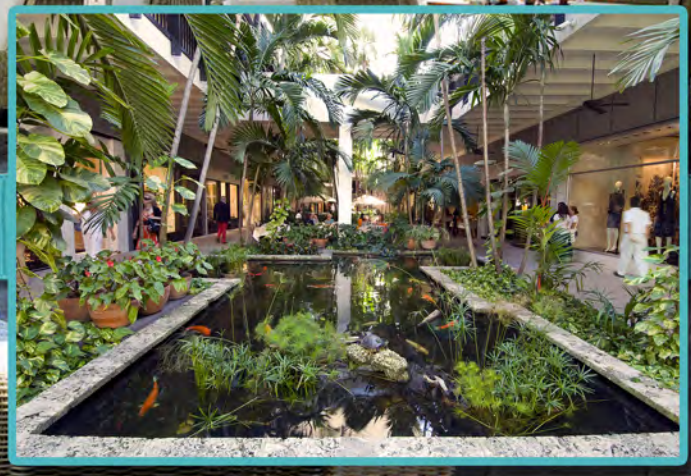
BAL HARBOUR VILLAGE

UTILITY MASTER PLAN



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BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR

FLORIDA'S PARADISE

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BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR
FLORIDA'S PARADISE

SECTION 1

EXECUTIVE SUMMARY

BACKGROUND

Bal Harbour Village is a small community located at the northern extent of the barrier island separating the Atlantic Ocean from the Biscayne Bay in northern Miami-Dade County. The Village contains approximately 0.6 square miles of land and water with a population, based on the 2012 United States Census Population Data, of approximately 2,597 residents. Refer to Exhibits G-1 and G-2 for location and vicinity maps.

Bal Harbour Village (BHV) was incorporated in 1946, at which time the majority of the Village's utility infrastructure was constructed. Additional portions of the Village's infrastructure were constructed in the late 1960's with repairs and modifications completed in the years since. The vast majority of the Village's infrastructure is more than sixty-six (66) years old and has surpassed the reasonably expected service life span of fifty (50) years by thirty percent.

The Village's potable water infrastructure was largely constructed in 1946 and utilized the rear easement approach to providing domestic service. This approach was convenient for construction purposes, but has become inaccessible and unmaintainable due to substantial encroachments constructed in the easement areas by property owners. The access issues also contributed to the need for remote meter reading systems as numerous meter locations become inaccessible. The potable water system has experienced maintenance and reliability issues over the last several years with recent events becoming more substantial. For the past four years repair costs on water mains in the Village has totaled nearly $360,000. Refer to the Water Main Inventory Repair List in Exhibit G-3.

The majority of the Village's gravity sanitary sewage collection system was likewise constructed in 1946. At the time of the sewage system construction, little existed in the way of locally written, recognized or enforced standards

governing such system construction and the Village's existing system is reflective of these issues. The system was constructed with little to no slope and at burial depths much too shallow to comply with current standards. The sewer infrastructure is also more than sixty-six (66) years old and has surpassed the reasonably expected service life span of fifty (50) years by thirty percent.

Over the course of the last fifteen to twenty years, numerous repairs and modifications have been performed to maintain the operation of the Village's infrastructure. Due to the age of the existing infrastructure, repairs have become more frequent and more costly. Recent evidence that age and corrosion have taken their toll on the system has been revealed in leaks, failing valves and collapsing pavement. Between the years 2005 to 2014 repair costs of sanitary sewers within the Village have cost $118,827. Refer to the Sanitary Sewer Inventory Repair List in Exhibit G-4.

The long-term costs associated with continuing to repair and maintain this aged infrastructure will continue to escalate and will soon eclipse the cost of constructing new facilities. Additional issues such as public inconvenience, leaks, pavement failures, boil water notices and sudden interruptions will increase in frequency as the systems continue to age and deteriorate. Sound engineering economy and judgment indicates that the infrastructure should be rebuilt to current codes and standards.

BHV is not the only municipality struggling with an aging infrastructure. Miami-Dade County has recently initiated a long-range $12 billion Capital Improvement Project designed to replace, rebuild and repair 13,000 miles of aging water and sewer mains as well as rehabilitate existing treatment plants. A consent decree by the United States Environmental Protection Agency (USEPA) declares that the County has violated sections of the Clean Water Act along with terms and conditions of its National Pollutant Discharge Elimination Systems (NPDES) permits.

According to environmental regulators the County's aging sewage infrastructure has ruptured 65 times within the past two years, spilling over 47 million gallons of untreated sewage into waterways and public streets within the County limits. The spills have caused beach closings resulting in $1.1 billion in repairs.

WHAT'S THE PLAN?

Miami-Dade's $12 Billion Water & Sewer Fix

Join the county and private industry discussion about this important public health issue and its economic imperative.

Upgrades to Miami-Dade's three water treatment plants can no longer be delayed and 50-year old water lines are in violation of the Clean Water Act forcing the county to act now. Some estimate a nine percent increase in water rates for 2013-2014, and six percent for three years thereafter.

Listen to why the county must act now and what opportunities are available for engineering and construction firms.

SPEAKERS

Humberto Alonso
Vice President, Atkins

Commissioner Lynda Bell
Miami-Dade County

John Renfrow
Director, Miami-Dade Water and Sewer

T. Spencer Crowley III
Shareholder, Akerman Senterfitt
Member, Urban Land Institute (ULI)

***Moderated by:* Eliott Rodriguez**
News Anchor, CBS 4

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November
14

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9:00-10:30 a.m. Program

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PURPOSE AND SCOPE OF STUDY

The purpose of this study is to prepare the basis for an engineering analysis and Master Plan for the replacement of the Village's aging utility infrastructure. This Utility Master Plan identifies and evaluates each of the infrastructure components and provides a base model for reconstruction of the facilities. This Master Plan takes into account the changes within the Village, the challenges of existing system's capacity and ability to handle modern demands and the planned and proposed changes to the Village in terms of additional residential units and commercial demands. Craig A. Smith & Associates has provided preliminary engineering analysis, planning and reporting to formulate, compile and present a comprehensive Utility Infrastructure Master Plan for Bal Harbour Village.

This Utility Master Plan provides the foundation from which the future design, permitting and specifications for the replacement of the Village's existing potable water and sanitary sewage systems are developed. This Master Plan addresses the Potable Water System, Sanitary Sewage System, Stormwater Drainage System Roadway Infrastructure, and Miscellaneous Improvements and its impacts on other utility systems in conjunction with estimated costs for construction.

BHV is in a continual process of growth and change within its community. The re-development the *St. Regis Resort Hotel* has recently been completed, and within the next several years expansion and development for the *Shops of Bal Harbour* and the *Oceana Bal Harbour* will occur. The expansion and enhancement of the BHV utility infrastructure is critical to keep in stride with current and future demands and impacts.

Adequate, sustainable utilities and stormwater protection are the fundamental concerns to the prosperity and livelihood of, not only Bal Harbour but, all South

Florida communities. The Village's objectives are to enhance its infrastructure needs, while preserving and protecting its natural resources.

UTILITY SUMMARY

Water Distribution Improvements

CAS has gathered and compiled data on the existing condition, construction and route of the current potable water distribution system throughout Bal Harbour Village. This information includes the history of the system(s), composition, placement, condition and serviceability. Known issues and deficiencies have been detailed and addressed.

This Potable Water System Master Plan has addressed and considered current, future and developmental maximum system demands to formulate system optimums. This plan has considered proposed or possible development, regulations and regulatory impact to system design and operation, analyzed system routing and formulated methods to optimize the system for domestic use and fire flow. This plan has evaluated pressure and connectivity issues and provided recommendations for improved system looping and redundant connectivity to improve service. The installation of a new water main system will increase domestic use and fire protection flows and pressure by up to fifty percent from present conditions.

This plan has offered a narrative summary of findings and recommendations for future utility system design configurations. This Utility Master Plan has also included recommended system routing for optimization of available right-of-way, alternatives for consideration and conceptual construction cost estimates.

The total preliminary estimated cost for water distribution improvements within the Village is $4,163,781. This cost includes all work necessary to complete the installation of a new water distribution system and connections to existing water mains on Collins Avenue and 96th Street. Water service and meter improvements within the residential area are currently budgeted at $1,554,966. Two emergency connections to existing water mains on 96th Street, indicated in the Village's 2013/2014 Fiscal Budget, are currently budgeted at $350,000.

An on-going project within BHV is the construction of a new 12-inch HDPE distribution water main on the east side of Collins Avenue. The initial phase of the water main distribution portion of the project was completed, in December, 2013, below the budgeted dollars. The meter conversion portion of the project is anticipated to be completed in Fiscal Year 2014. The remaining segment of 12-inch distribution water main on Collins Avenue will be installed at the same time as the secondary sanitary sewer system.

The need for the replacement of the existing water system is evident. A new system would eliminate the need for costly repairs, disruption of service and 'boil water' notifications, and increase flows and pressure for domestic use and fire protection up to fifty percent. Refer to the Water Distribution Improvements in Section 2 of this Utility Master Plan.

Sanitary Sewer Improvements

The existing sanitary sewage collection system within the Village is "Too old, Too shallow and Too flat." The system was not properly designed or constructed even to 1946 standards, which are similar to the current standards regarding minimum slopes and flowage (velocity) rates. Permitting, regulation and enforcement in 1946 were inconsistent to non-existent thereby providing opportunity for a substandard system to be constructed. Modern day regulation and enforcement

are superior to the practices of old. The evidence indicates that Bal Harbour's developer constructed the sanitary sewage system in 1946 utilizing sub-standard methods due to the high costs associated with dewatering excavations on a barrier island, leading to the issue of "Too old, Too shallow and Too flat."

It is important to recall that the vast majority of the infrastructure, water, sewer, curb, drainage and roadways were all constructed circa 1946, with only patchwork repairs and modifications having been performed since that time. Major improvement projects on facilities outside the main residential areas of the Village have been performed. All new work will be constructed to current standards, properly permitted, dewatered, inspected and restored to the benefit and enhancement of the Village.

CAS has gathered and reviewed available information and compiled data on the existing condition, construction and route of the current sanitary sewage collection system throughout Bal Harbour Village. Information obtained and compiled has included the history of the system(s), composition, placement, condition and serviceability. Known issues and deficiencies have been detailed and addressed.

CAS has assessed and considered current and future system demands, proposed or possible development, regulations and regulatory impact to system design and operation, analyzed system routing and considered methods to optimize the system for long-term viability. CAS has reviewed demand and connectivity issues and provided recommendations for improved system routing and connectivity to improve service that is beneficial to the Village as a whole. The installation of a new sanitary sewer system will result in a 10-20% reduction in groundwater infiltration costs (approximately $200,000 per year) and up to 50% reduction in operation and maintenance costs (approximately $50,000 per year).

CAS has provided a narrative summary of findings and recommendations for future system design configurations. This Utility Master Plan includes recommended system routing for optimization of available right-of-way, alternatives for consideration and conceptual construction cost estimates.

The total estimated preliminary cost for sanitary sewer improvements is $4,321,026. This cost includes all work necessary to complete the installation of a new sanitary sewer collection system, connection to all existing sanitary laterals within and adjacent to the residential area, and the construction of a new triplex sanitary sewer lift station including the electrical and mechanical and telemetry components. A future secondary force main, for emergency purposes only, is currently being explored.

An evaluation was also performed on the existing sanitary sewer collection system that serves the Collins Avenue corridor for this Utility Master Plan. The existing sanitary infrastructure on Collins Avenue, installed within the Village in 1946 and 1967, does not meet today's standards, regulations, and industry accepted materials for required pipe cover and minimum pipe slopes. Out-dated materials such as clay sewer pipe and brick manholes lack both integrity and protection against infiltration and exfiltration.

The total preliminary estimated cost for a complete secondary sanitary sewer rehabilitation project on the east side of Collins Avenue is $1,498,100. This cost includes all work necessary to complete the installation of a new sanitary sewer collection system, connection to all existing sanitary mains serving the ocean-front properties and the removal of the existing sanitary sewer. The Village will utilize sanitary systems, recently installed by the *St. Regis* Resort and the future sewer main to be installed by the *Oceana Bal Harbour* development, as part of the backbone infrastructure, and build from these networks to service the remaining ocean-front properties.

Sanitary sewer improvements for developments such as the *Oceana Bal Harbour* will be paid for and installed by the Developer. The responsibility of sanitary sewer services for other re-developed oceanfront properties will be determined in the future as needed.

The need for the replacement of the existing sanitary sewer system is evident. A new system would eliminate the need for costly repairs, disruption of service and eliminate further impact on existing roadways. A sewer replacement would also meet current and future demands, reduce groundwater infiltration between 10-20% (approximately $200,000 per year) and reduce operation and maintenance costs by nearly 50% (approximately $50,000 per year). Refer to the Sanitary Sewer Improvements in Section 3 of this Utility Master Plan.

Stormwater Improvements

Further expanding this Utility Master Plan in conjunction with the Sanitary Sewage Collection and Potable Water Distribution Systems, CAS has gathered and compiled data on the existing condition, construction and routing of the current storm drainage collection system throughout Bal Harbour Village. Information gathered and compiled includes a history of the system(s), composition, placement, condition and serviceability. Known issues and deficiencies have been detailed and addressed.

This Utility Master Plan has considered current system demands, proposed or possible development, regulations and regulatory impact to system design and operation, has analyzed system routing and considered methods to optimize the system for long-term viability. In addition, this plan has addressed recommendations for improved system operation. This plan has offered a narrative summary of findings and recommendations for system routing to

optimize use of available right-of-way, alternatives for consideration and conceptual construction cost estimates.

The Collins Avenue and 96th Street roadways and the stormwater systems located within the Village are owned and maintained by the Florida Department of Transportation and are therefore not within the Village's jurisdiction or authority. In regards to the residential area several factors went into the determination of the need to replace the existing stormwater network. An analysis of the existing stormwater system indicates there are approximately 1,450 linear feet of drainage pipe within the residential neighborhood that is deemed undersized in diameter for both storage and capacity. Older sections of the stormwater infrastructure, installed in 1946, have reached their life expectancy and, although failure has yet to occur, have the potential for future concerns. Other contributing factors include the discovery of stormwater pipe failures during investigative reviews of the underground system and the evaluation of rainfall events during the summer of 2012.

The total estimated preliminary cost for stormwater improvements is $6,721,430. This cost includes all work necessary to complete the installation of a new stormwater drainage system, the abandonment of eight stormwater wells and piping, pump station rehabilitation and telemetry systems, emergency generators for each of the two stormwater pump stations and the upsize of an existing outfall pipe.

The need for the replacement of the existing stormwater system is evident. A new system would reduce costly maintenance and operation repairs, reduce impacts on roads and gutters, meet regulatory standards and future demands such as rising sea levels. Refer to the Stormwater Improvements in Section 4 of this Utility Master Plan.

Rising Sea Levels

In order to offset the rise in sea levels the Utility Master Plan has incorporated measures to reduce the risk of future potential flooding by providing conceptual designs, within Village right-of-way, for both the stormwater system and the roadway improvements. The stormwater improvements would include larger structures and grates, better placement of and an increase number of structures to collect runoff faster and more efficiently than the current conditions. An increase in pipe sizes from the current system also allows for more storage capacity in the drainage pipe rather than on the road surface. The roadway improvements would include raising the existing roadway, gutter system and drainage inlets between four to six inches for the purpose of providing flood protection from a 10-year storm event.

An additional method of counteracting future rising sea levels is to establish a uniform elevation for all existing sea walls within the residential area. The sea wall should be at a grade that would protect against both mean normal water levels and the height of waves during extreme weather conditions. The sea wall elevation would be established based on the results of a comprehensive rainfall-runoff simulation and hydraulic modelling.

Village Roadway and Valley Gutter Improvements

The Infrastructure Master Plan has also included elements addressing the accompanying need for replacement of the existing curb and gutter system as well as the roadway pavement and underlying base materials.

The curbing system is understood to form a portion of the Village's stormwater or drainage system and, like the majority of the Village infrastructure, was constructed largely in 1946. Numerous patches and small segment replacements

have been performed over the years, but the majority of curbing dates to the original development. Due to its age, and factors associated with aged subsurface infrastructure, the curbing system has shifted, settled, and separated in numerous locations and has also reached the end of its service expectancy.

The Village roadway system was also primarily constructed in 1946. With the need of an overlay performed in the 1980's, the system has long outlived its expected service life. The roadway system, when properly designed and constructed, helps to direct surface water to the curbing system and eventually to a storm drainage infrastructure.

The roadway and curbing systems will be completely impacted by the reconstruction of the Village's utility infrastructure. The Utility Master Plan has addressed this issue and provides detailed construction cost estimates for their total replacement. It is important to note that these replacement costs will be supplementary to the infrastructure reconstruction.

The preliminary estimated cost for the removal of the existing curb and gutter and replacement with 2-foot concrete valley gutter is estimated at $2,123,610. The preliminary estimated cost for the complete removal, replacement and raising of the asphalt roadways and sub-bases to an acceptable Level of Service within the Village's residential area is estimated at $5,628,934.

Level of Service

The Utility Master Plan evaluated three alternatives for the Village roadway and drainage system in order to provide the Village with various Level of Service (LOS) options based on protection and costs. As flood protection increases, from rising sea levels and severe rainfall events, the higher the cost for stormwater and roadway improvements.

Option A involves the full replacement of the stormwater system to meet the 10-year storm level criteria in preparation of future rising sea levels, the raising of the existing roadways within the residential area between four and six inches, and the installation of a new concrete valley gutter. One hundred percent of the existing stormwater system within the residential area will be affected in Option A and the life expectancy of the newly installed system will be 50 years. The estimated cost of Option A is $11,096,614.

Stormwater replacement Option B involves the full replacement of the stormwater system to meet the 5-year storm level criteria in preparation of future rising sea levels, the raising of the existing roadways within the residential area between four and six inches, and the installation of a new concrete valley gutter. The difference between the 10-year and 5-year criteria will be a reduction in drainage pipe sizes. One hundred percent of the existing stormwater system within the residential area will be affected in Option B and the life expectancy of the newly installed system will be 50 years. The estimated cost of Option B is $10,088,400.

Stormwater replacement Option C involves upgrading the existing stormwater system to meet the 3-year storm level (the current level of service that the existing stormwater system provides). Option C is primarily a reparation project to the existing drainage system that would replace undersized pipes, structurally inadequate cross drain pipes, documented leaking pipes and to address isolated flood prone areas within the residential neighborhood. In option C the roads and valley gutters within the residential area will not be raised to a higher level to counteract future rising sea levels. The estimated cost of Option C is $5,041,980.

Off-site Sidewalk and Curbing Improvements

FDOT has recently completed a milling and resurfacing project for the entire 0.85 miles of road surface on Collins Avenue and Harding Avenue from the 9700 block to Haulover Bridge. Due to limited funding sidewalks, driveway entrance aprons, valley gutters and curb and gutters were not part of the project scope. A uniformly sloped curb and gutter system will distribute runoff efficiently from the road to the drainage inlet. Once the gutter's integrity and conveyance is compromised, by separation or settling, standing water and ponding will occur. The preliminary engineer's estimated cost for the replacement of all two-foot concrete curb and gutter on Collins Avenue is $1,196,449.

The existing sidewalks on the east and west sides of Collins Avenue have, over time, developed notable signs of deterioration. Cracks, settling and separation to the existing sidewalks can, without proper maintenance, become hazards to the general public. The preliminary engineer's estimated cost for concrete sidewalk improvements on Collins Avenue is $2,159,305. The preliminary engineer's estimated cost for replacing the existing *Blue Twilight* treatment sidewalks in kind is $2,837,329.

FDOT has recently completed a milling and resurfacing project for the entire 0.35 miles of road surface on 96th Street (SR 922) from the Kane Concourse Bridge at Indian Creek east to Collins Avenue. The jurisdictional boundary between the Bal Harbour Village and the Town of Surfside is located in the center of the road right-of-way. Due to limited funding sidewalks, driveway entrance aprons, valley gutters and curb and gutters were not part of the project scope. A uniformly sloped curb and gutter system will distribute runoff efficiently from the road to the drainage inlet. Once the gutter's integrity and conveyance is compromised, by separation or settling, standing water and ponding will occur. The preliminary engineer's estimated cost for the replacement of all two-foot concrete curb and gutter on 96th Street is $237,076.

The existing sidewalks on the north side of 96th Street have, over time, developed notable signs of deterioration. Cracks, settling and separation to the existing sidewalks can, without proper maintenance, become hazards to the general public. The preliminary engineer's estimated cost for concrete sidewalk improvements on 96th Street is $677,714. The preliminary engineer's estimated cost for replacing the existing *Blue Twilight* treatment sidewalks in kind is $900,626.

Exhibit G-8 *Utility Zone Description* indicates the current and future status of all water, sanitary sewer, stormwater, and on-site and off-site roadway improvements within the entire Village. Areas of the Village are divided into zones and a detailed description is included, in database form, for each utility principle. Each zone of the Village has either benefitted from recent utility infrastructure projects or will benefit from proposed utility projects outlined in this Utility Master Plan. As indicated in Exhibit G-6 (2014 Master Plan Utility Projects), all utility improvements are anticipated to be designed, permitted and constructed in Fiscal Year 2016.

MISCELLANEOUS SUMMARY

Village Lighting Enhancements

The existing Village street lighting infrastructure, within the residential area, was installed in the early 1980's. Exhibit M-1 indicates the existing street light locations serving the residential neighborhood. Currently, there are ninety existing concrete light poles spaced at 200-foot intervals. Due to the growth of landscaping over the last thirty years a majority of the light fixtures have become obstructed and are no longer effective in providing proper illuminance.

Landscaping diminishes the light source at night and creates dead zones, or blacked out areas, on the road surface.

The current conditions of the Village street light system are indicated in the photographs found in Exhibit M-5. Stress cracks and damage from wind, rain, saltwater, and vehicles have been found on many of the existing concrete poles. Repair patches were evident on a number of light poles. It was also observed that the integrity of the foundations of several poles has been compromised; causing the poles to lean. If not properly maintained this will eventually lead to a public hazard. Difficulty in accessing replacement parts for a thirty year old system is another reason for installing a new street light system.

The importance of a lighting system that meets the Village's needs is dependent on selecting an effective photometric design that minimizes long term operating expenses. System designs that meet the necessary requirements with the fewest luminaires and lower total input power can reduce initial and future operating costs. Other factors to consider include the selection of a proper light source and luminaire option, availability, spectral power distribution and the life of the system.

The total estimated preliminary cost for the street lighting improvements within the residential area of the Village is $3,030,558. The work required for the lighting improvements includes removal of existing poles and pullboxes, the installation of 270 new 150-watt sixteen foot high single light fixture post assemblies staggered along all residential roadways and 60 new 150-watt sixteen foot high twin light fixture post assemblies at all road intersections. This work includes the light pole, footer, pull box, inline fusing, grounding and wiring, fixture head and bulb, and GFI receptacle. Construction also includes six service entrance structures with combination SED, lighting contactors, service from FPL transformers, photocells, posts and unistruts, 50 additional precast concrete pull boxes and 42,300 linear feet of wiring, with grounds, serviced in 2-inch conduits.

Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-3) for preliminary design costs associated with roadway lighting improvements.

Collins Avenue and 96th Street Roadway/Pedestrian Lighting Improvements

The existing street lighting infrastructure on both Collins Avenue and 96th Street was installed in the early 1980's. Due to the growth of landscaping over the last thirty years a majority of the light fixtures have become obstructed and are no longer effective in providing proper illuminance. Landscaping diminishes the light source at night and creates dead zones, or blacked out areas, on the road surface.

The current conditions of the Collins Avenue and 96th Street roadway lighting system are indicated in the photographs found in Exhibits M-11 and M-12. Several existing light poles along both roadways require repair due to damaged poles or bases. At the time of site inspections for the Master Plan a street light assembly that had been located in front of *The Palace,* on the east side of Collins Avenue, had been removed (refer to photo 17 Exhibit M-11). With the removal of this pole street illuminance in this area has been affected due to the increased distance between lights. Difficulty in accessing replacement parts for a thirty year old system is another reason for installing a new street light system.

The Proposed Roadway/Pedestrian Light Pole System Map (Exhibit M-3 for Collins Avenue and M-4 for 96th Street) indicates the preliminary locations of proposed post assemblies. The ornamental street light pole would also be equipped with a pedestrian light, facing the opposite side of the street at a lower grade. The fixed street lighting is designed to provide sufficient light levels; uniformity and target contrast according to the type of roadway and accommodate visual needs for both drivers and pedestrians. Others factors to take into consideration is to minimize glare (direct and reflected), light pollution, and to increase energy efficiency, visibility and security.

The total estimated preliminary cost for the street lighting improvements within the Collins Avenue right-of-way is $2,372,667. The work required for the lighting improvements includes removal of existing poles and pullboxes, the installation of 96 new 150-watt thirty foot high post assemblies staggered on the east and west side of Collins Avenue. This work includes the light pole, footer, pull box, inline fusing, grounding and wiring, fixture heads and bulbs for both the street and pedestrian side, and GFI receptacle. Construction also includes four service entrance structures with combination SED, lighting contactors, service from FPL transformers, photocells, posts and unistruts, 26 additional precast concrete pull boxes and 21,300 linear feet of wiring, with grounds, serviced in 2-inch conduits. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-6) for preliminary design costs associated with the Collins Avenue roadway/pedestrian lighting improvements.

The total estimated preliminary cost for the street lighting improvements within the 96th Street right-of-way is $525,564. The work required for the lighting improvements includes removal of existing poles and pullboxes, the installation of 20 new 150-watt thirty foot high post assemblies on the north side of 96th Street. This work includes the light pole, footer, pull box, inline fusing, grounding and wiring, fixture heads and bulbs for both the street and pedestrian side, and GFI receptacle. Construction also includes four service entrance structures with combination SED, lighting contactors, service from FPL transformers, photocells, posts and unistruts, 12 additional precast concrete pull boxes and 4,400 linear feet of wiring, with grounds, serviced in 2-inch conduits. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-7) for preliminary design costs associated with the 96th Street roadway/pedestrian lighting improvements.

Collins Avenue and 96th Street Landscaping Enhancements

Additional miscellaneous improvements within the Village include landscaping beautification projects on Collins Avenue and 96th Street. The road surface infrastructure for Collins Avenue (SR A1A) and 96th Street (SR 922) are owned, operated and maintained by the Florida Department of Transportation (FDOT) however, the Village maintains the landscaping irrigation and lighting features within the DOT's right-of-way.

With the continuing presence of drought conditions and water conservation xeriscaping has become a common practice. Xeriscaping allows the creation of aesthetically pleasing landscapes with minimal consumption of dwindling water resources. Using drought-tolerant plants can significantly reduce water bills, and avoid the cost of expensive engineered irrigation systems. Xeriscaping is different from natural landscaping because the emphasis is on selection of plants for water conservation rather than on selecting native plants.

Xeriscaping also uses the concept of zoning, in which plants with similar water needs are grouped together in specific zones. Landscape areas should be laid out in a smaller but highly visible area where regular irrigation is provided, but with other broad areas requiring little maintenance or watering. If landscapes are designed using plants with water requirements corresponding to typical local rainfall patterns, significantly less water will be needed for irrigation.

The total estimated preliminary cost for the landscape improvements within the right-of-ways of Collins Avenue and 96th Street is $1,501,502. The work required for the landscaping improvements includes preparation of a soil layer, the planting of various species including trees and low-lying shrubs the installation of tree guards, mulch and sod and the construction of a temporary nursery during construction. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-4) for preliminary design costs associated with landscape improvements.

Collins Avenue and 96th Street Irrigation and Accent Lighting Enhancements

Irrigation Improvements

With the installation of landscaping features within the Collins Avenue and 96th Street corridors, the existing irrigation system requires upgrading. After thirty years since the initial installation, replacement parts for the irrigation system have become more difficult to find, in effect, causing repair costs to rise. Existing irrigation components, such as controllers and valves, are outdated and no longer meet the current code requirements.

New irrigation techniques have been developed that allow for more efficient and effective systems. Certain types of sprinkler heads apply water more efficiently than others. Rotary spray heads deliver water in a thicker stream than mist spray heads, ensuring more water reaches plants and less is lost to evaporation and wind. Drip systems around trees and shrubs use 20-50 percent less water than conventional pop up sprinkler systems and can save up to 30,000 gallons of water per year.

Rain sensors or shutoff devices and programmable controllers can conserve up to forty percent water consumption with proper design, maintenance and management of automatic irrigation systems. Micro–irrigation or drip systems are generally more efficient than conventional sprinklers, because they deliver low volumes of water directly to plants' roots, minimizing losses to wind, runoff, evaporation, or overspray.

Accent Lighting Improvements

With the installation of landscaping features within the Collins Avenue and 96th Street corridors, the existing accent lighting requires upgrading. After thirty years

since the initial installation, replacement parts for the landscape lighting have become more difficult to find, in effect, causing repair costs to rise. Existing lighting components, such as transformers and light fixtures, are outdated and no longer meet the current code requirements.

Current lighting regulations and technologies have been developed that allow for more efficient and effective systems. Energy efficient LED or solar lighting, digital sensors are methods that conserve energy and costs. Techniques such as up-lighting, moonlighting, silhouetting, shadowing and grazing can add aesthetic effects at lower costs and electricity.

The total estimated preliminary cost for the landscape irrigation and accent lighting improvements within the right-of-ways of Collins Avenue and 96th Street is $1,000,666. The work required includes sleeves, heads, valves, pumps, controllers, meters and electrical for irrigation and sleeves, LED lights and fixtures, transformers and electrical for accent landscape lighting. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-5) for preliminary design costs associated with landscape improvements.

PROJECT MILESTONES AND SCHEDULES

The estimated project milestones for the BHV utility improvements within the Village includes ten months for design and permitting (water, sewer, roadway and stormwater), twenty six months for construction and two months for project closeouts and certifications. The 12-inch water main project on Collins Avenue has already been designed, permitted and the majority of the construction completed prior to the end of 2013.

Bal Harbour Village recognizes the priority to enhance its aging utility infrastructure and is taking the appropriate steps to insure the safety and welfare of its citizens by providing a cohesive utility program that includes an enhanced utility level of service. Refer to Exhibits G-5, G-6 and G-7 for Utility Improvement

Project Tables for fiscal years 2014 and 2016 and a complete list of Utility Master Plan Projects.

RECOMMENDATIONS AND CONCLUSIONS

The following recommendations and conclusions were prepared for the Village's consideration regarding water, sanitary sewer, stormwater, and roadway improvements:

- The Utility Master Plan evaluation has determined that the existing sanitary sewer system within the Village's residential area is sub-standard and has exceeded its life expectancy. Craig A. Smith & Associates recommends a complete and total replacement of the aging sanitary sewer system as outlined in this Utility Master Plan. The sanitary sewer improvements, including the replacement of each sanitary lateral within the road right-of-way limits, should be accomplished prior to any proposed surface rehabilitation.

- With recent failures to the existing water main system within the residential neighborhood, coupled with the recommendation to perform a wholesale replacement of the sanitary sewer system, CAS recommends the replacement of the water main system within the Village's residential area prior to any proposed surface rehabilitation. The construction of a new sanitary sewer system, installed at the required slope and depth, will make it difficult to protect the aging water main infrastructure within the residential area. The installation of a new water main system, and the relocation of all water meters to an accessible location in the front of the residential properties, would be economically advisable from the standpoint that the existing road will already be disturbed by the installation of the sewer system.

- The construction of a new sanitary sewer and water main system within the Village's residential area would greatly impact the existing asphalt roadway and concrete curb and gutter (Miami curb). CAS recommends that if the Village implements the installation of utilities within the residential neighborhood's existing roadway limits, then the construction of a new roadway and concrete valley gutter would be required since the integrity of the roadway during construction would be compromised. The new roadway and gutter system would allow the stormwater components to continue to function properly.

- CAS recommends that, except for the Yacht Basin pump station and outfall, a complete drainage stormwater system be constructed. The drainage improvements will correct current deficiencies in the stormwater infrastructure and allow the road and gutter to function properly in order to remove surface water from the roads more efficiently. CAS also recommends that the Village utilize the Option A Level of Service for both the roadway and stormwater improvements. It would also be advantageous to construct the stormwater improvements while the road is disturbed by the installation of other necessary utilities.

- As an additional method of counteracting future rising sea levels, CAS recommends that the Village adopt an ordinance to its existing Building Code to establish a uniform elevation for all sea walls within the Village. The sea wall should be at a grade that would protect against both mean normal water levels and the height of waves during extreme weather conditions.

- Since a conventional open cut construction project could not be permitted within the resurfaced roadway of Collins Avenue, CAS recommends that the Village construct a secondary sanitary sewer system on the east side

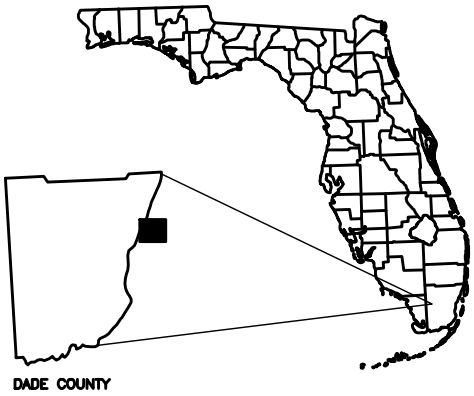
of Collins Avenue to replace the aging sanitary sewer infrastructure. The secondary system will utilize the sanitary system recently installed at the *St. Regis Resort Hotel*, to the south, and the proposed sanitary sewer system to be installed by *Oceana Bal Harbour,* to the north.

- The Village should also investigate the potential for an *Enterprise Fund* to establish a separate stormwater utility fee. A stormwater utility fee is a means of collecting shared revenue that addresses future costs associated with the maintenance or improvements to the Village's stormwater infrastructure. Stormwater fees are generally established on an equivalent residential unit (ERU) basis. Although the collected revenue could not support the costs associated with the stormwater improvements outlined in this report, portions of the monies can however, be applied to debt service that was used for stormwater activities or a permanent utility maintenance program.

- Upon completion of the utility improvements, referred to in this Master Plan, the Village should modify its current Operations and Maintenance manual and Best Management Practices (BMP's) to encompass the newly installed improvements. Periodic inspections and maintenance checks of the existing utilities, verification as to the integrity of all components of the utility systems (i.e. lift stations, structures and pipes, manholes, valves, etc.), along with proper record keeping can only prolong the longevity of the utility systems.

EXHIBIT G–1

LOCATION MAP



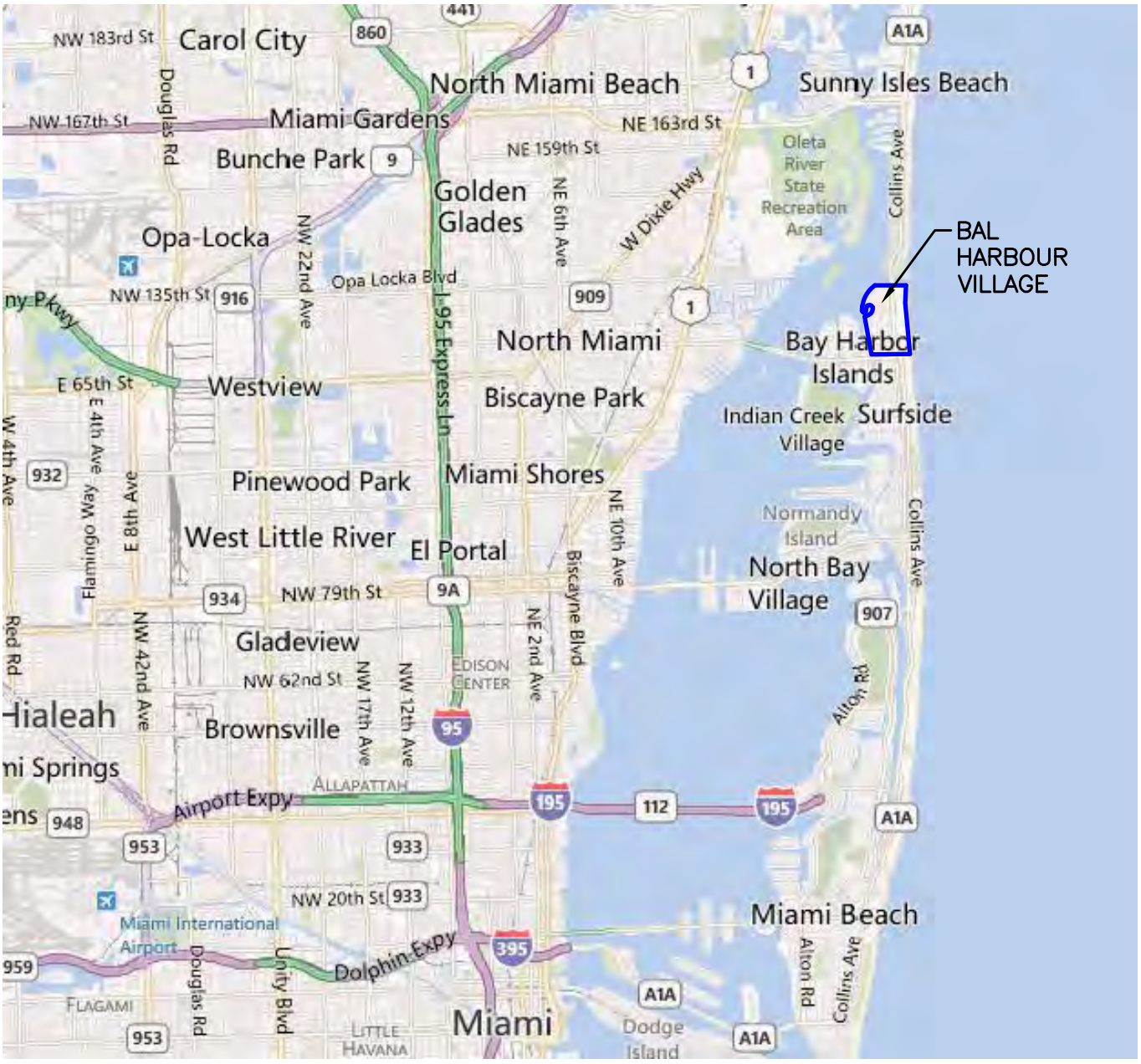


EXHIBIT G–2

VICINITY MAP

N

0 200 400 800
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 400'–0"
11" X 17" SCALE: 1" = 800'–0"

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN

CAS

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EXHIBIT G-3
BAL HARBOUR VILLAGE
WATER REPAIRS PERFORMED
IN VILLAGE (2010 – 2014)

Date	Description	Engineering Fees	Construction Fees	Total Costs
1/27/2014	Oceana Fire Hydrant Emergency Repair	$1,680	$7,381	$9,061
5/20/2013	Harbour Way/Park Drive Emergency Water Main Repair	$1,572	$10,817	$12,389
4/28/2013	Bal Moral Installation of New Fire Hydrant, Valves and Water Main	$4,200	$26,870	$31,070
12/7/2012	Bal Bay Drive Water Main Repair and Valve Replacement	$6,000	$51,410	$57,410
11/30/2012	Park Drive/Camden Drive Fire Hydrant and Valve Replacement	$1,900	$4,992	$6,892
10/9/2012	Park Drive Emergency Water Main Break Repair and Pipe and Valve Replacement	$34,000	$190,494	$224,494
11/3/2010	96th Street Emergency Water Main Repair	$9,845	$8,500	$18,345
TOTAL		**$59,197**	**$300,464**	**$359,661**

EXHIBIT G-4
BAL HARBOUR VILLAGE
SEWER REPAIRS PERFORMED
IN VILLAGE (2005 – 2014)

Date	Description	Engineering Fees	Construction Fees	Total Costs
2/10/2014	34 Bal Bay Drive Emergency Sewer Lateral Repair	$1,344	$19,753	$21,097
5/20/2013	241 Bal Cross Drive Emergency Sewer Lateral Repair	$1,952	$13,585	$15,537
1/13/2012	187 Bal Cross Drive Emergency Sewer Lateral Repair	$500	$7,978	$8,478
9/28/2008	Pump Station No. 2 Emergency Forcemain Repair	$11,855	$13,500	$25,355
8/28/2007	Byron Avenue Forcemain Repairs	$4,500	$9,600	$14,100
7/25/2006	Park Drive Sewer Main Repairs	$4,560	$9,600	$14,160
6/2/2005	Sewer Main Repairs at Sheraton	$4,100	$9,500	$13,600
3/9/2005	Sewer Main Repair at Bal Bay Drive/Yacht Basin	$1,000	$5,500	$6,500
TOTAL		**$29,811**	**$89,016**	**$118,827**

EXHIBIT G-5
BAL HARBOUR VILLAGE
CURRENTLY APPROVED BUDGETED UTILITY INFRASTRUCTURE IMPROVEMENT PROJECTS
(TO BE COMPLETED IN FISCAL YEAR 2013/2014)

Project	Description	Budgeted Amount
Collins Avenue 12" Water Main and Meter Conversion	12-inch Water Main to augment existing main and boost pressures to oceanfront high rises	$1,500,000
Stormwater System Improvements	Install New Check Valves and maintenance work at Stormwater Pump Station	$460,000
Sewer Pump Station Improvements	Instrumentational Upgrades to Master Lift Station (PS2) for Monitoring Purposes	$100,000
96th Street Emergency Water Main Connections	12-inch Water Main Connections to Byron Avenue and Bal Bay Drive Intersections	$350,000

EXHIBIT G-6
BAL HARBOUR VILLAGE
2014 MASTER PLAN UTILITY PROJECTS

Description	Funding Source	Status	Construction Schedule
Collins Avenue - 12" Water Main	Funded in Approved FY 2013 Water Fund Budget	Construction Completed in Dec. 2013	Completed
Collins Avenue - 12" Water Main & Crossing	By Oceana Developer	Developer Construction and Contribution	Completed
Collins Avenue & 96th Street - 12" Water Main	By Bal Harbour Shops Developer	Developer Construction and Contribution	To Be Determined
96th Street Emergency Water Main Connections	Funded in Approved FY 2013 Water Fund Budget	Conceptual Design Completed	To Be Completed in FY 2014
Village Water Mains Design and Permit	Funded in Approved FY 2013 Water Budget	Conceptual and Preliminary Design Completed	To Be Completed in FY 2014
Village Water Meters & Service Lines	Funded in Approved FY 2013 Water Fund Budget	Conceptual and Preliminary Design Completed Final Design and Permitting in FY 2013	To Be Completed in FY 2016
Village Water Mains Construction	To Be Funded in FY 2014 Water Fund Budget	Bidding and Construction in FY 2015	To Be Completed in FY 2016
Collins Avenue - 12" Sewer Main & 18" Crossing	By Oceana Developer	Developer Construction and Contribution	Completed
Village Sewer Mains Design and Permit	Funded in Approved FY 2013 Sewer Fund Budget	Conceptual and Preliminary Design Completed	Final Design To Be Completed in FY 2014
Village Sewer Mains Construction	To Be Funded in FY 2014 Sewer Fund Budget	Bidding and Construction in FY 2015	To Be Completed in FY 2016
Drainage System Design and Permit	Funded in Approved FY 2013 General Budget	Conceptual and Preliminary Design Completed	Final Design To Be Completed in FY 2014
Drainage System Construction	To Be Funded in FY 2014 General Budget	Bidding and Construction in FY 2015	To Be Completed in FY 2016
Gutter and Roadway Design	Funded in Approved FY 2013 Sewer Fund	Conceptual Design Completed	Final Design To Be Completed in FY 2014
New Replacement – Valley Gutter Construction	To Be Funded in FY 2014 Sewer Fund	Conceptual Design Completed	To Be Completed in FY 2016
New Replacement - Roadway Paving Construction	To Be Funded in FY 2014 Sewer Fund	Conceptual Design Completed	To Be Completed in FY 2016
Collins Avenue – Sanitary Sewer Secondary Improvements	To Be Funded in FY 2016 Sewer Fund	Conceptual Design Completed	To Be Completed in FY 2018

EXHIBIT G-7
BAL HARBOUR VILLAGE
FUTURE RECOMMENDED UTILITY INFRASTRUCTURE IMPROVEMENT PROJECTS

Project	Total Preliminary Cost Estimate
Village Water Distribution Improvements	$4,163,781
VIllage Water/ Irrigation Meter Replacements	$1,554,966
Village Sanitary Sewer Collection System Improvements	$4,321,026
Collins Avenue Sanitary Sewer Secondary Collection System Improvements	$1,498,100
Village Stormwater Sewer Collection System Improvements	$6,721,430
Village Roadway Concrete Valley Gutter	$2,123,610
Village Roadway Reconstruction	$5,628,934
Collins Avenue Concrete Curb and Gutter Replacement	$1,196,449
Collins Avenue Concrete Sidewalk Replacement	$2,159,305
96th Street Concrete Curb and Gutter Replacement	$237,076
96th Street Concrete Sidewalk Replacement	$677,714
TOTAL COST OF FUTURE PROPOSED UTILITY INFRASTRUCTURE PROJECTS	**$30,282,391**
Village Roadway Lighting Improvements	$3,030,558
Collins Avenue and 96th Street Roadway/Pedestrian Lighting Improvements	$2,898,231
Collins Avenue and 96th Street Landscaping Improvements	$1,501,502
Collins Avenue and 96th Street Irrigation and Accent Landscape Lighting Improvements	$1,000,666
TOTAL COST OF FUTURE PROPOSED MISCELLANEOUS ENHANCEMENT PROJECTS	**$8,430,957**

INTRACOASTAL WATERWAY
(INDIAN CREEK)

INTRACOASTAL WATERWAY
(INDIAN CREEK)

INTRACOASTAL WATERWAY
(INDIAN CREEK)

YACHT BASIN

BAL BAY DRIVE

BAL BAY COURT

HARBOUR WAY

BISCAY DRIVE

CAMDEN DRIVE

CAMDEN COURT

BALFOUR DRIVE

BAL CROSS DRIVE

PARK DRIVE

HARDING AVENUE

COLLINS AVENUE (A-1-A)

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 9

BLOCK 10

BLOCK 11

A

B

C

D

E

F

G

H

I

1 MAJESTIC

2 ST. REGIS RESORT

3 ST. REGIS RESORT

4 ST. REGIS RESORT

5 BAL MORAL

6 BAL MORAL

7 SEAVIEW HOTEL

8 SEAVIEW HOTEL

9 BAL HARBOUR TOWER

10 BAL HARBOUR TOWER

11 THE PALACE

12 BAL HARBOUR 101

13 TIFFANY

14 PLAZA OF BAL HARBOUR

15 OCEANA BAL HARBOUR

16 KENILWORTH CONDOS

17 BELINNI

18 CARLTON TERRACE

19 HARBOUR HOUSE

20 HARBOUR HOUSE

21 ONE BAL HARBOUR

EXHIBIT G-8

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE MAP

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BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE DESCRIPTION
EXHIBIT G-8

ZONE	WATER	SEWER	DRAINAGE	ROADWAYS
A	A NEW WATER MAIN SYSTEM HAS BEEN DESIGNED AND PERMITTED AND WILL BE INSTALLED AT THE SAME TIME AS THE SECONDARY SANITARY SEWER SYSTEM. THIS 12-INCH WATER MAIN WILL BOOST EXISTING PRESSURES AND FLOWS TO HIGH RISES ON THE EAST SIDE OF COLLINS AVENUE. THE VILLAGE HAS AN ONGOING PLAN TO UPGRADE ALL EXISTING DOMESTIC WATER METERS AND, IF NEEDED, FIRE HYDRANTS FOR THE OCEANFRONT HIGH RISES. WATER MAIN IMPROVEMENTS WERE INSTALLED AT 1 BAL HARBOUR AT THE TIME OF ITS DEVELOPMENT. NEW WATER MAIN AND FIRE HYDRANT IMPROVEMENTS FOR THE OCEANA WILL BE INSTALLED BY THE DEVELOPER FOR THE LENGTH OF ITS FRONTAGE PROPERTY. ALL MAINS ON THE SERVICE SIDE OF THE METERS ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	A NEW SECONDARY SANITARY SEWER COLLECTION SYSTEM WITHIN RIGHT-OF-WAY IS INCLUDED IN THE UTILITY MASTER PLAN AND WILL BE INSTALLED AT THE SAME TIME AS THE WATER MAIN. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ALL EXISTING SEWER CONNECTIONS WILL BE CONVERTED TO THE NEW MAIN AT THE TIME OF CONSTRUCTION. A PRIVATE FORCE MAIN AND LIFT STATION WERE INSTALLED AT 1 BAL HARBOUR BY DEVELOPER ALONG THE LENGTH OF ITS FRONTAGE PROPERTY. A NEW SANITARY SEWER SYSTEM FOR THE OCEANA WILL BE INSTALLED BY THE DEVELOPER ALONG THE LENGTH OF ITS FRONTAGE PROPERTY. ALL SEWER MAINS OUTSIDE R.O.W ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL STORMWATER IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY FDOT. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT AS PART OF THE UTILITY MASTER PLAN. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED.	ALL ROADWAY AND CURB IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. FDOT HAS RECENTLY COMPLETED AN ASPHALT OVERLAY PROJECT FOR THE ENTIRE COLLINS AVENUE ROADWAY WITHIN BAL HARBOUR. NEW SIDEWALKS, CURB AND GUTTERS, AND DRIVEWAY APRON IMPROVEMENTS FOR THE EAST, WEST AND CENTER MEDIAN OF COLLINS AVENUE ARE INCLUDED IN THE UTILITY MASTER PLAN. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT. ALL DRIVES, CURBS, SIDEWALKS AND PARKING AREAS OUTSIDE R.OW. ARE PRIVATELY OWNED AND MAINTAINED.
B	A NEW 12-INCH WATER MAIN WAS INSTALLED ON THE EAST SIDE OF COLLINS AVENUE, IN 2013, TO BOOST EXISTING PRESSURES AND FLOWS TO HIGH RISES. THE VILLAGE HAS AN ONGOING PLAN TO UPGRADE ALL EXISTING DOMESTIC WATER METERS AND, IF NEEDED, FIRE HYDRANTS FOR THE OCEANFRONT HIGH RISES. ALL MAINS ON THE SERVICE SIDE OF THE METERS ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	A NEW SECONDARY SANITARY SEWER COLLECTION SYSTEM IS INCLUDED IN THE UTILITY MASTER PLAN WITH DISCHARGE TO THE EXISTING SANITARY LIFT STATION ON COLLINS AVENUE AND 96TH STREET. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ALL EXISTING SEWER CONNECTIONS WILL BE CONVERTED TO THE NEW MAIN AT THE TIME OF CONSTRUCTION. ALL SEWER MAINS OUTSIDE R.O.W ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL STORMWATER IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY FDOT. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT AS PART OF THE UTILITY MASTER PLAN. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED.	ALL ROADWAY AND CURB IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. FDOT HAS RECENTLY COMPLETED AN ASPHALT OVERLAY PROJECT FOR THE ENTIRE COLLINS AVENUE ROADWAY WITHIN BAL HARBOUR. NEW SIDEWALKS, CURB AND GUTTERS, AND DRIVEWAY APRON IMPROVEMENTS FOR THE EAST, WEST AND CENTER MEDIAN OF COLLINS AVENUE ARE INCLUDED IN THE UTILITY MASTER PLAN. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT. ALL DRIVES, CURBS, SIDEWALKS AND PARKING AREAS OUTSIDE R.OW. ARE PRIVATELY OWNED AND MAINTAINED.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE DESCRIPTION
EXHIBIT G-8

