ward Avenue and Auahi Street to the existing downstream 48-inch sewer main of the East End Relief on Auahi Street. The flows from this main are collected farther downstream by the 60-inch sewer main located on Auahi Street. Connection to the new 48-inch sewer main will be made from Block N West on Ward Avenue. The new 48-inch sewer will replace the portion of the existing East End Relief sewer main that bisects the Block N West and Block H properties. This portion of the existing East End Relief sewer main will be demolished and abandoned in place (see Figure 5-15).

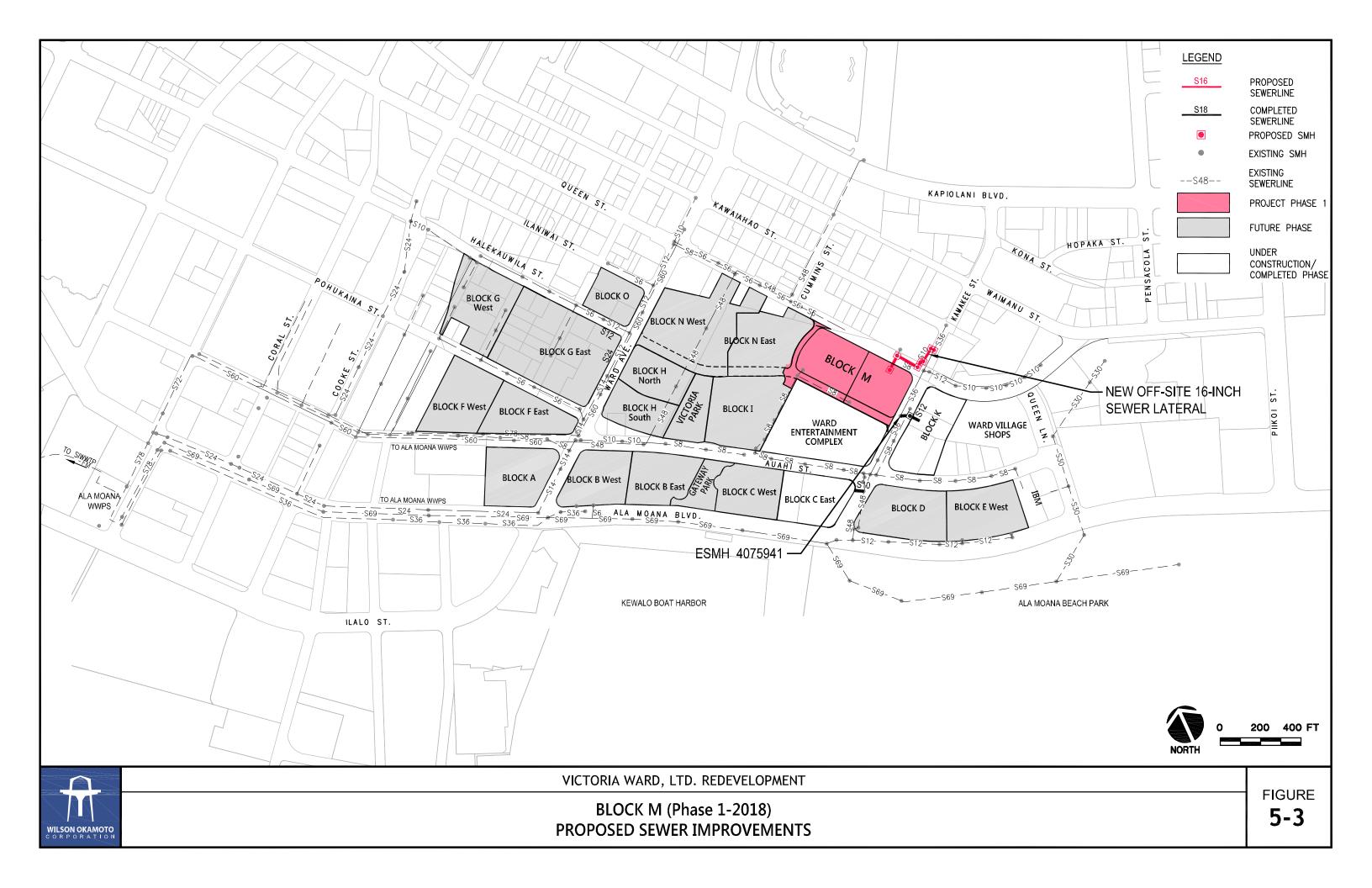
### 5.1.5 Phase 5 – Blocks D, H North, H South and E West

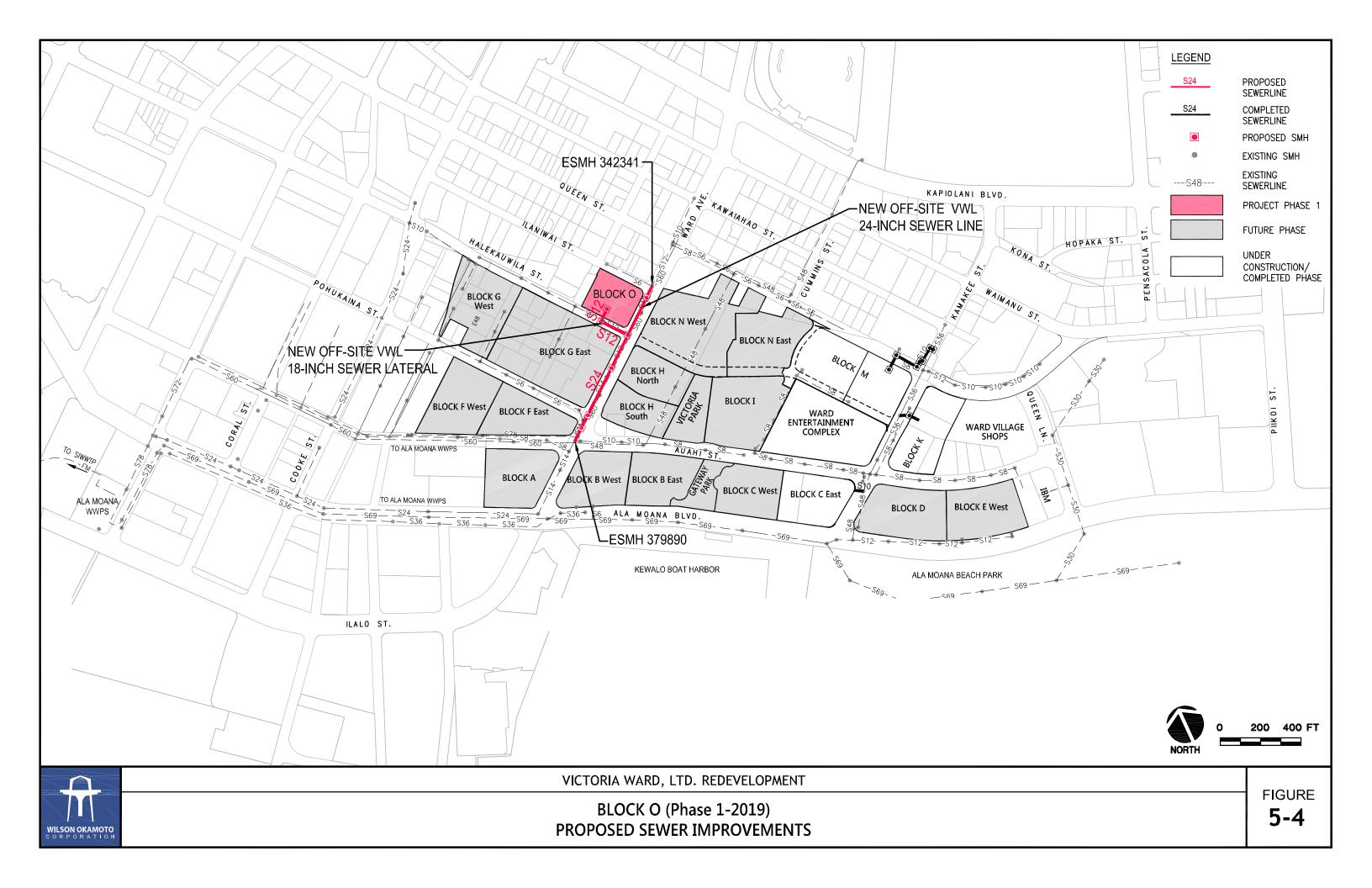
Phase 5 involves installing a new 18-inch sewer relief main along Auahi Street, east of Kamakee Street (see Figure 5-16). The line will discharge to the existing 48-inch sewer main near the intersection of Kamakee Street and Auahi Street at existing SMH 380287. Connections to the new line will be by a 12-inch sewer lateral from Block D and and a new 12-inch sewer lateral originating from Block E West.

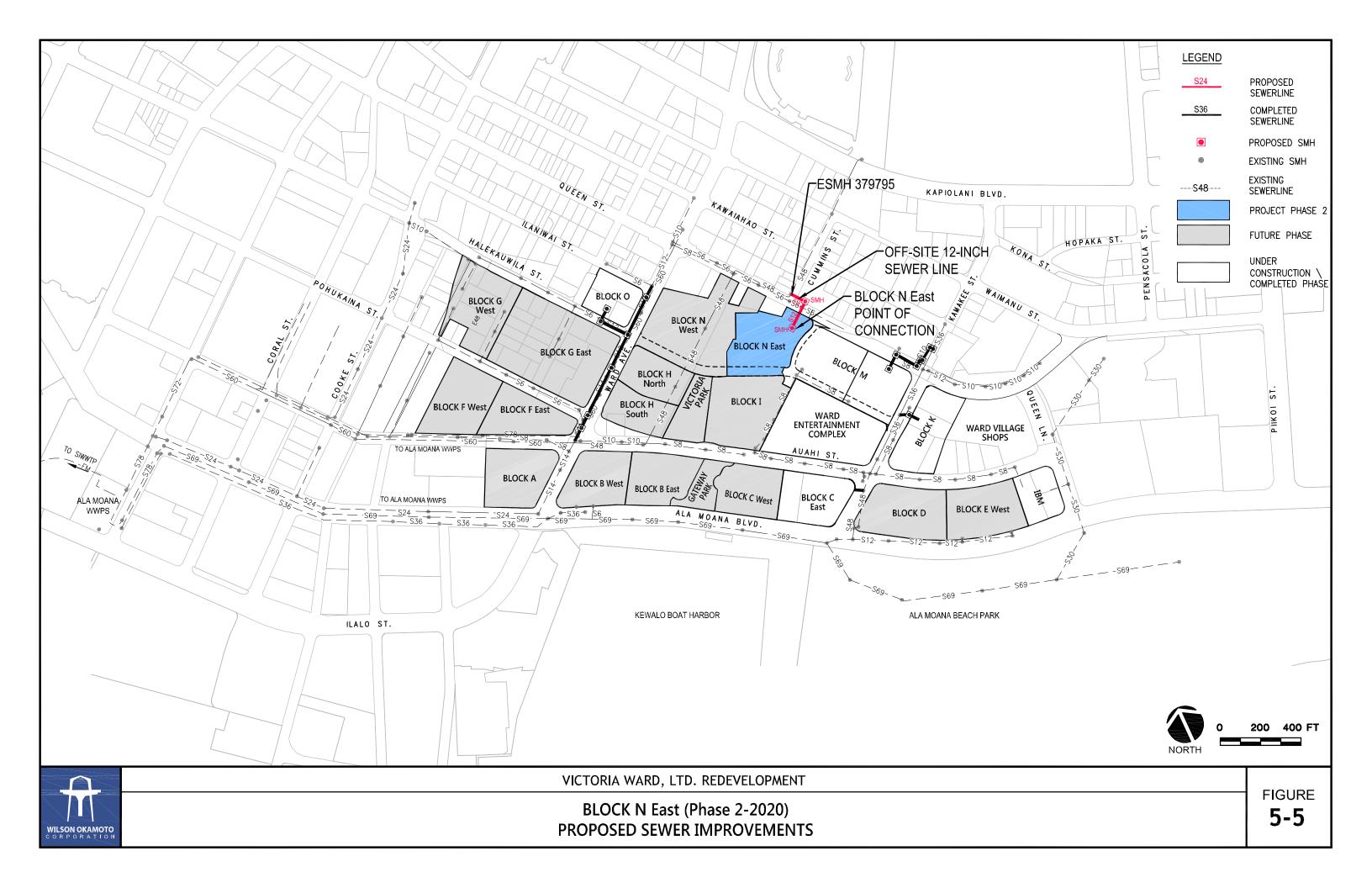
Phase 5 also involves installing a new 12-inch sewer lateral from Block H North that will discharge to the 48-inch East End Relief sewer main on Ward Avenue that was built in Phase 4 of the Project (see Figure 5-17). A new 12-inch sewer lateral originating from Block H South will also be installed and connect to the existing 48-inch sewer main on Auahi Street at existing SMH 379979 (see Figure 5-18). Wastewater flows from both are collected downstream by the 60-inch sewer main located on Auahi Street.

