

Hazen *Memorandum*

November 13, 2024

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Subject: 2024 Satellite City Wastewater Transmission Cost of Service and Surcharge Study

1. Background

The City of Miami Beach (CMB) transmits the wastewater flows from three “satellite cities” to the Miami-Dade County Water and Sewer Department’s (MDWASD) Central Regional Wastewater Treatment Plant (WWTP) on Virginia Key. The CMB anticipates that a town, called Indian Creek Village, will also have its wastewater flow transmitted through the CMB’s system to the WWTP. The following four “satellite cities” are the focus of this study.

- Bal Harbour
- Surfside
- Bay Harbor Islands
- Indian Creek Village

The CMB invoices the satellite cities a surcharge in addition to the “pass through” paid by the CMB to the MDWASD for wastewater treatment at the WWTP. The surcharge and the pass through are based on the metered flows of each satellite city.

To calculate the value of the surcharge to each satellite city that reflects the cost to serve, the CMB conducts a “cost of service” study that includes an itemization of the costs associated with the parts of the system that transmit the combined flows and an allocation of these costs to each satellite city. The City of Miami Beach (CMB) last conducted a cost of service study in 2007 as described in a memorandum from CDM, the consultant that completed this study, to Mr. Mike Alvarez, Assistant Public Works Director for the CMB dated December 6, 2007 (2007 CDM Study). Since then, the wastewater surcharge has been increased based on the annual inflation rate using the Consumer Price Index (CPI). Over time that

approach has become increasingly inadequate since it does not consider changes in the share of the wastewater contributed by the satellite cities over the past 17 years.

In addition, the annual increases in the costs to operate and maintain the system have not mirrored the annual changes in the CPI, resulting in a growing divergence between actual costs and the surcharges imposed. Therefore, the CMB has funded this cost of service study to update the surcharges based on the most recent data on system configuration, usage (i.e., wastewater flows), operation and maintenance costs, and the capital replacement costs. The cost of service study encompasses the following tasks:

1. Update the inventory of pipes and pump stations currently carrying the combined flows of the satellite cities and CMB relative to those included in the 2007 CDM study.
2. Obtain data from CMB on the satellite cities' and CMB's wastewater flows.
3. Estimate peak flows contributed by each satellite city and the CMB to the total system's peak flows.
4. Determine the percentage allocation of peak flows contributed by each satellite city at the pipe segment level.
5. Update the annual depreciation of the transmission system components that move flows from the satellite cities to the WWTP including the force mains and pump stations.
6. Update the annual operations and maintenance (O&M) cost associated with the transmission system serving the combined wastewater flows.
7. Calculate the surcharge and annual payment from each satellite city that recovers their allocated depreciation and annual O&M costs.

The data and methods used to update the satellite city and CMB peak flows, costs, and cost allocations are presented in the following sections. The final section presents the results of the cost of service study including the allocated surcharges per 1,000 gallons of wastewater flow (also referred to as rates) assigned to each satellite city.

2. Method Used to Update Contributions to Peak Flows

An element of this cost of service analysis is estimating the peak flows contributed by the CMB and each of the four satellite cities transmitting their wastewater through the CMB conveyance infrastructure. An accurate estimate of each city's peak flows ensure an equitable allocation of O&M and depreciated capital costs of the conveyance system among the four satellite cities and the CMB.

This cost of service analysis uses each city's percentages of total peak flows by force main segment and pump station to develop appropriate allocations of depreciated capital replacement costs. Peak flow values rather than average flow values were used to allocate the depreciated capital cost charge to be consistent with the 2007 CDM study. However, the two studies differ in the methods used to estimate the peak flows. The 2007 CDM Study relied on hydraulic modeling to estimate peak flow values throughout the entire sewer network, while the current study involved no new peak flow data collection or hydraulic modeling.

The challenge for the current study was to generate updated peak flow estimates for each satellite city at the pipe segment level in the absence of new pipe segment level peak flow data or hydraulic modeling. The CMB provided Hazen with historical monthly flow and billing data for Bay Harbor Islands, Bal Harbour, Surfside, and the CMB for the period FY05-06 through FY22-23. The data encompass monthly flow volumes contributed by each satellite city to the overall volume transmitted through the CMB transmission system.

Because Indian Creek Village has yet to send its wastewater through the CMB system, a forecast of average daily flow entering the system was used as a surrogate for historical data. Specifically, the peak flow was based on the average daily flow as reported in the Village's Intermediate Downstream Collection and Transmission System Certification of Adequate Reserve Capacity form as required by the MDWASD.

The historical flow data provided by the CMB are not at the pipe segment level as presented in the 2007 CDM Report which modeled peak flows and volume share for each satellite city along all the pipe segments of the CMB transmission system. The 2007 CDM report did not provide data or estimates of average or peak flows at the overall system level.

Because the historical average system flow data provided by CMB and the modeled results generated by CDM in the 2007 report cannot be reliably reconciled, the current study makes only selective use of the CDM results. Instead, forecasted peak flow allocations were based primarily on FY22-23 monthly flow data obtained from CMB for this study.

Since the 2007 CDM Study, North Bay Village no longer sends its wastewater through the CMB sewer system. Indian Creek Village will be a new entrant to the network once it installs a connecting 4-inch pipe. The major steps of the technical approach including the data used to perform the peak flow and surcharge update are provided as follows.

Step 1. Pipe Segment Update – Adding and Deleting Relevant Pipe Segments

Because the CDM Study was conducted 17 years ago, prudent due diligence required a detailed review of the CMB wastewater transmission system to ascertain if there have been physical changes to the sewer network and/or changes to the use of the existing pipes by the satellite cities. The list of facilities included in the 2007 CDM Study is provided in Table 1 and reflects the data included in Table 6 of the 2007 CDM Study memorandum.

Table 1 - List of CMB Wastewater Transmission Facilities Used by the Satellite Cities and included in the 2007 CDM Study

Facility (a)	Pipe ID (a)	PIPE LENGTH (feet)	PIPE DIAMETER (inches)
16" diameter F.M Byron Ave. from City Limit to 74th St.	1002	5,350	16
8" diameter F.M 74th St.	1005	20	8
8" diameter F.M 74th St.	1006	20	8
16" diameter F.M 74th St.	1007	50	16
36" diameter F.M 74th St.	1009	80	36
36" diameter F.M Byron Ave. from 74th St. to Wayne	1012	420	36
36" diameter F.M Byron Ave.	1020	160	36

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Facility (a)	Pipe ID (a)	PIPE LENGTH (feet)	PIPE DIAMETER (inches)
36" diameter F.M Byron Ave.	1021	300	36
30" diameter F.M Byron Ave.	1022	50	30
36" diameter F.M Byron Ave.	1023	20	36
36" diameter F.M Harding Ave. from 72 St to. 69 St.	1026	1,050	36
30" diameter F.M Harding Ave. from 69 St.to 63 St.	1038	3,560	30
30" diameter F.M Harding Ave. from 69 St. to 63 St.	1039	3,550	30
30" diameter F.M Indian Creek Dr. and 63 St.	1042	40	30
30" diameter F.M Indian Creek Dr. and 63 St.	1040	40	30
36" diameter F.M Indian Creek Dr. and 63 St.	1041	100	36
36" diameter F.M Indian Creek Dr. and 63 St.	1043	150	36
30" diameter F.M Indian Creek Dr. and 63 St.	1148	40	30
36" diameter F.M Indian Creek Dr. and 63 St.	1044	100	36
36" diameter F.M Indian Creek Dr. and 63 St.	1047	100	36
30" diameter F.M Indian Creek Dr. and 63 St.	1046	40	30
Booster Pump Station No. 29			
30" diameter F.M Indian Creek Dr. from 63 St. to 60 St.	1144	1,150	30
30" diameter F.M Indian Creek Dr. from 63 St.to 60 St.	1149	1,300	30
30" diameter F.M 60 St. from Indian Creek Dr. to Pine Dr.	1048	1,000	30
30" diameter F.M 60 St. from Indian Creek Dr. to La Gorce	1052	1,300	30
30" diameter F.M 60 St. from Pine Dr.to 58 St.	1060	1,550	30
30" diameter F.M La Gorce Dr. from 60 St. to 58 St.	1059	950	30
30 "diameter F.M 58 St.	1061	200	30
30" diameter F.M from 58 St. to 51 St.	1063	4,050	30
30" diameter F.M La Gorce Dr. from 58 St. to 51 St.	1062	3,750	30
30" diameter F.M Pine Dr. and 51 St.	1064	200	30
30" diameter F.M Pine Tree Dr. from 51 St. and 44 St.	1068	4,050	30
30" diameter F.M Pine Dr. and 51 St.	1065	200	30
30" diameter F.M Pine Tree Dr. from 51 St. and 44 St.	1069	4,100	30
30" diameter F.M Pine Tree Dr. and 44 St.	1070	10	30
30" diameter F.M Pine Tree Dr. from 44 St.to 28 St.	1072	4,420	30
30" diameter F.M Pine Tree Dr. from 44 St.to 28 St.	1071	4,400	30
42" diameter F.M	1073	250	42
Pump Station No. 28			
42" diameter F.M from Pine Tree Dr. to Dade Blvd &	1075	5,150	42
30" diameter F.M from Pine Tree Dr. to 17th St.	1077	5,550	30
42" diameter F.M from Dade Blvd to 17 St.	8225	1,450	42
30" diameter F.M 17 St.	8226	1,000	30
42" diameter F.M Michigan Ave. from 17 St. to 11 St_	1080	3,750	42

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Facility (a)	Pipe ID (a)	PIPE LENGTH (feet)	PIPE DIAMETER (inches)
30" diameter F.M Meridian Ave. from 17 St. to 11 St.	1088	4,200	30
30" diameter F.M 11 St.	1737	450	30
54" F.M Michigan Ave. from 11 St. to 3 St.	1089	3,450	54
54" diameter F.M Michigan Ave. from 3 St. Biscayne St.	1150	1,000	54
54" diameter F.M	1090	1,700	54
54" diameter F.M	1091	7,895	54
54" diameter F.M	3	45	54
30" diameter F.M	2	4	30
36" diameter F.M	1	6	36
16" diameter F.M Collins Ave. from City Limit to 74th St.	1001	5,050	16
6" diameter F.M 74th St.	1003	40	6
6" diameter F.M 74th St.	1004	10	6
16" diameter F.M 74th St.	1010	30	16
12" diameter F.M Bay Drive From 72 St. to Harding Ave.	1029	6,100	12
8" diameter F.M Harding Ave. and 72 St.	1028	10	8
12" diameter F.M Harding Ave.	1027	150	12
20" diameter F.M 72 St.	1024	150	20

(a) Facility description, location and identification number were taken from the 2007 CDM Study.

