MIAMIBEACH

OFFICE OF THE CITY MANAGER

NO. LTC # 155-2009

LETTER TO COMMISSION

TO: Mayor Matti Herrera Bower and Members of the City Commission

FROM: Jorge M. Gonzalez, City Manager JG for

DATE: June 12, 2009

SUBJECT: **Venetian Islands ROW Project – Water Main Replacement**

The purpose of this LTC is to provide a response to recent inquiries as to how the water main replacement scope for the Venetian Islands Right-of-Way (ROW) Project (the "Project") was developed. The current Project plans prepared by Jacobs / Edwards and Kelcey, Inc., the Project consultant, are currently at 100% design and nearly fully permitted for construction of budgeted improvements, including, $2.85 million of water main improvements ("all-in cost" of $4.6 million) on the three Venetian Islands of San Marino, Rivo Alto and Dilido Islands. It is important to note that the 2000 Series Water and Sewer Bonds, which has been the primary funding source of water improvements, budgeted approximately "all-in" $2.66 million (out of a total of $54.3 million) for the design, permitting, management and construction of water main improvements for all four of the Venetian Islands, including Belle Isle. The City Commission has added in excess of $2 million to the Water Main replacement budget since 2000.

In accordance with the direction provided by the City Commission at its May 13, 2009 meeting, the Project scope has been modified to include new stormwater drainage infrastructure and potential construction of additional lineal feet of water main replacement. In addition, the City Commission directed the City Administration to take water main coupons (a section of pipe) from those water mains not scheduled for replacement on Di Lido and Rivo Alto Islands. A Request for Qualifications was issued for a new design professional to incorporate certain components of the current Project plans with the approved additional scope.

Currently Proposed Water Main Replacements

The current completed design provides for the replacement of water mains as follows:

- San Marino Island: Replace entire loop along East and West San Marino Drives, and all cross streets (approximately 4,770 lineal feet)
- Di Lido Island: Replace water mains along Di Lido Drive, south of 1st Terrace, and a section of East Di Lido Drive, north of the Venetian Causeway (approximately 1,674 lineal feet).
- Rivo Alto Island: Replace water mains along all cross streets between East and West Rivo Alto Drive (approximately 1,609 lineal feet).

In summary, the current design identifies the replacement of approximately 8,053 lineal feet of the approximately 17,970 lineal feet of existing water mains (45% of the total) as illustrated in Attachment A. The existing design also requires the installation of 5,682 lineal feet of small diameter water service lines in the three islands. As noted above, the current budget also reflects an additional $2 million of funding by the City Commission since 2000.

Water System Master Plan

The water distribution system encompasses over 885,000 lineal feet (168 miles) of water distribution mains ranging in size from 2-inch to 36-inches in diameter. Of this total, approximately 500,000 lineal feet of mains are either 50 to 70 years of age and / or of smaller diameter (8 inches or smaller) primarily consisting of unlined cast iron and galvanized pipe thereby causing increased friction losses and lower system pressures. Because of the smaller cross-sectional pipe areas, tuberculation will normally have a greater impact on the carrying capacity of the smaller diameter water mains.

Tuberculation is the development or formation of small mounds of corrosion products on the inside of iron pipe as a result of oxygenated waters contacting the metal surface of the pipe. Iron, in one form or another, is the most common metal in water distribution systems. A natural chemical reaction occurs when potable water comes in contact with the metal surface of the pipe thereby transferring electrons from the oxygenated water onto the metal surface. This process creates oxidation of the ferrous (iron) metal in the pipe. Tubercules roughen the inside of the pipe thereby increasing its resistance to water flow. Tuberculation also weakens the water main by reducing the wall thickness of the pipe. These reductions in carrying capacity and in strength can increase pumping requirements, water main breakage, and repair costs, and, consequently, increased water delivery costs.