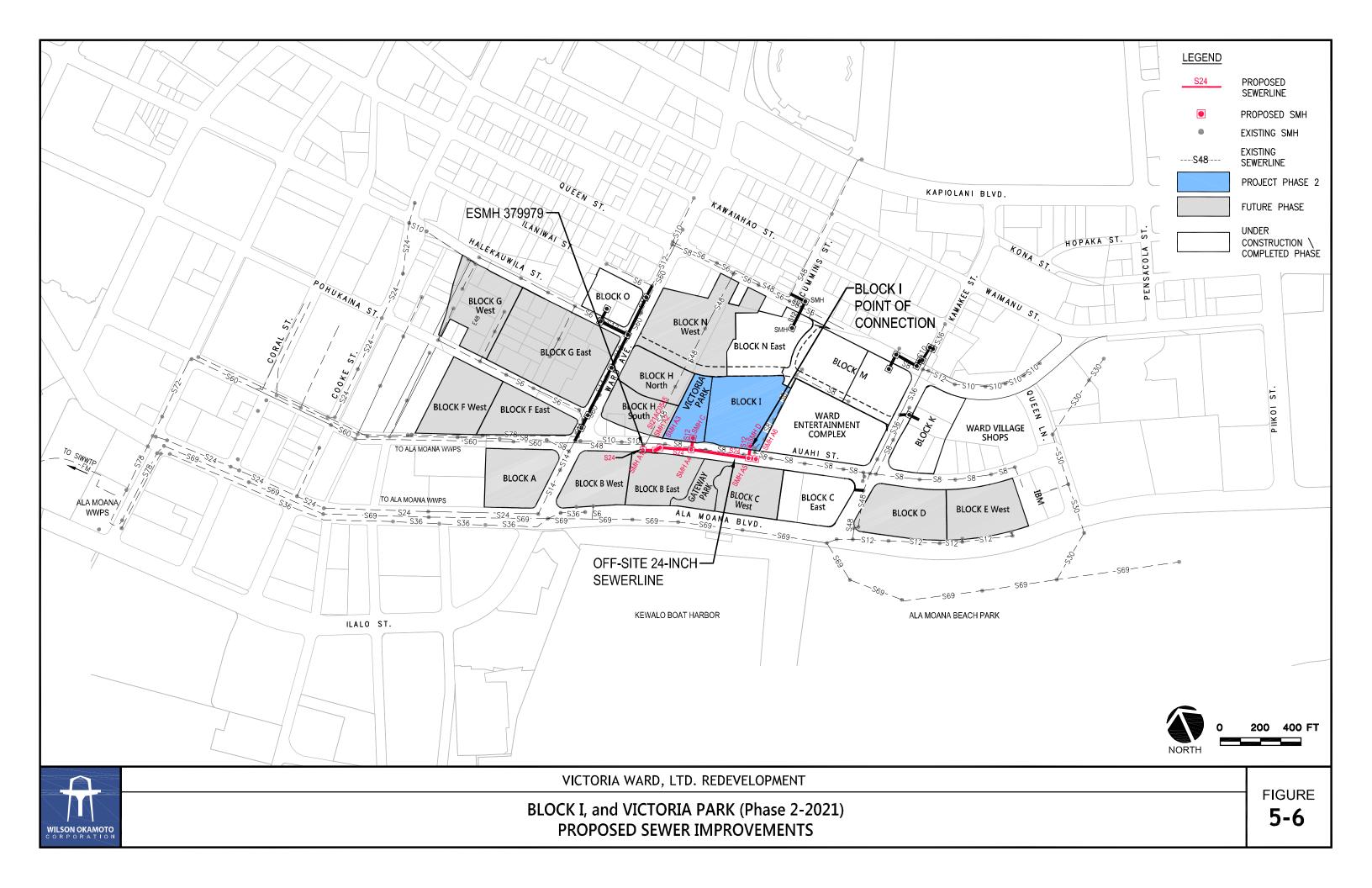


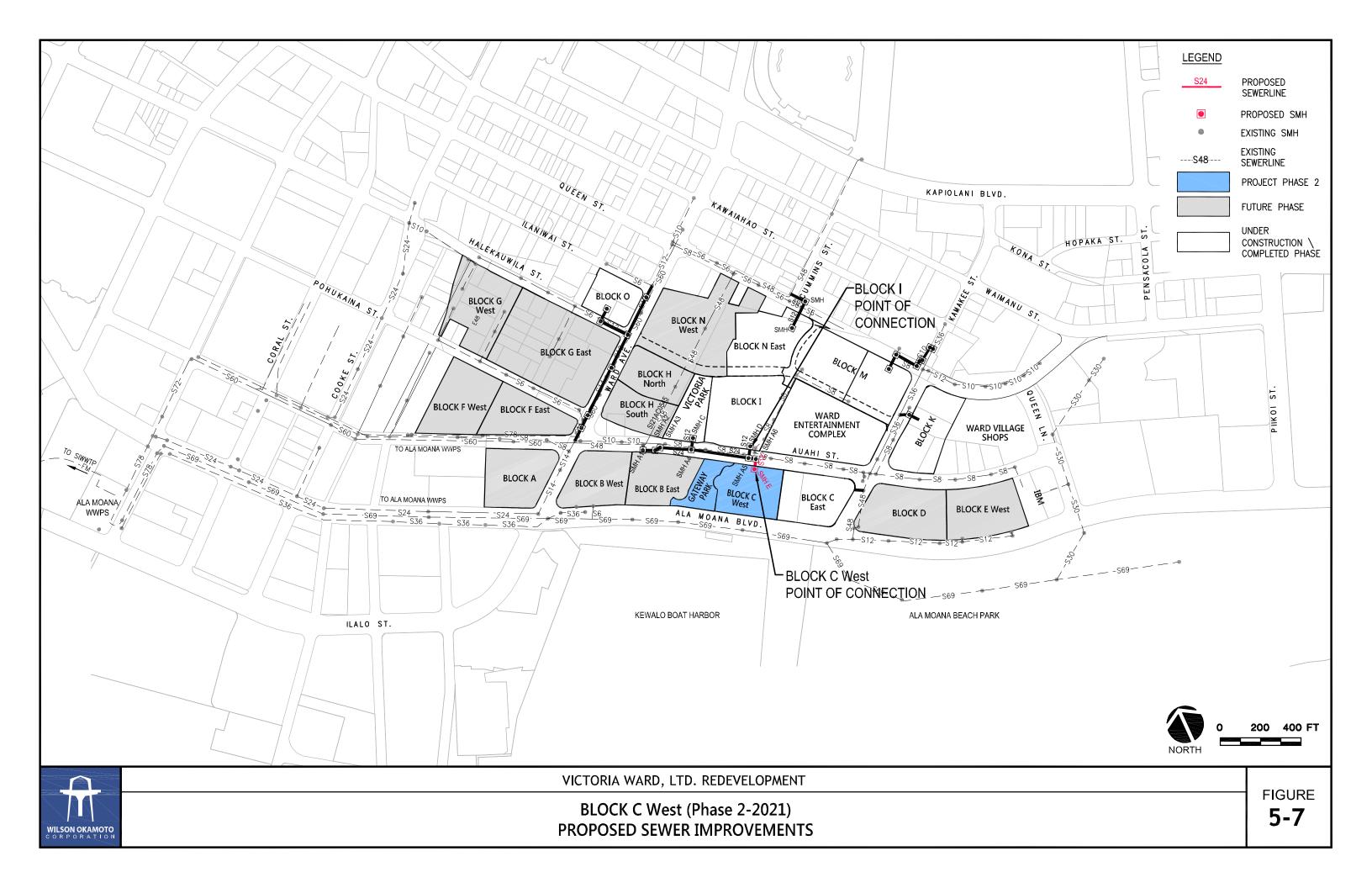


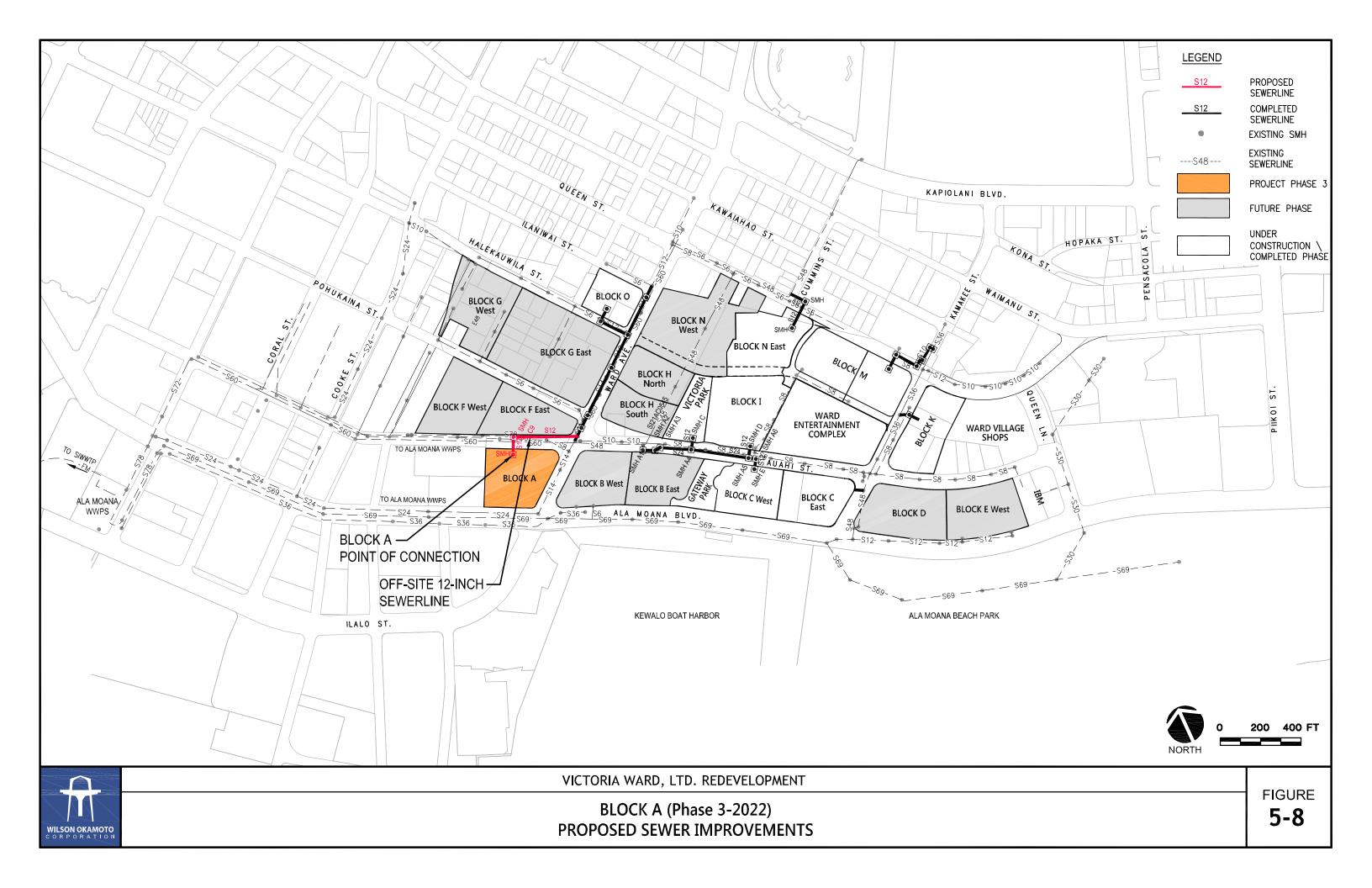


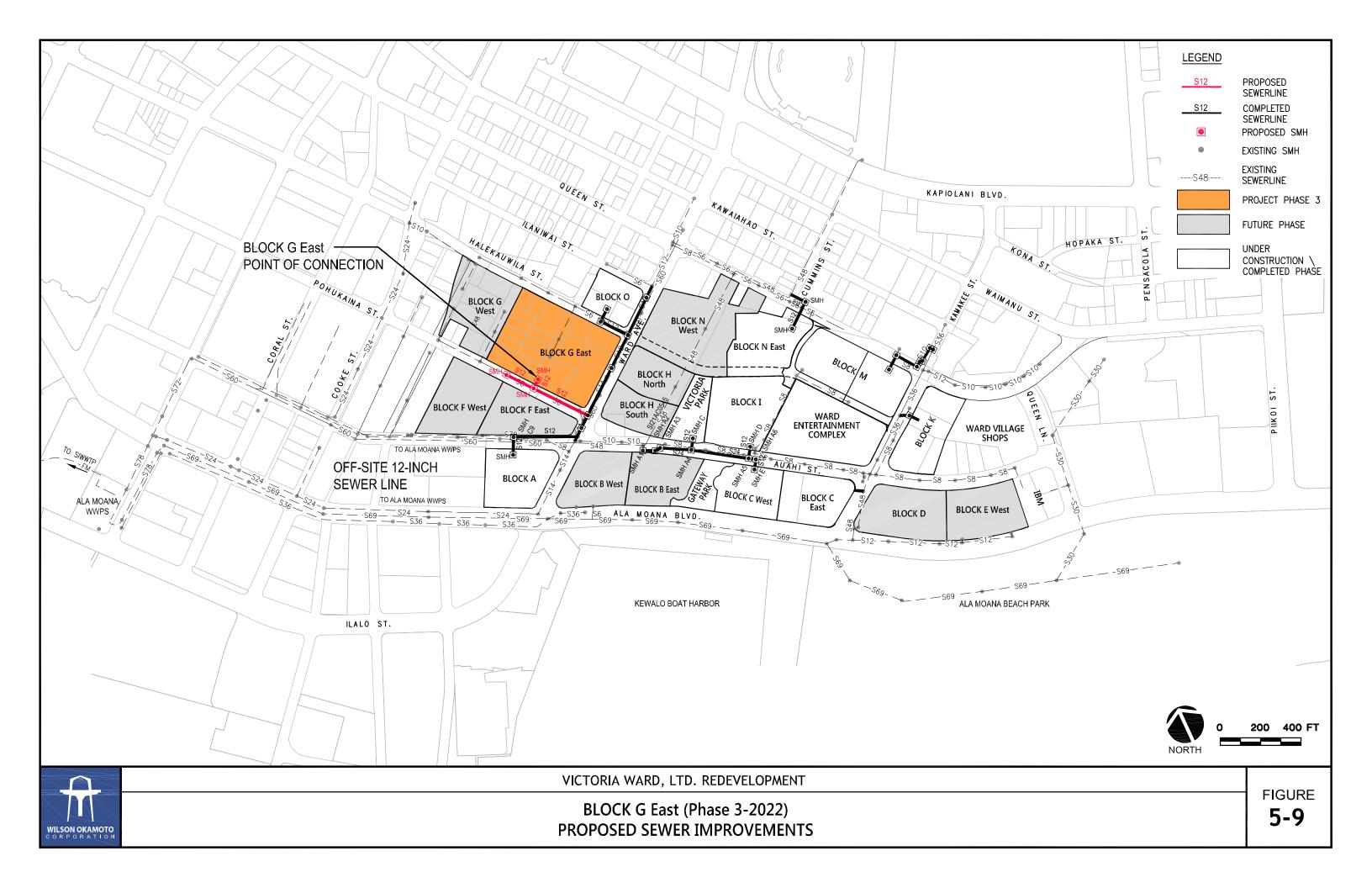


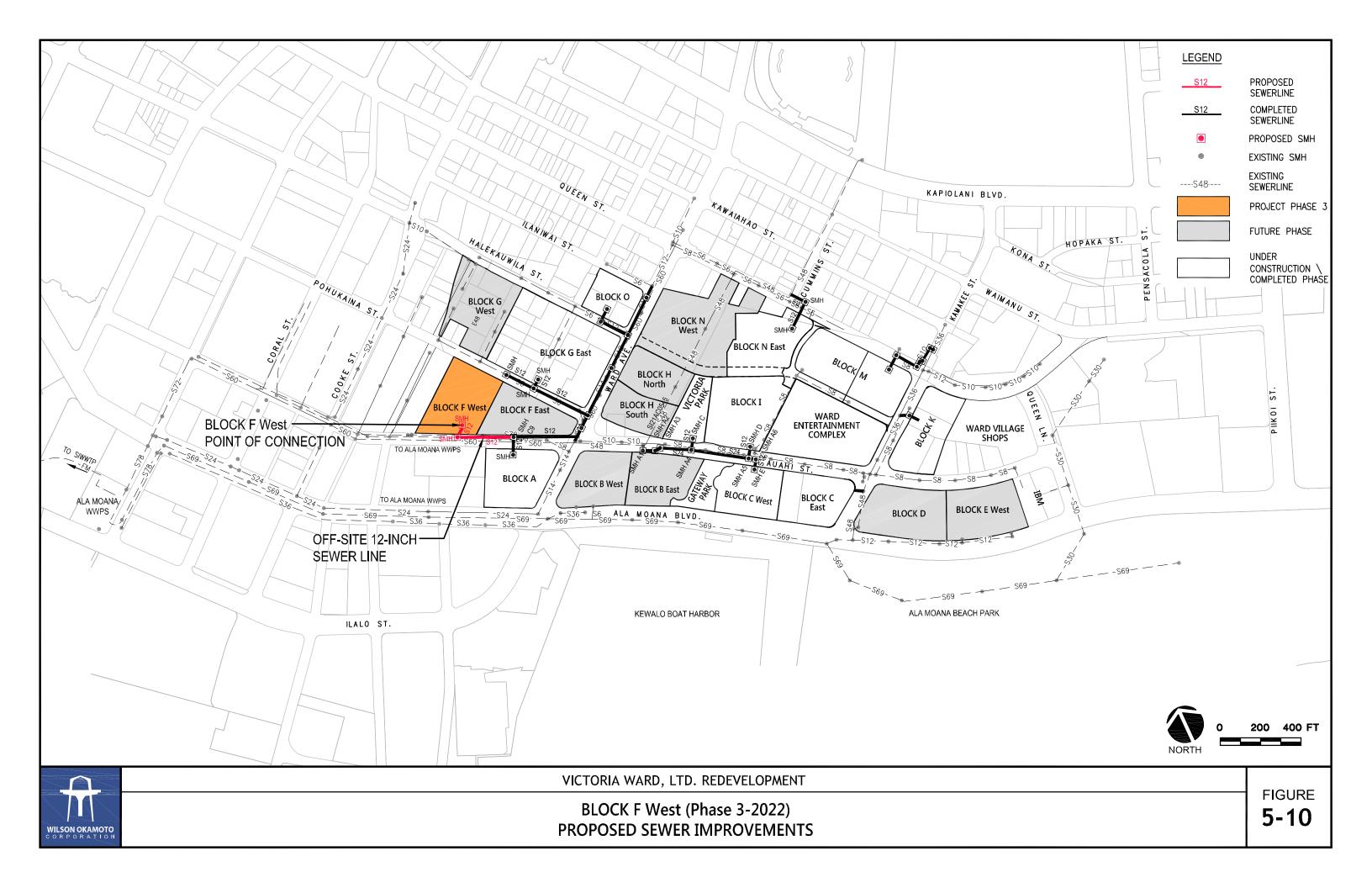


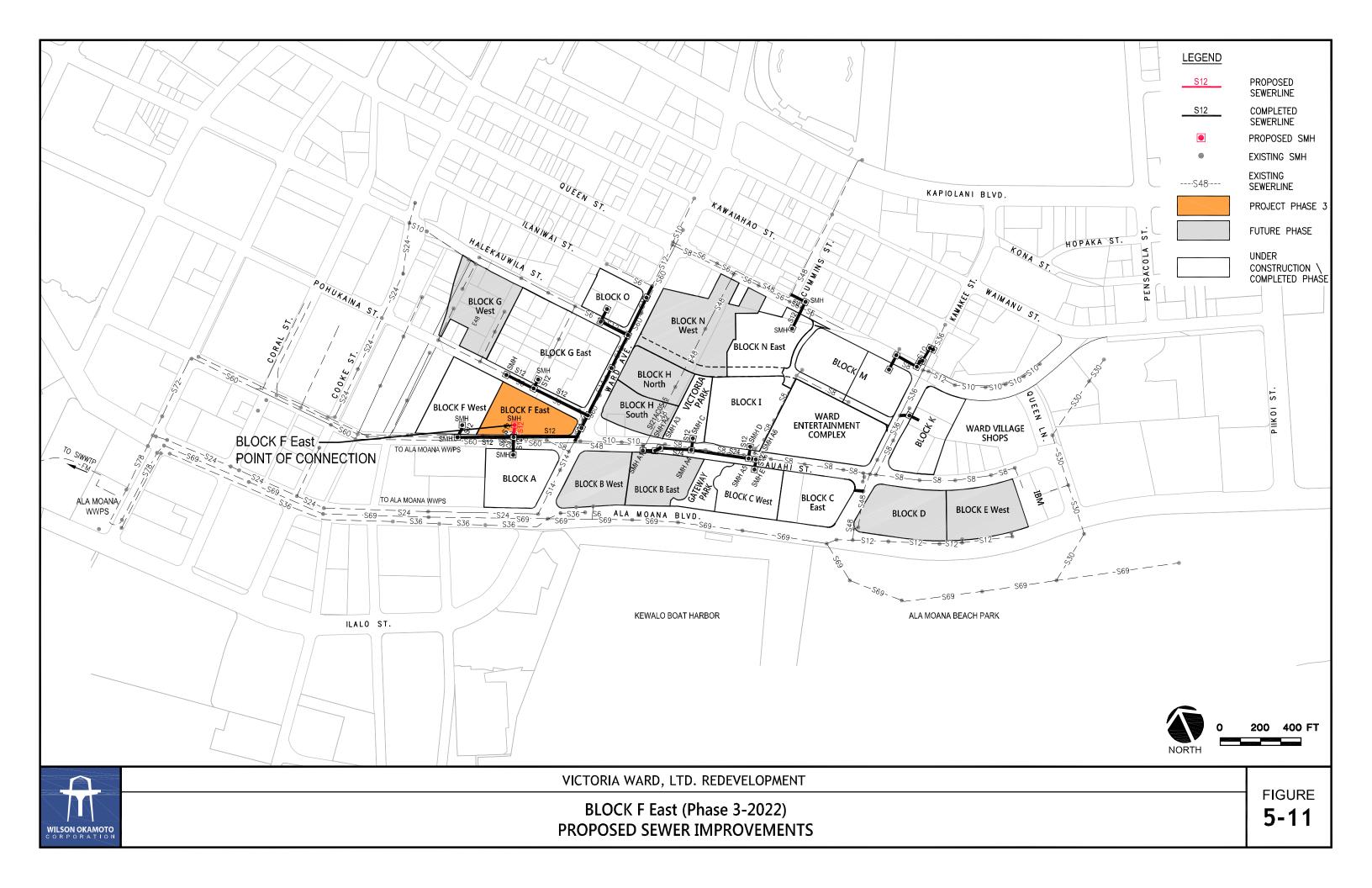


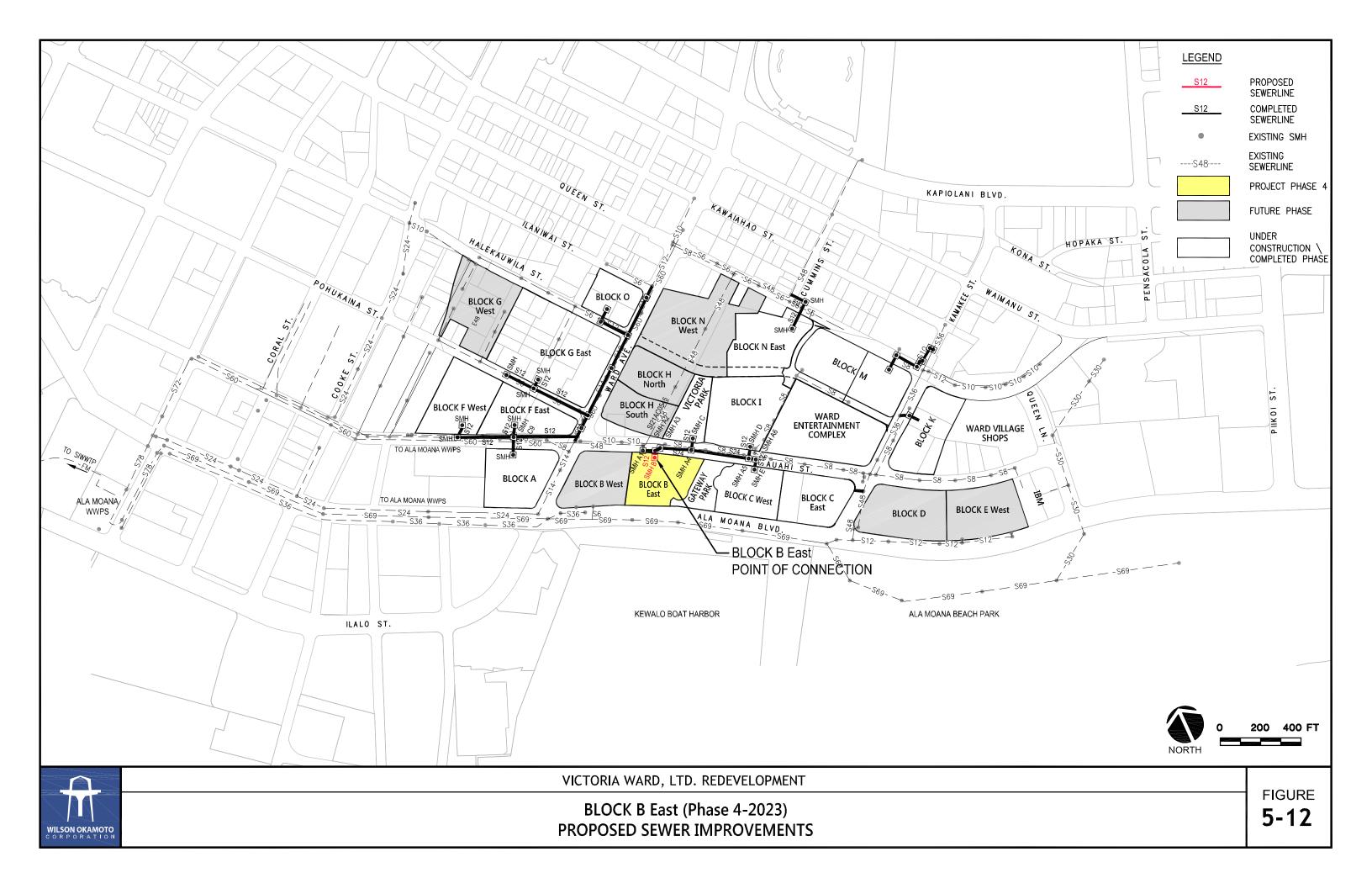


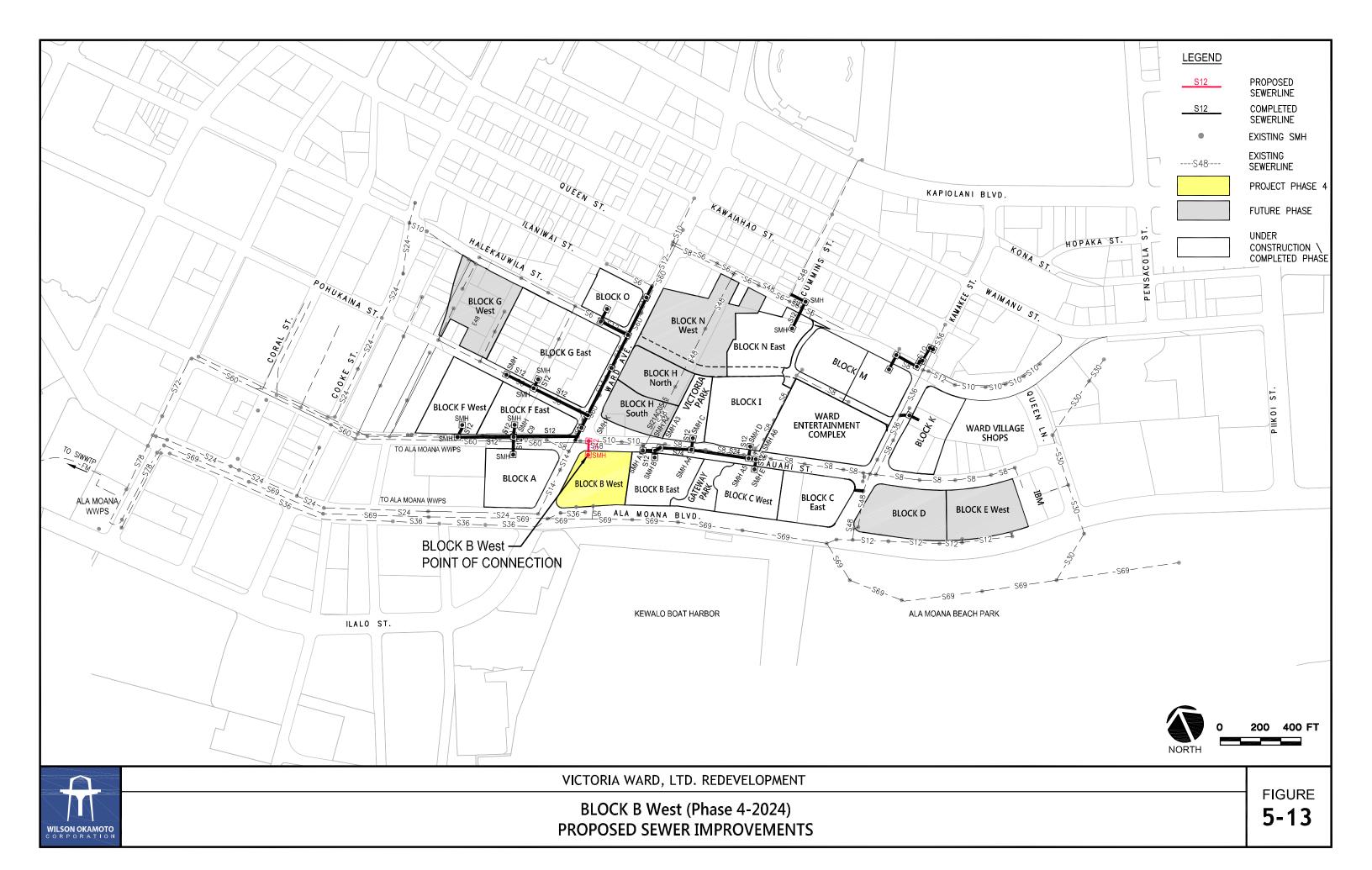


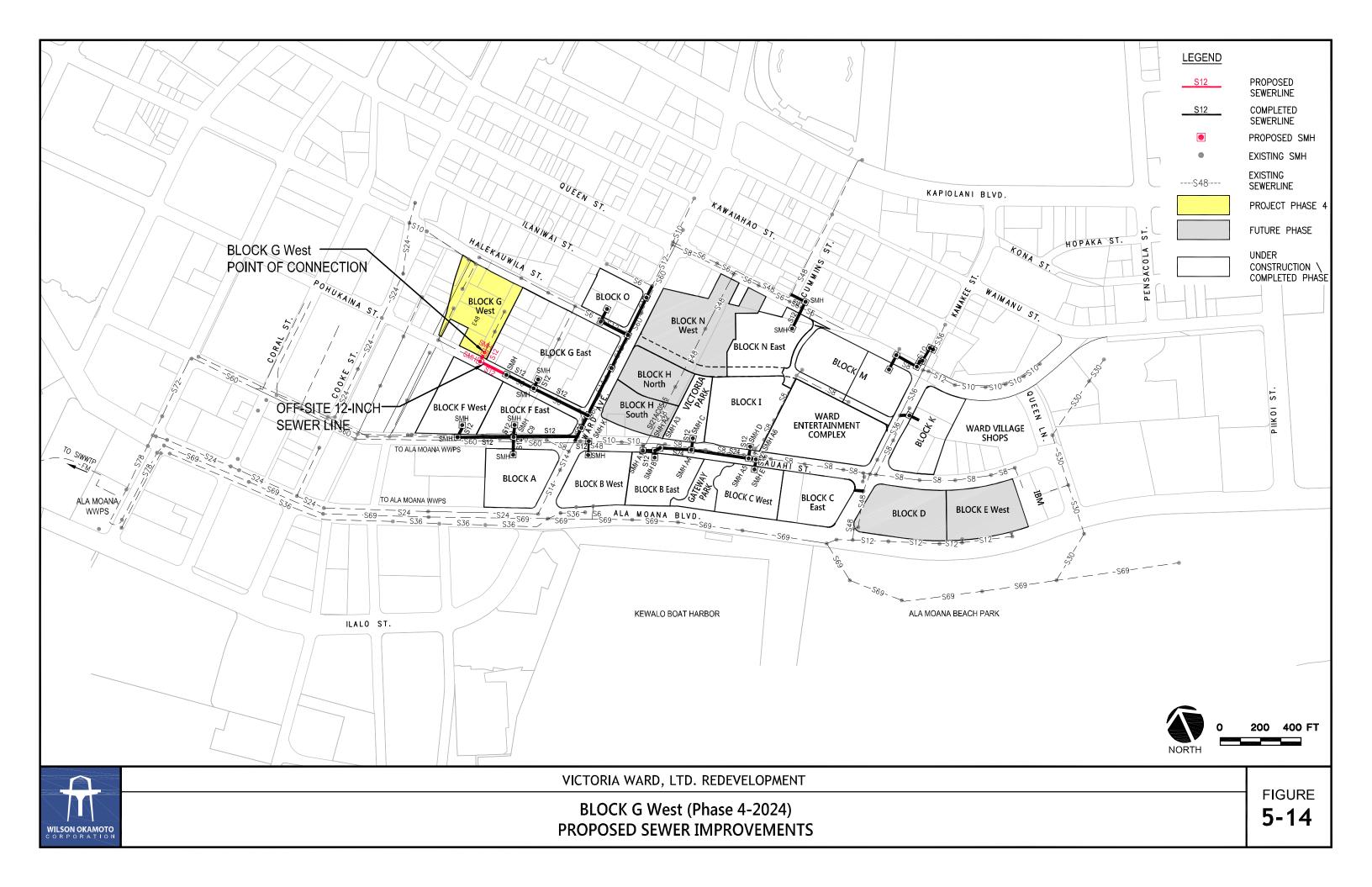


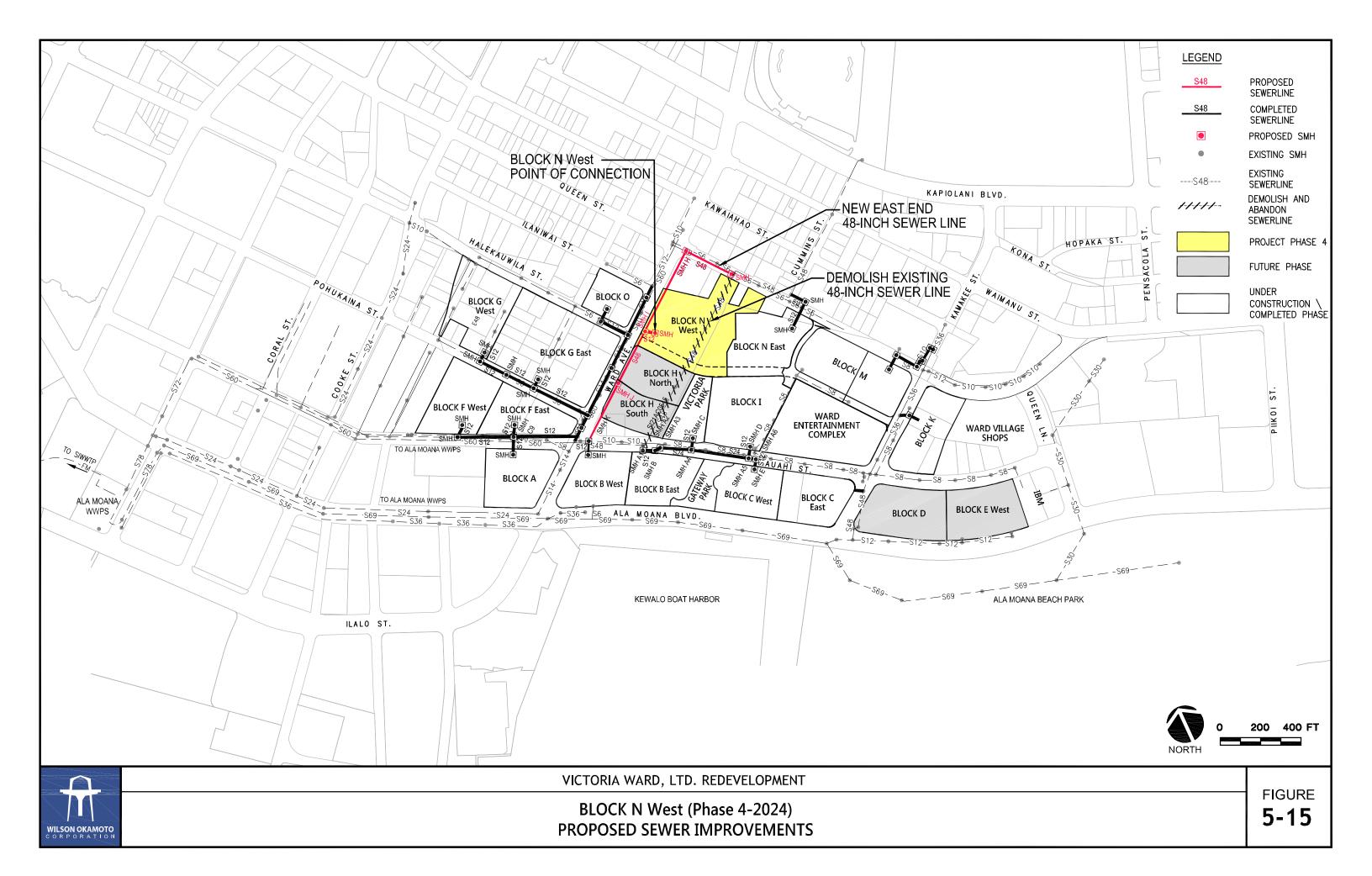


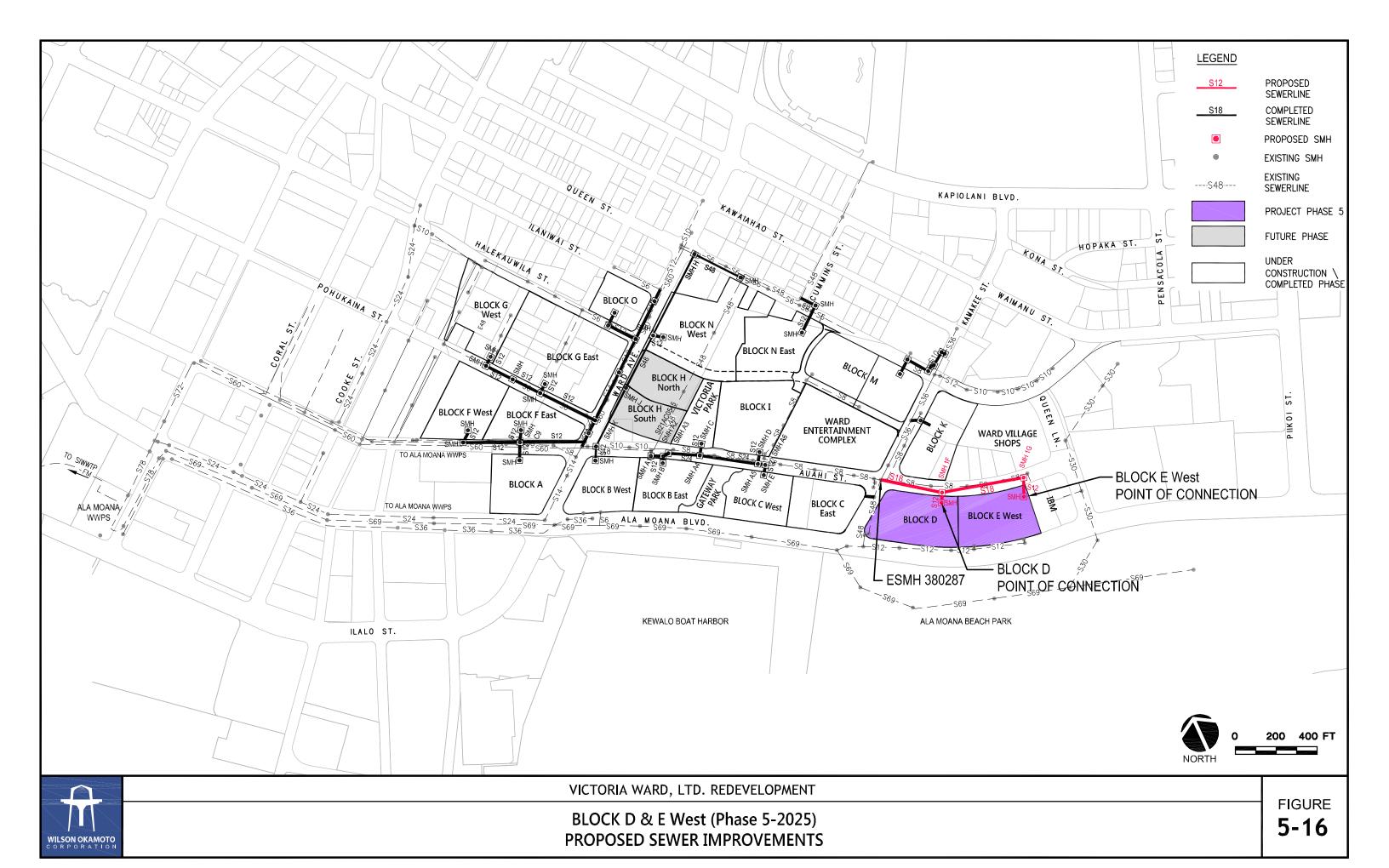


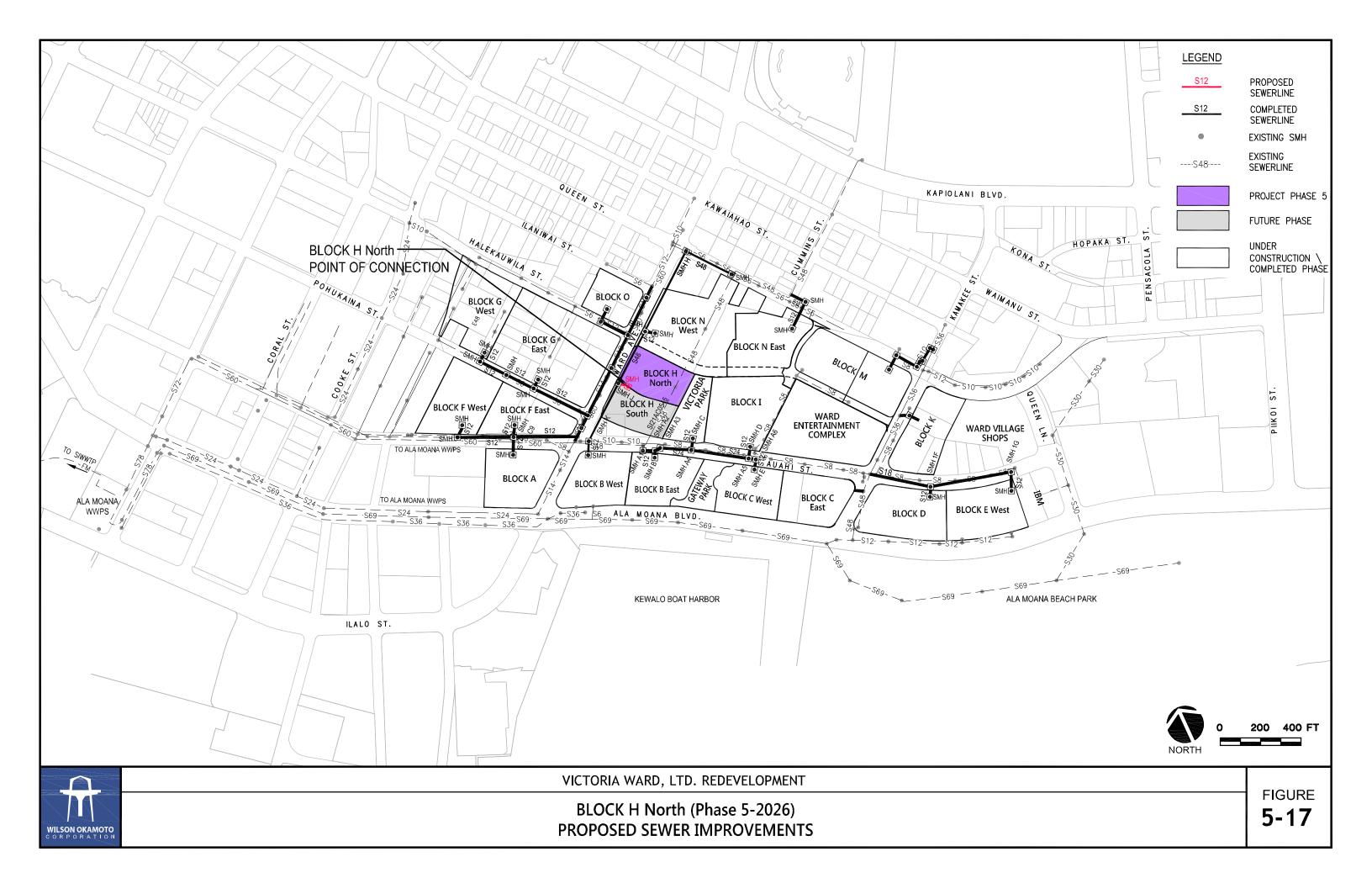


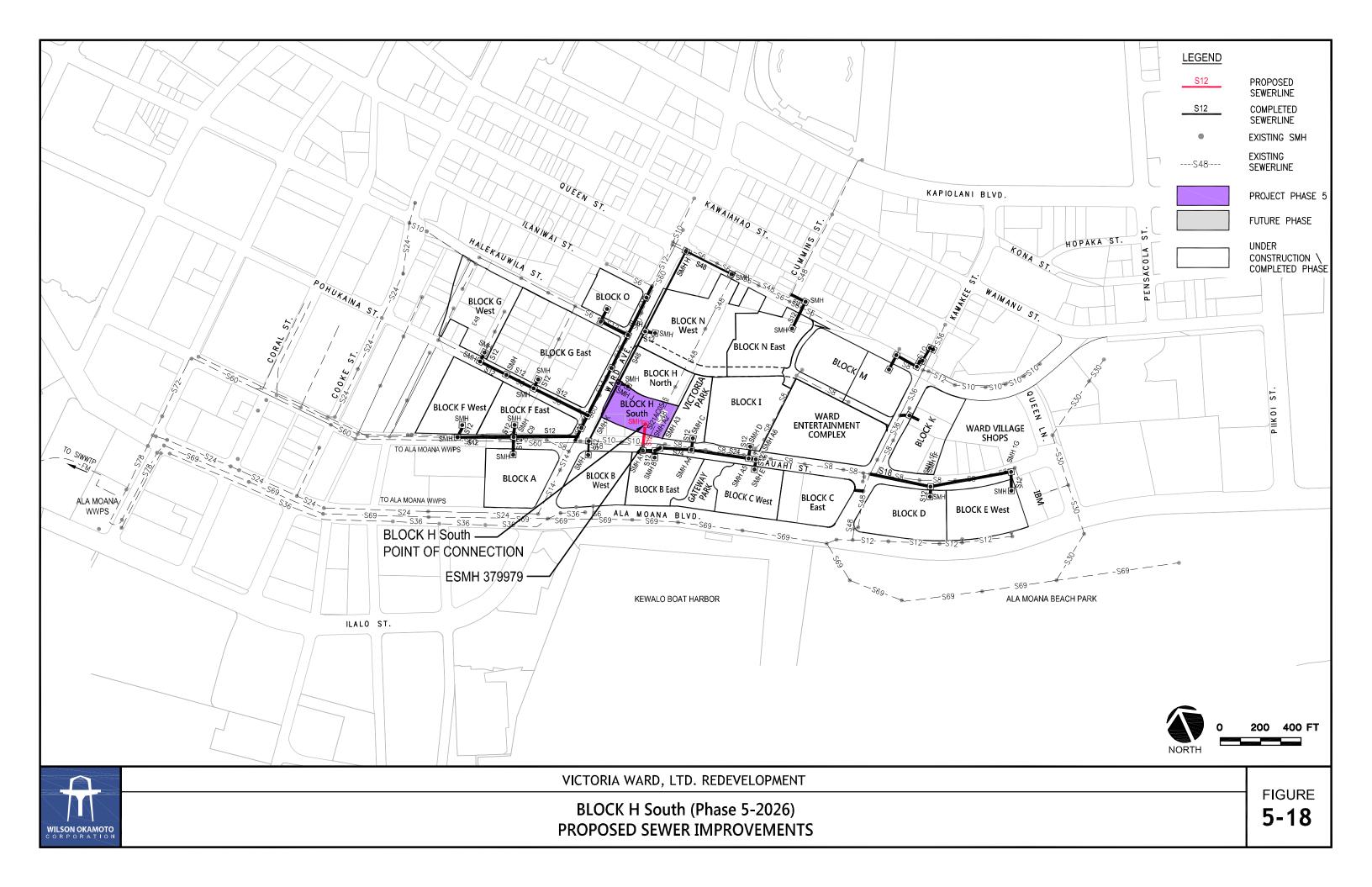












### 6. REFERENCES

- 1. City and County of Honolulu, Department of Budget and Fiscal Services, Division of Purchasing, *Construction Documents of Various Projects*, 2008 to 2011.
- 2. City and County of Honolulu, Department of Budget and Fiscal Services, Division of Purchasing, *City Executive Capital Budget and Program*, 2002 to 2012
- 3. City and County of Honolulu, Department of Environment Services, 2010 Wastewater Global Consent Decree, 2010.
- 4. City and County of Honolulu, Department of Environment Services, Collection Systems Maintenance, *IDIQ 2 and IDIQ 3 Projects*, 2011.
- 5. Fukunaga and Associates, Inc., Final Sewer I/I Plan, December 1999.
- 6. Hawai'i Community Development Authority, *Mauka Area Plan Kaka'ako Community Development District*, June 2005
- 7. R.M. Towill Corporation, *Spill Reduction Action Plan Engineering Report, Chapters* 1-5 Volume 1 of V. November 1995.
- 8. City and County of Honolulu, *Design Standards of the Department of Wastewater Management*, Volume 1, July 1993.
- 9. Ala Moana Boulevard/Auahi Street Sewer Rehabilitation Phase 2, Job No. W10-11, 2012.