ZONE	WATER	SEWER	DRAINAGE	ROADWAYS
C	A NEW 12-INCH WATER MAIN WAS INSTALLED IN 2013 TO BOOST EXISTING PRESSURES AND FLOWS TO HIGH RISES ON THE EAST SIDE OF COLLINS AVENUE. THE VILLAGE HAS AN ONGOING PLAN TO UPGRADE ALL EXISTING DOMESTIC WATER METERS AND, IF NEEDED, FIRE HYDRANTS FOR THE OCEANFRONT HIGH RISES. ST. REGIS DEVELOPERS INSTALLED A NEW 12-INCH WATER MAIN AND HYDRANTS ALONG THE LENGTH OF ITS FRONTAGE PROPERTY IN 2012. ALL MAINS ON THE SERVICE SIDE OF THE METERS ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	A NEW SECONDARY SANITARY SEWER COLLECTION SYSTEM IS INCLUDED IN THE UTILITY MASTER PLAN WITH DISCHARGE TO THE EXISTING MASTER LIFT STATION ON COLLINS AVENUE AND 96TH STREET. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ALL EXISTING SEWER CONNECTIONS WILL BE CONVERTED TO THE NEW MAIN AT THE TIME OF CONSTRUCTION. ST. REGIS DEVELOPERS INSTALLED A NEW SANITARY SEWER MAIN AND MANHOLES FOR THE LENGTH OF ITS PROPERTY IN 2012. ALL SEWER MAINS OUTSIDE R.O.W ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL STORMWATER IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY FDOT. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT AS PART OF THE UTILITY MASTER PLAN. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED.	ALL ROADWAY AND CURB IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE AND 96TH STREET ARE OWNED AND MAINTAINED BY THE FLORIDA DEPT. OF TRANSPORTATION. FDOT HAS RECENTLY COMPLETED AN ASPHALT OVERLAY PROJECT FOR THE ENTIRE COLLINS AVENUE AND 96TH STREET ROADWAY WITHIN BAL HARBOUR. NEW SIDEWALKS, CURB AND GUTTERS, AND DRIVEWAY APRON IMPROVEMENTS FOR THE EAST, WEST AND CENTER MEDIAN OF COLLINS AVENUE AND THE NORTH AND CENTER MEDIAN OF 96TH STREET ARE INCLUDED IN THE UTILITY MASTER PLAN. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT. ALL DRIVES, CURBS, SIDEWALKS AND PARKING AREAS OUTSIDE R.OW. ARE PRIVATELY OWNED AND MAINTAINED.
D	EXISTING DOMESTIC WATER AND FIRE PROTECTION FOR THE BAL HARBOUR SHOPS AND THE CHURCH BY THE SEA ARE FED PRIMARILY FROM WATER MAINS LOCATED ON 96TH STREET AND COLLINS AVENUE. UPGRADES TO TWO DOMESTIC AND TWO FIRE LINE CONNECTIONS FOR THE SHOPS (LOCATED ON PARK DRIVE) ARE INCLUDED IN THE UTILITY MASTER PLAN. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ALL EXISTING WATER CONNECTIONS WILL BE CONVERTED TO THE NEW MAIN AT THE TIME OF CONSTRUCTION. FUTURE UPGRADES TO THE SHOPS WILL INCLUDE A NEW WATER MAIN SYSTEM, INCLUDING FIRE HYDRANTS, ON 96TH STREET AND COLLINS AVENUE OVER THE LENGTH OF THE SHOPS FRONTAGE PROPERTY. ANY WATER MAINS, SERVICES, FIRE HYDRANTS OR BACK PREVENTORS LOCATED OUTSIDE THE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. WATER SERVICE FOR THE VILLAGE HALL IS PROVIDED FROM MAINS WITHIN THE RESIDENTIAL AREA. THE CURRENT SERVICE WILL BE UPGRADED AS PART OF THE UTILITY MASTER PLAN.	SANITARY SEWER FOR THE BAL HARBOUR SHOPS, THE CHURCH BY THE SEA AND VILLAGE HALL ARE COLLECTED AND DISCHARGED, VIA A PRIVATE LIFT STATION OR SANITARY GRAVITY SYSTEM, AT THREE POINTS OF CONNECTION WITHIN VILLAGE'S SANITARY SEWER SYSTEM ON PARK DRIVE AND BAL BAY DRIVE. AS INDICATED IN THE UTILITY MASTER PLAN, THE NEW SANITARY SEWER SYSTEM ON PARK DRIVE AND BAL BAY DRIVE WILL PROVIDE SEWER CONNECTIONS FOR THE SHOPS, THE CHURCH BY THE SEA AND VILLAGE HALL. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ALL EXISTING SEWER CONNECTIONS WILL BE CONVERTED TO THE NEW MAIN AT THE TIME OF CONSTRUCTION. ANY SANITARY SEWER MAINS, LATERALS OR LIFT STATIONS LOCATED OUTSIDE THE VILLAGE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED.	ALL STORMWATER IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE AND 96TH STREET ARE OWNED AND MAINTAINED BY FDOT. ANY EXISTING PONDING WITHIN THE R.O.W. AT HIGH RISE ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT AS PART OF THE UTILITY MASTER PLAN. ALL DRAINAGE SYSTEMS WITHIN THE CHURCH OR SHOPS PROPERTY ARE PRIVATELY OWNED AND MAINTAINED.	ALL ROADWAY AND CURB IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE AND 96TH STREET ARE OWNED AND MAINTAINED BY THE FLORIDA DEPT. OF TRANSPORTATION. FDOT HAS RECENTLY COMPLETED AN ASPHALT OVERLAY PROJECT FOR THE ENTIRE COLLINS AVENUE AND 96TH STREET ROADWAY WITHIN BAL HARBOUR. NEW SIDEWALKS, CURB AND GUTTERS, AND DRIVEWAY APRON IMPROVEMENTS FOR THE EAST, WEST AND CENTER MEDIAN OF COLLINS AVENUE AND THE NORTH AND CENTER MEDIAN OF 96TH STREET ARE INCLUDED IN THE UTILITY MASTER PLAN. ANY EXISTING PONDING WITHIN THE R.O.W. AT THE SHOPS OR CHURCH ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT. ALL DRIVES, CURBS, SIDEWALKS AND PARKING AREAS OUTSIDE R.OW. ARE PRIVATELY OWNED AND MAINTAINED.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE DESCRIPTION
EXHIBIT G-8

ZONE	WATER	SEWER	DRAINAGE	ROADWAYS
E	EXISTING FIRE PROTECTION FOR THE LOW-RISE MULTI-FAMILY UNITS ON THE WEST SIDE OF COLLINS AVENUE IS CURRENTLY PROVIDED BY AN EXISTING 12-INCH WATER MAIN, WITH FIRE HYDRANTS, ON THE WEST SIDE OF COLLINS AVENUE. DOMESTIC WATER, IRRIGATION AND INTERIOR FIRE PROTECTION (SPRINKLERS) IS CURRENTLY PROVIDED BY AN EXISTING 6-INCH WATER MAIN LOCATED IN THE RESIDENTIAL AREA ON PARK DRIVE. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING WATER MAINS AND SERVICES, FOR EACH MULTI-FAMILY PROPERTY, OVER TO A NEW 12-INCH WATER MAIN AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ANY WATER OR IRRIGATION MAINS, SERVICES, VALVES OR HYDRANTS LOCATED OUTSIDE THE VILLAGE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	EXISTING SANITARY SEWER CONNECTIONS TO LOW-RISE MULTI-FAMILY PROPERTIES ON THE WEST SIDE OF COLLINS AVENUE ARE PROVIDED BY SANITARY LATERALS ON THE WEST SIDE OF THE PROPERTY WITH CONNECTION TO THE EXISTING SANITARY SEWER SYSTEM WITHIN THE RESIDENTIAL AREA ON PARK DRIVE. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING SANITARY SEWER SERVICES, FOR EACH MULTI-FAMILY PROPERTY, OVER TO THE NEW MAINS AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ANY SANITARY SEWER MAINS, LATERALS OR LIFT STATIONS LOCATED OUTSIDE THE VILLAGE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL STORMWATER IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY FDOT. ANY EXISTING PONDING WITHIN THE R.O.W. AT LOW-RISE MULTI-FAMILY ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT AS PART OF THE UTILITY MASTER PLAN. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. AS PART OF THE UTILITY MASTER PLAN, PROPERTIES ON THE WEST SIDE OF COLLINS AVENUE WILL BE PROVIDED THE OPPORTUNITY TO CONNECT TO THE PROPOSED STORMWATER SYSTEM WITHIN THE RESIDENTIAL AREA ON PARK DRIVE. A CONTROL STRUCTURE WILL BE INSTALLED ON THE WEST SIDE OF THE WALL ADJACENT TO THE LINEAR PARK FOR EACH OF THE LOW-RISE PROPERTIES. A DRAINAGE PIPE WILL CONNECT THE STRUCTURE TO THE NEW DRAINAGE SYSTEM TO PROVIDE RUNOFF RELIEF FOR EACH PROPERTY. THE CONTROL STRUCTURE WILL ENSURE THAT EACH PROPERTY RETAINS 1-INCH OF PRE-TREATMENT PRIOR TO DISCHARGE. IT IS THE RESPONSIBILITY OF EACH PROPERTY OWNER TO INSTALL THE NECESSARY IMPROVEMENTS TO MAKE THE CONNECTION TO THE STRUCTURE. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW DRAINAGE SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL ROADWAY AND CURB IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. FDOT HAS RECENTLY COMPLETED AN ASPHALT OVERLAY PROJECT FOR THE ENTIRE COLLINS AVENUE WITHIN BAL HARBOUR. NEW SIDEWALKS, CURB AND GUTTERS, AND DRIVEWAY APRON IMPROVEMENTS FOR THE EAST, WEST AND CENTER MEDIAN OF COLLINS AVENUE ARE INCLUDED IN THE UTILITY MASTER PLAN. ANY EXISTING PONDING WITHIN THE R.O.W. AT LOW-RISE MULTI-FAMILY ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT. ALL DRIVES, CURBS, SIDEWALKS AND PARKING AREAS OUTSIDE R.OW. ARE PRIVATELY OWNED AND MAINTAINED.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE DESCRIPTION
EXHIBIT G-8

ZONE	WATER	SEWER	DRAINAGE	ROADWAYS
F	EXISTING FIRE PROTECTION FOR THE LOW-RISE MULTI-FAMILY UNITS ON THE WEST SIDE OF COLLINS AVENUE IS CURRENTLY PROVIDED BY AN EXISTING 12-INCH WATER MAIN, WITH FIRE HYDRANTS, ON THE WEST SIDE OF COLLINS AVENUE. DOMESTIC WATER, IRRIGATION AND INTERIOR FIRE PROTECTION (SPRINKLERS) IS CURRENTLY PROVIDED BY AN EXISTING 6-INCH WATER MAIN LOCATED IN THE RESIDENTIAL AREA ON PARK DRIVE. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING WATER MAINS AND SERVICES, FOR EACH MULTI-FAMILY PROPERTY, OVER TO A NEW 12-INCH WATER MAIN AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ANY WATER OR IRRIGATION MAINS, SERVICES, VALVES OR HYDRANTS LOCATED OUTSIDE THE VILLAGE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	EXISTING SANITARY SEWER CONNECTIONS TO LOW-RISE MULTI-FAMILY PROPERTIES ON THE WEST SIDE OF COLLINS AVENUE ARE PROVIDED BY SANITARY LATERALS ON THE WEST SIDE OF THE PROPERTY WITH CONNECTION TO THE EXISTING SANITARY SEWER SYSTEM WITHIN THE RESIDENTIAL AREA ON PARK DRIVE. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING SANITARY SEWER SERVICES, FOR EACH MULTI-FAMILY PROPERTY, OVER TO THE NEW MAINS AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. ANY SANITARY SEWER MAINS, LATERALS OR LIFT STATIONS LOCATED OUTSIDE THE VILLAGE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL STORMWATER IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY FDOT. ANY EXISTING PONDING WITHIN THE R.O.W. AT LOW-RISE MULTI-FAMILY ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT AS PART OF THE UTILITY MASTER PLAN. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. AS PART OF THE UTILITY MASTER PLAN, PROPERTIES ON THE WEST SIDE OF COLLINS AVENUE WILL BE PROVIDED THE OPPORTUNITY TO CONNECT TO THE PROPOSED STORMWATER SYSTEM WITHIN THE RESIDENTIAL AREA ON PARK DRIVE. A CONTROL STRUCTURE WILL BE INSTALLED ON THE WEST SIDE OF THE WALL ADJACENT TO THE LINEAR PARK FOR EACH OF THE LOW-RISE PROPERTIES. A DRAINAGE PIPE WILL CONNECT THE STRUCTURE TO THE NEW DRAINAGE SYSTEM TO PROVIDE RUNOFF RELIEF FOR EACH PROPERTY. THE CONTROL STRUCTURE WILL ENSURE THAT EACH PROPERTY RETAINS 1-INCH OF PRE-TREATMENT PRIOR TO DISCHARGE. IT IS THE RESPONSIBILITY OF EACH PROPERTY OWNER TO INSTALL THE NECESSARY IMPROVEMENTS TO MAKE THE CONNECTION TO THE STRUCTURE. ALL DRAINAGE SYSTEMS OUTSIDE R.O.W. ARE PRIVATELY OWNED AND MAINTAINED. THE LIFE EXPECTANCY OF THE NEW DRAINAGE SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	ALL ROADWAY AND CURB IMPROVEMENTS WITHIN THE RIGHT-OF-WAY OF COLLINS AVENUE ARE OWNED AND MAINTAINED BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. FDOT HAS RECENTLY COMPLETED AN ASPHALT OVERLAY PROJECT FOR THE ENTIRE COLLINS AVENUE WITHIN BAL HARBOUR. NEW SIDEWALKS, CURB AND GUTTERS, AND DRIVEWAY APRON IMPROVEMENTS FOR THE EAST, WEST AND CENTER MEDIAN OF COLLINS AVENUE ARE INCLUDED IN THE UTILITY MASTER PLAN. ANY EXISTING PONDING WITHIN THE R.O.W. AT LOW-RISE MULTI-FAMILY ENTRANCES WILL BE ADDRESSED DURING CURB AND GUTTER REPLACEMENT. ALL DRIVES, CURBS, SIDEWALKS AND PARKING AREAS OUTSIDE R.OW. ARE PRIVATELY OWNED AND MAINTAINED.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE DESCRIPTION
EXHIBIT G-8

ZONE	WATER	SEWER	DRAINAGE	ROADWAYS
G	NEW WATER MAINS, VALVES, FIRE HYDRANTS, DOMESTIC AND IRRIGATION SERVICES AND METERS WITHIN VILLAGE RIGHT-OF-WAY OR EASEMENT ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. THIS INCLUDES THE RELOCATION OF EXISTING WATER AND IRRIGATION METERS FROM THE REAR OF THE RESIDENTIAL LOTS TO THE FRONT OF THE LOTS (ADJACENT TO THE ROAD R.O.W.'S). IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. SERVICE LINES ON THE RESIDENTIAL SIDE OF THE METER ARE OWNED AND MAINTAINED BY INDIVIDUAL HOMEOWNERS. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW SANITARY SEWER MAINS, MANHOLES, SEWER LATERALS AND LIFT STATION WITHIN RIGHT-OF-WAY OR EASEMENT ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING SANITARY SEWER SERVICES, FOR EACH SINGLE-FAMILY PROPERTY, OVER TO THE NEW MAINS AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. SANITARY SERVICE LATERALS ON THE RESIDENTIAL SIDE OF THE CLEANOUT (OUTSIDE THE VILLAGE R.O.W.) ARE OWNED AND MAINTAINED BY INDIVIDUAL HOMEOWNERS. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW STORMWATER MAINS, INLETS AND MANHOLES WITHIN THE VILLAGE'S RIGHT-OF-WAYS ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. STORMWATER FOR THE VILLAGE'S NORTH DRAINAGE BASIN WILL BE COLLECTED AND DISCHARGED INTO THE INTRACOASTAL VIA AN EXISTING STORMWATER PUMPING STATION AND OUTFALL. PIPE SIZES WILL BE DESIGNED FOR A 10-YEAR STORM EVENT LEVEL OF SERVICE TO TAKE INTO ACCOUNT FUTURE RISING SEA LEVELS. THE LIFE EXPECTANCY OF THE NEW DRAINAGE SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW ROADWAY AND VALLEY GUTTER IMPROVEMENTS FOR THE RESIDENTIAL AREA ARE INCLUDED IN THE UTILITY MASTER PLAN. ROADS WILL BE RECONSTRUCTED AND RAISED BETWEEN FOUR TO SIX-INCHES TO TAKE INTO ACCOUNT FUTURE RISING SEA LEVELS AND TO PROVIDE A HIGHER LEVEL OF SERVICE (LOS) TO PREVENT STANDING WATER ON ROADS UP TO A 10-YEAR STORM EVENT. WORK WILL ALSO INCLUDE HARMONIZATION BETWEEN THE NEW ROAD SURFACE AND EXISTING RESIDENTIAL LOT GRADES AND DRIVEWAYS. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS.
H	NEW WATER MAINS, VALVES, FIRE HYDRANTS, DOMESTIC AND IRRIGATION SERVICES AND METERS WITHIN VILLAGE RIGHT-OF-WAY OR EASEMENT ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. THIS INCLUDES THE RELOCATION OF EXISTING WATER AND IRRIGATION METERS FROM THE REAR OF THE RESIDENTIAL LOTS TO THE FRONT OF THE LOTS (ADJACENT TO THE ROAD R.O.W.'S). IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. SERVICE LINES ON THE RESIDENTIAL SIDE OF THE METER ARE OWNED AND MAINTAINED BY INDIVIDUAL HOMEOWNERS. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW SANITARY SEWER MAINS, MANHOLES, SEWER LATERALS AND LIFT STATION WITHIN RIGHT-OF-WAY OR EASEMENT ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING SANITARY SEWER SERVICES, FOR EACH SINGLE-FAMILY PROPERTY, OVER TO THE NEW MAINS AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. SANITARY SERVICE LATERALS ON THE RESIDENTIAL SIDE OF THE CLEANOUT (OUTSIDE THE VILLAGE R.O.W.) ARE OWNED AND MAINTAINED BY INDIVIDUAL HOMEOWNERS. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW STORMWATER MAINS, INLETS AND MANHOLES WITHIN THE VILLAGE'S RIGHT-OF-WAYS ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. STORMWATER FOR THE VILLAGE'S NORTH DRAINAGE BASIN WILL BE COLLECTED AND DISCHARGED INTO THE INTRACOASTAL VIA AN EXISTING STORMWATER PUMPING STATION AND OUTFALL. PIPE SIZES WILL BE DESIGNED FOR A 10-YEAR STORM EVENT LEVEL OF SERVICE TO TAKE INTO ACCOUNT FUTURE RISING SEA LEVELS. THE LIFE EXPECTANCY OF THE NEW DRAINAGE SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW ROADWAY AND VALLEY GUTTER IMPROVEMENTS FOR THE RESIDENTIAL AREA ARE INCLUDED IN THE UTILITY MASTER PLAN. ROADS WILL BE RECONSTRUCTED AND RAISED BETWEEN FOUR TO SIX-INCHES TO TAKE INTO ACCOUNT FUTURE RISING SEA LEVELS AND TO PROVIDE A HIGHER LEVEL OF SERVICE (LOS) TO PREVENT STANDING WATER ON ROADS UP TO A 10-YEAR STORM EVENT. WORK WILL ALSO INCLUDE HARMONIZATION BETWEEN THE NEW ROAD SURFACE AND EXISTING RESIDENTIAL LOT GRADES AND DRIVEWAYS. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
UTILITY ZONE DESCRIPTION
EXHIBIT G-8

ZONE	WATER	SEWER	DRAINAGE	ROADWAYS
I	NEW WATER MAINS, VALVES, FIRE HYDRANTS, DOMESTIC AND IRRIGATION SERVICES AND METERS WITHIN VILLAGE RIGHT-OF-WAY OR EASEMENT ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. THIS INCLUDES THE RELOCATION OF EXISTING WATER AND IRRIGATION METERS FROM THE REAR OF THE RESIDENTIAL LOTS TO THE FRONT OF THE LOTS (ADJACENT TO THE ROAD R.O.W.'S). IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. SERVICE LINES ON THE RESIDENTIAL SIDE OF THE METER ARE OWNED AND MAINTAINED BY INDIVIDUAL HOMEOWNERS. THE LIFE EXPECTANCY OF THE NEW WATER MAIN SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW SANITARY SEWER MAINS, MANHOLES, SEWER LATERALS AND LIFT STATION WITHIN RIGHT-OF-WAY OR EASEMENT ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. PROVISIONS ARE MADE IN THE UTILITY MASTER PLAN TO CONVERT ALL EXISTING SANITARY SEWER SERVICES, FOR EACH SINGLE-FAMILY PROPERTY (INCLUDING THE VILLAGE PUBLIC WORKS COMPLEX), OVER TO THE NEW MAINS AT THE TIME OF CONSTRUCTION. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. SANITARY SERVICE LATERALS ON THE RESIDENTIAL SIDE OF THE CLEANOUT (OUTSIDE THE VILLAGE R.O.W.) ARE OWNED AND MAINTAINED BY INDIVIDUAL HOMEOWNERS. THE LIFE EXPECTANCY OF THE NEW SANITARY SEWER SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW STORMWATER MAINS, INLETS AND MANHOLES WITHIN THE VILLAGE'S RIGHT-OF-WAYS ARE INCLUDED IN THE UTILITY MASTER PLAN FOR THE RESIDENTIAL AREA. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS. STORMWATER FOR THE VILLAGE'S SOUTH DRAINAGE BASIN WILL BE COLLECTED AND DISCHARGED INTO THE INTRACOASTAL VIA TWO EXISTING OUTFALLS. PIPE SIZES WILL BE DESIGNED FOR A 10-YEAR STORM EVENT LEVEL OF SERVICE TO TAKE INTO ACCOUNT FUTURE RISING SEA LEVELS. THE LIFE EXPECTANCY OF THE NEW DRAINAGE SYSTEM, IF PROPERLY MAINTAINED, IS FIFTY YEARS.	NEW ROADWAY AND VALLEY GUTTER IMPROVEMENTS FOR THE RESIDENTIAL AREA ARE INCLUDED IN THE UTILITY MASTER PLAN. ROADS WILL BE RECONSTRUCTED AND RAISED BETWEEN FOUR TO SIX-INCHES TO TAKE INTO ACCOUNT FUTURE RISING SEA LEVELS AND TO PROVIDE A HIGHER LEVEL OF SERVICE (LOS) TO PREVENT STANDING WATER ON ROADS UP TO A 10-YEAR STORM EVENT. WORK WILL ALSO INCLUDE HARMONIZATION BETWEEN THE NEW ROAD SURFACE AND EXISTING RESIDENTIAL LOT GRADES AND DRIVEWAYS. IMPROVEMENTS TO BE DESIGNED, PERMITTED AND INSTALLED WITHIN THE NEXT TWO YEARS.

BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR
FLORIDA'S PARADISE

SECTION 2

WATER DISTRIBUTION IMPROVEMENTS

EXISTING WATER DISTRIBUTION INFRASTRUCTURE

All water mains servicing customers within the Village is owned, operated and maintained by Bal Harbour Village (BHV). The Village's primary source of water for its domestic and fire protection is purchased from the Miami-Dade Water and Sewer Department (WASD). BHV is considered a "consecutive user" to provide potable water to its customers through a 20-year wholesale water service agreement with WASD.

A secondary source connection is to the City of North Miami Beach, whom the Village relied on for water service until the County expanded its service area. This 16-inch water main is located at the north portion of the Village and is specifically utilized under emergency conditions only.

The Village receives its water supply from WASD's John E. Preston Water Treatment Plant. Finished water from the treatment plant is pumped through a system of water distribution pipelines to a remote series of storage tanks and pumping facilities. BHV is served by a 24-inch diameter water transmission main, installed in 1988, that runs east through Bay Harbour Village and over the Intracoastal Waterway (Indian River). The Village's point of connection is at the WASD's master meter located on the west side of Bal Bay Drive within the Village's park.

In the mid 1960's a secondary source of water was provided by the City of North Miami Beach (CNMB). A 16-inch asbestos concrete water main was installed by CNMB; which runs south over the Haulover Cut, into the Village's residential neighborhood, then south parallel to Park Drive and terminates at the Village Park. For nearly twenty years this distribution main discharged to a water storage tank and re-pump station, located at the present park location, and provided BHV with its only source of water supply. The storage tank was utilized in the Village for fire protection and to overcome the low pressure in the mains.

The storage tank and re-pump station were eventually abandoned and disassembled in the late 1990's. The 16-inch water main is still active and is used by BHV.

The existing water main infrastructure for the Collins Avenue corridor is an existing 12-inch cast iron water main on the west side of the road that serves the domestic potable and fire protection needs of the low-rises and the Bal Harbour Shops and an existing 8-inch cast iron water main on the east side of the road that serves the domestic potable and fire protection needs of the oceanfront high rises. The two mains, installed in 1946, have six interconnects between them and a series of hydrants for fire protection.

An existing 8-inch cast iron water main, located on the north side of 96th Street, is also owned and maintained by BHV. This water main was installed in 1946 and served to complete the Village's initial looped system. A 12-inch cast iron water main was installed for service from the City of Miami Beach and remained the main source of water from 1946 until the mid-1960's.

The existing water main infrastructure for the residential neighborhood was also installed in 1946 and consists of a water main distribution system ranging in size from 4-inch to 6-inch in diameter. The backbone of the existing system includes a 12-inch cast iron water main that runs parallel with the 16-inch ACP water main the length of the Residential Area on Park Drive, that is connected at Collins Avenue, and continues to the Public Works complex, and a 8-inch water main that is connected at 96th Street and runs north on Bal Bay Drive to Harbour Way West.

The other water mains located on the street side of the lots within the residential neighborhood, branch off of the distribution backbone and are 6-inches in size primarily to provide fire flows to the residential neighborhood. Remaining water mains within the residential limits, on properties that are not waterfront, on Bal

Bay Drive, are located in the rear of the lots which interconnect to the street side water mains. These rear lot water mains are 6-inch and 4-inch in diameter and are utilized specifically for potable water. The interior conditions of the existing 60-year old water mains are indicated in Exhibit W-6.

Fire hydrants within the residential neighborhood are properly spaced to provide protection and are located off of the 6-inch street side water mains. Water meters within the residential neighborhood are provided for each individual single-family customer. Water meters for waterfront properties, along Bal Bay Drive, are located on the street side between the water mains and the property line. All other meters within the residential area are located within the rear of the lots. With the development of properties (i.e. pools, decks, landscaping) access to the rear lot water mains and meters for service and reading purposes has made it difficult for the Village Public Work Department to maintain the water system. Currently, there are no backflow prevention devices within the residential neighborhood for domestic water meters. These devices prevent water backflow to the supply side of the main.

Recent water fitting failures within the Village's residential neighborhood has caused "boil water" conditions and disruption in utility usage. Emergency repair work was performed at two locations, at the intersections of Park Drive and Balfour Drive and at Park Drive and Camden Drive, on the water main system. Both instances required extensive nighttime repair and restoration at a cost of $190,000. Water main emergency repair costs performed within the Village from 2010 to 2014 have totaled nearly $360,000. A detailed description of the repairs is listed in Exhibit G-3.

Refer to *Existing Water Distribution System Map* (Exhibit W-1) for the Village's current water main infrastructure and Exhibit W-7 (Photos 1-22) for photographs of recent water main repair work within Bal Harbour Village.

FUTURE WATER DISTRIBUTION INFRASTRUCTURE

The potential future water system improvements for Bal Harbour Village and its residential neighborhood are indicated in Exhibit W-2. The proposed infrastructure will include a distribution backbone with a 16-inch diameter DIP water main installed from a connection point at the northeast section of the residential neighborhood at Collins Avenue, along Park Drive, to the southwest section of the residential neighborhood at a connection to the WASD's water meters on the 24-inch diameter water main at 96th Street and Bal Bay Drive. The remaining segments of the backbone will include two 12-inch diameter DIP water mains. Each water main will extend from connection points on Collins Avenue west to Bal Bay Drive and will be located on Harbour Way East and Harbour Way West. The 16-inch DIP water main will negate the dependency of CNMB's existing 16-inch ACP water main.

Proposed water mains that branch off of the main distribution backbone will be 8-inch DIP water mains that will supply potable drinking water to customers as well as provide fire protection to the area. These secondary mains will extend to the limits of the residential area and will provide a "looped" water main infrastructure. The installation of looped systems will eliminate the possibility of stagnant lines and the increase in the minimum pipe size from 6-inch to 8-inch in diameter will boost existing pressures and flows. Dead end lines such as Camden Court and the roundabout at Bal Bay Court will be served with 6-inch DIP water mains. New fire hydrants will be installed, within the general vicinity of existing hydrants, in order to provide the necessary coverage for fire protection. The proposed water mains will all be located within the limits of all residential roadways.

New water main connections for the *Bal Harbour Shops* will be provided on Park Drive. These connections are located at existing service points for two existing fire lines and two existing domestic water lines that serve the *Shops*. These connections will be provided within the Village's right-of-way. Any existing water

mains, service lines, hydrants or backflow assemblies within the *Shops* is privately owned and maintained. The *Shops* are also supplied with water on the south side (96th Street) and the east side (Collins Avenue) which completes a looped water main system. Future expansion of the *Bal Harbour Shops* will include an upgrade to 96th Street and Collins Avenue water mains, at the expense of the Shop's developer.

The installation of a new water distribution main within the residential area would also provide domestic and fire service to the low-rise multi-family units located on the west side of Collins Avenue. All multi-family properties from *Fairfield Manor* (9800 Collins Avenue) north to *Bay Colony* (290 Bal Bay Drive) are currently provided water service on the west side of their properties on Park Drive. The new connections will be provided within the Village's right-of-way. Any existing water mains, service lines, hydrants or backflow assemblies within the low-rise multi-family properties is privately owned and maintained.

Exhibit G-8 *Utility Zone Description* indicates the current and future status of all water improvements within the entire Village. Areas of the Village are divided into zones and a detailed description is included, in database form, for each utility principle. Each zone of the Village has either benefitted from recent water infrastructure projects or will benefit from proposed water distribution projects outlined in this Utility Master Plan. As indicated in Exhibit G-6 (2014 Master Plan Utility Projects), water improvements are anticipated to be designed, permitted and constructed in Fiscal Year 2016.

Additional water construction improvements would include two emergency water connections to existing water mains on 96th Street. The first emergency connection is located at the *Church by the Sea* and requires completing a connection to an existing 12-inch water main that runs south on Byron Avenue. The second emergency connection is located on the west side of Bal Bay Drive and requires a connection to the City of Miami Beach's existing 12-inch water

main that serves Bay Harbor Islands. These connections would only be utilized in the event of a break to the existing 12-inch water main on 96th Street and are included in the Village's Fiscal Year 2013/2014 Operating Budget (Water Fund Item 40-36-506.302) with a budgeted amount of $350,000. The date of completion for these emergency connections has not been determined. Refer to Exhibit G-6 2014 *Master Plan Utility Projects*.

For the initial phase of construction the water main will be tapped and a water service line will be provided to each property within the residential neighborhood. The water service will be a 2-inch polyethylene service line that will be extended to each property to service both potable water and irrigation. Vacant properties within the residential neighborhood will also receive water services that will be plugged and capped at the property line. This will allow for future connection at the property line and avoid impacting the future roadway improvements.

In the second phase of construction for the water main the Village will provide new domestic and irrigation meters for each water customer. All domestic water meters will be sized in accordance with demand as determined by the Village. The same will apply for irrigation meters. Reduced pressure backflow prevention devices will also be added to both the domestic/ potable and irrigation services. The water meters and appurtenances will be located in the front of the properties in order to allow for easier access for meter reading and for making future repairs and will be equipped with radio automatic meter reading (AMR) technology. Individually the water service lines that currently run from the existing meters in the rear of the properties will be re-routed to the water meters in the front of the properties. The projected estimated costs associated with the water service and meter connection project is $1,554,966. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit W-4) for preliminary design costs associated to the water meter and service improvements and Exhibit W-5 for the WASD's water service backflow preventer detail.

The work required for the future water main improvements would be the installation of approximately 5,005 linear feet of 16" DIP water main, 3,700 linear feet of 12" DIP water main, 200 linear feet of 10" DIP water main, 11,335 linear feet of 8" DIP water main, 1,825 linear feet of 6" DIP water main, 48 fire hydrants and assemblies, 82 gate valves ranging from 6" to 16" in size, 7 connections to existing water mains, and 223 service connections to various properties lying within and in the vicinity of the residential neighborhood.

All proposed water distribution systems would be designed and constructed according to current Federal, State and County standards and specifications including pipe depths of cover, larger pipe diameters to meet current fire flows and demands, and industry accepted pipe materials. The number of proposed gate valves would be increased so that in the event of a future break or disturbance, the water main could be isolated in order to affect the least number of customers. At the time the water infrastructure is installed, the existing water main system will remain operational so that water to residences and businesses would remain in service.

The total preliminary estimated cost for water distribution improvements within the Village's residential neighborhood, which also serves the *Bal Harbour Shops* and the low-rise multi-family units on the west side of Collins Avenue, is $4,163,781. This cost includes all work necessary to complete the installation of a new water distribution system and connections to existing water mains on Collins Avenue and 96th Street. The total preliminary estimated cost for the water service and meter improvements within the residential area is $1,554,966.

The preliminary estimated costs also include the installation of water service taps and service lines for each individual property within the residential neighborhood. The costs associated with the restoration of the existing roadways within the residential neighborhood are not included in the water distribution portion of the work. All roadway costs are defined and detailed in the *Roadway Improvements*

section of this Master Plan. Refer to *Proposed Water Distribution System Map* (Exhibit W-2) and the *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit W-3) for preliminary design layout and costs associated to the improvements.

Future water distribution improvements within BHV will include the continuation of an existing 12-inch water main on the west side of Collins Avenue and the replacement of an existing 12-inch water main on 96th Street, from the southeast corner of the *Bal Harbour Shops* to the WASD's water meters at Bal Bay Drive and 96th Street. This work would include new valving, replacement of existing fire hydrants, and connections to existing mains. The extension and replacement of the existing water mains would help boost existing pressure and increase water flows. Since these water improvements would greatly benefit the current and future expansion of the *Bal Harbour Shops,* the costs and installation of the new 12-inch water main will be borne by the *Bal Harbour Shops* Developer. Refer to Exhibit G-6 titled *2014 Master Plan Utility Projects*.

In order to improve and enhance its drinking water standards, BHV has implemented a plan to upgrade all existing potable water meters for the oceanfront high rise structures along the east side of Collins Avenue in an effort to prevent unaccounted water loss. The new meters are being installed above-ground and include AMR technology.

BHV has recently completed the construction of the majority of a new 12-inch HDPE distribution water main on the east side of Collins Avenue. The project had been designed and permitted for 2,800 linear feet of water main that is intended to augment the existing 8-inch water main that will boost existing pressures and flows to the oceanfront high rises. The initial phase of the project included the installation of 2,450 linear feet of 12-inch HDPE water main, two fire hydrant assemblies and connections to the existing 8-inch water main.

To avoid disturbing the existing surface conditions and utilities within the area, the majority of the installation was performed by directional drilling the pipe to the required depth. The project was completed in December, 2013 below the Village's allocated budget. The remaining 350 linear feet of 12-inch HDPE water main will be installed at the same time the secondary sanitary sewer main is installed on the east side of Collins Avenue.

As older beachfront structures in Bal Harbour are razed and reconstructed, it will be the individual Developer's responsibility to install the infrastructure improvements in order to handle the future potable water and fire protection demands of re-development. As part of their Developer's Agreement with the Village the *Oceana Bal Harbour* will be required to install a water main system along its entire frontage of Collins Avenue. A water main extension that crosses Collins Avenue and interconnects with the existing 12-inch diameter water main on the west side of Collins Avenue was installed by the Developer in late 2013.

Any future water distribution improvements made within Bal Harbour Village would require permitting through the Miami-Dade Water and Sewer Authority Department and the Miami-Dade County Department of Health and must adhere to WASD standards and specifications.

SEE SHEET 2 OF 3
FOR CONTINUATION

BALFOUR DRIVE

CAMDEN COURT

CAMDEN DRIVE

BAL BAY DRIVE

BLOCK 1

BLOCK 2

BLOCK 4

INTRACOASTAL WATERWAY
(INDIAN CREEK)

PARK DRIVE

COLLINS AVENUE (A-1-A)

HARDING AVENUE

96TH STREET

BAL MORAL

ST. REGIS RESORT

MAJESTIC

EXIST. WATER MAIN (TYP.)

EXIST. FIRE HYDRANT (TYP.)

EXIST. GATE VALVE (TYP.)

EXIST. VENTURI WATER METER

EXIST. MASTER WATER METER

EXIST. 24" WATER MAIN FEED
(OWNED & OPERATED BY
MD-WASAD)

EXIST. 16" ACP WATER MAIN

EXIST. WATER MAIN (TYP.)

HORIZONTAL GRAPHIC SCALE
0 40 80 160
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND
- EXISTING WATER MAIN
- EXISTING FIRE HYDRANT
- EXISTING GATE VALVE

EXHIBIT W-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING WATER MAIN SYSTEM MAP

SEE SHEET 3 OF 3
FOR CONTINUATION

YACH BASIN

HARBOUR WAY

BAL BAY COURT

BAL BAY DRIVE

CAMDEN DRIVE

BAL CROSS DRIVE

PARK DRIVE

COLLINS AVENUE (A-1-A)

BLOCK 1

BLOCK 3

BLOCK 5

BLOCK 6

INTRACOASTAL WATERWAY
(INDIAN CREEK)

TRACT A

OCEANA BAL HARBOUR

PLAZA OF BAL HARBOUR

TIFFANY

BAL HARBOUR 101

THE PALACE

BAL HARBOUR TOWER

BAL HARBOUR TOWER

SEAVIEW HOTEL

SEAVIEW HOTEL

EXIST. GATE VALVE (TYP.)

EXIST. WATER MAIN (TYP.)

EXIST. FIRE HYDRANT (TYP.)

EXIST. 16" ACP WATER MAIN

EXIST. WATER MAIN (TYP.)

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

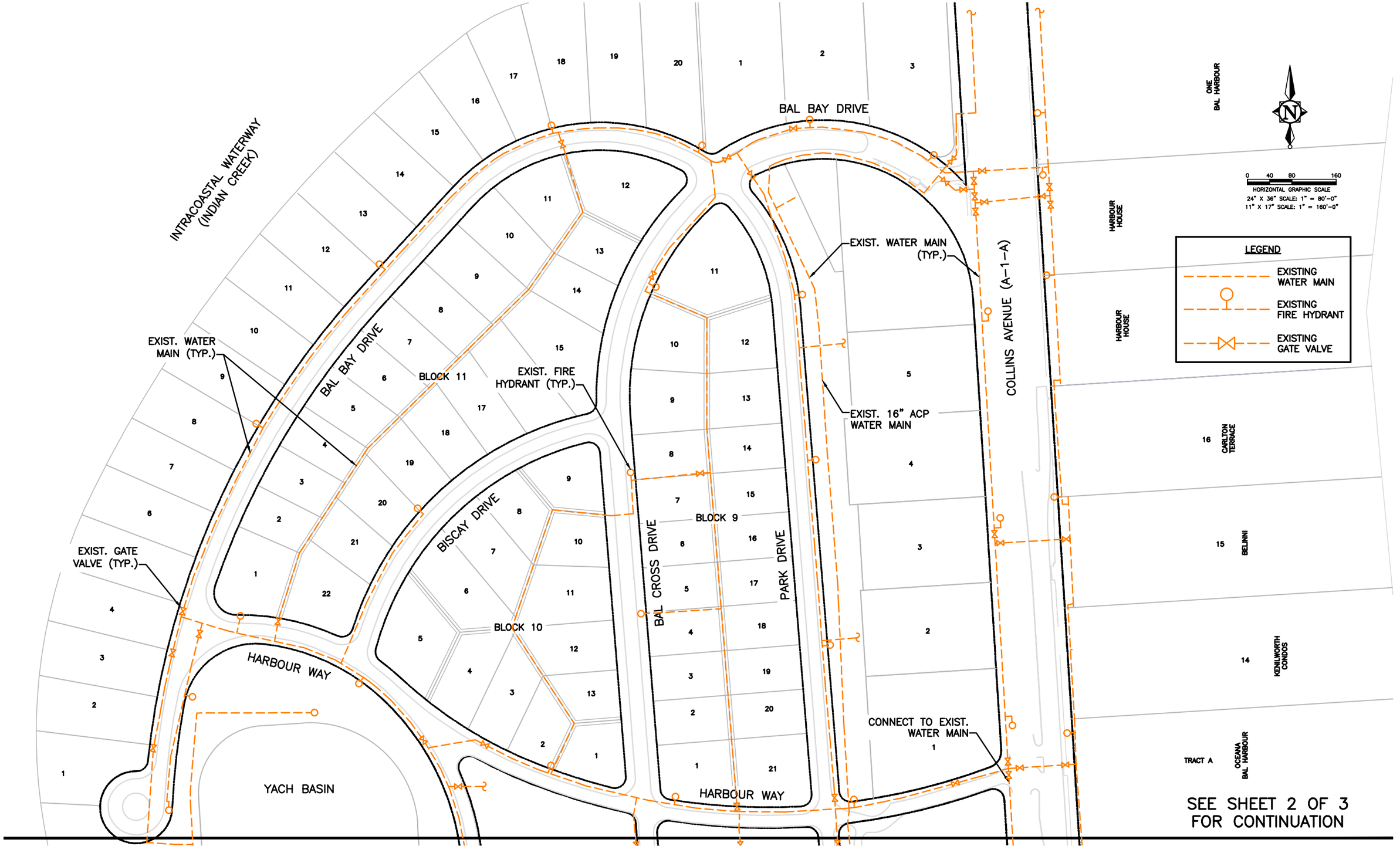
LEGEND

- EXISTING WATER MAIN
- EXISTING FIRE HYDRANT
- EXISTING GATE VALVE

SEE SHEET 1 OF 3
FOR CONTINUATION

EXHIBIT W-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING WATER MAIN SYSTEM MAP



3 OF 3

EXHIBIT W-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING WATER MAIN SYSTEM MAP

CAS

SEE SHEET 2 OF 3
FOR CONTINUATION

BALFOUR DRIVE

CAMDEN COURT

BLOCK 4

PROP. PLUG

CAMDEN DRIVE

BLOCK 2

BLOCK 1

BAL BAY DRIVE

INTRACOASTAL WATERWAY
(INDIAN CREEK)

PROP. FIRE HYDRANT
(TYP.)

CONNECT TO EXIST.
WATER MAIN

COLLINS AVENUE (A-1-A)

WATER MAIN
CONSTRUCTED
(DEC. 2013)

N

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

BAL MORAL

ST. REGIS
RESORT

MAJESTIC

PROP. WATER MAIN
(TYP.)

EXIST. 16" ACP
WATER MAIN

EXIST. WATER MAIN
(TYP.)

PARK DRIVE

PROP. WATER MAIN
(BY OTHERS)

HARDING AVENUE

EXIST. VENTURI
WATER METER

EMERGENCY
CONNECTION

EXIST. MASTER
WATER METER

CONNECT TO EXIST.
WATER MAIN

EXIST. 24" WATER MAIN FEED
(OWNED & OPERATED BY
MD-WASAD)

96TH STREET

LEGEND

- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- EXISTING GATE VALVE
- PROPOSED GATE VALVE
- PROPOSED BY OTHERS
- WATER MAIN CONSTRUCTED (DEC. 2013)

1 OF 3

EXHIBIT W-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED WATER MAIN SYSTEM MAP

CAS

SEE SHEET 3 OF 3
FOR CONTINUATION

YACH BASIN

PROP. FIRE HYDRANT (TYP.)

PROP. PLUG

BAL BAY COURT

BAL BAY DRIVE

CAMDEN DRIVE

BAL CROSS DRIVE

PARK DRIVE

HARBOUR WAY

BLOCK 1

BLOCK 3

BLOCK 5

BLOCK 6

INTRACOASTAL WATERWAY (INDIAN CREEK)

CONNECT TO EXIST. WATER MAIN

PROP. WATER MAIN (BY OTHERS)

WATER MAIN CONSTRUCTED (DEC. 2013)

PROP. WATER MAIN (TYP.)

EXIST. 16" ACP WATER MAIN

EXIST. WATER MAIN (TYP.)

COLLINS AVENUE (A-1-A)

TRACT A OCEANA BAL HARBOUR

PLAZA OF BAL HARBOUR

TIFFANY

BAL HARBOUR 101

THE PALACE

BAL HARBOUR TOWER

BAL HARBOUR TOWER

SEAVIEW HOTEL

SEAVIEW HOTEL

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- EXISTING GATE VALVE
- PROPOSED GATE VALVE
- PROPOSED BY OTHERS
- WATER MAIN CONSTRUCTED (DEC. 2013)

SEE SHEET 1 OF 3
FOR CONTINUATION

2 OF 3

EXHIBIT W-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED WATER MAIN SYSTEM MAP

INTRACOASTAL WATERWAY (INDIAN CREEK)

BAL BAY DRIVE

CONNECT TO EXIST. WATER MAIN

ONE BAL HARBOUR

HORIZONTAL GRAPHIC SCALE
0 40 80 160
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

EXIST. WATER MAIN (TYP.)

COLLINS AVENUE (A-1-A)

HARBOUR HOUSE

HARBOUR HOUSE

CARLTON TERRACE

PROP. FIRE HYDRANT (TYP.)

BAL BAY DRIVE

BLOCK 11

EXIST. 16" ACP WATER MAIN

BISCAY DRIVE

BAL CROSS DRIVE

BLOCK 9

PARK DRIVE

PROP. WATER MAIN (TYP.)

WATER MAIN CONSTRUCTED (DEC. 2013)

BELINNI

KENILWORTH CONDOS

BLOCK 10

HARBOUR WAY

CONNECT TO EXIST. WATER MAIN

CONNECT TO EXIST. WATER MAIN

PROP. WATER MAIN (BY OTHERS)

TRACT A

OCEANA BAL HARBOUR

YACH BASIN

HARBOUR WAY

LEGEND

- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- EXISTING GATE VALVE
- PROPOSED GATE VALVE
- PROPOSED BY OTHERS
- WATER MAIN CONSTRUCTED (DEC. 2013)

SEE SHEET 2 OF 3 FOR CONTINUATION

EXHIBIT W-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED WATER MAIN SYSTEM MAP

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
WATER DISTRIBUTION IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT W-3

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 220,700.00	$ 220,700.00
2	Maintenance of Traffic (3%)	1	LS	$ 82,762.50	$ 82,762.50
3	Survey Construction Stakeout and As-Builts (3%)	1	LS	$ 82,762.50	$ 82,762.50
4	Density Testing (1%)	1	LS	$ 27,587.50	$ 27,587.50
5	Clearing and Stripping (2%)	1	LS	$ 55,175.00	$ 55,175.00
6	Pavement Restoration	100	SY	$ 50.00	$ 5,000.00
7	Conc. Sidewalk Restoration	50	SY	$ 65.00	$ 3,250.00
8	Conc. Curb & Gutter Restoration	200	LF	$ 15.00	$ 3,000.00
9	Sod Restoration	3000	SY	$ 4.00	$ 12,000.00
10	Striping	1	LS	$ 1,200.00	$ 1,200.00
				TOTAL	$ 493,437.50
	Water Main				
1	16" DIP Water Main (Polywrapped)	5005	LF	$ 120.00	$ 600,600.00
2	12" DIP Water Main (Polywrapped)	3700	LF	$ 95.00	$ 351,500.00
3	10" DIP Water Main (Polywrapped)	200	LF	$ 65.00	$ 13,000.00
4	8" DIP Water Main (Polywrapped)	11335	LF	$ 45.00	$ 510,075.00
5	6" DIP Water Main (Polywrapped)	1825	LF	$ 35.00	$ 63,875.00
6	16" Gate Valve	14	EA	$ 2,300.00	$ 32,200.00
7	12" Gate Valve	29	EA	$ 1,900.00	$ 55,100.00
8	10" Gate Valve	2	EA	$ 1,500.00	$ 3,000.00
9	8" Gate Valve	33	EA	$ 1,200.00	$ 39,600.00
10	6" Gate Valve	4	EA	$ 800.00	$ 3,200.00
11	Fire Hydrant Assembly (incl. 6" GV)	48	EA	$ 5,000.00	$ 240,000.00
12	Fittings	28	TN	$ 2,500.00	$ 70,000.00
13	12" x 12" Tapping Sleeve & Valve	4	EA	$ 3,500.00	$ 14,000.00
				TOTAL	$ 1,996,150.00
	Water Services				
1	16" x 2" Tapping Saddle	41	EA	$ 500.00	$ 20,500.00
2	12" x 2" Tapping Saddle	15	EA	$ 400.00	$ 6,000.00
3	10" x 2" Tapping Saddle	1	EA	$ 325.00	$ 325.00
4	8" x 2" Tapping Saddle	160	EA	$ 250.00	$ 40,000.00
5	6" x 2" Tapping Saddle	9	EA	$ 150.00	$ 1,350.00
6	2" PE Water Service	5875	LF	$ 22.00	$ 129,250.00
7	1 1/2" PE Water Service	1120	LF	$ 15.00	$ 16,800.00
8	2" Corp. Stop	226	EA	$ 125.00	$ 28,250.00
9	1 1/2" Backflow Preventor	223	EA	$ 1,000.00	$ 223,000.00
10	1 1/2" Vacuum Breaker (Irrigation)	225	EA	$ 800.00	$ 180,000.00
				TOTAL	$ 645,475.00

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
WATER DISTRIBUTION IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT W-3

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
	Miscellaneous				
1	Connect to Exist. Water Main	7	EA	$ 3,000.00	$ 21,000.00
2	Sample Point	27	EA	$ 500.00	$ 13,500.00
3	2" Blowoff	2	EA	$ 500.00	$ 1,000.00
4	Water Main Deflection (16")	1	EA	$ 3,000.00	$ 3,000.00
5	Water Main Deflection (12")	2	EA	$ 2,500.00	$ 5,000.00
6	Water Main Deflection (10")	2	EA	$ 2,000.00	$ 4,000.00
7	Water Main Deflection (8")	3	EA	$ 1,500.00	$ 4,500.00
8	Water Main Deflection (6")	1	EA	$ 1,000.00	$ 1,000.00
9	Abandon Exist. WM (R/W)	17700	LF	$ 1.50	$ 26,550.00
10	Abandon Exist. WM (Lots)	8750	LF	$ 1.50	$ 13,125.00
				TOTAL	$ 92,675.00
				SUBTOTAL	$ 3,227,738
				10% CONTINGENCY	$ 322,774
				TOTAL CONSTRUCTION COST	$ 3,550,511
				ENGINEERING DESIGN (10%)	$ 322,774
				DESIGN SURVEY (1.5%)	$ 48,416
				UTILITY LOCATES (0.5%)	$ 16,139
				CONSTRUCTION OBSERVATION (5%)	$ 161,387
				ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 64,555
				TOTAL PRELIMINARY COST	$ 4,163,781

NOTE : WATER MAIN INSTALLATION DOES NOT INCLUDE ROADWAY RESTORATION.
COSTS DO NOT REFLECT SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

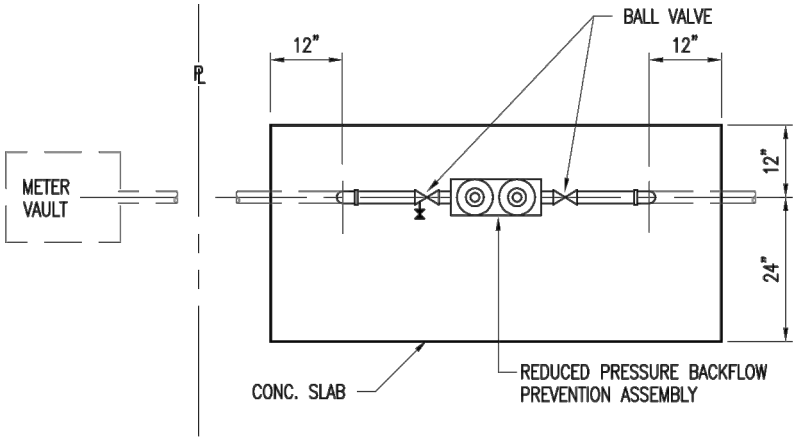
BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
WATER SERVICE INSTALLATION WITHIN RD
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT W-4

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (7%)	1	LS	$ 68,600.00	$ 68,600.00
2	Landscape Restoration (10%)	1	LS	$ 98,000.00	$ 98,000.00
3	Survey Construction Stakeout and As-Builts (3%)	1	LS	$ 29,400.00	$ 29,400.00
4	Sod Restoration (3%)	1	LS	$ 29,400.00	$ 29,400.00
				TOTAL	$ 225,400.00
	Water Main				
1	1" Water Meter w/ Box (Domestic)	196	EA	$ 1,000.00	$ 196,000.00
2	1 1/2" Water Meter w/ Box (Irrigation)	196	EA	$ 1,000.00	$ 196,000.00
3	1 1/2" PE Water Service (Domestic)	196	EA	$ 1,500.00	$ 294,000.00
4	1 1/2" PE Water Service (Irrigation)	196	EA	$ 1,500.00	$ 294,000.00
				TOTAL	$ 980,000.00

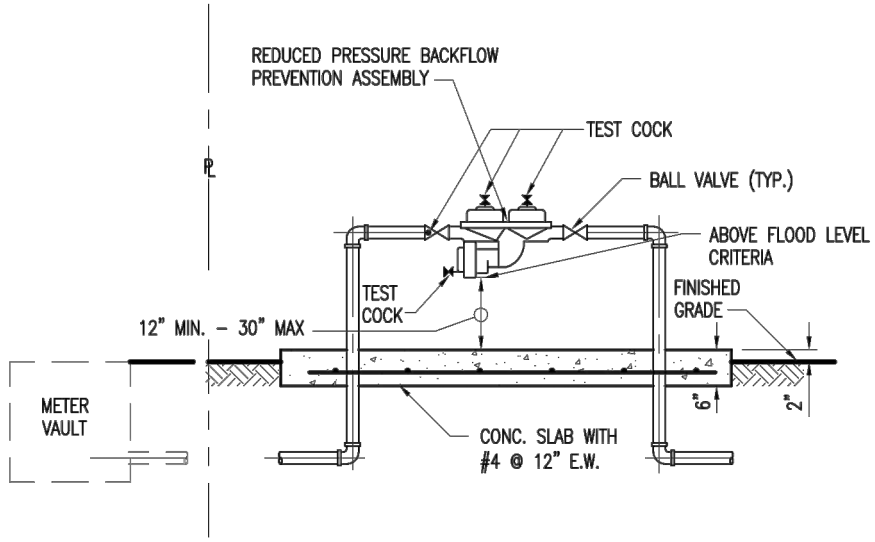
SUBTOTAL	$ 1,205,400
10% CONTINGENCY	$ 120,540
TOTAL CONSTRUCTION COST	$ 1,325,940
ENGINEERING DESIGN (10%)	$ 120,540
DESIGN SURVEY (1.5%)	$ 18,081
UTILITY LOCATES (0.5%)	$ 6,027
CONSTRUCTION OBSERVATION (5%)	$ 60,270
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 24,108
TOTAL PRELIMINARY COST	$ 1,554,966

EXHIBIT W–5

WASD REQUIRED BACKFLOW PREVENTER DETAIL (FOR HOUSE SERVICE)



PLAN VIEW



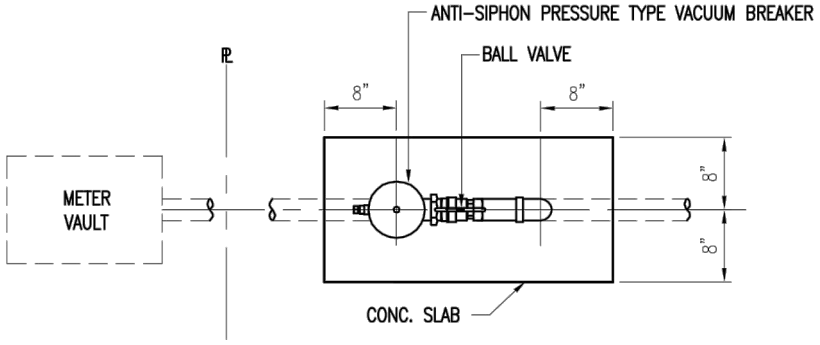
ELEVATION VIEW

GUARD POST DETAIL	WS 4.5	
ITEM	CROSS REF.	SPEC. REF.