Tuberculation is experienced throughout the United States and in Florida municipal water systems. The presence of tubercules also can cause water discoloration and can increase the potential of bacterial growth. Bacterial growth in a municipal water system is controlled by the use of chlorination and filtration systems utilized by the water system purveyor (Miami-Dade Water & Sewer Department). The City of Miami Beach monitors water quality levels to ensure water safety compliance and verify that its residents receive the highest potable water quality.

Water Quality / Microbiological Sampling

In order to ensure the safety and quality of the water delivered to our residents, the City takes 32 distribution samples and 8 water storage tank samples at least four times per month. The number of samples required and the frequency of testing for microbiological monitoring is population based and established via Florida Administrative Code (FAC) 62-550.518. The samples are collected from outside hose bibs, the chlorine residual levels are recorded, and the samples are taken to the Miami-Dade Preston Plant Laboratory for coliform bacteria analysis.

In addition, the City collects 60 water samples for lead and copper analysis from customer's homes every three years. These first draw samples are collected by the homeowner and City personnel deliver the samples to Miami-Dade Preston Plant Laboratory for analysis. The homes were initially selected from a list of 274 residences provided to the Florida Department of Health from a material survey conducted by the Public Works Engineering personnel for single family homes that met a specified criterion. Miami Beach is required to collect samples from the same locations every time and can only change a sample site to another on the survey when an existing customer declines or is unavailable to participate. In addition, the City collects four water samples at the four entry points for lead and copper analysis.

This is only a summary of the testing program that the City undertakes. The water that we provide to our residents is safe and of high quality. We follow all regulatory requirements and continue to take all appropriate measures to ensure the safety of our water supply. To date, the City has met all Federal, State and County guidelines for safe drinking water.

In the 1990s, Camp Dresser and McKee (CDM) was retained to prepare a Water System Master Plan and a Final Report was issued in 1995. This Master Plan evaluated and identified capital infrastructure requirements to support the continued operation of the water distribution system for a planning horizon of Year 2015. This infrastructure requirement was subsequently funded in the 2000 Water and Sewer Revenue Bond issuance at the approximate value of $2.66 million. The City prioritized water main replacement based upon the following three criteria:

- Priority 1 (P1) - Provide adequate system pressures by replacing under-sized pipes
- Priority 2 (P2) - Replace galvanized pipes; and
- Priority 3 (P3) - Replace tuberculated water lines

Priority 1 Criteria. This criterion was based upon computer hydraulic modeling efforts to identify those water distribution mains that were required to be increased in pipe diameter in order to maintain acceptable system pressures during forecasted demand events.

Priority 2 Criteria. The priority 2 criteria were established to replace water mains that were constructed of galvanized steel material. The City elected to replace the galvanized steel water mains since the vast majority of these installations were 6-inches in diameter or smaller and the use of galvanized steel pipe is no longer an acceptable practice. Ten State Standards – Recommended Standards for Water Works recommends water distribution mains to be a minimum of 6-inches in diameter.

Priority 3 Criteria. This criterion was established to replace those mains with tuberculation. A vast majority of the system inventory was constructed over 50 to 70 years ago and consisted of the most readily available pipe material at that time – cast iron. These cast iron mains were most likely unlined and an unlined cast iron pipe will develop tuberculation and corrosion product on the interior pipe wall over time. The extent of cast iron main installed in the City's system exceeds 335,000 lineal feet of pipe and the cost to replace this entire cast iron pipe inventory far exceeded available funds obtained via the Series 2000 Water and Sewer Bonds. Therefore, it was necessary to further segment this latter criterion into three (3) additional priority categorizations such as P3.1, P3.2, and P3.3. These sub-categories were based upon anticipated degree of tuberculation.