APPENDIX A: City and County of Honolulu, Department of Planning and Permitting, Approved Sewer Connection Applications



# CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET \* HONOLULU, HAWAII 96813 Phone: (808) 768-8209 \* Fax: (808) 768-4210

# SEWER CONNECTION APPLICATION

APPLICATION NO.: 2015/SCA-0046

STATUS: Approved with conditions

APR 27 2015

\$800.078.80

DATE RECEIVED: 01/22/2015

IWDP APP. NO.:

Section

3

PROJECT NAME: 2015/SCA-0046 Victoria Ward Block C Tower

Estimated Wastewater System Facility Charge\*

LOCATION:

Zone

Parcel 004

1122 ALA MOANA Honolulu / Down

25,000 Sq. Ft.

Zone Section Plat Parcel 3 001 2 001

Plat

001

56,446 Sq. Ft.

SPECIFIC LOCATION: 1140 Ala Moana Blvd.

APPLICANT:

**HOWARD HUGHES CORP** 

1240 ALA MOANA BLVD 601 HONOLULU, HI 96814

DEVELOPMENT TYPE: Dwelling, Multi-family

SEWER CONNECTION WORK DESIRED:

OTHER USES: Retail, 8,505 SF

NON-RESIDENTIAL AREA:

8.505.00 s.f.

APPROXIMATE DATE OF CONNECTION: 06/01/2015

5-Bedroom:

6-Bedroom:

PROPOSED UNITS

**ÉXISTING UNITS** UNITS TO BE DEMOLISHED

No. of Existing Units: 0 No. of Units to be Demolished: 0 No. of New Units: 175 Studios: Studios: Studios: 1-Bedroom: 1-Bedroom: 1-Bedroom: 26 2-Bedroom: 2-Bedroom: 2-Bedroom: 3-Bedroom: 3-Bedroom: 3-Bedroom: 4-Bedroom: 4-Bedroom: 4-Bedroom: 10

5-Bedroom:

6-Bedroom:

5-Bedroom: 6-Bedroom:

REMARKS Application supersedes 2013/SCA-0027 and is conditionally approved with the re-design of the sewer connection to the 48-inch on Kamakee Street. The Victoria Ward Block C project must connect to the 48-inch sewer via a new 10-inch sewer with crown-to-crown matching elevations. Submit construction plans for review and approval.

APPROVAL DATE: 04/21/2015

EXPIRATION DATE: 04/20/2017

Valid 2-years after approval date. Construction plans shall be completed and approved within this 2-year period. Construction shall commence within 1-year after approval of plans. \* Applicable WSFC shall be collected at the prevailing rate in accordance with ROH 1990, Chapter 14, Sections 14-10.3, 14-10.4, 14-10.5 and Appendix 14-D.

REVIEWED BY: Tessa Ching

vision, Wastewater Branch

ExternalID: 054292592-001

Jobld: 54292592

Initial Print Date: Tuesday April 21, 2015 9:12 am



### CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET \* HONOLULU, HAWAII 96813 Phone: (808) 768-8209 \* Fax: (808) 768-4210

# SEWER CONNECTION APPLICATION

APPLICATION NO.: 2015/SCA-0260

STATUS: Approved

\$1,436,406,40

DATE RECEIVED: 04/06/2015

IWDP APP. NO .:

Estimated Wastewater System Facility Charge'

PROJECT NAME: 2015/SCA-0260 Victoria Ward Limited - Block K Auahi Tower

LOCATION:

Zone	Section	Plat	Parcel
2	3	005	022

19,570 Sq. Ft.

SPECIFIC LOCATION: 1108 Auahi St.

APPLICANT:

Wilson Okamoto Corporation

Attn: Wayne Higa

1907 South Beretania St., #400

Honolulu, HI 96826

DEVELOPMENT TYPE: Dwelling, Multi-family

SEWER CONNECTION WORK DESIRED:

OTHER USES: Retail

NON-RESIDENTIAL AREA: 17,000.00 s.f.

APPROXIMATE DATE OF CONNECTION: 06/01/2015

PROPOSED UNI	TS	<b>EXISTING UNITS</b>	UNITS TO BE DEMOLISHED
No. of New Units:	318	No. of Existing Units: 0	No. of Units to be Demolished: 0
Studios:	20	Studios:	Studios:
1-Bedroom:	93	1-Bedroom:	1-Bedroom:
2-Bedroom:	132	2-Bedroom:	2-Bedroom:
3-Bedroom:	67	3-Bedroom:	3-Bedroom:
4-Bedroom:	4	4-Bedroom:	4-Bedroom:
5-Bedroom:		5-Bedroom:	5-Bedroom:
6-Bedroom:		6-Bedroom:	6-Bedroom:

REMARKS

APPROVAL DATE: 08/14/2015

EXPIRATION DATE: 08/13/2017

Valid 2-years after approval date. Construction plans shall be completed and approved within this 2-year period. Construction shall commence within 1-year after approval of plans. \* Applicable WSFC shall be collected at the prevailing rate in accordance with ROH 1990, Chapter 14, Sections 14-10.3, 14-10.4, 14-10.5 and Appendix 14-D.

REVIEWED BY: Mindy Yoneshige

ExternalID: 054771799-001

Page 1 of 1

Jobld: 54771799



## CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET \* HONOLULU, HAWAII 96813 Phone: (808) 768-8209 \* Fax: (808) 768-4210

# SEWER CONNECTION APPLICATION

APPLICATION NO.: 2014/SCA-0686

STATUS: Approved with conditions

\$2,064,116.00

DATE RECEIVED: 09/15/2014

IWDP APP, NO.:

Estimated Wastewater System Facility Charge<sup>\*</sup>

PROJECT NAME: 2014/SCA-0686 VWL Block M

LOCATION:

Zone	Section	Plat	Parcel
2	3	002	001

477,582 Sq. Ft.

SPECIFIC LOCATION: 330 Kamakee St.

APPLICANT:

Wilson Okamoto Corporation

Attn: Eric Kadooka

1907 South Beretania Street, Suite 400

Honolulu, Hawaii 96826

DEVELOPMENT TYPE: Dwelling, Multi-family

SEWER CONNECTION WORK DESIRED:

OTHER USES: Retail and Restaurant

NON-RESIDENTIAL AREA: 36,790.00 s.f.

APPROXIMATE DATE OF CONNECTION:

PROPOSED UNITS	EXISTING UNITS	UNITS TO BE DEMOLISHED
No. of New Units: 466	No. of Existing Units: 0	No. of Units to be Demolished: 0
Studios:	Studios:	Studios:
1-Bedroom: 117	1-Bedroom:	1-Bedroom:
2-Bedroom: 233	2-Bedroom:	2-Bedroom:
3-Bedroom: 116	3-Bedroom:	3-Bedroom:
4-Bedroom:	4-Bedroom:	4-Bedroom:
5-Bedroom:	5-Bedroom:	5-Bedroom:
6-Bedroom:	6-Bedroom:	6-Bedroom:

REMARKS Approval is based on completetion of upgrades to the Sand Island solids handling capabilities (anticipated in 2017) and connection to the 36-inch sewerline at 0.11% slope on Kamakee St. Additional WSFC fees may be required for the retail and restaurant facilities. An IWDP is required for restaurants.

APPROVAL DATE: 10/31/2014

EXPIRATION DATE: 10/30/2016

Valid 2-years after approval date. Construction plans shall be completed and approved within this 2-year period. Construction shall commence within 1-year after approval of plans. \* Applicable WSFC shall be collected at the prevailing rate in accordance with ROH 1990, Chapter 14, Sections 14-10.3, 14-10.4, 14-10.5 and Appendix 14-D.

REVIEWED BY: Tessa Ching

Site Development Qivisiqn, Wastewater Branch

ExternalID: 053438637-001

Jobld: 53438637



## CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET \* HONOLULU, HAWAII 96813 Phone: (808) 768-8209 \* Fax: (808) 768-4210



# SEWER CONNECTION APPLICATION

APPLICATION NO.: 2015/SCA-0813

STATUS: Approved with conditions

\$1,913,067.20

DATE RECEIVED: 10/09/2015

IWDP APP. NO.:

Estimated Wastewater System Facility Charge

PROJECT NAME: 2015/SCA-0813 VWL Block O

LOCATION:

Zone	Section	Plat	Parcel
2	1	050	001
Zone	Section	Plat	Parcel
2	1	050	061
<b>2</b> Zone	1 Section	050 Plat	061 Parcel

988 HALEKAUWILA ST Honolulu / [

15,000 Sq. Ft.

901 ILANIWAI ST Honolulu / Downt

27,124 Sq. Ft.

404 WARD AVE Honolulu / Downtov

9,644 Sq. Ft.

SPECIFIC LOCATION: 988 Halekauwila St.

APPLICANT:

Wilson Okamoto Corporation

Attn: Kevin Goto

1907 South Beretania Street, Suite 400

Honolulu, Hawaii 96826

DEVELOPMENT TYPE: Dwelling, Multi-family

SEWER CONNECTION WORK DESIRED:

New

OTHER USES: Retail

NON-RESIDENTIAL AREA: 30,000.00 s.f.

APPROXIMATE DATE OF CONNECTION: 12/31/2017

**EXISTING UNITS** UNITS TO BE DEMOLISHED PROPOSED UNITS No. of Units to be Demolished: 0 No. of Existing Units: 0 No. of New Units: 424 Studios: Studios: Studios: 1-Bedroom: 1-Bedroom 1-Bedroom: 161 2-Bedroom: 2-Bedroom: 2-Bedroom: 187 3-Bedroom: 3-Bedroom: 3-Bedroom: 4-Bedroom: 4-Bedroom: 4-Bedroom: 5-Bedroom: 5-Bedroom: 5-Bedroom: 6-Bedroom: 6-Bedroom: 6-Bedroom:

REMARKS Approval is contingent on the construction of the proposed 24-inch sewer line on Ward Avenue that will connect to the existing 78-inch on Auahi Street. Submit construction plans for review and approval.

APPROVAL DATE: 10/19/2015

EXPIRATION DATE: 10/18/2017

Valid 2-years after approval date. Construction plans shall be completed and approved within this 2-year period. Construction shall commence within 1-year after approval of plans.

\* Applicable WSFC shall be collected at the prevailing rate in accordance with ROH 1990, Chapter 14, Sections 14-10.3, 14-10.4, 14-10.5 and Appendix 14-D.

REVIEWED BY: Keith Miyashiro

Development Division, Wastewater Branch

ExternalID: 056041714-001

56041714 Jobld:

APPENDIX B: Wastewater Flow Data from the Department of Design and Construction, INFIX Adjusted Model Results for Existing Condition (1995) and Future Condition (2020)

