Agenda Item #:_____

Staff Report
City of Manhattan Beach

TO: Parking and Public Improvements Commission

FROM: Richard Thompson, Director of Community Development
Jim Arndt, Director of Public Works
Steve Finton, City Engineer

DATE: August 27, 2009

SUBJECT: Review of Water and Sewer Capital Improvement Needs

RECOMMENDATION:

No Commission action is needed. This report is for information only and is provided to give the Commission an update to the Infrastructure study undertaken by the City.

FISCAL IMPLICATION:

There are no fiscal implications associated with the recommended action, although City Council may construct some improvements that would impact water and sewer rates.

BACKGROUND:

On July 28, 2009, AKM Consulting Engineers and City staff made a presentation to City Council regarding the condition of the City's water and sewer systems (see 7/28/09 City Council staff report – Attachment A and PowerPoint presentation presented by AKM Consulting Engineers – Attachment B)

DISCUSSION:

The report indicates capital improvement needs in excess of $165,000,000 for both the water and sewer systems. The plan presented to City Council recommended annual capital investments in the amount of $4,000,000 and $2,500,000 over a twenty-year period for the water and sewer systems respectively. City Council directed staff to consider a more aggressive level of capital investment for water to address the aging system. Staff plans to respond back to Council with a more aggressive plan at their meeting of September 1, 2009.

Attachments: A. 7/28/09 City Council staff report
B. 7/28/09 PowerPoint presentation presented by AKM Consulting Engineers

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Attachment A

07/28/09-1.

Agenda Item #:

Staff Report
City of Manhattan Beach

TO: Honorable Mayor Cohen and Members of the City Council

THROUGH: Geoff Dolan, City Manager

FROM: Jim Arndt, Director of Public Works SF for JA
Steve Finton, City Engineer SF

DATE: July 28, 2009

SUBJECT: Review of Water and Sewer Capital Improvement Needs

RECOMMENDATION:
Staff recommends that the City Council hear a presentation by staff and AKM Consulting Engineers regarding the status of the water and sewer system master plan development.

FISCAL IMPLICATION:
The purpose of the master plans is to identify capital needs for the water and sewer systems. The extent of future fiscal impact will depend on the outcome of the water and sewer rate study and the extent of infrastructure funding allocated by City Council.

BACKGROUND:

The City's last water and sewer system master plans were completed in 1994 and 1995 respectively. Those plans were used to guide development of the City's water and sewer infrastructure management plans. Utility master plans require updating from time to time to account for further system deterioration, regulatory mandates and environmental changes. The water master plan must address the current water supply crisis and apparent accelerated deterioration of cast iron water mains. The sewer master plan must be updated to comply with condition assessment and capital improvement requirements of the State Waste Discharge Requirements (WDR) regulations.

On August 5, 2008, City Council awarded a professional services contract in the amount of $1,277,340 (including $423,400 for sewer cleaning and inspection) to AKM Consulting Engineers (AKM) to complete a master plan for the City's water and sewer systems. The purpose of the master plans was to determine the overall condition of the systems, identify any operational deficiencies and to determine the costs of needed improvements. The water master plan includes the additional task of identifying actions to be taken to assure an uninterruptible water supply for the foreseeable future. The general scope of the contract with AKM included the following:

Water System Master Plan:

The City's water system serves a population of 33,800 through 13,500 water meter accounts. Water consumption averages 7000 acre-feet per year or an average flow of 4,350 gallons per minute.

The water system consists of 114 miles of water mains, two wells, four booster pump stations, and three reservoirs providing 9.8 million gallons of water storage. The estimated replacement value of the system is approximately $250,000,000.

Water Supply:

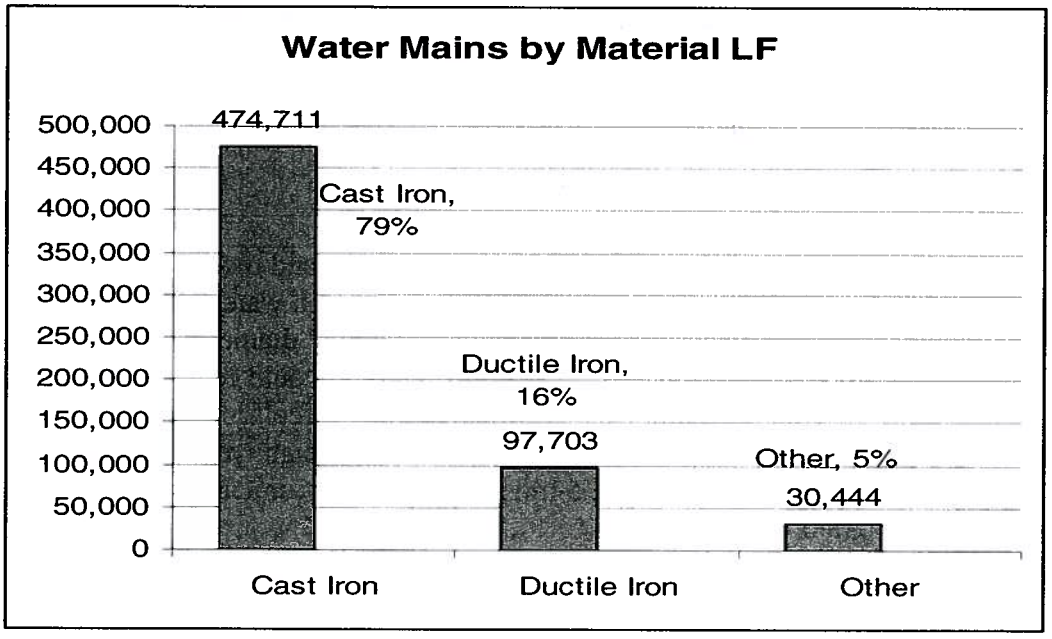
Three water sources are available to the City: 1) imported water, 2) groundwater, and, 3) Recycled Water. In 2008, the City purchased 5,278 acre-feet of imported potable water. The City owns two wells and has adjudicated rights to pump a maximum of 1,131.2 acre-feet annually. Recycled water accounts for approximately 4% of total use or approximately 260 acre-feet.

Condition Assessment

Water Mains

The condition of water mains cannot be determined through actual inspection as is the case for sewer mains. Condition must be assessed through pipe age, material and break history.

Material - Virtually all water mains in Manhattan Beach are constructed of ferrous metal. Older pipes are generally unlined cast iron pipes and the newer lines are typically lined ductile iron pipes. The cast iron pipes are more brittle and corrode more readily due to the lack of inner lining. Below is a chart showing the inventory of the different pipe materials. The majority of water mains (79%) are made of cast iron.



Fire Hydrant Additions -

AKM recommends installing additional fire hydrants to achieve a 450' maximum spacing. This would decrease the distance a fire truck would need to drag hose and facilitate fire emergency response. Hydrant spacing deficiencies have been located by AKM at 440 locations. AKM estimates the cost to install 440 new hydrants at **$3,361,500**. It is recommended that 18 additional hydrants be installed annually through 2020 at the cost of $121,500 per year and then increasing to 30 hydrants per year through 2030 at the cost of $202,500 per year.

Pump Stations Improvements -

The City maintains 4 booster pump stations as follows:

- Peck Reservoir Pump Station
- Block 35 Pump Station
- 2nd Street Pump Station
- Larsson Street Pump Station

AKM indicates that the Peck Reservoir and Block 35 pump stations appear to be in satisfactory condition and won't require improvement within the next twenty years. Problems encountered at the 2nd Street Pump Station have been diagnosed by AKM and replacement of the engine and control systems is recommended. Installation of vibration isolators are also recommended to mitigate the impact of the station on the neighborhood. The estimated cost of these improvements is **$405,000**.

Larsson Street Pump Station requires significant rehabilitation and capacity enhancement. The vault structure is deteriorated and maintenance space in the vault in insufficient. Additionally, all three pumps at the station must operate to provide peak domestic service. When pumps at the station are taken out of service for maintenance, the natural gas engine pump at 2nd Street must run to provide supplemental pressure to the high pressure zone. AKM recommends replacement of the station with a larger vault and with pumps of adequate capacity at the estimated cost of **$2,025,000**.

Wells -

The City currently operates two wells in the City of Redondo Beach as follows:

- Well 11A, Manhattan Beach Boulevard at Green Lane
- Well 15, Manhattan Beach Boulevard at Vail Avenue

It is recommended that an additional well be developed at the City's old well site No. 13 at the southeast corner of Aviation Boulevard and 6th Street at the cost of **$4,320,000**. This property is owned by the City and is available for well use. This site was previously used for a City well but was removed from service in the late 70s due to brackish water and other operational issues. It is believed that the salt plume has migrated away from the site and that the site could again be viable for well use. Doing so would decrease the City's dependency on imported water and would provide an injection site for in-ground water storage in the future.

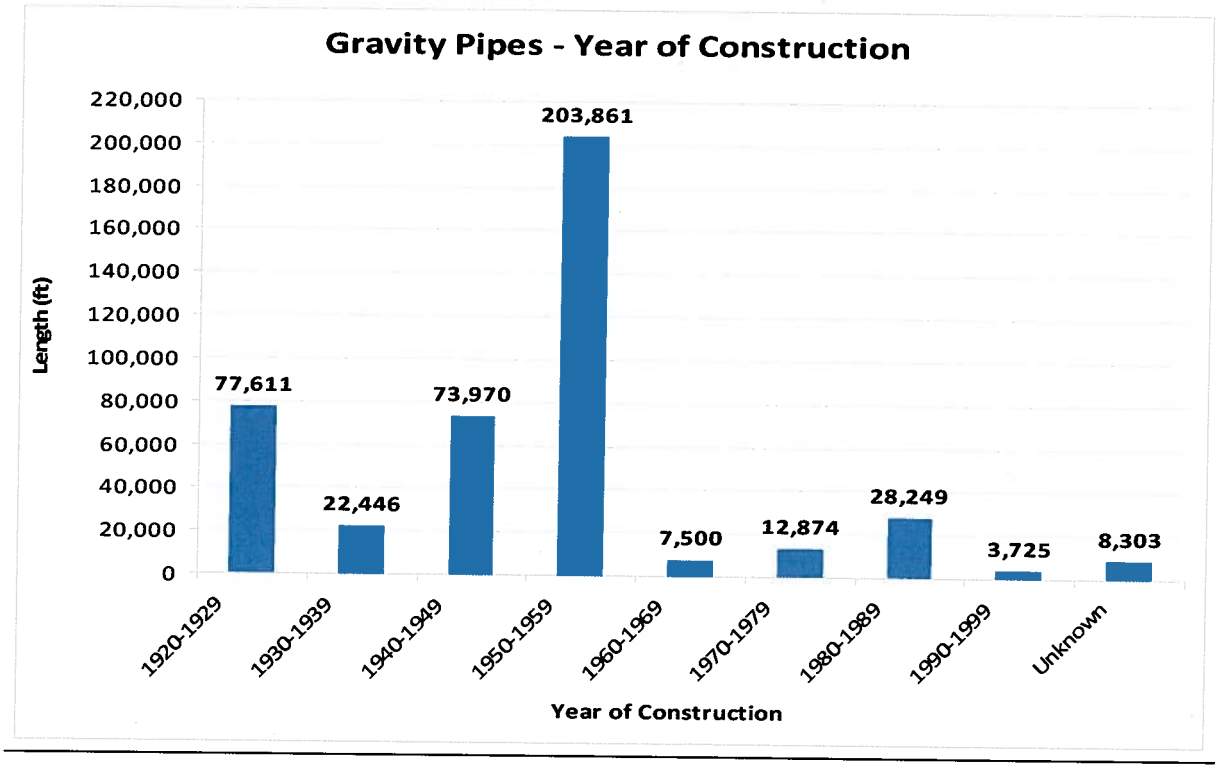
Sewer System Master Plan

The City's wastewater collection system serves approximately 12,000 customers within a 3.9 square mile area. Wastewater is collected in the City's collection system and conveyed to trunk sewers operated by the County Sanitation Districts of Los Angeles County (LACSD). Wastewater is ultimately treated at LACSD's Joint Water Pollution Control Plant in the City of Carson.

The sewer system consists of 83 miles of gravity sewer mains, 2,060 manholes, and 8 pump stations with 5,120 feet of sewer force mains.

Condition Assessment

Virtually all sewer mains in the City's system are made of vitrified clay pipe (VCP). VCP is very long lasting and can last indefinitely if installed correctly, if the surrounding soils are stable and if inadvertent contractor damage is avoided. Over the years, shifting soils and damage caused while installing service laterals take their toll on the system. Cracked pipe and offset pipe are common place in older systems. The Manhattan Beach system is a mature system with 86% of mains older than 50 years as indicated on the chart below.



Pump Station Upgrades -

The City owns and maintains 8 pump stations as follows:

Large System Stations	Original Construction	Last retrofitted
Bell Pump Station	1938	1997
Meadows Pump Station	1953	1997
Pacific Pump Station	1953	1997
Palm Pump Station	1953	1997
Poinsettia Pump Station	1949	1997
Voorhees Pump Station	1953	1997
City Building Stations		
Pier Pump Station	1935	1992
Civic Center Pump Station	1973	NA

The system stations are equipped with a sewage collection and storage well (wet well) and an adjacent well housing pumps and controls. Sewage is pumped from the stations through force mains to the nearest gravity system.