Source: Memorandum to Mr. Mike Alvarez, Assistant Public Works Director for the City of Miami Beach dated December 6, 2007 from CDM (2007 CDM Study).

A detailed review of the conveyance system using recent data provided by CMB found some changes in its use by the satellite cities and by the CMB from what was reported in the 2007 CDM report. Updates were made based on phone conversations with CMB and Bal Harbour staff, a review of the satellite city service contracts¹, and the CMB GIS, in conjunction with flow and meter markups provided by the CMB. In markups provided by the CMB, both Bay Harbor Islands meters on 74th street are now offline. The study assumes that the flow enters the CMB system at the city limit consistent with the 2007 CDM study.

Table 2 shows the pipe segments included in the 2007 CDM Report that are no longer in use or which are used in a different manner than reported earlier². For example, in 2011 Bal Harbour built³ a 16-inch force main that conveys wastewater from Bal Harbour and Surfside (and eventually Indian Creek Village's) through CMB's system. This new 16-inch force main replaces the Byron Ave force main service and associated 8-inch connections for Bal Harbour and Surfside flows.

These discontinued pipe segments, in conjunction with pipe segments that served North Bay Village and CMB exclusively, were removed from the updated cost allocation table. The 16-inch Bal Harbour force

¹ The three contracts between the CMB and each of the three satellite cities are provided in Attachment 1 of this memorandum.

² A map of the CMB sewer service system is provided in Attachment 2 of this memorandum.

³ Bal Harbour owns the new force main, but CMB is required to maintain emergency response for sanitary sewer overflows as the force main flows through the City's boundaries. The allocation of such costs is outside the scope of this study.

main enters the CMB system where it is metered in the public parking lot located north of 72nd Street. As Bal Harbour owns the new 16" force main, flows before the 72nd Street meter were removed from the cost allocation table as they are no longer part of the CMB wastewater system.

Table 2 - List of CMB Wastewater Transmission Facilities Included in the 2007 CDM Study That Were Edited or Removed for the 2024 Study Update

Facility (a)	Pipe ID (a)	Note (b)
16" diameter F.M Collins Ave. from City Limit to 74th St.	1001	Removed; Bay Harbor Islands-owned through 74th St. meter per CMB.
16" diameter F.M Byron Ave. from City Limit to 74th St.	1002	Removed; replaced by Bal Harbour-owned 16" FM built in 2011.
8" diameter F.M 74th St.	1005	Removed; replaced by Bal Harbour-owned 16" FM built in 2011.
8" diameter F.M 74th St.	1006	Removed; replaced by Bal Harbour-owned 16" FM built in 2011.
16" diameter F.M 74th St.	1007	Removed; replaced by Bal Harbour-owned 16" FM built in 2011.
36" diameter F.M 74th St.	1009	Except for the notes below, it is assumed the pipe system remains unchanged from the CDM 2007 report after this point.
36" diameter F.M Byron Ave. from 74th St. to Wayne	1012	Edited to "36" F.M Collins Ct. From 74th St to 73rd St. before MB flow enters" 440 feet long and Pipe ID updated to 1012a to reflect current service
36" diameter F.M Byron Ave.	1020	Edited to "36" F.M from parking lot where BHV, Surfside and ICD enter to 72nd St." 150 feet long and Pipe ID updated to 1021a to reflect flow order and current service
36" diameter F.M Byron Ave.	1021	Edited to "36" F.M Collins Ct. from 73rd St. before BH, Surfside and ICD enter" 150 feet long and Pipe ID updated to 1020a to reflect flow order and current service
30" diameter F.M Byron Ave.	1022	Edited to "30" F.M from parking lot where BHV, Surfside and ICD enter to 69th St." 1,170 feet long and Pipe ID updated to 1020a to reflect flow order and current service
36" diameter F.M Byron Ave.	1023	Removed; does not serve satellite cities.
6" diameter F.M 74th St.	1003	Removed; does not serve satellite cities.
6" diameter F.M 74th St.	1004	Removed; does not serve satellite cities.
12" diameter F.M Bay Drive From 72 St. to Harding Ave.	1029	Removed; used to serve North Bay Village only, no other satellite city flow.
8" diameter F.M Harding Ave. and 72 St.	1028	Removed; used to serve North Bay Village only, no other satellite city flow.
12" diameter F.M Harding Ave.	1027	Removed; used to serve North Bay Village only, no other satellite city flow.
20" diameter F.M 72 St.	1024	Removed; used to serve North Bay Village only, no other satellite city flow.

Table 2 - List of CMB Wastewater Transmission Facilities Included in the 2007 CDM Study That Were Edited or Removed for the 2024 Study Update

Facility (a)	Pipe ID (a)	Note (b)
30" diameter F.M Pine Tree Dr. and 44 St.	1070	Removed; does not serve satellite cities.
30" diameter F.M 17 St.	8226	Removed; does not serve satellite cities.
30" diameter F.M 11 St.	1737	Edited to add 30' of length to reflect repairs and length added since 2007; Pipe ID updated to 1737a to reflect current service.
54" F.M. Michigan Ave. from 3 St. Biscayne St.	1150	Edited to 1,278' and Pipe ID updated to 1150a to reflect current service.
54" diameter F.M	1090	Edited to 4,675' to reflect new HDPE 54" F.M. built 2015-2020. Updated to 1090a to indicate that it is a new pipe.
54" diameter F.M	1091	Removed; replaced with 60" F.M. to CMB meter at Fischer Island (See Table 3, Segment M)
South Pointe Booster Pump Station		Removed because it was a proposed facility that was never built.

(a) Facility description, location and identification numbers were taken from the 2007 CDM Study.

(b) The Note column describes the edits or removal of the pipe segment compared to the facility list in the CDM 2007 study.

Table 3 lists the wastewater facilities that were added to the cost allocation in this 2024 study. As shown in the table, six pipe segments that were not included in the 2007 Study are now being used by the satellite cities and CMB to transmit their respective wastewater flow; hence, they are included in the updated study.

For example, the three pipe segments referred to as Pipe Segments A, B, and C in Table 3 were not included in the previous study but are now being used by Bay Harbor Islands and CMB. Bay Harbor Island transmits wastewater through all three pipe segments while CMB transmits wastewater through pipe segments B and C only. Segments D, L and M were also added to reflect updates to the system provided by CMB since the 2007 Study. In the absence of updated hydraulic modeling information, flows were halved to allocate flows between the east and west 54" force mains.

Table 3. CMB and Satellite City Users of Pipe Segments Added to the 2024 Study

Added Pipe Segment	Facility	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek	CMB
A	20" West F.M between 16" and 36" FM connection		X		
B	20" West F.M between 16" and 36" FM connection (220 feet)		X		X
C	24" Connecting 20" to the 30" FM		X		X

D	36" F.M. 11th St. connecting to F.M. "1080" to west and F.M. "1090a" to east	X	X	X	X
L	48" F.M. at Washington and Commerce connecting F.M. "1090a" to F.M. "M"	X	X	X	X
M	60" F.M. from Alton Rd. to CMB meter on Fisher Island (replaced portion of 1091)	X	X	X	X

A list of the City of Miami Beach wastewater transmission pipelines, sizes, and lengths that were used in this study is provided in **Table A-1** in Appendix A of this memorandum.

Step 2: Determine FY22-23 Wastewater Contributions to the Updated CMB System

As noted above, CMB provided Hazen with monthly historical flow data for each user of the CMB system in FY22-23, the most recent complete year, and for FY06-07, which corresponds to the data year used in the 2007 CDM Report. These data are presented in Table 4 and Table 5, respectively. The FY22-23 flows serve as the basis for allocating the costs among the cities. The FY06-07 data in Table 2 are presented for historical context only.

Not shown in the Tables is the projected 39,967 gallons per day (gpd) of wastewater (14,587,955 gallons per year) that is expected to flow into the CMB system from Indian Creek Village once the connector pipe is installed.⁴

Table 4. FY22-23 Monthly Flow into the CMB Sewage Transmission System in Gallons

Month and Year	From Bay Harbor Islands	From Surfside	From Bal Harbour	Total Satellite Cities	From Miami Beach	Total All Flows
(1)	(2)	(3)	(4)	(5) = (2) + (3) + (4)	(6)	(7) = (5) + (6)
Oct-22	26,153,000	29,423,000	27,529,000	83,105,000	966,612,000	1,049,717,000
Nov-22	24,610,000	29,142,000	26,271,000	80,023,000	673,701,000	753,724,000
Dec-22	20,329,000	23,343,000	27,195,000	70,867,000	620,939,000	691,806,000
Jan-23	17,869,000	20,995,000	24,572,000	63,436,000	667,970,000	731,406,000
Feb-23	17,220,000	18,410,000	21,475,000	57,105,000	549,209,000	606,314,000
Mar-23	17,938,000	20,690,000	24,195,000	62,823,000	548,390,000	611,213,000
Apr-23	23,602,000	23,964,000	26,429,000	73,995,000	641,431,000	715,426,000
May-23	21,911,000	20,524,000	22,414,000	64,849,000	616,071,000	680,920,000
Jun-23	26,345,000	24,638,000	24,749,000	75,732,000	539,775,000	615,507,000
Jul-23	19,241,000	18,825,000	24,896,000	62,962,000	567,286,000	630,248,000
Aug-23	19,307,000	19,335,000	23,269,000	61,911,000	583,691,000	645,602,000
Sep-23	22,283,000	21,596,000	24,755,000	68,634,000	658,493,000	727,127,000
Annual Total Flow	256,808,000	270,885,000	297,749,000	825,442,000	7,633,568,000	8,459,010,000
Average Daily Flow	703,584	742,151	815,751	2,261,485	20,913,885	23,175,370
Average Gal/minute	489	515	566	1,570	14,524	16,094

⁴ Source: MDWASD form called Intermediate Downstream Collection and Transmission System (IDC&TS) Certification of Adequate Reserve Capacity (Utility Form) completed for Indian Creek Village.