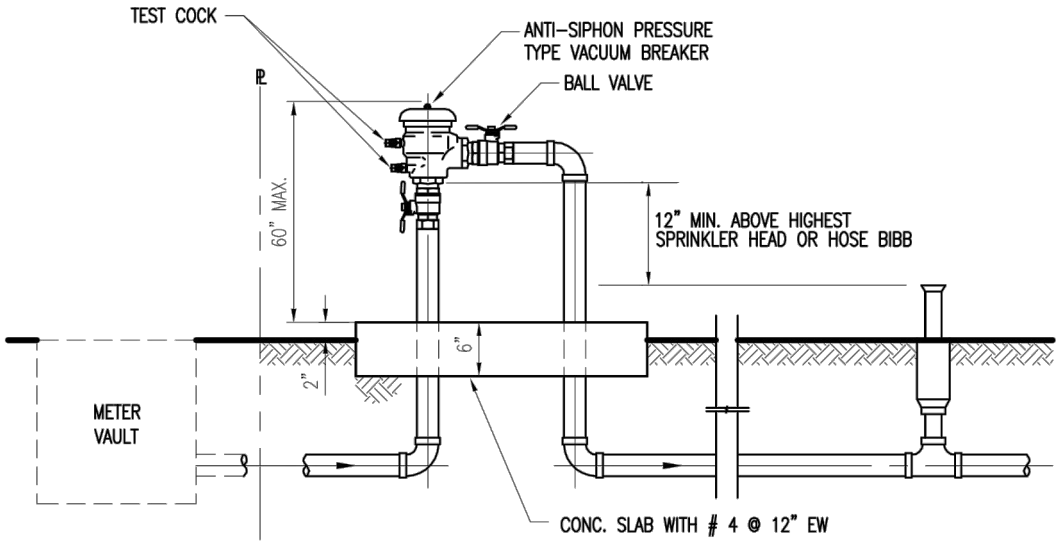
	ISSUE DATE	APPROVED BY		
MIAMI-DADE COUNTY Delivering Excellence Every Day	6/26/2012	F.A.	STANDARD DETAIL REDUCED PRESSURE ZONE BACKFLOW PREVENTER FOR WATER SERVICE 3/4" THRU 2"	WS 4.18 SHEET 1 OF 5

EXHIBIT W–5

WASD REQUIRED BACKFLOW
PREVENTER DETAIL
(FOR IRRIGATION SERVICE)



PLAN VIEW

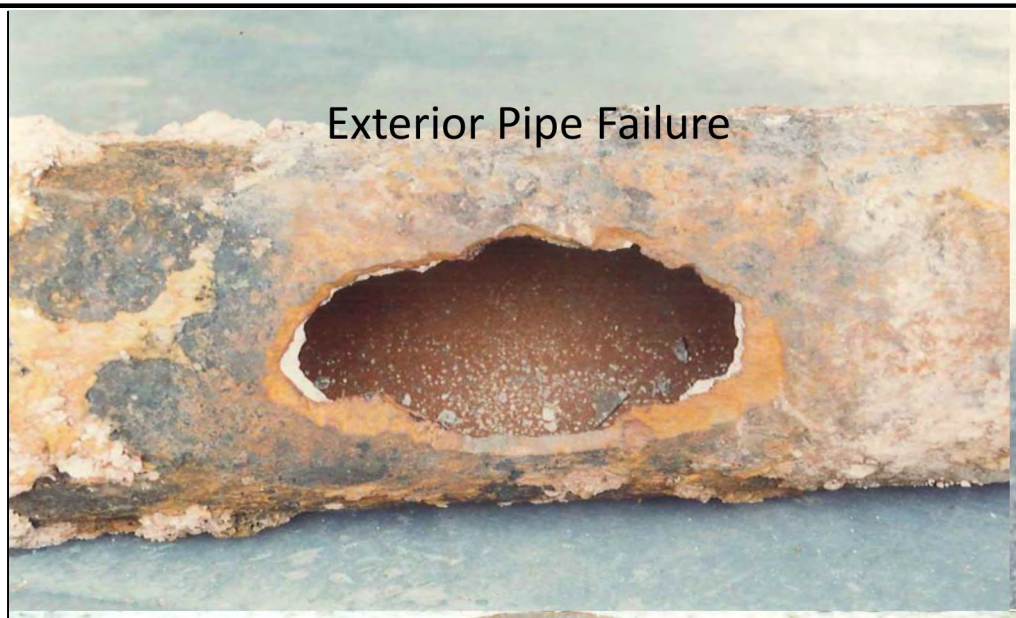


ELEVATION VIEW

GUARD POST DETAIL	WS4.5	XX 0.0
ITEM	CROSS REF.	SPEC. REF.

ISSUE DATE	APPROVED BY	STANDARD DETAIL	
11/01/2006	V.E.F.	PRESSURE VACUUM BREAKER IRRIGATION SYSTEM ONLY	WS 4.19 SHEET 1 OF 2

MIAMI-DADE COUNTY
Delivering Excellence Every Day



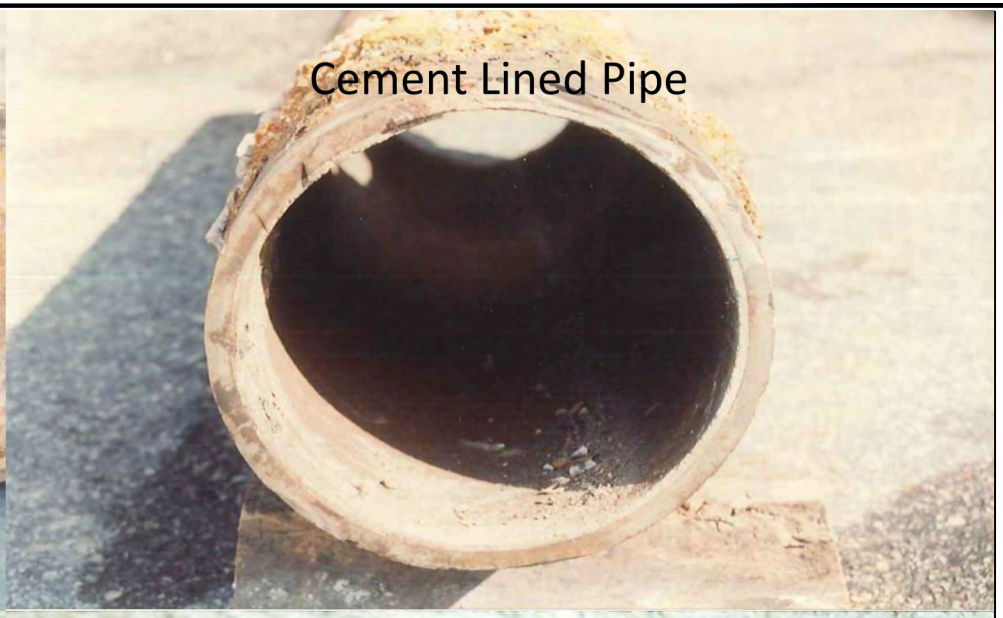


EXHIBIT W–6

EXISTING WATER PIPE CONDITIONS

EXHIBIT W-7

PHOTOGRAPHS

Photo 1 : Leaking Valves uncovered at Park Drive and Camden Drive.

Photo 2 : Leaking Valves on 6" water main uncovered on Park Drive.

EXHIBIT W-7

PHOTOGRAPHS

Photo 3: Thrust block removed in repair of leaking valves.

Photo 4: Exist. 6" and 12" water mains where valves were uncovered.

EXHIBIT W-7

PHOTOGRAPHS

Photo 5: Existing excavated water mains on Park Drive.

Photo 6: Night repair work on new water main assembly and fittings.

EXHIBIT W-7

PHOTOGRAPHS

Photo 7: Installed emergency repair replacement pipe.

Photo 8: Reconnected of repair pipe to existing system.

EXHIBIT W-7

PHOTOGRAPHS

Photo 9: Completed emergency night repair of water main.

Photo 10: Water main repair on Park Drive and Balfour Drive.

EXHIBIT W-7

PHOTOGRAPHS

Photo 11: Water main repair on Park Drive and Balfour Drive.

Photo 12: Night repair of water main on Park and Balfour Drive.

EXHIBIT W-7

PHOTOGRAPHS

Photo 13 : Failed water main pipe uncovered on 96th Street.

Photo 14 : Water main repair trench on north side of 96th Street.

EXHIBIT W-7

PHOTOGRAPHS

Photo 15 : Leaking water main pipe uncovered.

Photo 16 : Inside of water main pipe removed for repair.

EXHIBIT W-7

PHOTOGRAPHS

Photo 17 : Removal of existing pipe assembly.

Photo 18 : Removal of existing pipe assembly.

EXHIBIT W-7

PHOTOGRAPHS

Photo 19 : Removal of existing valve assembly.

Photo 20 : Removal of existing 12" water main pipe on 96th Street.

EXHIBIT W-7

PHOTOGRAPHS

Photo 21 : Repaired 12" water main on 96th Street.

Photo 22 : Backfilled water main trench on north side of 96th Street.

BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR
FLORIDA'S PARADISE

SECTION 3

SANITARY SEWER IMPROVEMENTS

EXISTING SANITARY SEWER INFRASTRUCTURE

All sanitary sewer components providing service to customers within the Village are owned, operated and maintained by Bal Harbour Village (BHV). BHV currently has an Inter-local Agreement with the City of Miami Beach to receive the Village's wastewater effluent. Treatment and disposal of the effluent is performed by Miami-Dade Water and Sewer Department (WASD).

Bal Harbour Village, as a whole, is located within the WASD's Central Wastewater Treatment Plant's Service Area. The Village's effluent is discharged, via a series of force mains, to the Central Wastewater Treatment Plant (WWTP). The Central Wastewater Treatment Plant is located on Virginia Key and began operation in 1956. The treatment facility consists of two plants operating in parallel. The original plant contains a modified aeration process and the second plant utilizes the pure oxygen activated sludge process. The majority of the treated effluent is discharged via a 120- inch deep ocean outfall; the remainder is utilized for reuse. State Legislation has set mandates for the de-activation of the ocean outfall. By 2015 the Central WWTP can only discharge 50% of its permitted rates. By 2025 the outfall will be discontinued entirely. Sludge from the plant is anaerobically digested, air dried and sold as soil conditioner. The capacity of the Central WWTP is approximately 100 MGD (millions of gallons per day) and is capable of handling the demand of the Bal Harbour Village.

Wastewater from the various customers (i.e. oceanfront high rises located on the east side of Collins Avenue, low rise apartments located on the west side of Collins Avenue, residential properties, and the commercial properties such as the *Bal Harbour Shops*) is discharged through a sanitary lateral or sewer main. Once the influent wastewater leaves the property it is collected within the Village's public wastewater collection system. BHV's wastewater collection is separated into two systems. An eastern system that serves the Collins Avenue corridor and a western system that serves the residential development. There is

a sewer interconnect between the two systems that serves as an emergency bypass in the event one of the systems is in need of repair.

The eastern sanitary sewer infrastructure for BHV's main Collins Avenue corridor, which provides service for all of the ocean-front high rises along with the commercial tenants within the *Bal Harbour Shops*, was installed in two phases. The initial phase of construction was performed in 1946 while the second phase was installed in the mid-1960's. The main collection system, located in the center median of Collins Avenue, constructed in the mid-1960's, extends as far north as the *Harbour House* and discharges at the Village's Master Lift Station (PS2), which was also installed in the mid-1960's. This collection system ranges in pipe size from 12-inch to 18-inch and is constructed of vitrified clay pipe. The original sanitary main, ranging in pipe size from 8-inch to 10-inch, is located on the east side of Collins Avenue. This system collects sewage from the oceanfront high rises prior to discharging into the main sanitary sewer collection system in the center of Collins Avenue.

The BHV Master Lift Station (PS2) is located in the median adjacent to the *Suntrust Bank*. This lift station was installed along with the Collins Avenue median sanitary sewer system in the mid-1960's. The Master Lift Station (PS 2) was completely redesigned and upgraded in October, 2004 to include four 130-horsepower submersible pumps. Two of the four pumps are designed as a back-up. The pumping station is adequately sized to receive the effluent from the Village's western sanitary system; prior to re-pumping into the Collins Avenue force main. The Master Lift Station is capable of handling the Village's current and future demand needs. The Master Lift Station has the capability to be easily modified and upsized to accommodate any additional capacity in the foreseeable future.

From the Master Lift Station the raw sewage is re-pumped into the new and recently completed 16-inch diameter HDPE sanitary force main that runs south

on Collins Avenue (SR A1A) to an existing 30" interceptor force main between 72nd Street and 73rd Street located in and owned by the City of Miami Beach. The 16-inch force main was installed as a joint venture between the Village and the Town of Surfside. The need for the construction of the new 16-inch force main was the direct result of failures regarding older force mains. Due to time constraints and surface restoration concerns the force main was installed by the directional drilling method. An emergency sewer connection was provided to, and paid for by, the Town of Bay Harbor Islands at a cost of $130,000. The force main was completed in 2011 at a shared cost of $ 4,115,008.

Prior to the installation of the 16-inch force main the only source of sewer discharge for the Village was a 16-inch cast iron force main that is routed from the Master Lift Station, down Byron Avenue, through the Town of Surfside and to a connection with a 36-inch force main located in the City of Miami Beach. The Byron Avenue force main was constructed in 1946 and provides service for both the Village and the Town of Surfside.

Since the Byron Avenue force main was the only source of discharge for both Municipalities, the main has never been taken off line to determine its current condition. Now with the new Collins Avenue force main in service, the Byron Avenue force main can be properly inspected. The Byron Avenue force main will be used for emergency purposes only, in the event that the Collins Avenue force main is taken off line due to maintenance or repair and until an additional secondary force main can be established for emergency use.

The western sanitary sewer infrastructure for BHV is located within the residential neighborhood and serves all of the residential single-family homes, all of the low rise apartments on the west side of Collins Avenue, and a small number of oceanfront properties on the east side of Collins Avenue. The western sewer system was constructed during the original development of the Village in 1946. The material of the sanitary pipe is vitrified clay and varies in diameter size from

8-inches to 15-inches. Influent within the RD's sanitary system is designed to flow from east to west to a centrally located existing sanitary lift station (PS 1) on the west side of Bal Bay Drive, south of Harbour Way. This lift station was originally constructed in 1946 and underwent modifications and upgrades in 2012.

The lift station (PS 1) is approximately twelve feet in depth and contains two-10 horsepower pumps. Once received into the duplex lift station the effluent is pumped into a force main located on Bal Bay Drive that runs south to 96th Street, then east to the Village's Master Lift Station (PS2) located north of 96th Street between Collins Avenue and Harding Avenue.

Over the years the residential areas' sanitary system has been modified, repaired and upgraded. In the summer of 2010 the existing 12-inch diameter cast iron force main, located on Bal Bay Drive, that connects PS1 to PS2 was lined with an 8-inch diameter HDPE force main to eliminate further deterioration of the existing cast iron pipe. The most recent upgrade of lift station No. 1, by installing new submersible pumps and a new electrical panel, occurred in 2012. Prior to those improvements the last modifications to the lift station were performed in 1989.

The existing sanitary system has served beyond its life expectancy of fifty years. Within the residential neighborhood the sanitary sewer main pipes were installed at inadequate slopes or, in some cases, no slope at all. A majority of manholes are constructed solely of clay bricks; an industry accepted method at the time. Vitrified clay pipe has been replaced by polyvinyl chloride as the construction material of choice for sewer mains. In 2005, on Park Drive, an entire section of sewer pipe north of Harbour Way was removed and replaced due to the settling and failure of the pipe. Sanitary sewer emergency repair costs performed within the Village from 2005 to 2014 have totaled approximately $118,800. A detailed description of the repairs is listed in Exhibit G-4.

With the proposed construction of the roads within the residential neighborhood becoming a reality, it is now time to completely replace and upgrade the sanitary sewer system. Exhibit S-8 (Photos 1-12) shows photographs of sanitary sewer repair work within the Village in 2007 and 2011.

Exhibit S-1 indicates the existing sanitary sewer configuration for the Village's service area. A database of the entire sanitary sewer infrastructure for Bal Harbour Village is shown in the *Existing Sanitary Sewer System Database* (Exhibit S-5).

PROPOSED SANITARY SEWER IMPROVEMENTS

Potential future sanitary sewer system improvements for the Bal Harbour Village and the residential neighborhood are shown in Exhibits S-2 and S-3. In addition to existing demands and flows the proposed sanitary sewer system will provide sewer service beneficial to the existing oceanfront properties, the low-rise apartments located on the west side of Collins Avenue, and the *Oceana Bal Harbour*. Larger sanitary sewer mains would be installed to increase capacity within the sewer system in order to accommodate future, additional demands. The sanitary sewer infrastructure would, for the most part, fall within the same footprint of the existing sanitary system. All flows would be collected at a proposed sanitary lift station located within the vicinity of the existing lift station on Bal Bay Drive, south of the Yacht Basin. The lift station would discharge to the existing sanitary force main located on the east side of Bal Bay Drive.

New sanitary sewer connections for the *Bal Harbour Shops* will be provided on Park Drive. These connections are located at four existing service points, from Bay Drive to Collins Avenue, for both gravity and force main lines that serve the *Shops*. These connections will be provided within the Village's right-of-way. Any

existing sewer mains, service lines, force mains or lift stations within the *Shops* is privately owned and maintained. A gravity sewer connection for the *Shops* is also located on the west side of Harding Avenue/Collins Avenue that discharges into the Village's Master Lift Station (PS2). Any future expansion of the *Bal Harbour Shops* that include sanitary sewer upgrades will be constructed at the expense of the Shop's developer.

The installation of a new sanitary sewer collection system within the residential area would also provide sewer service to the low-rise multi-family units located on the west side of Collins Avenue. All multi-family properties from *Fairfield Manor* (9800 Collins Avenue) north to *Bay Colony* (290 Bal Bay Drive) are currently provided sewer service, via sanitary laterals, located on the west side of their properties on Park Drive. The new connections will be provided within the Village's right-of-way. Any existing sewer mains, laterals, cleanouts or lift stations within the low-rise multi-family properties is privately owned and maintained.

Exhibit G-8 *Utility Zone Description* indicates the current and future status of all sanitary sewer improvements within the entire Village. Areas of the Village are divided into zones and a detailed description is included, in database form, for each utility principle. Each zone of the Village has either benefitted from recent sewer/force main infrastructure projects or will benefit from proposed sanitary sewer projects outlined in this Utility Master Plan. As indicated in Exhibit G-6 (2014 Master Plan Utility Projects), sanitary sewer improvements are anticipated to be designed, permitted and constructed in Fiscal Year 2016.

The work required for completion of the future sanitary sewer improvements would include the installation of approximately 101 sanitary sewer manholes, 12,145 linear feet of 8-inch diameter PVC sanitary sewer main, 410 linear feet of 10-inch diameter PVC sanitary sewer main, 1,825 linear feet of 12-inch diameter PVC sanitary sewer main, 1,595 linear feet of 15-inch diameter PVC sanitary sewer main, 1,535 linear feet of 18-inch diameter PVC sanitary sewer main along

with the connection to 243 existing sanitary laterals. The piping and manholes for the project will be installed at a depth range from 4 feet to 16 feet.

The lift station would be approximately 26-feet in depth and be situated in the general vicinity of the existing sanitary lift station. The proposed wetwell will be equipped with three-30 horsepower pumps and will be connected to the existing sanitary force main on Bal Bay Drive. The lift station will also be furnished with a new electrical control panel, flow meter and telemetry instrumentation that allows for remote monitoring of the station. In the event of a power failure, the sanitary lift station will also utilize a new emergency generator.

The proposed sanitary sewer system would be designed and constructed according to current Federal, State and County standards and specifications including pipe depths of cover, industry accepted pipe materials, and minimum slopes for pipes as well as pre-cast sanitary manholes with proper cover depths. All future sanitary sewer improvements within the residential neighborhood would be installed within the limits of the existing roadways and structured such that disturbance to the existing sanitary service to residences would be limited.

The total preliminary estimated cost for sanitary sewer improvements within the Village's residential neighborhood, which also serves the *Bal Harbour Shops* and the low-rise multi-family units on the west side of Collins Avenue, is $4,321,026. This cost includes all work necessary to complete the installation of a new sanitary sewer collection system, connection to all existing sanitary laterals within and adjacent to the residential area, and the construction of a new triplex sanitary sewer lift station including the electrical and mechanical components. Also included in the costs is the installation of telemetry instrumentation for both the proposed sanitary lift station (PS1), located within the residential neighborhood and the existing Master Lift Station (PS2), located on Collins Avenue.

The costs associated with the restoration of the existing roadways within the residential neighborhood are not included in the sanitary sewer portion of the work. All roadway costs are defined and detailed in the *Roadway Improvements* section of this Master Plan. Refer to the *Proposed Sanitary Sewer System Map* (Exhibit S-2) and the *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit S-6) for preliminary design layout and costs associated to the improvements.

An evaluation of the existing sanitary sewer system for Collins Avenue was performed as part of this Utility Master Plan. Through 'as-built' information and site investigations CAS has gathered and compiled data on the existing condition, construction and route of the existing Collins Avenue sanitary sewage collection system. Known issues and deficiencies have been detailed and addressed for the existing sewer infrastructure as indicated in the *Existing Sanitary Sewer System Database* (Exhibit S-5).

The existing sanitary infrastructure on Collins Avenue, like other utility systems installed within the Village in 1946, does not meet today's standards, regulations, and industry accepted materials for required pipe cover and minimum pipe slopes. Out-dated materials such as clay sewer pipe and brick manholes lack both integrity and protection against infiltration and exfiltration. Exhibit S-4 indicates comparisons between existing and proposed pipe depth, pipe slope and pipe type and size. The proposed installation of the sanitary sewer main adheres to current regulatory specifications and industry accepted standards.

In August of 2013, the Florida Department of Transportation (FDOT) began construction on the resurfacing of Collins Avenue from 96th Street north to the Haulover Bridge. The resurface project has recently been completed. According to Section 5.6.2 of FDOT's *Utility Accommodation Manual* it states that, "Open cutting of existing pavement and side roads, less than five (5) years old, on FDOT R/W generally will only be considered with written justification to include an analysis of factors demonstrating that means other than open cutting would

not be feasible." FDOT will not release a Utility Permit for construction if the road has been resurfaced within the previous five years, unless under an emergency condition.

Since a conventional open cut construction project could not be permitted within the resurfaced roadway of Collins Avenue, an alternative approach for the restoration of the existing system was explored. CAS recommends that the existing secondary sanitary sewer system on the east side of Collins Avenue be rehabilitated.

The total preliminary estimated cost for a complete sanitary sewer rehabilitation project on the east side of Collins Avenue is $1,498,100. This work includes the installation of 2,670 linear feet of 12-inch DIP sanitary sewer main pipe, the installation of 15 sanitary manholes, the removal of the existing sanitary sewer system (located on the same side of Collins Avenue), connection to all existing sanitary sewer mains from oceanfront properties, driveway, sidewalk and landscape restoration, dewatering, a temporary bypass system to serve the oceanfront properties during construction, and maintenance of traffic. Refer to the *Proposed Collins Avenue Sanitary Sewer Secondary System Map* (Exhibit S-3) and the *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit S-7) for preliminary design layout and costs associated to the Collins Avenue secondary sanitary sewer improvements.

The proposed secondary sanitary sewer system will be installed at a deeper elevation to prevent conflicts with existing and proposed utilities located in the Collins Avenue corridor. The sewer flows for the northern portion of the oceanfront properties (from the *Bal Harbour Tower* north to *One Bal Harbour*) will gravity towards the new sanitary system installed by the *Oceana Bal Harbour* and then flow west to the new lift station within the RD (PS1). A future force main will be installed by *One Bal Harbour* to accommodate flows from its existing private sanitary lift station.

The sewer for the southern portion of the oceanfront properties (from the *The Seaview* south to the *Majestic*) will flow by means of gravity towards the recently installed sanitary sewer system located within the frontage limits of *St. Regis Resort Hotel* and then flow west to the existing Master Lift Station located on Collins Avenue (PS2).

The existing sanitary sewer system, located within the median of Collins Avenue, will be preserved as an emergency bypass to direct flows from the oceanfront properties south to the Master Lift Station (PS2).

As older beachfront structures in Bal Harbour are razed and reconstructed, it will be the Developer's responsibility to provide sanitary sewer infrastructure improvements in order to handle future demands. As part of their developer's agreement the *Oceana Bal Harbour* is required to install a gravity sewer main across the entire frontage of Collins Avenue and has installed a connection to the Village's residential areas sanitary sewer infrastructure on the west side of Collins Avenue at Harbour Way.

According to the Bal Harbour Village budget, Miami-Dade County has pledged money from the *General Obligation Bonds* to add a segment of sewer force main that would allow Bal Harbour and other surrounding municipalities to pump sewage to the north treatment plant. The County has advised that these funds are scheduled for availability as follows: Fiscal year 16/17 - $1 million, Fiscal year 17/18 - $3.65 million, Fiscal year 18/19 - $1.85 million. Due to the economic situation, it is possible that this could change, but this is the current status. The County has claimed that there is no capacity at the north plant to handle additional sewage. Bal Harbour and the Town of Surfside are currently looking into this claim.

Once funding is finalized the force main project can be designed, permitted and constructed within three years. The secondary force main will be utilized for emergency purposes only; in the event that the southern Collins Avenue force main or the City of Miami Beach force main is taken off line due to maintenance or repair.

Any future sanitary sewer improvements made within Bal Harbour Village would require permitting through the Miami-Dade Water and Sewer Authority Department and Miami-Dade Department of Environmental Resource Management and must adhere to WASD standards and specifications.

SEE SHEET 2 OF 3
FOR CONTINUATION

BALFOUR DRIVE
CAMDEN COURT
CAMDEN DRIVE
BAL BAY DRIVE
PARK DRIVE
HARDING AVENUE
COLLINS AVENUE (A-1-A)
96TH STREET
INTRACOASTAL WATERWAY (INDIAN CREEK)
BLOCK 1
BLOCK 2
BLOCK 4
BAL MORAL
ST. REGIS RESORT
MAJESTIC

EXISTING SANITARY SEWER FORCE MAIN
EXISTING SANITARY SEWER LATERAL (TYP.)
EXISTING SANITARY SEWER MANHOLE (TYP.)
EXISTING SANITARY SEWER MAIN (TYP.)
EXISTING PUMP STATION (PS 2)
EXISTING SANITARY SEWER FORCE MAIN TO MIAMI BEACH
EXISTING SANITARY SEWER FORCE MAIN

HORIZONTAL GRAPHIC SCALE
0 40 80 160
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING SANITARY SEWER MAIN
- EXISTING SANITARY LATERAL
- EXISTING SANITARY FORCE MAIN
- EXISTING SANITARY LIFT STATION

EXHIBIT S-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING SANITARY SEWER SYSTEM MAP

SEE SHEET 3 OF 3
FOR CONTINUATION

YACHT BASIN

EXISTING SANITARY SEWER MANHOLE (TYP.)

EXISTING PUMP STATION (PS 1)

EXISTING SANITARY SEWER FORCE MAIN

EXISTING SANITARY SEWER MAIN (TYP.)

EXISTING SANITARY SEWER LATERAL (TYP.)

HARBOUR WAY

BAL BAY COURT

BAL BAY DRIVE

CAMDEN DRIVE

BAL CROSS DRIVE

PARK DRIVE

COLLINS AVENUE (A-1-A)

BLOCK 1

BLOCK 3

BLOCK 5

BLOCK 6

INTRACOASTAL WATERWAY
(INDIAN CREEK)

TRACT A
OCEANA BAL HARBOUR

PLAZA OF BAL HARBOUR

TIFFANY

BAL HARBOUR 101

THE PALACE

BAL HARBOUR TOWER

BAL HARBOUR TOWER

SEAVIEW HOTEL

SEAVIEW HOTEL

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING SANITARY SEWER MAIN
- EXISTING SANITARY LATERAL
- EXISTING SANITARY FORCE MAIN
- EXISTING SANITARY LIFT STATION

SEE SHEET 1 OF 3
FOR CONTINUATION

EXHIBIT S-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING SANITARY SEWER SYSTEM MAP

3 OF 3

EXHIBIT S-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING SANITARY SEWER SYSTEM MAP

SEE SHEET 2 OF 3
FOR CONTINUATION

BALFOUR DRIVE

CONNECT TO EXISTING SAN SEWER

CAMDEN COURT

BLOCK 4

BLOCK 1

BLOCK 2

CAMDEN DRIVE

BAL BAY DRIVE

INTRACOASTAL WATERWAY (INDIAN CREEK)

PROPOSED SANITARY SEWER MAIN (TYP.)

EXISTING SANITARY SEWER FORCE MAIN

PROPOSED SANITARY SEWER LATERAL (TYP.)

EXISTING SANITARY SEWER SYSTEM (TYP.)

PROPOSED SANITARY SEWER MANHOLE (TYP.)

PARK DRIVE

COLLINS AVENUE (A-1-A)

HARDING AVENUE

EXISTING SANITARY SEWER FORCE MAIN

96TH STREET

BAL MORAL

ST. REGIS RESORT

MAJESTIC

EXISTING PUMP STATION (PS 2)

EXISTING SANITARY SEWER FORCE MAIN TO MIAMI BEACH

HORIZONTAL GRAPHIC SCALE
0 40 80 160
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING SANITARY SEWER MAIN
- EXISTING SANITARY FORCE MAIN
- PROPOSED SANITARY SEWER MAIN
- PROPOSED SANITARY LATERAL
- PROPOSED SANITARY LIFT STATION
- PROPOSED SANITARY SEWER MAIN (BY OTHERS)

EXHIBIT S-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED SANITARY SEWER SYSTEM MAP

SEE SHEET 3 OF 3
FOR CONTINUATION

YACHT BASIN

PROPOSED SANITARY SEWER MANHOLE (TYP.)

PROPOSED SANITARY SEWER LIFT STATION (PS 1)

EXISTING SANITARY SEWER FORCE MAIN

BAL BAY COURT

BAL BAY DRIVE

CAMDEN DRIVE

BAL CROSS DRIVE

PARK DRIVE

HARBOUR WAY

BLOCK 1

BLOCK 3

BLOCK 5

BLOCK 6

INTRACOASTAL WATERWAY (INDIAN CREEK)

10 CONNECT TO PROPOSED SANITARY SEWER SYSTEM (BY OTHERS)

PROPOSED SANITARY SEWER MAIN (TYP.)

PROPOSED SANITARY SEWER LATERAL (TYP.)

EXISTING SANITARY SEWER SYSTEM (TYP.)

COLLINS AVENUE (A-1-A)

TRACT A

OCEANA BAL HARBOUR

13 PLAZA OF BAL HARBOUR

12 TIFFANY

11 BAL HARBOUR 101

10 THE PALACE

9 BAL HARBOUR TOWER

8 BAL HARBOUR TOWER

7 SEAVIEW HOTEL

SEAVIEW HOTEL

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING SANITARY SEWER MAIN
- EXISTING SANITARY FORCE MAIN
- PROPOSED SANITARY SEWER MAIN
- PROPOSED SANITARY LATERAL
- PROPOSED SANITARY LIFT STATION
- PROPOSED SANITARY SEWER MAIN (BY OTHERS)

SEE SHEET 1 OF 3
FOR CONTINUATION

2 OF 3

EXHIBIT S-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED SANITARY SEWER SYSTEM MAP

BAL BAY DRIVE

PROPOSED SANITARY SEWER MANHOLE (TYP.)

INTRACOASTAL WATERWAY (INDIAN CREEK)

BAL BAY DRIVE

BLOCK 11

BISCAY DRIVE

BLOCK 10

HARBOUR WAY

YACHT BASIN

PROPOSED SANITARY SEWER MAIN (TYP.)

BAL CROSS DRIVE

BLOCK 9

PARK DRIVE

PROPOSED SANITARY SEWER LATERAL (TYP.)

HARBOUR WAY

COLLINS AVENUE (A-1-A)

EXISTING SANITARY SEWER SYSTEM (TYP.)

ONE BAL HARBOUR

HARBOUR HOUSE

HARBOUR HOUSE

CARLTON TERRACE

BELINN

KENILWORTH CONDOS

TRACT A

OCEANA BAL HARBOUR

0 40 80 160

HORIZONTAL GRAPHIC SCALE

24" X 36" SCALE: 1" = 80'-0"

11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING SANITARY SEWER MAIN
- EXISTING SANITARY FORCE MAIN
- PROPOSED SANITARY SEWER MAIN
- PROPOSED SANITARY LATERAL
- PROPOSED SANITARY LIFT STATION
- PROPOSED SANITARY SEWER MAIN (BY OTHERS)

SEE SHEET 2 OF 3 FOR CONTINUATION

3 OF 3

EXHIBIT S-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED SANITARY SEWER SYSTEM MAP

EXISTING SANITARY SEWER FORCE MAIN

PROPOSED SANITARY SEWER MAIN (TYP.)

CONNECT TO EXISTING SANITARY SEWER SYSTEM (TYP.)

EXISTING SANITARY SEWER MAIN (TYP.)

96TH STREET

COLLINS AVENUE (A-1-A)

EXISTING PUMP STATION (PS 2)

PROPOSED SANITARY SEWER MANHOLE (TYP.)

EXISTING SANITARY SEWER MANHOLE (TYP.)

EXISTING SANITARY SEWER FORCE MAIN TO MIAMI BEACH

EXISTING SANITARY SEWER (TO REMAIN)

1
MAJESTIC

2
ST. REGIS RESORT

3
ST. REGIS RESORT

4
ST. REGIS RESORT

5
BAL MORAL

6
BAL MORAL

7
SEAVIEW HOTEL

0 25 50 100
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 50'-0"
11" X 17" SCALE: 1" = 100'-0"

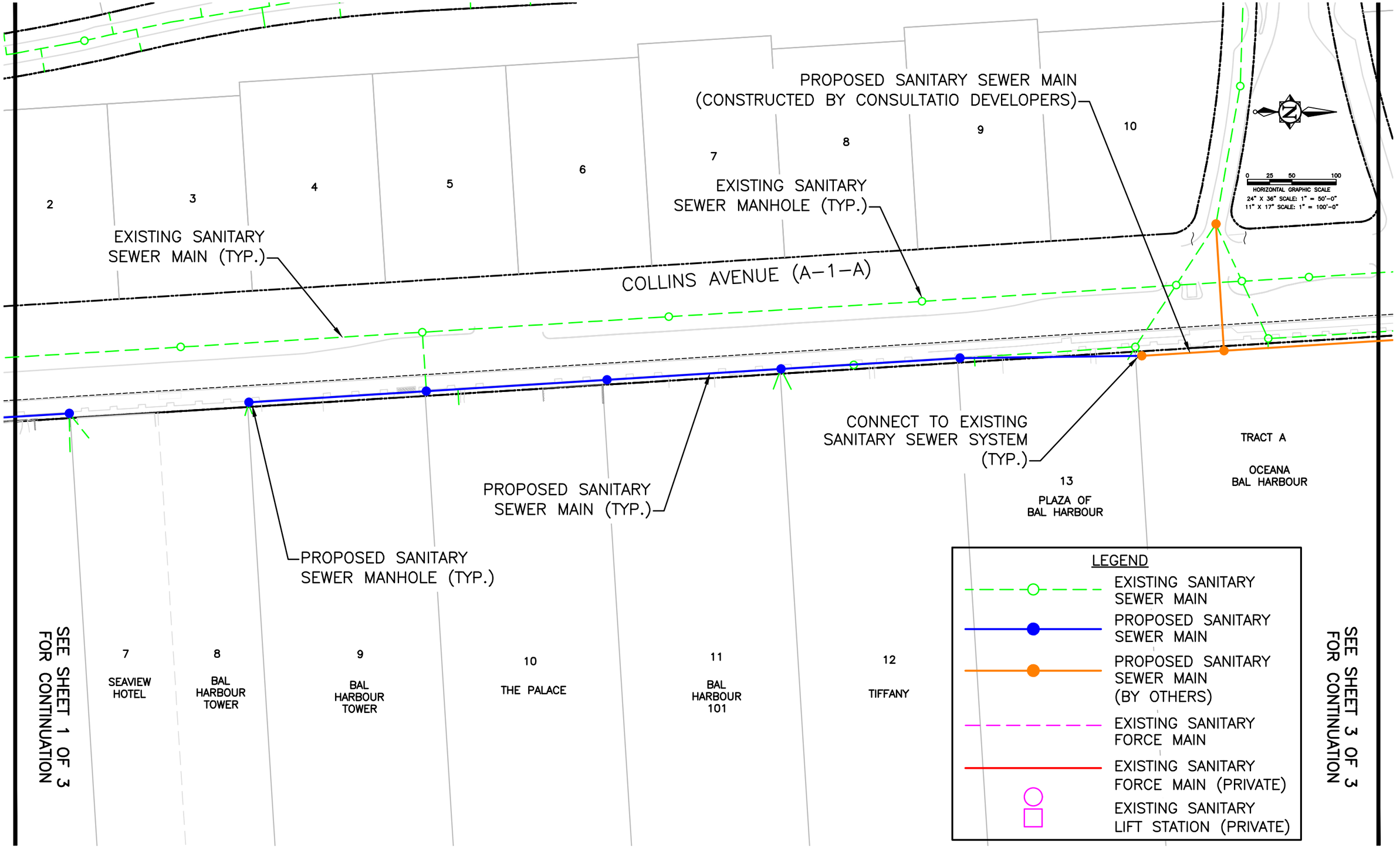
LEGEND

- EXISTING SANITARY SEWER MAIN
- PROPOSED SANITARY SEWER MAIN
- PROPOSED SANITARY SEWER MAIN (BY OTHERS)
- EXISTING SANITARY FORCE MAIN
- EXISTING SANITARY FORCE MAIN (PRIVATE)
- EXISTING SANITARY LIFT STATION (PRIVATE)

SEE SHEET 2 OF 3 FOR CONTINUATION

EXHIBIT S-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE SANITARY SEWER SECONDARY SYSTEM MAP



2 OF 3

EXHIBIT S-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE SANITARY SEWER SECONDARY SYSTEM MAP

P:\Cities_Villages_Towns\Bal_Harbour\12-1146-BCP-BAL HARBOUR-UTILITY-RDWY-MASTER-PLAN\04-Engineering Plans\02-Exhibits\PROP SEWER A-1-A\00-1146-SAN-EXB.dwg, 8/26/2014 9:50:59 AM, mmarenco, 1:2

EXISTING SANITARY SEWER MAIN (TYP.)

EXISTING SANITARY SEWER MANHOLE (TYP.)

CONNECT TO EXISTING SANITARY SEWER SYSTEM (TYP.)

COLLINS AVENUE (A–1–A)

EXISTING SANITARY SEWER FORCE MAIN (PRIVATE)

PROPOSED SANITARY SEWER MANHOLE (TYP.)

EXISTING SANITARY LIFT STATION (PRIVATE)

CONNECT TO EXISTING SANITARY SEWER SYSTEM (TYP.)

PROPOSED SANITARY SEWER MAIN (TYP.)

PROPOSED SANITARY SEWER MAIN (CONSTRUCTED BY CONSULTATIO DEVELOPERS)

1 2 3 4 5 3

TRACT A

OCEANA BAL HARBOUR

14 KENILWORTH CONDOS

15 BELINNI

16 CARLTON TERRACE

HARBOUR HOUSE

HARBOUR HOUSE

ONE BAL HARBOUR

0 25 50 100

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 50'-0"
11" X 17" SCALE: 1" = 100'-0"

LEGEND

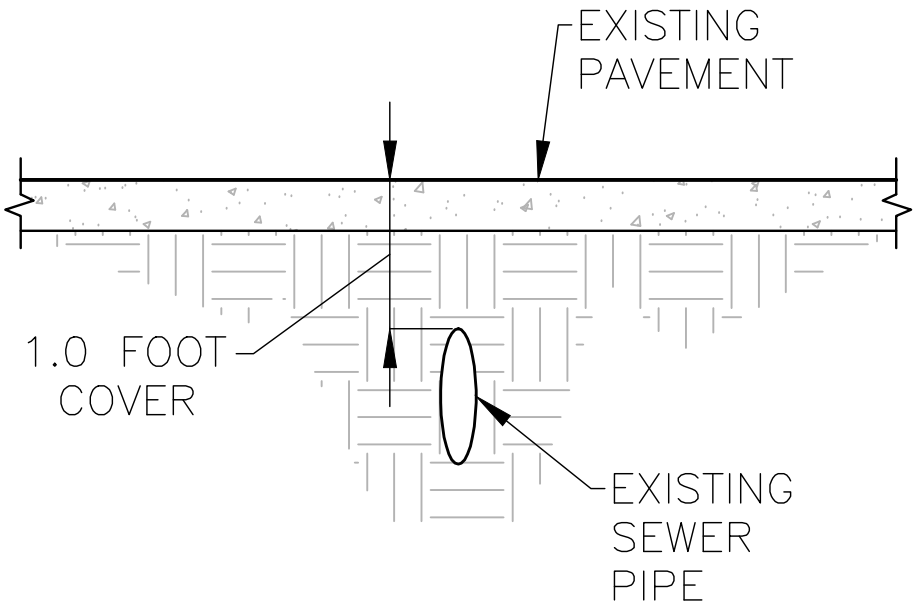
- EXISTING SANITARY SEWER MAIN
- PROPOSED SANITARY SEWER MAIN
- PROPOSED SANITARY SEWER MAIN (BY OTHERS)
- EXISTING SANITARY FORCE MAIN
- EXISTING SANITARY FORCE MAIN (PRIVATE)
- EXISTING SANITARY LIFT STATION (PRIVATE)

SEE SHEET 2 OF 3 FOR CONTINUATION

EXHIBIT S–3

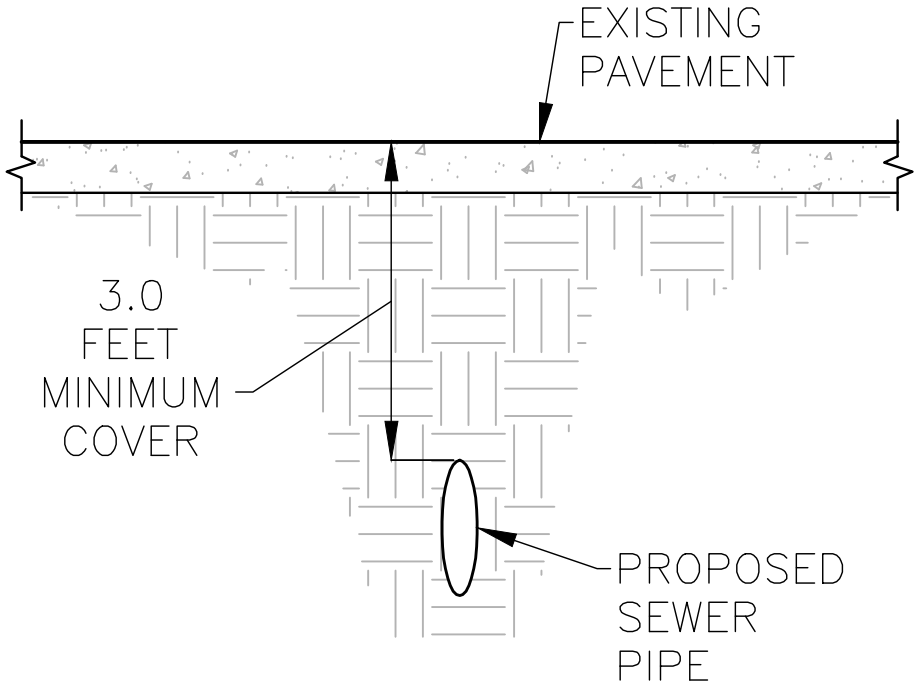
BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE SANITARY SEWER SECONDARY SYSTEM MAP

EXISTING DEPTH



DEPTH OF COVER AT
TERMINAL MAINS LESS
THAN MINIMUM STANDARD.