The system stations were rehabilitated in 1997 and the Pier Station was reconstructed during the Pier improvement in 1992. The City Hall station is a smaller pump facility and is in satisfactory condition.

The improvements recommended by AKM are related to preventing sewer overflows by providing additional sewage storage and increased operational redundancy. Increasing storage capacity would provide staff additional time to respond to a station failure. Construction of a redundant sewer force main at each system station will allow the stations to operate in the event that one of the force mains breaks or is damaged. The City can control inflows from City building stations; therefore, redundant force mains would not be required there. Below is a summary of pump station needs as recommended by AKM:

Pump Station Needs	Estimated Cost Through 2021	Comment
1 Pier Pump Station		
Replace forcemain	$486,000	The existing force main is attached to the pier and is deteriorated.
2 Poinsettia Pump Station		
Replace pump station	$2,700,000	The existing station wells are poorly designed and additional capacity is needed.
Install second forcemain	$67,000	
3 Pacific Pump Station		
Upgrade pump station	$540,000	Larger pumping system required to pump peak wet-weather flows
Install second forcemain	$396,900	
Construct emergency storage	$1,134,000	Additional storage required to store ½ hour peak wet-weather flow.

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Attachment A – Capital Improvement Needs - Water System

City of Manhattan Beach
Water Capital Improvement Program
2010-2021

CIP No.	Project Description	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Pipe replacement program (annual- small diameter cast iron pipe, 1.5 miles/yr through 2021, 2.5 miles/yr thereafter)	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000
2	New Fire Hydrants (18 per year through 2021, 30 per year thereafter)	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500
3	Second Street Booster Pump Station-Install Solid State Controller	$270,000										
4	Second Street Booster Pump Station-Install engine vibration isolators	$135,000										
5	Replace or parallel well collection line from Well 15 to Well 11A	$1,350,800										
6	Replace Larsson Pump Station		$2,025,000									
7	Construct Well at Aviation and 6th Street (Well Site 13)			$4,320,000								
8	Construct well collection line from Well 11A to Block 35				$3,037,500							
9	Construct well collection line on Aviation from Well Site 13 to 6th St				$324,000							
10	Replace Block 35 Reservoir (4 mg)								$8,100,000			
11	Replace Peck Reservoir (4 mg)											$8,100,000
Total		$5,337,300	$5,596,500	$7,891,500	$6,933,000	$3,571,500	$3,571,500	$3,571,500	$11,671,500	$3,571,500	$3,571,500	$11,671,500

Attachment C – Sample sewer manhole inspection report

Table 4
Manhole Condition Inspection Summary

DVD No.	Session ID	Street	Manhole	Inspection Date	Surface Condition	Manhole Cover	Frame	Cone	Barrel / Wall	Rungs	Bench	Channel	Debris	Debris Depth (in)	Grease	Vermin	Odor	Priority Score	Condition Ranking	Comment	Recommendation	Project Cost ($)
4	25	Highland Ave	19-015	1/12/09	Pavement - Concrete Collar	Good	Good	Failing	Failing	Good	Good	Good	No	0	No	No	No	20	1	Fractures in cone and barrel. Fracture seen in street pavement surrounding manhole cover.	Replace	30,000
1	28	1st St	01-080	11/21/08	Pavement - Concrete Collar	Good	Good	Poor	Poor	Failing	Poor	Poor	No	0	No	No	No	23	2	Missing mortar	Repair mortar	6,000
2	51	Curtis Ave	05-052	12/2/08	Pavement - Concrete Collar	Broken	Good	Good	Good	Poor	Poor	Poor	No	0	No	No	No	22	3	Broken manhole cover. Corrosion at bench and channel.	Replace manhole cover and line	13,500
1	90	Gates Ave	01-072	11/20/08	Pavement - Concrete Collar	Good	Good	Poor	Fair	Poor	Poor	Poor	No	0	Yes	No	Yes	20	4	Corrosion at bench and channel.	Line manhole	10,000
1	36	2nd St	01-086	11/24/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	Yes	2	No	No	No	13	5	Corrosion at bench and channel.	Line manhole	10,000
3	74	Duncan Ave	10-039	12/19/08	Pavement - Concrete Collar	Good	Good	Good	Good	Failing	Poor	Poor	No	0	No	No	No	13	6	Corrosion at bench and channel.	Line manhole	10,000
2	109	18th St	06-244	12/5/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	0	No	No	No	12	7	Corrosion at bench and channel.	Line manhole	10,000
2	23	9th St	04-054	12/1/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	0	No	No	No	12	8	Corrosion at bench and channel.	Line manhole	10,000
2	50	Meadows Ave	05-023	12/2/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	0	No	No	No	12	9	Corrosion at bench and channel. Not a smooth transition.	Line manhole	10,000
2	120	14th St	06-191	12/8/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	0	No	No	No	12	10	Corrosion at bench and channel.	Line manhole	10,000
4	291	Cedar Way	25-012	1/22/09	Pavement - Concrete Collar	Good	Good	Poor	Poor	Poor	Good	Good	No	0	No	No	No	12	11	Corrosion and cracking in cone and wall	Line manhole	10,000
4	293	Village Dr	25-025	1/22/09	Pavement - Concrete Collar	Good	Good	Poor	Poor	Poor	Good	Good	No	0	No	No	No	12	12	Corrosion in cone and barrel.	Line manhole	10,000
3	46	11th St	09-028	12/18/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	0	No	Yes	No	11	13	Corrosion at bench and channel.	Line manhole	10,000
2	53	Rowell Ave	05-055	12/2/08	Pavement - Concrete Collar	Broken	Good	Good	Good	Fair	Good	Good	No	0	No	No	No	11	14	Broken manhole cover.	Replace manhole cover	3,500
4	181	Flournoy Rd	17-057	1/8/09	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Poor	Poor	No	0	No	No	No	11	15	Corrosion at bench and channel.	Line manhole	10,000
2	80	14th St	06-050	12/4/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	0	No	No	No	10	16	Corrosion at bench and channel.	Line manhole	10,000
2	131	14th St	06-077	12/8/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	0	No	No	No	10	17	Corrosion at bench and channel.	Line manhole	10,000
4	178	31st St	17-053	1/8/09	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	0	No	No	No	10	18	Corrosion at channel.	Line manhole	10,000
2	47	Tennyson St	06-020	12/2/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Fair	Poor	No	0	No	No	No	8	19	Corrosion at channel.	Line manhole	10,000
2	60	Voorhees Ave	05-005	12/2/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Fair	Poor	No	0	No	No	No	8	20	Corrosion at channel.	Line manhole	10,000
4	284	The Strand	14-084	1/21/09	Pavement - Concrete Collar	Cracked	Good	Good	Good	N/A	Good	Good	No	0	No	No	No	8	21	Cracked manhole cover.	Replace manhole cover	3,500
3	99	Manhattan Ave	11-116A	12/22/08	Pavement - Concrete Collar	Good	Good	Poor	Good	Poor	Good	Good	No	0	No	No	No	7	22	Cracks in cone.	Line manhole	10,000
2	119	19th St	06-030	12/5/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Fair	Poor	No	0	No	No	No	6	23	Corrosion at channel.	Line manhole	10,000
4	205	Blanche Rd	17-040	1/8/09	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Good	Poor	No	0	No	No	No	6	24	Corrosion at channel.	Line manhole	10,000
1	26	1st St	01-081	11/21/08	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Good	Poor	No	0	No	No	No	6	25	Corrosion at channel.	Line manhole	10,000
4	143	Marine Ave	15-053	1/7/09	Pavement - Concrete Collar	Good	Good	Poor	Good	Fair	Good	Good	No	0	No	No	No	6	26	Missing mortar and possibly bricks.	Repair mortar	6,000
3	100	Manhattan Ave	11-117	12/22/08	Pavement - Concrete Collar	Good	Good	Poor	Good	Good	Good	Good	No	0	No	No	No	5	27	Cracks in cone.	Line manhole	10,000
1	88	Gates Ave	01-073	11/20/08	Pavement - Concrete Collar	Good	Fair	Fair	Fair	Poor	Good	Good	No	0	No	No	No	5	28			
1	29	Gates Ave	01-078	11/21/08	Pavement - Concrete Collar	Good	Good	Fair	Fair	Failing	Good	Good	No	0	No	No	No	5	29			
1	53	Marine Ave	01-234	11/24/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Fair	Fair	No	0	No	Yes	No	5	30			
1	17	Peck Ave	03-072	11/25/08	Pavement - Concrete Collar	Good	Good	Fair	Fair	Failing	Good	Good	No	0	No	No	No	5	31			
3	107	The Strand	11-135A	12/22/08	Pavement - Concrete Collar	Good	Good	Fair	Good	Failing	Good	Good	Yes	1	No	No	No	5	32			
1	85	Nelson Ave	01-027	11/20/08	Pavement - Concrete Collar	Good	Fair	Good	Fair	Fair	Good	Fair	No	0	No	No	No	4	33			
1	84	Nelson Ave	01-028	11/20/08	Pavement - Concrete Collar	Good	Fair	Good	Fair	Fair	Good	Fair	No	0	No	No	No	4	34			
1	83	Nelson Ave	01-029	11/20/08	Pavement - Concrete Collar	Good	Fair	Good	Fair	Fair	Good	Fair	No	0	No	No	No	4	35			
1	82	Nelson Ave	01-030	11/20/08	Pavement - Concrete Collar	Good	Fair	Good	Fair	Fair	Good	Fair	No	0	No	No	No	4	36			
1	30	2nd St	01-069	11/21/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Fair	Fair	No	0	No	No	No	4	37			
2	33	Gates Ave	04-002	12/2/08	Pavement - Concrete Collar	Good	Good	Fair	Fair	Poor	Good	Good	No	0	No	No	No	4	38			
3	92	9th St	11-094	12/22/08	Pavement - Concrete Collar	Good	Good	Fair	Good	Failing	Good	Good	No	0	No	No	No	4	39			
3	108	Ocean Dr	11-129	12/22/08	Pavement - Concrete Collar	Good	Good	Good	Good	Failing	Good	Fair	No	0	No	No	No	4	40			
4	190	Blanche Rd	17-066	1/8/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Failing	Good	Good	No	0	No	No	No	4	41			
4	234	38th Pl	18-051	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	42			
4	229	Ocean Dr	18-053	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	43			
4	235	38th Pl	23-003	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	44			
4	230	The Strand	23-022	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	45			
4	231	The Strand	23-025	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	46			
4	233	The Strand	23-046	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	47			
4	232	The Strand	23-050	1/19/09	Pavement - Concrete Collar	Good	Good	Fair	Good	Poor	Good	Good	No	0	No	Yes	No	4	48			
4	292	Carlotta Way	25-014	1/22/09	Pavement - Concrete Collar	Good	Good	Fair	Fair	Poor	Good	Good	No	0	No	No	No	4	49			
1	27	1st St	01-058	11/21/08	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Fair	Fair	No	0	No	No	No	3	50			
1	34	2nd St	01-082	11/24/08	Pavement - Concrete Collar	Good	Good	Good	Good	Failing	Good	Good	No	0	No	No	No	3	51			
1	37	2nd St	01-087	11/24/08	Pavement - Concrete Collar	Good	Good	Good	Good	Failing	Good	Good	No	0	No	No	No	3	52			
1	44	9th St	01-166	11/24/08	Pavement - Concrete Collar	Good	Good	Good	Good	Failing	Good	Good	No	0	No	No	No	3	53			

Agenda Item #:_____

Attachment B

CITY OF MANHATTAN BEACH

Water and Wastewater Capital Improvement Programs

July 28, 2009

Water

Background

- Manhattan Beach provides potable and recycled water to 13,500 customers
- Service area population is 33,800
- Average annual demand is 7,000 acre feet (6.3 million gallons per day or 4,350 gallons per minute)

Water Supply

- Manhattan Beach's water demand is met by potable imported water, groundwater, and recycled water
- Potable imported water is supplied by MWD of Southern California through the West Basin Municipal Water District
- The City purchased 5,278 acre feet of potable water in 2008
- The City has adjudicated rights to 1,131.2 acre feet of water in the West Coast Groundwater Basin

Water Supply

- The City has two wells in Redondo Beach
- In 2008, the City pumped 953 acre feet of groundwater
- Because of high manganese levels, groundwater has to be blended with potable imported water prior to delivery into the system (2 parts groundwater to 1 part potable imported water)
- Existing recycled water demand of 260 acre feet per year is 4 percent of the total demand
- Recycled water is served through 27 meters