Table 5. FY06-07 Monthly Flow into the CMB Sewage Transmission System in Gallons

Thru Month	From Bay Harbor Islands	From Surfside	From Bal Harbour	Total Satellite Cities	From Miami Beach	Total All Flows
(1)	(2)	(3)	(4)	(5) = (2) + (3) + (4)	(6)	(7) = (5) + (6)
Oct-06	31,216,634	28,122,903	22,096,567	120,607,539	693,780,461	814,388,000
Nov 06	29,593,700	18,959,223	14,896,532	110,810,349	619,803,651	730,614,000
Dec 06	30,111,668	20,055,520	15,757,908	110,099,837	590,251,163	700,351,000
Jan 07	30,702,260	25,380,731	19,942,003	120,021,461	564,539,539	684,561,000
Feb 07	28,599,318	22,032,279	17,311,076	103,589,890	508,109,110	611,699,000
Mar 07	29,503,810	23,829,446	18,723,136	111,939,795	571,726,205	683,666,000
Apr 07	26,549,228	21,797,187	17,126,361	106,841,707	578,631,293	685,473,000
May 07	28,299,458	19,937,392	15,665,094	108,311,124	716,397,876	824,709,000
June 07	27,080,437	20,379,759	16,012,667	105,601,788	600,860,212	706,462,000
July 07	23,590,000	17,647,908	13,866,214	99,127,626	607,243,374	706,371,000
Aug 07	21,126,473	19,378,976	15,226,338	102,788,565	606,856,435	709,645,000
Sept 07	22,822,998	18,376,949	14,439,031	106,035,351	646,526,649	752,562,000
Annual Total Flow	329,195,984	255,898,273	201,062,927	1,305,775,032	7,304,725,968	8,610,501,000
Average Daily Flow	901,907	701,091	550,857	3,577,466	20,012,948	23,590,414
Average Gal/minute	626	487	383	2,484	13,898	16,382

Comparing the satellite cities and CMB flows for each of the two years, it was found that the total annual flow entering the system has decreased from 8.61 billion gallons per year (gpy) in FY06-07 to 8.46 billion gpy in FY22-23. The overall contribution of the satellite cities not including Indian Creek decreased from about 15 percent of the total to about 10 percent. Of the satellite cities, only Bal Harbour generated a significant increase in wastewater contribution to the system, from 201 million gpy to 298 gpy. Bay Harbor Islands' flow decreased from 329 million gpy to 257 million gpy while Surfside's wastewater flow increased modestly from 256 million gpy to 271 million gpy. The main implication of the changes in satellite community flows is that future conveyance surcharges will need to reflect the change in relative contributions of the cities.

Step 3. Calculate System Peak Flows for each of the Satellite Cities and CMB

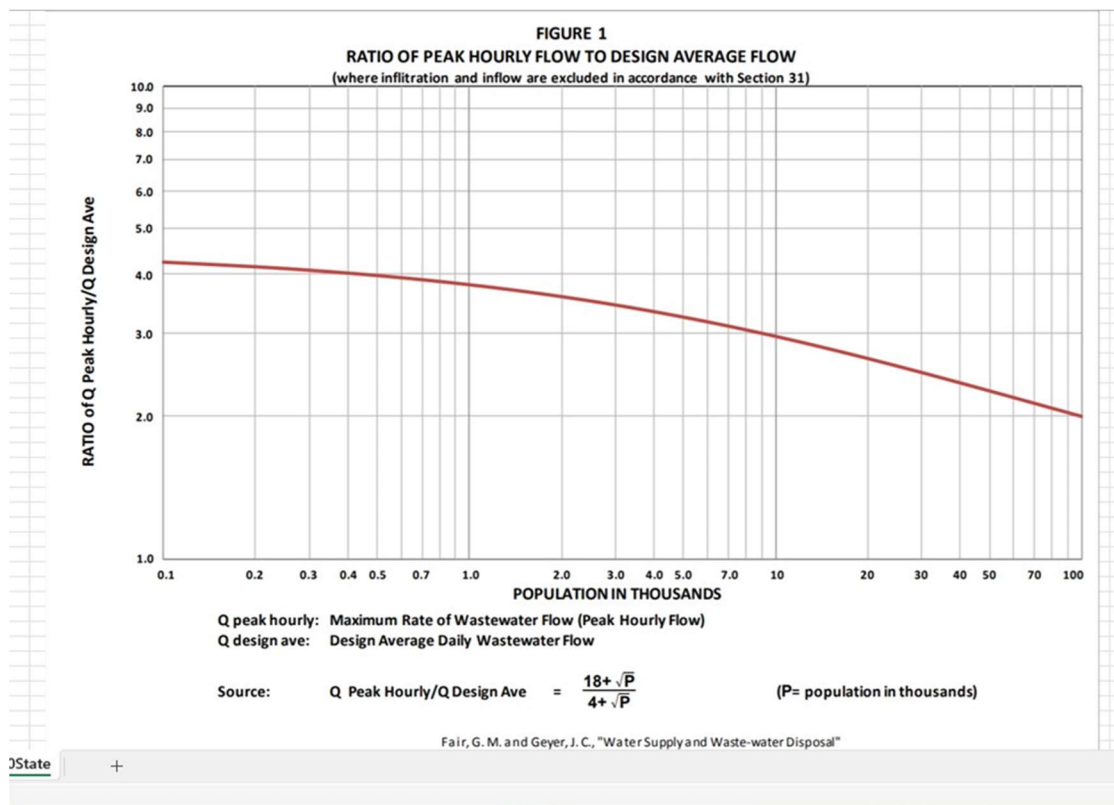
To convert average flows to peak flows for each satellite city and the CMB, Hazen employed the peak hour flow ratio method from the Recommended Standards for Wastewater Facilities (10 States Standards). First developed in 1976, the method has been used for almost 50 years and is regarded as the premiere model for estimating peak flows regardless of geographic location. Data requirements are relatively few and include the population of the service area. Alternatively, the wastewater generation in gallons per person per day and annual average daily flow can be used as input data.

Table 6 illustrates how the 10-State Method calculates a peak flow estimate for a wastewater system with a population of 7,400 residents. The model uses a default input of 100 gallons per day (gpd) per capita to generate an average wastewater flow. For the example shown, a calculated Peak Flow Factor of 3.082 is multiplied by the average flow of 0.74 mgd or 515 gpm to yield a Peak Flow of 1,588 gpm.

Table 6. Example Peak Flow Factor Calculation using 10 States Standards

Population to Flow Conversion	
Unit Wastewater Flow (gpd/capita)	100
Unit Wastewater Flow (gpm/capita)	0.069
Unit Wastewater Flow (gpm/1000 capita)	69.444
Peak Flow Calculations	
Annual Average Daily Flow (AADF) (gpd)	742,151
Annual Average Daily Flow (AADF) (gpm)	515
Annual Average Daily Flow (AADF) (MGD)	0.74
Equivalent Population (K)	7.42
10-State Standard Peaking Factor	3.082
PHF (gpm)	1,588
PHF (MGD)	2.29

Alternatively, one can enter collected data for average flow, and the model will generate an assumed population of the service area. The user can modify the per capita flow if the default assumption is at significant variance from the known per capita consumption. The relationship between population size (wastewater flow) and the Peak Flow Factor is illustrated in the chart shown in **Figure 1**. As shown in the Figure, service areas with larger populations (and larger wastewater volumes) have smaller peak flow factors compared to smaller populations and lower average flows. A wastewater system with a population of 20,000 and an average daily flow of 2 mgd would have a Peak Flow Factor of 2.67.



In developing the Peak Flow calculations for this study, the default per capita wastewater flow of 100 gallons per capita per day (gpcd) used in the 10 States Standards model was modified based on the ratio of the reported FY22-23 average daily wastewater flow of the city and the 2020 Census population of the city. The modified per capita wastewater flow was compared to the reported per capita daily water consumption of the city to validate the approach. In each case, the modified gpcd value was very different from the default value of 100 gpcd. The per capita wastewater flow of each city is provided in Table 7.

Table 7. Wastewater Flow Per Capita Per Day (gpcd) Used in Calculating Peak Flows Using the 10 States Model

City:	Bay Harbor Islands	Surfside	Bal Harbour	Indian Creek	CMB
Per Capita Daily Wastewater Flow:	125	140	260	500	260

Peak Flows for each satellite city and the CMB were calculated by multiplying average flows for FY22-23 by the Peak Flow Factor calculated using the 10 States Standards model described above. The calculations are shown in Table 8. Peak Flows are presented in gallons per minute (gpm).

Table 8. Estimated FY22-23 Peak Flow Entering the CMB Wastewater Transmission System Using the Peak Flow Factor Calculated using the 10-States Standard Model

Row No.	Metric	Bay Harbor Islands	Surfside	Bal Harbour	Indian Creek Village	CMB
(1)	Average Flow (gpm)	489	515	566	28	14,524
(2)	Peak Flow Factor	3.20	2.39	3.43	4.27	2.08
(3) = (1) x (2)	Peak Flow (gpm)	1,562	1,660	1,941	118	30,202

Hazen tested the validity of the model for South Florida using historical SCADA data for the CMB System. Specifically, Hazen evaluated CMB SCADA hourly flow data from May 1, 2022 through May 2, 2023. During this period, the highest recorded hourly flow reached 37,577 gpm on October 13, 2022. This hourly flow includes flow from the satellite cities. Subtraction of the satellite city flows from the total system flow yields a CMB peak flow estimate of 31,964 gpm. This estimate aligns well with the 10 States Standards Model estimate of 30,202 gpm and therefore supports the use of the model results for all five cities.

The peak flows presented in Table 8 are estimates of the peak flows entering the CMB transmission system from each of the satellite cities and do not represent the peak flows along each segment of the CMB transmission system. The updated peak flow value for each satellite city was used as the peak flow entering CMB's transmission system because each city's flow enters the system from only one source. For CMB flows entering different parts of the system, the peak flow entering the pipe segment as reported in the 2007 CDM study was adjusted by the ratio of CMB's total FY23-23 peak flow and the total peak flow inferred from the 2007 CDM study. For each city, peak flows through each pipe segment were increased, decreased, or unchanged as needed based on the entry of flows from other cities, the peak flows used in the CDM study for each pipe segment, and the branching of the flows into multiple pipes.

Step 3. Estimating Peak Flows at the Individual Pipe Segments

The individual peak flows entering the system do not stay at the same level as the wastewater is conveyed downstream through the sewer system. This is because the sewer system is comprised of pipes of different diameters and, at some junctions, the waste stream is directed into two separate pipes, with each downstream pipe taking a portion of the upstream volume.

As shown in Table 9, which was extracted from CDM's 2007 Report (Table 7), a portion of the Bay Harbor Islands' (BHI) wastewater flow is diverted from a 42-inch pipe to a 30-inch pipe at Pump Station No. 28, resulting in a reduction in BHI's peak flow in the two pipes: one with a peak flow of 745 gpm in the original pipe segment and the other with a peak flow of 350 gpm at the 30" F.M. from Pine Tree Dr. to 17th St.. Similar splits of wastewater occur as the wastewater moves from the initial entry points in the north of the system to its exit flow into Fisher island and on to the wastewater treatment plant.