PROPOSED DEPTH

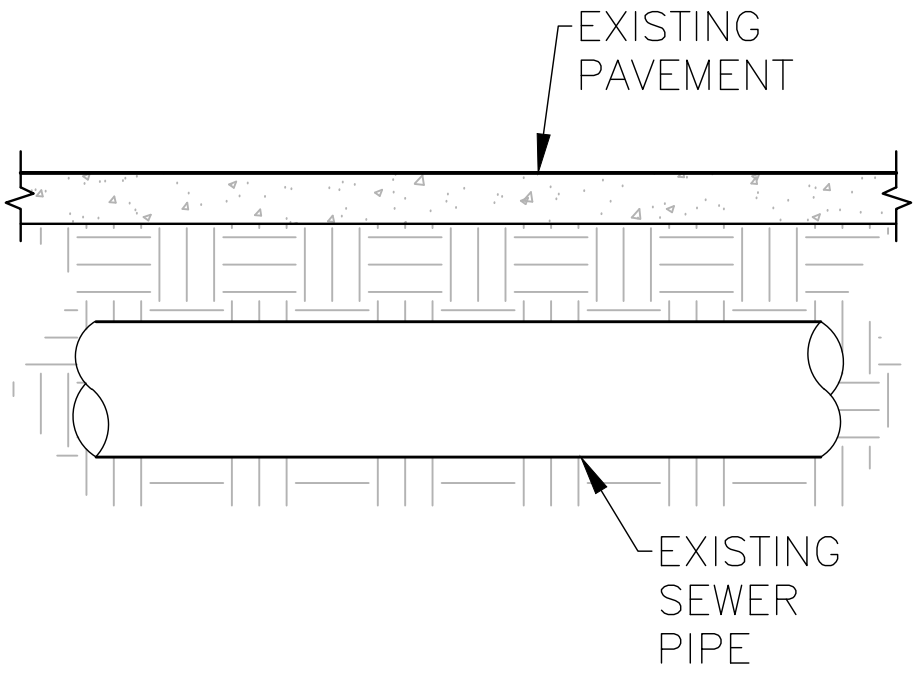


MINIMUM COVERS MET ON
ALL SEWER PIPE

EXHIBIT S–4

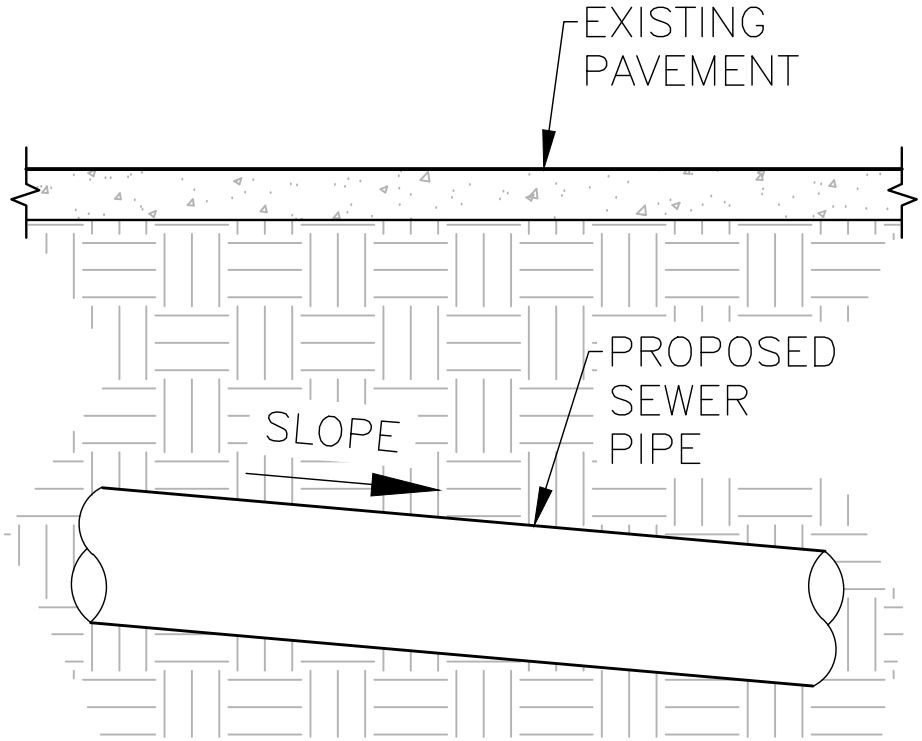
SANITARY SEWER DEPTH COMPARISONS
EXISTING – PROPOSED

EXISTING SLOPE



SUBSTANDARD SLOPES.
MAJORITY OF PIPES LAID FLAT.

PROPOSED SLOPE

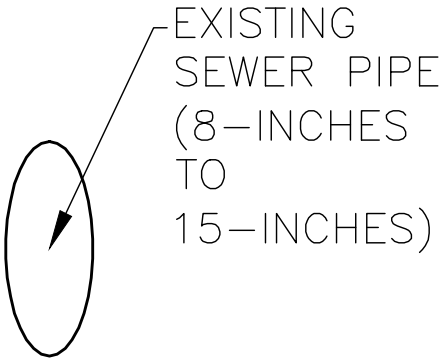


SLOPES AT MINIMUM
STANDARDS FOR VARIOUS
PIPE SIZES.

EXHIBIT S–4

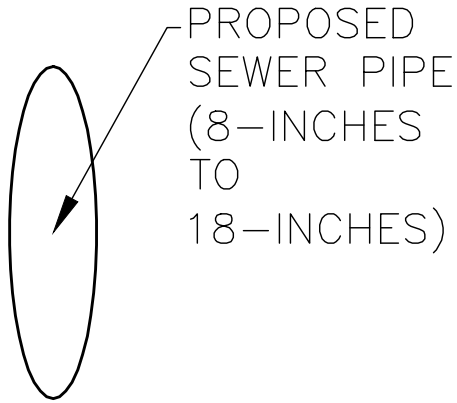
SANITARY SEWER SLOPE COMPARISONS
EXISTING – PROPOSED

EXISTING PIPE



EXISTING CLAY PIPE
INSTALLED IN 1946 & 1960

PROPOSED PIPE



PROPOSED PIPE SIZED TO
MEET TODAY'S DEMANDS
CONSTRUCTED OF INDUSTRY
ACCEPTED MATERIAL.

EXHIBIT S–4

SANITARY SEWER PIPE TYPE & SIZE COMPARISONS
EXISTING – PROPOSED

BAL HARBOUR VILLAGE
EXISTING SANITARY SEWER
COMPREHENSIVE DATABASE
EXHIBIT S-5

Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
LS1	-	Bal Bay Drive	N of Bal Bay Court	51+4.60/78.60'L	Lift Station	6.42	(-) 0.97 E	18"	CLAY	80	(-) 0.0016	0.0012	X	YES	12" PIPE SLOPES IN WRONG DIRECTION
35	LS1	Bal Bay Drive	San. Lift Station N of Bal Bay Court	51+25.29/1.44'L	Manhole	4.22	(-) 1.10 W (-) 1.15 S (-) 1.17 N	18" 15" 15"	CLAY CLAY CLAY	80 269 270	(-) 0.0016 (-) 0.0017 0.0011	0.0012 0.0015 0.0015	X X X	YES YES YES	12" PIPE SLOPES IN WRONG DIRECTION
34	35 (33)	Bal Bay Drive	Bal Bay Court South	48+57.35/11.1'L	Manhole	4.70	(-) 0.68 N (-) 0.63 S 0.60 W	15" 12" 8"	CLAY CLAY CLAY	269 462 110	(-) 0.0017 (-) 0.0001 (-) 0.002	0.0015 0.0022 0.0040	X X X	YES YES YES	PIPE LENGTH LONGER THAN 400'/ PIPE TO MANHOLE No. 1 & 3 FLOWS IN OPPOSITE DIRECTION PIPE TO MH No. 39 FLOWS IN OPPOSITE DIRECTION
31	34	Bal Bay Drive	N of Balfour Drive	43+95.53/0.99'L	Manhole	4.88	(-) 0.69 N (-) 0.80 S 0.56 W 0.13 E	12" 12" 6" 6"	CLAY CLAY CLAY CLAY	462 180 - -	(-) 0.0001 0.0022 - -	0.0022 0.0022 - -	X M - -	YES YES YES YES	PIPE LENGTH LONGER THAN 400'/ PIPE TO MANHOLE No. 2 FLOWS IN OPPOSITE DIRECTION CLAY PIPE PAST 50-YR LIFE EXPECTANCY
30a	31	Bal Bay Drive	N of Balfour Drive	42+15.99/3.01'L	Manhole	4.59	(-) 0.40 N (-) 0.40 S 0.62 W 1.73 E	12" 12" 6" 6"	CLAY CLAY CLAY CLAY	180 232 - -	0.0022 0.0021 - -	0.0022 0.0022 - -	M M - -	NO NO YES NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
30	30a (29)	Bal Bay Drive	Balfour Dr. Intersection	39+84.24/0.02'R	Manhole	5.00	0.09 N 0.12 S 0.87 W 0.13 E 0.89 NE 0.85 SE	12" 8" 6" 10" 6" 6"	CLAY CLAY CLAY CLAY CLAY CLAY	232 351 - 307 - -	0.0021 0.00088 - 0.0009 - -	0.0022 0.0040 - 0.0028 - -	M X - X - -	YES YES YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
4	30	Bal Bay Drive	S of Balfour Drive	36+33.57/0.97'L	Manhole	5.26	0.43 N 0.43 S	8" 8"	CLAY CLAY	351 349	0.00088 0.0010	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
3	4	Bal Bay Drive	N of Park Drive	32+84.26/1.47'L	Manhole	5.08	0.79 N 0.74 S	8" 8"	CLAY CLAY	349 342	0.0010 0.0003	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
2	3	Bal Bay Drive	Park Dr. Intersection	29+42.17/1.46'L	Manhole	4.84	0.84 N 0.89 S 1.26 NE	8" 8" 8"	CLAY CLAY CLAY	342 190 -	0.0003 0.0010 -	0.0040 0.0040 -	M X -	YES YES NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
1	2	Bal Bay Drive	S of Park Drive	27+51.99/3.71'L	Manhole	4.27	1.13 N 1.11 SE 1.05 NE	8" 6" 6"	CLAY CLAY CLAY	190 - -	0.0010 - -	0.0040 - -	X - -	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
29	30	Balfour Drive	Camden Drive	20+00.38/0.87'L	Manhole	5.23	0.42 W 0.40 E 0.42 N 0.40 S 0.82 NW 0.73 NE 0.68 SE 0.71 SW	10" 10" 8" 8" 6" 6" 6" 6"	CLAY CLAY CLAY CLAY CLAY CLAY CLAY CLAY	307 328 349 437 - - - -	0.0009 0.0017 0.0001 0.0003 - - - -	0.0028 0.0028 0.0040 0.0040 - - - -	X X X X - - - -	YES YES YES YES YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE LENGTH LONGER THAN 400'
20	29 (19)	Balfour Drive	Bal Cross Drive	16+37.99/0.35'L	Manhole	5.43	0.96 W 0.98 E 0.99 NE	10" 10" 8"	CLAY CLAY CLAY	328 385 68	0.0017 0.0003 0.0034	0.0028 0.0028 0.0040	X X X	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
16	20	Balfour Drive	Park Drive	20+23.77/0.11'R	Manhole	5.03	1.10 W 1.15 E 1.17 N	10" 10" 8"	CLAY CLAY CLAY	385 220 300	0.0003 0.0005 0.0018	0.0028 0.0028 0.0040	X X X	NO NO YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY

Slope Standards: **M** - Minimum Accepted Slopes per Ten States Standard.

X - Substandard, Less than the minimum slope for pipe size.

Cover Standards: **YES:** At or greater than the minimum 36 inches of cover.
NO: Less than the minimum 36 inches of cover.

BAL HARBOUR VILLAGE
EXISTING SANITARY SEWER
COMPREHENSIVE DATABASE
EXHIBIT S-5

Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
13	16	Balfour Drive	W of Collins Avenue	22+43.92/0.56'R	Manhole	4.71	1.26 W 1.38 E	10" 12"	CLAY CLAY	220 93	0.0005 (-) 0.0001	0.0028 0.0022	X X	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE TO MH 14 FLOWS IN OPPOSITE DIRECTION
104	13	Collins Avenue	Balfour Drive	23+31.60/30.46'L	Conflict Manhole	5.07	1.37 W 1.42 E	12" 12"	CLAY CLAY	93 47	(-) 0.0001 0.0036	0.0022 0.0022	X M	NO NO	PIPE TO MH 14 FLOWS IN OPPOSITE DIRECTION CLAY PIPE PAST 50-YR LIFE EXPECTANCY
103	104	Collins Avenue	Center Median	196+48.59 48.40' L	Manhole	5.58	(-) 0.77 N (-) 1.04 S 1.54 E 1.54 W	15" 18" 12" 12"	CLAY CLAY CLAY CLAY	246 245 68 47	0.0015 0.0014 0.018 0.0036	0.0015 0.0012 0.0022 0.0022	M M M M	YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
102	103	Collins Avenue	East R/W	196+37.82 18.57'R	Manhole	5.15	1.77 W 1.74 N 1.89 S 2.83 E	12" 10" 10" 12"	CLAY CLAY CLAY CLAY	68 85 110 -	0.018 (-) 0.0012 (-) 0.0012 -	0.0022 0.0028 0.0028 -	M X X -	NO NO NO NO	10" PIPE FLOWS IN OPPOSITE DIRECTION CLAY PIPE PAST 50-YR LIFE EXPECTANCY COLLINS AVENUE NORTH SAN. SEWER MAIN COLLINS AVENUE SOUTH SAN. SEWER MAIN SERVES 9801 COLLINS AVENUE LESS THAN REQUIRED PIPE COVER
12	29	Camden Drive	Camden Court	15+63.54/0.99'L	Manhole	5.20	0.55 N 0.55 S 0.58 E	8" 8" 8"	CLAY CLAY CLAY	437 431 200	0.0003 (-) 0.0001 (-) 0.0003	0.0040 0.0040 0.0040	X X X	YES YES YES	PIPE LENGTH LONGER THAN 400' PIPE LENGTH LONGER THAN 400'/ PIPE FLOWS IN OPPOSITE DIRECTION FROM MH No's 18 & 21
10	12	Park Drive	Camden Drive	23+71.85/0.83'L	Manhole	4.61	0.51 N 0.53 E 0.54 S 0.67 W	8" 8" 8" 8"	CLAY CLAY CLAY CLAY	431 300 235 134	(-) 0.0001 0.0026 - (-) 0.0006	0.0040 0.0040 - 0.0040	X X - X	YES YES YES YES	PIPE LENGTH LONGER THAN 400'/ PIPE FLOWS IN OPPOSITE DIRECTION FROM MH No. 17 SERVES SHOPPES OF BAL HARBOUR
9	10	Park Drive	E of Camden Drive	26+72.59/1.23'L	Manhole	5.25	1.33 SW 1.26 NE 1.62 E	8" 8" 8"	CLAY CLAY CLAY	300 245 -	0.0026 0.0005 -	0.0040 0.0040 -	X X -	YES YES NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY SERVES SHOPPES OF BAL HARBOUR
8	9	Park Drive	S of Balfour Drive	29+19.03/2.41'L	Manhole	5.02	1.40 S 1.40 W 1.31 E	8" 8" 8"	CLAY CLAY CLAY	245 - -	0.0005 - -	0.0040 - -	X - -	NO NO YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES SHOPPES OF BAL HARBOUR
11	12	Camden Court	E of Camden Drive	52+24.89/7.43'L	Manhole	5.31	0.52 W 0.91 E 0.91 N 0.95 S	8" 6" 4" 4"	CLAY CLAY CLAY CLAY	200 - - -	(-) 0.0003 - - -	0.0040 - - -	X - - -	YES YES YES YES	PIPE FLOWS IN OPPOSITE DIRECTION FROM MH No. 17 CLAY PIPE PAST 50-YR LIFE EXPECTANCY
5	10	Park Drive	W of Camden Drive	22+37.93/0.78'L	Manhole	4.56	0.59 NE 0.84 N 0.84 NW 0.76 SW	8" 8" 8" 8"	CLAY CLAY CLAY CLAY	134 - - -	(-) 0.0006 - - -	0.0040 - - -	X - - -	YES YES YES YES	PIPE FLOWS IN OPPOSITE DIRECTION FROM MH No. 18 CLAY PIPE PAST 50-YR LIFE EXPECTANCY SERVES SHOPPES OF BAL HARBOUR
6	7	Bal Harbour Shoppes	S of Camden Drive	-	Manhole	-	-	-	-	-	-	-	-	-	STRUCTURE NO LONGER IN SERVICE
7	10	Bal Harbour Shoppes	S of Camden Drive	-	Manhole	-	-	-	-	-	-	-	-	-	STRUCTURE NO LONGER IN SERVICE

Slope Standards: **M** - Minimum Accepted Slopes per Ten States Standard.

X - Substandard, Less than the minimum slope for pipe size.

Cover Standards: **YES:** At or greater than the minimum 36 inches of cover.
NO: Less than the minimum 36 inches of cover.

BAL HARBOUR VILLAGE
EXISTING SANITARY SEWER
COMPREHENSIVE DATABASE
EXHIBIT S-5

Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
28	29	Camden Drive	N of Balfour Drive	23+50.00/1.08'L	Manhole	5.01	0.42 N 0.45 S	8" 8"	CLAY CLAY	349 349	0.0002 0.0001	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
27	28	Camden Drive	N of Balfour Drive	26+99.69/1.01'L	Manhole	4.89	0.57 N 0.50 S	8" 8"	CLAY CLAY	171 349	0.0029 0.0002	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
26	27	Camden Drive	W of Bal Cross Drive	28+71.95/0.86'L	Manhole	4.85	1.11 NE 1.07 S 1.56 E	8" 8" 8"	CLAY CLAY CLAY	140 171 -	(-) 0.001 0.0029 -	0.0040 0.0040 -	X X -	YES YES NO	PIPE FLOWS IN OPPOSITE DIRECTION FROM MH No, 26 LESS THAN REQUIRED PIPE COVER
25	26	Camden Drive	W of Bal Cross Drive	30+13.04/0.85'L	Manhole	4.49	0.93 E 0.94 SW	8" 8"	CLAY CLAY	138 140	0.0026 (-) 0.001	0.0040 0.0040	X X	NO NO	PIPE FLOWS IN OPPOSITE DIRECTION FROM MH No. 25
24	25	Bal Cross Drive	Camden Dr. Intersect.	15+90.02/0.77'L	Manhole	4.58	1.36 N 1.36 S 1.30 W 1.79 E	8" 8" 8" 6"	CLAY CLAY CLAY CLAY	201 250 138 -	0.0017 0.0005 0.0026 -	0.0040 0.0040 0.0040 -	X X X -	NO NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
23	24	Bal Cross Drive	S of Harbour Way	17+90.64/0.67'L	Manhole	4.37	1.72 S 1.86 E	8" 8"	CLAY CLAY	201 -	0.0017 -	0.0040 -	X -	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
19	20	Bal Cross Drive	Balfour Dr. Intersection	06+29.15/0.36'L	Manhole	5.51	1.21 N 1.22 SW 1.49 W 1.51 E	8" 8" 6" 6"	CLAY CLAY CLAY CLAY	189 68 - -	0.0030 0.0034 - -	0.0040 0.0040 - -	X X - -	YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
18	19	Bal Cross Drive	N of Balfour Drive	08+19.47/0.76'L	Manhole	5.40	1.79 N 1.79 S	8" 8"	CLAY CLAY	181 189	0.0014 0.0030	0.0040 0.0040	X X	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
17	18	Bal Cross Drive	N of Balfour Drive	09+99.96/1.01'L	Manhole	5.07	2.06 S 2.14 W	8" 6"	CLAY CLAY	181 -	0.0014 -	0.0040 -	X -	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
15	16	Park Road	N of Balfour Drive	34+50.15/0.45'L	Manhole	5.23	1.72 N 1.71 S	8" 8"	CLAY CLAY	300 300	(-) 0.001 0.0018	0.0040 0.0040	X X	NO NO	LESS THAN REQUIRED PIPE COVER CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FOWS IN OPPOSITE DIRECTION
14	15	Park Road	N of Balfour Drive	37+49.93/1.06'L	Manhole	5.08	1.42 S 1.35 E	8" 8"	CLAY CLAY	300 -	(-) 0.001 -	0.0040 -	X -	NO YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION
22	24	Bal Cross Drive	S of Camden Drive	13+40.20/0.82'L	Manhole	4.67	1.49 N 1.51 S 1.84 E	8" 8" 6"	CLAY CLAY CLAY	250 210 -	0.0005 0.0015 -	0.0040 0.0040 -	X X -	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
21	22	Bal Cross Drive	S of Camden Drive	11+29.85/1.00'L	Manhole	5.02	1.83 N 1.88 W 1.84 SW 1.87 SE	8" 8" 6" 6"	CLAY CLAY CLAY CLAY	210 - - -	0.0015 - - -	0.0040 - - -	X - - -	NO NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
33	34	Bal Bay Court	W of Bal Bay Drive	48+81.37/17.66'L	Manhole	4.87	0.34 N 0.33 E 0.37 W	8" 8" 6"	CLAY CLAY CLAY	102 110 -	0.0135 (-) 0.002 -	0.0040 0.0040 -	M X -	YES YES YES	PIPE TO MH No. 2 FLOWS IN OPPOSITE DIRECTION
32	33	Bal Bay Court	W of Bal Bay Drive	49+56.64 168.58'L	Manhole	4.71	1.38 S 1.38 NW 1.37 W	8" 6" 6"	CLAY CLAY CLAY	102 - -	0.0135 - -	0.0040 - -	M - -	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER

Slope Standards: **M** - Minimum Accepted Slopes per Ten States Standard.

X - Substandard, Less than the minimum slope for pipe size.

Cover Standards: **YES:** At or greater than the minimum 36 inches of cover.
NO: Less than the minimum 36 inches of cover.

BAL HARBOUR VILLAGE
EXISTING SANITARY SEWER
COMPREHENSIVE DATABASE
EXHIBIT S-5

Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
68	35	Bal Bay Drive	Harbour Way (East)	53+94.46/7.33'R	Manhole	4.10	(-) 0.90 N (-) 0.86 S (-) 0.85 E 0.04 SE	10" 15" 15" 8"	CLAY CLAY CLAY CLAY	241 270 387 -	0.0019 0.0011 0.0003 -	0.0028 0.0015 0.0015 -	X X X -	YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
42	68	Harbour Way East	Bal Cross Drive	19+99.59/1.79'L	Manhole	4.14	(-) 0.65 E (-) 0.74 W (-) 0.13 SE	15" 15" 8"	CLAY CLAY CLAY	30 387 -	0.0067 0.0003 -	0.0015 0.0015 -	M X -	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
41a	42 (63a)	Harbour Way East	Bal Cross Drive	35+42.71/3.21'R	Manhole	3.76	(-) 0.81 N (-) 0.85 W (-) 0.86 E	8" 15" 15"	PVC CLAY CLAY	163 30 298	0.0007 0.0067 0.002	0.0040 0.0015 0.0015	X M M	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
41	41a (38)	Harbour Way East	Park Drive	47+62.09/0.69'L	Manhole	3.87	(-) 0.40 E (-) 0.24 W (-) 0.44 S	15" 15" 8"	CLAY CLAY CLAY	160 298 300	0.0004 0.002 0.0019	0.0015 0.0015 0.0040	X M X	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
40	41	Harbour Way East	Collins Ave. & Park Dr.	40+02.62/0.05'R	Manhole	4.12	(-) 0.31 E (-) 0.34 W	15" 15"	CLAY CLAY	157 160	0.0038 0.0004	0.0015 0.0015	M X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
39	40	Harbour Way East	W Side Collins Ave.	41+60.20/0.40'R	Manhole	4.09	0.63 NE 0.50 SE 0.29 W	12" 12" 15"	CLAY CLAY CLAY	70 82 157	0.0034 (-) 0.004 0.0038	0.0022 0.0022 0.0015	M X M	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 12" PIPE FLOWS IN OPPOSITE DIRECTION LESS THAN REQUIRED PIPE COVER
82	39	Collins Avenue	Ctr Median	42+16.68 47.46'L	Manhole	5.21	2.04 N 2.00 S 0.70 NE 0.70 SW	12" 12" 12" 12"	CLAY CLAY CLAY CLAY	76 74 73 61	0.0002 0.001 0.001 0.001	0.0022 0.0022 0.0022 0.0022	X X X X	NO NO YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
75	82	Collins Avenue	E Side Collins Ave.	213+82.85 18.67'R	Manhole	4.10	0.78 N 0.78 SW 0.91 E	12" 12" 10"	CLAY CLAY CLAY	250 73 -	0.002 0.001 -	0.0022 0.0022 -	X X -	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES 10201 COLLINS AVENUE
87	39	Collins Avenue	Harbour Way East	212+83.29 47.81'L	Manhole	4.65	1.94 N 1.69 S 0.16 NW 0.13 SE	12" 15" 12" 12"	CLAY CLAY CLAY CLAY	74 281 82 83	0.001 0.003 (-) 0.004 0.0096	0.0022 0.0015 0.0022 0.0022	X M X M	NO NO YES YES	SANITARY SEWER MAIN - COLLINS AVENUE CTR MEDIAN SANITARY SEWER MAIN - COLLINS AVENUE CTR MEDIAN CLAY PIPE PAST 50-YR LIFE EXPECTANCY 12" PIPE FLOWS IN OPPOSITE DIRECTION
86	87	Collins Avenue	Harbour Way East	212+33.11 18.69'R	Manhole	4.03	0.93 NW 0.63 NE 0.68 S 0.91 SE	12" 10" 10" 10"	CLAY CLAY CLAY CLAY	83 - 318 -	0.006 - 0.001 -	0.0022 - 0.0028 -	M - X -	NO NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES EAST SIDE OF COLLINS AVENUE
36	37	Park Road	N of Balfour Drive	38+82.44/1.22'L	Manhole	4.65	0.78 N	8"	CLAY	280	0.0021	0.0040	X	YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
37	38	Park Road	S of Harbour Way	41+62.11/1.01'L	Manhole	4.00	0.19 N 0.17 S	8" 8"	CLAY CLAY	300 280	0.0003 0.0021	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
38	41	Park Road	S of Harbour Way	44+62.39/0.88'L	Manhole	4.00	0.13 N 0.11 S 0.39 W	8" 8" 8"	CLAY CLAY CLAY	300 300 -	0.0019 0.0003 -	0.0040 0.0040 -	X X -	YES YES NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER

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BAL HARBOUR VILLAGE
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Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
67	68	Bal Bay Drive (South)	Yacht Area	56+42.61 43.48'L	Manhole	4.25	(-) 0.48 N (-) 0.45 S	10" 10"	CLAY CLAY	219 241	0.0004 0.0019	0.0028 0.0028	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
66	67	Harbour Way	Bal Bay Drive (South)	11+34.31/12.96'R	Manhole	4.40	(-) 0.52 W (-) 0.38 S (-) 0.18 E	8" 10" 8"	CLAY CLAY CLAY	211 219 230	0.0027 0.0004 (-) 0.0019	0.0040 0.0028 0.0040	X X X	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION
53	66	Harbour Way	Biscay Drive	60+69.48/0.09'R	Manhole	4.59	0.09 N 0.07 W 0.05 E	8" 8" 8"	CLAY CLAY CLAY	242 150 211	0.0009 0.0033 0.0027	0.0040 0.0040 0.0040	X X X	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
49	53	Harbour Way	W of Biscay Drive	62+20.72/0.17'L	Manhole	4.88	0.59 W 0.57 E	8" 8"	CLAY CLAY	167 150	0.0016 0.0033	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
48	49	Bal Bay Drive	Harbour Way	70+19.14/0.66'L	Manhole	5.12	0.89 N 0.82 S 0.86 E	8" 8" 8"	CLAY CLAY CLAY	340 331 167	0.00017 0.0012 0.0016	0.0040 0.0040 0.0040	X X X	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
46	48	Bal Bay Drive	N of Harbour Way	73+59.88/0.01'L	Manhole	4.98	0.96 N 0.95 S	8" 8"	CLAY CLAY	302 340	(-) 0.0006 0.00017	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION
45	46	Bal Bay Drive	N of Harbour Way	76+62.18/0.06'R	Manhole	4.53	0.78 NE 0.76 SW 1.47 W 1.39 E	8" 8" 6" 6"	CLAY CLAY CLAY CLAY	359 302 - -	0.0012 (-) 0.0006 - -	0.0040 0.0040 - -	X X - -	YES YES NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION LESS THAN REQUIRED PIPE COVER
44	45	Bal Bay Drive	N of Harbour Way	80+21.93/0.07'L	Manhole	4.41	1.22 NE 1.21 SW	8" 8"	CLAY CLAY	188 359	0.0003 0.0012	0.0040 0.0040	X X	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
43	44	Bal Bay Drive	W of Bal Cross Drive	82+12.01/0.66'L	Manhole	4.08	1.28 SW 1.45 NE 1.46 N	8" 8" 6"	CLAY CLAY CLAY	188 - -	0.0003 - -	0.0040 - -	X - -	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
52	53	Biscay Drive	N of Harbour Way	12+44.52/0.55'L	Manhole	4.60	0.32 S 0.34 NE	8" 8"	CLAY CLAY	242 150	0.0009 0.0020	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
51	52	Biscay Drive	N of Harbour Way	13+94.62/0.40'L	Manhole	4.81	0.64 SW 0.65 NE	8" 8"	CLAY CLAY	150 150	0.0020 0.0011	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
50	51	Biscay Drive	W of Bal Cross Drive	15+45.05/0.69'L	Manhole	4.76	0.82 W 0.98 N 1.10 S	8" 6" 6"	CLAY CLAY CLAY	150 - -	0.0011 - -	0.0040 - -	X - -	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
65	66	Harbour Way West	E of Bal Bay Drive	13+62.70/0.04'L	Manhole	4.18	(-) 0.62 E (-) 0.63 W	8" 8"	CLAY PVC	150 230	0.0020 (-) 0.0019	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION
64	65	Harbour Way West	Bal Cross Intersection	21+69.28/0.34'L	Manhole	3.86	(-) 0.33 N (-) 0.31 W (-) 0.34 E	8" 8" 8"	CLAY CLAY CLAY	401 150 30	0.0004 0.0020 (-) 0.010	0.0040 0.0040 0.0040	X X X	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPES FLOW IN OPPOSITE DIRECTION
59	64	Bal Cross Drive	N of Harbour Way	25+69.74/0.29'R	Manhole	3.85	(-) 0.20 N (-) 0.17 S	8" 8"	CLAY CLAY	392 401	0.0025 0.0004	0.0040 0.0040	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPES FLOW IN OPPOSITE DIRECTION
58	59	Bal Cross Drive	N of Biscay Drive	29+61.86/0.04'L	Manhole	4.41	0.78 S 0.76 NE 0.79 W	8" 8" 6"	CLAY CLAY CLAY	392 200 -	0.0025 (-) 0.0011 -	0.0040 0.0040 -	X X -	NO NO YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION LESS THAN REQUIRED PIPE COVER
57	58	Bal Cross Drive	S of Bal Bay Drive	31+62.92/0.45'R	Manhole	3.76	0.56 NE 0.53 S	8" 8"	CLAY CLAY	203 200	0.0042 (-) 0.0011	0.0040 0.0040	M X	NO NO	LESS THAN REQUIRED PIPE COVER CLAY PIPE PAST 50-YR LIFE EXPECTANCY 8" PIPE FLOWS IN OPPOSITE DIRECTION

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Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
56	57	Bal Cross Drive	Bal Bay Dr. Intersection	84+57.77/0.59'L	Manhole	4.03	1.40 N	6"	CLAY	-	-	-	-	NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							1.42 SW	8"	CLAY	203	0.0042	0.0040	M	NO	8" PIPE FLOWS IN OPPOSITE DIRECTION
							1.34 E	8"	CLAY	194	(-) 0.0007	0.0040	X	NO	LESS THAN REQUIRED PIPE COVER
55	56	Bal Bay Drive	E of Park Drive	86+50.41	Manhole	4.03	1.20 W	8"	CLAY	194	(-) 0.0007	0.0040	X	NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
				12.21'L			1.23 E	8"	CLAY	100	0.0158	0.0040	M	NO	8" PIPE FLOWS IN OPPOSITE DIRECTION
							1.32 N	6"	CLAY	-	-	-	-	NO	LESS THAN REQUIRED PIPE COVER
							1.28 NE	8"	CLAY	-	-	-	-	NO	
54	55	Bal Bay Drive	E of Park Drive	87+48.03/4.78'L	Manhole	4.37	2.81 W	8"	CLAY	100	0.0158	0.0040	M	NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							3.01 N	8"	CLAY	-	-	-	-	NO	LESS THAN REQUIRED PIPE COVER
							3.21 S	8"	CLAY	-	-	-	-	NO	
63a	64	Harbour Way West	E of Bal Cross Drive	15+42.01/3.87'L	Manhole	3.59	(-) 0.69 S	8"	CLAY	162	0.0007	0.0040	X	YES	CONNECTS TO MH No. 114 @ HARBOUR WAY EAST
	(41a)						(-) 0.61 E	8"	CLAY	299	0.0022	0.0040	X	YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							(-) 0.64 W	8"	CLAY	30	(-) 0.010	0.0040	X	YES	8" PIPE FLOWS IN OPPOSITE DIRECTION
63	63a	Harbour Way West	Park Dr. Intersection	48+59.12/0.02'R	Manhole	3.99	0.10 N	8"	CLAY	260	0.00027	0.0040	X	YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							0.06 W	8"	CLAY	299	0.0022	0.0040	X	YES	
62	63	Park Drive	N of Harbour Way	51+18.99/0.22'R	Manhole	4.07	0.20 N	8"	CLAY	350	0.0018	0.0040	X	YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							0.17 S	8"	CLAY	260	0.00027	0.0040	X	YES	
61	62	Park Drive	N of Harbour Way	54+69.16/0.35'R	Manhole	3.66	0.88 N	8"	CLAY	349	0.0019	0.0040	X	NO	LESS THAN REQUIRED PIPE COVER
							0.88 S	8"	CLAY	350	0.0018	0.0040	X	NO	STRUCTURE FILLED WITH SEDIMENT CLAY PIPE PAST 50-YR LIFE EXPECTANCY
60	61	Park Drive	S of Bal Bay Drive	58+18.39/0.47'R	Manhole	4.12	1.55 S	8"	CLAY	349	0.0019	0.0040	X	NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							1.57 E	8"	CLAY	-	-	-	-	NO	SERVES 291 BAL BAY DRIVE LESS THAN REQUIRED PIPE COVER
47	48	Bal Bay Drive	S of Harbour Way	66+87.11/0.21'R	Manhole	4.68	1.22 N	8"	CLAY	331	0.0012	0.0040	X	NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
							1.26 S	8"	CLAY	-	-	-	-	NO	LESS THAN REQUIRED PIPE COVER

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Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
LS 2	-	Collins Avenue	Harding Avenue	187+79.87 133.51'L	Lift Station	-	(-) 6.80 E	18"	DIP	10	0.028	0.0012	M	YES	
109A	LS 2	Collins Avenue	Harding Avenue	12+49.58/66.97'R	Manhole	5.29	(-) 6.62 N (-) 6.62 W	18" 18"	DIP DIP	19 10	0.158 0.028	0.0012 0.0012	M M	YES YES	
109	109A	Collins Avenue	Harding Avenue	12+49.58/66.97'R	Manhole	5.29	(-) 4.28 NW (-) 4.01 NE (-) 3.61 S	18" 12" 18"	DIP DIP DIP	109 73 19	0.0079 0.012 0.158	0.0012 0.0015 0.0012	M M M	YES YES YES	
108	109 (109B)	Collins Avenue	W Side Harding Avenue	12+75.33/41.64'L	Manhole	5.15	(-) 3.37 N (-) 3.41 E (-) 2.21 W 0.27 SE	18" 18" 12" 6"	DIP DIP CLAY CLAY	184 109 - -	0.0021 0.0079 - -	0.0012 0.0012 - -	M M - -	YES YES - -	 SERVES BAL HARBOUR SHOPS SERVES SUNTRUST BANK
107	108	Collins Avenue	West Side Harding Avenue	189+92.42 103.77'L	Manhole	6.79	(-) 2.93 NE (-) 2.98 S	18" 18"	DIP DIP	123 184	0.00 0.0021	0.0012 0.0012	X M	YES YES	
106	107	Collins Avenue	Center Median S of Balfour Drive	190+82.28 39.55'L	Manhole	6.12	(-) 2.71 N (-) 2.93 SW	18" 18"	DIP DIP	328 123	0.00057 0.00	0.0012 0.0012	X X	YES YES	PIPE SLOPES ARE SUBSTANDARD
105	106 (100)	Collins Avenue	Center Median S of Balfour Drive	194+04.76 50.33'L	Manhole	5.71	(-) 2.47 N (-) 2.52 S (-) 2.20 E	15" 18" 12"	CLAY DIP CLAY	244 328 68	0.0025 0.00057 0.0622	0.0015 0.0012 0.0022	M X M	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE SLOPE IS SUBSTANDARD
103	105 (102)	Collins Avenue	Center Median Balfour Dr. Intersection	196+48.59 48.40'L	Manhole	5.62	(-) 1.74 N (-) 1.86 S (-) 1.26 E (-) 1.48 W	15" 15" 12" 12"	CLAY CLAY CLAY CLAY	246 244 68 47	(-) 0.0021 0.0025 0.018 0.0036	0.0015 0.0015 0.0022 0.0022	X M M M	YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE TO MH No. 92 FLOWS IN OPPOSITE DIRECTION
92	103	Collins Avenue	Center Median N of Balfour Drive	198+94.33 48.46'L	Manhole	6.45	(-) 2.21 N (-) 2.26 S	15" 15"	CLAY CLAY	267 246	0.0015 (-) 0.0021	0.0015 0.0015	M X	YES YES	PIPE TO MH No. 103 FLOWS IN OPPOSITE DIRECTION
91	92	Collins Avenue	Center Median N of Balfour Drive	201+61.60 47.94'L	Manhole	6.30	(-) 1.77 N (-) 1.82 S	15" 15"	CLAY CLAY	272 267	0.0026 0.0015	0.0015 0.0015	M M	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
90	91 (84)	Collins Avenue	Center Median N of Balfour Drive	204+33.82 47.70'L	Manhole	5.38	(-) 1.02 N (-) 1.07 S 0.68 E	15" 15" 12"	CLAY CLAY CLAY	278 272 66	0.0010 0.0026 0.0135	0.0015 0.0015 0.0015	X M M	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE SLOPE IS SUBSTANDARD
89	90	Collins Avenue	Center Median S of Harbour Way	207+11.55 47.94'L	Manhole	4.69	(-) 0.69 N (-) 0.74 S	15" 15"	CLAY CLAY	285 278	0.0011 0.0010	0.0015 0.0015	X X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE SLOPES ARE SUBSTANDARD
88	89	Collins Avenue	Center Median S of Harbour Way	209+96.60 47.31'L	Manhole	5.07	(-) 0.31 N (-) 0.36 S	15" 15"	CLAY CLAY	287 285	0.0020 0.0011	0.0015 0.0015	M X	YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
87	88 (86)	Collins Avenue	Center Median S of Harbour Way	212+83.29 47.81'L	Manhole	4.65	0.22 N 0.27 S 0.16 NW 0.13 SE	12" 15" 12" 12"	CLAY CLAY CLAY CLAY	74 287 82 83	0.0036 0.0020 (-) 0.004 0.0060	0.0022 0.0015 0.0022 0.0022	M M X M	YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY 12" PIPE FLOWS IN WRONG DIRECTION
82	87 (75)	Collins Avenue	Center Median Harbour Way Intersection	213+57.27 47.79'L	Conflict Manhole	5.11	0.54 N 0.49 S 0.56 NE 0.870 SW	12" 12" 12" 12"	CLAY CLAY CLAY CLAY	76 74 73 70	- 0.0036 0.003 0.0034	0.0022 0.0022 0.0022 0.0022	- M M M	YES YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
81	82	Collins Avenue	Center Median Harbour Way Intersection	214+32.83 47.59'L	Conflict Manhole	5.04	- -	12" 12"	CLAY CLAY	156 76	- -	0.0022 0.0022	- -	- -	INVERTS UNOBTAINABLE. LOCATED IN PIPE SLEEVE.

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Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
80	81	Collins Avenue	Center Median Harbour Way Intersection	215+88.91 47.74'L	Manhole	4.84	1.19 N 1.14 S	12" 12"	CLAY CLAY	190 156	0.0014 -	0.0022 0.0022	X -	NO NO	LESS THAN REQUIRED PIPE COVER
79	80	Collins Avenue	Center Median N of Harbour Way	217+78.51 47.62'L	Manhole	5.78	1.50 NE 1.47 S	12" 12"	CLAY CLAY	93 190	- 0.0014	0.0022 0.0022	- X	YES YES	PIPE SLOPES ARE SUBSTANDARD
78	79 (72)	Collins Avenue	East Side N of Harbour Way	218+41.13 20.49'R	Manhole	5.07	1.82 N 1.77 SW 2.37 E	12" 12" 12"	CLAY CLAY CLAY	202 93 11	0 0.0029 0.0537	0.0022 0.0022 0.0022	X M M	YES YES YES	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE SLOPE TO MH No. 77 SUBSTANDARD
77	78	Collins Avenue	East Side N of Harbour Way	220+43.63 21.55' R	Manhole	4.00	1.76 N 1.81 S	12" 12"	CLAY CLAY	200 202	0.0020 -	0.0022 0.0022	X -	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE SLOPE IS SUBSTANDARD
76A	77	Collins Avenue	East Side N of Harbour Way	222+43.72 21.62' R	Manhole	4.15	1.97 N 2.15 S	12" 12"	CLAY CLAY	172 200	0.0018 0.0020	0.0022 0.0022	X X	NO NO	LESS THAN REQUIRED PIPE COVER PIPE SLOPES ARE SUBSTANDARD
76	76A	Collins Avenue	East Side N of Harbour Way	224+15.42 21.59' R	Manhole	4.89	2.28 S 2.10 E	12" 12"	CLAY CLAY	172 9	0.0018 0.0540	0.0022 0.0022	X M	NO NO	LESS THAN REQUIRED PIPE COVER PIPE SLOPE IS SUBSTANDARD
70	76	Collins Avenue	East Side N of Harbour Way	224+15.06 30.40' R	Manhole	4.46	1.31 E 1.36 W	12" 12"	CLAY CLAY	9 -	0.0540 -	0.0022 -	M -	YES -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY SERVES HARBOUR HOUSE SOUTH
109B	109	Collins Avenue	East Side N of 96th Street	187+63.38 43.82' L	Manhole	6.64	(-) 2.96 NE (-) 3.14 SW	12" 12"	DIP DIP	65 73	0.012 0.0126	0.0022 0.0022	M M	YES YES	
95A	109B (95)	Collins Avenue	East Side N of 96th Street	187+74.66 20.29' R	Manhole	6.41	(-) 2.14 SW 2.21 SE (-) 2.24 NW	12" 12" 12"	DIP DIP DIP	65 22 54	0.0126 0.0045 (-) 0.0042	0.0022 0.0022 0.0022	M M X	YES YES YES	PIPE SLOPE IS SUBSTANDARD
96	95A	Collins Avenue	East Side N of 96th Street	188+29.70 21.68' R	Manhole	6.01	(-) 2.41 NW (-) 2.47 SE (-) 2.25 E	12" 12" 8"	DIP DIP PVC	88 54 -	0.0017 (-) 0.0042 -	0.0022 0.0022 -	X X -	YES YES -	PIPE SLOPES ARE SUBSTANDARD SERVES ST REGIS RESORT PROPERTY
97	96	Collins Avenue	East Side N of 96th Street	189+23.52 35.19' R	Manhole	5.59	(-) 2.21 N (-) 2.26 S (-) 2.14 E	12" 12" 12"	DIP DIP DIP	80 88 -	0.0016 0.0017 -	0.0022 0.0022 -	X X -	YES YES -	PIPE SLOPES ARE SUBSTANDARD SERVES ST REGIS RESORT PROPERTY
98	97	Collins Avenue	East Side N of 96th Street	190+10.71 34.41' R	Manhole	6.01	(-) 2.03 N (-) 2.08 SE	12" 12"	DIP DIP	98 80	0.0037 0.0016	0.0022 0.0022	M X	YES YES	PIPE SLOPE IS SUBSTANDARD
98A	98	Collins Avenue	East Side N of 96th Street	191+18.01 35.10' R	Manhole	6.28	(-) 1.61 N (-) 1.67 S (-) 1.51 E (-) 1.58 NE	12" 12" 12" 6"	DIP DIP DIP PVC	138 98 - -	- 0.0037 - -	0.0022 0.0022 - -	- M - -	YES YES - -	FLOW COULD NOT BE VERIFIED FROM MH No. 99 SERVES ST REGIS RESORT PROPERTY
99	98A	Collins Avenue	East Side N of 96th Street	192+58.34 34.71' R	Manhole	5.58	- -	12" 12"	DIP DIP	145 N 138 S	- -	- -	- -	- -	MANHOLE NOT ACCESSIBLE
100	99	Collins Avenue	East Side S of Balfour Drive	194+02.11 18.02'R	Manhole	5.43	1.57 N 0.25 S 2.03 W	10" 12" 12"	CLAY DIP CLAY	126 145 68	0.00016 - 0.0622	0.0028 0.0022 0.0022	X - M	NO NO NO	LESS THAN REQUIRED PIPE COVER FLOW COULD NOT BE VERIFIED FROM MH No. 99 CLAY PIPE PAST 50-YR LIFE EXPECTANCY
95	95A	Collins Avenue	East Side N of 96th Street	187+52.18 19.33' R	Manhole	6.47	2.31 NW 2.36 SE	12" 12"	DIP DIP	22 -	0.0045 -	0.0022 -	M -	YES -	SERVES ST REGIS RESORT PROPERTY

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Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
100	105 (99)	Collins Avenue	East Side S of Balfour Drive	194+02.11 18.02'R	Manhole	5.43	1.57 N 0.25 S 2.03 W	10" 12" 12"	CLAY DIP CLAY	126 145 68	0.00016 - 0.622	0.0028 0.0022 0.0022	X - M	NO NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER FLOW COULD NOT BE VERIFIED FROM MH No. 99
101	100	Collins Avenue	East Side S of Balfour Drive	195+28.50 17.91'R	Manhole	5.26	1.75 N 1.59 S	10" 10"	CLAY CLAY	110 126	(-) 0.0013 0.00016	0.0028 0.0028	X X	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY PIPE FLOW IN WRONG DIRECTION
102	101 (103)	Collins Avenue	East Side Balfour Dr. Intersection	196+37.82 18.57'R	Manhole	5.15	1.74 N 1.89 S 2.83 E 1.77 W	10" 10" 12" 12"	CLAY CLAY CLAY CLAY	85 110 - 68	(-) 0.002 (-) 0.0013 - 0.018	0.0028 0.0028 0.0022 0.0022	X X - M	NO NO - NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES BAL MORAL PROPERTY
94A	102	Collins Avenue	East Side N of Balfour Drive	197+22.38 18.15'R	Manhole	5.03	1.59 N 1.57 S 1.65 E	10" 10" 12"	CLAY CLAY CLAY	112 85 -	0.00044 (-) 0.002 -	0.0028 0.0028 0.0022	X X -	NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
94	94A	Collins Avenue	East Side N of Balfour Drive	198+34.83 18.38'R	Manhole	5.10	1.61 N 1.64 S 1.71 E	10" 10" 10"	CLAY CLAY CLAY	197 112 -	0.0036 0.00044 -	0.0028 0.0028 0.0028	M X -	NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
93	94	Collins Avenue	East Side N of Balfour Drive	200+31.81 18.66'R	Manhole	5.41	2.33 S 2.39 NE	10" 8"	CLAY CLAY	197 -	0.0036 -	0.0028 0.0040	M -	NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
84	90 (83)	Collins Avenue	East Side N of Balfour Drive	204+34.10 18.76'R	Manhole	4.69	1.63 N 1.62 S 1.57 W 1.69 SE	12" 10" 15" 10"	CLAY CLAY CLAY CLAY	33 200 66 -	0.0072 0.0028 0.0135 -	0.0022 0.0040 0.0015 0.0015	M M M -	NO NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER FLOWS COULD NOT BER VERIFIED FROM MH No. 90 SERVES THE PALACE PROPERTY
84A	84	Collins Avenue	East Side N of Balfour Drive	204+67.42 18.32'R	Manhole	4.33	1.38 N 1.39 S 1.37 E	12" 12" 12"	CLAY CLAY CLAY	366 33 -	0.00076 0.0072 -	0.0022 0.0022 0.0022	X M -	NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES BAL HARBOUR TOWERS PROPERTY
85	84A	Collins Avenue	East Side N of Balfour Drive	208+33.82 18.64'R	Manhole	4.24	1.01 N 1.10 S 1.05 SE 2.24 SE	12" 12" 12" 12"	CLAY CLAY CLAY CLAY	82 366 - -	(-) 0.0014 0.00076 - -	0.0022 0.0022 0.0022 0.0012	X X - -	NO NO - -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER REVERSE FLOWS FROM MH No. 85A
85A	85	Collins Avenue	East Side N of Balfour Drive	209+15.62 19.18'R	Manhole	4.42	1.00 N 1.13 S 1.33 E	12" 12" 12"	CLAY CLAY CLAY	317 82 -	0.001 (-) 0.0014 -	0.0022 0.0022 0.0015	X X -	NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES THE TIFFANY PROPERTY
86	85A (87)	Collins Avenue	East Side S of Harbour Way	212+33.11 18.69'R	Manhole	4.03	0.63 NW 0.68 S 0.91 SE	12" 12" 10"	CLAY CLAY CLAY	83 317 -	0.006 0.001 -	0.0022 0.0022 0.0028	M X -	NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES THE PLAZA AT BAL HARBOUR PROPERTY
83	84	Collins Avenue	East Side N of Balfour Drive	202+34.20 18.74'R	Manhole	5.47	2.18 N 2.21 E 2.20 SE	10" 8" 8"	CLAY CLAY CLAY	200 - -	0.0028 - -	0.0028 0.0040 0.0040	M - -	YES - -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY

Slope Standards: **M** - Minimum Accepted Slopes per Ten States Standard.

X - Substandard, Less than the minimum slope for pipe size.

Cover Standards: **YES:** At or greater than the minimum 36 inches of cover.
NO: Less than the minimum 36 inches of cover.

BAL HARBOUR VILLAGE
EXISTING SANITARY SEWER
COMPREHENSIVE DATABASE
EXHIBIT S-5

Structure No.	Connects To	Location	Cross Reference	Station/ Offset	Structure Type	Exist Rim Elev.	Exist Invert	Exist Pipe Size	Pipe Material	Pipe Length	Actual Slope	Req'd. Slope	Slope LOS	Minimum Cover	Comments
75	82	Collins Avenue	East Side Harbour Way Intersection	213+82.85 18.67'R	Manhole	4.10	0.78 N 0.91 E 0.78 SW	10" 12" 12"	CLAY CLAY CLAY	250 - 73	0.0021 - 0.003	0.0028 0.0022 0.0022	X - M	NO - NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER
74	75	Collins Avenue	East Side N of Harbour Way	216+32.80 18.89' R	Manhole	4.60	1.36 N 1.31 S	10" 10"	CLAY CLAY	10 250	(-) 0.009 0.0021	0.0028 0.0028	X X	NO NO	CLAY PIPE PAST 50-YR LIFE EXPECTANCY LESS THAN REQUIRED PIPE COVER SERVES THE KENILWORTH CONDOS PROPERTY
73A	74	Collins Avenue	East Side N of Harbour Way	216+42.84 19.55' R	Manhole	4.67	1.30 N 1.27 S 1.17 E	10" 10" 8"	CLAY CLAY CLAY	198 10 -	- (-) 0.009 -	0.0028 0.0028 -	- X -	NO NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY FLOW CANNOT BE VERIFIED FROM MH No's 71 AND 78 SERVES THE KENILWORTH CONDOS PROPERTY
73	73A (72)	Collins Avenue	East Side N of Harbour Way	218+34.02 20.68' R	Manhole	4.77	1.44 NE 1.32 S	10" 12"	CLAY CLAY	13 198	-	0.0028	-	-	CLAY PIPE PAST 50-YR LIFE EXPECTANCY
72	78	Collins Avenue	East Side N of Harbour Way	218+41.35 31.87' R	Manhole	5.53	1.25 N 2.95 W 1.69 SE	10" 12" 10"	CLAY CLAY CLAY	192 11 -	- - -	0.0028 0.0022 0.0028	- - -	YES NO -	CLAY PIPE PAST 50-YR LIFE EXPECTANCY FLOWS CANNOT BE VERIFIED SERVES THE BELLINI PROPERTY
71	72	Collins Avenue	East Side N of Harbour Way	220+32.83 31.43' R	Manhole	4.28	- -	10" 10"	CLAY CLAY	202 192	- -	0.0028 0.0028	- -	- -	SERVES THE CARLTON TERRACE PROPERTY MANHOLE FILLED WITH SEDIMENT FLOWS CANNOT BE VERIFIED
71A	71	Collins Avenue	East Side N of Harbour Way	222+35.11 31.37' R	Manhole	4.22	1.92 S 1.97 E	10" 10"	CLAY CLAY	202 -	- -	0.0028 -	- -	NO -	FLOW CANNOT BE VERIFIED FROM MH No 71 LINE ABANDONED AND PLUGGED TO THE NORTH CLAY PIPE PAST 50-YR LIFE EXPECTANCY

Slope Standards: **M** - Minimum Accepted Slopes per Ten States Standard.