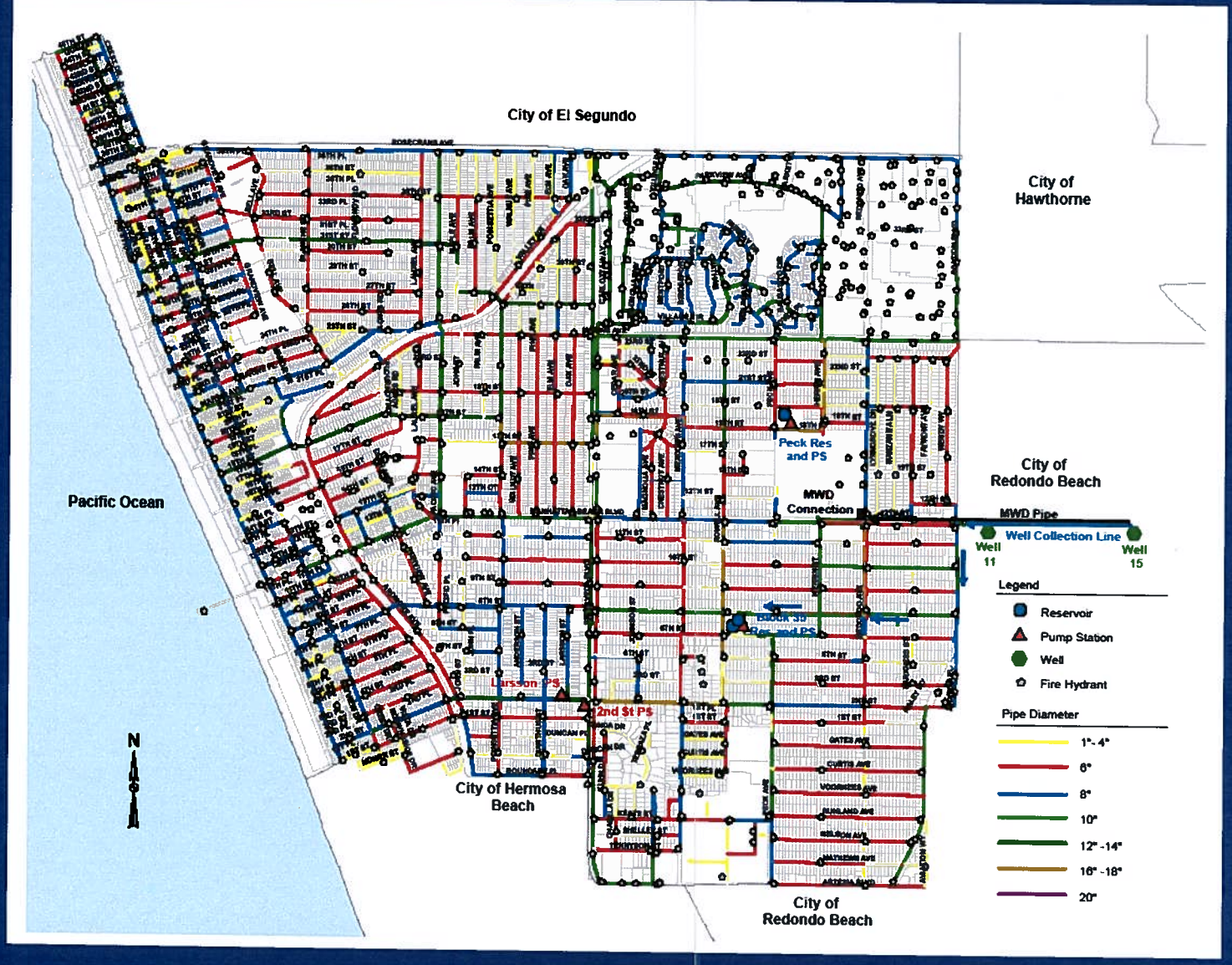
Water

Existing System

- **The existing water system consist of:**
  - ✓ Three storage reservoirs with a total constructed volume of 9.8 million gallons
  - ✓ Four booster pump stations
  - ✓ Two wells
  - ✓ 114 miles (602,000 feet) of pipe ranging in size from 1-inch to 20-inches in diameter
  - ✓ The estimated replacement value of the system is $250,000,000

Water

Existing System



Water

Master Plan

- **Master Plan Tasks**
  - ✓ Develop new Water Geographic Information System
    - ✓ Geo-referenced 1,100 intersection drawings
    - ✓ Geo-referenced 1,561 as-built drawings
  - ✓ Build hydraulic model of the system (geometry based on Water GIS)
  - ✓ Create diurnal water use curves for two zones based on SCADA information
  - ✓ Develop hydraulic model loads from existing water use records and diurnal curves
  - ✓ Install 15 pressure data loggers and collect SCADA information for calibrating the hydraulic model

Water

Master Plan

- **Master Plan Tasks**
  - ✓ Flow test 25 fire hydrants
  - ✓ Calibrate hydraulic model
  - ✓ Field inspect all water facilities – Wells, Reservoirs, Booster Pump Stations
  - ✓ Develop system evaluation criteria
  - ✓ Evaluate system based on criteria; hydraulic analysis results with average day, maximum day, and maximum day plus fire flows; and operational efficiency
  - ✓ Formulate a Capital Improvement Program
  - ✓ Prepare Master Plan report

Water Criteria

- **Source of Supply**
  - ✓ Maximum day demand system wide
  - ✓ Average day demand from local sources-Groundwater
- **Storage**
  - ✓ Average day demand in above ground storage
- **Pumping**
  - ✓ Maximum day demand plus fire flow, or peak hour demand with the largest pump out of service

Water Criteria

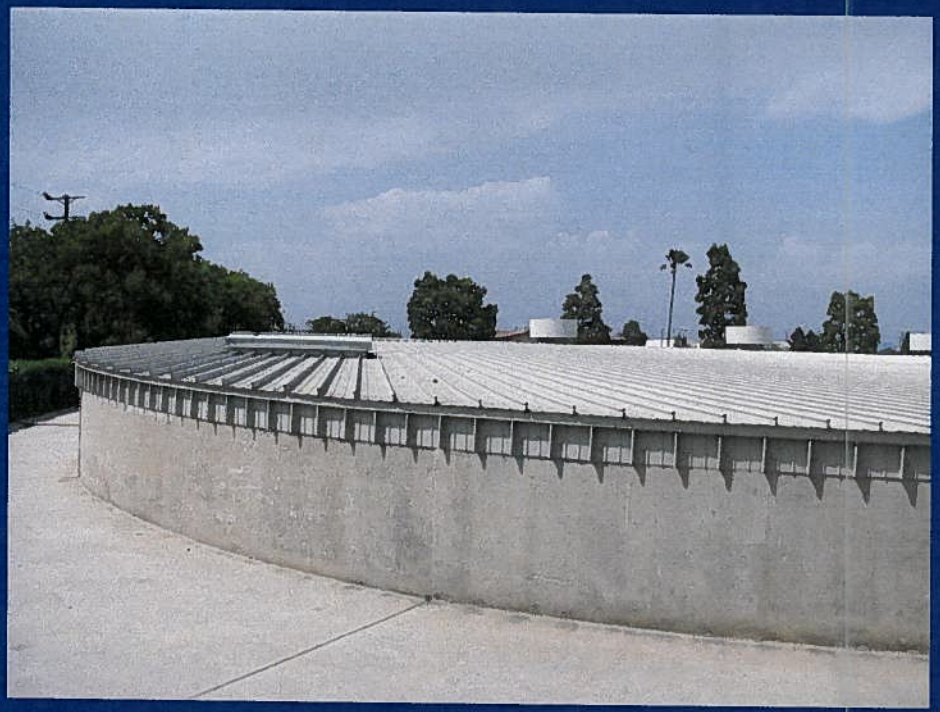
- **Pressure**
  - ✓ Minimum 50 pounds per square inch (psi) during average day demand
  - ✓ Minimum 40 psi during peak hour demand
  - ✓ Minimum 20 psi at the hydrant during maximum day demand plus fire flow
- **Fire Flow**
  - ✓ 2,000 gallons per minute (gpm) for single family residential
  - ✓ 3,000 gpm for multiple family residential
  - ✓ 3,500 gpm for schools
  - ✓ 4,000 gpm for Commercial/Industrial

Water Evaluation

- **Reservoirs**

  Peck Reservoir, completed in 1957, has a constructed volume of 7.5 million gallons.

  Its roof is in fair condition and is projected to reach the end of its useful life around 2020.

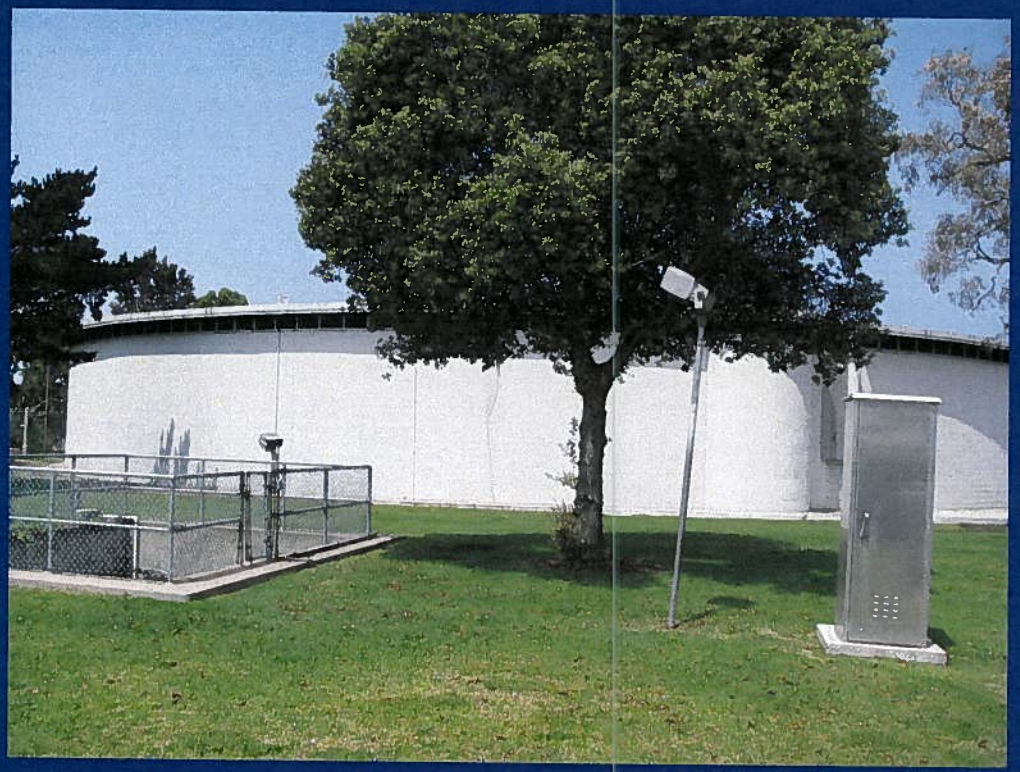


Water Evaluation

- **Reservoirs**

  Block 35 Ground Level Reservoir was constructed in 1948.

  Although its constructed volume is 2.0 million gallons, it is kept only half full due to leakage at higher levels.



Water

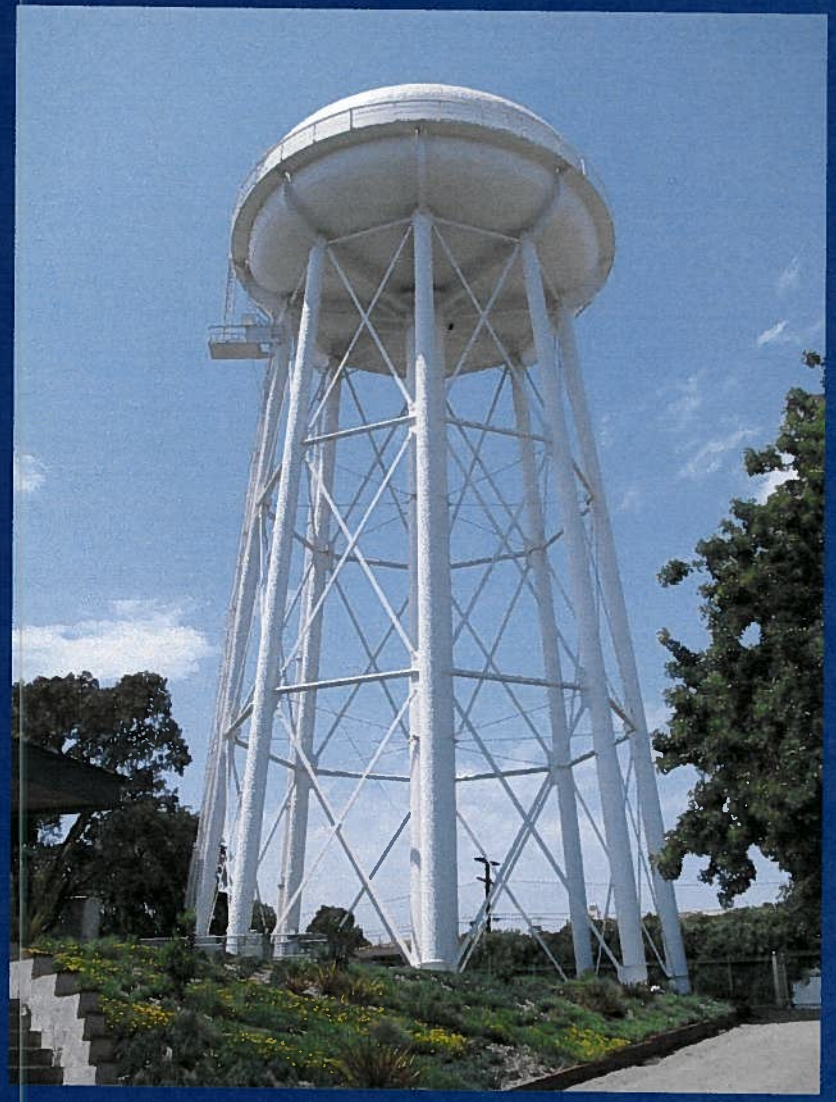
Evaluation

- **Reservoirs**

  Block 35 Elevated Reservoir has a constructed volume of 300,000 gallons.