Table 9. 2007 Peak Flows of Bay Harbor Islands Entering PS 28 and Three Pipe Segments

Facility	BHI, Peak Flow in gpm	Percentage of Initial Peak Flow Used in 2007 CDM Report
Pump Station No. 28	Initial Peak Flow = 1,095	100%
42" F.M. from Pine Tree Dr. to Dade Blvd & Jefferson Ave.	745	68%
30" F.M. from Pine Tree Dr. to 17 th St.	350	32%

Source: Table 7: Peak Flow Contributions for Satellite Cities, CDM 2007

CDM's estimated peak flows along the system were based on hydraulic modeling results. Because no modeling was done for this study, the updated system peak flows to consecutive force mains were adjusted using the peak flow percentage allocations from the 2007 CDM Report. For example, in Table 9, the 2007 peak flow through Pump Station 28 was apportioned 68 percent to the 42" F.M. from Pine Tree Dr. to Dade Blvd & Jefferson Ave. and 32 percent to the 30" F.M. from Pine Tree Dr. to 17th St. The same approach to apportioning the peak flows was used to update the peak flows for the current study and for all sections of the system where the wastewater flow is directed into two separate pipes.

3. Peak Flow Estimates and Flow Allocations by Pipe Segment and Satellite City

Using the data and methods described above, Table 10 presents the updated peak flow by pipe segment for the four satellite cities and the CMB. Table 11 shows the percentage allocation of those flows for each pipe segment. The percentage allocations were calculated based on each satellite city's and CMB's peak flow contribution to the estimated total peak flow for each pipe segment. When added together the peak flow contributions of the users to each pipe segment total 100 percent of the total peak flow.

The contributions of the satellite city peak flows dominate the total peak flow in the northern sections of the system, but as the CMB flows enter the system further downstream, CMB's peak flows become dominant, accounting for more than 80 percent of the total peak flow in the larger diameter pipe segments in the southern portion of the sewer system. Letters included in the Pipe ID indicate that the pipe segment was adjusted or added by Hazen, as identified in this memorandum.

Table 10. User Peak Flows by Pipe Segment for FY 22-23 (gpm)

Pipe ID	Pipe Segment	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek Village	City of Miami Beach	TOTAL
1010	16" F.M 74th St.	0	1,562	0	367	1,929
A	20" West F.M between 16" and 36" FM connection	0	937	0	0	937
B	20" West F.M between 16" and 36" FM connection	0	937	0	367	1,304
C	24" Connecting 20" to the 30" FM	0	937	0	1,300	2,237
1009	36" F.M 74th St.	0	625	0	0	625
1012a	36" F.M Collins Ct. From 74th St. to 73rd St. before MB flow enters	0	625	0	0	625
1020a	36" F.M from parking lot where BHV, Surfside and ICV enter to 72nd St.	3,103	625	59	2,757	6,544
1021a	36" F.M Collins Ct. from 73rd St. before BH, Surfside and ICV enter	0	625	0	866	1,491
1022a	30" F.M from parking lot where BHV, Surfside and ICV enter to 69th St.	1,551	937	59	1,300	3,847
1026	36" F.M Harding Ave. from 72 St. to 69 St.	3,103	1,562	59	2,757	7,481
1038	30" F.M Harding Ave. from 69 St. to 63 St.	1,552	780	59	3,212	5,604
1039	30" F.M Harding Ave. from 69 St. to 63 St.	1,551	782	59	3,192	5,583
1042	30" F.M Indian Creek Dr. and 63 St.	1,552	780	59	3,212	5,604
1040	30" F.M Indian Creek Dr. and 63 St.	1,551	782	59	3,192	5,583
1041	36" F.M Indian Creek Dr. and 63 St.	1,551	782	59	3,192	5,583
1043	36" F.M Indian Creek Dr. and 63 St.	3,103	1,562	59	6,404	11,128
1148	30" F.M Indian Creek Dr. and 63 St.	1,458	735	59	3,707	5,959
1044	36" F.M Indian Creek Dr. and 63 St.	3,103	1,562	59	7,964	12,688
1047	36" F.M Indian Creek Dr. and 63 St	1,644	827	59	4,258	6,789
1046	30" F.M Indian Creek Dr. and 63 St.	1,644	827	59	4,258	6,788
PS29	Booster Pump Station No. 29	3,103	1,562	118	6,404	11,187
1144	30" F.M Indian Creek Dr. from 63 St. to 60 St.	1,644	827	63	4,258	6,792
1149	30" F.M Indian Creek Dr. from 63 St. to 60 St.	1,458	735	56	3,707	5,956
1048	30" F.M 60 St. from Indian Creek Dr. to Pine Dr.	1,644	827	63	4,258	6,792
1052	30" F.M 60 St. from Indian Creek Dr. to La Gorce Dr.	1,458	735	56	4,968	7,217

Table 10. User Peak Flows by Pipe Segment for FY 22-23 (gpm)

Pipe ID	Pipe Segment	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek Village	City of Miami Beach	TOTAL
1060	30" F.M 60 St. from Pine Dr. to 58 St.	1,644	827	63	4,258	6,792
1059	30" F.M La Gorce Dr. from 60 St to 58 St.	1,458	735	56	4,968	7,217
1061	30" F.M 58 St.	58	30	2	220	310
1063	30" F.M from 58 St. to 51 St.	1,702	857	65	4,478	7,102
1062	30" F.M La Gorce Dr. from 58 St to 51 St.	1,401	705	53	4,748	6,907
1064	30" F.M Pine Dr. and 51 St.	1,401	705	53	4,748	6,907
1068	30" F.M Pine Tree Dr. from 51 St. and 44 St.	1,549	780	59	5,099	7,487
1065	30" F.M Pine Dr. and 51 St.	153	77	6	306	542
1069	30" F.M Pine Tree Dr. from 51 St and 44 St.	1,554	782	59	5,054	7,449
1070	30" F.M Pine Tree Dr. and 44 St.	0	0	0	13	13
1072	30" F.M Pine Tree Dr. from 44 St. to 28 St.	1,554	782	59	5,068	7,463
1071	30" F.M Pine Tree Dr. from 44 St. to 28 St.	1,549	780	59	5,085	7,473
1073	42" F.M	3,103	1,562	118	10,153	14,936
PS28	Pump Station No. 28	3,103	1,562	118	10,153	14,936
1075	42" F.M from Pine Tree Dr. to Dade Blvd. & Jefferson Ave.	2,110	1,063	81	10,035	13,288
1077	30" F.M from Pine Tree Dr. to 17th St.	993	499	38	4,648	6,178
8225	42". F.M from Dade Blvd. to 17 St.	2,110	1,063	81	10,884	14,137
8226	30" F.M 17th St.	0	0	0	2,504	2,504
1080	42" F.M Michigan Ave. from 17 St. to 11 St.	2,110	1,063	81	13,388	16,641
1088	30" F.M Meridian Ave. from 17 St. to 11 St.	993	499	38	4,760	6,290
1737a	30" F.M 11 St.	993	499	38	6,215	7,746
D	36" F.M. 11th St. connecting to F.M. "1080" to west and F.M. "1090a" to east	1551	781	59	13,226	15,618
1089	54" F.M Michigan Ave. from 11 St. to 3 St.	1551	781	59	13,226	15,618
1090a	54" F.M. down Euclid/Washington St. (from pipe "D" to "L")	1551	781	59	13,226	15,618
1150a	54" F.M Michigan Ave. from 3 St. to Commerce St.	1551	781	59	14,910	17,302
L	48" F.M. at Washington and Commerce connecting F.M. "1090a" to F.M. "M"	1551	781	59	14,910	17,302

Table 10. User Peak Flows by Pipe Segment for FY 22-23 (gpm)

Pipe ID	Pipe Segment	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek Village	City of Miami Beach	TOTAL
3	54" F.M	3103	1562	118	30,202	34,985
2	30" F.M	3103	1562	118	30,202	34,985
1	36" F.M	3103	1562	118	30,202	34,985
M	60" F.M. from Alton Rd. to CMB meter on Fisher Island	3103	1562	118	30,202	34,985

Table 11. User Peak Flow Percentage Allocations by Pipe Segment for FY 22-23

Pipe ID	Pipe Segment	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek Village	City of Miami Beach	TOTAL
1010	16" F.M 74th St.	0.0%	81.0%	0.0%	19%	100%
A	20" West F.M between 16" and 36" FM connection	0.0%	100.0%	0.0%	0%	100%
B	20" West F.M between 16" and 36" FM connection	0.0%	71.9%	0.0%	28%	100%
C	24" Connecting 20" to the 30" FM	0.0%	41.9%	0.0%	58%	100%
1009	36" F.M 74th St.	0.0%	100.0%	0.0%	0%	100%
1012a	36" F.M Collins Ct. From 74th St. to 73rd St. before MB flow enters	0.0%	100.0%	0.0%	0%	100%
1020a	36" F.M from parking lot where BHV, Surfside and ICV enter to 72nd St.	47.4%	9.5%	1.1%	42%	100%
1021a	36" F.M Collins Ct. from 73rd St. before BH, Surfside and ICV enter	0.0%	41.9%	0.0%	58%	100%
1022a	30" F.M from parking lot where BHV, Surfside and ICV enter to 69th St.	40.3%	24.4%	1.5%	34%	100%
1026	36" F.M Harding Ave from 72 St. to 69 St.	41.5%	20.9%	0.8%	37%	100%
1038	30" F.M Harding Ave. from 69 St.to 63 St.	27.7%	13.9%	1.1%	57%	100%
1039	30" F.M Harding Ave. from 69 St. to 63 St.	27.8%	14.0%	1.1%	57%	100%
1042	30" F.M Indian Creek Dr. and 63 St.	27.7%	13.9%	1.1%	57%	100%
1040	30" F.M Indian Creek Dr. and 63 St.	27.8%	14.0%	1.1%	57%	100%
1041	36" F.M Indian Creek Dr .and 63 St.	27.8%	14.0%	1.1%	57%	100%
1043	36" F.M Indian Creek Dr. and 63 St.	27.9%	14.0%	0.5%	58%	100%
1148	30" F.M Indian Creek Dr. and 63 St.	24.5%	12.3%	1.0%	62%	100%
1044	36" F.M Indian Creek Dr. and 63 St.	24.5%	12.3%	0.5%	63%	100%