X - Substandard, Less than the minimum slope for pipe size.

Cover Standards: **YES:** At or greater than the minimum 36 inches of cover.
NO: Less than the minimum 36 inches of cover.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
SANITARY SEWER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT S-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization and Demobilization (8%)	1	LS	$ 235,061.92	$ 235,061.92
2	Maintenance of Traffic (3%)	1	LS	$ 88,148.22	$ 88,148.22
3	Survey Stakeout and As-Builts (2%)	1	LS	$ 58,765.48	$ 58,765.48
4	Density Testing (1%)	1	LS	$ 29,382.74	$ 29,382.74
5	Asphalt Road Restoration	1000	SY	$ 50.00	$ 50,000.00
6	Sod Restoration	4000	SY	$ 4.00	$ 16,000.00
				TOTAL	$ 477,358.36
	Sanitary Structures				
1	4' Dia. Sanitary Manhole (0'-6' cut)	53	EA	$ 3,200.00	$ 169,600.00
2	4' Dia. Sanitary Manhole (6'-8' cut)	14	EA	$ 3,600.00	$ 50,400.00
3	4' Dia. Sanitary Manhole (8'-10' cut)	8	EA	$ 4,200.00	$ 33,600.00
4	4' Dia. Sanitary Manhole (10'-12' cut)	10	EA	$ 4,600.00	$ 46,000.00
5	4' Dia. Sanitary Manhole (12'-14' cut)	6	EA	$ 5,000.00	$ 30,000.00
6	4' Dia. Sanitary Manhole (14'-16' cut)	2	EA	$ 7,500.00	$ 15,000.00
7	Drop Sanitary Manhole (6'-8' cut)	1	EA	$ 4,200.00	$ 4,200.00
8	Drop Sanitary Manhole (8'-10' cut)	2	EA	$ 5,200.00	$ 10,400.00
9	Drop Sanitary Manhole (10'-12' cut)	2	EA	$ 5,500.00	$ 11,000.00
10	Drop Sanitary Manhole (12'-14' cut)	3	EA	$ 6,500.00	$ 19,500.00
11	Sanitary Sewer Triplex Lift Station	1	LS	$ 800,000.00	$ 800,000.00
12	Electrical for Lift Station	1	LS	$ 75,000.00	$ 75,000.00
				TOTAL	$ 1,264,700.00
	Sanitary Pipe				
1	8" PVC Sanitary Pipe (0'-6' cut)	6988	LF	$ 38.00	$ 265,544.00
2	8" PVC Sanitary Pipe (6'-8' cut)	2819	LF	$ 45.00	$ 126,855.00
3	8" PVC Sanitary Pipe (8'-10' cut)	1742	LF	$ 60.00	$ 104,520.00
4	8" PVC Sanitary Pipe (10'-12' cut)	594	LF	$ 75.00	$ 44,550.00
5	10" PVC Sanitary Pipe (10'-12' cut)	208	LF	$ 85.00	$ 17,680.00
6	10" PVC Sanitary Pipe (12'-14' cut)	203	LF	$ 95.00	$ 19,285.00
7	12" PVC Sanitary Pipe (0'-6' cut)	553	LF	$ 50.00	$ 27,650.00
8	12" PVC Sanitary Pipe (6'-8' cut)	444	LF	$ 65.00	$ 28,860.00
9	12" PVC Sanitary Pipe (8'-10' cut)	399	LF	$ 75.00	$ 29,925.00
10	12" PVC Sanitary Pipe (10'-12' cut)	289	LF	$ 90.00	$ 26,010.00
11	12" PVC Sanitary Pipe (12'-14' cut)	139	LF	$ 110.00	$ 15,290.00
12	15" PVC Sanitary Pipe (10'-12' cut)	686	LF	$ 115.00	$ 78,890.00
13	15" PVC Sanitary Pipe (12'-14' cut)	907	LF	$ 135.00	$ 122,445.00
14	18" PVC Sanitary Pipe (8'-10' cut)	362	LF	$ 85.00	$ 30,770.00
15	18" PVC Sanitary Pipe (10'-12' cut)	645	LF	$ 105.00	$ 67,725.00
16	18" PVC Sanitary Pipe (12'-14' cut)	450	LF	$ 125.00	$ 56,250.00
17	18" PVC Sanitary Pipe (14'-16' cut)	77	LF	$ 200.00	$ 15,400.00
				TOTAL	$ 1,077,649.00

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
SANITARY SEWER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT S-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
	Miscellaneous				
1	Sanitary Cleanout (Short)	76	EA	$ 250.00	$ 19,000.00
2	Sanitary Cleanout (Long)	167	EA	$ 375.00	$ 62,625.00
3	Remove Existing Sewer Structures	68	EA	$ 400.00	$ 27,200.00
4	Remove Existing Sewer Pipe	17200	LF	$ 8.00	$ 137,600.00
5	Connect to Existing Sanitary Sewer	1	EA	$ 3,500.00	$ 3,500.00
6	Lift Station Emergency Generator	1	LS	$ 180,000.00	$ 180,000.00
7	Upgrade Lift Station Instrumentation w/ Telemetry System	2	EA	$ 50,000.00	$ 100,000.00
				TOTAL	$ 529,925.00

SUBTOTAL	$	3,349,632
10% CONTINGENCY	$	334,963
TOTAL CONSTRUCTION COST	$	3,684,596
ENGINEERING DESIGN (10%)	$	334,963
DESIGN SURVEY (1.5%)	$	50,244
UTILITY LOCATES (0.5%)	$	16,748
CONSTRUCTION OBSERVATION (5%)	$	167,482
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$	66,993
TOTAL	$	4,321,026

NOTE : SANITARY SEWER MAIN INSTALLATION DOES NOT INCLUDE ROADWAY RESTORATION. COSTS DO NOT REFLECT SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
COLLINS AVENUE SANITARY SEWER SECONDARY SYSTEM IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT S-7

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization and Demobilization (8%)	1	LS	$ 76,152.00	$ 76,152.00
2	Maintenance of Traffic (3%)	1	LS	$ 28,557.00	$ 28,557.00
3	Survey Construction Stakeout and As-Builts (3%)	1	LS	$ 28,557.00	$ 28,557.00
4	Density Testing (2%)	1	LS	$ 19,038.00	$ 19,038.00
5	Asphalt Driveway Restoration	3000	SY	$ 40.00	$ 120,000.00
6	Sidewalk Paver Restoration	400	SY	$ 65.00	$ 26,000.00
7	Remove & Replace Exist. Driveway Pavers	1500	SY	$ 85.00	$ 127,500.00
8	Landscape Restoration (6%)	1	LS	$ 57,114.00	$ 57,114.00
9	Sod Restoration	4000	SY	$ 4.00	$ 16,000.00
10	Dewatering	2670	LF	$ 40.00	$ 106,800.00
				TOTAL	$ 605,718.00
	Sanitary Structures				
1	4' Dia. Sanitary Manhole (8'-10' cut)	4	EA	$ 6,500.00	$ 26,000.00
2	4' Dia. Sanitary Manhole (10'-12' cut)	11	EA	$ 8,500.00	$ 93,500.00
				TOTAL	$ 119,500.00
	Sanitary Pipe				
1	12" DIP Sanitary Pipe (8'-10' cut)	430	LF	$ 80.00	$ 34,400.00
2	12" DIP Sanitary Pipe (10'-12' cut)	2240	LF	$ 120.00	$ 268,800.00
				TOTAL	$ 303,200.00
	Miscellaneous				
1	Remove Existing Sewer Structures	14	EA	$ 750.00	$ 10,500.00
2	Remove Existing Sewer Pipe	2700	LF	$ 12.00	$ 32,400.00
3	Bypass Sewer System during Construction	1	LS	$ 20,000.00	$ 20,000.00
4	Connect to Existing Sanitary Sewer	14	EA	$ 5,000.00	$ 70,000.00
				TOTAL	$ 132,900.00
				SUBTOTAL	$ 1,161,318
				10% CONTINGENCY	$ 116,132
				TOTAL CONSTRUCTION COST	$ 1,277,450
				ENGINEERING DESIGN (10%)	$ 116,132
				DESIGN SURVEY (1.5%)	$ 17,420
				UTILITY LOCATES (0.5%)	$ 5,807
				CONSTRUCTION OBSERVATION (5%)	$ 58,066
				ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 23,226
				TOTAL PRELIMINARY COST	$ 1,498,100

NOTE : COSTS DO NOT REFLECT SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

EXHIBIT S-8

PHOTOGRAPHS

Photo 1 : Sanitary Sewer Force Main repairs on Byron Avenue.

Photo 2 : Sanitary Sewer Force Main repairs on Byron Avenue.

EXHIBIT S-8

PHOTOGRAPHS

Photo 3: Sanitary Sewer Force Main repairs on Byron Avenue.

Photo 4: Sanitary Sewer Force Main repairs on Collins Avenue.

EXHIBIT S-8

PHOTOGRAPHS

Photo 5: Sanitary Sewer Force Main repair on 96th Street.

Photo 6: Force Main repair inside Drainage Conflict Structure.

EXHIBIT S-8

PHOTOGRAPHS

Photo 7: Longitudinal crack of PVC Sanitary Force Main.

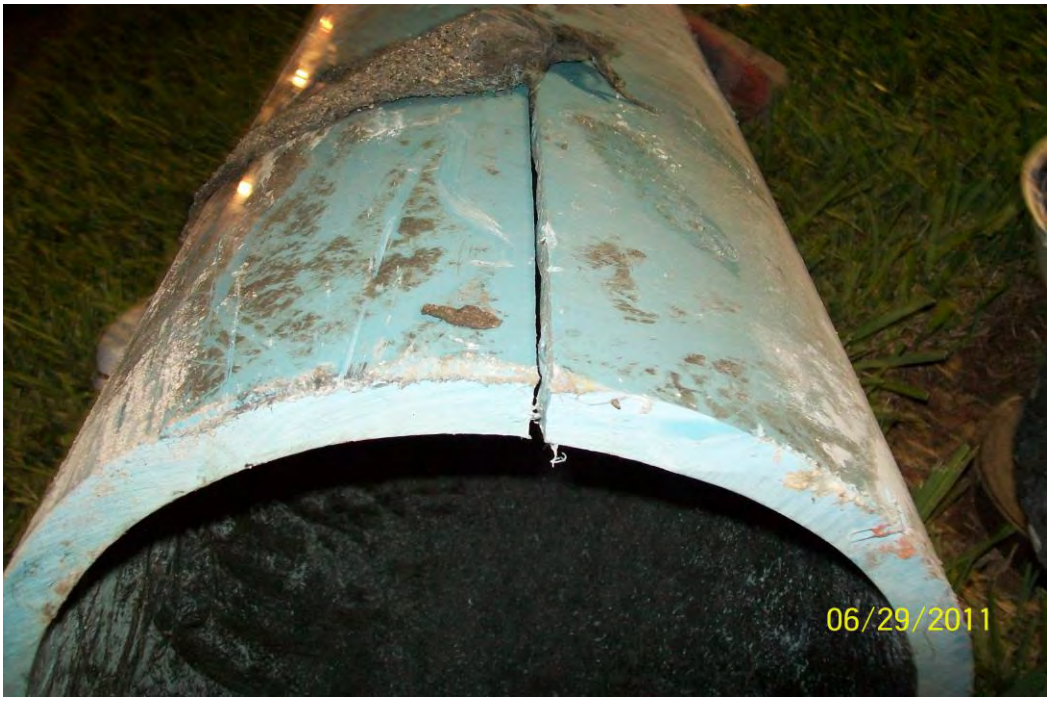


Photo 8: Longitudinal crack of PVC Sanitary Force Main.

EXHIBIT S-8

PHOTOGRAPHS

Photo 9: Sanitary Sewer Force Main repair on 96th Street.

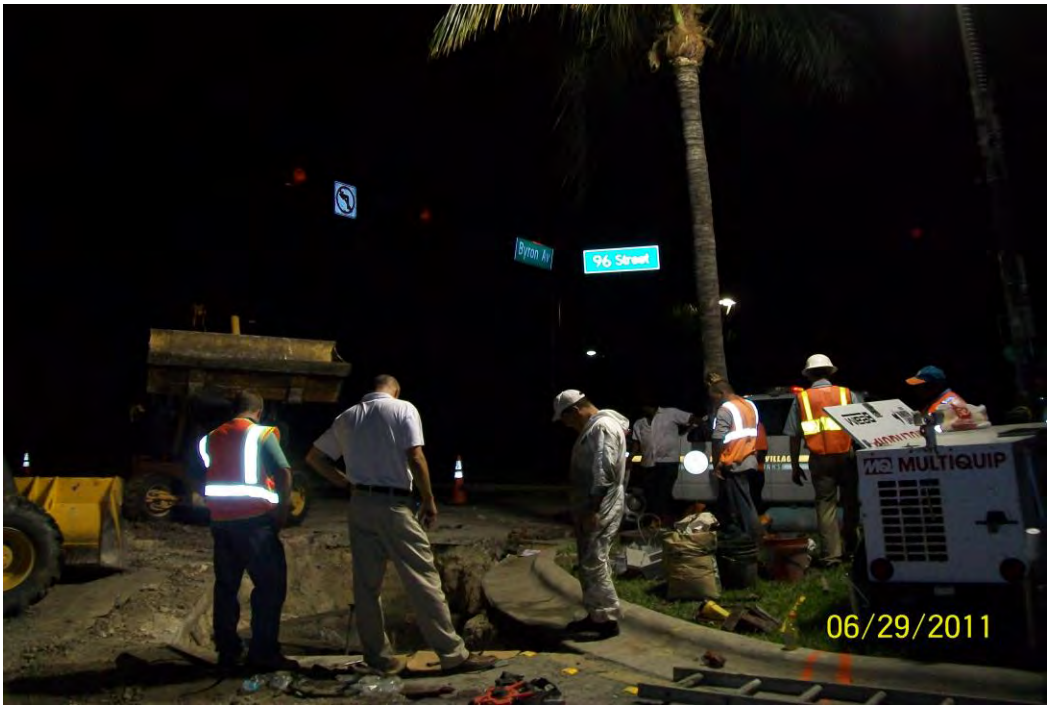


Photo 10: Sanitary Sewer Force Main repair on 96th Street.

EXHIBIT S-8

PHOTOGRAPHS

Photo 11: Sanitary Sewer Force Main repair on 96th Street.

Photo 12: Sanitary Sewer Force Main repair on 96th Street.

BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR
FLORIDA'S PARADISE

SECTION 4

STORMWATER IMPROVEMENTS

EXISTING STORMWATER INFRASTRUCTURE

The existing stormwater infrastructure within Bal Harbour Village is separated into two distinct systems. The roadways and the stormwater system that provide flood relief for Collins Avenue (SR A1A) and 96th Street (SR 922) are owned, operated and maintained by the Florida Department of Transportation (FDOT). The remaining sections of stormwater infrastructure within the Village, more specifically the residential area, are owned, operated and maintained by the Village.

The initial stormwater system and its components were installed at the inception of the Village in 1946. With the expansion of the state roads FDOT provided upgrades to its stormwater infrastructure in the 1960's. Both Collins Avenue and 96th Street have stormwater systems that act independent of one another. The Collins Avenue infrastructure was constructed as a positive gravity drainage system flowing from the south extent of Collins Avenue, within the Village, to the north with a 60-inch RCP outfall at the north end of the Village that discharges into the Haulover Cut.

The 96th Street stormwater network also acts as a positive gravity drainage system flowing from the east extent of 96th Street, within the Village, to the western limits of the Village. Via a stormwater pumping station, located at the Village's Public Works site, the stormwater is then discharged into four injection wells prior to a 48-inch RCP emergency overflow outfall into the Intracoastal Waterway (Indian Creek). BHV is responsible for maintenance and operation of the pumping station.

In 1946 the stormwater infrastructure for the residential neighborhood was constructed to provide flood protection to the low-lying area. The system was designed to act as a positive gravity system divided into several independent sub basins. The residential area contained as many as eight discharge outfalls, two

of which conveyed surface water from Collins Avenue. Improvements were made to the original system in 1982 and 1997 to offset the aging infrastructure. Existing developed properties along the east side of Collins Avenue are required to contain and maintain their individual surface water.

In 1997 the Village extensively modified its stormwater infrastructure by installing a duplex stormwater pumping station and eight injection wells within the park, located east of the Yacht Basin. Under an Environmental Resource Permit with the South Florida Water Management District (SFWMD), permit number 13-00876-P, the stormwater system was modified to provide for water quality treatment and to provide flood protection where the older stormwater system was found to be inadequate.

The majority of the improvements were concentrated on 42 acres within the central and northern portion of the residential neighborhood. The drainage wells and pumping station were designed to retain in excess of a 5-yr 24-hr storm event. During severe storm events the system is designed to overflow outfall through a 48-inch x 76-inch RCP outfall to the Intracoastal Waterway (Indian Creek). An additional component of the improvements was the disconnection with the Collins Avenue network. The remaining portion of the stormwater network has not been rehabilitated since 1946 and has surpassed its critical point of life expectancy.

The Village currently maintains four discharge outfalls. The major outfall is utilized by the stormwater pumping station within the Harbour Way green space. The remaining three outfalls are gravity discharges each located adjacent to Bal Bay Drive and south of Harbour Way. The outfalls are concurrent with the infrastructure element of the Village's *Comprehensive Plan* and the Florida Department of Environmental Protection's National Pollutant Discharge Elimination System MS4 Program (NPDES).

Exhibit D-1 *Existing Storm Drainage System Map* indicates the existing stormwater configuration for the entire Village, including the systems owned and maintained by FDOT.

FUTURE STORMWATER INFRASTRUCTURE

The potential future stormwater system improvements for the Bal Harbour Village and the residential area are indicated in Exhibit D-2 *Proposed Storm Drainage System Map*. The determination to replace the existing infrastructure within the residential neighborhood is based on a thorough analysis of the existing drainage system. The determining factors included an evaluation of undersized pipes, shallow pipes with minimum cover that affect the integrity of the pipe, pipes with detectable leaks and groundwater infiltration, aging or undersized drainage inlets and manholes, and documented areas of flooding. With the installation of a new drainage infrastructure in conjunction with new roadways, valley gutter and harmonization with existing property features the stormwater improvements will provide long-term flood relief for the residents of Bal Harbour Village.

An analysis of the existing stormwater system indicates there are approximately 1450 linear feet of drainage pipe within the residential neighborhood that is deemed undersized in diameter for both storage and capacity. Current industry standards are based on the Florida Department of Transportation's (FDOT's) criteria for the minimum pipe size and material type. The existing pipes would be removed and replaced with 18-inch minimum diameter A-2000 Poly Vinyl Chloride Pipe. This material is proven to be both durable and cost effective.

Over a period of time impacts on stormwater pipes, due to the weight load from vehicles, can structurally affect the pipes integrity. This impact varies dependant on the material of the pipe and its separation, or cover, from the road elevation.

Older sections of the stormwater infrastructure, installed in 1946, have reached their life expectancy and, although failure has yet to occur, have the potential for future concerns. The existing cross drain pipes would be replaced with pipes of the same diameter, ranging in size from 18-inch to 54-inch with A-2000 PVC Drainage pipe used for sizes ranging from 18-inch to 36-inch diameter and Reinforced Concrete Pipe (RCP) used for sizes ranging from 42-inch to 54-inch diameter.

In October of 2009, *Shenandoah Construction* was contracted by the Village to perform investigative work on portions of the residential neighborhood's stormwater system. In areas where repetitive ponding and potential settling had occurred, *Shenandoah* vacuum cleaned the pipes and structures and video documented the inside of the pipes. CAS analyzed these results and found the integrity of several stormwater pipes had been compromised. The areas of concern were for stormwater pipes serving Bal Cross Drive and Park Road located north of Harbour Way. The A-2000 PVC drainage pipe and drainage inlets with the A-lok system create a water-tight stormwater system preventing pipe separation and groundwater infiltration.

As part of the information gathering for this Utility Master Plan, CAS representatives documented rainfall events during the summer of 2012. The first storm event occurred on July 17, 2012. The second event was during the period of August 25th to August 27th, 2012 when the Village and neighboring municipalities were inundated by record amounts of rainfall from *Hurricane Isaac*. Exhibit D-3 *Observed Roadway Flood Areas (8/27/12)* indicates the areas impacted by the flood event two days after the storm began. During the storm, the majority of the areas within the Village where standing water remained for a long duration were located on roadways within the residential area more specifically Park Drive east of Bal Bay Drive, Camden and Bal Cross Drive south of Harbour Way, and at the most northern, low-lying area within the Village at the intersection of Bal Bay Drive and Park Drive. Refer to Exhibit D-7 (Photos 1-10)

for photographic evidence of the July 17, 2012 rainfall event. The design of the stormwater drainage network and roadway surface will properly size the drainage pipe and create a continual longitudinal and cross slope that will remove standing water during short duration and high frequency rain events.

During site investigations over the years it has been determined that the integrity of the existing drainage structures, especially those installed in 1946, is compromised. To properly slope the drainage pipe toward the pumping station or outfall pipes it has been found that either the existing structures are not deep enough or not large enough to accommodate the required pipe sizes and provide adequate pipe cover. At the time the structures were installed the A-lok water-tight technology was not available. To meet current design standards CAS recommends that 180 existing drainage inlets and manholes be removed and replaced.

In order to receive a Surface Water Management Permit through Miami-Dade DERM the Village cannot increase the number of outfalls it currently maintains. Therefore, the proposed drainage network will be similar in basin size and methodology as compared to the existing stormwater system. The major differences between the existing system and the proposed system are that the drainage inlets and pipes will be properly located and sized in order to maximize their effectiveness.

The proposed stormwater system within the residential area will be divided into three primary basins. The south basin will incorporate drainage from Park Drive, south of Balfour Drive, a portion of Bal Bay Drive, south of Balfour Drive and the *Shops of Bal Harbour.* The drainage basin discharges into the *Intracoastal Waterway* via an existing 48-inch RCP pipe. The second basin will incorporate drainage from Balfour Drive, including areas on Camden Drive, Camden Court and Bal Bay Drive. The drainage basin discharges into the *Intracoastal Waterway* via an existing 24-inch CMP pipe. The existing 24-inch pipe is undersized and

will require a new outfall pipe by means of pipe bursting and directionally drilling to reduce construction activity for the neighboring properties. The largest drainage basin incorporates a majority of the residential neighborhood from Balfour Drive north to Bal Bay Drive and from Park Drive west to the Intracoastal. The northern basin is controlled by a stormwater pumping station, equipped with two 17,500 GPM pumps and discharges into the Intracoastal via a 48-inch by 76-inch RCP outfall. The Village maintains a fourth outfall, located north of Bal Bay Court. During the design of the proposed drainage system this outfall will be eliminated. No additional outfalls are proposed for the BHV's stormwater system.

Water Quality Design Alternatives

Past experience with Class V drainage wells has led Craig A. Smith & Associates to seek design alternatives in lieu of wells. This decision was made for economic and long-term maintenance and performance reasons with no expected decrease in water quality treatment. The alternative to a well is a vortex separating device such as H.I.L. Technologies Downstream Defender. Routine maintenance of these structures would be less expensive than the maintenance of a drainage well system for the purposes of maintaining performance and achieving similar treatment results. Reasons for the substitution include reduced costs associated with maintenance, the relative ease of performing this maintenance, reliable and predictable performance and consistency with regards to agency permitting requirements.

Maintenance associated with disposal wells include acid or chemical injection to dissolve solids which block the porous aquifer, backflushing the wells at high rates and, in extreme cases, excavation of new wells and abandonment of clogged wells. All of these operations are specialized and expensive. Maintenance of the vortex separating device involves routine removal and disposal of the floatable and sediment materials which have accumulated.

Monitoring accumulation is done by visual inspections. Removal and disposal can be accomplished with a vac-truck by one of a number of licensed contractors.

Well performance is measured in terms of backpressure in relation to pumping rates. Well degradation is a function of accumulated pumping volumes, pre-treatment of stormwater, void size in the underlying aquifer and pumping rates. All of these factors are variable and difficult to predict and design. Specialists are required to monitor and record well performance. Conversely, visual inspection of the device for sediment and floatable pollutant accumulation can be performed routinely by existing town staff with minimal training.

Differing and contradictory requirements and attitudes among the agencies complicate permitting and add to the construction costs. While Miami Dade County accepts deep well injection as an acceptable water quality treatment method, South Florida Water Management District (SFWMD) and the Florida Department of Environmental Protection (FDEP) consider deep well injection as disposal methods. Thus, these agencies require increased water quality pre-treatment. This additional pre-treatment is typically accomplished through the addition of standard pollution retardant baffles and sediment settling basin structures. These structures tend to be large and expensive due to the large flows associated with stormwater events in South Florida.

The proposed integration of the water quality downstream defenders would include installing two 8-foot diameter structures prior to the existing stormwater pump station at the Yacht Basin, and installing one 6-foot diameter structure at each of the existing outfalls (at the proposed 36-inch outfall at Balfour Drive and Bal Bay Drive and the existing 48-inch outfall pipe within the Village Park) The inclusion of these water quality treatment structures in lieu of wells may be a potential to minimize future water quality concerns by directing runoff from expanded contributing areas to these water quality structures in lieu of the

original conceptual design. This consolidation of outfalls for a small municipality minimizes operation and maintenance costs of the system.

Improvements to the existing stormwater pump station that the Village maintains on behalf FDOT for the 96th Street drainage system will include a telemetry system so that the Village can monitor the pump station remotely. An emergency generator will also be provided in order to continuously run the station during emergency conditions. The stormwater pump station, located east of the Yacht Basin in the Harbour Way green area, will undergo upgrades and rehabilitation in order to properly discharge the stormwater from the new system. The pump station will also be furnished with new instrumentation and telemetry which will allow for remote monitoring of the station. In the event of a power failure, the pumping station will also be equipped with a new emergency generator. The existing wells, utilized for water quality, will be abandoned and the piping will be removed and replaced with two 8-foot water quality Downstream Defenders and a Bypass Weir Box.

Stormwater Improvements

The proposed stormwater system would be designed and constructed according to current Federal, State and Miami-Dade County Department of Environmental Resource Management (MD-DERM) standards and specifications including pipe depths of cover, industry accepted pipe and structure materials, and minimum sizes and slopes for pipes as well as pre-cast inlets and manholes with proper cover depths. All future stormwater improvements within the residential area would be installed within the limits of the existing roadways or Village lands and scheduled to be installed after the completion of the water and sewer utilities and prior to the roadway and gutter improvements.

The work required for completion of the future stormwater improvements would include the installation of approximately 126 inlets and manholes with A-lok technology, 12,410 linear feet of 18-inch to 36-inch diameter A-2000 PVC drainage pipe, 1,815 linear feet of 42-inch to 78-inch diameter RCP drainage pipe, the removal of 12,750 linear feet of existing drainage pipe and 180 existing drainage structures, four downstream defender water quality structures, one bypass weir structure, the abandonment of eight stormwater wells and piping, pump station rehabilitation and telemetry systems, emergency generators for each of the two stormwater pump stations, work required to increase an existing drainage outfall pipe from 24-inch to 36-inch and the connection to three existing drainage systems. The drainage piping and inlets/manholes for the project will be installed at a depth range from 5 feet to 12 feet.

New stormwater connections for the *Bal Harbour Shops* and the *Church by the Sea* will be provided to replace existing drainage discharges from the *Shops*. An existing 48-inch drainage pipe is located on the east side of Bal Bay Drive, south of Park Drive, and an existing 24-inch drainage pipe is located at the intersection of Park Drive and Camden Drive. As part of the southern drainage basin, the drainage connections will be provided within the Village's right-of-way. The Shops are required by DERM to provide 1-inch of pre-treatment for their runoff prior to discharge into the Village's stormwater system. Any existing stormwater mains, laterals, inlets, manholes or roof drains within the *Shops* or Church are privately owned and maintained. Any future expansion of the *Bal Harbour Shops* that include stormwater upgrades will be constructed at the expense of the Shop's developer.

Included in the conceptual design of the stormwater system in the Utility Master Plan are provisions that would provide stormwater relief to the low-rise multi-family units located on the west side of Collins Avenue. All multi-family properties from *Fairfield Manor* (9800 Collins Avenue) north to *Bay Colony* (290 Bal Bay

Drive) currently collect runoff from their roofs and parking lots and provide their own storage, by means of a well or exfiltration trench, with little to no discharge. Incorporated into the conceptual design of the stormwater drainage system will be discharge connections for each of the multi-family properties. A control structure will be installed in the linear park, on the west side of the existing wall, with an 18-inch discharge pipe connected to the proposed stormwater system on Park Drive. The control structure will include a weir wall with an elevation established to ensure that each multi-family property retains its required 1-inch of pre-treatment prior to discharge into the proposed stormwater system.

Improvements for the discharge connections includes eighteen Type 'M-6' Control Structures with weir walls,1550 LF of 18-inch PVC drainage pipe and four M-5 drainage manholes to connect the individual properties to the proposed Park Road stormwater system. It is the responsibility of all multi-family property owners to install the stormwater improvements necessary to make the connection to the control structure serving their property. Any existing stormwater mains, laterals, inlets, manholes or roof drains within the low-rise multi-family properties is privately owned and maintained.

Exhibit G-8 *Utility Zone Description* indicates the current and future status of all stormwater improvements within the entire Village. Areas of the Village are divided into zones and a detailed description is included, in database form, for each utility principle. Each zone of the Village has either benefitted from recent stormwater infrastructure projects or will benefit from proposed stormwater projects outlined in this Utility Master Plan. As indicated in Exhibit G-6 (2014 Master Plan Utility Projects), stormwater improvements are anticipated to be designed, permitted and constructed in Fiscal Year 2016.

Rising Sea Levels

Based on historical documentation, sea levels have risen prominently since the early 1900's with every indication that they will continue to rise in the decades to come. According to the United States National Oceanic and Atmospheric Administration (NOAA), the nearest Mean Sea Level Trends Station for Bal Harbour is located in Miami Beach (Station 8723170). The mean sea level trend for this station, based on monthly data acquired over a fifty-year period, is 2.39 millimeters per year which is equivalent to a change of 0.78 feet in 100 years. Design criteria for tidal conditions for Miami Beach, and other neighboring municipalities, will increase tailwater conditions by as much as two feet.

In order to offset the rise in sea levels the Utility Master Plan has incorporated measures to reduce the risk of future potential flooding by providing conceptual designs, within Village right-of-way, for both the stormwater system and the roadway improvements. The stormwater improvements would include larger structures and grates, better placement of and an increase number of structures to collect runoff faster and more efficiently than the current conditions. An increase in pipe sizes from the current system also allows for more storage capacity in the drainage pipe rather than on the road surface. For a detailed description and costs for the roadway improvements within the residential area refer to Section 5 of this Utility Master Plan.

Level of Service

The Utility Master Plan evaluated three alternatives for the Village roadway and drainage system in order to provide the Village with various Level of Service (LOS) options based on protection and costs. As flood protection increases, from rising sea levels and severe rainfall events, the higher the cost for stormwater and roadway improvements. Exhibit D-4 and D-5 indicate a comparison of the

levels of service and the costs for construction. Option A involves the full replacement of the stormwater system to meet the 10-year storm level criteria in preparation of future rising sea levels, the raising of the existing roadways within the residential area between four and six inches, and the installation of a new concrete valley gutter. One hundred percent of the existing stormwater system within the residential area will be affected in Option A and the life expectancy of the newly installed system will be 50 years. Improvements to the existing pumping station, adjacent to the Yacht Basin, may include modifications to the existing discharge pumps. The estimated cost of Option A is $11,096,614.

Stormwater replacement Option B involves the full replacement of the stormwater system to meet the 5-year storm level criteria in preparation of future rising sea levels, the raising of the existing roadways within the residential area between four and six inches, and the installation of a new concrete valley gutter. The difference between the 10-year and 5-year criteria will be a reduction in drainage pipe sizes. One hundred percent of the existing stormwater system within the residential area will be affected in Option B and the life expectancy of the newly installed system will be 50 years. Improvements to the existing pumping station, adjacent to the Yacht Basin, may include modifications to the existing discharge pumps. The estimated cost of Option B is $10,088,400.

Stormwater replacement Option C involves upgrading the existing stormwater system to meet the 3-year storm level (the current level of service that the existing stormwater system provides). Option C is primarily a reparation project to the existing drainage system that would replace undersized pipes, structurally inadequate cross drain pipes, documented leaking pipes and to address isolated flood prone areas within the residential neighborhood. In option C the roads and valley gutters within the residential area will not be raised to a higher level to counteract future rising sea levels. The estimated cost of Option C is $5,041,980.

The work required for completion of the future stormwater improvements would include the installation of approximately 126 inlets and manholes with A-lok technology, 12,410 linear feet of 18-inch to 36-inch diameter A-2000 PVC drainage pipe, 1,815 linear feet of 42-inch to 78-inch diameter RCP drainage pipe, the removal of 12,750 linear feet of existing drainage pipe and 180 existing drainage structures, four downstream defender water quality structures, one bypass weir structure, the abandonment of eight stormwater wells and piping, pump station rehabilitation and telemetry systems, emergency generators for each of the two stormwater pump stations, work required to increase an existing drainage outfall pipe from 24-inch to 36-inch and the connection to three existing drainage systems. The drainage piping and inlets/manholes for the project will be installed at a depth range from 5 feet to 12 feet.

The total preliminary estimated cost for the stormwater improvements within the Village's residential neighborhood, which also serves the *Bal Harbour Shops, the Church by the Sea, Village Hall and Public Works Complex* and the low-rise multi-family units on the west side of Collins Avenue, is $6,721,430. The preliminary design layout for the stormwater improvements are indicated on the *Proposed Stormwater System Map* (Exhibit D-2). Refer to the *Stormwater Improvements Engineer's Estimate of Preliminary Cost Estimate* (Exhibit D-6) for the preliminary quantities and costs associated to the improvements.

The advantages to replacing the existing stormwater system are that it will reduce current street flooding and standing water, reduce the structural impacts and stability of existing road surfaces and gutters, and reduce the cost of operations and maintenance of the stormwater system. Stormwater replacement will also bring the system up to current regulatory standards and meet current and future demands to the system, including the impact of rising sea levels.

There is no recommendation for stormwater improvements on either Collins Avenue (SR A1A) or 96th Street (SR 922). The roadways and the stormwater system that provide flood relief are owned and maintained by the Florida Department of Transportation. As older high-rises, low-rises and the Bal Harbour Shops within the Collins Avenue/ 96th Street corridor are expanded, razed or revitalized; it will be the owner's responsibility to provide a self-contained stormwater system on their individual properties.

SEE SHEET 2 OF 3
FOR CONTINUATION

EXISTING DRAINAGE OUTFALL (TYP.)

BALFOUR DRIVE

CAMDEN COURT

BLOCK 4

BLOCK 2

BLOCK 1

CAMDEN DRIVE

BAL BAY DRIVE

INTRACOASTAL WATERWAY (INDIAN CREEK)

EXISTING DRAINAGE PIPE (TYP.)

PARK DRIVE

EXISTING DRAINAGE STRUCTURE (TYP.)

EXISTING PUMP STATION (96TH STREET DRAINAGE SYSTEM)

96TH STREET

HARDING AVENUE

COLLINS AVENUE (A-1-A)

EXISTING DRAINAGE SYSTEM (OWNED AND OPERATED BY FDOT)

EXISTING DRAINAGE SYSTEM (OWNED AND OPERATED BY FDOT)

BAL MORAL

ST. REGIS RESORT

MAJESTIC

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

EXISTING STORM DRAINAGE SYSTEM

EXISTING STORM DRAINAGE STRUCTURE

EXHIBIT D-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING STORM DRAINAGE SYSTEM MAP

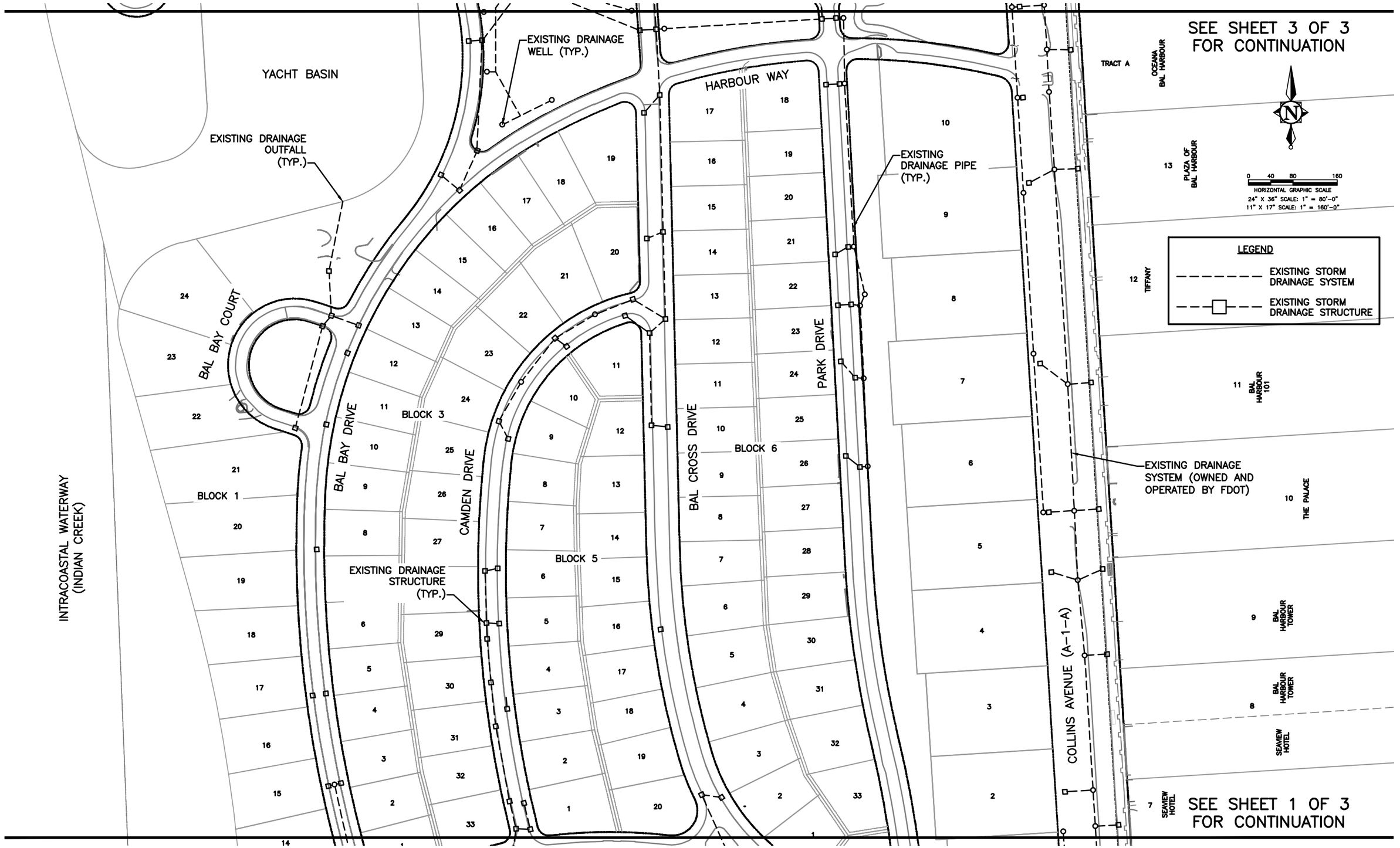


EXHIBIT D-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING STORM DRAINAGE SYSTEM MAP

EXISTING DRAINAGE OUTFALLS TO HAULOVER CUT (TYP.)

BAL BAY DRIVE

INTRACOASTAL WATERWAY (INDIAN CREEK)

EXISTING DRAINAGE STRUCTURE (TYP.)

EXISTING DRAINAGE PIPE (TYP.)

COLLINS AVENUE (A-1-A)

ONE BAL HARBOUR

HARBOUR HOUSE

HARBOUR HOUSE

CARLTON TERRACE

BELINNI

KENILWORTH CONDOS

OCEANA BAL HARBOUR

TRACT A

BLOCK 11

BLOCK 10

BLOCK 9

BISCAY DRIVE

BAL CROSS DRIVE

PARK DRIVE

HARBOUR WAY

HARBOUR WAY

EXISTING STORMWATER PUMP STATION

EXISTING DRAINAGE OUTFALL (TYP.)

EXISTING DRAINAGE WELL (TYP.)

YACHT BASIN

EXISTING DRAINAGE SYSTEM (OWNED AND OPERATED BY FDOT)

N

0 40 80 160

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

EXISTING STORM DRAINAGE SYSTEM

EXISTING STORM DRAINAGE STRUCTURE

SEE SHEET 2 OF 3 FOR CONTINUATION

EXHIBIT D-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING STORM DRAINAGE SYSTEM MAP

SEE SHEET 2 OF 3
FOR CONTINUATION

EXISTING 24" CMP OUTFALL (TO BE UPSIZED TO 36" HDPE)

PROPOSED DOWNSTREAM DEFENDER

BALFOUR DRIVE

PROPOSED CONTROL STRUCTURE (TYP.)

CAMDEN COURT

BLOCK 4

BLOCK 2

CAMDEN DRIVE

BLOCK 1

BAL BAY DRIVE

INTRACOASTAL WATERWAY (INDIAN CREEK)

PROPOSED CATCH BASIN (TYP.)

PARK DRIVE

PROPOSED MANHOLE (TYP.)

COLLINS AVENUE (A-1-A)

BAL MORAL

ST. REGIS RESORT

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING STORM DRAINAGE SYSTEM
- EXISTING STORM DRAINAGE MANHOLE
- EXISTING STORM DRAINAGE CATCH BASIN
- PROPOSED STORM DRAINAGE SYSTEM
- PROPOSED STORM DRAINAGE MANHOLE
- PROPOSED STORM DRAINAGE CATCH BASIN
- PROPOSED CONTROL STRUCTURE
- PROPOSED FLOW ARROWS

CONNECT TO EXISTING DRAINAGE SYSTEM (BAL HARBOUR SHOPS)

PROPOSED STORMWATER PIPE (TYP.)

EXISTING PUMP STATION

EXISTING 48" OUTFALL

EXISTING 48" OUTFALL

PROPOSED DOWNSTREAM DEFENDER

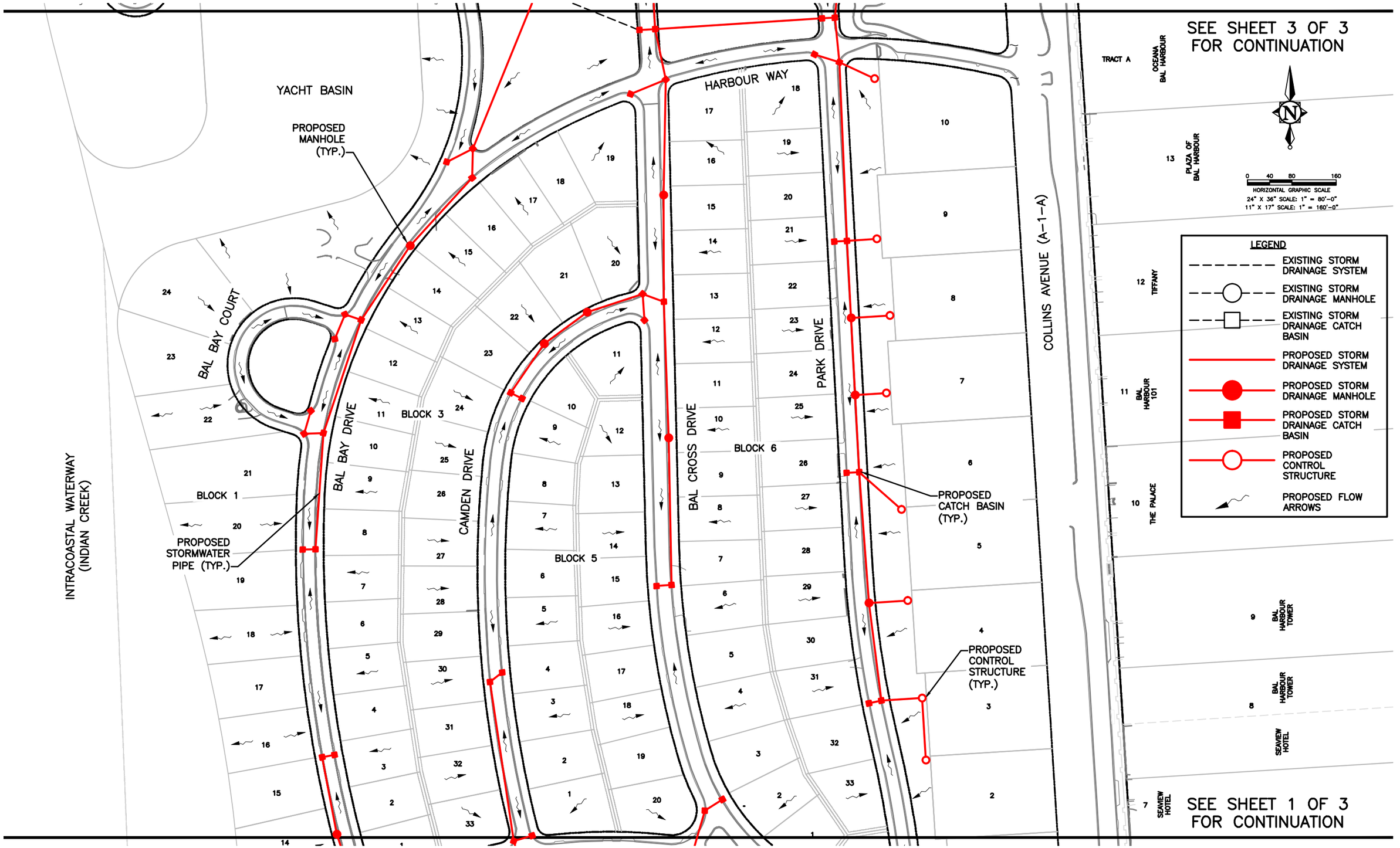
96TH STREET

HARDING AVENUE

MAJESTIC

EXHIBIT D-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED STORM DRAINAGE SYSTEM MAP



2 OF 3

EXHIBIT D-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED STORM DRAINAGE SYSTEM MAP

INTRACOASTAL WATERWAY (INDIAN CREEK)

BAL BAY DRIVE

PROPOSED STORMWATER PIPE (TYP.)

PROPOSED MANHOLE (TYP.)

PROPOSED CONTROL STRUCTURE (TYP.)

BLOCK 11

BISCAY DRIVE

BLOCK 10

HARBOUR WAY

PROPOSED DOWNSTREAM DEFENDER (TYP.)

EXISTING PUMP STATION

EXISTING 48" X 76" RCP OUTFALL

YACHT BASIN

PROPOSED BYPASS WIER

BAL CROSS DRIVE

BLOCK 9

PARK DRIVE

PROPOSED CATCH BASIN (TYP.)

EXISTING 48" X 76" RCP

HARBOUR WAY

COLLINS AVENUE (A-1-A)

ONE BAL HARBOUR

HARBOUR HOUSE

HARBOUR HOUSE

CARLTON TERRACE

BELINNI

KENILWORTH CONDOS

TRACT A

OCEANA BAL HARBOUR

0 40 80 160

HORIZONTAL GRAPHIC SCALE

24" X 36" SCALE: 1" = 80'-0"

11" X 17" SCALE: 1" = 160'-0"

LEGEND

- EXISTING STORM DRAINAGE SYSTEM
- EXISTING STORM DRAINAGE MANHOLE
- EXISTING STORM DRAINAGE CATCH BASIN
- PROPOSED STORM DRAINAGE SYSTEM
- PROPOSED STORM DRAINAGE MANHOLE
- PROPOSED STORM DRAINAGE CATCH BASIN
- PROPOSED CONTROL STRUCTURE
- PROPOSED FLOW ARROWS

SEE SHEET 2 OF 3 FOR CONTINUATION

EXHIBIT D-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED STORM DRAINAGE SYSTEM MAP

1 OF 3

EXHIBIT D-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
OBSERVED ROADWAY FLOOD AREAS (08/27/12)

SEE SHEET 3 OF 3
FOR CONTINUATION

N

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND
FLOOD AREAS

BAL BAY DRIVE
YACHT BASIN
HARBOUR WAY
HARBOUR WAY
INTRACOASTAL WATERWAY (INDIAN CREEK)
BAL BAY COURT
BAL BAY DRIVE
CAMDEN DRIVE
BAL CROSS DRIVE
PARK DRIVE
COLLINS AVENUE (A-1-A)
BLOCK 1
BLOCK 3
BLOCK 5
BLOCK 6
TRACT A OCEANA BAL HARBOUR
13 PLAZA OF BAL HARBOUR
12 TIFFANY
11 BAL HARBOUR 101
10 THE PALACE
9 BAL HARBOUR TOWER
8 BAL HARBOUR TOWER

SEE SHEET 1 OF 3
FOR CONTINUATION

EXHIBIT D-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
OBSERVED ROADWAY FLOOD AREAS (08/27/12)

3 OF 3

EXHIBIT D-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
OBSERVED ROADWAY FLOOD AREAS (08/27/12)

P:\Cities_Villages_Towns\Bal_Harbour\12-1146-BCP-BAL HARBOUR UTILITY RDWY MASTER PLAN\04-Engineering Plans\02-Exhibits\FLOOD AREAS\00-1146-FLD-EXB.dwg, 8/26/2014 8:59:56 AM, mmarenco, 1:2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER REPLACEMENT OPTIONS
EXHIBIT D-4

OPTION A	
Full replacement of drainage system to meet 10-Year Storm Level of Service (LOS) in preparation of future rising sea levels	
Estimated Cost:	**$11,096,614**

OPTION B	
Full replacement of drainage system to meet 5-Year Storm Level of Service (LOS)	
Estimated Cost:	**$10,088,400**

OPTION C	
Upgrading Existing Drainage System To: • Replace undersized pipes to meet (current) 3-Year Storm Level of Service (LOS). • Structurally inadequate cross drain pipes. • Documented leaking pipes. • Isolated flooding areas within the Village Residential Area.	
Estimated Cost:	**$5,041,980**

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER OPTION COMPARISON
EXHIBIT D-5

STORMWATER OPTIONS

Option	Level of Service (Storm Event)	% of System Affected	Life Expectancy	Cost
A	10 Years	100	50 Years	$11,096,614[1]
B	5 Years	100	50 Years	$10,088,400[2]
C	3 Years or Less	35	0 to 10 Years	$5,041,980[3]

[1] Costs are for the complete drainage system and valley gutter improvements and a proportionate percentage of the raised roadway within the Village residential area.

[2] Costs are for complete drainage system with reduced pipe sizes, complete valley gutter improvements and a proportionate percentage of the raised roadway within the Village residential area.