  It was constructed in 1948 and was seismically rehabilitated in 2000.

  It is in good condition and is expected to last beyond the planning horizon of this master plan.



Water Evaluation

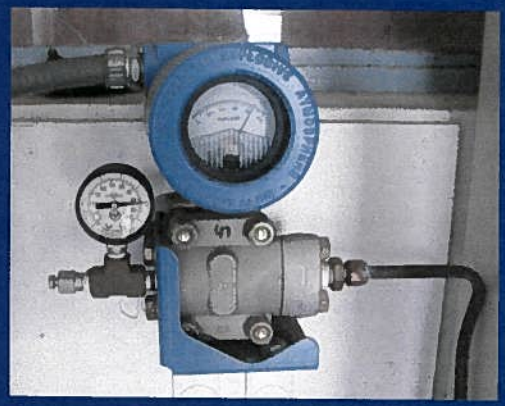
- **Booster Pump Stations**

  Block 35 Pump Station was upgraded in 2000 and is in good condition.

Water Evaluation

- **Booster Pump Stations**

  Peck Pump Station was also upgraded in 2000 and is in good condition.

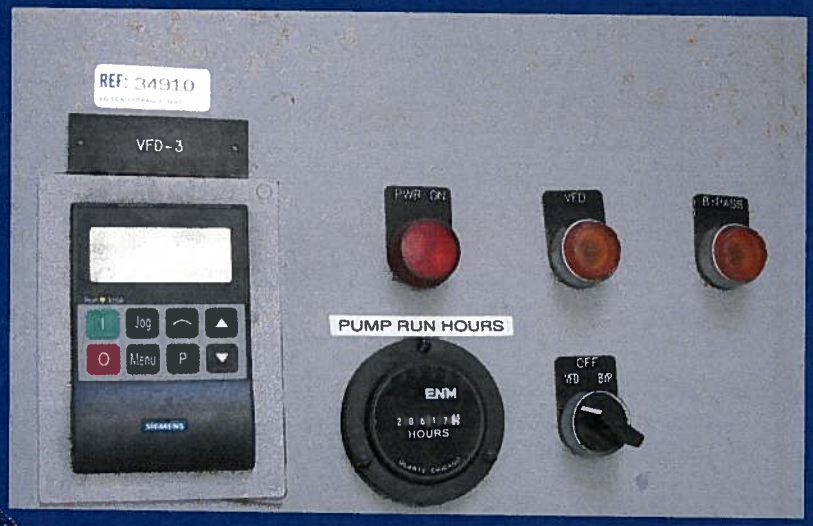


Water

Evaluation

- **Booster Pump Stations**

  Larsson Pump Station mechanical and electrical equipment was replaced in 2000, but the structure is in poor condition.



Water Evaluation

- **Booster Pump Stations**

  Second Street Pump Station was constructed in 1977 and is in fair condition. The engine is old, and spare parts are hard to find

  The pump starts before the third pump at Larsson Pump Station starts, causing frequent vibration in the area.

  Pump controls need to be upgraded to eliminate frequent pump starts. Engine should be replaced and vibration isolators should be installed.

Water Evaluation

- **Wells**

  Well 11A was drilled in 1998 and equipped in 2000.

  It is in good condition.

  It has a capacity of 2,300 gallons per minute.

Water

Evaluation

- **Wells**

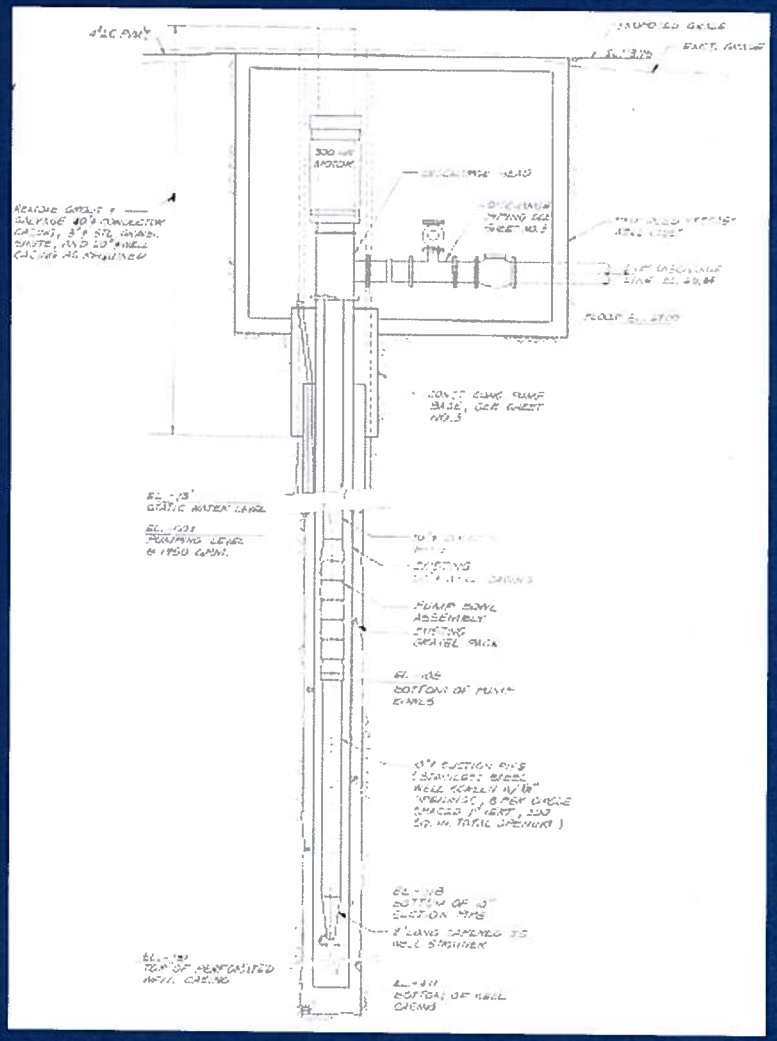
Well 15 was constructed in 1978.

The electrical equipment was upgraded in 2000.

The original capacity of 1,600 gpm has declined to about 500 gpm.

Its mechanical equipment needs to be replaced.

Its discharge pipe, constructed in 1979, is too small to for Well 15 to operate simultaneously with Well 11A.



Water Evaluation

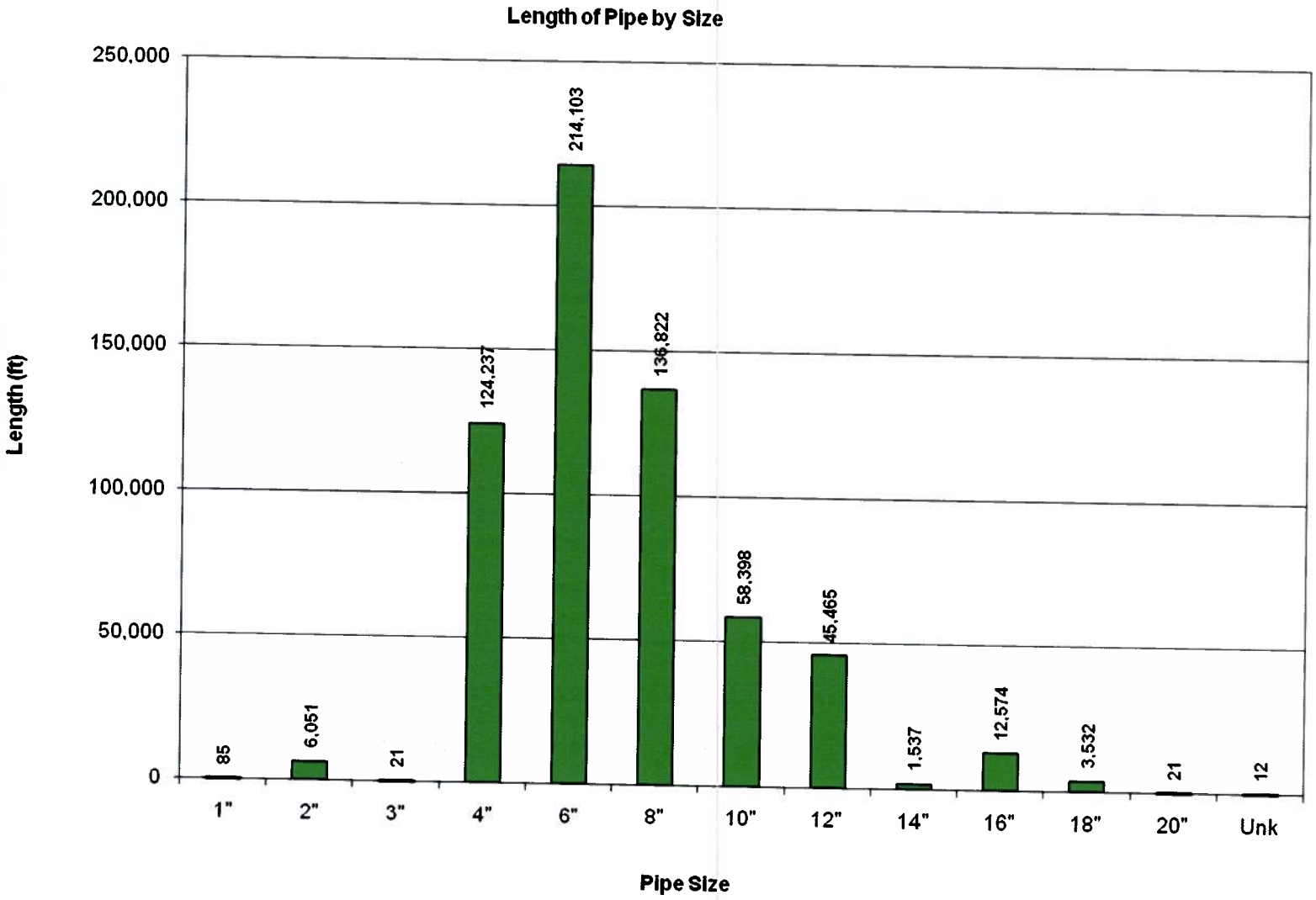
- **Transmission and Distribution System**
  - ✓ Constructed between 1920s and the present
  - ✓ The system includes nearly 220,000 feet of pipe older than 60 years
  - ✓ Over 79% of the system is made up of unlined cast iron pipe
  - ✓ 22% of the pipes are 4-inch and smaller

Water Evaluation

- **Transmission and Distribution System**
  - ✓ Fire hydrant spacing does not meet current criteria
  - ✓ Fire flow tests conducted showed deficiencies in over 40 percent of the hydrants
  - ✓ Fire hydrant tests conducted in 2009 showed a 10 % or more decrease in flows at most of the hydrants since 2003
  - ✓ Up to 10 pipe breaks per year occurred since 2006