The service impact of tuberculated pipes consists of reduced system pressures, decreased pipe wall thickness and potential water main leaks / breakage. The most likely indicators to a system operator that pipes are tuberculated are obscured water clarity, increased resident complaints regarding low pressure / flow, reduced system pressures and water main breaks. Common methods that are utilized to determine the degree of tuberculation consist of system pressure monitoring, frequency of complaints and destructive testing such as obtaining in-situ pipe coupons. Priority 3 water mains were evaluated, and subsequently prioritized, utilizing the previously mentioned criteria based upon level of severity. This methodology resulted in the current scope of work for water main replacement for the Venetian Islands.

> ***P3.1 Criteria.*** The P3.1 water mains received the top priority and were selected based upon the highest frequency of complaints / main breakages. Those locations where the most concentration of complaints were recollected / logged were assigned to this category. There is presently sufficient funding to replace all P3.1 and this is reflected in the current design of the referenced Project.

P3.2 Criteria. The P3.2 water mains received the second highest priority. There is presently sufficient funding to replace the majority of P3.2 lines, and this is reflected in the current design of the referenced Project.

P3.3 Criteria. The P3.3 water mains received the lowest priority based upon receipt of minimal complaints, or water line breaks and / or a history with no complaints / or water line breaks.

In an effort to further refine the selection, the City retained the services of its General Water Consultant (CDM) in 2007 to prepare an update of the City of Miami Beach citywide water distribution hydraulic computer model. This model was updated based upon those changes that had occurred during the previous planning cycle and was integrated into the City's comprehensive Geographic Information System (GIS) database. This update allowed the City to evaluate the hydraulic capacity of the system and confirm the need for the previously recommended improvements based upon the actual growth observed during the previous planning horizon. Also, the Consultant was tasked to evaluate soil resistivity values of the soil surrounding the pipe envelope for selected P3.2 mains.

This additional analysis yielded additional infrastructure replacements that allowed the City to identify additional infrastructure needs with respect to the P3.2 criteria. Therefore, it was determined that additional P3.2 water mains were in need of replacement on San Marino Island. This effort led to the determination to include the full replacement of the San Marino Island water mains in the current design effort.

Additional Assessments

City staff proceeded to develop a plan to extract pipe coupons (small sections of the existing water mains) from seven (7) locations in the existing water distribution network of the Di Lido and Rivo Alto Islands. Four (4) coupon sampling points were targeted on the Di Lido Island and three (3) coupon sampling points were targeted for the Rivo Alto Island as illustrated in Attachment B. Please note that pipe coupons were not taken on the San Marino Island since the Project already contemplates complete replacement of the existing water main network on San Marino Island. As requested by the Venetian Islands Homeowners Association, the board members were invited to be present and notified when the pipe coupons were taken.