### APPENDIX B INFIX Adjusted - Existing Condition (1995) Model Results

MH UP MH PAG	ACE OPDE	I HE ADE	A WCD A	DEA TOTA	1 1071	IF 050 III	100 000 -				an anne To	12	na la an a	Lac 12 :	Land Description	Donas Joseph	212 00 00 1	Transit Ind		1	9.00.00		ere e al a		1 25 SO	erunier. I			
0067 SI21AJ0068		619	0.79	0.95	0.95	0.00	O OO	0.00	88.00	88.00	SS.00	88.00			0.0078 0.0			0.0063		8 0.0038	1.855	0.4186	CT_CAP BA	SE_RATE DV 29.4746				2.000	NE_WWI BASINNAME
0066 SI21AJ0067	0.00	619	1.11	1.34	2.29	0.00	0.00	0.00	155.20	155.20	243.20	243.20			0.0215 0.0		200000	0.0053	1.00	8 0.0040	1.894	0.4272	11.8	29,4746	56.7200 56.7200	6613.1476 6613.1476	0.0026	0.0050	0.0063 01A01 0.0088 01A01
0065 SI21AJ0066	7.00	619	1.85	2.08	4.36	0.00	0.00	0.00	258.50	258.50	501.70	501.70		-	0.0444 0.0		0.1000	0.0289		8 0.0045	2.005	0.4522	22.5	29.4746	56.7200	6613.1476	0.0046	0.0000	0.0137 01A01
0064 SI21AJ0065	136	619	1.20	1.50	5.87	0.00	0.00	0.00	167.90	167.90	669.60	669.60			0.0592 0.0	33		0.0388		8 0.0034	1.750	0.3947	34.4	29.4746	56.7200	6613.1476	0.0049	0.0095	0.0099 01A01
0013 SI21AJ0064	136	619	0.00	3.31	9.18	0.00	0.00	0.00	0.00	295.30	964.90	964.90			0.0853 0.0			0.0607		8 0.0039	1.881	0.4242	47.3	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0002 01A01
																			1201	7.111	7,164.7	7		2010.10		00101110	0.0000	0.0000	0.0002 01701
0062 St21AJ0063	136	618	2.79	3.00	3.00	0.00	0.00	0.00	390.70	390.70	390.70	390.70	0.0115	3.00	0.0345 0.03	222 0.0337	0.0567	0.0198	0.0766	8 0.0039	1.874	0.4228	18.1	29.4746	56.7200	6613.1476	0.0115	0.0222	0.0198 01A01
0061 SI21AJ0062	136	618	3.39	3.65	6.65	0.00	0.00	0.00	475.30	475.30	866.00	866.00	Contract of the contract of th		0.0766 0.0		2 2 2 3 1	0.0440		8 0.0039	1.874	0.4227	40.1	29,4746	56.7200	6613.1476	0.0140	0.0270	0.0242 01A01
0013 SI21AJ0061	136	618	1.70	1.87	8.52	0.00	0.00	0.00	237.60	237.60	1103.60	1103.60	4 555 545 7		0.0976 0.0			0.0564		8 0.0057	2.264	0.5107	42.4	29.4746	56.7200	6613.1476	0.0070	0.0135	0.0124 01A01
																	-							201.0		001011112	5.0575	0.0100	0.0121 017401
0072 SI21AJ0073	204 1	076	2.27	2.52	2.52	0.00	0.00	0.00	244.60	244.60	244.60	244.60	0.0072	3.00	0.0216 0.0	139 0.0211	0.0355	0.0167	0.0522	8 0.0039	1.874	0.4227	12.3	29.4746	56.7200	6613.1476	0.0072	0.0139	0.0167 01A01
0064 SI21AJ0072	204 1	076	0.51	0.75	3.28	0.00	0.00	0.00	50.70	50.70	295.30	295.30	77.70.70		0.0261 0.0		1.500.00	0.0217		8 0.0039	1.880	0.4241	15.2	29.4746	56.7200	6613.1476	0.0015	0.0029	0.0050 01A01
																													20020
0020 SI21AJ0021	70	248	0.46	3.98	266.35	0.00	0.00	21918.90	64.80	336.70	21629.00	43547.90	2.6951	2.03	5.4661 2.3	788 5.0739	7.8450	3.9836	11.8286 3	6 0.0005	2.127	9.7183	121.7	39.4401	113.9916	17682.4500	0.0026	0.0074	0.0136 01D01
0019 SI21AJ0020	71	248	0.11	4.01	270.36	0.00	0.00	21918.90	15.10	303.80	21932.80	43851.70	2.7071		5.4868 2.4			4.0546		0.0005	2.110	9.6386	124.0	39.4401	113.9916	17682.4500	0.0006	0.0017	0.0033 01D01
0018 SI21AJ0019	71	248	1.04	1.30	271.66	0.00	0.00	21918.90	106.60	106.60	22039.40	43958.30	2.7113	2.03	5.4940 2.42			4.0775		0.0022	4.404	20.1178	59.6	39.4401	113.9916	17682.4500	0.0042	0.0122	0.0229 01D01
990 SI21AJ0018	71	248	0.00	4.97	276.63	0.00	0.00	21918.90	0.00	295.90	22335.30	44254.20	2.7229		5.5141 2.45			4.1654	20000	5 0.0011	3.145	14.3684	84.5	39.4401	113.9916	17682.4500	0.0000	0.0000	0.0002 01D01
0017 SI21AJ0990	71	248	0.28	0.64	277.27	0.00	0.00	21918.90	39.60	39.60	22374.90	44293.80	200	7.00	5.5168 2.46		3767			6 -0.0010	0.000	0.0000	99999.9	39.4401	113.9916	17682.4500	0.0016	0.0045	0.0103 01D01
0016 SI21AJ0017	71	248	0.27	3.93	281.19	0.00	0.00	21918.90	26.70	198.10	22573.00	44491.90	2.7323	2.02	5.5302 2.48	864 5.2187	8.0166	4.2461	12.2628 3	0.0015	3.644	16.6480	73.7	39.4401	113.9916	17682.4500	0.0011	0.0030	0.0104 01D01
0015 SI21AJ0016	71	248	1.40	3.33	284.52	0.00	632.80	22551.70	184.70	184.70	22757.70	45309.40	2.7646		5.5856 2.57		8.1652	4.3049	0.75.1	6 -0.0005	0.000	0.0000	99999.9	39.4401	113.9916	17682.4500	0.0073	0.0211	0.0303 01D01
0014 SI21AJ0015	71	248	2.26	2.57	287.09	0.00	0.00	22551.70	316.10	316.10	23073.80	45625.50	2.7770	2.02	5.6070 2.6	156 5.3927	8.2226	4.3504	12.5731 3	0.0005	2.089	9.5408	131.8	39,4401	113.9916	17682.4500	0.0125	0.0360	0.0455 01D01
0013 SI21AJ0014	71	248	0.56	0.66	287.75	0.00	0.00	22551.70	79.00	79.00	23152.80	45704.50	2.7801	2.02	5.6123 2.62	246 5.4048	-	4.3521	JANUAR I	0.0005	2,190	10.0049	125.9	39.4401	113.9916	17682.4500	0.0031	0.0090	0.0117 01D01
0012 SI21AJ0013	71	248	0.00	17.91	305.66	0.00	0.00	22551.70	0.00	2068.50	25221.30	47773.00	2.8411	2.01	5.7167 2.74	420 5.5831	8.4587	4.4805		0.0005	2.078	9.4915	136.3	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0014 01A01
		1																											
IX INFORMATION FOR SEV	EWER LINE #5																												
0056 SI21AJ0057	136	617	0.20	0.37	1.97	0.00	0.00	0.00	00.40	00.40	241.42	241.12	0.0000	2.65	0.0070	470	20.000	0.000	5.4540		100.45		- 10	327.5.7	2550				
0055 SI21AJ0057			0.20	0.37 4.57		0.00	0.00	0.00	28.10	28.10	314.40	314,40	2002.4	. 12.00	0.0278 0.01		0.0456	0.0130	200	2 0.0025	1.974	1.0022	5.9	29.4746	56.7200	6613.1476	8000.0	0.0016	0.0025 01A01
053 SI21AJ0056					6.54	0.00	0.00	0.00	0.00	656.90	971.30	971.30			0.0859 0.08				10.72	0.0026	2.007	1.0186	18.1	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0007 01A01
051 SI21AJ0053			0.19	0.51	7.06	0.00	0.00	0.00	26.60	26.60	997.90	997.90		-0.00	0.0882 0.08					0.0025	1.974	1.0018	19.1	29.4746	56.7200	6613.1476	0.0008	0.0015	0.0034 01A01
0050 SI21AJ0053	-		0.00	0.57	7.62	0.00	0.00	0.00	0.00	30.60	1028.50	1028.50			0.0910 0.05			0.0504		0.0025	1.958	0.9938	20.1	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0021 01A01
0048 SI21AJ0050			0.00	0.39	8.01	0.00	0.00	0.00	0.00	30.60	1059.10	1059.10			0.0937 0.06			0.0530	10.00	0.0026	1.986	1.0078	20.5	29,4746	56.7200	6613.1476	0.0000	0.0000	0.0010 01A01
0010 SI21AJ0048			0.22	25.68	33.69	0.00	0.00	0.00	158.50	158.50	1217.60	1217.60	100000		0.1077 0.08	-	0.1767	10000		0.0025	1.968	0.9992	40.0	29.4746	56.7200	6613.1476	0.0047	0.0090	0.1698 01A01
OF INDUSTR	100		V.22	0.60	34.49	0.00	0.00	0.60	30.60	61.20	1278.80	1278.80	0.03//	3.00	0.1131 0.07	725 0.1102	0.1856	0.2281	0.4137 1	0.0025	1.958	0.9938	41.6	29.4746	56.7200	6613,1476	0.0009	0.0017	0.0036 01A01
0553 SI21AC0554	138	333	0.57	0.65	0.65	0.00	0.00	0.00	75.00	75.50	75.60	75.73			W 2002			57.05			0.000	12/53/04							
			0.00	0.30	0.05	0.00	4134	0.00	75.80	75.80	75.80	75.80		2.5	0.0067 0.00			0.0043		0.0039	1.552	0.1970	7.8	29.4746	56.7200	6613.1476	0.0022	0.0043	0.0043 01A01
0556 SI21AC0552	- 3.65		0.00	0.30	1.25	0.00	0.00	0.00	0.00	0.00	75.80	75.80	Deleter Co.		0.0067 0.00				0.0173	0.0030	1.361	0.1727	10.0	29.4746	56.7200	6613,1476	0.0000	0.0000	0.0020 01A01
			0.49	0.79	2.04	0.00	0.00	0.00	59.40	0:00 59.40	75.80 135.20	75.80			0.0067 0.00		0.0110			0.0034	1.448	0.1838	10.5	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0020 01A01
	100		0.13	0.73	2.01	0.00	0.00	0.00	33.40	59.40	135.20	135.20	0.0040	3.00	0.0120 0.00	0.0117	0.0195	0.0135	0.0331	0.0040	1.565	0.1986	16.7	29.4746	56.7200	6613.1476	0.0018	0.0034	0.0052 01A01
3010 SI21AC3027	6	10	0.00	8.33	15.37	0.00	0.00	0.00	0.00	724.50	1473.30	1472.22	0.0434	2.02	0.4000	222	0.0400	0.4040		3 mare	2222	200000		22,790	22.00	- 500 00000	10000	10000	100
0185 SI21AC0261	6		0.00	18.34	18.34	0.00	123.80	123.80	0.00	1505.30	1505.30	1473.30 1629.10		-	0.1303 0.08		0.2138			1.3175	39.962	14.0859	22	29,4746	56.7200	6613.1476	0.0000	0.0000	0.0000 01A01
0183 SI21AC0185	6		0.00	4.31	22.65	0.00	8.00	131.60	0.00	341.50	1846.80	1978.60			2.000		0.2364			0.0018	1.665	0.8451	42.3	29.4746	56.7200	6613,1476	0.0000	0.0000	0.0020 01A01
0540 SI21AC0183	6		0.25	6.01	28.65	0.00	0.00	131.60	35.00	472.80	2319.60	2451.40			0.1749 0.11		0.2872		0.4369 12		1,658	0.8415	51.9	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0022 01A01
0177 SI21AC0540	6		0.08	0.40	29.05	0.00	0.00	131.80	10.80	10.80	2330.40	2462.20			0.2167 0.13		0.3558			0.0018	1.668	0.8466	64.4	29.4746	56.7200	6613.1476	0.0010	0.0020	0.0038 01A01
0178 SI21AC0177	6		0.00	8.97	38.02	0.00	0.00	131.80	0.00	944.30	3274.70	3406.50		1.50	Author and		0.3573			0.0018	1.849	1.2771	43.0	29.4746	56.7200	6613.1476	0.0003	0.0006	0.0026 01A01
3039 St21AC0178	6	3.7	0.00	0.02	38.04	0.00	0.00	131.80	0.00	0.00	3274.70	3406.50			0.3012 0.19		0.4944	0.2514		0.0064	3.493 29.389	2.4135	30.9	29.4746	56.7200	6613,1476	0.0000	0.0000	0.0006 01A01
3017 SI21AC3018	31	88	1.36	1.67	1.67	0.00	0.00	0.00	190.20	190.20	190.20	190.20		-	0.0168 0.01			0.0110	0.0386 8	0.4130	1,984	0.4477	3.2	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0001 01A01
3016 SI21AC3017	31	83	0.00	0.03	1.69	0.00	0.00	0.00	0.00	0.00	190.20	190.20			0.0168 0.01	700 V V V V V V V V V V V V V V V V V V		0.0112	0.0388 8	0.0044	2.013	-	8.6	29.4746	56.7200	6613.1476	0.0056	0.0108	0.0110 01A01
0152 SI21AC3016	31		0.00	0.10	1.79	0.00	0.00	0.00	0.00	0.00	190.20	190.20	0.00								4.27.53	0.4540	8.5	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0002 01A01
0151 SI21AC0152	31		1.41	2.69	4.48	0.00	0.00	0.00	197.30	261.40	451.60	451.60					0.0276		0.0395	0.0069	2.489	0.5615	7.0	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0007 01A01
3014 SI21AC0151	31	88	0.00	3.77	8.26	0.00	0.00	0.00	0.00	272.90	724.50	724.50	See all	-	0.0399 0.02	200	0.0656		0.0952 8	0.0040	1.898	0.4281	22.2	29.4746	56.7200	6613.1476	0.0058	0.0112	0.0108 01A01
3013 SI21AC3014	31		0.00	0.05	8.31	0.00	0.00	0.00	0.00	0.00	724.50	724.50		-127	0.0641 0.04		0.1052		0.1598 8	0.0200	4.243	0.9572	16.7	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0009 01A01
3027 SI21AC3013	31		0.60	0.02	8.33	0.00	0.00	0.00	0.00	0.00	724.50	724.50			0.0641 0.04		0.1052		0.1601 8	0.0132	3.442 2.171	0.7764	20.6	29.4746 29.4746	56.7200 56.7200	6613.1476 6613.1476	0.0000	0.0000	0.0003 01A01
									1.00		72.00	121.00	0.0214	0.00	0.0041 0.04	0.0024	0.1032	0.0331	0.1002 10	0.0039	2.1/1	0.7655	20.9	29.4740	50.7200	0013.1470	0.0000	0.0000	0.0002 01A01
333 SI21AC0338	3	2	0.00	0.73	7922.42	0.00	0.00	137652.20	0.00	0.00	59487.80	197140.00	8.7900	1.70 1	14.9218 5.31	148 14 1049	20.2366	63 0976	83.3343 66	0.0016	5.299	67.2410	123.9	29.4746	EE 7900	EE12 1475	0.0000	0.0000	0.0048.01404
330 SI21AC0333	3	2	0.00	0.69	7923.11	0.00	0.00	137652.20	0.00	0.00	59487.60	197140.00		1.70 1			20.2366			0.0016	5.322	67.5280	123.4	29.4746	56,7200	6613.1476	0.0000	0.0000	0.0048 01A01
863 SI21AC0330	3	2	0.00	0.54	7923.65	0.00	0.00	137652 20	0.00	0.00	59487.80	197140.00	10° A.C.		14.9218 5.31		20.2366	-		0.0016	5.322	67.5260	123.4		56.7200	6613.1476	0.0000	0.0000	0.0045 01A01
84 SI21AC0263	3		0.00	0.64	7924.28	0.00	0.00	137652.20	0.00	0.00	59487.80	197140.00		2704	14.9218 5.31		20.2366			0.0016	5.299	67.2416	124.0	29.4746 29.4746	56.7200 56.7200	6613.1476 6613.1476	0.0000	0.0000	0.0036 01A01 0.0042 01A01
41 SI21AC0184	3		0.00	0.57	7924.85	0.00	0.00	137652.20	0.00	0.00	59487.60	197140.00			14.9218 5.31		20.2366			0.0016	5.328	67.6130	123.3	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0042 01A01 0.0037 01A01
39 SI21AC0541	3	2	0.00	0.30	7925.15	0.00	0.00	137652.20	0.00	0.00	59487.80	197140.00			14.9218 5.31		20.2366		83.3523 60		8.434	107.0182	77.9	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0037 01A01 0.0020 01A01
																						7.46	-		22.7600	20.3.7.7.9	2.000	4.000	vices vine)
52 SI21AJ0093	24	51	0.00	0.41	416.12	0.00	0.00	22351.40	0.00	0.00	18154.70	40506.10	2.0587	2.11	4.3482 3.30	90 5.3677	7.6572	7.8223	15.4795 48	0.0008	3.268	26.5428	58.3	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0075 01C01A
55 SI21AC0562	24	51	0.00	13.34	429.46	0.00	156.80	22508.20	0.00	1002.20	19156.90	41665.10			4.4094 3.37		7.7842			0.0012	3.989	32.3930	48.5	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0079 01C01A
51 SI21AC0555	24	51	0.00	0.42	429.88	0.00	0.00	22508.20	0.00	0.00	19156.90	41665.10			4.4094 3.37		7.7842			0.0009	3.420	27.7776	56.6	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0076 01C01A
0 SI21AC0551	24	51	0.00	8.83	438.70	0.00	55.00	22563.20	0.00	669.00	19825.90	42389.10			4.4476 3.41		7.8634			0.0010	3.656	29.6952	53.4	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0069 01C01A
549 SI21AC0550	24	51	0.00	0.43	439.13	0.00	0.00	22563.20	0.00	0.00	19825.90	42389.10	7 5 7 7 7		4.4476 3.41	22	7.8634			0.0010	3.642	29.5745	53.7	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0079 01C01A
45 SI21AC0549			0.00	0.43	439.57	0.00	0.00	22563.20	0.00	0.00	19825.90	42389.10		-	4.4476 3.41		7.8634			0.0010	3.626	29.4465	53.9	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0080 01C01A
5 SI21AC0545	24	51 (	0.00	0.47	440.04	0.00	0.00	22563.20	0.00	0.00	19825.90	42389.10	2.1142		4.4476 3.41		7.8634			0.0038	7.019	57.0042	27.9	66.7545	89.3067	18345.3770	0.0000	0.0000	0.0087 01C01A
										- 4 4																			
1 SI21AC0172		2.5	0.27	0.49	0.49	0.00	0.00	0.00	35.90	35.90	35.90	35.90			0.0032 0.00		0.0052	0.0033	0.0085 6	0.0050	1.746	0.2216	3.8	29.4746	56.7200	6613.1476	0.0011	0.0020	0.0033 01A01
73 SI21AC0171			1.85	2.15	2.64	0.00	0.00	0.00	231.90	231.90	267.80	267.80	0.0079	3.00	0.0237 0.01	52 0.0231	0.0389	0.0175	0.0564 6	0.0050	1.751	0.2222	25.4	29.4746	56.7200	6613.1476	0.0068	0.0132	0.0142 01A01
74 SI21AC0173		9-1	1.64	3.14	5.78	0.00	0.00	0.00	220.10	342.10	609.90	609.90	0.0180	3.00	0.0539 0.03	46 0.0526	0.0885	0.0383	0.1268 6	0.0050	1.751	0.2222	57.1	29.4746	56.7200	6613.1476	0.0065	0.0125	0.0121 01A01
75 SI21AC0174			0.34	0.53	6.32	0.00	0.00	0.00	34.10	34.10	644.00	644.00	0.0190	3.00	0.0570 0.03	65 0.0555	0.0935	0.0418	0.1353 6	0.0050	1,751	0.2222	60.9	29.4746	56.7200	6613.1476	0.0010	0.0019	0.0035 01A01
6 SI21AC0175			1.71	2.04	8.36	0.00	0.00	0.00	238.90	238.90	882.90	882.90	2000		0.0781 0.05		0.1282			0.0060	1.917	0.2433	75.4	29.4746	56,7200	6613.1476	0.0070	0.0136	0.0135 01A01
7 SI21AC0176	31	90 (	0.44	0.52	8.88	0.00	0.00	0.00	61.40	61.40	944.30	944.30	0.0278	3.00	0.0835 0.05	36 0.0814	0.1371	0.0587	0.1958 6	0.0060	1.918	0.2434	80.4	29.4746	56.7200	6613.1476	0.0018	0.0035	0.0035 01A01
v 000100110	-		200						-																				
7 SI21AC0548	70 2	7	3.30	3.55	3.55	0.00	0.00	0.00	462.70	462.70	462.70	462.70			0.0409 0.02		0.0672			0.0037	1.826	0.4119	22.0	29.4746	56,7200	6613.1476	0.0136	0.0262	0.0235 01A01
	70 2		3.30	3.57	7.11	0.00	0.00	0.00	462.70	462.70	925.40	925.40		707	0.0818 0.05		0.1343	0.0470	0.1813 8	0.0036	1.788	0.4033	45.0	29.4746	56.7200	6613,1476	0.0136	0.0262	0.0236 01A01
44 SI21AC0546	70 2		1.99	2.25	9.37	0.00	0.00	0.00	278.80	278.80	1204.20	1204.20			0.1065 0.06		0.1748	0.0619	0.2367 10	0.0083	3.178	1.1203	21.1	29.4746	56.7200	6613.1476	0.0082	0.0158	0.0149 01A01
82 SI21AC0544	70 2		0.86	1.16	10.53	0.00	0.00	0.00	120.60	120.80	1325.00	1325.00	307.02	3.00	0.1172 0.07	52 0.1142	0.1923	0.0696	0.2619 10	0.0022	1.622	0.5717	45.8	29.4746	56,7200	6613.1476	0.0036	0.0069	0.0077 01A01
181 SI21AC0182	70 2		0.00	0.02	10.55	0.00	0.00	0.00	0.00	0.00	1325.00	1325.00			0.1172 0.07		0.1923	0.0698	0.2621 15	0.0032	2.564	2.0332	12.9	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0002 01A01
	70 2		0.26	0.32	10.88	0.00	0.00	0.00	36.70	36.70	1361.70	1361.70		3.00	0.1204 0.07	72 0.1174	0.1976	0.0719	0.2696 14	0.0017	1,798	1.2419	21.7	29.4746	56.7200	6613.1476	0.0011	0.0021	0.0021 01A01
	70 2		0.00	3.04				0.00	0.00	343.60	1705.30	1705.30		3.00		67 0.1470		0.0920				1.2771							