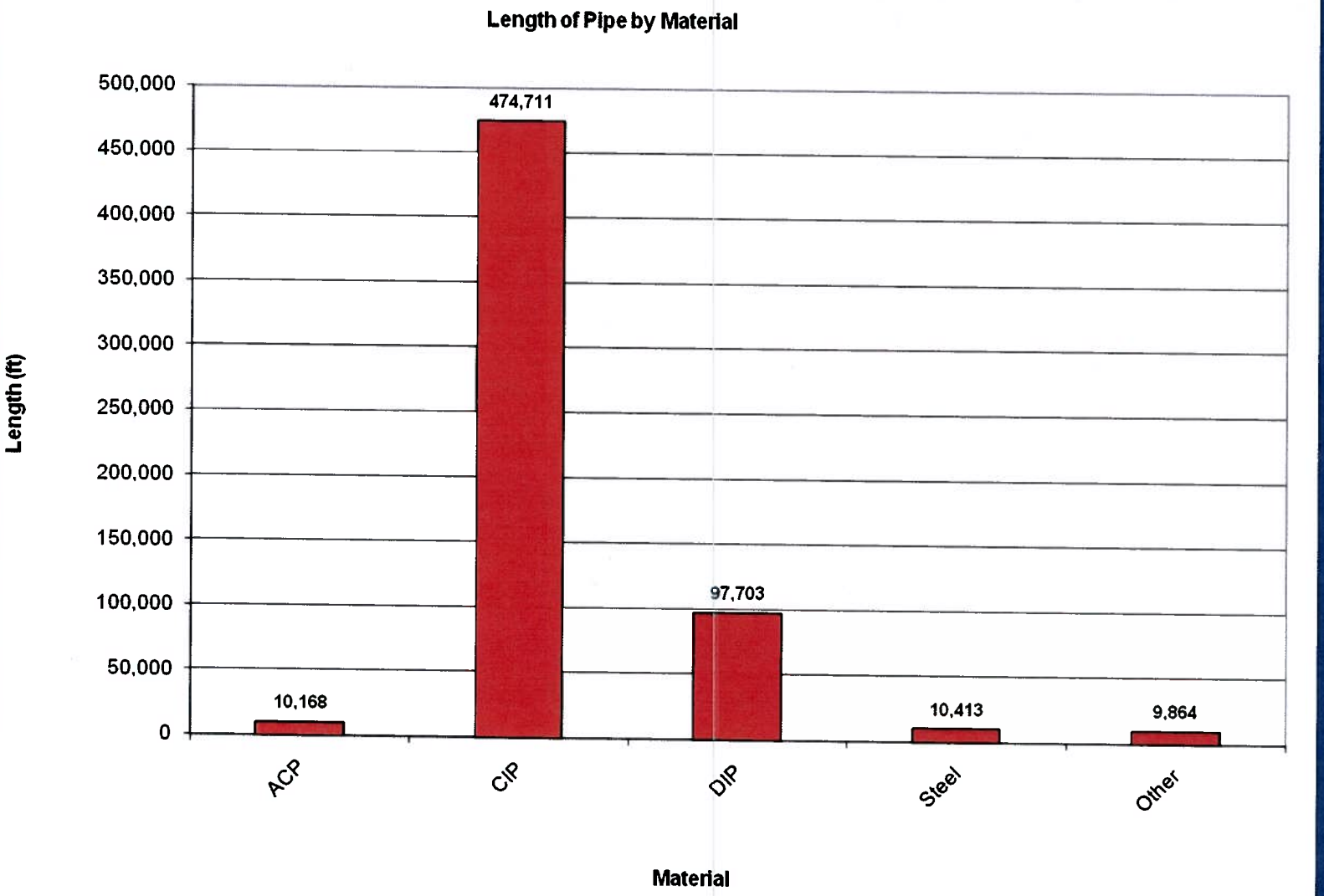
Water

Pipe Size



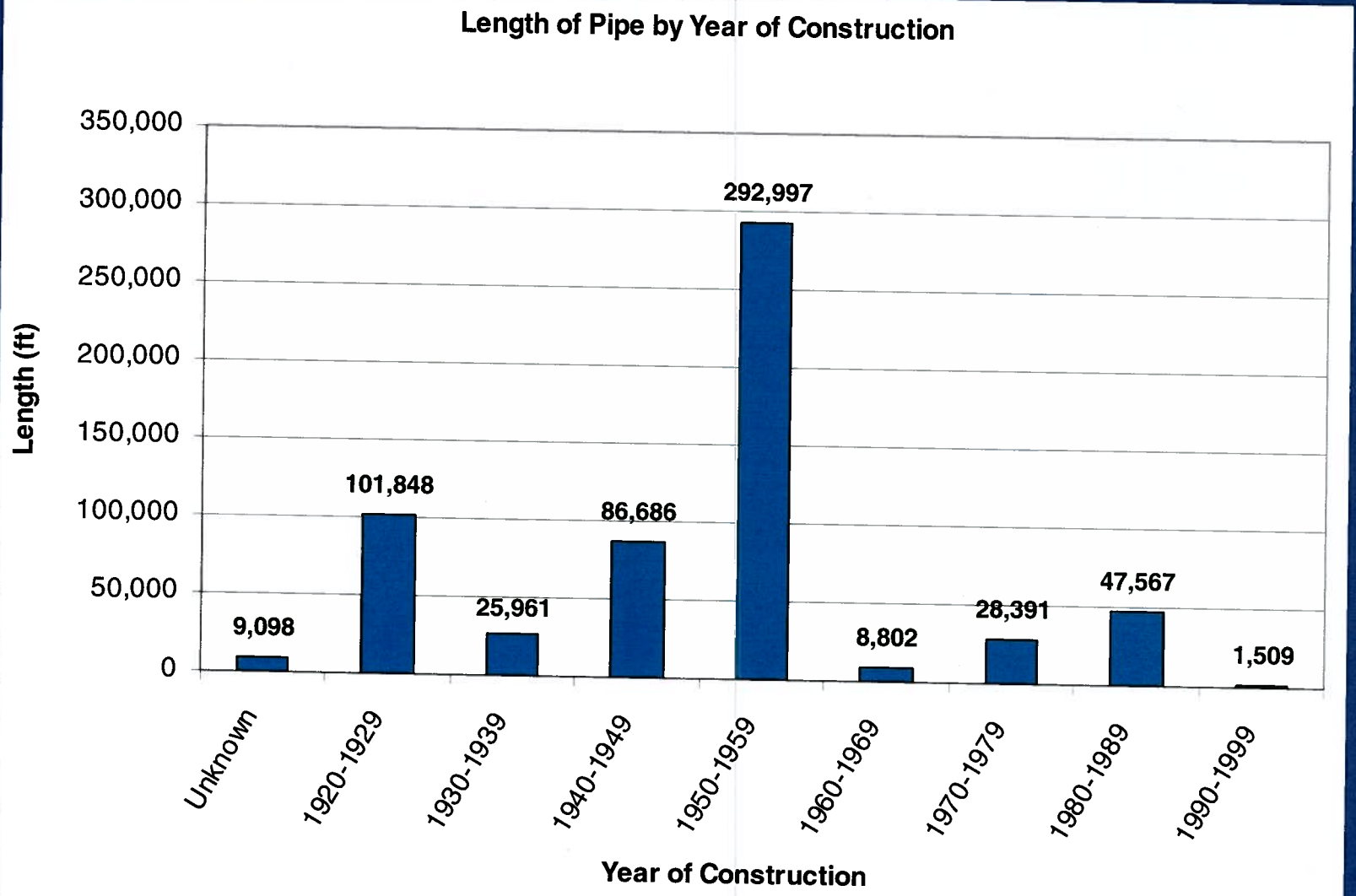
Water

Pipe Material



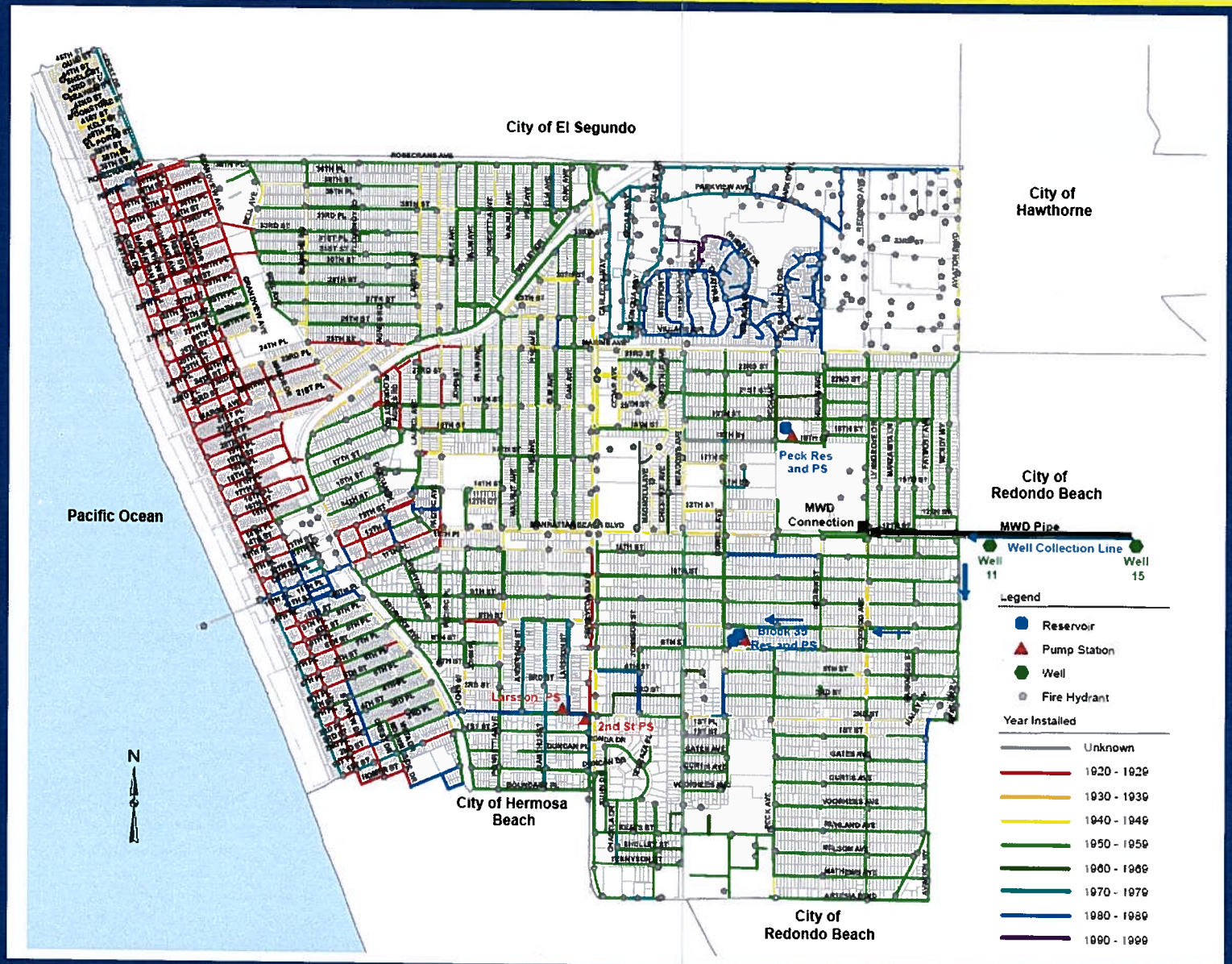
Water

Year of Construction



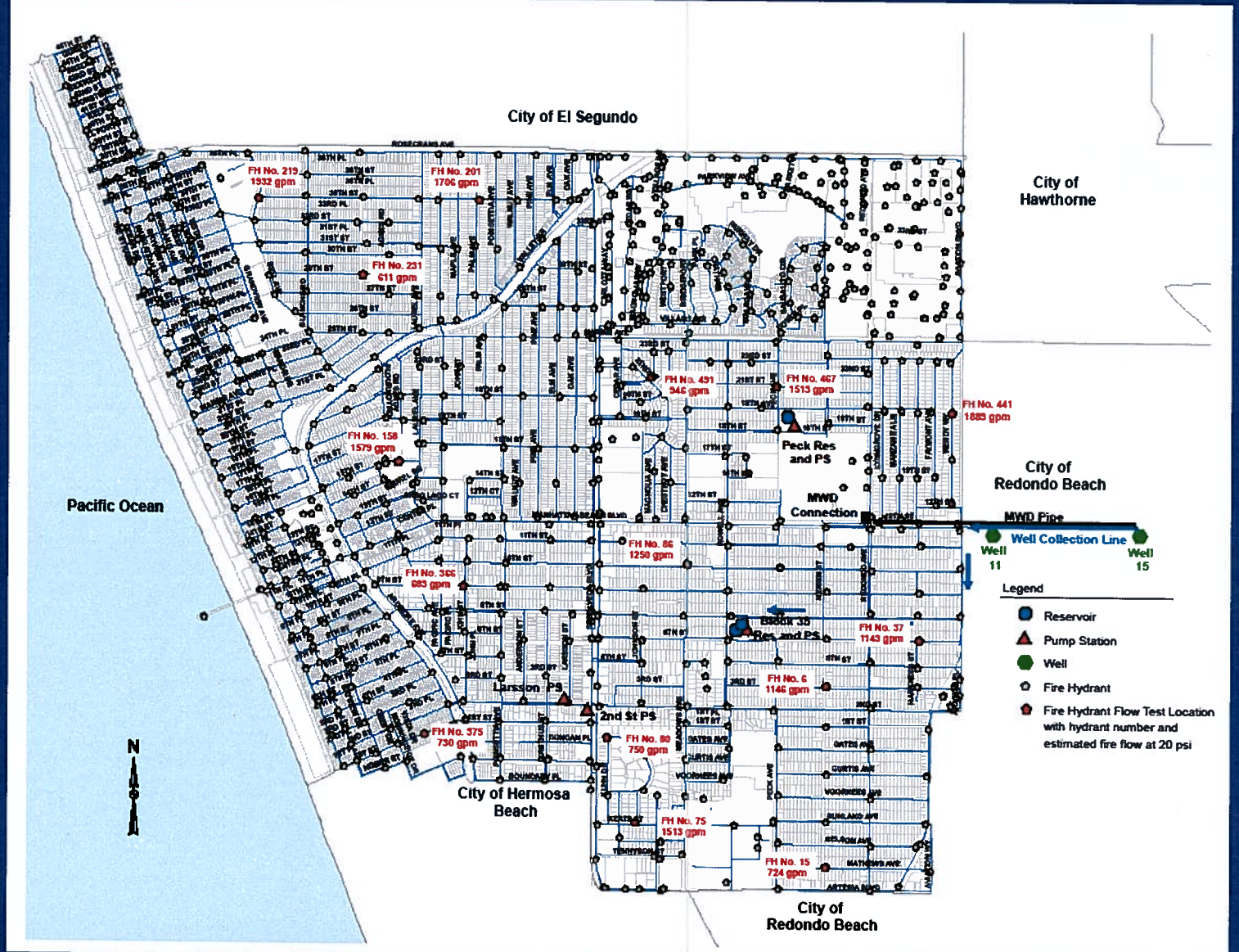
Water

Year Installed



Water

Fire Hydrant Flow Tests



Water

Fire Hydrant Flow Tests

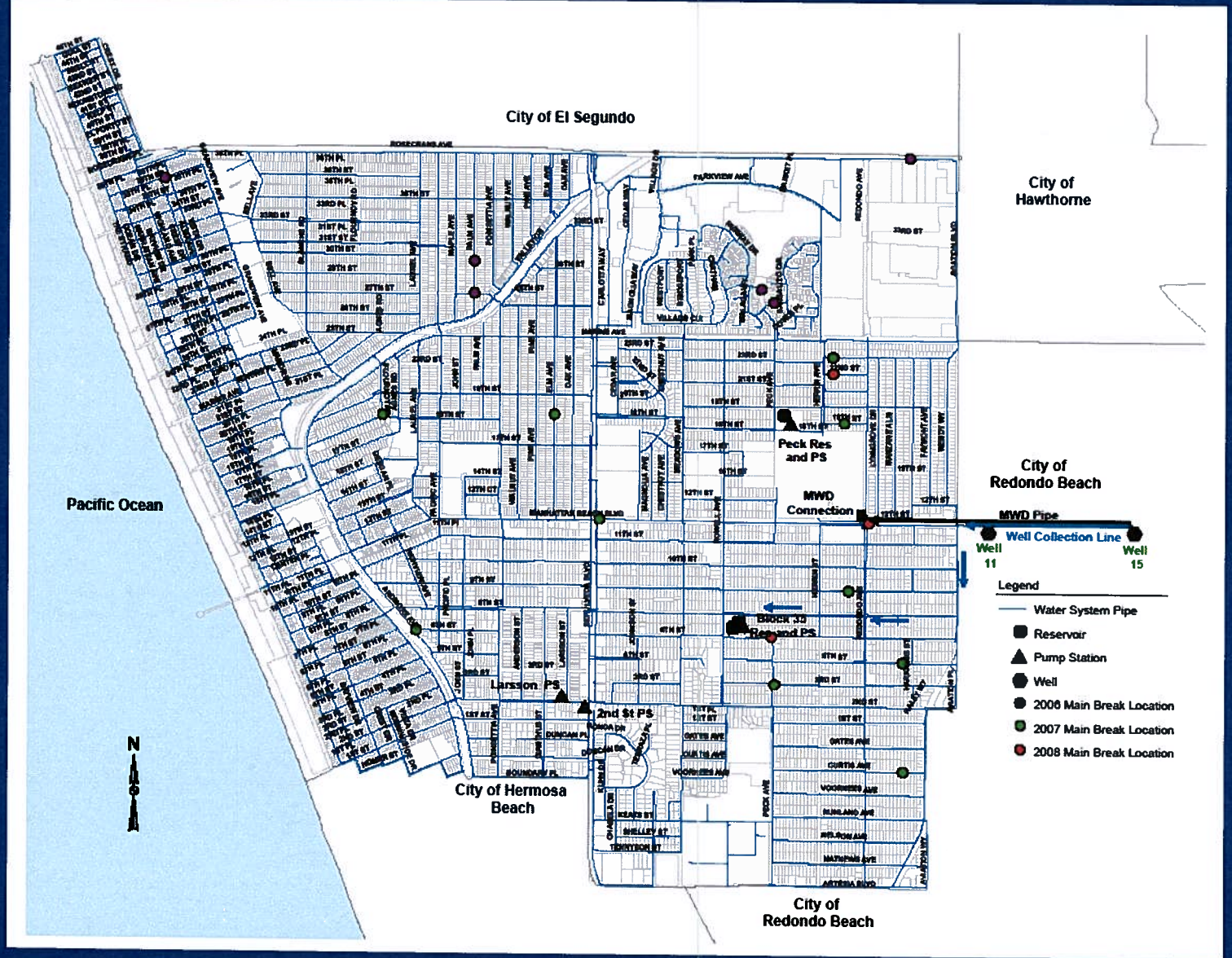
Fire Flow Test Results

Fire Hydrant Number	Location	Pipe Size	2003 Test Results			2009 Test Results	
			High Pressure (psi)	Low Pressure (psi)	GPM	Pitot Reading (psi)	GPM
6	Herrin Street and 3rd Street	6"	61	38	1,030	22	790
37	Harkness Street and 6th Street	4"	87	57	1,220	28	890
15	Mathews Avenue and Herrin Street	6"	58	42	1,040	24	820
75	Altura Way and Keats St	4" & 6"	71	42	1,060	30	920
80	Ronda Drive and Kuhn Drive	4" & 6"	55	28	950	20	750
86	Meadows Avenue and 10th Street	4" & 6"	62	47	1,030	26	860
158	15th Street, west of Deegan Place	6"	75	55	1,250	36	1,010
201	Palm Avenue and 35th Street	4" & 6"	74	21	700	34	980
219	Bell Avenue and 35th Street	6"	98	75	1,350	34	980
231	Flournoy Road and 29th Street	4"	74	55	1,130	28	890
258	Vista Drive and 24th Street	4" & 6"	64	18	725	33	960
284	Alma Avenue and 33rd Street	8"	56	52	1,160	36	1,010
366	John Stret and 9th Street	4"	58	40	1,040	28	890
375	Ingleside Drive and 1st Street	4" & 6"	92	20	750	18	730
441	Wendy Way and 19th Street	6"	92	73	1,300	36	1,010
467	Peck Avenue and 21st Street	6" & 8"	85	51	1,130	30	920
491	Magnolia Avenue and 22nd Street	8"	52	37	980	26	860
546	Brideport, south of Village Circle	8"	85	75	1,350	40	1,060
N/A	Northeast corner of Parkview Ave and Market Place	10"				54	1,230

Note: "-" indicates pressure change across adjacent hydrant was too great

Water

Recent Main Breaks



Water Capital Improvement Program

- **Water Mains**

  ✓ Replace cast iron pipes older than 60 years and 4-inch and smaller pipe by 2030

  1.5 miles per year to 2019-2020 ($3.45 M/yr)
  2.5 miles per year to 2029-2030 ($5.75 M/yr)

  ✓ Add 440 fire hydrants

  18 hydrants per year through 2019-2020 ($121,500/yr)
  30 hydrants per year thereafter ($201,500/yr)

Water Capital Improvement Program

- **Booster Pump Stations**

  ✓ Second Street Pump Station

  Upgrade control system ($0.27 M)
  Replace engine install vibration isolators ($0.4 M)

  ✓ Larsson Pump Station

  Replace with a new facility ($2.025 M)

Water Capital Improvement Program

- **Local Supply**
  - ✓ Construct a new well of 1,800 gpm capacity at 6th Street and Aviation Boulevard ($4.32 M)
  - ✓ Construct well collection lines

    Well 15 to Well 11A ($1.36 M)