Table 11. User Peak Flow Percentage Allocations by Pipe Segment for FY 22-23

Pipe ID	Pipe Segment	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek Village	City of Miami Beach	TOTAL
1047	36" F.M Indian Creek Dr. and 63 St	24.2%	12.2%	0.9%	63%	100%
1046	30" F.M Indian Creek Dr. and 63 St.	24.2%	12.2%	0.9%	63%	100%
PS29	Booster Pump Station No. 29	27.7%	14.0%	1.1%	57%	100%
1144	30" F.M Indian Creek Dr. from 63 St. to 60 St.	24.2%	12.2%	0.9%	63%	100%
1149	30" F.M Indian Creek Dr. from 63 St. to 60 St.	24.5%	12.3%	0.9%	62%	100%
1048	30" F.M 60 St. from Indian Creek Dr. to Pine Dr.	24.2%	12.2%	0.9%	63%	100%
1052	30" F.M 60 St. from Indian Creek Dr. to La Gorce Dr.	20.2%	10.2%	0.8%	69%	100%
1060	30" F.M 60 St. from Pine Dr. to 58 St.	24.2%	12.2%	0.9%	63%	100%
1059	30" F.M La Gorce Dr. from 60 St to 58 St.	20.2%	10.2%	0.8%	69%	100%
1061	30" F.M 58 St.	18.6%	9.7%	0.7%	71%	100%
1063	30" F.M from 58 St. to 51 St.	24.0%	12.1%	0.9%	63%	100%
1062	30" F.M La Gorce Dr. from 58 St to 51 St.	20.3%	10.2%	0.8%	69%	100%
1064	30" F.M Pine Dr. and 51 St.	20.3%	10.2%	0.8%	69%	100%
1068	30" F.M Pine Tree Dr. from 51 St. and 44 St.	20.7%	10.4%	0.8%	68%	100%
1065	30" F.M Pine Dr. and 51 St.	28.2%	14.2%	1.1%	56%	100%
1069	30" F.M Pine Tree Dr. from 51 St and 44 St.	20.9%	10.5%	0.8%	68%	100%
1070	30" F.M Pine Tree Dr. and 44 St.	0.0%	0.0%	0.0%	100%	100%
1072	30" F.M Pine Tree Dr. from 44 St. to 28 St.	20.8%	10.5%	0.8%	68%	100%
1071	30" F.M Pine Tree Dr. from 44 St. to 28 St.	20.7%	10.4%	0.8%	68%	100%
1073	42" F.M	20.8%	10.5%	0.8%	68%	100%
PS28	Pump Station No. 28	20.8%	10.5%	0.8%	68%	100%
1075	42" F.M from Pine Tree Dr. to Dade Blvd. & Jefferson Ave.	15.9%	8.0%	0.6%	76%	100%
1077	30" F.M from Pine Tree Dr. to 17th St.	16.1%	8.1%	0.6%	75%	100%
8225	42". F.M from Dade Blvd. to 17 St.	14.9%	7.5%	0.6%	77%	100%
8226	30" F.M 17th St.	0.0%	0.0%	0.0%	100%	100%

Table 11. User Peak Flow Percentage Allocations by Pipe Segment for FY 22-23

Pipe ID	Pipe Segment	Bal Harbour and Surfside	Bay Harbor Islands	Indian Creek Village	City of Miami Beach	TOTAL
1080	42" F.M Michigan Ave. from 17 St. to 11 St.	12.7%	6.4%	0.5%	80%	100%
1088	30" F.M Meridian Ave. from 17 St. to 11 St.	15.8%	7.9%	0.6%	76%	100%
1737a	30" F.M 11 St.	12.82%	6.45%	0.49%	80%	100%
D	36" F.M. 11th St. connecting to F.M. "1080" to west and F.M. "1090a" to east	9.93%	5.00%	0.38%	85%	100%
1089	54" F.M Michigan Ave. from 11 St. to 3 St.	9.93%	5.00%	0.38%	85%	100%
1090a	54" F.M. down Euclid/Washington St. (from pipe "D" to "L")	9.93%	5.00%	0.38%	85%	100%
1150a	54" F.M Michigan Ave. from 3 St. to Commerce St.	8.97%	4.51%	0.34%	86%	100%
L	48" F.M. at Washington and Commerce connecting F.M. "1090a" to F.M. "M"	8.97%	4.51%	0.34%	86%	100%
3	54" F.M	8.87%	4.46%	0.34%	86%	100%
2	30" F.M	8.87%	4.46%	0.34%	86%	100%
1	36" F.M	8.87%	4.46%	0.34%	86%	100%
M	60" F.M. from Alton Rd. to CMB meter on Fisher Island	8.87%	4.46%	0.34%	86%	100%

4. Estimated Annual Depreciation of the Wastewater Conveyance System

The satellite cities pay the CMB for the depreciated capital cost of the conveyance system they use to transmit their wastewater. Since the 2007 CDM Study was performed, CMB has escalated annual replacement cost charges based on the national inflation rate. Because annual changes in infrastructure costs can significantly deviate from the economy's overall inflation rate, it is likely that over time this method has resulted in charges that poorly reflect the true replacement costs of CMB's conveyance system that includes miles of piping and two pump stations.

The estimated replacement costs prepared for this study were based on recent cost estimates developed for wastewater design projects in South Florida. Costs were developed based on the pipe's width and length and on bid pricing in the south Florida area including the North Miami Beach Corona Del Mar Gravity Sewer, the Fort Lauderdale River Oaks Stormwater, the Pine Gardens Jupiter Infrastructure Improvements, and the Drainage and Watermain in Palm Beach. Pipe replacement costs include mobilization, demobilization, traffic control, excavation, bedding, backfill, and site restoration. Since bid prices include overhead and profit, no additional markup was added. The cost elements for each pipe segment include:

- Tapping

- Line Stop
- Gate Valve
- Check Valve
- Pipe Replacement (per linear foot)

Tapping, line stops, and valves were priced based on pipe diameter.

Hazen's estimated recent bid cost to replace Pump Station 28 is \$26.1 million. This cost estimate was used for the capital cost of Pump Station 28. The capital cost for Pump Station 29 was estimated based on the capital cost per horsepower for Pump Station 28 which has 1,650 total horsepower for an estimated cost of \$15,800 per horsepower. When applied to Pump Station 29's 950 horsepower the capital cost of Pump Station 29 is estimated to be \$15,423,000.

The annualized depreciated capital costs were estimated, assuming a 50-year expected useful life for the pipes and associated equipment and a 30-year expected useful life for the pump stations. Straight line depreciation was used for all cost elements.

Table 12 presents the estimated capital replacement costs and annualized depreciation for each component of the CMB transmission system that carries the cities' combined flows.

Table 12. Estimated Capital Cost and Annualized Depreciation to Reflect the Replacement Cost of the CMB Conveyance System, 2024 dollars

Pipe ID	Pipe Segment	Estimated Capital Cost	Estimated Annual Depreciation
1010	16" F.M 74th St.	\$82,122	\$1,642
A	20" West F.M between 16" and 36" FM connection	\$749,628	\$14,993
B	20" West F.M between 16" and 36" FM connection	\$722,192	\$14,444
C	24" Connecting 20" to the 30" FM	\$488,842	\$9,777
1009	36" F.M 74th St.	\$568,742	\$11,375
1012a	36" F.M Collins Ct. From 74th St. to 73rd St. before MB flow enters	\$1,247,204	\$24,944
1020a	36" F.M from parking lot where BHV, Surfside and ICV enter to 72nd St.	\$700,665	\$14,013
1021a	36" F.M Collins Ct. from 73rd St. before BH, Surfside and ICV enter	\$987,127	\$19,743
1022a	30" F.M from parking lot where BHV, Surfside and ICV enter to 69th St.	\$2,415,634	\$48,313
1026	36" F.M Harding Ave. from 72 St. to 69 St.	\$2,396,822	\$47,936
1038	30" F.M Harding Ave. from 69 St. to 63 St.	\$6,826,225	\$136,525
1039	30" F.M Harding Ave. from 69 St. to 63 St.	\$6,807,771	\$136,155
1042	30" F.M Indian Creek Dr. and 63 St.	\$330,292	\$6,606
1040	30" F.M Indian Creek Dr. and 63 St.	\$330,292	\$6,606

Table 12. Estimated Capital Cost and Annualized Depreciation to Reflect the Replacement Cost of the CMB Conveyance System, 2024 dollars

Pipe ID	Pipe Segment	Estimated Capital Cost	Estimated Annual Depreciation
1041	36" F.M Indian Creek Dr. and 63 St.	\$606,434	\$12,129
1043	36" F.M Indian Creek Dr. and 63 St.	\$700,665	\$14,013
1148	30" F.M Indian Creek Dr. and 63 St.	\$330,292	\$6,606
1044	36" F.M Indian Creek Dr. and 63 St.	\$606,434	\$12,129
1047	36" F.M Indian Creek Dr. and 63 St	\$606,434	\$12,129
1046	30" F.M Indian Creek Dr. and 63 St.	\$330,292	\$6,606
PS29	Booster Pump Station No. 29	\$15,422,727	\$514,091
1144	30" F.M Indian Creek Dr. from 63 St. to 60 St.	\$2,378,726	\$47,575
1149	30" F.M Indian Creek Dr. from 63 St. to 60 St.	\$2,655,541	\$53,111
1048	30" F.M 60 St. from Indian Creek Dr. to Pine Dr.	\$2,101,910	\$42,038
1052	30" F.M 60 St. from Indian Creek Dr. to La Gorce Dr.	\$2,655,541	\$53,111
1060	30" F.M 60 St. from Pine Dr. to 58 St.	\$3,116,900	\$62,338
1059	30" F.M La Gorce Dr. from 60 St to 58 St.	\$2,009,639	\$40,193
1061	30" F.M 58 St.	\$625,562	\$12,511
1063	30" F.M from 58 St. to 51 St.	\$7,730,489	\$154,610
1062	30" F.M La Gorce Dr. from 58 St to 51 St.	\$7,176,858	\$143,537
1064	30" F.M Pine Dr. and 51 St.	\$625,562	\$12,511
1068	30" F.M Pine Tree Dr. from 51 St. and 44 St.	\$7,730,489	\$154,610
1065	30" F.M Pine Dr. and 51 St.	\$625,562	\$12,511
1069	30" F.M Pine Tree Dr. from 51 St and 44 St.	\$7,822,760	\$156,455
1070	30" F.M Pine Tree Dr. and 44 St.	\$274,929	\$5,499
1072	30" F.M Pine Tree Dr. from 44 St. to 28 St.	\$8,413,300	\$168,266
1071	30" F.M Pine Tree Dr. from 44 St. to 28 St.	\$8,376,391	\$167,528
1073	42" F.M	\$1,751,013	\$35,020
PS28	Pump Station No. 28	\$26,100,000	\$870,000
1075	42" F.M from Pine Tree Dr. to Dade Blvd. & Jefferson Ave.	\$25,375,554	\$507,511
1077	30" F.M from Pine Tree Dr. to 17th St.	\$10,498,642	\$209,973
8225	42". F.M from Dade Blvd. to 17 St.	\$7,536,615	\$150,732