[3] Costs are for repair or replacement of the existing drainage system, complete valley gutter improvements and a proportionate percentage of the roadway restoration at current elevations within the Village residential area.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT D-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 314,856.00	$ 314,856.00
2	Maintenance of Traffic (4%)	1	LS	$ 157,428.00	$ 157,428.00
3	Survey Stakeout & As-Builts (3%)	1	LS	$ 118,071.00	$ 118,071.00
4	Density Testing (2%)	1	LS	$ 78,714.00	$ 78,714.00
5	Clearing & Stripping (3%)	1	LS	$ 118,071.00	$ 118,071.00
6	Landscape Restoration (1%)	1	LS	$ 39,357.00	$ 39,357.00
7	Sod Restoration	3500	SY	$ 4.00	$ 14,000.00
8	SWPPP & NPDES NOI Permitting (2%)	1	LS	$ 78,714.00	$ 78,714.00
				TOTAL	$ 919,211.00
	Structures				
1	Type 'C-4' Inlet	63	EA	$ 4,500.00	$ 283,500.00
2	Type M-4 Inlet	2	EA	$ 5,000.00	$ 10,000.00
3	Type M-4 Manhole	10	EA	$ 5,300.00	$ 53,000.00
4	Type 'C-5' Inlet	14	EA	$ 5,700.00	$ 79,800.00
5	Type M-5 Inlet	4	EA	$ 5,200.00	$ 20,800.00
6	Type M-5 Manhole	7	EA	$ 5,500.00	$ 38,500.00
7	Type 'C-6' Inlet	8	EA	$ 8,000.00	$ 64,000.00
8	Type M-6 Inlet	5	EA	$ 8,300.00	$ 41,500.00
9	Type M-6 Manhole	3	EA	$ 8,600.00	$ 25,800.00
10	Type 'C-7' Inlet	4	EA	$ 9,000.00	$ 36,000.00
11	Type M-7 Inlet	1	EA	$ 9,500.00	$ 9,500.00
12	Type M-7 Manhole	3	EA	$ 9,800.00	$ 29,400.00
13	Type 'C-8' Inlet	2	EA	$ 11,000.00	$ 22,000.00
14	6' Dia. Water Quality Structure	2	EA	$ 35,000.00	$ 70,000.00
15	8' Dia. Water Quality Structure	2	EA	$ 50,000.00	$ 100,000.00
16	Bypass Weir Box	1	EA	$ 15,000.00	$ 15,000.00
				TOTAL	$ 898,800.00
	Pipe				
1	18" A2000 PVC Pipe	3750	LF	$ 70.00	$ 262,500.00
2	24" A2000 PVC Pipe	3250	LF	$ 90.00	$ 292,500.00
3	30" A2000 PVC Pipe	2040	LF	$ 110.00	$ 224,400.00
4	36" A2000 PVC Pipe	3370	LF	$ 135.00	$ 454,950.00
5	42" RCP	600	LF	$ 155.00	$ 93,000.00
6	48" RCP	600	LF	$ 200.00	$ 120,000.00
7	54" RCP	550	LF	$ 250.00	$ 137,500.00
8	60" RCP	40	LF	$ 300.00	$ 12,000.00
9	78" RCP	25	LF	$ 450.00	$ 11,250.00
				TOTAL	$ 1,608,100.00

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT D-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
	Drainage Connections for Low-Rise Multi-Family Properties				
1	18" A2000 PVC Pipe	1550	LF	$ 70.00	$ 108,500.00
2	Type M-6 Control Structure w/ Weir Wall	18	EA	$ 12,500.00	$ 225,000.00
3	Type M-5 Manhole	4	EA	$ 5,500.00	$ 22,000.00
4	Upsize to M-6 Inlet on Bal Bay Drive	1	LS	$ 10,500.00	$ 10,500.00
5	Sod Restoration	875	SY	$ 4.00	$ 3,500.00
				TOTAL	$ 369,500.00
	Miscellaneous				
1	Remove Exist. Catch Basin	142	EA	$ 650.00	$ 92,300.00
2	Remove Exist. Storm Manhole	38	EA	$ 750.00	$ 28,500.00
3	Remove Exist. Drainage Pipe (12"-24")	11000	LF	$ 15.00	$ 165,000.00
4	Remove Exist. Drainage Pipe (30"-42")	1750	LF	$ 30.00	$ 52,500.00
5	Connect to Existing Drainage	3	EA	$ 5,000.00	$ 15,000.00
6	Plug and Abandon Exist. 24" Outfall	1	LS	$ 3,500.00	$ 3,500.00
7	Abandon Exist. Stormwater Wells	8	EA	$ 16,000.00	$ 128,000.00
8	Remove Exist. Well Piping (20"-36" DIP)	800	LF	$ 50.00	$ 40,000.00
9	Pipe Burst Exist. 24" Outfall Pipe, Directional Drill 36" HDPE Outfall Pipe	1	LS	$ 60,000.00	$ 60,000.00
10	Upgrade Pump Station Instrumentation w/ Telemetry System	2	EA	$ 50,000.00	$ 100,000.00
11	Pump Station Rehabilitation	1	LS	$ 460,000.00	$ 460,000.00
12	Emergency Generator (96 Street)	1	LS	$ 90,000.00	$ 90,000.00
13	Emergency Generator (Yacht Basin)	1	LS	$ 180,000.00	$ 180,000.00
				TOTAL	$ 1,414,800.00

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
EXHIBIT D-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
				SUBTOTAL	$5,210,411
				10% CONTINGENCY	$ 521,041
				TOTAL CONSTRUCTION COST	$ 5,731,452
				ENGINEERING DESIGN (10%)	$ 521,041
				DESIGN SURVEY (1.5%)	$ 78,156
				UTILITY LOCATES (0.5%)	$ 26,052
				CONSTRUCTION OBSERVATION (5%)	$ 260,521
				ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 104,208
				TOTAL PRELIMINARY COST	$ 6,721,430

NOTE : TRENCH RESTORATION IS INCLUDED IN PIPE COSTS. PRICES DO NOT INCLUDE ROADWAY RESTORATION, SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

EXHIBIT D-7

PHOTOGRAPHS

Photo 1 : 276-284 Bal Bay Drive, looking south.

Photo 2: 276 Bal Cross Drive, looking west.

EXHIBIT D-7

PHOTOGRAPHS

Photo 3: Intersection of Park Road and Bal Cross Drive, looking southwest.

Photo 4: Bal Cross Drive and Park Road, looking east.

EXHIBIT D-7

PHOTOGRAPHS

Photo 5: 271 Bal Cross Drive, looking east.

Photo 6: Park Drive, looking north to Bal Bay Drive.

EXHIBIT D-7

PHOTOGRAPHS

Photo 7: Camden Drive, looking south.

Photo 8: 275-279 Bal Bay Drive, looking north.

EXHIBIT D-7

PHOTOGRAPHS

Photo 9: Catch Basin at 265 Bal Bay Drive, looking south.

Photo 10: 259-251 Bal Bay Drive, looking west.

EXHIBIT D-7

PHOTOGRAPHS

Photo 11: Roots infiltrating stormwater pipe joint.

Photo 12: Longitudinal crack at top of stormwater pipe.

EXHIBIT D-7

PHOTOGRAPHS

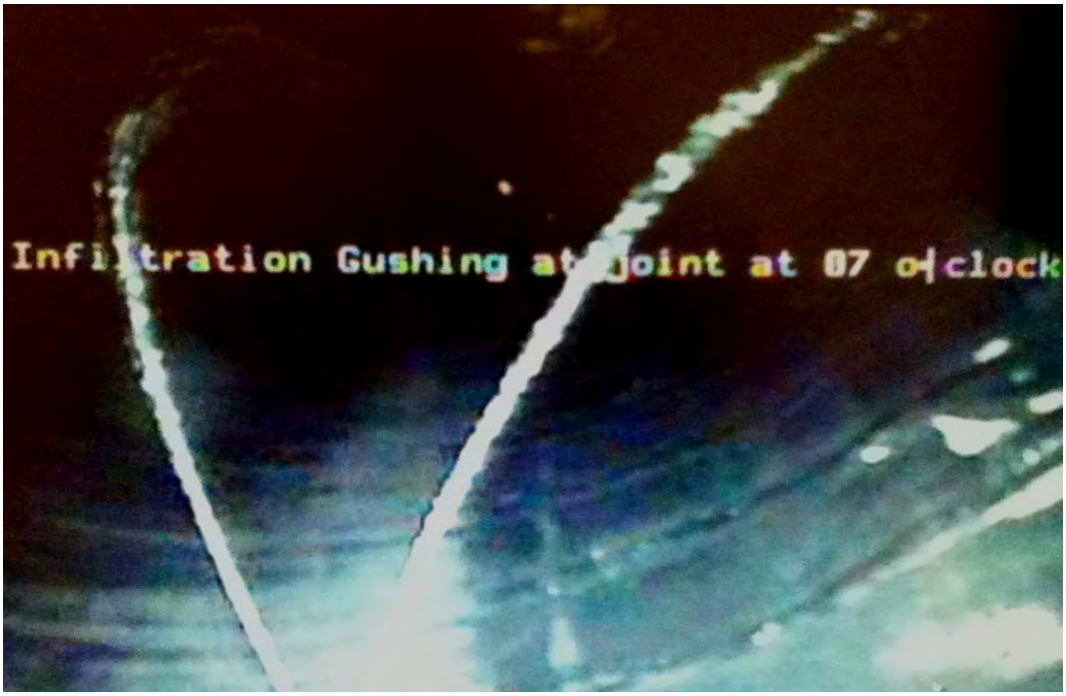


Photo 13: Groundwater infiltration into stormwater pipe.

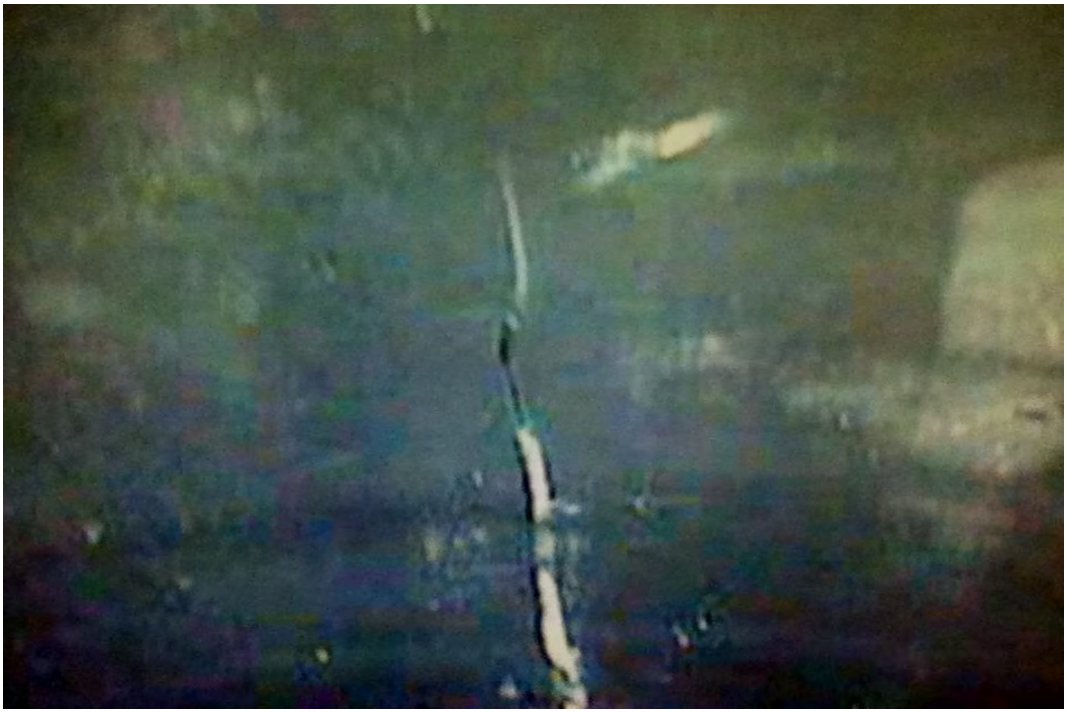


Photo 14: Longitudinal crack at top of stormwater pipe.

BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR
FLORIDA'S PARADISE

SECTION 5

ROADWAY IMPROVEMENTS

EXISTING ROADWAY INFRASTRUCTURE

The existing roadway infrastructure within Bal Harbour Village is separated into two distinct systems. The roadways for Collins Avenue (SR A1A) and 96th Street (SR 922) are principal roadway thoroughfares owned, operated and maintained by the Florida Department of Transportation (FDOT). These roadways are classified as state arterial roads, due primarily to traffic loads; they have the highest level of service. The remaining roadways within the Village, more specifically within the residential area, are classified as Urban Collectors and local roads and are owned, operated and maintained by the Village.

Village Roadways

The initial roadways within the Village residential area were constructed at the inception of the Village in 1946. An asphalt overlay of the roadway system within Bal Harbour was performed in the 1980's. Predominantly, the current concrete curb and gutter system within the Village still remains from the original construction. Bal Bay Drive, Harbour Way, Balfour Drive and Park Drive are classified as Urban Collector roads. The collector system provides traffic circulation within residential neighborhoods and commercial and industrial areas. Urban collectors also channel traffic from local roads onto the arterial system. Access to the principal arterial roads is located at Harbour Way (for Collins Avenue) and Bal Bay Drive (for 96th Street).

All other roadways located within the Village that has not been mentioned above are classified as local roads. Local roads direct land access and link to higher classification systems. All collector roadways and local streets within the Village are two lane roads and vary in width from 22 feet to 24 feet. Overall there are approximately four miles of roadways located within the Village of Bal Harbour residential area.

The current conditions of the Village roadways are indicated in the photographs found in Exhibit R-12. After thirty five years without repairs road surface deterioration has occurred; resulting in surface cracking and settling. Pavement systems primarily fail due to fatigue and a lack of maintenance. According to the American Association of State Highway and Transportation Officials (AASHO) Road Test, heavily loaded vehicles, such as moving trucks and construction vehicles and equipment, can do more than 10,000 times the damage done by a normal passenger car.

Other failure modes include aging and surface abrasion. As years go by, the binder in a bituminous wearing course gets stiffer and less flexible. When it becomes "old" enough, the surface will start losing aggregates, and macrotexture depth increases dramatically. If no maintenance action is done quickly on the wearing course, systematic failures, such as potholes and surface cracking, will form. Roadway sectional repairs, or patches, are indicative of failures over time.

The existing concrete curb and gutter within the residential neighborhood was installed along with the drainage network in 1946. The condition of the existing curb & gutter is deteriorating due to age, settlement, and a substandard base. The existing concrete curb and gutter (Miami curb), located within the residential area, has shifted, settled, and separated in many locations and is unable to perform its primary function of collecting and distributing surface water from the roadways to the drainage system.

Collins Avenue

Collins Avenue (State Road A1A) is classified as a State Urban Arterial Road. Arterial roadways provide the highest level of mobility, the highest volume of traffic, longest trip lengths and provides continuity for collector roads. Collins

Avenue became a four lane divider road (two lanes in each direction separated by a center median) in the mid 1940's. Haulover Bridge, located at the northern limits of the Village, was constructed in 1950. Expansion of the 0.85 mile road occurred in the 1960's when Collins Avenue was widened to a six lane divider road with turn lanes.

Collins Avenue (SR A1A) along with the frontage road located on the east and west sides of Collins Avenue that loops under Haulover Bridge is presently owned, operated and maintained by the Florida Department of Transportation (FDOT).

96th Street

96th Street (SR 922) is also classified as a State Urban Arterial Road. Arterial roadways provide the highest level of mobility, the highest volume of traffic, longest trip lengths and provides continuity for collector roads. 96th Street became a two lane divider road (one lane in each direction separated by a center median) in the mid 1940's. Expansion of the 0.35 mile road occurred in the 1960's when 96th Street was widened to a four lane divider road with turn lanes. Although 96th Street is presently owned, operated and maintained by the Florida Department of Transportation (FDOT), the jurisdictional boundary between the Bal Harbour Village and the Town of Surfside is located in the center of the road right-of-way.

A portion of 96th Street, east of Collins Avenue that dead ends at the ocean, is jointly owned, maintained and operated by Bal Harbour Village and Surfside.

FUTURE ROADWAY INFRASTRUCTURE

Village Roadways

With the installation of a new water, sewer, and drainage infrastructure the increasing need for roadway replacement within the residential neighborhood becomes essential. As indicated in Exhibit R-12, cracks, settling and separation to the existing curb and gutter and roadway surface demonstrates how indicative the need for repairs can be. A uniformly sloped roadway and curb and gutter system will distribute runoff efficiently and effectively to the drainage inlet. Once the road surface and gutter system's integrity and conveyance are compromised, by separation or settling, standing water, ponding, and, in some cases, flooding will occur. The more severe the damage the longer the duration of standing water.

Rising Sea Levels

In order to offset the rise in sea levels the Utility Master Plan has incorporated measures to reduce the risk of future potential flooding by providing conceptual designs, within Village right-of-way, for both the stormwater system and the roadway improvements.

The roadway improvements would include raising the existing roadway, gutter system and drainage inlets between four to six inches for the purpose of providing flood protection from a 10-year storm event and providing added storage in swales and the drainage system. Raising the elevation of an existing road within a retrofit project has its limitations. Change in road grades has to be incremental and in relationship to the surrounding structures. Increasing the elevation in the road too significantly can potentially redistribute the flooding from the road to a private property. Upon completion of the road elevation project,

blending or harmonization with existing features is required (i.e. driveways, walks, walls, landscaping, etc.).

An additional method of counteracting future rising sea levels is to establish a uniform elevation for all existing sea walls within the residential area. The sea wall should be at a grade that would protect against both mean normal water levels and the height of waves during extreme weather conditions. The sea wall elevation would be established based on the results of a comprehensive rainfall-runoff simulation and hydraulic modelling.

For a detailed description and costs for the roadway improvements within the residential area refer to Exhibits R-1, R-6 and R-7.

Level of Service

The Utility Master Plan evaluated three alternatives for the Village roadway and drainage system in order to provide the Village with various Level of Service (LOS) options based on protection and costs. As flood protection increases, from rising sea levels and severe rainfall events, the higher the cost for stormwater and roadway improvements. Exhibit D-4 and D-5 indicate a comparison of the levels of service and the costs for construction. Exhibit R-4 provides a typical lot and road profile, with and without a sea level rise, for all three options.

Option A involves the full replacement of the stormwater system to meet the 10-year storm level criteria in preparation of future rising sea levels, the raising of the existing roadways within the residential area between four and six inches, and the installation of a new concrete valley gutter. With an anticipated sea level rise the 10-year storm protection will restrict runoff to the swale areas and prevent long-term flooding or ponding in the roadways.

One hundred percent of the existing stormwater system within the residential area will be affected in Option A and the life expectancy of the newly installed system will be 50 years. Improvements to the existing pumping station, adjacent to the Yacht Basin, may include modifications to the existing discharge pumps. The estimated cost of Option A is $11,096,614.

Stormwater replacement Option B involves the full replacement of the stormwater system to meet the 5-year storm level criteria in preparation of future rising sea levels, the raising of the existing roadways within the residential area between four and six inches, and the installation of a new concrete valley gutter. The anticipated effect of Option B without sea level rises will include street runoff accumulation within the swale areas. With anticipate sea level rises the results are flooding and long-term standing water in the swales and roadways up to the top of crown elevation.

The difference between the 10-year and 5-year criteria will be a reduction in drainage pipe sizes. One hundred percent of the existing stormwater system within the residential area will be affected in Option B and the life expectancy of the newly installed system will be 50 years. Improvements to the existing pumping station, adjacent to the Yacht Basin, may include modifications to the existing discharge pumps. The estimated cost of Option B is $10,088,400.

Stormwater replacement Option C involves upgrading the existing stormwater system to meet the 3-year storm level (the current level of service that the existing stormwater system provides). Option C is primarily a reparation project to the existing drainage system that would replace undersized pipes, structurally inadequate cross drain pipes, documented leaking pipes and to address isolated flood prone areas within the residential neighborhood. In Option C the roads and valley gutters within the residential area will not be raised to a higher level to counteract future rising sea levels. The anticipated effect without sea level rise is flooding and long-term standing water in the swales and roadways up to the top

of crown elevation. With a scenario of sea level rising the anticipated effect in Option C is long-term property and road flooding with standing waters for a significant duration. The potential exists for residential flooding in older homes that do not meet the current 100-year flood elevation. The estimated cost of Option C is $5,041,980.

Asphalt Pavement

With the construction of a new water main, sanitary sewer main, utility services, a new stormwater infrastructure and all items associated with these improvements, the existing roads within the residential neighborhood will require a total restoration. The current conditions of the Village roadways are indicated in the photographs found in Exhibit R-12. After thirty five years without repairs road surface and curb deterioration has occurred; resulting in surface cracking, settling, and during storm events ponding. Even without the proposed infrastructure improvements, the existing roadway system has exceeded its life expectancy.

The asphalt roadway, initially installed in 1946 with an overlay in the 1980's, provides an integral component in the distribution of surface water and initiates the conveyance of the water quickly to the stormwater collection system in order to reduce standing water and ponding on the road surface after rain events. As rainfall collects within the streets, during a storm event, the roadways are designed, by differences in elevations, to direct the accumulated water to the valley gutter adjacent to the edge of pavement. The gutter system then conveys the runoff to the nearest drainage structure so that water is removed from the road surface and stored in the underground pipe network. As mentioned above the future roadway section will be designed and constructed at a level of service that will minimize flooding and standing water after severe rainfall events.

Due to the utility installations described in this Master Utility Plan, the Village will seize the opportunity to reconstruct the roadway network within the residential area to current design and construction standards including uniformly raising the elevation of the road and, in turn, the inlet elevations, properly designing high and low points, and utilizing continual longitudinal and cross slopes to properly drain the roads of surface water during storm events.

The total preliminary estimated cost for the roadway improvements within the Village's residential neighborhood is $5,628,934. Improvements to the roadway will include removal of the remaining asphalt and limerock base not disturbed during the construction of other utilities, importing, integrating, stabilizing and compacting a new road subbase at a higher elevation, the installation of a new compacted limerock base, two courses of asphalt pavement, new pavement striping and decorative street poles. Refer to Exhibit R-1 for the proposed roadway improvement map and Exhibit R-7 for the *Engineer's Estimate of Preliminary Cost Estimate*.

In areas where muck and deleterious materials are uncovered a geo-synthetic flexible fabric material would be used to stabilize the roadway. Prior to design of the roads a geotechnical firm will be hired to perform soil borings and analyze the conditions of the soil makeup. The underlying soils within the RD have been known to contain pockets or layers of deleterious materials such as muck or marl that could affect construction and, in turn subbase restoration costs beneath the road surface.

Due to the elevation change from the previous roadway, harmonization will be an integral part of roadway construction in order for the new road to meet the existing surrounding conditions. This would include reworking existing landscaping, ornamental features or driveways for existing developed properties. Each property's harmonization would differ based on its relationship to the revised roadway design. Stormwater improvements also include pavement

striping, adjustment of existing utility valves or manholes, maintenance of traffic and testing.

Exhibit R-5 *Roadway Sample Results* shows a before and after comparison of a recently completed development similar in size and scope to Bal Harbour Village. Although most of the improvements from a Utility Master Plan are underground, a completed retrofit project can dramatically enhance a neighborhood's appearance.

Concrete Valley Gutter

The existing concrete curb and gutter within the residential area was installed along with the drainage network in 1946. The condition of the existing curb & gutter, as indicated in the photographs in Exhibit R-12, is deteriorating due to age, settlement, and a substandard base. The existing concrete curb and gutter (Miami curb), located within the residential neighborhood, has shifted, settled, and separated in many locations and is unable to perform its primary function of collecting and distributing surface water from the roadways to the drainage system. The installation of new 2-foot wide concrete valley gutter, along the perimeter of all roadways within the residential area, would secure the road surface both by strengthening and confining, would act as an aesthetic enhancement to the neighborhood and an integral part of the stormwater collection system by alleviating surface ponding on the roads within the residential area after heavy rains.

To prevent future settling, the concrete valley gutter would be installed on a compacted limerock base. The preliminary estimated cost for the removal and replacement of the reinforced concrete curb and gutter with the new 2-foot concrete valley gutter is $2,123,610. This cost also includes harmonization between the new valley gutter and the existing residential driveways and raising

the grade to match the proposed roadway elevation. Refer to the *Engineer's Estimate of Preliminary Cost Estimate - 2' Concrete Valley Gutter Installation* (Exhibit R-6).

Exhibit G-8 *Utility Zone Description* indicates the current and future status of all roadway improvements within the entire Village. Areas of the Village are divided into zones and a detailed description is included, in database form, for each utility principle. Each zone of the Village has either benefitted from recent roadway infrastructure projects or will benefit from proposed roadway projects outlined in this Utility Master Plan. As indicated in Exhibit G-6 (2014 Master Plan Utility Projects), roadway improvements are anticipated to be designed, permitted and constructed in Fiscal Year 2016.

Collins Avenue

FDOT has recently completed a milling and resurfacing project for the entire 0.85 miles of road surface on Collins Avenue and Harding Avenue from the 9700 block to Haulover Bridge. Due to limited funding sidewalks, driveway entrance aprons, valley gutters and curb and gutters were not part of the project scope. During the course of the projected limited sections of curb and gutter were replaced that had been deemed irreparable. The $1.57 million dollar project also included minor drainage repairs on Collins Avenue and major drainage improvements at and under Haulover Bridge.

Exhibit R-13 shows photographs to the condition of the existing sidewalks on the east and west side and the existing concrete curb and gutter on the east, west and center median of Collins Avenue. Cracks, settling and separation to the existing sidewalks can, without proper maintenance, become hazards to the general public. The preliminary engineer's estimated cost for sidewalk improvements is $2,159,305. As described in Exhibit R-8 this cost includes the

installation of new concrete sidewalks on the east and west sides for the entire length of Collins Avenue, the removal and disposal of the existing sidewalk, the removal and installation of new concrete aprons at each driveway entrance adjacent to Collins Avenue, relocation of existing utilities, harmonization to the existing properties (i.e. regrading, landscaping, entrance features, etc.) and conformance to ADA standards including ramps.

Exhibit R-8A offers a comparison of the cost of installing new concrete sidewalks to the costs of replacing the existing *Blue Twilight* treatment sidewalks in kind. The installation process for the *Blue Twilight* treatment involves introducing specified chipped granite into the coarse layer of the sidewalk. The preliminary engineer's estimated cost for *Blue Twilight* alternative is $2,837,329. The differential in costs indicated in Exhibit R-8A is solely due to the unique composition of the sidewalk.

The new road surface on Collins Avenue is only one element to a fully functioning stormwater system. As indicated in Exhibit R-13, cracks, settling and separation to the existing curb and gutter demonstrates how indicative the need for repairs can be. A uniformly sloped curb and gutter system will distribute runoff efficiently from the road to the drainage inlet. Once the gutter's integrity and conveyance is compromised, by separation or settling, standing water and ponding will occur. The preliminary engineer's estimated cost for the replacement of all two-foot concrete curb and gutter on Collins Avenue is $1,196,449. As described in Exhibit R-9 *Engineer's Estimate of Preliminary Cost Estimate* this cost includes the removal and replacement of the existing two-foot concrete curb and gutter on the east, west and center median of Collins Avenue, a stabilized limerock base that will prevent future settling, and harmonization with existing features.

Exhibit R-2 indicates the proposed concrete sidewalks and curb and gutter improvements for Collins Avenue. With the completion of the FDOT asphalt

project the installation of new sidewalk and curb and gutter elements will only enhance the Collins Avenue corridor both functionally and aesthetically.

96th Street

FDOT has recently completed a milling and resurfacing project for the entire 0.35 miles of road surface on 96th Street (SR 922) from the Kane Concourse Bridge at Indian Creek east to Collins Avenue. The jurisdictional boundary between the Bal Harbour Village and the Town of Surfside is located in the center of the road right-of-way. Due to limited funding sidewalks, driveway entrance aprons, valley gutters and curb and gutters were not part of the project scope. During the course of the projected limited sections of curb and gutter were replaced that had been deemed irreparable.

Exhibit R-14 indicates the condition of the existing sidewalks on the north side and the existing concrete curb and gutter on the north and center median of 96th Street. Cracks, settling and separation to the existing sidewalks can, without proper maintenance, become hazards to the general public. The preliminary engineer's estimated cost for sidewalk improvements is $677,714. As described in Exhibit R-10 this cost includes the installation a new concrete sidewalks on the north side for the entire length of 96th Street, the removal and disposal of the existing sidewalk, the removal and installation of new concrete aprons at each driveway entrance adjacent to 96th Street, relocation of existing utilities, harmonization to the existing properties (i.e. regrading, landscaping, entrance features, etc.) and conformance to ADA standards including ramps.

Exhibit R-10A offers a comparison of the cost of installing new concrete sidewalks to the costs of replacing the existing *Blue Twilight* treatment sidewalks in kind. The installation process for the *Blue Twilight* treatment involves introducing specified chipped granite into the coarse layer of the sidewalk. The

preliminary engineer's estimated cost for *Blue Twilight* alternative is $900,626. The differential in costs indicated in Exhibit R-10A is solely due to the unique composition of the sidewalk.

The new road surface on 96th Street is only one element to a fully functioning stormwater system. As indicated in Exhibit R-14, cracks, settling and separation to the existing curb and gutter demonstrates how indicative the need for repairs can be. A uniformly sloped curb and gutter system will distribute runoff efficiently from the road to the drainage inlet. Once the gutter's integrity and conveyance is compromised, by separation or settling, standing water and ponding will occur. The preliminary engineer's estimated cost for the replacement of all two-foot concrete curb and gutter on 96th Street is $237,076. As described in Exhibit R-11 *Engineer's Estimate of Preliminary Cost Estimate* this cost includes the removal and replacement of the existing two-foot concrete curb and gutter on the north and center median of 96th Street, a stabilized limerock base that will prevent future settling, and harmonization with existing features.

Exhibit R-3 indicates the proposed concrete sidewalks and curb and gutter improvements within the Village's 96th Street jurisdiction. With the completion of the FDOT asphalt project the installation of new sidewalk and curb and gutter elements will only enhance the 96th Street corridor both functionally and aesthetically.

1 OF 3

EXHIBIT R-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED ROADWAY IMPROVEMENT MAP

SEE SHEET 3 OF 3
FOR CONTINUATION

PROPOSED 22' WIDTH ASPHALT

PROPOSED 22' WIDTH ASPHALT

PROPOSED 24' WIDTH ASPHALT

PROPOSED 22' WIDTH ASPHALT

PROPOSED VALLEY GUTTER (TYP.)

PROPOSED 22' WIDTH ASPHALT

PROPOSED 22' WIDTH ASPHALT

PROPOSED 22' WIDTH ASPHALT

PROPOSED 24' WIDTH ASPHALT

BAL BAY DRIVE

YACHT BASIN

HARBOUR WAY

HARBOUR WAY

PARK DRIVE

BAL CROSS DRIVE

COLLINS AVENUE (A-1-A)

INTRACOASTAL WATERWAY (INDIAN CREEK)

BAL BAY COURT

BAL BAY DRIVE

CAMDEN DRIVE

BLOCK 1

BLOCK 3

BLOCK 5

BLOCK 6

TRACT A OCEANA BAL HARBOUR

PLAZA OF BAL HARBOUR

TIFFANY

BAL HARBOUR 101

THE PALACE

BAL HARBOUR TOWER

BAL HARBOUR TOWER

SEE SHEET 1 OF 3
FOR CONTINUATION

N

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND
PROPOSED ASPHALT
PROPOSED VALLEY GUTTER

2 OF 3

EXHIBIT R-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED ROADWAY IMPROVEMENT MAP

SEE SHEET 2 OF 3
FOR CONTINUATION

3 OF 3

EXHIBIT R-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED ROADWAY IMPROVEMENT MAP

PROP. HANDICAP RAMP (TYP.)

PROP. CONC. SIDEWALK (TYP.)

EXIST. CONC. SIDEWALK TO REMAIN (TYP.)

COLLINS AVENUE (A-1-A)

PROP. DROP CURB (TYP.)

PROP. 2' CONC. VALLEY GUTTER

PROP. 2' CONC. CURB & GUTTER (TYP.)

HARDING AVENUE

PROP. 2' CONC. CURB & GUTTER (TYP.)

EXIST. CONC. CURB & GUTTER TO REMAIN (TYP.)

PROP. CONC. DRIVEWAY APRON (TYP.)

N

0 15 30 60

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

PROP. CONC. SIDEWALK (TYP.)

96TH STREET

COLLINS AVENUE (A-1-A)

EXIST. CONC. SIDEWALK TO REMAIN (TYP.)

1
MAJESTIC

2
ST. REGIS RESORT

3
ST. REGIS RESORT

4
ST. REGIS RESORT

SEE SHEET 2 OF 5 FOR CONTINUATION

1 OF 5

EXHIBIT R-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE CURB & GUTTER/SIDEWALK IMPROVEMENTS PLAN

BAL CROSS DRIVE

1

2

3

0 15 30 60
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

PROP. CONC. DRIVEWAY APRON (TYP.)

PROP. CONC. SIDEWALK (TYP.)

PROP. DROP CURB (TYP.)

COLLINS AVENUE (A-1-A)

PROP. 2' CONC. CURB & GUTTER (TYP.)

PROP. HANDICAP RAMP (TYP.)

PROP. 2' CONC. CURB & GUTTER (TYP.)

PROP. CONC. DRIVEWAY APRON (TYP.)

PROP. CONC. SIDEWALK (TYP.)

PROP. DROP CURB (TYP.)

PROP. 2' CONC. VALLEY GUTTER

5

BAL MORAL

6

BAL MORAL

7

SEAVIEW HOTEL

7

SEAVIEW HOTEL

8

BAL HARBOUR TOWER

SEE SHEET 1 OF 5 FOR CONTINUATION

SEE SHEET 3 OF 5 FOR CONTINUATION

EXHIBIT R-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE CURB & GUTTER/SIDEWALK IMPROVEMENTS PLAN

4

5

6

7

8

9

0 15 30 60
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

PROP. CONC. SIDEWALK (TYP.)

PROP. CONC. DRIVEWAY APRON (TYP.)

PROP. DROP CURB (TYP.)

PROP. 2' CONC. CURB & GUTTER (TYP.)

COLLINS AVENUE (A-1-A)

PROP. 2' CONC. CURB & GUTTER (TYP.)

PROP. CONC. DRIVEWAY APRON (TYP.)

PROP. CONC. SIDEWALK (TYP.)

PROP. DROP CURB (TYP.)

9

BAL HARBOUR TOWER

10

THE PALACE

11

BAL HARBOUR 101

12

TIFFANY

13

PLAZA OF BAL HARBOUR

SEE SHEET 2 OF 5 FOR CONTINUATION

SEE SHEET 4 OF 5 FOR CONTINUATION

EXHIBIT R-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE CURB & GUTTER/SIDEWALK IMPROVEMENTS PLAN

10

HARBOUR WAY

HARBOUR WAY

1

2

3

4

0 15 30 60
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

PROP. CONC. SIDEWALK (TYP.)

PROP. 2' CONC. CURB & GUTTER (TYP.)

PROP. DROP CURB (TYP.)

COLLINS AVENUE (A-1-A)

PROP. CONC. DRIVEWAY APRON (TYP.)

PROP. DROP CURB (TYP.)

PROP. HANDICAP RAMP (TYP.)

PROP. 2' CONC. CURB & GUTTER (TYP.)

PROP. CONC. SIDEWALK (TYP.)

PROP. CONC. DRIVEWAY APRON (TYP.)

TRACT A

OCEANA BAL HARBOUR

14

KENILWORTH CONDOS

15

BELINNI

SEE SHEET 3 OF 5 FOR CONTINUATION

SEE SHEET 5 OF 5 FOR CONTINUATION

EXHIBIT R-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE CURB & GUTTER/SIDEWALK IMPROVEMENTS PLAN

5

3

PROP. CONC. SIDEWALK (TYP.)

PROP. DROP CURB (TYP.)

COLLINS AVENUE (A-1-A)

0 15 30 60

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

PROP. CONC. SIDEWALK (TYP.)

16

CARLTON TERRACE

HARBOUR HOUSE

HARBOUR HOUSE

ONE BAL HARBOUR

SEE SHEET 4 OF 5 FOR CONTINUATION

5 OF 5

EXHIBIT R-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE CURB & GUTTER/SIDEWALK IMPROVEMENTS PLAN

1 OF 4

EXHIBIT R–3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET CURB & GUTTER/SIDEWALK IMPROVEMENTS MAP

SEE SHEET 1 OF 4
FOR CONTINUATION

PROP. CONC. SIDEWALK (TYP.)

PROP. CONC. DRIVEWAY APRON (TYP.)

PROP. HANDICAP RAMP (TYP.)

PROP. DROP CURB (TYP.)

PROP. 2' CONC. CURB & GUTTER (TYP.)

PROP. HANDICAP RAMP (TYP.)

PROP. HANDICAP RAMP (TYP.)

PROP. CONC. WALK

PROP. CONC. WALK

EXIST. CONC. CURB & GUTTER TO REMAIN (TYP.)

96TH STREET

EXIST. CONC. SIDEWALK TO REMAIN (TYP.)

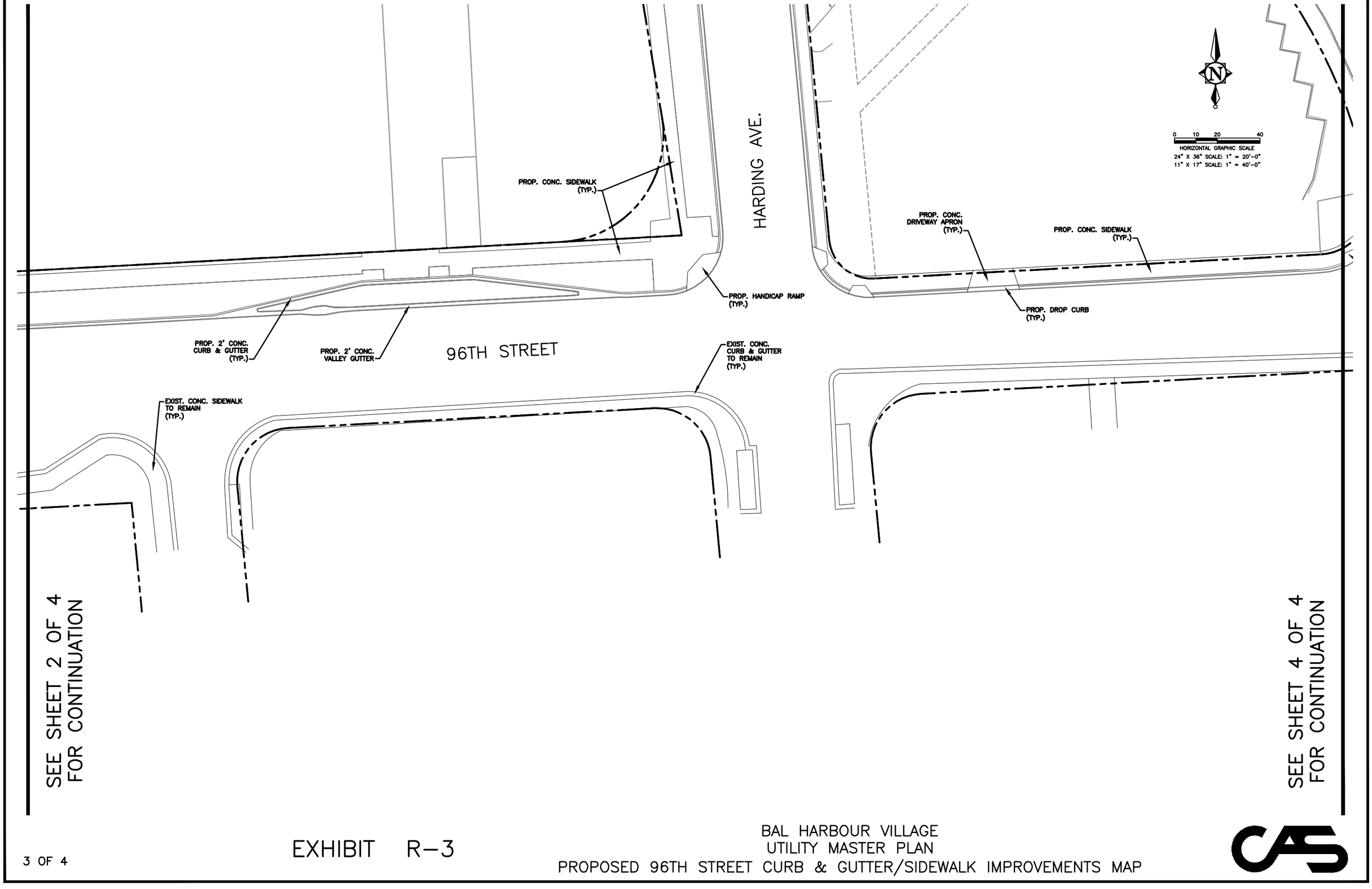
SEE SHEET 3 OF 4
FOR CONTINUATION

0 10 20 40
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 20'-0"
11" X 17" SCALE: 1" = 40'-0"

EXHIBIT R-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET CURB & GUTTER/SIDEWALK IMPROVEMENTS MAP

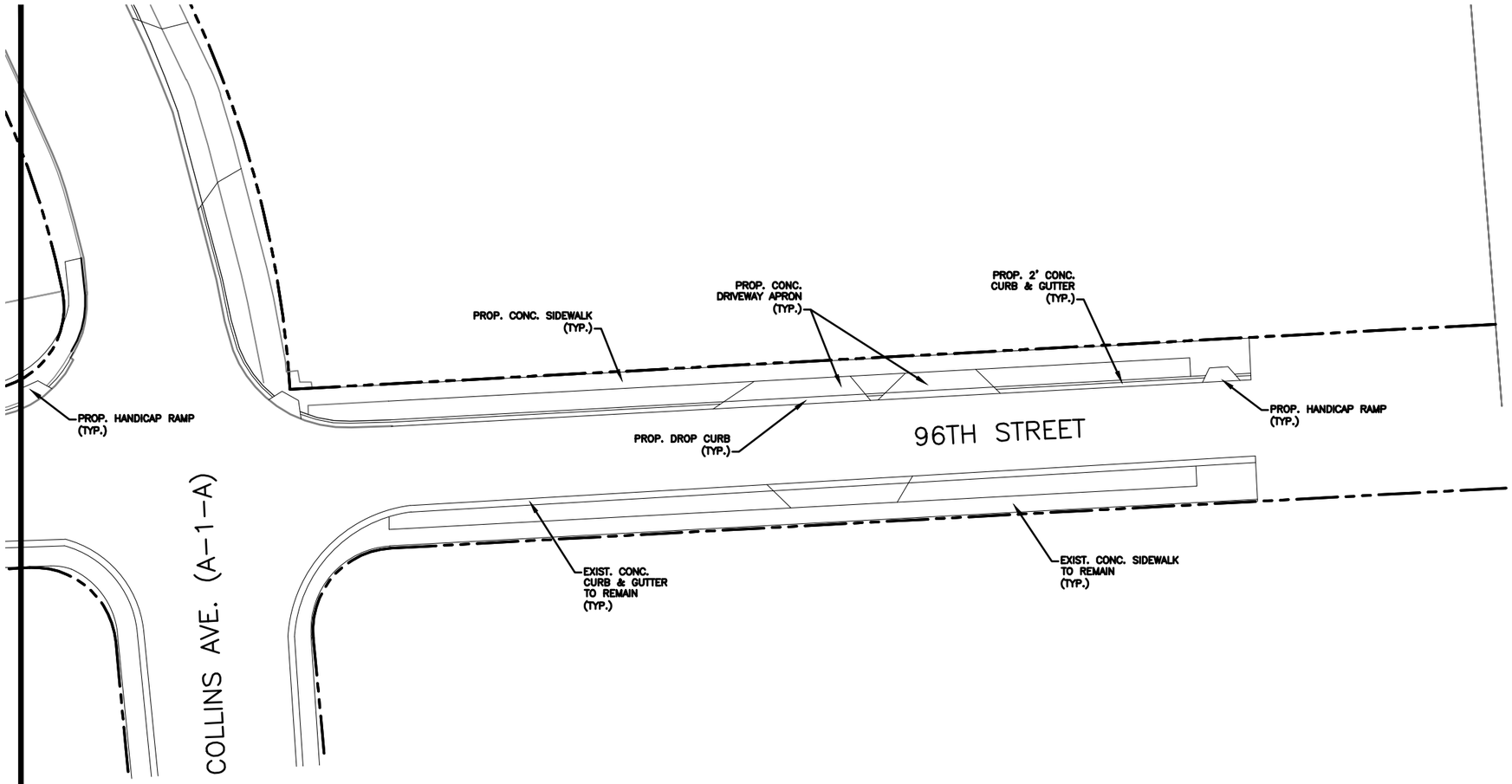
2 OF 4



3 OF 4

EXHIBIT R-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET CURB & GUTTER/SIDEWALK IMPROVEMENTS MAP



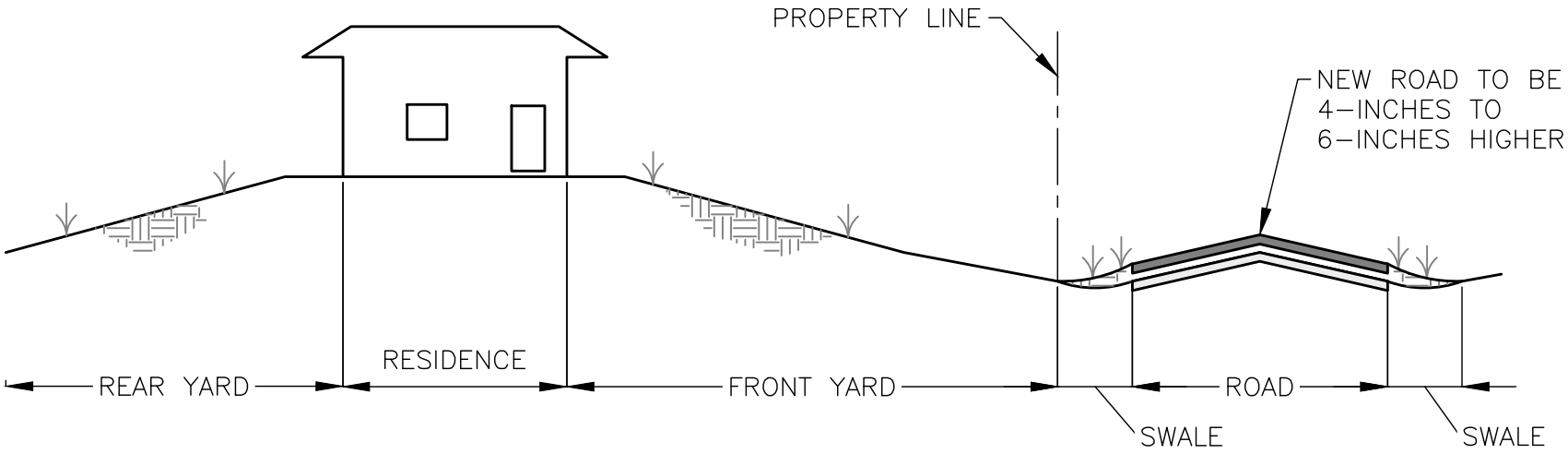
0 10 20 40

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 20'-0"
11" X 17" SCALE: 1" = 40'-0"