    Well 11A to Block 35 Reservoir ($3.38 M)
    New well to 8th Street ($0.324 M)
- **Reservoirs**
  - ✓ Replace Block 35 Reservoir with a 4 million gallon facility ($8.1 M)
  - ✓ Replace Peck Reservoir with a 4 million Gallon reservoir ($8.1 M)

Water Capital Improvement Program

City of Manhattan Beach
Water Capital Improvement Program
2010-2020

CIP No.	Project Description	2009-2010	2010-2011	2011-2012	2012-2013	2013-2124	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
1	Pipe replacement program (annual-small diameter cast iron pipe, 1.5 mile/yr through 2021, 2.5 miles/yr thereafter)	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000	$3,450,000
2	New Fire Hydrants (18 per year through 2021, 30 per year thereafter)	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500	$121,500
3	Second Street Booster Pump Station-Install Solid State Controller	$270,000										
4	Second Street Booster Pump Station-Install engine vibration isolators	$400,000										
5	Replace or parallel well collection line from Well 15 to Well 11A	$1,360,800										
6	Replace Larsson Pump Station		$2,025,000									
7	Construct Well at Aviation and 6th Street (Well Site 13)			$4,320,000								
8	Construct well collection line from Well 11A to Block 35				$3,037,500							
9	Construct well collection line on Aviation from Well Site 13 to 8th St				$324,000							
10	Replace Block 35 Reservoir (4 mg)								$8,100,000			
11	Replace Peck Reservoir (4 mg)											$8,100,000
	Total	**$5,602,300**	**$5,596,500**	**$7,891,500**	**$6,933,000**	**$3,571,500**	**$3,571,500**	**$3,571,500**	**$11,671,500**	**$3,571,500**	**$3,571,500**	**$11,671,500**

Wastewater

Background

- Manhattan Beach provides wastewater collection service to approximately 12,000 customers
- The service area encompasses approximately 3.9 square miles within the corporate boundaries
- Wastewater is conveyed to one of the Los Angeles County Sanitation District (LACSD) trunk sewers
- Wastewater is ultimately treated at LACSD's Joint Water Pollution Control Plant in the City of Carson

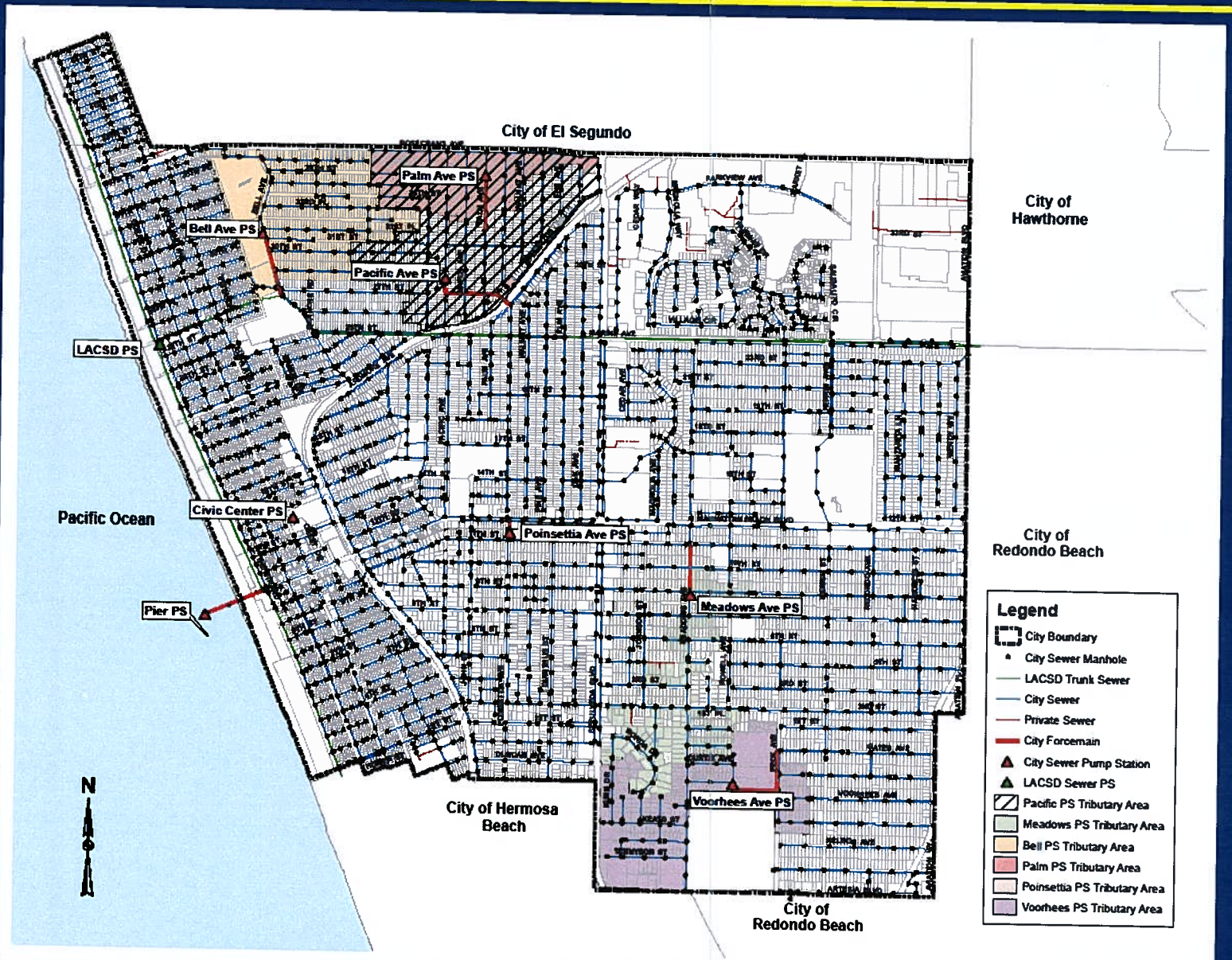
Wastewater

Existing System

- **The City's wastewater collection system consists of:**
  - ✓ 83 miles of gravity pipe (438,500 feet)
  - ✓ Gravity pipes range in diameter from 6-inches to 21-inches, with the majority being 8-inches
  - ✓ Gravity pipes are primarily vitrified clay pipe
  - ✓ 2,060 manholes
  - ✓ Six (6) large and two (2) small pump stations
  - ✓ 5,120 feet of force main, ranging in diameter from 4-inches to 6-inches