Table 12. Estimated Capital Cost and Annualized Depreciation to Reflect the Replacement Cost of the CMB Conveyance System, 2024 dollars

Pipe ID	Pipe Segment	Estimated Capital Cost	Estimated Annual Depreciation
8226	30" F.M 1mdw7th St	\$2,101,910	\$42,038
1080	42" F.M Michigan Ave. from 17 St. to 11 St.	\$18,625,685	\$372,514
1088	30" F.M Meridian Ave. from 17 St. to 11 St.	\$8,007,304	\$160,146
1737a	30" F.M 11 St.	\$1,142,284	\$22,846
D	36" F.M. 11th St. connecting to F.M. "1080" to west and F.M. "1090a" to east	\$2,206,476	\$44,130
1089	54" F.M Michigan Ave. from 11 St. to 3 St.	\$26,142,161	\$522,843
1090a	54" F.M. down Euclid/Washington St. (from pipe "D" to "I")	\$35,180,722	\$703,614
1150a	54" F.M Michigan Ave. from 3 St. to Commerce St.	\$10,114,539	\$202,291
L	48" F.M. at Washington and Commerce connecting F.M. "1090a" to F.M. "M"	\$1,004,624	\$20,092
3	54" F.M	\$1,015,985	\$20,320
2	30" F.M	\$263,857	\$5,277
1	36" F.M	\$429,280	\$8,586
M	60" F.M. from Alton Rd. to CMB meter on Fisher Island	\$28,920,509	\$578,410
	TOTAL – Including 60" F.M. from Alton Rd. to CMB meter on Fisher Island	\$313,994,155	\$6,833,519
	TOTAL – Not including 60" F.M. from Alton Rd. to CMB meter on Fisher Island	\$285,073,646	\$6,255,109

Total replacement cost including the costs for the pump stations was calculated with and without the 60" force main, as was requested by CMB. When the 60" force main is included, the total replacement cost is estimated to be \$314 million and the depreciated annual replacement cost is estimated to be \$6.8 million.

When the 60" force main is not included, the total replacement cost is estimated to be \$285 million and the depreciated annual replacement cost is estimated to be \$6.3 million.

The percentage allocation of peak flows taken from Table 11 and the resulting allocated depreciation for each pipe segment and city taken from Table 12 are provided in Table 13 and were used to calculate the annual total depreciation allocated to each city.

Table 13. Allocation of the Annualized Replacement Cost by Pipe Segment and City

Pipe ID	Pipe Segment	Bal Harbour and Surfside		Bay Harbor Islands		Indian Creek Village		City of Miami Beach	
		Pct. of Flow	Allocated Cost	Pct. of Flow	Allocated Cost	Pct. of Flow	Allocated Cost	Pct. Of Flow	Allocated Cost
1010	16" F.M 74th St.	0.0	\$0	81.0	\$1,330	0.0	\$0	19.0	\$312
A	20" West F.M between 16" and 36" FM connection	0.0	\$0	100.0	\$14,993	0.0	\$0	0.0	\$0
B	20" West F.M between 16" and 36" FM connection	0.0	\$0	71.9	\$10,381	0.0	\$0	28.1	\$4,063
C	24" Connecting 20" to the 30" FM	0.0	\$0	41.9	\$4,095	0.0	\$0	58.1	\$5,682
1009	36" F.M 74th St.	0.0	\$0	100.0	\$11,375	0.0	\$0	0.0	\$0
1012a	36" F.M Collins Ct. From 74th St. to 73rd St. before MB flow enters	0.0	\$0	100.0	\$24,944	0.0	\$0	0.0	\$0
1020a	36" F.M from parking lot where BHV, Surfside and ICV enter to 72nd St.	47.4	\$6,644	9.5	\$1,338	0.9	\$127	42.1	\$5,904
1021a	36" F.M Collins Ct. from 73rd St. before BH, Surfside and ICV enter	0.0	\$0	41.9	\$8,275	0.0	\$0	58.1	\$11,468
1022a	30" F.M from parking lot where BHV, Surfside and ICV enter to 69th St.	40.3	\$19,472	24.4	\$11,770	1.5	\$743	33.8	\$16,328
1026	36" F.M Harding Ave. from 72 St. to 69 St.	41.5	\$19,882	20.9	\$10,009	0.8	\$380	36.9	\$17,665
1038	30" F.M Harding Ave. from 69 St. to 63 St.	27.7	\$37,818	13.9	\$19,011	1.1	\$1,442	57.3	\$78,254
1039	30" F.M Harding Ave. from 69 St. to 63 St.	27.8	\$37,810	14.0	\$19,063	1.1	\$1,446	57.2	\$77,836
1042	30" F.M Indian Creek Dr. and 63 St.	27.7	\$1,830	13.9	\$920	1.1	\$70	57.3	\$3,786
1040	30" F.M Indian Creek Dr. and 63 St.	27.8	\$1,834	14.0	\$925	1.1	\$70	57.2	\$3,776
1041	36" F.M Indian Creek Dr. and 63 St.	27.8	\$3,368	14.0	\$1,698	1.1	\$129	57.2	\$6,934
1043	36" F.M Indian Creek Dr. and 63 St.	27.9	\$3,907	14.0	\$1,967	0.5	\$75	57.5	\$8,064
1148	30" F.M Indian Creek Dr. and 63 St.	24.5	\$1,617	12.3	\$814	1.0	\$66	62.2	\$4,109
1044	36" F.M Indian Creek Dr. and 63 St.	24.5	\$2,966	12.3	\$1,493	0.5	\$57	62.8	\$7,613
1047	36" F.M Indian Creek Dr. and 63 St	24.2	\$2,938	12.2	\$1,478	0.9	\$106	62.7	\$7,607
1046	30" F.M Indian Creek Dr. and 63 St.	24.2	\$1,600	12.2	\$805	0.9	\$58	62.7	\$4,143
PS29	Booster Pump Station No. 29	27.7	\$142,403	14.0	\$71,973	1.1	\$5,655	57.2	\$294,060
1144	30" F.M Indian Creek Dr. from 63 St. to 60 St.	24.2	\$11,517	12.2	\$5,795	0.9	\$440	62.7	\$29,823
1149	30" F.M Indian Creek Dr. from 63 St. to 60 St.	24.5	\$13,006	12.3	\$6,551	0.9	\$497	62.2	\$33,057
1048	30" F.M 60 St. from Indian Creek Dr. to Pine Dr.	24.2	\$10,177	12.2	\$5,121	0.9	\$388	62.7	\$26,352

Table 13. Allocation of the Annualized Replacement Cost by Pipe Segment and City

Pipe ID	Pipe Segment	Bal Harbour and Surfside		Bay Harbor Islands		Indian Creek Village		City of Miami Beach	
		Pct. of Flow	Allocated Cost	Pct. of Flow	Allocated Cost	Pct. of Flow	Allocated Cost	Pct. Of Flow	Allocated Cost
1052	30" F.M 60 St. from Indian Creek Dr. to La Gorce Dr.	20.2	\$10,733	10.2	\$5,406	0.8	\$410	68.8	\$36,561
1060	30" F.M 60 St. from Pine Dr. to 58 St.	24.2	\$15,091	12.2	\$7,594	0.9	\$576	62.7	\$39,077
1059	30" F.M La Gorce Dr. from 60 St to 58 St.	20.2	\$8,122	10.2	\$4,091	0.8	\$310	68.8	\$27,669
1061	30" F.M 58 St.	18.6	\$2,324	9.7	\$1,209	0.7	\$92	71.0	\$8,886
1063	30" F.M from 58 St. to 51 St.	24.0	\$37,049	12.1	\$18,664	0.9	\$1,416	63.0	\$97,481
1062	30" F.M La Gorce Dr. from 58 St to 51 St.	20.3	\$29,112	10.2	\$14,644	0.8	\$1,111	68.7	\$98,670
1064	30" F.M Pine Dr. and 51 St.	20.3	\$2,538	10.2	\$1,276	0.8	\$97	68.7	\$8,600
1068	30" F.M Pine Tree Dr. from 51 St. and 44 St.	20.7	\$31,986	10.4	\$16,114	0.8	\$1,222	68.1	\$105,289
1065	30" F.M Pine Dr. and 51 St.	28.2	\$3,530	14.2	\$1,778	1.1	\$135	56.5	\$7,068
1069	30" F.M Pine Tree Dr. from 51 St and 44 St.	20.9	\$32,636	10.5	\$16,419	0.8	\$1,245	67.9	\$106,155
1070	30" F.M Pine Tree Dr. and 44 St.	0.0	\$0	0.0	\$0	0.0	\$0	100.0	\$5,499
1072	30" F.M Pine Tree Dr. from 44 St. to 28 St.	20.8	\$35,035	10.5	\$17,626	0.8	\$1,337	67.9	\$114,267
1071	30" F.M Pine Tree Dr. from 44 St. to 28 St.	20.7	\$34,721	10.4	\$17,492	0.8	\$1,327	68.0	\$113,988
1073	42" F.M	20.8	\$7,275	10.5	\$3,662	0.8	\$278	68.0	\$23,805
PS28	Pump Station No. 28	20.8	\$180,729	10.5	\$90,986	0.8	\$6,902	68.0	\$591,384
1075	42" F.M from Pine Tree Dr. to Dade Blvd. & Jefferson Ave.	15.9	\$80,572	8.0	\$40,590	0.6	\$3,079	75.5	\$383,270
1077	30" F.M from Pine Tree Dr. to 17th St.	16.1	\$33,755	8.1	\$16,970	0.6	\$1,287	75.2	\$157,961
8225	42". F.M from Dade Blvd. to 17 St.	14.9	\$22,493	7.5	\$11,332	0.6	\$860	77.0	\$116,048
8226	30" F.M 17th St.	0.0	\$0	0.0	\$0	0.0	\$0	100.0	\$42,038
1080	42" F.M Michigan Ave. from 17 St. to 11 St.	12.7	\$47,225	6.4	\$23,790	0.5	\$1,805	80.5	\$299,694
1088	30" F.M Meridian Ave. from 17 St. to 11 St.	15.8	\$25,285	7.9	\$12,712	0.6	\$964	75.7	\$121,185
1737a	30" F.M 11 St.	12.8	\$2,929	6.4	\$1,473	0.5	\$112	80.2	\$18,332
D	36" F.M. 11th St. connecting to F.M. "1080" to west and F.M. "1090a" to east	9.9	\$4,383	5.0	\$2,207	0.4	\$167	84.7	\$37,372
1089	54" F.M Michigan Ave. from 11 St. to 3 St.	9.9	\$51,934	5.0	\$26,146	0.4	\$1,983	84.7	\$442,780