### APPENDIX B INFIX Adjusted - Existing Condition (1995) Model Results

DOWN_MH UP_MH	PAGE	ORDER LI	NE_AREA IN	CR_AREA TO	OTAL_AREA LI	INE_RES	INCR RES T	OTAL RES LIN	E OTHER INC	R OTHER T	OTL OTHER T	OTAL POP	Q AVE FLOW	FACT Q MAX	DRY II DES Q	AVE DE	S_Q_MAX WET_II DE	ES Q PEAK SIZE	SLOPE VEL	OCITY CA	PACITY PO	T CAP BAS	E RATE DW	I RATE W	WI RATE LI	NE BASE LI	NE DWI LIZ	NE WWI BASINNAM	E S
SI21AC0138 SI21AC0542			0.26	0.58	14.50	0.00		0.00	36.70	36.70	1742.00		0.0513	3.00 0.1540		0.1501	0.2528 0.0959	0.3487 14		1.699	1.1736	29.7	29.4746	56.7200	6613.1476	0.0011	0.0021	0.0039 01A01	
121AC0198 SI21AC0197	31	91	0.42	0.64	0.64	0.00	0.00	0.00	46.70	46.70	46.70	48.70	0.0014	3.00 0.0041	0.0026	0.0040	0.0068 0.0043	0.0110 6	0.0050	1.751	0.2222	E 0	29,4746	56.7200	6613.1476	0.0014	0.0026	0.0042.04404	
21AC0199 SI21AC0198	31	91	0.67	0.98	1,62	0.00	0.00	0.00	76.80	76.80	123.50	-	0.0014		0.0070	0.0106	0.0179 0.0107	0.0286 6	0.0050	1.748	0.2222	5.0 12.9	29.4746	56.7200	6613.1476	0.0014	0.0026	0.0043 01A01 0.0065 01A01	
21AC0200 SI21AC0199	31	91	0.15	0.35	1.97	0.00	0.00	0.00	21.40	21,40	144,90		0.0043		0.0082	0.0125	0.0210 0.0130	0.0340 6	0.0051	1.763	0.2237	15.2	29.4746	56.7200	6613.1476	0.0006	0.0012	0.0023 01A01	
21AC0201 SI21AC0200	31	91	0.55	0.74	2.70	0.00	0.00	0.00	54.50	54.50	199.40	199.40	0.0059		0.0113	0.0172	0.0269 0.0179	0.0468 6	0.0050	1.751	0.2222	21.1	29.4746	56.7200	6613.1476	0.0016	0.0031	0.0049 01A01	
21AC0202 SI21AC0201	31	-	0.46	1.86	4.57	0.00	0.00	0.00	55.10	157.00	356.40		0.0105	3.00 0.0315		0.0307	0.0517 0.0302	0.0819 6	0.0060	1.918	0.2434	33.6	29.4746	56.7200	6613,1476	0.0016	0.0031	0.0043 01A01	
21AC0183 SI21AC0202	31	91	0.68	0.87	5.44	0.00	0.00	0.00	81.40	81.40	437.80	437.80	0.0129	3.00 0.0387	0.0248	0.0377	0.0635 0.0359	0.0995 6	0,0060	1,918	0.2434	40.9	29.4746	56.7200	6613.1476	0.0024	0.0046	0.0058 01A01	
21AC0188 SI21AC0189	31	92	0.77	0.94	0.94	0.00	0.00	0.00	102,70	102.70	102.70	102.70	0.0030	3.00 0.0091	0.0058	0.0089	0.0149 0.0062	0.0211 6	0.0040	1.558	0.1977	10.7	29.4746	56.7200	6613.1476	0.0030	0.0058	0.0062 01A01	-
21AC0187 SI21AC0188	31	92	0.76	1.10	2.04	4.00	4.00	4.00	81.10	81.10	183.80	0.000	0.0055	3.00 0.0166		0.0162	0.0273 0.0135	0.0407 6	0.0019	1.074	0.1363	29.9	29.4746	56.7200	6613.1476	0.0035	0.0038	0.0073 01A01	
21AC0186 SI21AC0187	32	92	0.38	0.66	2.70	4.00	4.00	8.00	48.20	48.20	232.00	7.55	0.0071		0.0136	0.0207	0.0348 0.0178	0.0527 6	0.0066	2.011	0.2551	20.6	29.4746	56.7200	6613.1476	0.0015	0.0030	0.0044 01A01	
121AC0185 SI21AC0186	32	92	0.96	1.28	3.98	0.00	0.00	8.00	109.50	109.50	341.50	349.50	0.0103	3.00 0.0309	0.0198	0.0301	0.0507 0.0263	0.0770 6	0.0060	1.912	0.2426	31.7	29.4746	56.7200	6613.1476	0.0032	0.0062	0.0085 01A01	-10
101100000	-		9.24	4.74	2.12		704																						
121AC0203 SI21AC0204 121AC0201 SI21AC0203	80		0.29	0.42	0.42 1.21	0.00	0.00	0.00	40.20 61.70	40.20 61.70	40.20 101.90		0.0012	3.00 0.0036 3.00 0.0090		0.0035	0.0058 0.0028 0.0148 0.0080		0.0060	1.912	0.2427	3.5	29.4746	56.7200 56.7200	6613.1476 6613.1476	0.0012	0.0023	0.0028 01A01	
JE MODEOS	05		0,00	0.73	1.2.1	0.00	0.00	0.00	61.70	01.70	101.90	101.90	0.0030	3.00 0.6090	0.0058	0.0068	0.0148 0.0060	0.0228 6	0.0000	1.920	0.2437	9.3	29.4/40	56.7200	6613.14/6	0.0018	0.0035	0.0052 01A01	
121AC0205 SI21AC0206	80	299	0.58	0.72	0.72	0.00	0.00	0.00	69.80	69.80	69.80	69.80	0.0021	3.00 0.0062	0.0040	0.0060	0.0101 0.0048	0.0149 6	0.0050	1.743	0.2212	6.7	29.4746	56.7200	6613.1476	0.0021	0.0040	0.0048 01A01	
121AC0173 SI21AC0205	80	299	0.37	0.59	1.31	0.00	0.00	0.00	52.20	52.20	122.00	5.15 (5.0)	0.0036	3.00 0.0108		0.0105	0.0177 0.0087		0.0051	1.772	0.2248	11.7	29.4746	56.7200	6613.1476	0.0015	0.0030	0.0039 01A01	
								- 11-																					
121AC0156 SI21AC0196	80		0.00	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00		0.0000	3.00 0.0000		0.0000	0.0000 0.0015	0.0015 6	0.0050	1.751	0.2222	0.7	29,4746	56.7200	6613.1476	0.0000	0.0000	0.0015 01A01	
21AC0155 SI21AC0156	80		1.64	1.98	3.64	0.00	0.00	0.00	163.70 109.20	163.70 109.20	163.70 272.90		0.0048	3.00 0.0145		0.0141	0.0238 0.0146		0.0049	1.740	0.2208	17.4	29.4746	56,7200	6613.1476	0.0048	0.0093	0.0131 01A01	
ZINGS IOT CILL MOSTOS	- 00	231	1.05	1.45	3.04	0.00	0.00	0.00	109.20	109.20	212.90	2/2.90	0.0080)	3.00 0.0241	0.0155	0.0235	0.0396 0.0241	0.0637 6	0.0057	1.868	0.2370	26.9	29,4746	56.7200	6613.1476	0.0032	0.0062	0.0095 01A01	
21AJ0023 SI21AJ0024	24	49	0.00	0.54	1686.39	0.00	0.00	98751.20	0.00	0.00	61235.10	159986.30	9.5264	1.68 15.9773	6.1166	15.6430	22.0939 14.2963	36.3902 69	0.0005	3.262	54.7495	66.5	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0036 01A01	
21AJ0022 SI21AJ0023	24	49	0.00	0.42	1686.81	0.00	0.00	98751.20	0.00	0.00	61235.10	159986.30		1.68 15.9773		15.6430	22.0939 14.2991	5-3-5-5	0.0005	3.240	54.3810	66.9	29,4746	56.7200	6613.1476	0.0000	0.0000	0.0027 01A01	
21AJ0011 SI21AJ0022	24		0.00	0.29	1687.10	0.00	0.00	98751.20	0.00	0.00	61235.10	159986.30	9.5264	1.68 15.9773	6.1166	15.6430	22.0939 14.3010		0.0005	3.197	53.6506	67.8	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0019 01A01	
1AJ1002 SI21AJ0011	24		0.00	0.53	1687.63	0.00	0.00	98751.20	0.00	0.00	61235.10	159986.30		1.68 15.9773		15.6430	22.0939 14.3045	36.3984 69		3.287	55.1632	66.0	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0035 01A01	
21AC0119 SI21AJ1002 21AC0118 SI21AC0119	24		0.00	-90.06	1597.57	0.00		95348.10	0.00	7900.60	69135.70	164483.80	1000	1.67 16.3038		16.7860	23.3337 14.9692		0.0006	3.547	59.5280	64.3	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0050 01A01	
21AC0118 SI21AC0119 21AC0109 SI21AC0118	24		0.00	0.68	1598.25 1598.77	0.00	0.00	95348.10 95348.10	0.00	0.00	69135.70 69135.70	164483.80 164483.80		1.67 16.3038 1.67 16.3038		16.7860	23.3337 14.9737 23.3337 14.9771		0.0006	3.537	59.3840 59.4684	64.5	29.4746 29.4746	56.7200 56.7200	6613.1476 6613.1476	0.0000	0.0000	0.0045 01A01	
21AC4120 SI21AC0109	24		0.00	0.60	1599.37	0.00	0.00	95348.10	0.00	0.00	69135.70	164483.80		1.67 16.3038		16.7860	23.3337 14.9711	1270.07	0.0002	2.233	37.4699	102.3	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0034 01A01 0.0040 01A01	
21AC0117 SI21AC4120	24	49	0.00	-820.11	779.26	0.00	122-122-123	45646.30	0.00	-34510.50	34625.20	80271.50		1.86 8.7917	7	8.1677	12.2438 7.2618		0.0006	3.625	60.8375	32.1	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0003 01A01	
21AC0136 SI21AC0138	70		0.26	0.96	15.46	0.00	0.00	0.00	37.00	37.00	1779.00	1779.00		3.00 0.1573	0.1009	0.1533	0.2582 0.1022	0.3604 24	0.0009	2.143	4.3509	8.3	29.4746	56.7200	6613.1476	0.0011	0.0021	0.0064 01A01	
21AC0145 SI21AC0136	70		1.29	1.96	17,42	0.00	0.00	0.00	180.30	180.30	1959.30	1959.30		3.00 0.1732		0.1689	0.2844 0.1152	0.3995 24		2.142	4.3484	9.2	29.4746	56.7200	6613.1476	0.0053	0.0102	0.0129 01A01	
21AC0144 SI21AC0145 21AC3026 SI21AC0144	70	- 100	0.00	0.14	18.70	0.00	0.00	0.00	165.00	165.00	2124.30	2124.30		3.00 0.1878		0.1831	0.3083 0.1237	20.42	0.0003	1.344	2.7294	15.8	29.4746	56.7200	6613.1476	0.0049	0.0094	0.0085 01A01	
21AC3024 SI21AC3026	70		0.00	2.42	21.27	0.00	0.00	0.00	0.00	192.60	2124.30 2316.90	2124.30			0.1205	0.1831	0.3083 0.1246 0.3363 0.1406	170 ( )	0.0009	2.212	4.4906 4.1352	9.6	29.4746 29.4746	56.7200 56.7200	6613.1476 6613.1476	0.0000	0.0000	0.0009 01A01 0.0032 01A01	
21AC0142 SI21AC3024	70	247	0.00	2.39	23.66	0.00	0.00	0.00	0.00	260.50	2577.40	2577.40		3.00 0.2279	100000	0.2221	0.3741 0.1565		0.0007	1.859	3.7749	14.1	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0004 01A01	
21AC4130 SI21AC0142	70	247	1.19	2.78	26.44	0.00	0.00	0.00	314.80	422.20	2999.60	2999.60	0.0884	3.00 0.2652	100000000000000000000000000000000000000	0.2585	0.4353 0.1749		0.0026	3.637	7.3848	8.3	29.4746	56.7200	6613.1476	0.0093	0.0179	0.0108 01A01	
21AC4120 SI21AC4130	70	247	0.00	1.86	28.30	0.00	0.00	0.00	0.00	191.60	3191.20	3191.20	0.0941	3.00 0.2822	0.1810	0.2750	0.4631 0.1872	0.6503 24	0.0150	8.819	17.9060	3.6	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0004 01A01	
2440222			14.42		2710.00		20.700	0.000													- 1 - 1								
21AC3038 SI21AC3039 21AC3019 SI21AC3038	3	2	0.00	33.61 0.16	7963.76	0.00	131.80	137784.00	0.00	3274.70	62762.50	200546.50	2000	1.69 15.0664	5.5081	14.3985	20.5745 63.3710		0.0005	3.652	78.3233	107.2	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0038 01A01	3
21AC3015 SI21AC3019	3	2	0.00	0.10	7963.92 7964.50	0.00	0.00	137784.00	0.00	0.00	62762.50 62762.50	200546.50	2.00	1.69 15.0664 1.69 15.0664		14.3985	20.5745 63.3721		0.0006	3.769	80.8300	103.9	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0010 01A01	
21AC3010 SI21AC3015	3	2	0.00	0.26	7964.77	0.00	0.00	137784.00	0.00	0.00	62762.50	200546.50		1.69 15.0664 1.69 15.0664	5.5081	14.3985	20.5745 63.3759 20.5745 63.3777	83.9504 78 83.9522 78	0.0005	3.700	79.3461 78.5556	105.8	29.4746 29.4746	56,7200 56,7200	6613.1476 6613.1476	0.0000	0.0000	0.0039 01A01 0.0017 01A01	- 1
21AC3004 SI21AC3010	3	2	0.00	184.74	8149.50	0.00	3948.50	141732.50	0.00	13810.60	76573.10	218305.60				16.0348	22.5233 67.1740	The Albert Co.	0.0005	3.639	78.0375	114.9	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0032 01A01	
21AC3001 SI21AC3004	3	2	0.00	3.61	8153.12	0.00	0.00	141732.50	0.00	360.40	76933.50	218666.00	9.6260	1.67 16.1190	6.4398	16.0659	22.5589 67.1979		0.0005	3.634	77.9236	115.2	29.4746	56,7200	6613.1476	0.0000	0.0000	0.0029 01A01	
21DM5000 SI21AC3001	3	2	0.00	2.66	8155.78	0.00	0.00	141732.50	0.00	259.70	77193.20	218925.70	9.6337	1.67 16.1299	6.4546	16.0882	22.5845 67.2154	89.7999 75	0.0008	4.337	113.8797	78.9	29.4746	56,7200	6613.1476	0.0000	0.0000	0.0004 01A01	
21AC3000 SI21DM5000	3	2	0.00	175.59	8331.37	0.00	3388.40	145120.90	0.00	16404.20	93597.40	238718.30		4	0.00	17.7942	24.5331 68.3767		0.0220	23.127	607.1989	15.3	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0001 01A01	- 1
21AC3036 SI21AC3000 21AC0000 SI21AC3036	3	2	0.00	0.63 339.07	8332.00 8671.07	0.00	12383.70	145120.90 157504.60	0.00	0.00	93597.40	238718.30				17.7942	24.5331 68.3808		0.0005	3.499	75.0265	123.8	29,4746	56.7200	6613.1476	0.0000	0.0000	0.0042 01A01	- 4
21AQ0000 SI21AC0000	3	2	0.70	1223.99	9895.07	0.00	68209.50	225714.10	69.80	22895.60 54542.20	171035.20	273997.60 396749.30		1.59 21.9659 1.50 31.0343		23.4143 37.1198	31.5231 79.1067 47.4646 94.4250		0.0005	3.445 20.724	73.8798 444.4404	149.7 31.9	29.4746 29.4746	58.7200 56.7200	6613.1476 6613.1476	0.0000	0.0000	0.0018 01A01 0.0058 01A01	
											***************************************		20.000	1.00 01.0010	1011000	01.1100	411,040 51.4205	141.0030 70	0.0112	20.724	711,1101	01.0	23.4140	30.1200	0010.1470	0.0021	0.0040	0.0036 01A01	
21AC0005 SI21AC2005	3	4	0.00	441.58	441.61	0.00	22563.20	22563.20	0.00	19825.90	19825.90	42389.10	2.1142	2.10 4.4476	3.4158	5.5300	7.8634 8.0358	15.8992 72	0.0007	4.012	93.3460	17.0	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0102 01A01	- 3
21AC1001 SI21AC0005	3	4	0.00	0.98	442.59	0.00	0.00	22563.20	0.00	0.00	19825.90	42389.10		2.10 4.4476		5.5300	7.8634 8.0422	15.9056 72	0.0006	3.685	85.7353	18.6	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0065,01A01	- 3
1AC1005 SI21AC1001	3	4	0,00	0.03	442.62	0.00	0.00	22563.20	0.00	0.00	19825.90	42389.10		2.10 4.4476		5.5300	7.8634 8.0424		0.0005	3.349	77.9242	20.4	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0002 01A01	
1AC0004 SI21AC1005 1AC0003 SI21AC0004	4	4	0.00	0.02	442.64	0.00	0.00	22563.20	0.00	0.00	19825.90	42389.10		2.10 4.4476		5.5300	7.8634 8.0425		0.0006	3.780	87.9504	18.1	29.4746	56,7200	6613.1476	0.0000	0.0000	0.0001 01A01	
PIAC0003 SI21AC0004	4	4	0.00	0.51	443.14 443.39	0.00	0.00	22563.20 22563.20	0.00	0.00 21.30	19825.90 19847.20	42389.10 42410.40		2.10 4.4476		5.5300	7.8634 8.0459		0.0006	3.691	85.8644	18.5	29.4746	56,7200	6613.1476	0.0000	0.0000	0.0034 01A01	
1AC0002 SI21AC1313	4	4	0.00	779.36	1222.75	0.00		68209.50	0.00	34625.20	54472.40	122681.90		2.10 4.4487 1.76 12.0439		5.5319 13.6995	7.8657 8.0475 18.9130 15.3100		0.0006	3.555 3.555	82,7158 82,7158	19.2 41.4	29.4746 29.4746	56.7200 56.7200	6613.1476 6613.1476	0.0000	0.0000	0.0003 01A01 0.0003 01A01	- 3
21AC0000 SI21AC0002	4	4	0.00	0.36	1223.11	0.00	0.00	68209.50	0.00	0.00	54472.40	122681.90		1.76 12.0439		13.6995	18.9130 15.3124	34.2253 72		3.110	72.3638	47.3	29.4746	56,7200	6613.1476	0.0000	0.0000	0.0003 01A01 0.0024 01A01	
																											72.4		
21AC0160 SI21AC0195	6	9	0.20	0.51	162.30	0.00	0.00	3948.50	28.40	28.40	12259.40	16207.90		2.50 1.6932		1.5021	2.5170 3.5467	6.0637 24		2.503	5.0821	119.3	41.9855	51.0146	21973.8905	0.0012	0.0014	0.0112 01A03	
21AC0157 SI21AC0160 21AC1157 SI21AC0157	6	9	0.00	6.22	168.52	0.00	0.00	3948.50	0,00	77.90	12337.30	16285.80		2.49 1.7001		1.5093	2.5279 3.6833	6.2112 24		2.502	5.0791	122.3	41.9855		21973.8905	0.0000	0.0000	0.0082 01A03	- 3
1AC1157 SI21AC0157	6	9	0.00	0.33	168.85 168.89	0.00	0.00	3948.50 3948.50	0.00	0.00	12337.30 12337.30	16285.80 16285.80		2.49 1.7001 2.49 1.7001		1.5093	2.5279 3.6906	6.2185 24		2.491	5.0581	122.9	41.9855		21973.8905	0.0000	0.0000	0.0073 01A03	- 1
JEHO IN	3		0.00	9.04	100.03	.0.00	0.00	3540.00	0.00	0.00	12337.30	10203.00	0.0010	2.49 1.7001	0.0210	1.0093	2.5279 3.6915	6.2194 24	0.0047	4.919	9.9875	62.3	41.9855	51.0146	21973.8905	0.0000	0.0000	0.0008 01A03	2
1AJ0003 SI21AJ0004	71	248	0.26	0.47	343.83	0.00	0.00	22551.70	36.70	36.70	26720.10	49271.80	2.8853	2.01 5.7921	2.8270	5.7123	8.6191 4.7329	13.3520 36	0.0021	4.346	19.8528	67.3	29.4746	56.7200	6613.1476	0.0011	0.0021	0.0031 01A01	1
1AJ1002 SI21AJ0003			0.00	0.03	343.85	0.00	0.00	22551.70	0.00	0.00	26720.10	49271.80		2.01 5.7921		5.7123	8.6191 4.7331		0.0164	12.070	55.1405	24.2	29.4746	56.7200	6613.1476	0.0000	0.0000	0.0002 01A01	1
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INFIX INFORMATION FOR	RSEWERL	LINE #24																											
INFIX INFORMATION FOR	SEWED	LINE #25					-																						-
	SEVERE																												-
1AC0153 SI21AC0154	80	298	0.33	0.66	0.66	0.00	0.00	0.00	42.90	42.90	42.90	42.90	0.0013	3.00 0.0038	0.0024	0.0037	0.0062 0.0044	0.0106 6	0.0050	1.751	0.2222	4.8	29.4746	56.7200	6613.1476	0.0013	0.0024	0.0044 01A01	
1AC0152 SI21AC0153	80		0.15	0.40	1.06	0.00	0.00	0.00	21.20	21.20	64.10		0.0019	3.00 0.0057		0.0055	0.0093 0.0070		0.0050	1.747	0.2217	7.4	29.4746	56,7200	6613.1476	0.0006	0.0024	0.0027 01A01	
1AC0179 SI21AC0543	136	-	1.93	2.22	2.22	0.00	0.00	0.60	269.60	269.60	269.60	269.60		3.00 0.0238		0.0232	0.0391 0.0147		0.0052	2.168	0.4890	11.0	29.4746	56.7200	6613.1476	0.0079	0.0153	0.0147 01A01	
21AC0180 SI21AC0179 21AJ0057 SI21AJ0058	136		0.53	0.69	2.91	0.00	0.00	0.00	74.00	74.00	343.60	343.60		3.00 0.0304		0.0296	0.0499 0.0192		0.0060	2.330	0.5257	13.1	29.4746	56.7200	6613.1476	0.0022	0.0042	0.0046 01A01	- 2
	136	617	1.35	1.60	1.60	0.00	0.00	0.00	286.30	286.30	286.30	286.30	0.0084	3.00 0.0253	0.0162	0.0247	0.0416 0.0106	0.0521 8	0.0078	2.657	0.5994	8.7	29.4746	56.7200	6613.1476	0.0084	0.0162	0.0106 01A01	2