Wastewater

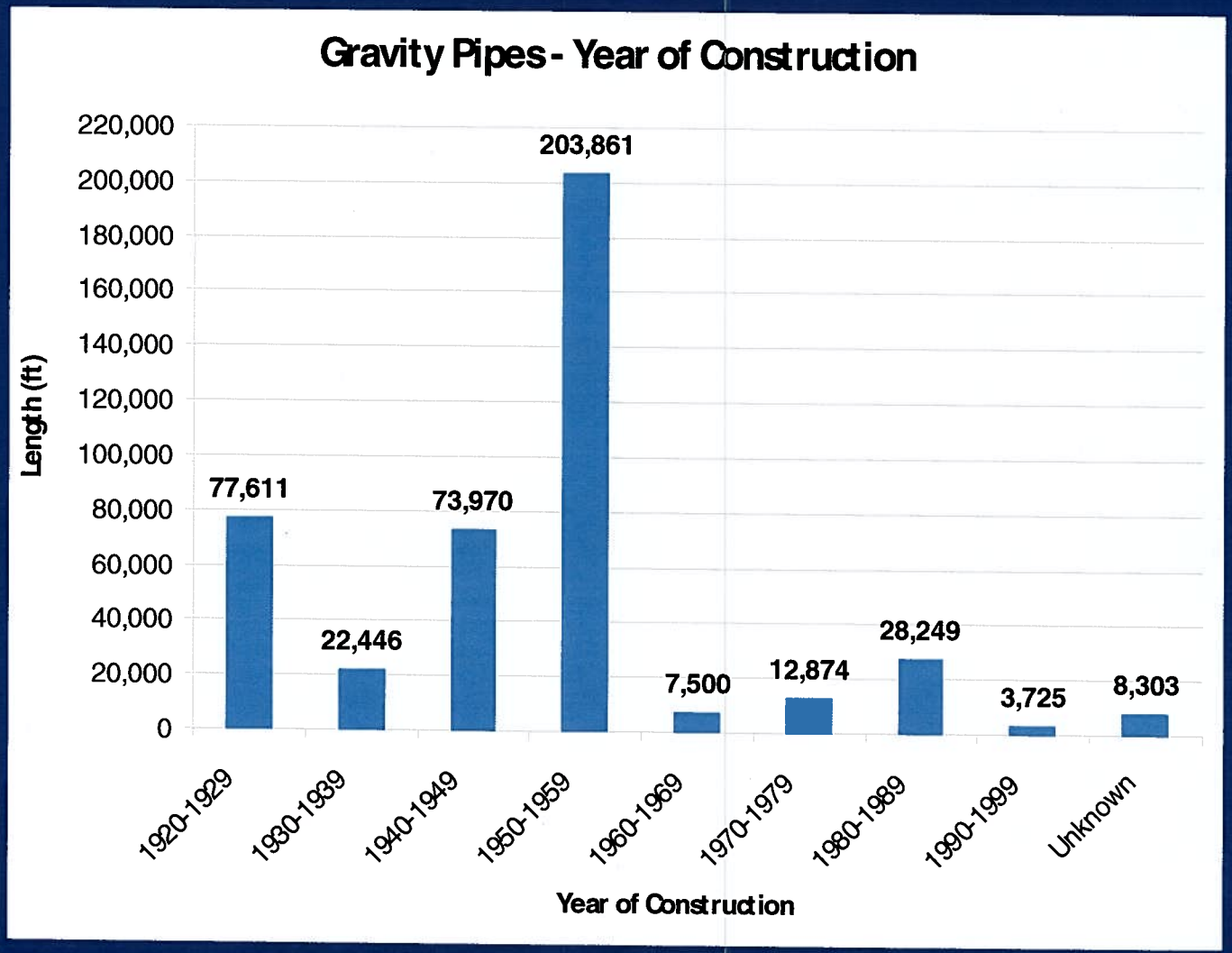
Existing System



Wastewater

Age of Existing System

- **Collection System**



Wastewater — Age of Existing System

- **Eight (8) Pump Stations and Force Mains** (continued)

1. Bell Pump Station (*constructed 1938, P.S. retrofitted 1997*)
2. Meadows Pump Station (*constructed 1953, P.S. retrofitted 1997*)
3. Pacific Pump Station (*constructed 1953, P.S. retrofitted 1997*)
4. Palm Pump Station (constructed 1953, P.S. retrofitted 1997)
5. Poinsettia Pump Station (*constructed 1949*)
6. Voorhees Pump Station (*constructed 1953, P.S. retrofitted 1997*)
7. Pier Pump Station (*constructed 1935, upgraded in 1992*)
8. Civic Center Pump Station (*constructed 1973*)

Wastewater Waste Discharge Requirements

- State Water Resources Control Board issued the General Waste Discharge Requirements (Order No. 2006-0003) on May 2, 2006

- The Order prohibits:
  - ✓ Any sanitary sewer overflow (SSO) that results in a discharge of untreated or partially treated wastewater to the waters of the United States
  - ✓ Any SSO that results in a discharge of untreated or partially treated wastewater that creates a nuisance as defined in California Water Code Section 13050 (m)

Wastewater Waste Discharge Requirements

- Order requires that all wastewater collection agencies prepare a Sewer System Management Plan (SSMP)
- Three very significant elements of the SSMP are:
  - ✓ Operation and Maintenance Program, which includes an accurate map of the system, and a Rehabilitation and Replacement Plan based on visual and closed circuit television (CCTV) inspection of manholes and sewer pipes
  - ✓ Fats, Oils, and Grease (FOG) Control Program
  - ✓ System Evaluation and Capacity Assurance Plan
- The Sewer Master Plan completed these elements of the SSMP

FOG Program

- **Under the FOG Program, AKM prepared**
  - ✓ Draft FOG Ordinance
  - ✓ FOG Discharge Manual
  - ✓ Reviewed the City's Municipal Code and provided comments for revision of the Code

Wastewater Capacity Evaluation

- **Master Plan Tasks Related to Capacity Evaluation**
  - ✓ Georeferenced over 750 as-built drawings
  - ✓ Collected data from as-built drawings and created new Sewer GIS
  - ✓ Built hydraulic model (geometry based on Sewer GIS)
  - ✓ Flow monitored eight locations for three months to develop unit flow factors and for calibrating the model
  - ✓ Reviewed water use records for entire city to aid in development of unit flow factors
  - ✓ Reviewed pump station plans and SCADA information to evaluate influent flow rates, pump capacities, and wetwell capacities

Wastewater Capacity Evaluation

Capacity Evaluation Results

- **Collection System**
  - ✓ One reach identified with minor capacity deficiency (PDWF d/D = 0.65) – no action recommended at this time
- **Pump Stations in Need of Capacity Upgrades to Handle Estimated Wet Weather Flows**
  - ✓ Poinsettia PS (increase capacity to 150 gpm)
  - ✓ Pacific PS (increase capacity to 400 gpm)
  - ✓ Voorhees PS (increase capacity to 350 gpm)
  - ✓ Meadows PS (increase capacity to 310 gpm)
  - ✓ Bell PS (increase capacity to 300 gpm)

Wastewater Capacity Evaluation

(continued)

- Pump Stations Have Minimal Operational Storage and no Emergency Storage

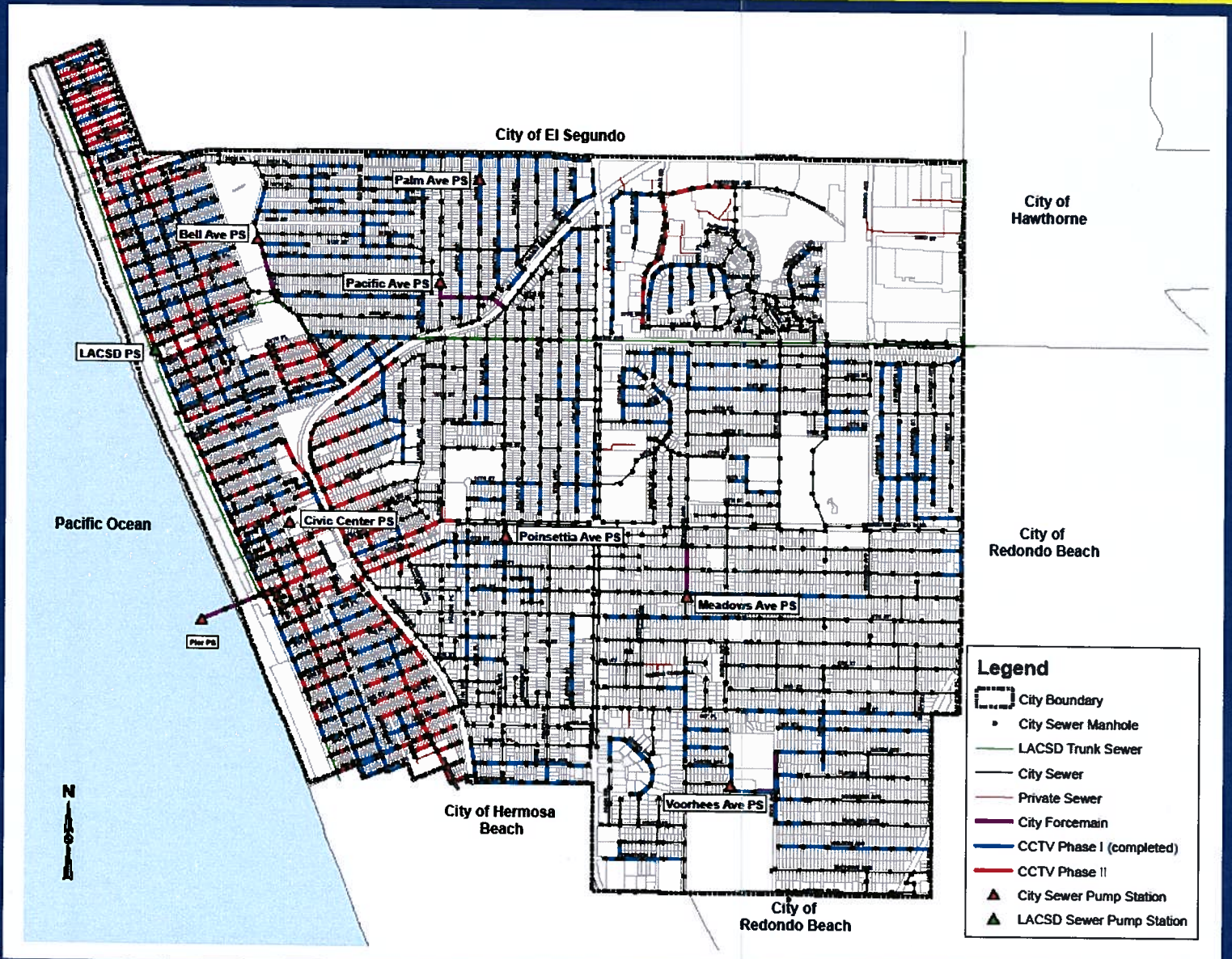
- Emergency Storage of 30 minutes of Peak Wet Weather Flow Should be Provided to Allow City Staff Response Time in Case of a Mechanical Failure
  - ✓ Pacific PS (capacity = 12,000 gallons)
  - ✓ Voorhees PS (capacity = 10,500 gallons)
  - ✓ Meadows PS (capacity = 9,300 gallons)
  - ✓ Bell PS (capacity = 8,400 gallons)
  - ✓ Palm PS (capacity = 4,800 gallons)
  - ✓ Emergency storage for Poinsettia Pump Station should be provided in the new pump station

Wastewater Condition Evaluation

- **Master Plan Tasks Related to Condition Evaluation**
  - ✓ 30 miles of pipe and 743 manholes have been CCTV inspected and its condition evaluated
  - ✓ 14 miles of pipe and associated manholes are currently being CCTV inspected (expected completion date for inspections is August 2009)
  - ✓ Approximately 53 percent of the collection system will be CCTV inspected at the end of the Master Plan project
  - ✓ Field inspections of all sewer pump stations

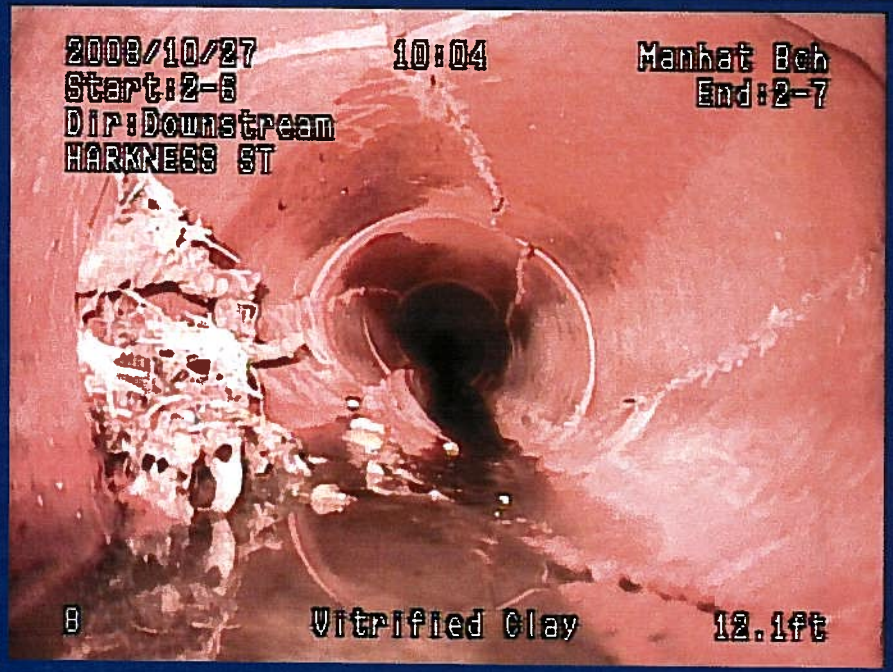
Wastewater Condition Evaluation

(Continued)