Table 13. Allocation of the Annualized Replacement Cost by Pipe Segment and City

Pipe ID	Pipe Segment	Bal Harbour and Surfside		Bay Harbor Islands		Indian Creek Village		City of Miami Beach	
		Pct. of Flow	Allocated Cost	Pct. of Flow	Allocated Cost	Pct. of Flow	Allocated Cost	Pct. Of Flow	Allocated Cost
1090a	54" F.M. down Euclid/Washington St. (from pipe "D" to "I")	9.9	\$69,891	5.0	\$35,186	0.4	\$2,669	84.7	\$595,869
1150a	54" F.M Michigan Ave. from 3 St. to Commerce St.	9.0	\$18,138	4.5	\$9,131	0.3	\$693	86.2	\$174,328
L	48" F.M. at Washington and Commerce connecting F.M. "1090a" to F.M. "M"	9.0	\$1,802	4.5	\$907	0.3	\$69	86.2	\$17,315
3	54" F.M	8.9	\$1,802	4.5	\$907	0.3	\$69	86.3	\$17,542
2	30" F.M	8.9	\$468	4.5	\$236	0.3	\$18	86.3	\$4,556
1	36" F.M	8.9	\$761	4.5	\$383	0.3	\$29	86.3	\$7,412
M	60" F.M. from Alton Rd. to CMB meter on Fisher Island	8.9	\$51,286	4.5	\$25,818	0.3%	\$1,958	86.3	\$499,276
	TOTAL – Including 60" F.M. from Alton Rd. to CMB meter on Fisher Island		\$1,162,661		\$660,674		\$43,692		\$4,966,493
	TOTAL – Not including 60" F.M. from Alton Rd. to CMB meter on Fisher Island		\$1,111,375		\$634,856		\$41,734		\$4,467,216

When the 60" FM is included, the CMB, with the largest contribution of wastewater flow through the system, was allocated \$5.0 million of the total annual depreciation. Bay Harbor Islands' allocation is \$661,000, Surfside's and Bal Harbour's allocation is \$1.16 million together; and Indian Creek Village's allocation is \$43,700. The allocation to Bal Harbour and Surfside can be further apportioned based on the estimate that Bal Harbour contributes about 52 percent to their combined peak flow and Surfside contributes 48 percent of the total. Accordingly. Bal Harbour would be allocated \$609,000 and Surfside, \$554,000.

When the 60" FM is not included, the CMB allocation is \$4.5 million of the total annual depreciation. Bay Harbor Islands' allocation is \$635,000 and Indian Creek Village's allocation is \$41,700. Bal Harbour's and Surfside's total allocation is \$1.11 million where \$581,900 is allocated to Bal Harbour and \$529,400 is allocated to Surfside.

5. Estimate of the Annual Operation and Maintenance Cost for the Portion of the CMB System Carrying the Combined Flows

The CMB incurs an array of ongoing costs to operate and maintain the wastewater conveyance system infrastructure that moves the wastewater flows through the CMB to the WWTP on Virginia Key. These costs include staff salaries and benefits, vehicle fleet management, insurance, energy, fuel, contractual services, and a variety of materials and supplies. As shown in Table 14, total CMB operation and maintenance expenditures were \$14.7 million in FY22-23. This cost does not include the pass through cost of sewage treatment, capital depreciation, and other costs not applicable to this cost of service evaluation. The depreciation costs were specifically excluded from the total because they were already accounted for in the allocated capital replacement costs.

Of the \$14.7 million in annual expenditure, 49 percent, or \$7.28 million, was used for the operation and maintenance of the force main system. This system is comprised of the pressurized pipes and pump stations that move the wastewater through the CMB and to the WWTP. Of this \$7.28 million annual cost, 43 percent was allocated to the portion of CMB's force main system that moves the combined flows of the satellite cities and the CMB. This 43 percent is the ratio of the total length of the force mains carrying the combined flows (80,319 feet) and the length of the complete CMB force main system (184,819 feet). This allocated annual cost is \$3.16 million.

Table 14. FY22-23 Operation and Maintenance Costs Associated with the CMB Wastewater Gravity and Force Main System (\$ or percentages)

Account Description	Total Cost in Dollars	Gravity System Cost	Force Main System Cost	% of Gravity System	% of Force Main System
Administration Fees	\$1,251,000	\$625,500	\$625,500	50%	50%
Allowances	105,797	51,841	53,957	49%	51%
Applications/ Computer Hardware	206,000	103,000	103,000	50%	50%
Bank Fees	331,529	331,529	0	100%	0%
Central Services-Internal Svc	1,000	500	500	50%	50%
Contract Maintenance	1,503,270	508,015	995,255	34%	66%
Contracted Services - Repairs	337,714	473,272	(135,558)	140%	-40%
Dues & Memberships	1,207	591	616	49%	51%
Electricity	417,312	0	417,312	0%	100%
Employee Fringe Benefits	53,518	26,224	27,294	49%	51%
Engine Fuel & Lubricants	4,742	0	4,742	0%	100%
Fleet Management-Internal Svc	448,000	224,000	224,000	50%	50%
Health & Life Insurance	297,515	145,782	151,733	49%	51%
Holiday Pay - Overtime	21,270	10,422	10,848	49%	51%
OPEB Contributions	57,000	28,500	28,500	50%	50%
OPEB pay-as-you-go	201,000	98,490	102,510	49%	51%

Table 14. FY22-23 Operation and Maintenance Costs Associated with the CMB Wastewater Gravity and Force Main System (\$ or percentages)

Account Description	Total Cost in Dollars	Gravity System Cost	Force Main System Cost	% of Gravity System	% of Force Main System
Other Contractual Services	3,269,794	1,636,136	1,633,658	50%	50%
Other Operating Expenditures	1,687,530	843,765	843,765	50%	50%
Overtime	248,072	121,555	126,517	49%	51%
Professional Services	263,299	233,159	30,140	89%	11%
Property Mgmt-Internal Svc	55,000	16,500	38,500	30%	70%
Renovations	3,000	3,000	0	100%	0%
Rent-Building & Equipment	111,012	68,506	42,506	62%	38%
Retirement Contributions - Pen	513,000	251,370	261,630	49%	51%
Salaries and Wages	1,929,094	945,256	983,838	49%	51%
Self-Insurance-Internal Svc	1,193,000	596,500	596,500	50%	50%
Sewer Charges	46,714	23,357	23,357	50%	50%
Shift Differential	14,411	7,062	7,350	49%	51%
Social Security Medicare	31,787	15,575	16,211	49%	51%
Steeplejack	8,854	4,338	4,515	49%	51%
Storm Water	2,303	1,152	1,152	50%	50%
Supplies – Office	1,398	699	699	50%	50%
Supplies – Other	3,349	1,675	1,675	50%	50%
Telephone	27,417	13,709	13,709	50%	50%
Temporary Labor	7,307	7,307	0	100%	0%
Training & Awards	38,276	18,755	19,521	49%	51%
Travel	362	177	185	49%	51%
Uniform Expense	22,127	10,842	11,285	49%	51%
Water	30,429	15,214	15,214	50%	50%
Work Above Classification	246	120	125	49%	51%
Workmen's Compensation Pay	1,000	490	510	49%	51%
Total	\$14,746,654	\$7,463,886	\$7,282,768	51%	49%
Annual Cost of Force Main System Carrying Combined Flows of CMB and Satellite Cities (43.45% of \$7.28 million)			\$3,164,967		

Source: City of Miami Beach, 2024

The \$3.16 million annual O&M cost was allocated to the cities based on the overall contribution of each city's annual wastewater flow to the total flow. The FY22-23 contribution of each system user to the total annual flow served as the basis for allocating the annual O&M costs. These allocations are presented in Table 15.

Table 15. Allocation of Annual Operation and Maintenance Costs of the CMB Wastewater Transmission System

Municipality	FY22-23 Wastewater (gallons)	Percent of Annual Total	Cost Allocation
(1)	(2)	(3) = (2) / Total (2)	(4) = (3) x \$3.16 million
Bay Harbor Islands	256,808,000	3.03%	\$95,920
Surfside	270,885,000	3.20%	\$101,178
Bal Harbour	297,749,000	3.51%	\$111,212
Indian Creek Village	14,587,955	0.17%	\$5,449
CMB	7,633,568,000	90.09%	\$2,851,208
Total	8,473,597,955	100.00%	\$3,164,967

As shown in Table 16, the annual operation and maintenance cost on a per thousand gallon basis is \$0.37 based on the FY 22-23 wastewater flows from CMB and the satellite cities of 8.47 billion gallons and the annual shared O&M cost of \$3.16 million.

Table 16. Operation and Maintenance Cost per Thousand Gallons in 2024 dollars

Annual Cost	FY22-23 Wastewater Flow (gallons)	Cost per gallon	Cost per thousand gallons
(1)	(2)	(3) = (1) / (2)	4 = (3) X 1,000 rounded to nearest penny
\$3,164,967	8,473,597,955	\$0.000374	\$0.37

6. Allocated Cost of Service

The allocated user charges are the total of the annualized capital replacement cost and the annual operation and maintenance cost allocated across the four satellite cities and the CMB. Capital replacement cost allocations were based on the estimated peak flows contributed by each city at the pipe segment level. Annual O&M costs were allocated based on the contributions of each city to the overall system annual flow. The surcharge for Indian Creek Village was based on its projected wastewater flow.

The CMB requested that the user charges be calculated with and without including the annual depreciation of the 60" force main that begins on Alton Road. The charges under each scenario are presented in turn.

6.1 Allocated Cost of Service and Wastewater Surcharge with the 60" Force Main

Table 17 presents the total annual cost allocation for each city before the 1.5 percent administrative fee is applied. The “Capital Replacement Charge” is the annual depreciation that includes the 60” force main. The total annual capital replacement and O&M cost allocation ranges from \$49,141 for Indian Creek Village to \$7.8 million for the CMB. For Bay Harbor Islands the allocated annual cost is \$756,600 and for Surfside the allocation is \$655,000. For Bal Harbor, the annual cost allocation is \$720,000.