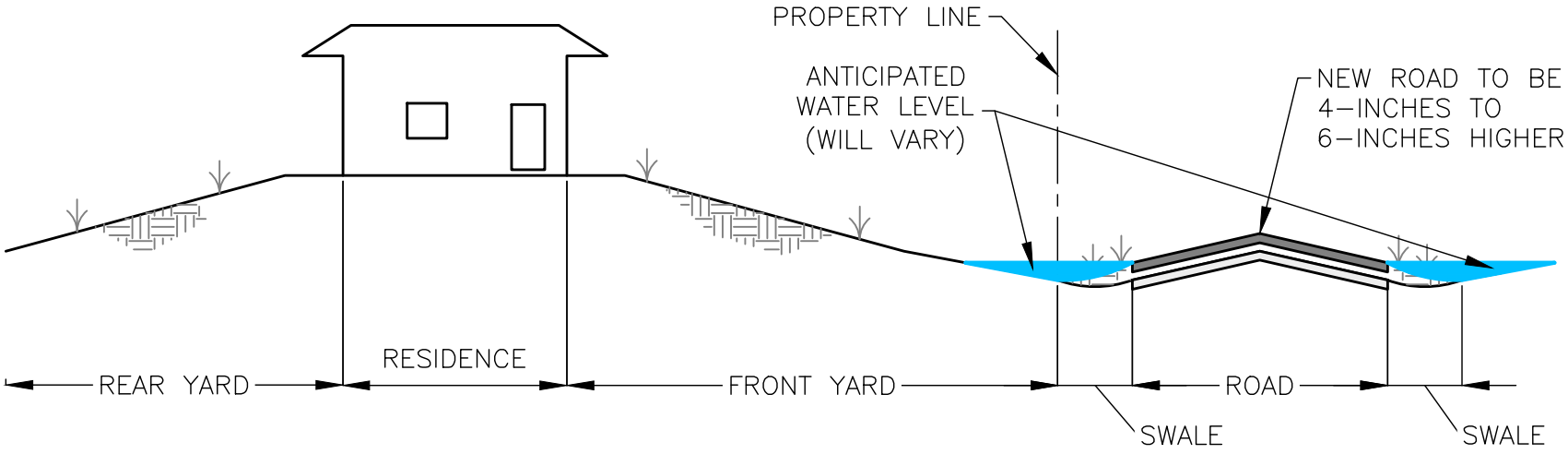
SEE SHEET 3 OF 4
FOR CONTINUATION

EXHIBIT R-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET CURB & GUTTER/SIDEWALK IMPROVEMENTS MAP

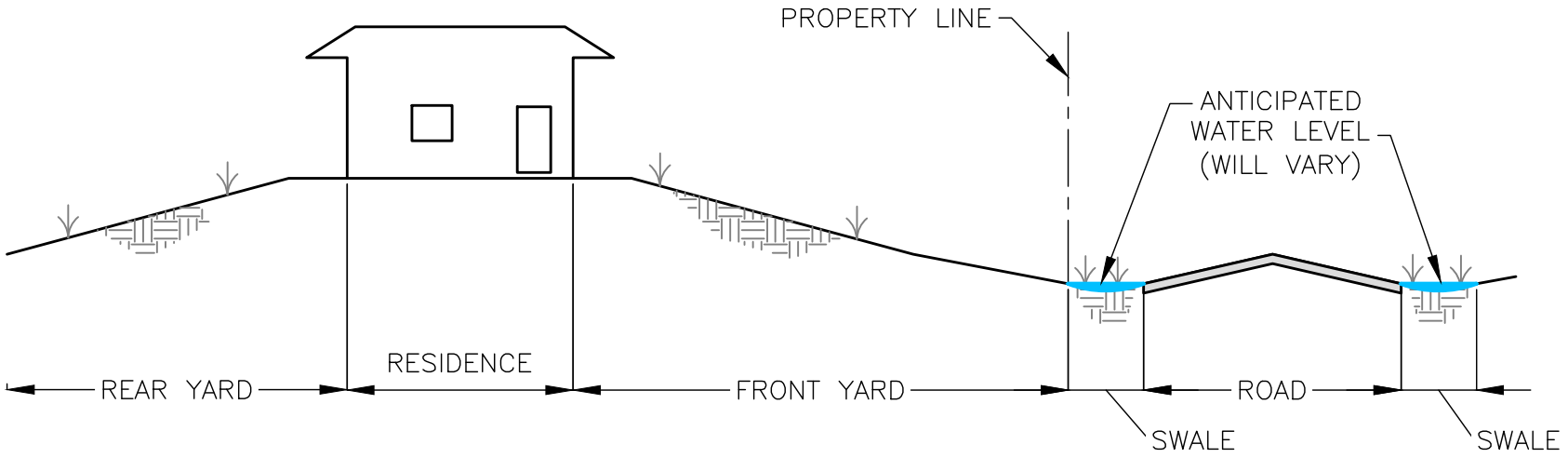


WITHOUT SEA LEVEL RISE



WITH SEA LEVEL RISE

EXHIBIT R–4 OPTION A



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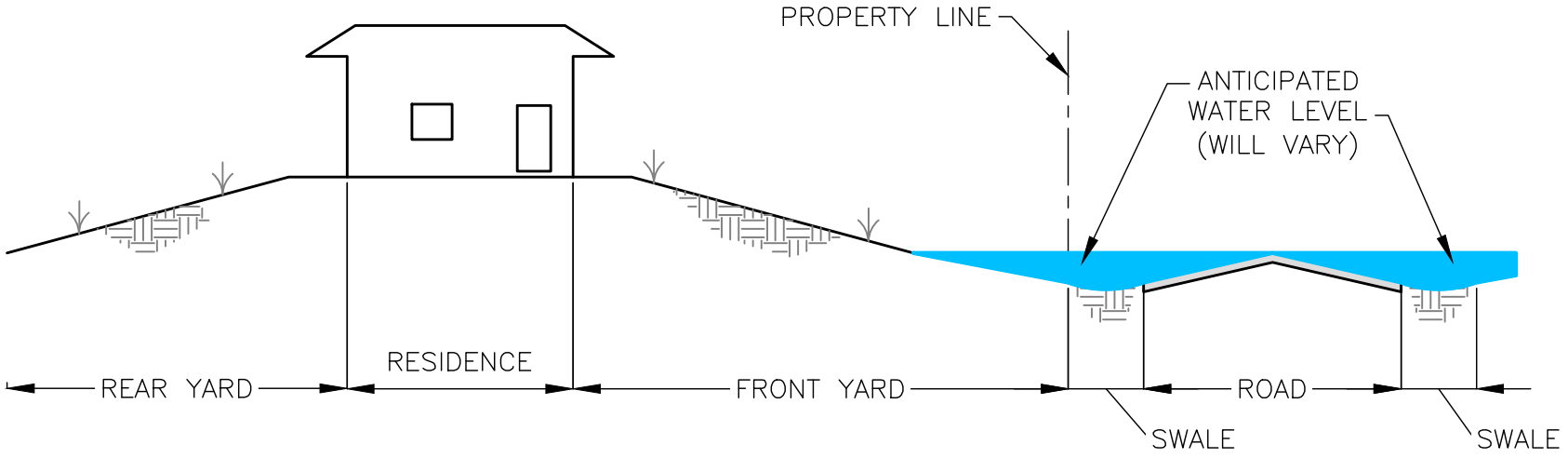
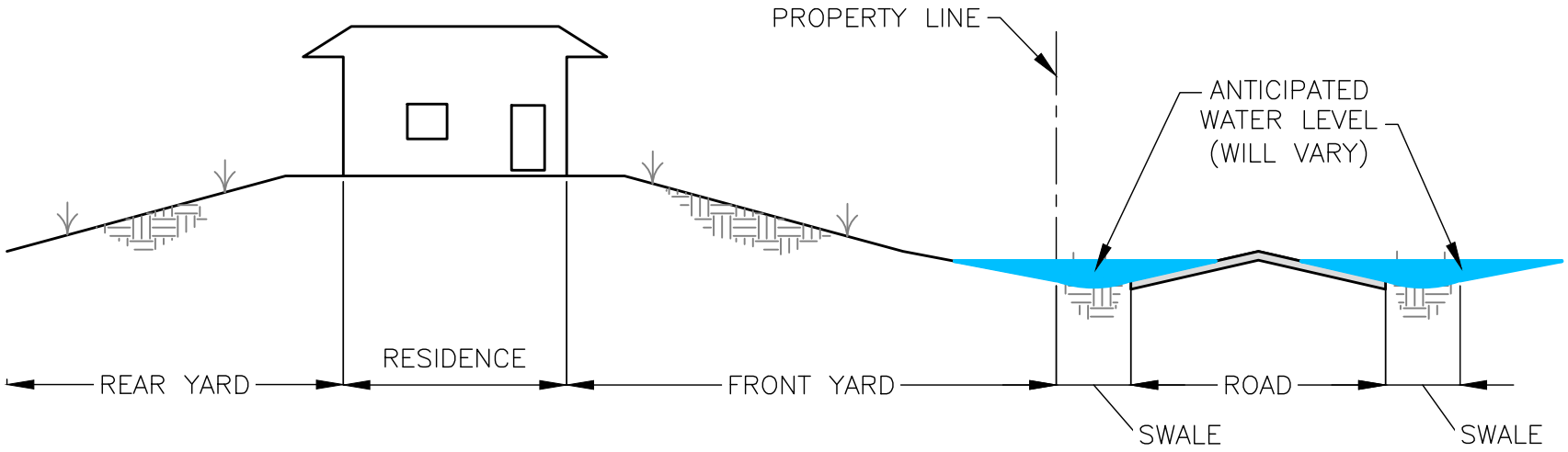


WITH SEA LEVEL RISE

EXHIBIT R–4 OPTION B



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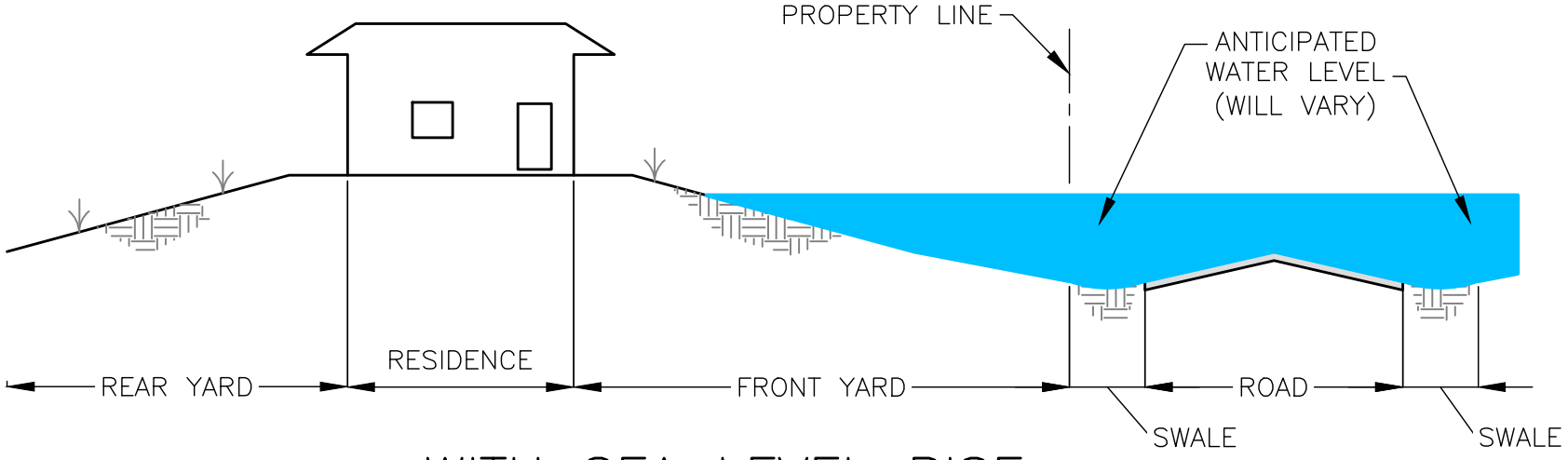
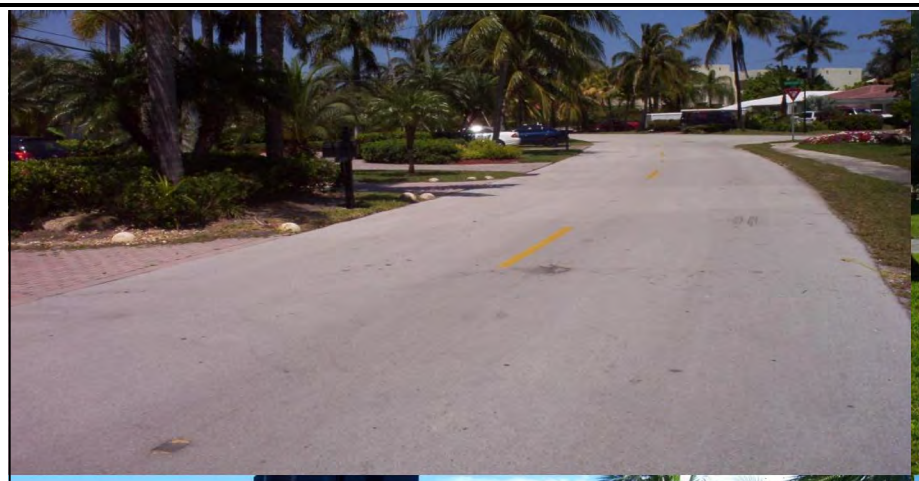
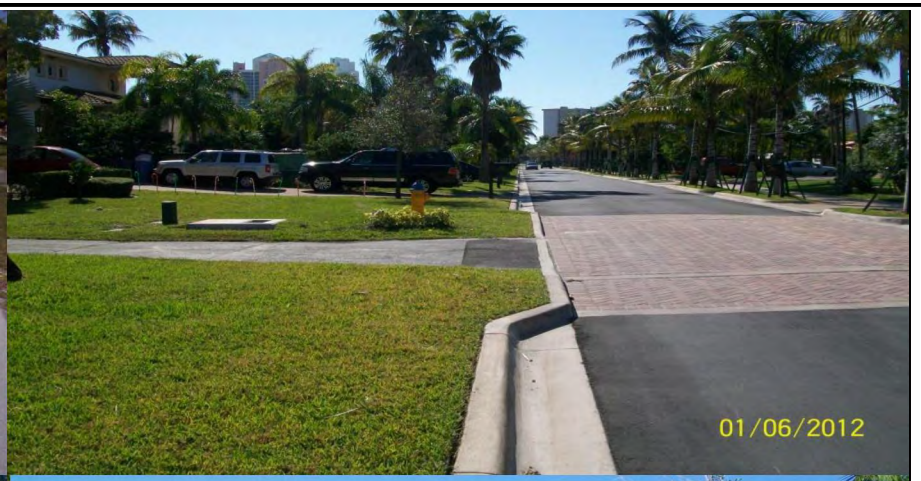
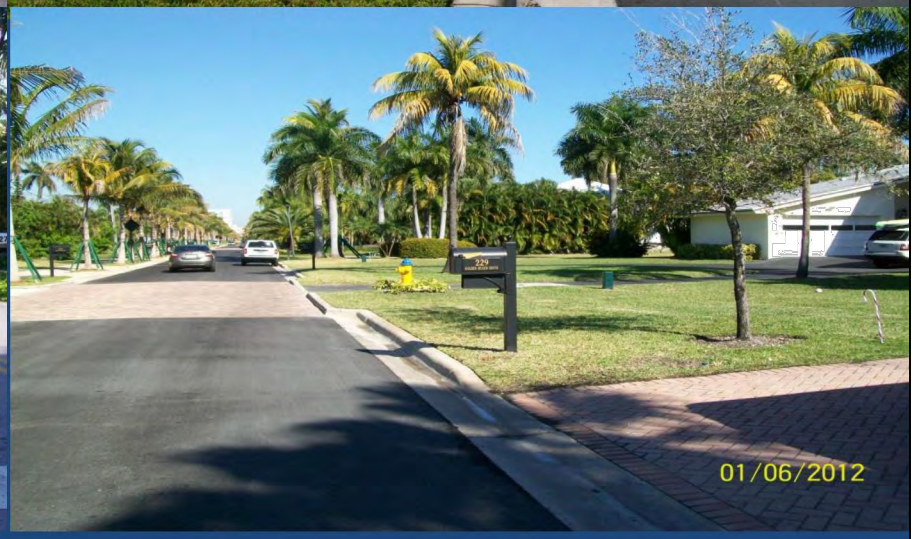


WITH SEA LEVEL RISE

EXHIBIT R–4 OPTION C







BEFORE **AFTER**

EXHIBIT R–5

ROADWAY SAMPLE RESULTS

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
VILLAGE 2' CONCRETE VALLEY GUTTER INSTALLATION
EXHIBIT R-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization	1	LS	$ 77,120.00	$ 77,120.00
2	Regrading and Sodding	17000	SY	$ 18.00	$ 306,000.00
3	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 36,789.00	$ 36,789.00
				TOTAL	$ 419,909.00
	Curbing				
1	2' Concrete Valley Gutter	40000	LF	$ 16.00	$ 640,000.00
2	Limerock Curb & Gutter Pad	13300	SY	$ 11.00	$ 146,300.00
3	Harmonization of Exist. Drives with New Curbs	1	LS	$ 320,000.00	$ 320,000.00
4	Removal of Existing Concrete Curb & Gutter	40000	LF	$ 3.00	$ 120,000.00
				TOTAL	$ 1,226,300.00

SUBTOTAL	$1,646,209
10% CONTINGENCY	$ 164,621
TOTAL CONSTRUCTION COST	$ 1,810,830
ENGINEERING DESIGN (10%)	$ 164,621
DESIGN SURVEY (1.5%)	$ 24,693
UTILITY LOCATES (0.5%)	$ 8,231
CONSTRUCTION OBSERVATION (5%)	$ 82,310
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 32,924
TOTAL PRELIMINARY COST	$ 2,123,610

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
VILLAGE ROADWAY IMPROVEMENTS
EXHIBIT R-7

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 298,360.00	$ 298,360.00
2	Density Testing (3%)	1	LS	$ 111,885.00	$ 111,885.00
3	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 111,885.00	$ 111,885.00
4	Maintenance of Traffic (3%)	1	LS	$ 111,885.00	$ 111,885.00
				TOTAL	$ 634,015.00
	Roadway				
1	Asphalt Final Lift	55000	SY	$ 10.00	$ 550,000.00
2	Asphalt Structural Course	55000	SY	$ 8.00	$ 440,000.00
3	8" Limerock Base	55000	SY	$ 15.00	$ 825,000.00
4	Remove Existing Asphalt	55000	SY	$ 5.00	$ 275,000.00
5	Remove Existing Limerock Base	55000	SY	$ 6.00	$ 330,000.00
6	Import Subbase Roadway Material	55000	SY	$ 3.00	$ 165,000.00
7	Stabilize and Grade 12" Compacted Subbase	55000	SY	$ 6.00	$ 330,000.00
8	Geosynthetic Flexible Fabric	11000	SY	$ 5.00	$ 55,000.00
9	Harmonize Existing Lot Grades to New Roadway	1	LS	$ 650,000.00	$ 650,000.00
				TOTAL	$ 3,620,000.00
	Miscellaneous				
1	Adjustment of Manholes and Valves	1	LS	$ 40,000.00	$ 40,000.00
2	Stop Sign w/ Street Names on Decorative Pole	33	EA	$ 1,500.00	$ 49,500.00
3	Pavement Striping	1	LS	$ 20,000.00	$ 20,000.00
				TOTAL	$ 109,500.00

SUBTOTAL	$ 4,363,515
10% CONTINGENCY	$ 436,352
TOTAL CONSTRUCTION COST	$ 4,799,867
ENGINEERING DESIGN (10%)	$ 436,352
DESIGN SURVEY (1.5%)	$ 65,453
UTILITY LOCATES (0.5%)	$ 21,818
CONSTRUCTION OBSERVATION (5%)	$ 218,176
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 87,270
TOTAL PRELIMINARY COST	$ 5,628,934

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
COLLINS AVENUE CONCRETE SIDEWALK REPLACEMENT
EXHIBIT R-8

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 111,592.00	$ 111,592.00
2	Maintenance of Traffic (6%)	1	LS	$ 83,694.00	$ 83,694.00
3	Regrading and Sodding (Back of Walk)	6000	SY	$ 25.00	$ 150,000.00
4	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 41,847.00	$ 41,847.00
5	Density Testing (3%)	1	LS	$ 41,847.00	$ 41,847.00
				TOTAL	$ 428,980.00
	Concrete Sidewalk				
1	Reinforced Concrete Sidewalk (Width Varies)	7300	SY	$ 60.00	$ 438,000.00
2	Relocate Existing Utilities	1	LS	$ 150,000.00	$ 150,000.00
3	Harmonization of Exist. Properties	1	LS	$ 100,000.00	$ 100,000.00
4	Reinforced Concrete Drive Aprons (6-inch)	1700	SY	$ 120.00	$ 204,000.00
5	Driveway Removal and Harmonization	1	LS	$ 125,000.00	$ 125,000.00
6	ADA Ramps and Truncated Domes	1	LS	$ 60,000.00	$ 60,000.00
7	Removal and Disposal of Exist. Conc. Sidewalk	7300	SY	$ 23.00	$ 167,900.00
				TOTAL	$ 1,244,900.00

SUBTOTAL	$1,673,880
10% CONTINGENCY	$ 167,388
TOTAL CONSTRUCTION COST	$ 1,841,268
ENGINEERING DESIGN (10%)	$ 167,388
DESIGN SURVEY (1.5%)	$ 25,108
UTILITY LOCATES (0.5%)	$ 8,369
CONSTRUCTION OBSERVATION (5%)	$ 83,694
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 33,478
TOTAL PRELIMINARY COST	$ 2,159,305

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
COLLINS AVENUE DISTINCTIVE SIDEWALK REPLACEMENT
EXHIBIT R-8A

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 146,632.00	$ 146,632.00
2	Maintenance of Traffic (6%)	1	LS	$ 109,974.00	$ 109,974.00
3	Regrading and Sodding (Back of Walk)	6000	SY	$ 25.00	$ 150,000.00
4	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 54,987.00	$ 54,987.00
5	Density Testing (3%)	1	LS	$ 54,987.00	$ 54,987.00
				TOTAL	$ 516,580.00
	Concrete Sidewalk				
1	"Blue Twilight" Treatment Sidewalk (Width Varies)	7300	SY	$ 120.00	$ 876,000.00
2	Relocate Existing Utilities	1	LS	$ 150,000.00	$ 150,000.00
3	Harmonization of Exist. Properties	1	LS	$ 100,000.00	$ 100,000.00
4	Reinforced Concrete Drive Aprons (6-inch)	1700	SY	$ 120.00	$ 204,000.00
5	Driveway Removal and Harmonization	1	LS	$ 125,000.00	$ 125,000.00
6	ADA Ramps and Truncated Domes	1	LS	$ 60,000.00	$ 60,000.00
7	Removal and Disposal of Exist. Conc. Sidewalk	7300	SY	$ 23.00	$ 167,900.00
				TOTAL	$ 1,682,900.00

SUBTOTAL	$2,199,480
10% CONTINGENCY	$ 219,948
TOTAL CONSTRUCTION COST	$ 2,419,428
ENGINEERING DESIGN (10%)	$ 219,948
DESIGN SURVEY (1.5%)	$ 32,992
UTILITY LOCATES (0.5%)	$ 10,997
CONSTRUCTION OBSERVATION (5%)	$ 109,974
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 43,990
TOTAL PRELIMINARY COST	$ 2,837,329

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
COLLINS AVENUE 2' CONCRETE CURB AND GUTTER INSTALLATION
EXHIBIT R-9

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 61,832.00	$ 61,832.00
2	Maintenance of Traffic (6%)	1	LS	$ 46,374.00	$ 46,374.00
3	Density Testing (3%)	1	LS	$ 23,187.00	$ 23,187.00
4	Regrading and Sodding (Back of Curb)	6500	SY	$ 18.00	$ 117,000.00
5	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 23,187.00	$ 23,187.00
				TOTAL	$ 271,580.00
	Curbing				
1	2' Concrete Curb and Gutter	20000	LF	$ 16.00	$ 320,000.00
2	2' Concrete Valley Gutter	3500	LF	$ 16.00	$ 56,000.00
3	Limerock Gutter Pad	5400	SY	$ 11.00	$ 59,400.00
4	Harmonization of Exist. Drives/Bus Stops	1	LS	$ 150,000.00	$ 150,000.00
5	Removal of Existing Concrete Curb & Gutter	23500	LF	$ 3.00	$ 70,500.00
				TOTAL	$ 655,900.00

SUBTOTAL	$927,480
10% CONTINGENCY	$ 92,748
TOTAL CONSTRUCTION COST	$ 1,020,228
ENGINEERING DESIGN (10%)	$ 92,748
DESIGN SURVEY (1.5%)	$ 13,912
UTILITY LOCATES (0.5%)	$ 4,637
CONSTRUCTION OBSERVATION (5%)	$ 46,374
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 18,550
TOTAL PRELIMINARY COST	$ 1,196,449

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
96th STREET CONCRETE SIDEWALK REPLACEMENT (NORTH SIDE)
EXHIBIT R-10

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 35,024.00	$ 35,024.00
2	Maintenance of Traffic (6%)	1	LS	$ 26,268.00	$ 26,268.00
3	Regrading and Sodding (Back of Walk)	1200	SY	$ 25.00	$ 30,000.00
4	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 13,134.00	$ 13,134.00
5	Density Testing (3%)	1	LS	$ 13,134.00	$ 13,134.00
				TOTAL	$ 117,560.00
	Concrete Sidewalk				
1	Reinforced Concrete Sidewalk (Width Varies)	2400	SY	$ 60.00	$ 144,000.00
2	Relocate Existing Utilities	1	LS	$ 60,000.00	$ 60,000.00
3	Harmonization of Exist. Properties	1	LS	$ 40,000.00	$ 40,000.00
4	Reinforced Concrete Drive Aprons (6-inch)	280	SY	$ 120.00	$ 33,600.00
5	Driveway Removal and Harmonization	1	LS	$ 55,000.00	$ 55,000.00
6	ADA Ramps and Truncated Domes	1	LS	$ 20,000.00	$ 20,000.00
7	Removal and Disposal of Exist. Conc. Sidewalk	2400	SY	$ 23.00	$ 55,200.00
				TOTAL	$ 407,800.00

SUBTOTAL	$525,360
10% CONTINGENCY	$ 52,536
TOTAL CONSTRUCTION COST	$ 577,896
ENGINEERING DESIGN (10%)	$ 52,536
DESIGN SURVEY (1.5%)	$ 7,880
UTILITY LOCATES (0.5%)	$ 2,627
CONSTRUCTION OBSERVATION (5%)	$ 26,268
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 10,507
TOTAL PRELIMINARY COST	$ 677,714

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
96th STREET DISTINCTIVE SIDEWALK REPLACEMENT (NORTH SIDE)
EXHIBIT R-10A

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 46,544.00	$ 46,544.00
2	Maintenance of Traffic (6%)	1	LS	$ 34,908.00	$ 34,908.00
3	Regrading and Sodding (Back of Walk)	1200	SY	$ 25.00	$ 30,000.00
4	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 17,454.00	$ 17,454.00
5	Density Testing (3%)	1	LS	$ 17,454.00	$ 17,454.00
				TOTAL	$ 146,360.00
	Concrete Sidewalk				
1	"Blue Twilight" Treatment Sidewalk (Width Varies)	2400	SY	$ 120.00	$ 288,000.00
2	Relocate Existing Utilities	1	LS	$ 60,000.00	$ 60,000.00
3	Harmonization of Exist. Properties	1	LS	$ 40,000.00	$ 40,000.00
4	Reinforced Concrete Drive Aprons (6-inch)	280	SY	$ 120.00	$ 33,600.00
5	Driveway Removal and Harmonization	1	LS	$ 55,000.00	$ 55,000.00
6	ADA Ramps and Truncated Domes	1	LS	$ 20,000.00	$ 20,000.00
7	Removal and Disposal of Exist. Conc. Sidewalk	2400	SY	$ 23.00	$ 55,200.00
				TOTAL	$ 551,800.00

SUBTOTAL	$698,160
10% CONTINGENCY	$ 69,816
TOTAL CONSTRUCTION COST	$ 767,976
ENGINEERING DESIGN (10%)	$ 69,816
DESIGN SURVEY (1.5%)	$ 10,472
UTILITY LOCATES (0.5%)	$ 3,491
CONSTRUCTION OBSERVATION (5%)	$ 34,908
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 13,963
TOTAL PRELIMINARY COST	$ 900,626

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
STORMWATER IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
96th STREET 2' CONCRETE CURB AND GUTTER INSTALLATION
(NORTH SIDE AND CENTER MEDIAN)
EXHIBIT R-11

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 12,252.00	$ 12,252.00
2	Maintenance of Traffic (6%)	1	LS	$ 9,189.00	$ 9,189.00
3	Density Testing (3%)	1	LS	$ 4,594.50	$ 4,594.50
4	Regrading and Sodding (Back of Curb)	550	SY	$ 18.00	$ 9,900.00
5	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 4,594.50	$ 4,594.50
				TOTAL	$ 40,530.00
	Curbing				
1	2' Concrete Curb and Gutter	2400	LF	$ 16.00	$ 38,400.00
2	2' Concrete Curb and Gutter (Median)	1400	LF	$ 16.00	$ 22,400.00
3	2' Concrete Valley Gutter	350	LF	$ 16.00	$ 5,600.00
4	Limerock Gutter Pad	400	SY	$ 11.00	$ 4,400.00
5	Harmonization of Exist. Drives/Bus Stops	1	LS	$ 60,000.00	$ 60,000.00
6	Removal of Existing Concrete Curb & Gutter	4150	LF	$ 3.00	$ 12,450.00
				TOTAL	$ 143,250.00

SUBTOTAL	$183,780
10% CONTINGENCY	$ 18,378
TOTAL CONSTRUCTION COST	$ 202,158
ENGINEERING DESIGN (10%)	$ 18,378
DESIGN SURVEY (1.5%)	$ 2,757
UTILITY LOCATES (0.5%)	$ 919
CONSTRUCTION OBSERVATION (5%)	$ 9,189
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 3,676
TOTAL PRELIMINARY COST	$ 237,076

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 1 : Bal Cross Drive, road and curb settling, looking south.

Photo 2 : Park Drive, road and curb surface cracking, looking north.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 3 : Bal Cross Drive, road surface cracks, looking east.

Photo 4 : Bal Cross Drive, curb settling and surface cracks, looking south.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 5 : Harbour Way, road settling and ponding, looking southeast.

Photo 6 : Bal Bay Drive, road and curb settling, looking northeast.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 7 : Harbour Way, surface ponding and cracking, looking south.

Photo 8 : Bal Bay Drive, curb failure, looking southeast.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 9 : Bal Bay Drive, curb and roadway settling, looking northeast.

Photo 10 : Bal Bay Drive, roadway repair and cracking, looking north.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 11: Bal Bay Drive, road repairs and settling, looking southwest.

Photo 12 : Bal Bay Drive and Balfour Drive, structure settling and road repairs, looking northwest.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 13 : Bal Bay Drive, road and curb failures, looking south.

Photo 14 : Bal Bay Drive, curb settling and ponding, looking south.

EXHIBIT R-12

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 15 : Camden Court, road surface cracking, looking east.

Photo 16 : Park Drive, curb failure, looking north.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 1 : Standing water at Balfour Drive intersection, looking north.

Photo 2 : Damaged concrete gutter at *Shops* Bus Stop, looking north.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 3 : Damaged sidewalk west side of Collins Avenue, looking north.

Photo 4 : Cracked sidewalk south of Harbour Way, looking north.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 5 : Settling sidewalk at *Bal Bridge South*, looking north.

Photo 6 : Curb settling in northbound median, looking south.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 7 : Curb failures at *Plaza of Bal Harbour*, looking south.

Photo 8 : Ponding in gutter on east side of Collins Ave., looking south.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 9 : Curb failures at *101 Bal Harbour*, looking south.

Photo 10 : Driveway approach damage at *Seaview Hotel*, looking south.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 11: Cracked sidewalk at *Tiffany*, looking south.

Photo 12 : Settling sidewalk at *Bal Moral*, looking south.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 13 : Gutter failures and ponding at *Bal Moral*, looking south.

Photo 14 : Damaged curb and gutter at *Bal Moral*, looking south.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 15 : Damaged south entrance at *Bal Moral*, looking south.

Photo 16 : Curb and Gutter settling in center median, looking west.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 17 : Standing water in gutter south of *Carlton Terrace*, looking north.

Photo 18 : Damaged gutter in front of *Carlton Terrace,* looking north.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 19 : Damaged walk and gutter at *Carlton Terrace,* looking north.

Photo 20 : Standing water at *Harbour House*, looking south.

EXHIBIT R-13

PHOTOGRAPHS – COLLINS AVENUE

Photo 21 : Damaged sidewalk/ drive at *Carlton Terrace*, looking east.

Photo 22 : Damaged sidewalk at *Carlton Terrace*, looking south.

EXHIBIT R-14

PHOTOGRAPHS – 96TH STREET

Photo 1 : 96th Street, curb & gutter ponding, looking east.

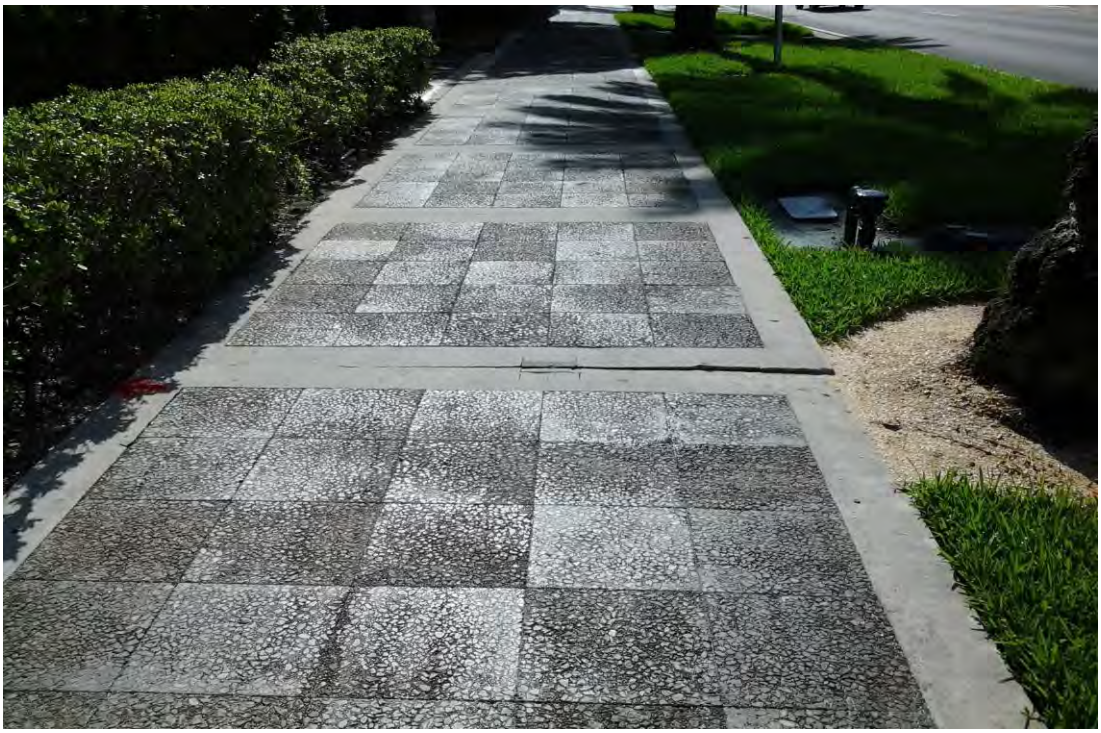


Photo 2 : North side of 96th Street, sidewalk settling at joint, looking east.

EXHIBIT R-14

PHOTOGRAPHS – 96TH STREET

Photo 3 : Non-uniform styles of sidewalk, north side of road, looking east.

Photo 4 : Sidewalk settling, north side of road, looking east.

EXHIBIT R-14

PHOTOGRAPHS – 96TH STREET

Photo 5 : Sidewalk cracking, in front of *Shops*, looking east.

Photo 6 : Ponding in gutter on north side due to settling, looking east.

EXHIBIT R-14

PHOTOGRAPHS – 96TH STREET

Photo 7 : Sidewalk cracking, north side of road, looking east.

Photo 8 : Gutter separation, north side of road, looking east.

EXHIBIT R-14

PHOTOGRAPHS – 96TH STREET

Photo 9 : Ponding at Harding Avenue and 96th Street, looking north.

Photo 10 : Ponding at easternmost end of 96th Street, looking east.

BAL HARBOUR VILLAGE

UTILITY MASTER PLAN

BAL HARBOUR
FLORIDA'S PARADISE

SECTION 6

MISCELLANEOUS IMPROVEMENTS

MISCELLANEOUS IMPROVEMENTS

Village Lighting Enhancements

The existing Village street lighting infrastructure, within the residential area, was installed in the early 1980's. Exhibit M-1 indicates the existing street light locations serving the residential neighborhood. Currently, there are ninety existing concrete light poles spaced at 200-foot intervals. Due to the growth of landscaping over the last thirty years a majority of the light fixtures have become obstructed and are no longer effective in providing proper illuminance. Landscaping diminishes the light source at night and creates dead zones, or blacked out areas, on the road surface.

The current conditions of the Village street light system are indicated in the photographs found in Exhibit M-10. Stress cracks and damage from wind, rain, saltwater, and vehicles have been found on many of the existing concrete poles. Repair patches were evident on a number of light poles. It was also observed that the integrity of the foundations of several poles has been compromised; causing the poles to lean. If not properly maintained this will eventually lead to a public hazard. Difficulty in accessing replacement parts for a thirty year old system is another reason for installing a new street light system.

The Proposed Light Pole System Map (Exhibit M-2) indicates the preliminary locations of proposed twin post assemblies, at all intersections, and single post assemblies staggered on all collector and local roads within the residential neighborhood. The fixed street lighting is designed to provide sufficient light levels; uniformity and target contrast according to the type of roadway and accommodate visual needs for both drivers and pedestrians. Others factors to take into consideration is to minimize glare (direct and reflected), light pollution, and to increase energy efficiency, visibility and security.

The importance of a lighting system that meets the Village's needs is dependent on selecting an effective photometric design that minimizes long term operating expenses. System designs that meet the necessary requirements with the fewest luminaires and lower total input power can reduce initial and future operating costs. Other factors to consider include the selection of a proper light source and luminaire option, availability, spectral power distribution and the life of the system.

The total estimated preliminary cost for the street lighting improvements within the residential area of the Village is $3,030,558. The work required for the lighting improvements includes removal of existing poles and pullboxes, the installation of 270 new 150-watt sixteen foot high single light fixture post assemblies staggered along all residential roadways and 60 new 150-watt sixteen foot high twin light fixture post assemblies at all road intersections. This work includes the light pole, footer, pull box, inline fusing, grounding and wiring, fixture head and bulb, and GFI receptacle. Construction also includes six service entrance structures with combination SED, lighting contactors, service from FPL transformers, photocells, posts and unistruts, 50 additional precast concrete pull boxes and 42,300 linear feet of wiring, with grounds, serviced in 2-inch conduits. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-5) for preliminary design costs associated with roadway lighting improvements.

All proposed street lighting systems within the residential area would be designed and constructed according to current Federal, State, County, NEMA and ANSI/IES standards and specifications.

Collins Avenue and 96th Street Roadway/Pedestrian Lighting Improvements

The existing street lighting infrastructure on both Collins Avenue and 96th Street was installed in the early 1980's. Due to the growth of landscaping over the last thirty years a majority of the light fixtures have become obstructed and are no longer effective in providing proper illuminance. Landscaping diminishes the light source at night and creates dead zones, or blacked out areas, on the road surface.

The current conditions of the Collins Avenue and 96th Street roadway lighting system are indicated in the photographs found in Exhibits M-11 and M-12. Several existing light poles along both roadways require repair due to damaged poles or bases. At the time of site inspections for the Master Plan a street light assembly that had been located in front of *The Palace,* on the east side of Collins Avenue, had been removed (refer to photo 17 Exhibit M-11). With the removal of this pole street illuminance in this area has been affected due to the increased distance between lights. Difficulty in accessing replacement parts for a thirty year old system is another reason for installing a new street light system.

The Proposed Roadway/Pedestrian Light Pole System Map (Exhibit M-3 for Collins Avenue and M-4 for 96th Street) indicates the preliminary locations of proposed post assemblies. The ornamental street light pole would also be equipped with a pedestrian light, facing the opposite side of the street at a lower grade. The fixed street lighting is designed to provide sufficient light levels; uniformity and target contrast according to the type of roadway and accommodate visual needs for both drivers and pedestrians. Others factors to take into consideration is to minimize glare (direct and reflected), light pollution, and to increase energy efficiency, visibility and security.

The importance of a lighting system that meets the Village's needs on these main thoroughfares is dependent on selecting an effective photometric design that

minimizes long term operating expenses. System designs that meet the necessary requirements with the fewest luminaires and lower total input power can reduce initial and future operating costs. Other factors to consider include the selection of a proper light source and luminaire option, availability, spectral power distribution and the life of the system.

There is a vast array of technologies in the current lighting market each with their own advantages and disadvantages. Incandescent lamps are standard electric light bulbs that have the lowest initial costs, positive color rendering yet are primarily inefficient. These bulbs typically have short lifespans and use more watts than other technologies to produce the same lumens. High Pressure Sodium (HPS) lamps is a more popular and efficient street lighting option however, this technology has a low color rendering index (CRI) that does not reproduce colors effectively. HPS lamps also contain mercury and lead. Another commonly used technology, Compact Fluorescent lamps are efficient with a high CRI but have a limited lumen output, a high heat build-up in the ballast, a low lifespan and contain mercury. Light Emitting Diodes (LED) lamps are the fastest growing technology that use between 40% to 80% and have at least five times the life expectancy of HPS lamps. Although the initial costs are higher the LED technology pays large dividends with advanced light output, color rendering, efficiency and reliability.

The total estimated preliminary cost for the street lighting improvements within the Collins Avenue right-of-way is $2,372,667. The work required for the lighting improvements includes removal of existing poles and pullboxes, the installation of 96 new 150-watt thirty foot high post assemblies staggered on the east and west side of Collins Avenue. This work includes the light pole, footer, pull box, inline fusing, grounding and wiring, fixture heads and bulbs for both the street and pedestrian side, and GFI receptacle. Construction also includes four service entrance structures with combination SED, lighting contactors, service from FPL transformers, photocells, posts and unistruts, 26 additional precast concrete pull

boxes and 21,300 linear feet of wiring, with grounds, serviced in 2-inch conduits. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-6) for preliminary design costs associated with the Collins Avenue roadway/pedestrian lighting improvements.

The total estimated preliminary cost for the street lighting improvements within the 96th Street right-of-way is $525,564. The work required for the lighting improvements includes removal of existing poles and pullboxes, the installation of 20 new 150-watt thirty foot high post assemblies on the north side of 96th Street. This work includes the light pole, footer, pull box, inline fusing, grounding and wiring, fixture heads and bulbs for both the street and pedestrian side, and GFI receptacle. Construction also includes four service entrance structures with combination SED, lighting contactors, service from FPL transformers, photocells, posts and unistruts, 12 additional precast concrete pull boxes and 4,400 linear feet of wiring, with grounds, serviced in 2-inch conduits. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-7) for preliminary design costs associated with the 96th Street roadway/pedestrian lighting improvements.

All proposed street lighting systems within the Collins Avenue and 96th Street rights-of-way would be designed and constructed according to current Federal, State, County, NEMA and ANSI/IES standards and specifications.

Collins Avenue and 96th Street Landscaping Enhancements

Additional miscellaneous improvements within the Village include landscaping beautification projects on Collins Avenue and 96th Street. The road surface infrastructure for Collins Avenue (SR A1A) and 96th Street (SR 922) are owned, operated and maintained by the Florida Department of Transportation (FDOT) however, the Village maintains the landscaping irrigation and lighting features within the DOT's right-of-way.

Landscaping improvements are located within the east and west right-of-ways and the median strip on Collins Avenue and the north right-of-way and median strip on 96th Street. Any existing landscaping within the high rise properties on the east side of Collins Avenue, the low-rise multi-family units located on the west side of Collins Avenue, the *Bal Harbour Shops* on the west side of Collins Avenue and the north side of 96th Street and the *Church by the Sea* and *Sun Trust* bank properties on the north side of 96th Street are privately owned and maintained. Refer to Exhibits M-13 and M-14 for existing landscape photographs within the Collins Avenue and 96th Street corridors.

With the continuing presence of drought conditions and water conservation xeriscaping has become a common practice. Xeriscaping allows the creation of aesthetically pleasing landscapes with minimal consumption of dwindling water resources. Using drought-tolerant plants can significantly reduce water bills, and avoid the cost of expensive engineered irrigation systems. Xeriscaping is different from natural landscaping because the emphasis is on selection of plants for water conservation rather than on selecting native plants.

By their nature, xeriscaping techniques vary by region. Landscape architects, horticulturalists, and gardeners in every area have developed lists of plants which can thrive under local climate conditions and rainfall patterns. Drought tolerant species may be imported, although some concern must be given to avoiding

species which may crowd out indigenous plants or become invasive. Groundcovers, a common substitute for lawns, may be herbaceous perennials, ornamental grasses, or deciduous or coniferous shrubs. Buffalo grass and blue gamma grass may be substituted for water thirsty bluegrass in many situations. Mulches, such as bark chips, pine needles, wood grindings, composted cotton burrs or gravel and decomposed granite can provide landscape variety.

Xeriscaping also uses the concept of zoning, in which plants with similar water needs are grouped together in specific zones. Landscape areas should be laid out in a smaller but highly visible area where regular irrigation is provided, but with other broad areas requiring little maintenance or watering. If landscapes are designed using plants with water requirements corresponding to typical local rainfall patterns, significantly less water will be needed for irrigation.

The total estimated preliminary cost for the landscape improvements within the right-of-ways of Collins Avenue and 96th Street is $1,501,502. The work required for the landscaping improvements includes preparation of a soil layer, the planting of various species including trees and low-lying shrubs the installation of tree guards, mulch and sod and the construction of a temporary nursery during construction. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-8) for preliminary design costs associated with landscape improvements.

Collins Avenue and 96th Street Irrigation and Accent Lighting Enhancements

Irrigation Improvements

With the installation of landscaping features within the Collins Avenue and 96th Street corridors, the existing irrigation system requires upgrading. After thirty years since the initial installation, replacement parts for the irrigation system have become more difficult to find, in effect, causing repair costs to rise. Existing irrigation components, such as controllers and valves, are outdated and no longer meet the current code requirements.

Irrigation improvements are located within the east and west right-of-ways and the median strip on Collins Avenue and the north right-of-way and median strip on 96th Street. Any existing irrigation features within the high rise properties on the east side of Collins Avenue, the low-rise multi-family units located on the west side of Collins Avenue, the *Bal Harbour Shops* on the west side of Collins Avenue and the north side of 96th Street and the *Church by the Sea* and *Sun Trust* bank properties on the north side of 96th Street are privately owned and maintained.

New irrigation techniques have been developed that allow for more efficient and effective systems. Certain types of sprinkler heads apply water more efficiently than others. Rotary spray heads deliver water in a thicker stream than mist spray heads, ensuring more water reaches plants and less is lost to evaporation and wind. Drip systems around trees and shrubs use 20-50 percent less water than conventional pop up sprinkler systems and can save up to 30,000 gallons of water per year.

Rain sensors or shutoff devices and programmable controllers can conserve up to forty percent water consumption with proper design, maintenance and management of automatic irrigation systems. Micro–irrigation or drip systems are

generally more efficient than conventional sprinklers, because they deliver low volumes of water directly to plants' roots, minimizing losses to wind, runoff, evaporation, or overspray.

Soil moisture–based control technologies water plants based on their needs by measuring the amount of moisture in the soil and tailoring the irrigation schedule accordingly. Evapotranspiration (Et) is the amount of water that is evaporated from the soil and transpired through the leaves of the plant. This amount of water needs to be replenished through watering. *Et* is affected by a number of factors including temperature, humidity, wind speed, soil fertility and disease control. The *Et* alters during each season of the year.

According to data accumulated by the United States Geological Survey (USGS), the 2013 *Et* levels for Miami-Dade County range from 1.10 in February to 6.20 in June. With an understanding of the *Et* for a given area a plan can be developed for the amount of water needed to be replaced through irrigation.

Accent Lighting Improvements

With the installation of landscaping features within the Collins Avenue and 96th Street corridors, the existing accent lighting requires upgrading. After thirty years since the initial installation, replacement parts for the landscape lighting have become more difficult to find, in effect, causing repair costs to rise. Existing lighting components, such as transformers and light fixtures, are outdated and no longer meet the current code requirements.

Lighting improvements are located within the east and west right-of-ways and the median strip on Collins Avenue and the north right-of-way and median strip on 96th Street. Any existing lighting features within the high rise properties on the east side of Collins Avenue, the low-rise multi-family units located on the west

side of Collins Avenue, the *Bal Harbour Shops* on the west side of Collins Avenue and the north side of 96th Street and the *Church by the Sea* and *Sun Trust* bank properties on the north side of 96th Street are privately owned and maintained.

Current lighting regulations and technologies have been developed that allow for more efficient and effective systems. Energy efficient LED or solar lighting, digital sensors are methods that conserve energy and costs. Techniques such as up-lighting, moonlighting, silhouetting, shadowing and grazing can add aesthetic effects at lower costs and electricity.

The total estimated preliminary cost for the landscape irrigation and accent lighting improvements within the right-of-ways of Collins Avenue and 96th Street is $1,000,666. The work required includes sleeves, heads, valves, pumps, controllers, meters and electrical for irrigation and sleeves, LED lights and fixtures, transformers and electrical for accent landscape lighting. Refer to *Engineer's Estimate of Preliminary Cost Estimate* (Exhibit M-9) for preliminary design costs associated with landscape improvements.

SEE SHEET 2 OF 3
FOR CONTINUATION

BALFOUR DRIVE

CAMDEN COURT

CAMDEN DRIVE

BAL BAY DRIVE

INTRACOASTAL WATERWAY
(INDIAN CREEK)

BLOCK 1

BLOCK 2

BLOCK 4

PARK DRIVE

COLLINS AVENUE (A-1-A)

HARDING AVENUE

96TH STREET

EXIST. LIGHT POLE
(TYP.)

BAL MORAL

ST. REGIS RESORT

MAJESTIC

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

EXHIBIT M-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING LIGHT POLE SYSTEM MAP

SEE SHEET 3 OF 3
FOR CONTINUATION

SEE SHEET 1 OF 3
FOR CONTINUATION

2 OF 3

EXHIBIT M-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING LIGHT POLE SYSTEM MAP

INTRACOASTAL WATERWAY
(INDIAN CREEK)

BAL BAY DRIVE

BAL BAY DRIVE

BLOCK 11

BISCAY DRIVE

BLOCK 10

HARBOUR WAY

YACH BASIN

BAL CROSS DRIVE

BLOCK 9

PARK DRIVE

HARBOUR WAY

EXIST. LIGHT POLE
(TYP.)

COLLINS AVENUE (A-1-A)

ONE
BAL HARBOUR

HARBOUR
HOUSE

HARBOUR
HOUSE

CARLTON
TERRACE

BELINNI

KENILWORTH
CONDOS

TRACT A

OCEANA
BAL HARBOUR

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

SEE SHEET 2 OF 3
FOR CONTINUATION

EXHIBIT M-1

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
EXISTING LIGHT POLE SYSTEM MAP

SEE SHEET 2 OF 3
FOR CONTINUATION

BALFOUR DRIVE

CAMDEN COURT

CAMDEN DRIVE

BAL BAY DRIVE

INTRACOASTAL WATERWAY
(INDIAN CREEK)

BLOCK 1

BLOCK 2

BLOCK 4

PARK DRIVE

COLLINS AVENUE (A-1-A)

HARDING AVENUE

96TH STREET

PROP. LIGHT POLE
ASSEMBLY
(TYP.)

6 BAL MORAL

5 BAL MORAL

4 ST. REGIS RESORT

3 ST. REGIS RESORT

2 ST. REGIS RESORT

1 MAJESTIC

N

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

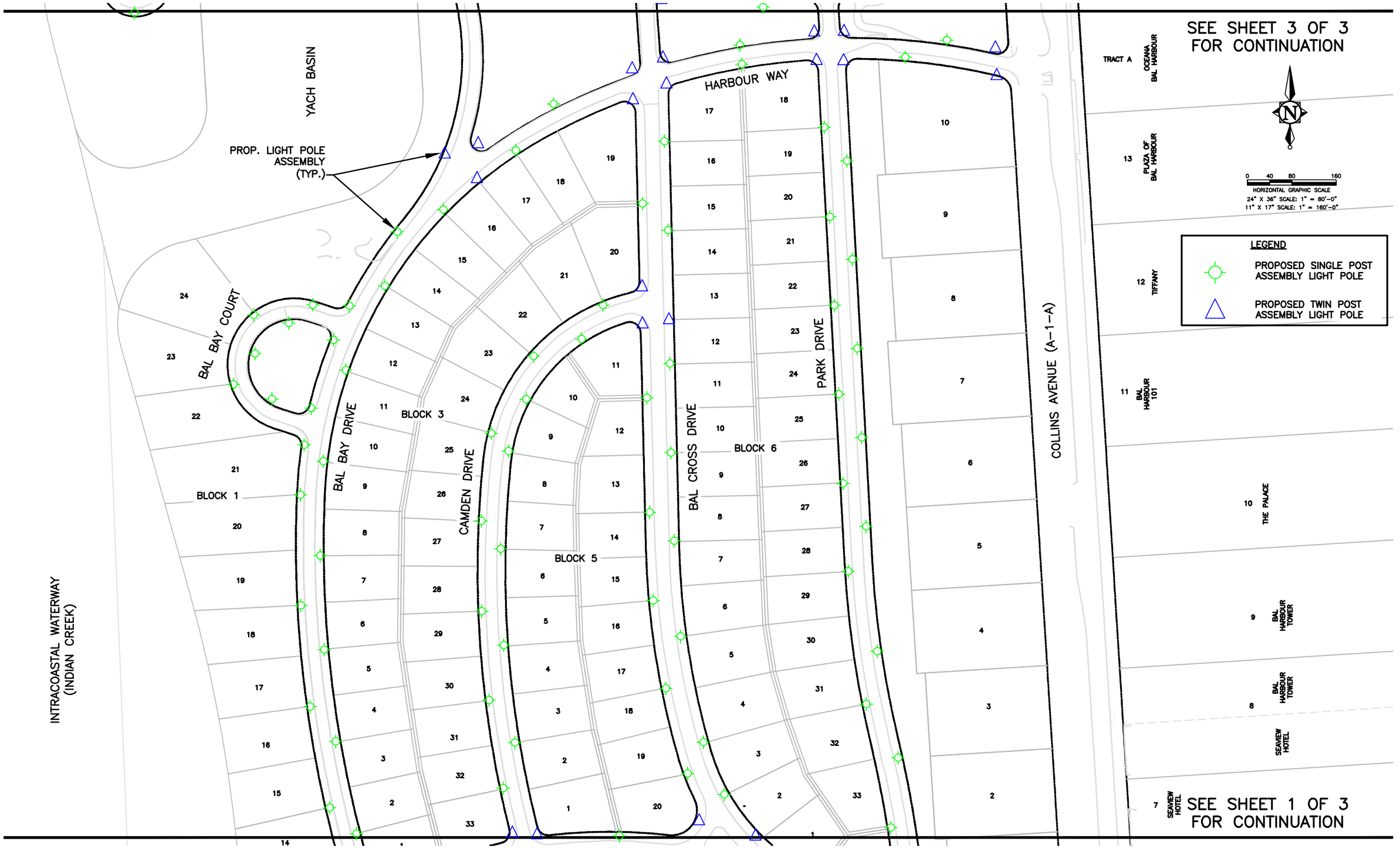
LEGEND

PROPOSED SINGLE POST
ASSEMBLY LIGHT POLE

PROPOSED TWIN POST
ASSEMBLY LIGHT POLE

EXHIBIT M-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED LIGHT POLE SYSTEM MAP



2 OF 3

EXHIBIT M-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED LIGHT POLE SYSTEM MAP

INTRACOASTAL WATERWAY
(INDIAN CREEK)

BAL BAY DRIVE

BAL BAY DRIVE

BLOCK 11

BISCAY DRIVE

BLOCK 10

HARBOUR WAY

YACH BASIN

BAL CROSS DRIVE

BLOCK 9

PARK DRIVE

HARBOUR WAY

PROP. LIGHT POLE
ASSEMBLY
(TYP.)