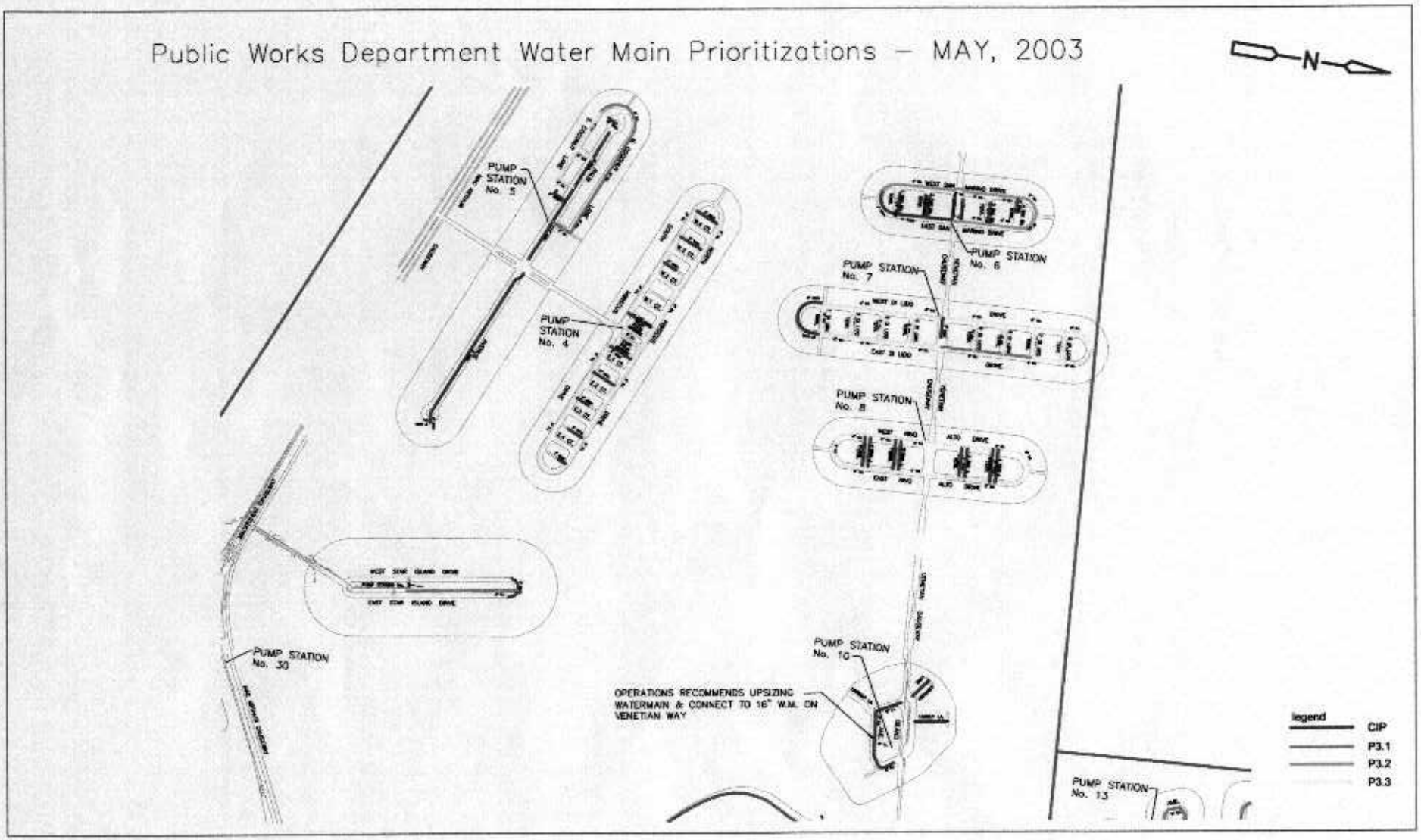
Next Steps

Based upon the initial information that we have collected, it appears that the sections of pipe where coupons were taken justify categorization into the Priority 3.1 category noted above. Should the City Commission desire to do so, there appears to be sufficient funds within the neighborhood budget to fund the replacement of all remaining water mains. The staff recommendation at this time is to go ahead and replace these remaining water mains.