Table 17. Annual Allocation of Capital Replacement and Operation and Maintenance Costs to CMB and the Satellite Cities

Municipality	Capital Replacement Charge	O&M Charge	Total
Bay Harbor Islands	\$660,674	\$95,920	\$756,594
Surfside	\$553,867	\$101,178	\$655,045
Bal Harbour	\$608,794	\$111,212	\$720,006
Indian Creek Village	\$43,692	\$5,449	\$49,141
City of Miami Beach (CMB)	\$4,966,493	\$2,851,208	\$7,817,701
Total	\$6,833,520	\$3,164,967	\$9,998,487

Although the O&M surcharge is uniform across all entities because it is allocated on a whole system basis, the capital replacement charge per thousand gallons varies depending on the length and diameter of the pipes used by the respective cities. Two users with the same peak flows but using different parts of the system with different specifications would not necessarily have the same charges due to differences in capital replacement costs associated with the part of the system being used. Table 18 presents the per thousand gallon surcharge to each user for each cost element and the combined surcharge per thousand gallons.

Table 18. Cost Recovery Surcharge Per thousand gallons by City and Cost Element

Municipality	Capital Replacement Surcharge	O&M Surcharge	Combined Surcharge (a)
Bay Harbor Islands	\$2.57	\$0.37	\$2.95
Surfside	\$2.04	\$0.37	\$2.42
Bal Harbour	\$2.04	\$0.37	\$2.42
Indian Creek Village	\$3.00	\$0.37	\$3.37
City of Miami Beach	\$0.65	\$0.37	\$1.02

(a) The sum of the capital replacement and the O&M surcharges may be off by one cent in the combined surcharge column due to rounding.

The CMB charges a 1.5 percent administrative fee. The total surcharge for each city is presented in Table 19. The surcharges reflect the cost per 1,000 gallons of wastewater flow to serve the portions of CMB’s transmission system that carry the combined flows of CMB and the satellite cities. The surcharge for Bay Harbor Islands is \$2.99. The surcharge for Surfside and Bal Harbour is \$2.45. The surcharge for Indian Creek Village is \$3.42. CMB’s resulting surcharge is \$1.04 per 1,000 gallons of wastewater flow.

These surcharges per 1,000 gallons are in addition to the pass through of MDWASD’s wholesale wastewater treatment charge to CMB for flows through the CMB meter at Fisher Island.

Table 19. Wastewater Transmission Service Surcharge in \$ per thousand gallons with 1.5% Administrative Fee

Municipality	Rate Per 1,000 gallons with Admin. Fee
Bay Harbor Islands	\$2.99
Surfside	\$2.45
Bal Harbour	\$2.45
Indian Creek Village	\$3.42
City of Miami Beach	\$1.04

The difference in the surcharge per 1,000 gallons reflects the municipality’s share of total peak flow entering each force main and pump station relative to the other municipalities and the economies of scale associated with higher levels of wastewater flow through the system. For example, the relatively small surcharge assigned to CMB is due to these two influences. First, a large portion of CMB’s wastewater flow enters the system farther south, using less of the northern transmission system than the satellite cities. Also, while the CMB’s annual cost of service is \$7.8 million or 78 percent of the total allocated cost, its total wastewater flow through the system of 7.6 billion gallons per year is 90 percent of the total combined flow (as presented in Table 15), resulting in a lower cost per 1,000 gallons of wastewater flow.

6.2 Allocated Cost of Service and Wastewater Surcharge without the 60” Force Main

Table 20 presents the total annual cost allocation for each city before the 1.5 percent administrative fee is applied. The “Capital Replacement Charge” is the annual depreciation that does not include the 60” force main. The total annual capital replacement and O&M cost allocation ranges from \$47,182 for Indian Creek Village to \$7.3 million for the CMB. For Bay Harbor Islands the allocated annual cost is \$730,800 and for Surfside the allocation is \$630,600. For Bal Harbor, the annual cost allocation is \$693,200.

Table 20. Annual Allocation of Capital Replacement and Operation and Maintenance Costs to CMB and the Satellite Cities Without the 60” Force Main

Municipality	Capital Replacement Charge	O&M Charge	Total
Bay Harbor Islands	\$634,856	\$95,920	\$730,776
Surfside	\$529,435	\$101,178	\$630,613
Bal Harbour	\$581,940	\$111,212	\$693,152
Indian Creek Village	\$41,734	\$5,449	\$47,182
City of Miami Beach (CMB)	\$4,467,216	\$2,851,208	\$7,318,425
Total	\$6,255,181	\$3,164,967	\$9,420,148

Table 21 presents the per thousand gallon surcharge to each user for each cost element and the combined surcharge per thousand gallons.

**Table 21. Cost Recovery Surcharge Per thousand gallons by City and Cost Element
Without the 60" Force Main**

Municipality	Capital Replacement Surcharge	O&M Surcharge	Combined Surcharge (a)
Bay Harbor Islands	\$2.47	\$0.37	\$2.85
Surfside	\$1.95	\$0.37	\$2.33
Bal Harbour	\$1.95	\$0.37	\$2.33
Indian Creek Village	\$2.86	\$0.37	\$3.23
City of Miami Beach	\$0.59	\$0.37	\$0.96

(a) The sum of the capital replacement and the O&M surcharges may be off by one cent in the combined surcharge column due to rounding.

The CMB charges a 1.5 percent administrative fee. The total surcharge for each city is presented in Table 22. The surcharges reflect the cost per 1,000 gallons of wastewater flow to serve the portions of CMB's transmission system that carry the combined flows of CMB and the satellite cities. The surcharge for Bay Harbor Islands is \$2.89. The surcharge for Surfside and Bal Harbour is \$2.36. The surcharge for Indian Creek Village is \$3.28. CMB's resulting surcharge is \$0.97 per 1,000 gallons of wastewater flow.

These surcharges per 1,000 gallons are in addition to the pass through of MDWASD's wholesale wastewater treatment charge to CMB for flows through the CMB meter at Fisher Island.

**Table 22. Wastewater Transmission Service Surcharge in \$ per
thousand gallons with 1.5% Administrative Fee
Without the 60" Force Main**

Municipality	Rate Per 1,000 gallons with Admin. Fee
Bay Harbor Islands	\$2.89
Surfside	\$2.36
Bal Harbour	\$2.36
Indian Creek Village	\$3.28
City of Miami Beach	\$0.97

Appendix A – List of City of Miami Beach Wastewater Transmission Pipelines Used in this Study

These pipelines carry the combined flows of the CMB and the satellite cities.

Table A-1 List of City of Miami Beach Wastewater Transmission Pipelines, Sizes and Lengths

Pipe ID	Facility Description	Pipe Length in feet
1010	16" F.M 74th St.	30
A	20" West F.M between 16" and 36" FM connection	432
B	20" West F.M between 16" and 36" FM connection	413
C	24" Connecting 20" to the 30" FM	181
1009	36" F.M 74th St.	80
1012a	36" F.M Collins Ct. From 74th St. to 73rd St. before MB flow enters	440
1020a	36" F.M Collins Ct. from 73rd St. before BH, Surfside and ICV enter	150
1021a	36" F.M from parking lot where BHV, Surfside and ICV enter to 72nd St.	302
1022a	30" F.M from parking lot where BHV, Surfside and ICV enter to 69th St.	1,170
1026	36" F.M Harding Ave. from 72 St. to 69 St.	1,050
1038	30" F.M Harding Ave. from 69 St. to 63 St.	3,560
1039	30" F.M Harding Ave. from 69 St. to 63 St.	3,550
1042	30" F.M Indian Creek Dr. and 63 St.	40
1040	30" F.M Indian Creek Dr. .and 63 St.	40
1041	36" F.M Indian Creek Dr. .and 63 St.	100
1043	36" F.M Indian Creek Dr. .and 63 St.	150
1148	30" F.M Indian Creek Dr. .and 63 St.	40
1044	36" F.M Indian Creek Dr. and 63 St.	100
1047	36" F.M Indian Creek Dr. and 63 St	100
1046	30" F.M Indian Creek Dr. and 63 St.	40
1144	30" F.M Indian Creek Dr. from 63 St. to 60 St.	1,150
1149	30" F.M Indian Creek Dr. from 63 St. to 60 St.	1,300
1048	30" F.M 60 St. from Indian Creek Dr. to Pine Dr.	1,000
1052	30" F.M 60 St. from Indian Creek Dr. to La Gorce Dr.	1,300
1060	30" F.M 60 St. from Pine Dr. to 58 St.	1,550
1059	30" F.M La Gorce Dr. from 60 St to 58 St.	950
1061	30" F.M 58 St.	200
1063	30" F.M from 58 St. to 51 St.	4,050
1062	30" F.M La Gorce Dr. from 58 St to 51 St.	3,750
1064	30" F.M Pine Dr. and 51 St.	200
1068	30" F.M Pine Tree Dr. from 51 St. and 44 St.	4,050
1065	30" F.M Pine Dr. and 51 St.	200
1069	30" F.M Pine Tree Dr. from 51 St and 44 St.	4,100
1070	30" F.M Pine Tree Dr. and 44 St.	10
1072	30" F.M Pine Tree Dr. from 44 St. to 28 St.	4,420
1071	30" F.M Pine Tree Dr. from 44 St. to 28 St.	4,400
1073	42" F.M	250

Table A-1 List of City of Miami Beach Wastewater Transmission Pipelines, Sizes and Lengths

Pipe ID	Facility Description	Pipe Length in feet
1075	42" F.M from Pine Tree Dr. to Dade Blvd. & Jefferson Ave.	5,150
1077	30" F.M from Pine Tree Dr. to 17th St.	5,550
8225	42". F.M from Dade Blvd. to 17 St.	1,450
8226	30" F.M 17th St	1,000
1080	42" F.M Michigan Ave. from 17 St. to 11 St.	3,750
1088	30" F.M Meridian Ave. from 17 St. to 11 St.	4,200
1737a	30" F.M 11 St.	480
D	36" F.M. 11th St. connecting to F.M. "1080" to west and F.M. "1090a" to east	949
1089	54" F.M Michigan Ave. from 11 St. to 3 St.	3,450
1090a	54" F.M. down Euclid/Washington St. (from pipe "D" to "I")	4,675
1150a	54" F.M Michigan Ave. from 3 St. to Commerce St.	1,278
L	48" F.M. at Washington and Commerce connecting F.M. "1090a" to F.M. "M"	57
3	54" F.M	45
2	30" F.M	4
1	36" F.M	6
M	60" F.M. from Alton Rd. to CMB meter on Fisher Island	3,427