COLLINS AVENUE (A-1-A)

ONE
BAL HARBOUR

HARBOUR
HOUSE

HARBOUR
HOUSE

16 CARLTON TERRACE

15 BELINNI

14 KENILWORTH CONDOS

TRACT A OCEANA BAL HARBOUR

0 40 80 160
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 80'-0"
11" X 17" SCALE: 1" = 160'-0"

LEGEND

PROPOSED SINGLE POST ASSEMBLY LIGHT POLE

PROPOSED TWIN POST ASSEMBLY LIGHT POLE

SEE SHEET 2 OF 3
FOR CONTINUATION

3 OF 3

EXHIBIT M-2

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED LIGHT POLE SYSTEM MAP

RIGHT-OF-WAY

COLLINS AVENUE (A-1-A)

HARDING AVENUE

EXIST. STREET LIGHT POLE
(TO BE REMOVED)
(TYP.)

RIGHT-OF-WAY

RIGHT-OF-WAY

PROP. ROADWAY/PEDESTRIAN
LIGHT POLE
(TYP.)

0 15 30 60
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

LEGEND

EXISTING STREET LIGHT POLE

PROPOSED ROADWAY/PEDESTRIAN
LIGHT POLE

96TH STREET

RIGHT-OF-WAY

COLLINS AVENUE (A-1-A)

2

ST. REGIS
RESORT

3

ST. REGIS
RESORT

4

ST. REGIS
RESORT

1

MAJESTIC

SEE SHEET 2 OF 5
FOR CONTINUATION

1 OF 5

EXHIBIT M-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

EXHIBIT M-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

LEGEND

EXISTING STREET LIGHT POLE

PROPOSED ROADWAY/PEDESTRIAN LIGHT POLE

HORIZONTAL GRAPHIC SCALE
0 15 30 60
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

4 | 5 | 6 | 7 | 8 | 9

PROP. ROADWAY/PEDESTRIAN LIGHT POLE (TYP.)

RIGHT-OF-WAY

COLLINS AVENUE (A-1-A)

RIGHT-OF-WAY

EXIST. STREET LIGHT POLE (TO BE REMOVED) (TYP.)

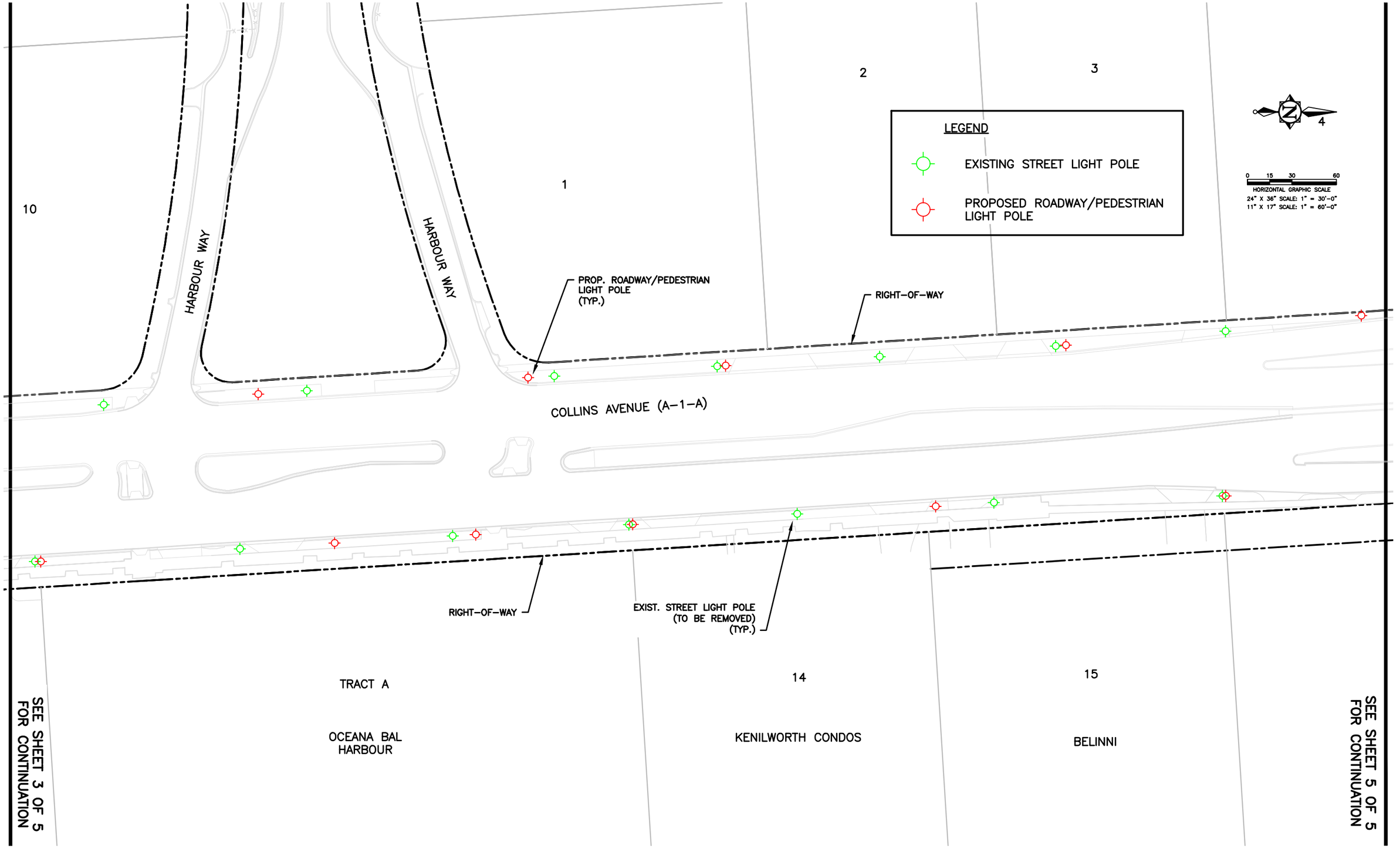
9	10	11	12	13
BAL HARBOUR TOWER	THE PALACE	BAL HARBOUR 101	TIFFANY	PLAZA OF BAL HARBOUR

SEE SHEET 2 OF 5 FOR CONTINUATION

SEE SHEET 4 OF 5 FOR CONTINUATION

EXHIBIT M-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP



4 OF 5

EXHIBIT M-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

5

3

PROP. ROADWAY/PEDESTRIAN LIGHT POLE (TYP.)

RIGHT-OF-WAY

COLLINS AVENUE (A-1-A)

LEGEND

EXISTING STREET LIGHT POLE

PROPOSED ROADWAY/PEDESTRIAN LIGHT POLE

0 15 30 60

HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 30'-0"
11" X 17" SCALE: 1" = 60'-0"

RIGHT-OF-WAY

EXIST. STREET LIGHT POLE (TO BE REMOVED) (TYP.)

16

CARLTON TERRACE

HARBOUR HOUSE

HARBOUR HOUSE

ONE BAL HARBOUR

SEE SHEET 4 OF 5 FOR CONTINUATION

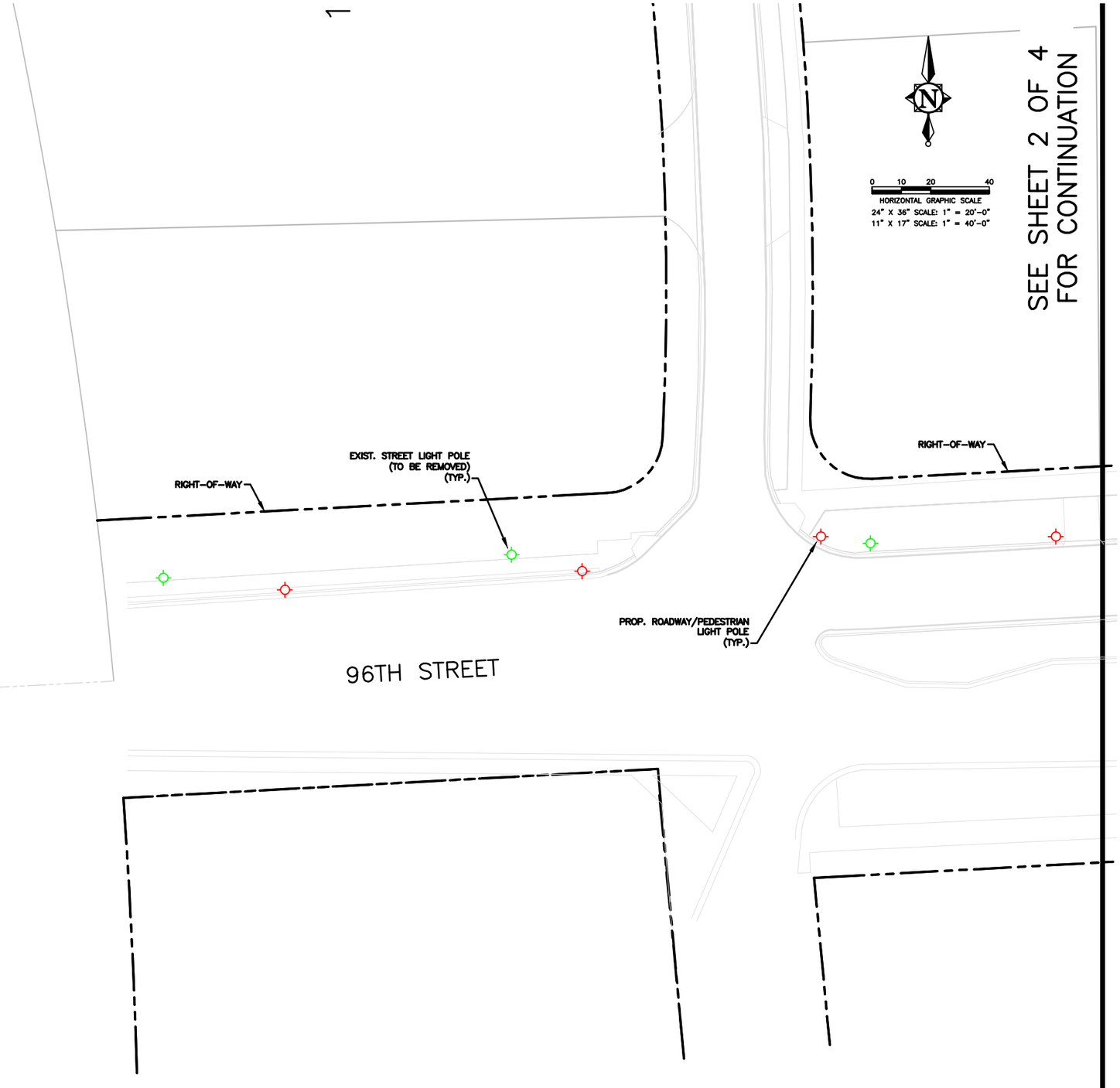
EXHIBIT M-3

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED COLLINS AVENUE ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

LEGEND

EXISTING STREET LIGHT POLE

PROPOSED ROADWAY/PEDESTRIAN LIGHT POLE



1 OF 4

EXHIBIT M-4

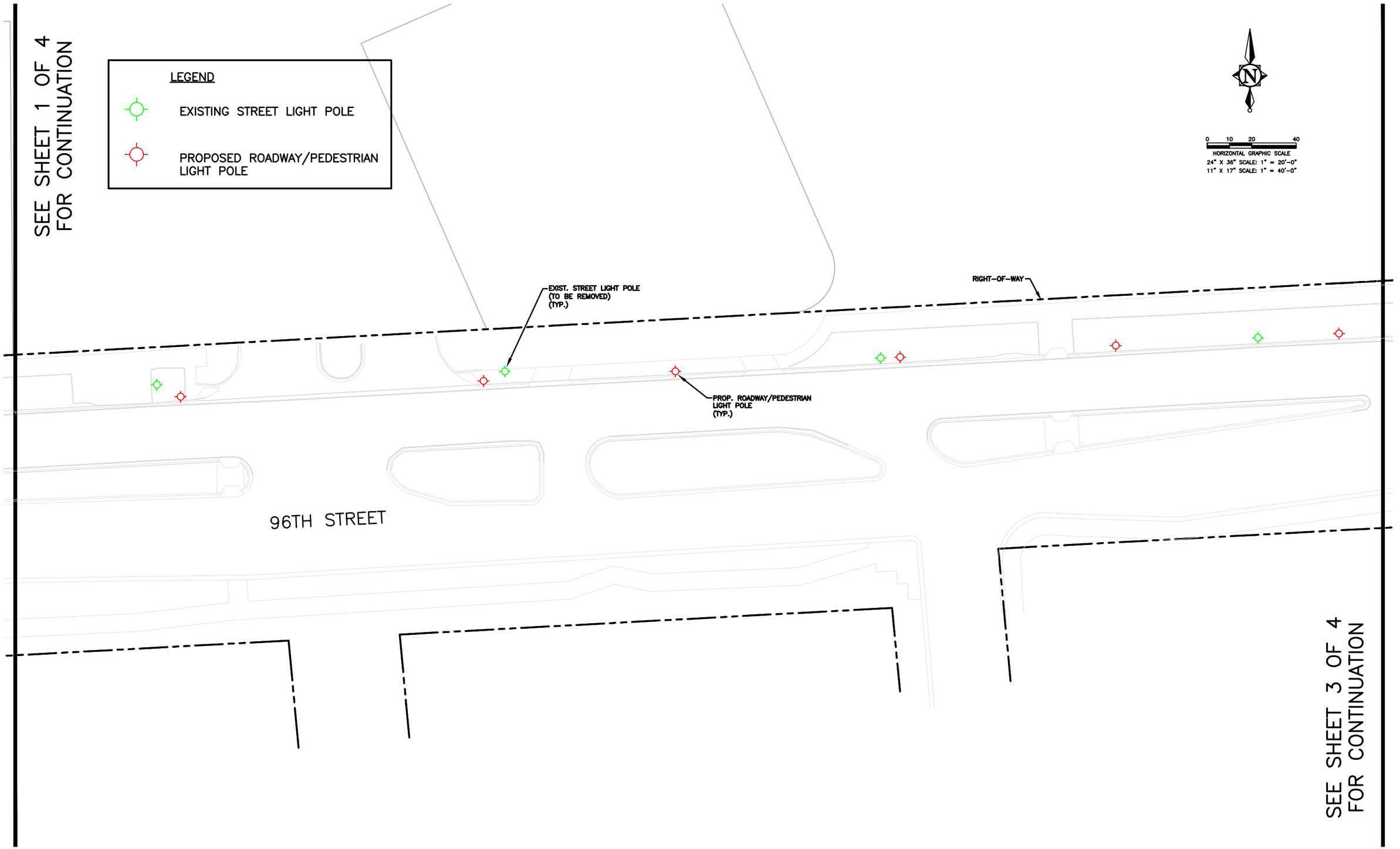
BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

SEE SHEET 1 OF 4
FOR CONTINUATION

LEGEND

EXISTING STREET LIGHT POLE

PROPOSED ROADWAY/PEDESTRIAN LIGHT POLE



N

0 10 20 40
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 20'-0"
11" X 17" SCALE: 1" = 40'-0"

SEE SHEET 3 OF 4
FOR CONTINUATION

2 OF 4

EXHIBIT M-4

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

P:\Cities_Villages_Towns\Bal_Harbour\12-1146-BCP-BAL-HARBOUR-UTILITY-RDWY-MASTER-PLAN\04-Engineering\Plans\02-Exhibits\PROP LIGHT POLES 96TH ST\00-1146-CNE-EXB.dwg, 2/3/2015 11:48:00 AM, mmarenco, 1:2

LEGEND

EXISTING STREET LIGHT POLE

PROPOSED ROADWAY/PEDESTRIAN LIGHT POLE

EXIST. STREET LIGHT POLE (TO BE REMOVED) (TYP.)

RIGHT-OF-WAY

96TH STREET

HARDING AVE.

RIGHT-OF-WAY

PROP. ROADWAY/PEDESTRIAN LIGHT POLE (TYP.)

N

0 10 20 40

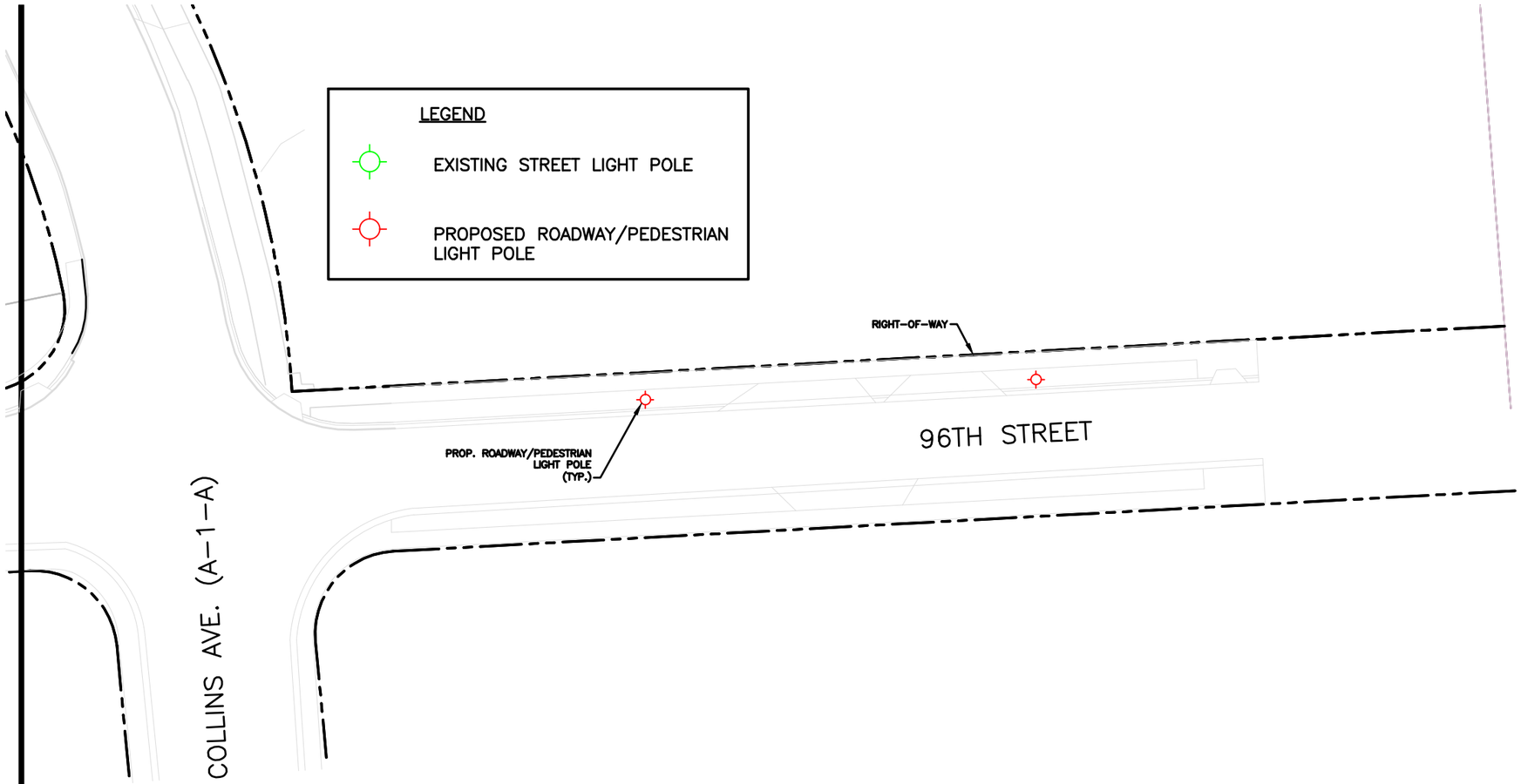
HORIZONTAL GRAPHIC SCALE
24" X 36" SCALE: 1" = 20'-0"
11" X 17" SCALE: 1" = 40'-0"

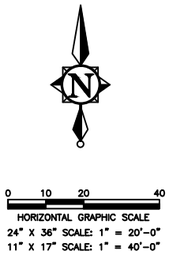
SEE SHEET 2 OF 4 FOR CONTINUATION

SEE SHEET 4 OF 4 FOR CONTINUATION

EXHIBIT M-4

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP





SEE SHEET 3 OF 4
FOR CONTINUATION

EXHIBIT M-4

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
PROPOSED 96TH STREET ROADWAY/PEDESTRIAN LIGHT POLE SYSTEM MAP

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
MISCELLANEOUS IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
RESIDENTIAL ROADWAY LIGHTING IMPROVEMENTS
EXHIBIT M-5

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (10%)	1	LS	$ 210,470.00	$ 210,470.00
2	Maintenance of Traffic (6%)	1	LS	$ 126,282.00	$ 126,282.00
3	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 63,141.00	$ 63,141.00
				TOTAL	$ 399,893.00
	Lighting				
1	150 W - 16 foot high Single Light Fixture Post Assembly (incl. Footer, Pull Box & GFI Receptacle)	270	EA	$ 4,100.00	$ 1,107,000.00
2	150 W - 16 foot high Twin Light Fixture Post Assembly (incl. Footer, Pull Box & GFI Receptacle)	60	EA	$ 4,900.00	$ 294,000.00
3	Service Entrance Structure (incl. Combination SED, Lighting Contactor, Photocell, Posts and Unistrut)	6	EA	$ 6,500.00	$ 39,000.00
4	Precast Concrete Pull Box	50	EA	$ 1,450.00	$ 72,500.00
5	Wiring w/ Grounds in 2" Conduit	42300	LF	$ 14.00	$ 592,200.00
				TOTAL	$ 2,104,700.00

SUBTOTAL	$2,504,593
10% CONTINGENCY	$ 250,459
TOTAL CONSTRUCTION COST	$ 2,755,052
ENGINEERING DESIGN (2%)	$ 50,092
DESIGN SURVEY (1.5%)	$ 37,569
UTILITY LOCATES (0.5%)	$ 12,523
CONSTRUCTION OBSERVATION (5%)	$ 125,230
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 50,092
TOTAL PRELIMINARY COST	$ 3,030,558

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
MISCELLANEOUS IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
COLLINS AVENUE ROADWAY/PEDESTRIAN LIGHTING IMPROVEMENTS
EXHIBIT M-6

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (10%)	1	LS	$ 164,780.00	$ 164,780.00
2	Maintenance of Traffic (6%)	1	LS	$ 98,868.00	$ 98,868.00
3	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 49,434.00	$ 49,434.00
				TOTAL	$ 313,082.00
	Lighting				
1	150 W - 30 foot high Light Fixture w/ Pedestrian Light Post Assembly (incl. Footer, Pull Box & GFI Receptacle)	96	EA	$ 13,000.00	$ 1,248,000.00
2	Service Entrance Structure (incl. Combination SED, Lighting Contactor, Photocell, Posts and Unistrut)	6	EA	$ 10,000.00	$ 60,000.00
3	Precast Concrete Pull Box	26	EA	$ 1,600.00	$ 41,600.00
4	Wiring w/ Grounds in 2" Conduit	21300	LF	$ 14.00	$ 298,200.00
				TOTAL	$ 1,647,800.00

SUBTOTAL		$1,960,882
10% CONTINGENCY	$	196,088
TOTAL CONSTRUCTION COST	$	2,156,970
ENGINEERING DESIGN (2%)	$	39,218
DESIGN SURVEY (1.5%)	$	29,413
UTILITY LOCATES (0.5%)	$	9,804
CONSTRUCTION OBSERVATION (5%)	$	98,044
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$	39,218
TOTAL PRELIMINARY COST	$	2,372,667

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
MISCELLANEOUS IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
96th STREET ROADWAY/PEDESTRIAN LIGHTING IMPROVEMENTS
EXHIBIT M-7

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (10%)	1	LS	$ 36,500.00	$ 36,500.00
2	Maintenance of Traffic (6%)	1	LS	$ 21,900.00	$ 21,900.00
3	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 10,950.00	$ 10,950.00
				TOTAL	$ 69,350.00
	Lighting				
1	150 W - 30 foot high Light Fixture w/ Pedestrian Light Post Assembly (incl. Footer, Pull Box & GFI Receptacle)	20	EA	$ 13,000.00	$ 260,000.00
2	Service Entrance Structure (incl. Combination SED, Lighting Contactor, Photocell, Posts and Unistrut)	4	EA	$ 6,500.00	$ 26,000.00
3	Precast Concrete Pull Box	12	EA	$ 1,450.00	$ 17,400.00
4	Wiring w/ Grounds in 2" Conduit	4400	LF	$ 14.00	$ 61,600.00
				TOTAL	$ 365,000.00

SUBTOTAL		$434,350
10% CONTINGENCY	$	43,435
TOTAL CONSTRUCTION COST	$	477,785
ENGINEERING DESIGN (2%)	$	8,687
DESIGN SURVEY (1.5%)	$	6,515
UTILITY LOCATES (0.5%)	$	2,172
CONSTRUCTION OBSERVATION (5%)	$	21,718
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$	8,687
TOTAL PRELIMINARY COST	$	525,564

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
MISCELLANEOUS IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
COLLINS AVE. AND 96TH STREET LANDSCAPE IMPROVEMENTS
EXHIBIT M-8

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 80,840.00	$ 80,840.00
2	Maintenance of Traffic (6%)	1	LS	$ 60,630.00	$ 60,630.00
3	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 30,315.00	$ 30,315.00
				TOTAL	$ 171,785.00
	Landscaping				
1	Prepared Soil Layer (12-inch)	1	LS	$ 65,000.00	$ 65,000.00
2	Shredded Melaleuca Mulch (Grade B)	1	LS	$ 6,000.00	$ 6,000.00
3	Trees (Various Species and Sizes)	1	LS	$ 650,000.00	$ 650,000.00
4	Low-Lying Shrubs (Various Species)	1	LS	$ 140,000.00	$ 140,000.00
5	Plantings (Various Species)	1	LS	$ 75,000.00	$ 75,000.00
6	Tree Root Guards	30	LS	$ 450.00	$ 13,500.00
7	Sod	6000	SY	$ 6.00	$ 36,000.00
8	Establish and Maintain On-Site Nursery during Construction	1	LS	$ 25,000.00	$ 25,000.00
				TOTAL	$ 1,010,500.00

SUBTOTAL	$ 1,182,285
10% CONTINGENCY	$ 118,229
TOTAL CONSTRUCTION COST	$ 1,300,514
ENGINEERING DESIGN (8%)	$ 94,583
DESIGN SURVEY (1.5%)	$ 17,734
UTILITY LOCATES (0.5%)	$ 5,911
CONSTRUCTION OBSERVATION (5%)	$ 59,114
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$ 23,646
TOTAL PRELIMINARY COST	$ 1,501,502

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

BAL HARBOUR VILLAGE
UTILITY MASTER PLAN
MISCELLANEOUS IMPROVEMENTS
ENGINEER'S ESTIMATE OF PRELIMINARY COST ESTIMATE
COLLINS AVE. AND 96TH STREET IRRIGATION AND
ACCENT LANDSCAPE LIGHTING IMPROVEMENTS
EXHIBIT M-9

ITEM No.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
1	Mobilization & Demobilization (8%)	1	LS	$ 53,040.00	$ 53,040.00
2	Maintenance of Traffic (6%)	1	LS	$ 39,780.00	$ 39,780.00
4	Survey Construction Stakeout & As-Builts (3%)	1	LS	$ 19,890.00	$ 19,890.00
				TOTAL	$ 112,710.00
	Irrigation/ Lighting				
1	Landscape Irrigation (incl. Sleeves, Risers, Meters, Controllers, Heads, Valves and Pumps)	1	LS	$ 300,000.00	$ 300,000.00
2	Electrical for Landscape Irrigation	1	LS	$ 58,000.00	$ 58,000.00
3	Accent Lighting for Landscape Features (incl. Sleeves, LED Lights, Fixtures and Transformers)	1	LS	$ 250,000.00	$ 250,000.00
4	Electrical for Accent Lighting	1	LS	$ 55,000.00	$ 55,000.00
				TOTAL	$ 663,000.00

SUBTOTAL		$775,710
10% CONTINGENCY	$	77,571
TOTAL CONSTRUCTION COST	$	853,281
ENGINEERING DESIGN (10%)	$	77,571
DESIGN SURVEY (1.5%)	$	11,636
UTILITY LOCATES (0.5%)	$	3,879
CONSTRUCTION OBSERVATION (5%)	$	38,786
ENGINEERING SERVICES DURING CONSTRUCTION (2%)	$	15,514
TOTAL PRELIMINARY COST	$	1,000,666

NOTE : PRICES DO NOT INCLUDE SOIL CONDITIONS OR POTENTIAL DEMUCKING FACTORS.

EXHIBIT M-10

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 1 : Typical existing light fixture within the Village's residential area.

Photo 2: Light pole obscured by landscaping (134 Bal Bay Drive).

EXHIBIT M-10

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 3: Light pole obscured by landscaping (150 Camden Drive).

Photo 4: Repaired concrete light pole (126 Bal Cross Drive).

EXHIBIT M-10

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 5: Light pole obscured by landscaping (80 Park Drive).

Photo 6: Damaged concrete pole base (152 Park Drive).

EXHIBIT M-10

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 7: Leaning concrete light pole (152 Park Drive).

Photo 8: Cracked concrete pole base (261 Bal Cross Drive).

EXHIBIT M-10

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 9: Cracked concrete light pole at Harbour Way East and Park Drive.

Photo 10: Longitudinal cracked concrete light pole (261 Bal Cross Drive).

EXHIBIT M-10

PHOTOGRAPHS – BAL HARBOUR VILLAGE

Photo 11: Light pole obscured by landscaping (216 Bal Cross Drive).

Photo 12: Damage pole base at Bal Harbour Manor and Harbour Way.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 1: Proposed roadway/pedestrian light post configuration.

Photo 2: Existing light pole assembly on east side of Collins Avenue.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 3: Existing light pole obscured by landscaping, looking north.

Photo 4: Existing light poles on east side of Collins Avenue at *Bal Moral*.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 5: Existing light pole east side of Collins Ave. at *The Seaview*

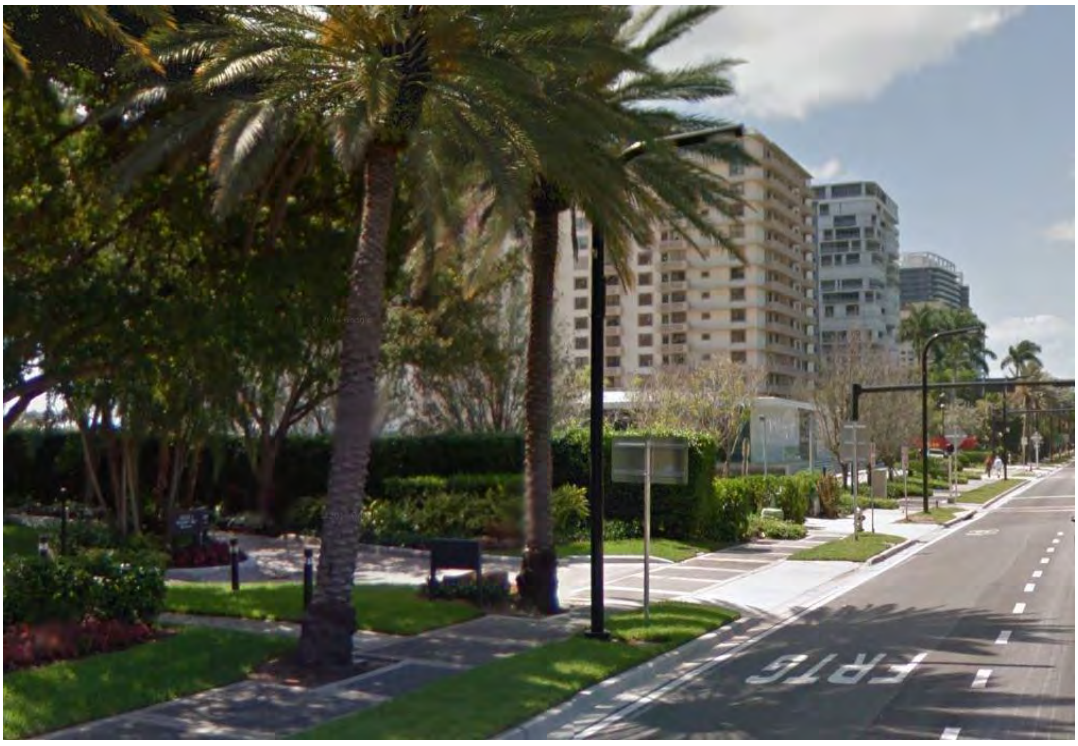


Photo 6: Existing light pole at *The Kenilworth*, looking south.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 7: Existing light pole with missing base, looking north.

Photo 8: Street lights at the *Carlton Terrace*, looking north.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 9: Existing street light poles at *1 Bal Harbour*, looking north.

Photo 10: Existing street light poles at *1 Bal Harbour*, looking north.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

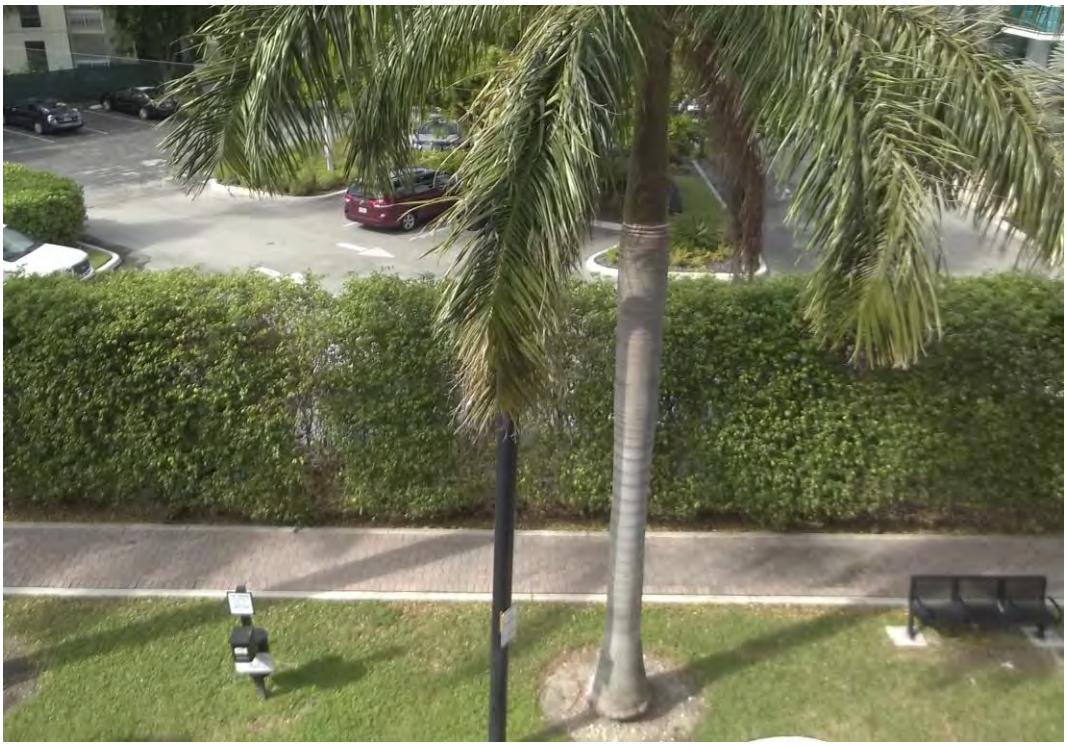


Photo 11: Existing light pole obscured by landscaping.

Photo 12: Existing light pole obscured by landscaping on the west side of Collins Avenue, looking north.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 13: Existing damaged light pole.

Photo 14: Existing damaged light pole base.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 15: Existing light pole obscured by landscaping, looking south.

Photo 16: Existing light pole obscured by landscaping.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 17: Missing street light behind existing pull box.

Photo 18: Existing light poles on west side of Collins Avenue.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 19: Existing light poles near *Collins Apartments*, looking north.

Photo 20: Existing light poles at *Avondale Apartments*, looking north.

EXHIBIT M-11
PHOTOGRAPHS
COLLINS AVENUE (ROADWAY LIGHTING)

Photo 21: Street light poles adjacent to *The Shops*, looking south.

Photo 22: Street lights adjacent to *Fairfield Manor*, looking north.

EXHIBIT M-12
PHOTOGRAPHS
96TH STREET (ROADWAY LIGHTING)

Photo 1: Proposed roadway/pedestrian light post configuration.

Photo 2: Existing street light post, north side of 96th Street, looking east.

EXHIBIT M-12
PHOTOGRAPHS
96TH STREET (ROADWAY LIGHTING)

Photo 3: Existing light pole, looking west.

Photo 4: Existing light pole pedestal and pull box, located in sidewalk.

EXHIBIT M-12
PHOTOGRAPHS
96TH STREET (ROADWAY LIGHTING)

Photo 5: Existing light pole mast arm and light.

Photo 6: Existing light pole obscured by landscaping.

EXHIBIT M-12
PHOTOGRAPHS
96TH STREET (ROADWAY LIGHTING)

Photo 7: Existing light pole on north side of 96th Street, looking east.

Photo 8: Existing light pole on the north side of 96th Street, looking west.

EXHIBIT M-12
PHOTOGRAPHS
96TH STREET (ROADWAY LIGHTING)

Photo 9 : Existing light pole pedestal and pull box in green area.

Photo 10: Existing light pole adjacent to the 96th Street bridge, looking west.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 1 : Existing landscaping at Founder's Circle, looking south.

Photo 2: Existing landscaping east side of Collins Avenue at *Majestic*.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 3: Existing landscaping east side of Collins Avenue at *St. Regis*.

Photo 4: Existing landscaping east side of Collins Avenue at *Bal Moral*.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 5: Existing landscaping east side of Collins Ave. at *The Tower*.

Photo 6: Existing landscaping at *Carlton Terrace*, looking north.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 7: Existing landscaping at *One Bal Harbour*, looking north.

Photo 8: Center median landscaping adjacent to *The Shops*, looking north.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 9: Median adjacent to Founder's Circle, looking north.

Photo 10: Center median landscaping at *The Shops*, looking north.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 11: Center median landscaping at *St. Regis*, looking north.

Photo 12: Center median north of Bal Cross Drive, looking north.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 13: Center median, adjacent to *Tiffany*, looking north.

Photo 14: Center median landscaping adjacent to *Oceana*, looking south.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

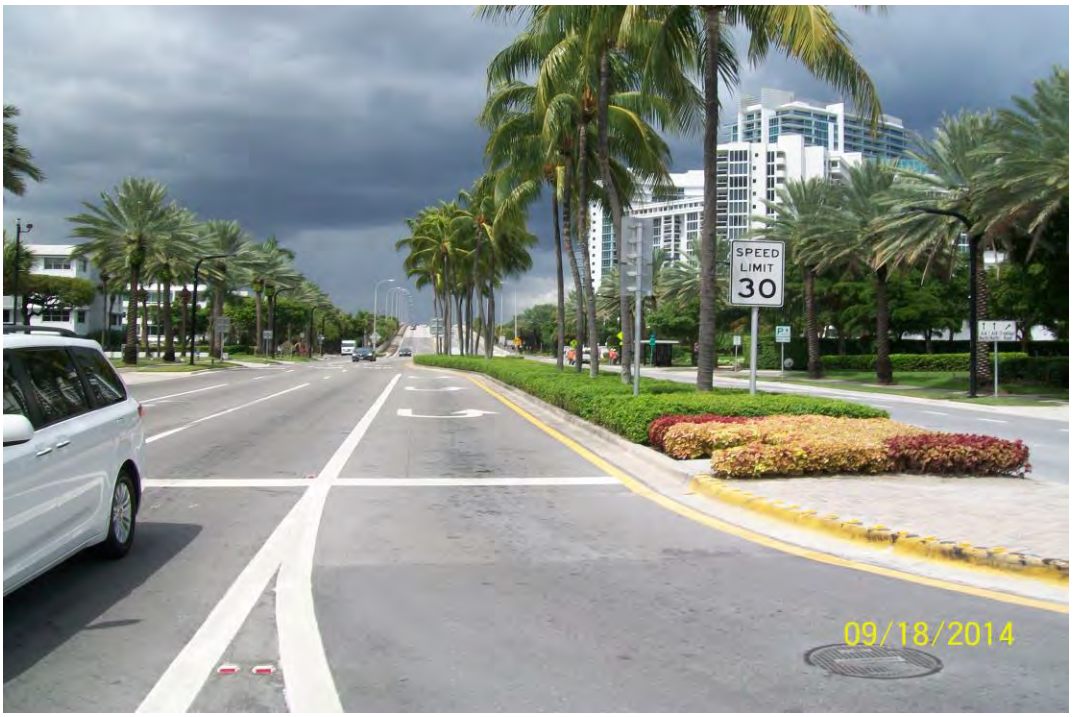


Photo 15: Center median landscaping adjacent to *Bellini*, looking north.

Photo 16: Landscaping on west access road adjacent to Haulover Bridge.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 17: Existing landscaping at *Bal Bridge North*, looking south.

Photo 18: Existing landscaping at west side of Collins Avenue, looking south.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 19: Existing landscaping at Harbour Way, looking south.

Photo 20: Landscaping at 10170 Collins Avenue, looking south.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 21: Landscaping near *Collins Apartments*, looking north.

Photo 22: Landscaping adjacent to 9910 Collins Avenue, looking south.

EXHIBIT M-13
PHOTOGRAPHS
COLLINS AVENUE (LANDSCAPING)

Photo 23: Landscaping adjacent to *The Shops*, looking south.

Photo 24: Landscaping adjacent to *The Shops*, looking south.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 1 : Existing 96TH Street landscaping, looking east.

Photo 2: Median landscaping at Byron Avenue, looking east.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 3: Median and north side landscaping, looking west.

Photo 4: Existing median landscaping at 500 Block, looking southwest.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 5: Existing median landscaping, looking west.

Photo 6: Existing median and north side landscaping, looking west.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 7: Existing landscaping at Village Hall, looking north.

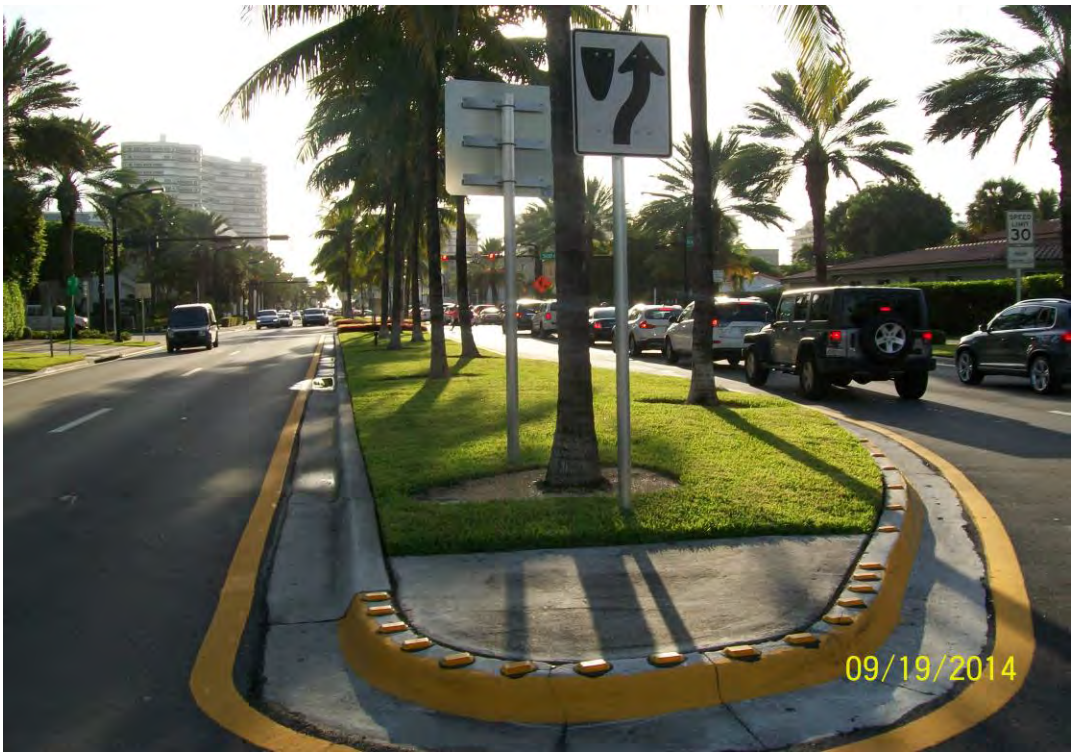


Photo 8: Existing median landscaping, looking east.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 9 : Existing north landscaping at Harding Avenue, looking west.

Photo 10: Existing landscaping at the Shops, looking west.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 11: Existing landscaping at the Shops, looking west.

Photo 12: Existing landscaping at Byron Avenue, looking east.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 13: Existing landscaping at Church by the Sea, looking west.

Photo 14: Existing north landscaping at 500 Block, looking west.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

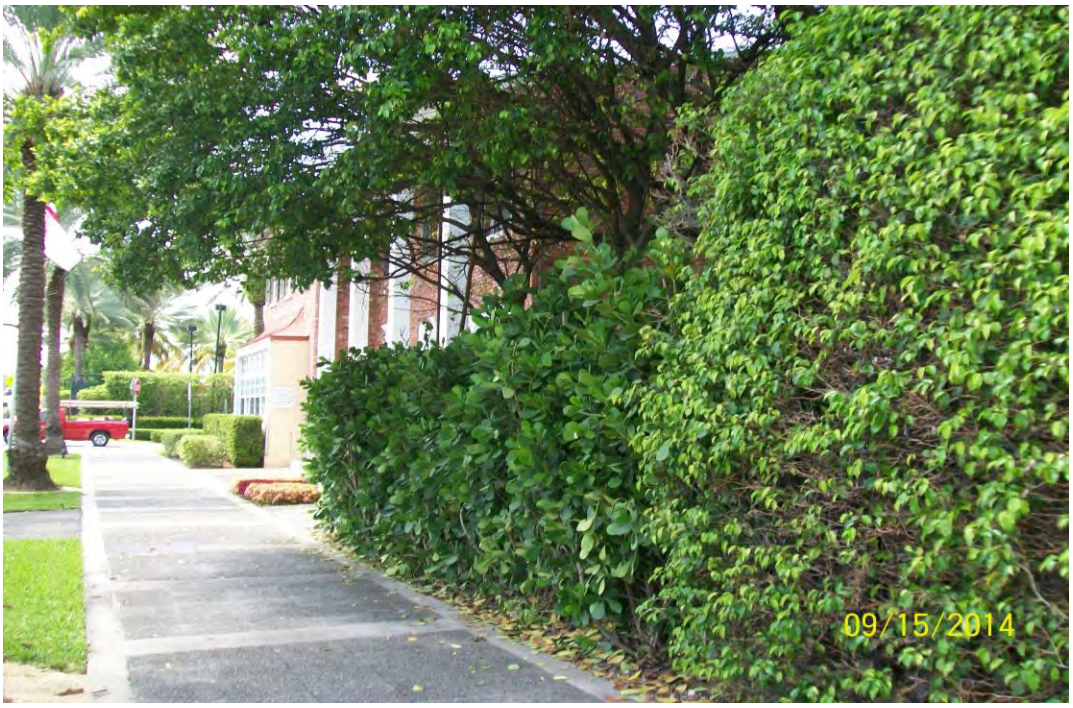


Photo 15: Existing north landscaping near Village Hall, looking west.

Photo 16: Existing north landscaping near bridge, looking west.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 17 : Existing 96TH Street landscaping, looking east.

Photo 18: Existing landscaping at Bal Bay Drive, looking north.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

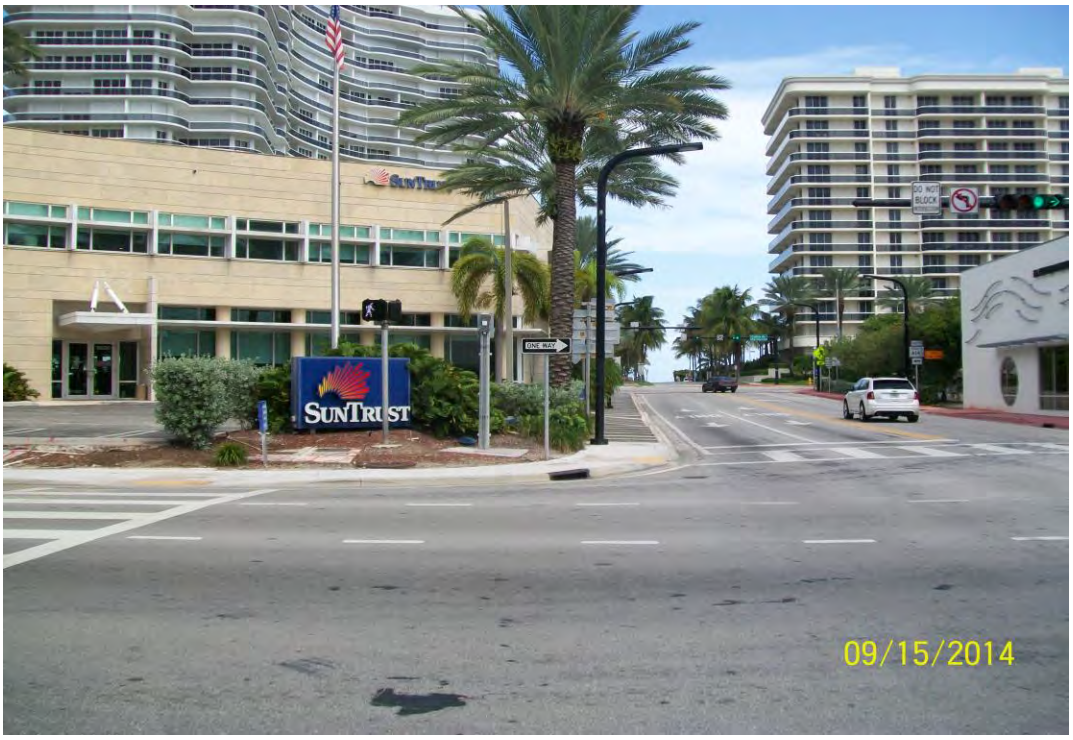


Photo 19: North side landscaping at Harding Avenue, looking east.

Photo 20: North side landscaping at Sun Trust Bank, looking east.

EXHIBIT M-14
PHOTOGRAPHS
96TH STREET (LANDSCAPING)

Photo 21: Landscaping at the Majestic, looking east.

Photo 22: Existing landscaping at east end of 96th Street, looking east.