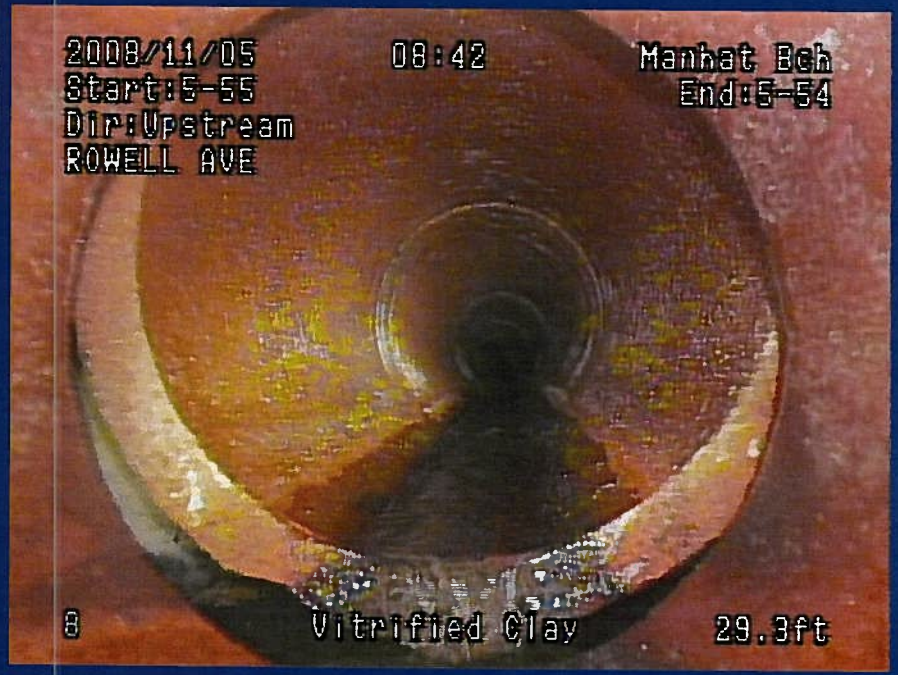
Wastewater Condition Evaluation

(Continued)



Broken Pipe

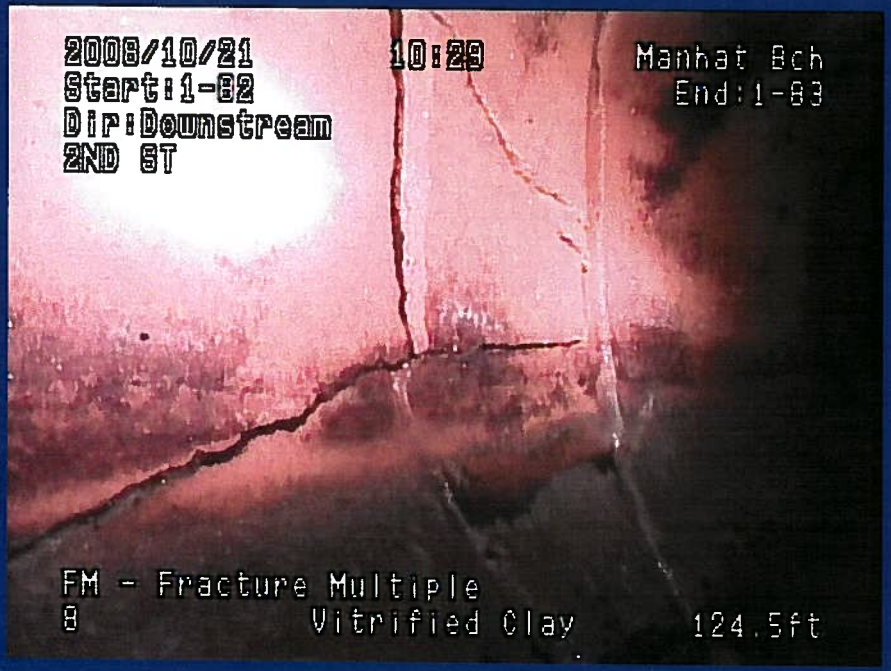
Large Offset Joint



Wastewater

Condition Evaluation

(Continued)



Multiple Fractures

Grease Deposits

Wastewater

Condition Evaluation

(Continued)

Roots

Eroding Channel in Manhole

Wastewater

Condition Evaluation

(Continued)

Broken Manhole Cover

Corrosion in Manhole

Condition Evaluation

(Continued)

Condition Evaluation Results

- **Collection System**

✓ Of the evaluated pipes,

9.8 percent identified with severe deficiencies

3.1 percent identified with major deficiencies

48.8 percent identified with moderate deficiencies

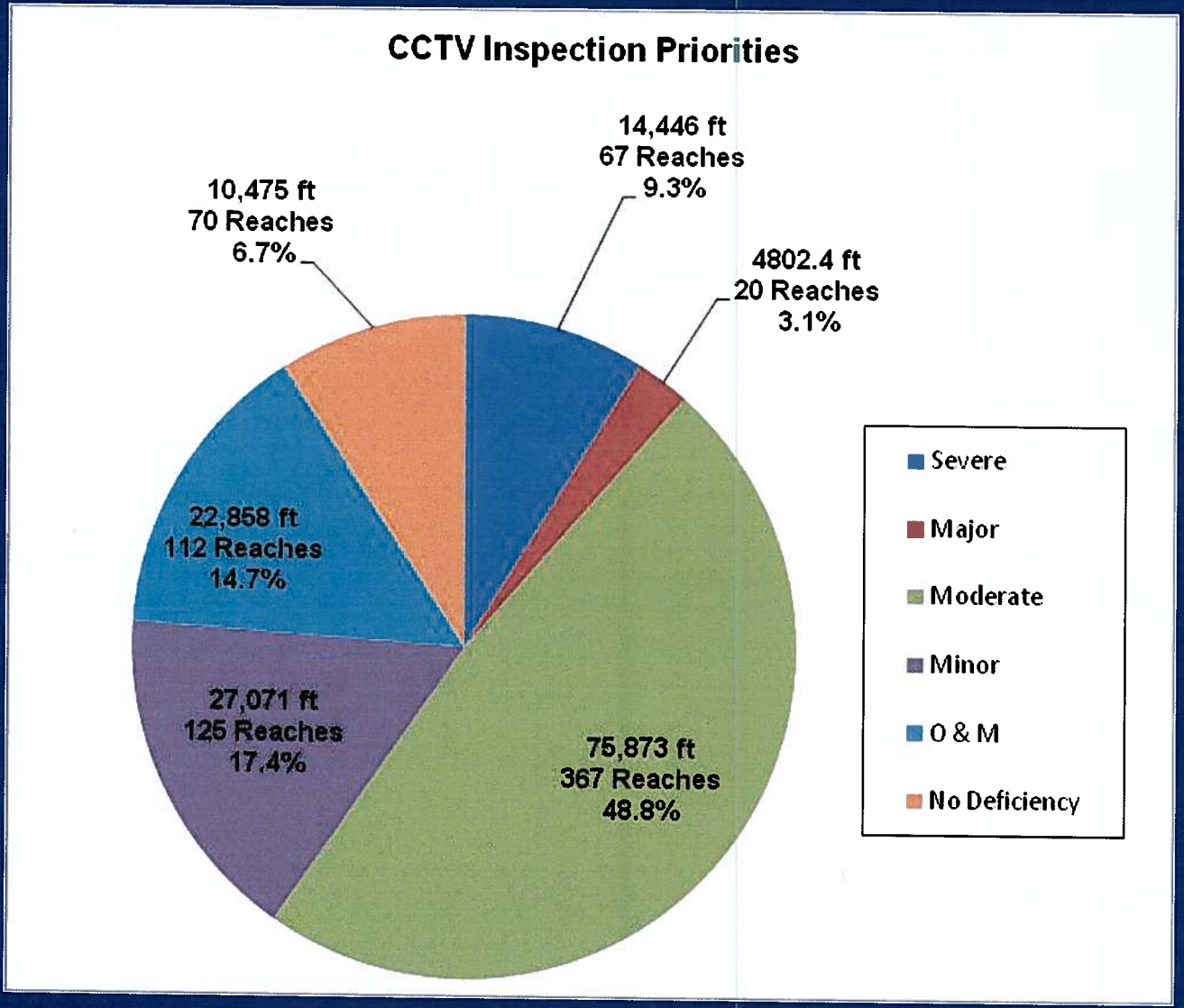
17.4 percent identified with minor deficiencies

14.7 percent identified with O&M issues only

6.7 percent identified with no deficiencies

Wastewater Condition Evaluation

(Continued)



Wastewater Condition Evaluation

(continued)

- **Pump Stations**
  - ✓ Poinsettia Pump Station and its force main was built in 1949 and is in need of replacement.

Wastewater Condition Evaluation

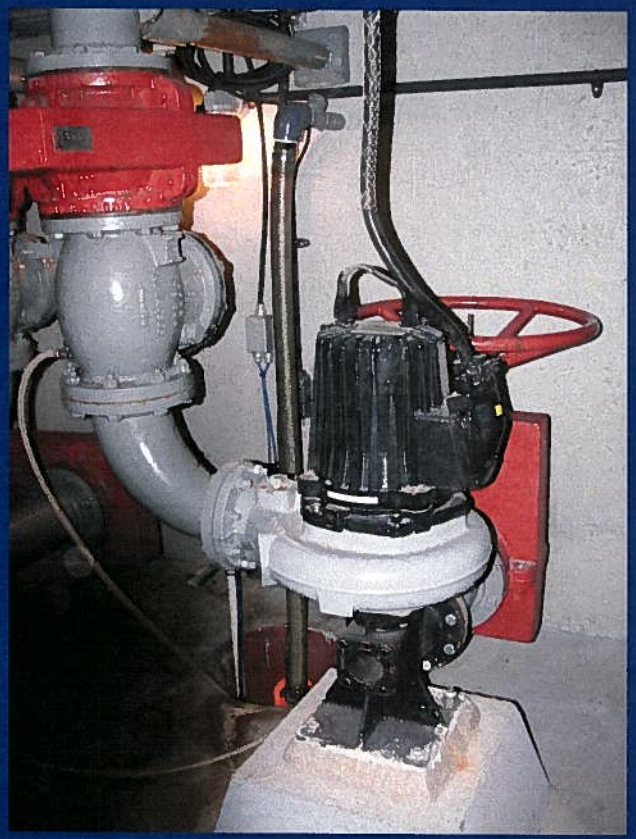
(continued)

- **Pump Stations**
  - ✓ The Pier Pump Station force main is in need of replacement.

Wastewater Condition Evaluation

(continued)

- **Pump Stations**
  - ✓ The force mains for Pacific, Voorhees, Meadows, Palm, and Bell Pump Stations should be replaced when the pump stations are upgraded



Wastewater Capital Improvement Program

City of Manhattan Beach
Wastewater Capital Improvement Program
2010-2020

CIP No.	Project Description	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Replace Pier Pump Station Forcemain	$486,000										
2	Replace Poinsettia Pump Station	$405,000	$2,295,000									
	Replace Poinsettia Pump Station Forcemain		$67,000									
3	Replace/Rehabilitate Severe and Major Condition Pipes	$898,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000	$1,796,000
4	Replace/Rehabilitate Sewer Manholes		$199,800	$199,800	$199,800	$199,800	$199,800	$199,800	$199,800	$199,800	$199,800	$199,800
5	Upgrade Pacific Pump Station			$540,000								
	Replace Pacific Pump Station Forcemain			$396,900								
6	Upgrade Voorhees Pump Station				$540,000							
	Replace Voorhees Pump Station Forcemain				$301,320							
7	Upgrade Meadows Pump Station					$540,000						
	Replace Meadows Pump Station Forcemain					$236,520						
8	Upgrade Bell Pump Station						$540,000					
	Replace Bell Pump Station Forcemain						$291,600					
9	Replace Palm Pump Station Forcemain							$251,100				
10	Construct Emergency Storage for Pacific PS								$1,134,000			
11	Construct Emergency Storage for Voorhees PS									$992,250		
12	Construct Emergency Storage for Meadows PS										$878,850	
13	Construct Emergency Storage for Bell PS											$793,800
14	Construct Emergency Storage for Palm PS											$453,600
	Total	**$1,789,000**	**$4,357,800**	**$2,932,700**	**$2,837,120**	**$2,772,320**	**$2,827,400**	**$2,246,900**	**$3,129,800**	**$2,988,050**	**$2,874,650**	**$3,243,200**