APPENDIX B
INFIX Adjusted - Future Condition (2020) Model Results

loousi sui	Up MI	DIOT O	DD50 110			ar years had	oue neer. In	oran eres for	sure sate to	a range loss	F.		10.500 office 1	5.57 E			1,000	27.5 L.S	2000 1000												
SI21AJ0067	SI21AJ0068	139	630	0.79	0.95	0.95	0.00	0.00	0.00	237.60	237.60	237.60		0.0043		0.0130		O.0099	S_Q_MAX WET_II 0.0185 0.006		8 0.0038	1.855	0.4186	CT_CAP BA	SE_RATE DW 18.1869	VI_RATE V 23.3977	6604.0547	0.0043	0.0056	NE_WWI BASINNAM 0.0063 01A01	E SL
SI21AJ0066	SI21AJ0067	139	630	1.11	1.34	2.29	0.00	0.00	0.00	332.60	332.60	570.20		0.0104	3.00	0.0311		0.0237	0.0445 0.015		8 0.0040	1.894	0.4272	13.9	18.1869	23.3977	6604.0547	0.0060	0.0038	0.0003 01A01	1
SI21AJ0065	SI21AJ0066	139	630	1.85	2.03	4.36	0.00	0.00	0.00	553.90	553.90	1124.10	1124.10	0.0204	3.00	0.0613	0.0263	0.0467	0.0876 0.0288	0.1165	8 0.0045	2.005	0.4522	25.8	18.1869	23.3977	6604.0547	0.0101	0.0130	0.0137 01A01	1
SI21AJ0064 SI21AJ0013	SI21AJ0065 SI21AJ0064	139	630	1.20	1.50	5.87	0.00	0.00	0.00	359.70	359.70	1483.80		0.0270	3.00	0.0810		0.0617	0.1157 0.0387		8 0.0034	1,750	0.3947	39.1	18.1869	23.3977	6604.0547	0.0065	0.0084	0.0099 01A01	- 4
312 TAJ0013	S121AJUU64	139	630	0.00	3.31	9.18	0.00	0.00	0.00	0.00	831.90	2315.70	2315.70	0.0421	3.00	0.1264	0.0542	0.0963	0.1805 0.0606	0.2411	8 0.0039	1.881	0.4242	56.8	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0002 01A01	1
SI21AJ0062	S121AJ0063	139	629	2.79	3.00	3.00	0.00	0.00	0.00	837.20	837.20	837.20	837.20	0.0152	3.00	0.0457	0.0196	0.0348	0.0653 0.0198	0.0851	8 0.0039	1,874	0.4228	20.1	18.1869	23.3977	6604.0547	0.0152	0.0196	0.0198 01A01	2
SI21AJ0061	SI21AJ0062	139	629	3.39	3.65	6.65	0.00	0.00	0.00	1018.50	1018.50	1855.70		0.0337		0.1012		0.0772	0.1447 0.0439		8 0.0039	1.874	0.4227	44.6	18.1869	23.3977	6604.0547	0.0185	0.0238	0.0241 01A01	2
SI21AJ0013	SI21AJ0061	139	629	1.70	1.87	8.52	0.00	0.00	0.00	509.20	509.20	2364.90	2364.90	0.0430	3.00	0.1290	0.0553	0.0983	0.1844 0.0563	0.2406	8 0.0057	2.264	0.5107	47.1	18.1869	23.3977	6604.0547	0.0093	0.0119	0.0123 01A01	2
C1044 10070	C1044 12072	007		-	- 22		244			141.71	200																				
SI21AJ0072 SI21AJ0064	SI21AJ0073 SI21AJ0072	207	1098	0.51	2.52 0.75	2.52 3.28	0.00	0.00	0.00	679.80 152.10	679.80 152.10	679.80 831.90		0.0124	3.00	0.0371	0.0159	0.0283	0.0530 0.0167 0.0649 0.0216		8 0.0039 8 0.0039	1.874	0.4227	16.5	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0124	0.0159	0.0167 01A01	3
	CIETIOCOTE	201	(050	0.01	0.10	3.20	0.00	0.00	0.00	132.10	132.10	631.90	031.90	0.0151	3.00	0.0454	0.0195	0.0346	0.0049 0.0216	0.0665	8 0.0039	1,680	0.4241	20.4	18.1869	23.3911	6604.0547	0.0028	0.0036	0.0050 01A01	3
SI21AJ0020	SI21AJ0021	72	262	0.46	3,98	266.37	0.00	0.00	21799.30	139.00	721.50	30852.20	52651.50	3.3219	1.97	6.5287	2.0664	5.3883	8.5951 3.9838	12.5788	36 0.0005	2.127	9.7183	129.4	32 2828	65.3934	17682.4500	0.0045	0.0091	0.0136 01D01	4
SI21AJ0019	SI21AJ0020	72	262	0,11	4.01	270.38	0.00	0.00	21799.30	32.30	876.30	31728.50	53527.80	3.3502	1.96	6.5759	2.1237	5.4739	8.6996 4.0548	12.7543	36 0.0005	2.110	9.6386	132.3	32 2828	65.3934	17682.4500	0.0010	0.0021	0.0033 01D01	4
SI21AJ0018 SI21AJ0990	SI21AJ0019 SI21AJ0018	72		0.00	1.30 4.97	271.68	0.00	0.00	21799.30	311.30	311.30	32039.80		3.3602	1.96	6.5926		5.5043	8.7367 4.0777		36 0.0022	4.404	20.1178	63.7	32 2828	65.3934	17682.4500	0.0101	0.0204	0.0229 01D01	4
SI21AJ0017	SI21AJ0990	72	262	0.28	0.64	276.64 277.28	0.00	1687.50	23486.80 23486.80	0.00 84.90	867.70 84.90	32907.50 32992.40		3.4427	1.95	6.7299 6.7344	55.00	5.7539 5.7621	9.0410 4.1655 9.0511 4.1768		36 0.0011 36 -0.0010	0.000	0.0000	91.9	32.2828 32.2828	65.3934 65.3934	17682.4500 17682.4500	0.0000	0.0000	0.0002 01D01 0.0103 01D01	4
SI21AJ0016	SI21AJ0017	72	262	0.27	3.93	281.21	0.00	5082.50	28549.30	80.10	457.30	33449.70	61999.00		1.94		2.6776	6.3013	9.7068 4.2463		36 0.0015	3.644	16.6480	83.8	32 2828	65.3934	17682.4500	0.0027	0.0052	0.0104 01D01	4
SI21AJ0015	SI21AJ0016	72	262	1.40	3.33	284.54	0.00	632.80	29182.10	418.70	418.70	33868.40	63050.50	3.6576	1.94	7.0850	2.7464	6.4040	9.8315 4.3051	14,1365	36 -0.0005	0.000	0.0000	99999.9	32 2828	65.3934	17682.4500	0.0135	0.0274	0.0303 01D01	4
SI21AJ0014 SI21AJ0013	SI21AJ0015 SI21AJ0014	72	262	2.26	2.57	287.11	0.00	0.00	29182.10	677.30	677.30	34545.70		3.6795	1.94	7.1210		6.4702	9.9117 4.3506	1	36 0.0005	2.089	9.5408	149.5	32 2828	65.3934	17682.4500	0.0219	0.0443	0.0455 01D01	4
	SI21AJ0014 SI21AJ0013	72	262	0.56	0.66	287.77 305.68	0.00	0.00	29182.10 29182.10	169.30	169.30 4680.60	34715.00	63897.10 68577.70		1.93	7.1300 7.2697	2.8018	6.4867 6.6813	9.9318 4.3623 10.1810 4.4805		36 0.0005 36 0.0005	2.190	10.0049 9.4915	142.9	32 2828 18 1869	65.3934 23.3977	17682.4500 6604.0547	0.0055	0.0111	0.0117 01D01 0.0014 01A01	4
							0.00	0.00	ESTOLITO	0.00	4000.00	03030.00	00011.10	5.7101	1,55	1.2031	23113	0.0013	10.1010 4.4000	14.0013	30 0.0003	2.076	3.4313	134.5	10.1003	23.3911	0004.0547	0.0000	0.0000	0.0014 01A01	4
NO INFIX INF	ORMATION FOR	R SEWER LI	INE #5																												
SI21AJ0057	SI21AJ0058	138	628	1.35	1.60	1.60	0.00	0.00	0.00	405.60	405.60	405.60	405.50	0.0074	3.00	0.0224	0.0005	0.0160	0.0345 0.0405	0.0423	9 0.0070	2 667	0.5004	2.0	19 1000	22 2027	5001 5512	0.0074	Desce	0.0105.01101	
SI21AJ0056	SI21AJ0057	138	628	0.20	0.37	1.97	0.00	0.00	0.00	60.30	60.30	465.90		0.0074	3.00	0.0221	0.0095	0.0169	0.0316 0.0105 0.0363 0.0130		8 0.0078 12 0.0025	1.974	0.5994 1.0022	7.0	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0074	0.0095	0.0105 01A01 0.0025 01A01	6
SI21AJ0055	SI21AJ0056	138	628	0.00	4.57	6.54	0.00	0.00	0.00	0.00	1222.50	1688.40		0.0307	3.00		0.0395	0.0702	0.1316 0.0432		12 0.0026	2.007	1.0186	17.2	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0023 01A01	6
SI21AJ0053	SI21AJ0055	138	628	0.19	0.51	7.06	0.00	0.00	0.00	57.00	57.00	1745.40		0.0317	3.00	200	0.0408	0.0726	0.1361 0.0466		12 0.0025	1.974	1.0018	18.2	18.1869	23.3977	6604.0547	0.0010	0.0013	0.0034 01A01	6
SI21AJ0051 SI21AJ0050	SI21AJ0053 SI21AJ0051	139	628	0.00	0.57	7.62 8.01	0.00	0.00	0.00	0.00	65.60	1811.00		0.0329	3.00		0.0424	0.0753	0.1412 0.0503		12 0.0025	1.958	0.9938	19.3	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0021 01A01	6
SI21AJ0048	St21AJ0050	139	628	25.36	25.68	33.69	0.00	0.00	0.00	158.50	65.60 158.50	1876.60 2035.10	17/5	0.0341	3.00		0.0439	0.0780	0.1463 0.0529 0.1587 0.2225		12 0.0026 12 0.0025	1.986	0.9992	19.8	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0000	0.0000	0.0010 01A01 0.1696 01A01	6
S121AJ0010	SI21AJ0048	139	628	0.22	08.0	34.49	0.00	0.00	0.00	65.60	131.20	2166.30		0.0394	3.00	0.1182		0.0901	0.1689 0.2278		12 0.0025	1.958	0.9938	39.9	18.1869	23.3977	6604.0547	0.0029	0.0037	0.0036 01A01	6
201100000	DIOLLOGETTA	***	1040			5744				AUA	120		W.S. 11.			1.200															
SI21AC0553 SI21AC0552	SI21AC0554 SI21AC0553	140	643	0.57	0.65	0.65	0.00	0.00	0.00	172.20 0.00	0.00	172.20 172.20		0.0031	3.00	0.0094		0.0072	0.0134 0.0043		6 0.0039	1.552	0.1970	9.0	18.1869	23.3977	6604.0547	0.0031	0.0040	0.0043 01A01	7
SI21AC0556	SI21AC0552	140	643	0.00	0.30	1.25	0.00	0.00	0.00	0.00	0.00	172.20		0.0031	3.00	0.0094		0.0072	0.0134 0.0063 0.0134 0.0082		6 0.0034	1,351	0.1727	11.4	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0000	0.0000	0.0020 01A01 0.0020 01A01	7
SI21AC0262	SI21AC0556	140	643	0.49	0.79	2.04	0.00	0.00	0.00	147.00	147.00	319.20		0.0058		0.0174		0.0133	0.0249 0.0135		6 0.0040	1.565	0.1986	19.3	18.1869	23.3977	6604.0547	0.0007	0.0034	0.0052 01A01	7
	2700022000			10.50		723		200																							
SI21AC3017 SI21AC3016	SI21AC3018 SI21AC3017	6	11	1.35	1.67	1.67	0.00	0.00	0.00	407.60	407.60	407.60	-	0.0074	3.00	0.0222		0.0170	0.0318 0.0110		8 0.0044	1.984	0.4477	9.6	18,1869	23.3977	6604.0547	0.0074	0.0095	0.0110 01A01	8
SI21AC0152	SI21AC3016	6	11	0.00	0.03	1.69	0.00	0.00	0.00	0.00	0.00	407.60 407.60		0.0074	3.00	0.0222	0.0095	0.0170	0.0318 0.0112 0.0318 0.0118		8 0.0045 8 0.0069	2.013	0.4540	9.5 7.8	18.1859 18.1869	23.3977	6604.0547 6604.0547	0.0000	0.0000	0.0002 01A01	8
SI21AC0151	SI21AC0152	6	11	1.41	2.69	4.48	0.00	0.00	0.00	422.80	566.60	974.20	974.20		3.00		0.0228	0.0405	0.0759 0.0296		8 0.0040	1.898	0.4281	24.7	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0007 01A01 0.0108 01A01	8
SI21AC3014	SI21AC0151	6	11	0.00	3.77	8.26	0.00	0.00	0.00	0.00	818.70	1792.90	1792.90	0.0326	3.00	0.0978	0.0420	0.0746	0.1398 0.0545	0.1943	8 0.0200	4.243	0.9572	20.3	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0009 01A01	8
SI21AC3013	SI21AC3014	6	11	0.00	0.05	8.31	0.00	0.00	0.00	0.00	0.00	1792.90	1792.90		3.00	0.0978		0.0746	0.1398 0.0549		8 0.0132	3.442	0.7764	25.1	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0003 01A01	8
SI21AC3027 SI21AC3010	SI21AC3013 SI21AC3027	6	11	0.00	7.04	8.33 15.37	0.00	0.00	0.00	0.00	0.00	1792.90 3453.70	1792.90	0.0326	3.00	0.0978	200	0.0746	0.1398 0.0550	0.1948	10 0,0039	2.171	0.7653	25.5	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0002 01A01	8
SI21AC0185	SI21AC0261	6	12	0.00	18.34	18.34	0.00	108.60	108.60	0.00	3373.30	3373.30		0.0633	3.00		0.0808	0.1436	0.2692 0.1015 0.2714 0.1211	0.3707	10 1.3175 12 0.0018	39.962 1.665	14.0859 0.8451	2.6 46.4	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0000	0.0000	0.0000 01A01 0.0020 01A01	8
SI21AC0183	SI21AC0185	6	12	0.00	4.31	22.65	0.00	0.00	108.60	0.00	859.10	4232.40		0.0789	3.00	0.2368		0.1805	0.3384 0.1496		12 0.0018	1.658	0.8415	58.0	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0020 01A01	8
SI21AC0540	SI21AC0183	7	12	0.25	6.01	28.65	0.00	0.00	108.60	75.00	1207.80	5440.20	5548.80	0.1009	3.00	0.3027	0.1298	0.2307	0.4325 0.1892	0.6218	12 0.0018	1.668	0.8466	73.4	18.1869	23.3977	6604.0547	0.0014	0.0018	0.0038 01A01	8
SI21AC0177 SI21AC0178	SI21AC0540 SI21AC0177	7	12	0.08	0.40 8.97	29.05 38.02	0.00	0.00	108.60	23.20	23.20	5463.40	30000000	0.1013	3.00	0.3040	17777	0.2317	0.4344 0.1919		14 0.0018	1.849	1.2771	49.0	18.1869	23.3977	6604.0547	0.0004	0.0005	0.0026 01A01	8
	SI21AC0178	7	12	0.00	0.02	38.04	0.00	0.00	108.60	0.00	0.00	7623.10 7623.10		0.1406	3.00	0.4218		0.3215	0.6027 0.2511 0.6027 0.2512	0.8538	14 0.0064 15 0.4150	3.493 29.389	2.4135	35.4	18.1869	23.3977	6604.0547 6604.0547	0.0000	0.0000	0.0006 01A01 0.0001 01A01	8
																							27.0373		10.1000	20.0011	000110011	0.000	0.0000	0.0001 017.01	-
	SI21AC0338	3	2	0.00	0.73	8641.61	0.00	0.00	181159.20	0.00	0.00	68457.90	249617.10					15.2259	21.7703 65.4539		60 0.0016	5.299	67.2410	129.7	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0048 01A01	9
	SI21AC0333 SI21AC0330	3	2	0.00	0.69	8642.29 8642.83	0.00	0.00	181159.20	0.00	0.00	68457.90	249617.10			16.2923		15.2259	21.7703 65.4585		60 0.0016	5.322	67.5280	129.2	18.1869	23,3977	6604.0547	0.0000	0.0000	0.0045 01A01	9
	SI21AC0330	3	2	0.00	0.64	8643.47	0.00	0.00	181159.20 181159.20	0.00	0.00	68457.90 68457.90	249617.10 249617.10			16.2923 16.2923		15.2259 15.2259	21,7703 65,4620 21,7703 65,4662		60 0.0016	5.298 5.299	67.2264 67.2416	129.8	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0000	0.0000	0.0036 01A01 0.0042 01A01	9
121AC0541	S121AC0184	3	2	0.00	0.57	8644.04	0.00	0.00	181159.20	0.00	0.00	68457.90	249617.10			16.2923		15.2259	21.7703 65.4700		60 0.0016	5.328	67.6130	129.0	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0042 01A01	9
SI21AC3039	SI21AC0541	3	2	0.00	0.30	8644.33	0.00	0.00	181159.20	0.00	0.00	68457.90	249617.10	9,7479	1.67	16.2923	5.4780	15 2259	21.7703 65.4719		60 0.0040	8.434	107.0182	81.5	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0020 01A01	9
SI21AC0562	SI21AJ0093	25	52	0.00	0.41	416.42	0.00	0.00	29892.80	0.00	0.00	22818.10	52710.90	2.4722	205	5.0798	3.3500	5.7220	9 3305 7 7000	40,4500	40 0 0000	2000	20 5400	66.0	50.0040	64.4000	40000 0000	****			100
and the state of t	SI21AC0562	25	52	0.00	13.34	429.76	0.00	156.80	30049.60	0.00	2043.60	24861.70	54911.30			5.0/98		5.7230 5.8145	8.3305 7.8224 8.4518 7.9251		48 0.0008 48 0.0012	3.268	26.5428 32.3930	60.9 50.6	50.3040 50.3040	61.4827 61.4827	18288.3943 18288.3943	0.0000	0.0000	0.0075 01C01A 0.0079 01C01A	10
	SI21AC0555	25	.52	0.00	0.42	430.18	0.00	0.00	30049.60	0.00	0.00	24861.70	54911.30			5.1495		5.8145	8.4518 7.9328		48 0.0009	3.420	27,7776	59.0	50.3040	61,4827	18288.3943	0.0000	0.0000	0.0076 01C01A	10
100	SI21AC0551	25	52	0.00	8.83	439.00	0.00	48.20	30097.80	0.00	1499.20	26360.90	56458.70	-	255	5.1985		5.8789	8.5369 8.0005	16.5375	48 0.0010	3.656	29.6952	55.7	50.3040	61.4827	18288.3943	0.0000	0.0000	0.0069 01C01A	10
	SI21AC0550 SI21AC0549	25 25	52 52	0.00	0.43	439.43 439.87	0.00	0.00	30097.80 30097.80	0.00	0.00	26360.90	56458.70 56458.70			5.1985		5.8789	8.5369 8.0084		48 0.0010	3.642	29.5745	55,9	50.3040	61.4827	18288.3943	0.0000	0.0000	0.0079 01C01A	10
	SI21AC0545		52	0.00	0.47	440.34	0.00	0.00	30097.80	0.00	0.00	26360.90 26360.90	56458.70			5.1985 5.1985		5.8789	8.5369 8.0163 8.5369 8.0250	16.5533 16.5620	48 0.0010 48 0.0038	3.626 7.019	29.4465 57.0042	56.2 29.1	50.3040	61.4827 61.4827	18288.3943 18288.3943	0.0000	0.0000	0.0079 01C01A 0.0087 01C01A	10
																			0.0230	10.0020	0.0000		- / NOTE	24.1	50.0540	V1.7021	.0230.0340	0.0000	5.0000	0.000/ 0100/A	10
	SI21AC0172	32	92	0.27	0.49	0.49	0.00	0.00	0.00	80.20	80.20	80.20	7.337.4	0.0015		0.0044		0.0033	0.0063 0.0033		6 0.0050	1.746	0.2216	4.3	18.1869	23.3977	6604.0547	0.0015	0.0019	0.0033 01A01	- 11
1.12.22	SI21AC0171 SI21AC0173	32	92	1.85	3.14	2.64 5.78	0.00	0.00	0.00	555.50 491.10	555.50	635,70		0.0116		0.0347		0.0264	0.0496 0.0175	0.0670	6 0.0050	1.751	0.2222	30.2	18.1869	23.3977	6604.0547	0.0101	0.0130	0.0142 01A01	11
	SI21AC0173	32	92	0.34	0.53	6.32	0.00	0.00	0.00	102.40	778.10 102.40	1413.80 1516.20	1413.80 1516.20			0.0771		0.0588	0.1102 0.0382 0.1182 0.0417	0.1484 0.1599	6 0.0050 6 0.0050	1.751	0.2222	66.8 72.0	18.1869 18.1869	23.3977	6604.0547 6604.0547	0.0089	0.0115	0.0121 01A01 0.0035 01A01	11
	SI21AC0175	32	92	1.71	2.04	8.36	0.00	0.00	0.00	511.90	511.90	2028.10	- 17	0.0369		0.1107		0.0843	0.1581 0.0552	0.1339	6 0.0060	1.917	0.2222	87.7	18.1869	23.3977	6604.0547	0.0019	0.0024	0.0035 01A01 0.0135 01A01	11
	SI21AC0176	32	92	0,44	0.52	8.88	0.00	0.00	0.00	131.60	131.60	2159.70	2159.70	0.0393		0.1178		0.0898	0.1684 0.0586		6 0.0060	1.918	0.2434	93.2	18.1869	23.3977	6604.0547	0.0024	0.0031	0.0035 01A01	11
			261	2.22	2.55	2.55	2.11	0.00		*** 74	44.11						5548	200		-											
121AC0177	012140277	19.2	261	3,30	3.55	3.55	0.00	0.00	0.00	991.40 991.40	991.40 991.40	991.40		0.0180		0.0541	T. L. P. S. L. C.	0.0412	0.0773 0.0234	0.1007	8 0.0037	1.826	0.4119	24.5	18.1869	23.3977	6604.0547	0.0180	0.0232	0.0234 01A01	12
121AC0177	SI21AC0548 SI21AC0547	71		3 30	3.57					331.40	991.40	1982.80	1982.80	0.0301	3.00	0.1082	0.0464	0.0825	0.1546 0.0470	0.2016	8 0.0036	1,788	0.4033	50.0	18.1869	23.3977	6604.0547	0.0180	0.0232	0.0235 01A01	12
SI21AC0177 SI21AC0547 SI21AC0546	SI21AC0548 SI21AC0547 SI21AC0546	71 71 71	261 261	3.30 1.99	3.57 2.25	7.11 9.37	0.00			597.50	597.50	2580.30	2580.30	0.0469	3.00		0.0604	0.1073	0.71.01	0.2630	10 0.0093	3 178	1 1203	23.5	18 1869	23 2077	6604 0547				10
SI21AC0177 SI21AC0547 SI21AC0546 SI21AC0544 SI21AC0182	SI21AC0547 SI21AC0546 SI21AC0544	71	261		3.57 2.25 1.16	7.11 9.37 10.53	0.00	0.00	0.00		597.50 258.80	2580.30 2839.10	2580.30 2839,10	0.0469 0.0516		0.1408 0.1549	100000	0.1073	0.2012 0.0618 0.2213 0.0695	0.2630 0.2909	10 0.0083 10 0.0022	3.178 1.622	1.1203 0.5717	23.5 50.9	18.1869 18.1869	23.3977 23.3977	6604.0547 6604.0547	0.0109	0.0140	0.0149 01A01	12
SI21AC0177 SI21AC0547 SI21AC0546 SI21AC0544 SI21AC0182 SI21AC0181	SI21AC0547 SI21AC0546	71 71	261 261	1.99	2.25	9.37	0.00	0.00	0.00	597.50		377		0.0516 0.0516	3.00 3.00	0.1408	0.0664 0.0664	B 100 L To 1 B	0.2012 0.0618						U-1 35 -524			0.0109	0.0140		12 12 12