Attachments

TH/CC/JC

Attachment A



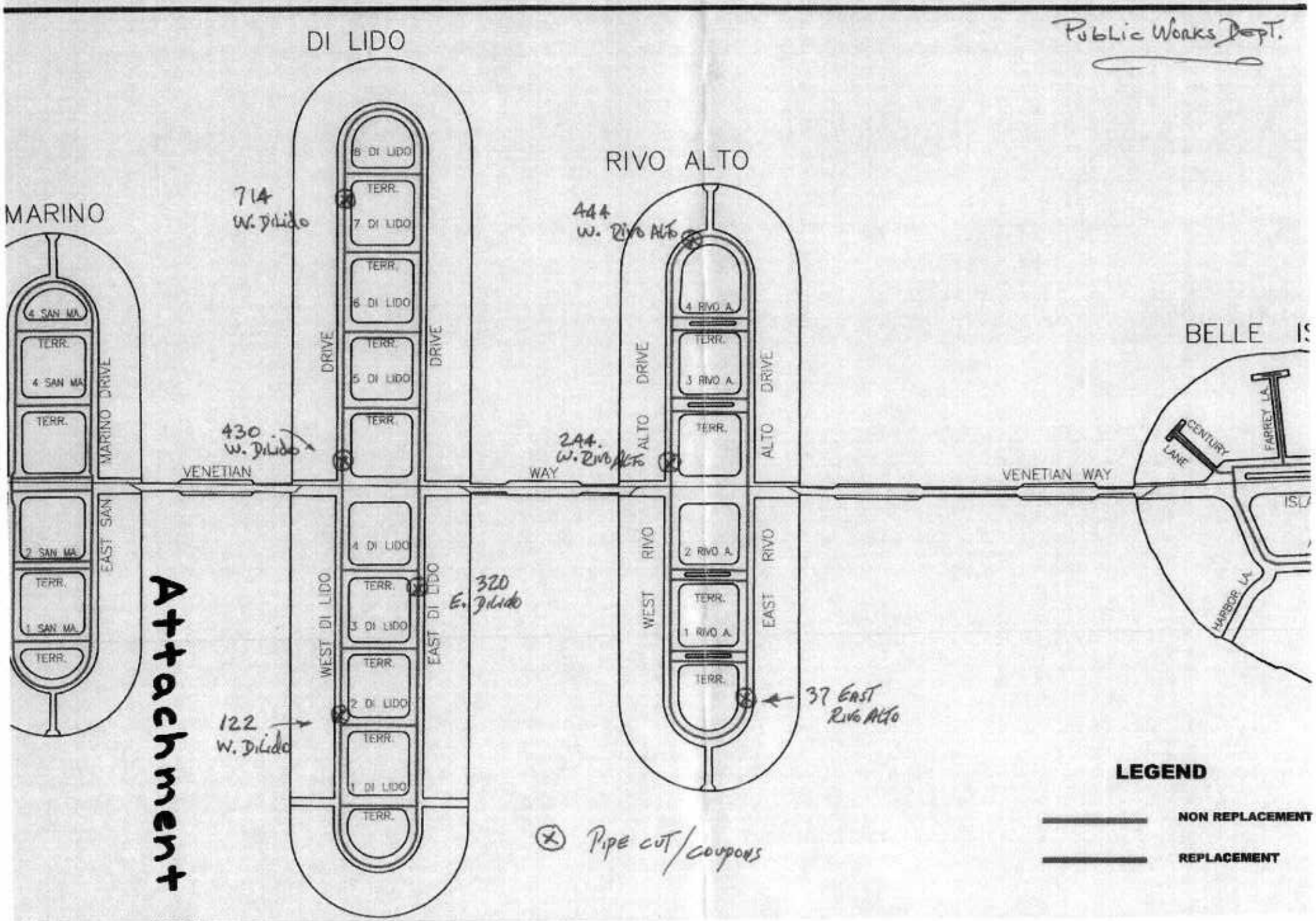
City of Miami Beach
Islands; Venetian, Star, Palm and Hibiscus Neighborhood
Proposed Water Line Improvements

BP13C - Venetian Islands Watermain Tabulation 6-1-09.xls

BP13C - Venetian Islands Watermain Priorities								
		Proposed Watermain Replacement (LF)				Estimated Construction Costs		
Island	Total Watermain In Project Area	CIP lines (P1 ands P2)	P3.1 lines	P3.2 lines	Total Proposed Watermain Replacements	@ $50 / LF	@ $100 / LF	@ $150 / LF
San Marino	4,770	2,000	0	2,770	4,770	$238,500	$477,000	$715,500
Di Lido	8,600	700	974	0	1,674	$83,700	$167,400	$251,100
Rivo Alto	4,600	1,609	0	0	1,609	$80,450	$160,900	$241,350
Total	**17,970**	**4,309**	**974**	**2,770**	**8,053**	$402,650	$805,300	$1,207,950

ATTACHMENT "A"

CITY OF MIAMI BEACH
WATER MAIN INFORMATION FOR VENETIAN ISLANDS



Attachment B