#### APPENDIX B INFIX Adjusted - Future Condition (2020) Model Results

Section   Sect	WN MH UP	MH PA	AGE OR	DER LINE	ARFA II	NCR ARFA	TOTAL AREA	LINE RES	INCR RES	TOTAL RES. I.	NE OTHER IN	P OTHER TO	ATI OTHER T	OTAL DOD	O AVE EL	OW EACT O	MAY D	יו אמי	DEC O AVE DEC	0.1142	WET II DE	C O DEAK CIZE	e coor w	EL COLEY OF	DAGITY D	OT 040 D	105 0175	NIII DATE					
Section   Sect	Contract Contract				100								The second of th		The second secon	and the second s												1.00					SL #
Column	1AC0138 SI2	1AC0542	72	261		0.58	14.50	0.0	0.0									-															12
Section   Sect																							0.0010	1,000	1,1100	51,0	10.1005	20,0077	0001.0011	0.0014	0.0010	0.0033 01A01	- 12
Property	1AC0198 SI2	1AC0197	32	93	0.42	0.64	0.64	0.0	0.0	0.00	126.30	126.30	126.30	126.30	0.0023	3.00	0.0069	0.0030	0.0053	0.0098	0.0043	0.0141	6 0.0050	1.751	0.2222	6.3	18.1869	23.3977	6604.0547	0.0023	0.0030	0.0043 01A01	13
Control   Cont	IAC0199 SI2	1AC0198	32	93	0.67	0.98	1.62	0.0	0.0	0.00	202.10	202.10	328.40			0.7	Transfer of the	7777	0.0137							16.4					10000000	0.0064 01A01	13
Section   Control   Cont	1AC0200 SI2	1AC0199	32	93	0.15	0.35	1.97	0.0	0.0	0.00	45.90	45.90	374.30	374.30	0.0068				0.0156			0.0422	55 - 75 S.L.V.	1.763	7000	18.8						0.0023 01A01	13
Column	IAC0201 SI2	1AC0200	32	93	0.55	0.74	2,70	0.0	0.0	0.00	163.60	163.60	537.90	537.90	0.0098	3.00	0.0293	0.0126	0.0224	0.0419	0.0179	0.0598	6 0.0050	1.751	0.2222	26.9	18.1869		6604.0547			0.0049 01A01	13
Column   C			- 50						_	The second secon	137.80	391.70	929.60	929.60	0.0169	3.00	0.0507	0.0217	0.0387	0.0725	0.0301	0.1026	6 0.0060	1.918	0.2434	42.2	18.1869	23.3977	6604.0547	0.0025	0.0032	0.0043 01A01	13
Section   Control   Cont	IAC0183 SI2	1AC0202	32	93	0.68	0.87	5,44	0.0	0.0	0.00	203.20	203.20	1132.80	1132.80	0.0206	3.00	0.0618	0.0265	0.0471	0.0883	0.0359	0.1242	6 0.0060	1.918	0.2434	51.0	18.1869	23.3977	6604.0547	0.0037	0.0048	0.0057 01A01	13
State   Martin   Ma		77.20.00	140	2.65	360		20.50	-	1																								
Section   Sect		1 - 1/2 - 1 1		94						1							TO C	110		1	0.0062		6 0.0040		0.1977		18.1869	23.3977	6604,0547	0.0042	0.0054	0.0062 01A01	14
STORY NO. 19			- 12							1			100000		1 2 2 2 2 3	1.00			20.2.2.2			1.0074.34						23.3977	6604.0547	0.0041	0.0053	0.0073 01A01	14
				31						-	0.000			-															100000000000000000000000000000000000000		- A - A	0.0044 01A01	14
Martin	AC0163 812	TAC0166	-32	94	0.96	1.28	3.98	0.0	0.00	0.00	287.90	287.90	859.10	859.10	0.0156	3.00	0.0469	0.0201	0.0357	0.0670	0.0263	0.0932	6 0.0060	1.912	0.2426	38.4	18.1869	23.3977	6604.0547	0.0052	0.0067	0.0065 01A01	14
Martin	AC0203 S12	1400204	82	313	0.30	0.42	0.43	0.0	0 00	0.00	02.40	22.40	00.40	20.40	****				*****		4-22-2	10.000		2.17	2.45.2	7.72	30000		500000000		3.000.0	- 41 CV CV VV VV VV	-
March   Marc												0.000							2.00.00				The second secon			10.04						0.0028 01A01	15
Section   Sect		11100200	- 02	010	0.00	0.73	1.21	0.0	0.00	0.00	107.00	107.60	253.90	253.90	0.0046	3.00	0.0139	0.0059	0.0106	0.0198	0.0080	0.0278	6 0.0060	1.920	0.2437	11.4	18.1869	23.3977	6604.0547	0.0031	0.0039	0.0052 01A01	15
Section   Sect	AC0205 SI21	1AC0206	81	312	0.58	0.72	0.72	0.0	0.00	0.00	175 10	175.10	175 10	176 10	0.0022	3.00	0.0000	0.0044	0.0072	0.0125	0.0046	0.0104	0.0050	. 740	0.0040	0.0	40.4000	03.0037	********		12 202/	202000000	- 122
March   Same										1		3.35.13	71.001.01															-				The state of the s	16
Section   Sect								0.0	0.0.	0.00	111.50	111250	207.00	207.00	0.0032	3.00	0.0137	0.0007	0.01(9	0.0224	0.0007	0.0310	6 0.0031	1.112	0.2248	13.0	18.1809	23.3977	6604.0547	0.0020	0.0026	0.0039 01A01	16
Section   Sect	AC0156 SI21	1AC0196	32	90	0.00	0.23	0.23	0.0	0 000	0.00	0.00	0.00	0.00	0.00	0.0000	3.00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015	6 0.0050	1.751	0.2222	0.7	19 1950	22 2077	6604 0E47	0.0000	0.0000	0.0015 01401	17
Martin				90							1,501.5					-					1111111111		_								1000		17
March   Marc			32	90		1.43		-		1						10.000	100000	100101						200.00								0.0031 01A01 0.0095 01A01	17
Martes   M																								,,,,,,	,,,,,,,	9.71	10.1000	20.0011	-20-19-11	9.0000	0.0011	Sieves Sinst.	17
Property	AJ0023 St21	1AJ0024	24	50	0.00	1702.94	1703.26	0.0	122628.40	122628.40	0.00	73383.90	79846.40	202474.80	11.2950	1.63	18.4641	6.2970	17.5921	24.7612	14.3870	39.1482	69 0.0005	3.262	54,7495	71.5	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0036 01A01	18
Service 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AJ0022 SI21	1AJ0023	24	50	0.00	0.42															-			5 25 2	10000							0.0027 01A01	18
Service Provide Provid		1AJ0022	24	50	0.00	0.29	1703.97	0.0	0.00	122628.40	0.00						A 100 May 100						5 2 300			100,000		100000				0.0027 01A01	18
Secondary   Seco		1AJ0011	24	50	0.00	0.53	1704.50	0.0	0.00	122628.40	0.00	2.35	79846.40																		1000	0.0035 01A01	18
Property			24	50	0.00	-93.65	1610.85	0.0	-3300.40	119328.00	0.00	15954.80	95801.20	215129.20	11.8794				19,1659					10.00	-25523							0.0050 01A01	18
Part			2.77	50	200	-	0.000	_	-		0.00	0.00	95801.20	215129.20	11.8794	1.62	19.2724	7.2866	19.1659	26.5590	15.0447	41.6036	69 0.0006	3.537	59.3640	70.1	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0045 01A01	18
Martine   Mart	AC0109 SI21	1AC0118	24	50	0.00	0.52	1612.04	0.0	0.00	119328.00	0.00	0.00	95801.20	215129.20	11.8794	1.62	19.2724	7.2866	19.1659	26.5590	15.0481	41.6071	69 0.0006	3.544	59.4684	70.0	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0034 01A01	18
Martine   Mart		0.50.00	-	0.54	3.5																												
Marche   M					-								3577.20	3577.20	0.0651	3.00	0.1952	0.0837	0.1488	0.2789	0.1021	0.3810	24 0.0009	2.143	4.3509	8.8	18.1869	23.3977	6604.0547	0.0009	0.0012	0.0063 01A01	19
Second Process							10000	7500								3.00			0.1648	0.3090	0.1150	0.4240	24 0.0009	2.142	4.3484	9.8	18.1869	23.3977	6604.0547	0.0070	0.0090	0.0129 01A01	19
990000 19 100000 19 12 10 10 10 10 10 10 10 10 10 10 10 10 10					1.18				7													0.4601	24 0.0003	1.344	2.7294	16.9	18.1869	23.3977	6604.0547	0.0064	0.0083	0.0085 01A01	19
Secondary   Column		.,			0.00						2.00					3.00	7757			0.3366	0.1244	0.4610	24 0.0009	2.212	4.4906	10.3	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0009 01A01	19
Secondary   1965-100   17   27   28   18   29   28   24   44   18   18   18   18   18   18   1								1000						- 7 7 7 7	10000									2.037	4.1352	12.5	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0032 01A01	19
Part			- 17.							20.7			1.55.00.00				77.50		223.75												0.0000	0.0004 01A01	19
					-	1000		11111																								0.0108 01A01	19
Statistics   Sta	NOTIZE DIZI	7104100	12	2011	0.00	1.00	20.30	0.00	0.00	0.00	0.00	0233.00	22///.90	22111.90	0,4143	2.69	1.1138	0.5330	0.9472	1.6467	0.1669	1.8336	24 0.0150	8.819	17,9060	10.2	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0004 01A01	19
	AC3038 SI21	AC3039	3	2	0.00	38.61	8682.95	0.00	108 60	181267.80	0.00	7623.10	76091.00	257249 90	0.0000	1.67	10 4017	E 6600	15 5 4 7 4	22.4500	CE 7000	07 0770	70 0 0005	2.550	70.0000	1100	40.4000	60.6600	****		5 4500	99-22 -37-27	-
			3	2	-				1													*****											20
Second Person		-	3	2								77.4.74				110.00			100000	10.000		5.00	- 1-3 I		2000	0.000				100000000000000000000000000000000000000			20
Marchand	AC3010 SI21	AC3015	3	2	0.00																	-0.00						100000000000000000000000000000000000000					20
	AC3004 SI21	AC3010	3	2	0.00	77.77.7											7 7 7 7 7 7																20
	AC3001 SI21	AC3004	3	2	0.00	3.61													10000	0.000						-							20
SPANSON STREET OF STREET O	DM5000 SI21	AC3001	3	2	0.00	2.66	8874.96									5.63			71.2.7.7.7														20
1944-1949   1944	AC3000 SI21	DM5000	-3	2	0.00	175.59	9050.56						- 10 to 5 to 5				7.00															0.0001 01A01	20
\$\frac{1}{2}\frac{1}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac	AC3036 SI21	AC3000	3	2	0.00	0.63	9051.19			189770.80	0.00			309518.40	11.4092		2.5								1000000	197.00						0.0042 01A01	20
921400009 871400009 871400009 871400009 871400009 871400009 871400009 87140009 871400009 871400009 871400009 871400009 871400009			3	2					10900.30	200671.10	0.00	48161.40	167909.00	368580.10	14.1392	-						A 31 300 A				2.47.2						0.0018 01A01	20
9214-0000 9214-000 92	AQ0000 SI21	AC0000	3	2	0.35	1230.97	10621.23	0.00	87224.10	287895 20	3143.80	90331.00	258240.00	546135.20	22.6959				39.1460													0.0035 01A01	20
\$\frac{1}{2}\$\frac{1}{2}\$\$\frac																																	30
SPIACHOS SPI			3	4	-													-		8.5369	8.0354	16.5723	72 0.0007	4.012	93.3460	17.8	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0102 01A01	21
SEMACOUS SEMACTORS - 4 0.00 0.02 44.94 0.00 0.00 0.00 0.00 0.00 0.00 0.0			3	4												2.05	5.1985	3.3384	5.8789	8.5369	8.0419	16.5788	72 0.0006	3.685	85.7353	19.3	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0065 01A01	21
SPIAMONIS SPIAMO			3	4										-							200000			3.349		21.3	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0002 01A01	21
SPIACOUS SPIACH 4 0.00 75.71 1224 0.00 91/28 30 91/28 10 0.00 5678.77 1224 0.00 91/28 30 91/28 10 0.00 5678.77 1224 0.00 91/28 30 91/28 10 0.00 0.00 0.00 0.00 0.00 0.00 0.00			4	4	200								- PO7 to 7 1	_ LVA.V.																	0.0000	0.0001 01A01	21
SEPLACONOS			4	4			7.5						7.00						1.000				11		380.81							0.0003 01A01	21
SETANOPES SETANO			4	4																												0.0003 01A01	21
SELIACOUS SELIAC		,,,,,,,,,,,	-		0.09	0.30	1223.11	0.00	0.00	07224.10	0.00	0.00	84043.40	1/1267.50	8.4424	1.71	14.4190	7.1033	15.5457	21.5223	15,3458	36.8682	/2 0.0004	3.110	72.3638	50.9	18.1869	23.3977	6604.0547	0.0000	0.0000	0.0024 01A01	21
SIZIACO100	AC0195 SI21	AC0194	6	10	0.70	0.09	161.70	0.00	0.00	#497 E0	210.20	210.50	15722.00	20210.70	0.0000	0.00	2 1051	0.0004	4 7000	0.5570	2 5255	2,5002	04 00000	0.111		1600	40.000	44	12142		2.45		-
SIZIACOSIS			6																													0.0215 01A03	22
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APPENDIX C: Victoria Ward Master Plan Sewerage Calculations by Block:

**Table 1 – Average Flow** 

Table 2 – Design Peak Flow

Table 3 – Evaluation of Existing Sewer System

# APPENDIX C Table 1 AVERAGE FLOW

Phase	Projected	Property		Retail			Restaurant						Multi-Famil	y High-Rise					Average	Average
	Occupancy	Description	Area	Capita	Flow Rate	Area	Capita	Flow Rate	Studio	1-Bedroom	2-Bedroom	3-Bedroom	4-Bedroom	5-Bedroom	6-Bedroom	7-Bedroom	Capita	Flow Rate	Flow	Flow
	Date	·	(sf)	-	(gpd)	(sf)	(seatings)	(gpd)	(units)	(units)	(units)	(units)	(units)	(units)	(units)	(units)	·	(gpd)	(gpd)	(mgd)
Phase 1	2016	Block C East	8,505	57	1,418	0	0	0	0	26	50	84	10	5	0	0	608	48,640	50,058	0.050
Phase 1	2017	Block K	17,000	113	2,833	0	0	0	20	93	132	67	4	2	0	0	896	71,648	74,481	0.074
Phase 1	2018	Block M	72,073	480	12,012	9,326	4,197	104,918	47	182	177	60	0	0	0	0	1,194	95,488	212,418	0.212
Phase 1	2019	Block O	30,000	200	5,000	0	0	0	0	161	187	76	0	0	0	0	1,150	91,968	96,968	0.097
		Subtotal	127,578	851	21,263	9,326	4,197	104,918	67	462	546	287	14	7	0	0	3,847	307,744	433,925	0.434
Phase 2	2020	Block N East	15,000	100	2,500	5,000	2,250	56,250	300	300	128	23	0	0	0	0	1,650	132,032	190,782	0.191
Phase 2	2021	Block I	37,500	250	6,250	37,500	16,875	421,875	240	240	96	24	0	0	0	0	1,325	105,984	534,109	0.534
Phase 2	2021	Victoria Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000
Phase 2	2021	Block C West	5,000	33	833	5,000	2,250	56,250	0	19	71	24	8	3	0	1	399	31,904	88,987	0.089
		Subtotal	57,500	383	9,583	47,500	21,375	534,375	540	559	295	71	8	3	0	1	3,374	269,920	813,878	0.814
Phase 3	2022	Block A	15,000	100	2,500	5,000	2,250	56,250	45	91	68	23	0	0	0	0	554	44,352	103,102	0.103
Phase 3	2022	Block G East	67,500	450	11,250	22,500	10,125	253,125	48	72	40	0	0	0	0	0	352	28,160	292,535	0.293
Phase 3	2022	Block F West	15,000	100	2,500	5,000	2,250	56,250	105	140	88	18	0	0	0	0	808	64,672	123,422	0.123
Phase 3	2023	Block F East	18,750	125	3,125	6,250	2,813	70,313	93	124	78	16	0	0	0	0	716	57,312	130,750	0.131
		Subtotal	116,250	775	19,375	38,750	17,438	435,938	291	427	274	57	0	0	0	0	2,431	194,496	649,809	0.650
Phase 4	2023	Block B East	4,865	32	811	4,865	2,189	54,731	0	0	71	32	6	0	2	0	371	29.664	85,206	0.085
Phase 4	2024	Block B West	7,657	51	1,276	2,553	1,149	28,721	35	70	52	17	0	0	0	0	424	33,888	63,885	0.064
Phase 4	2024	Block G West	67,500	450	11,250	22,500	10,125	253,125	49	73	41	0	0	0	0	0	359	28,704	293,079	0.293
Phase 4	2024	Block N West	22,500	150	3,750	7,500	3,375	84,375	240	240	120	0	0	0	0	0	1,296	103,680	191,805	0.192
		Subtotal	102,522	683	17,087	37,418	16,838	420,953	324	383	284	49	6	0	2	0	2,449	195,936	633,976	0.634
Phase 5	2025	Block D	7,500	50	1,250	2,500	1,125	28,125	0	54	99	27	0	0	0	0	493	39,456	68,831	0.000 0.069
Phase 5	2026	Block H North	30,000	200	5,000	10,000	4,500	112,500	175	200	100	25	0	0	0	0	1,130	90,400	207,900	0.208
Phase 5	2026	Block H South	45,000	300	7,500	15,000	6,750	168,750	66	132	99	33	0	0	0	0	805	64,416	240,666	0.241
Phase 5	2027	Block E West	6,696	45	1,116	2,232	1,004	25,110	0	56	102	28	0	0	0	0	510	40,768	66,994	0.067
		Subtotal	89,196	595	14,866	29,732	13,379	334,485	241	442	400	113	0	0	0	0	2,938	235,040	584,391	0.584
		Tatal	493,046	3,287	82,174	162,726	73,227	1,830,668	1,463	2,273	1,799	F77	20	10	2	1	15,039	1,203,136	3,115,978	3.116
	1	Total	493,046	3,287	82,174	162,726	13,221	1,830,668	1,463	2,2/3	1,799	577	28	10	2	1	15,039	1,203,136	3,115,978	3.116

# Assumptions:

Retail Capita = 0.0067 capita/sf (1 person / 150 sf)

Restaurant Capita = 0.45 seatings/sf (9 seatings / 20 sf)

Studio Capita = 2.0 capita/unit

1-Bedroom Capita = 2.0 capita/unit

2-Bedroom Capita = 2.8 capita/unit

3-Bedroom Capita = 4.0 capita/unit

4-Bedroom Capita = 5.0 capita/unit

5-Bedroom Capita = 6.0 capita/unit

6-Bedroom Capita = 7.0 capita/unit

7-Bedroom Capita = 8.0 capita/unit

Retail Flow = 25 gal/capita/day
Restaurant Flow = 25 gal/capita/day
MFHR Flow = 80 gal/capita/day

APPENDIX C
TABLE 2
DESIGN PEAK FLOW

Phase	Projected Occupancy	Property Description	Area (acres)	Capita	Average Flow Rate	Max Flow	Max Flow	Dry Weather I/I	Design Avg. Flow	Flow	Wet Weather I/I	Design Peak Flow
	Date				(mgd)	Factor	(mgd)	(mgd)	(mgd)	(mgd)	(mgd)	(mgd)
Phase 1	2016	Block C East	1.86	665	0.050	5.43	0.272	0.023	0.073	0.295	0.005	0.300
Phase 1	2017	Block K	1.80	1,009	0.074	4.99	0.372	0.035	0.110	0.407	0.005	0.412
Phase 1	2018	Block M	4.04	5,871	0.212	3.51	0.745	0.205	0.418	0.951	0.011	0.962
Phase 1	2019	Block O	1.18	1,350	0.097	4.71	0.457	0.047	0.144	0.504	0.003	0.507
		Subtotal	8.88	8,894	0.434		1.845	0.311	0.745	2.157	0.024	2.181
Phase 2	2020	Block N East	2.71	4,000	0.191	3.79	0.723	0.140	0.331	0.863	0.007	0.870
Phase 2	2021	Block I	3.30	18,450	0.534	2.79	1.491	0.646	1.180	2.136	0.009	2.146
Phase 2	2021	Victoria Park	2.71	0	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000
Phase 2	2021	Block C West	2.55	2,682	0.089	4.10	0.365	0.094	0.183	0.459	0.007	0.466
		Subtotal	11.27	25,132	0.814		2.579	0.880	1.694	3.459	0.024	3.482
Phase 3	2022	Block A	2.10	2,904	0.103	4.04	0.417	0.102	0.205	0.518	0.006	0.524
Phase 3	2022	Block G East	4.52	10,927	0.293	3.10	0.907	0.382	0.675	1.289	0.012	1.302
Phase 3	2022	Block F West	3.00	3,158	0.123	3.97	0.490	0.111	0.234	0.601	0.008	0.609
Phase 3	2023	Block F East	2.68	3,654	0.131	3.86	0.504	0.128	0.259	0.632	0.007	0.640
		Subtotal	12.30	20,644	0.650		2.318	0.723	1.372	3.041	0.034	3.074
Phase 4	2023	Block B East	1.83	2,592	0.085	4.13	0.352	0.091	0.176	0.443	0.005	0.448
Phase 4	2024	Block B West	1.89	1,623	0.064	4.54	0.290	0.057	0.121	0.347	0.005	0.352
Phase 4	2024	Block G West	4.48	10,934	0.293	3.10	0.908	0.383	0.676	1.291	0.012	1.303
Phase 4	2024	Block N West	2.76	4,821	0.192	3.65	0.700	0.169	0.361	0.869	0.008	0.876
		Subtotal	10.96	19,971	0.634		2.250	0.699	1.333	2.949	0.030	2.980
Phase 5	2025	Block D	2.38	1,668	0.069	4.51	0.311	0.058	0.127	0.369	0.007	0.376
Phase 5	2026	Block H North	1.60	5,830	0.208	3.51	0.731	0.204	0.412	0.935	0.004	0.939
Phase 5	2026	Block H South	1.60	7,855	0.241	3.31	0.797	0.275	0.516	1.072	0.004	1.076
Phase 5	2027	Block E West	2.14	1,559	0.067	4.58	0.307	0.055	0.122	0.361	0.006	0.367
		Subtotal	7.72	16,912	0.584		2.145	0.592	1.176	2.737	0.021	2.758
		Total	51.13	91,553	3.116		11.137	3.204	6.320	14.342	0.133	14.475

APPENDIX C
TABLE 3
EVALUATION OF EXISTING SEWER SYSTEM

Pipe Location	Pipe Size	Adjacent		Inflow		Total Pipe	Surcharge	Evaluation	
	(inch)	Property Descriptions	INFIX 2020 (mgd)	Property (mgd)	Total (mgd)	Capacity (mgd)	(%)		
Auahi St east of Kamakee St	8	Blocks D and E West	0.24	0.74	0.98	0.42	233.94	Inadequate.	
Auahi St west of Kamakee St	8	Blocks B East, C East, C West, and I	0.24	3.36	3.60	0.51	705.80	Inadequate.	
Kamakee St	8	Block K	0.09	0.41	0.50	0.42	119.53	Inadequate.	
Kamakee St	36	Block K and M	15.05	1.37	16.42	9.89	166.07	Adequacy proved by WWB and ENV.	
Queen Lane	30	None	N/A	N/A	N/A	N/A	N/A	N/A	
Ala Moana Blvd	10	Blocks D and E West	0.4	0.74	1.14	1.00	114.26	Inadequate.	
Queen St	6	Blocks N East and N West	0.04	1.75	1.79	0.19	940.46	Inadequate.	
Ward Ave	14	Blocks A, G East, G West, F East, F West, and O	0.85	5.41	6.26	2.41	259.69	Inadequate.	
Ward Ave	60	N/A	83.35	0.00	83.35	67.61	123.28	Inadequate.	
Easement under Sports Auth	48	Blocks H North, H South and N West	16.56	2.89	19.45	57.00	34.13	Adequate.	
Pohukaina St	6	Blocks G East, and G West	0.23	2.60	2.83	0.24	1181.16	Inadequate.	
Auahi St – East of Ward Ave	10	Block B West, B East, Block C West and I	0.28	3.41	3.69	0.57	647.64	Inadequate.	
Halekauwila St	6	Block O	0.12	0.51	0.63	0.24	261.29	Inadequate.	
Ilaniwai St	6	Block O	0.09	0.51	0.60	0.24	248.79	Inadequate.	
Kamani St	6	N/A	0.03	0.00	0.03	0.24	12.50	N/A	
Ahui St	6	N/A	0.03	0.00	0.03	0.22	13.64	N/A	
Ohe St	6	N/A	0.09	0.00	0.09	0.24	37.50	N/A	
Ala Moana Blvd	69	Blocks C East, D, E West, K, and M	41.61	2.42	44.03	59.47	74.03	Adequate.	
Ala Moana Blvd	24	Block A	0.38	0.52	0.90	4.35	20.78	Adequate.	
Auahi/Keawe St	78	All Blocks	113.01	14.47	127.48	73.88	172.56	Adequacy proved by WWB and ENV.	
Auahi/Keawe St	72	All Blocks except C East, D, E West, K and M	36.87	12.06	48.93	82.72	59.15	Adequate.	
Cooke St	24	N/A	6.78	0.00	6.78	9.98	67.94	N/A	
Ala Moana Blvd	36	N/A	15.05	0.00	15.05	55.14	27.29	N/A	
Ala Moana Blvd	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Queen St	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	