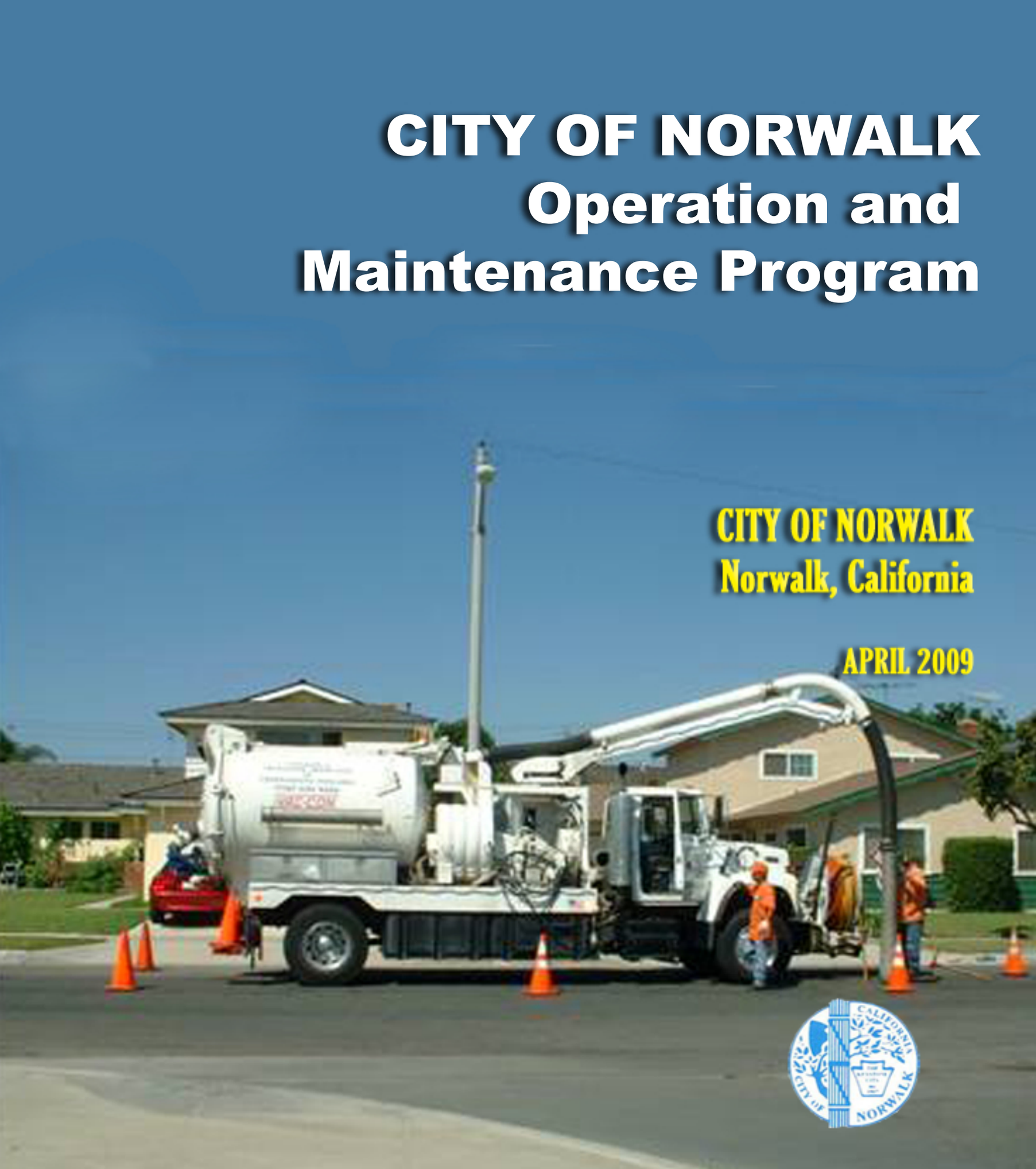
CITY OF NORWALK
Operation and Maintenance Program



CITY OF NORWALK
Norwalk, California

APRIL 2009

CITY OF NORWALK

OPERATION AND MAINTENANCE PROGRAM

Prepared By:

AKM CONSULTING ENGINEERS
553 Wald
Irvine, California 92618
(949) 753-7333

Prepared For:

CITY OF NORWALK
12700 Norwalk Boulevard
Norwalk, California 90650
(562) 929-5723

APRIL 2009

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

CITY OF NORWALK
OPERATION AND MAINTENANCE PROGRAM

Certification

I certify under penalty of law that this document and all attachments were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Delfino Consunji, P.E. City Engineer	Date
Noel Ford Maintenance Supervisor	Date

CITY OF NORWALK
OPERATION AND MAINTENANCE PROGRAM

Introduction

This Operation and Maintenance Program has been prepared to provide the City of Norwalk (City) with the tools and procedures for maintaining its gravity sewer system and sewer pump stations with adequately trained staff, and contractors possessing adequate knowledge, skills, and abilities. The goal of the Operation and Maintenance Program is to eliminate sanitary sewer overflows, and thereby protect public health and the environment.

It documents the City's existing plan, and complies with the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Order No. 2006-0003 (Order), issued by the California State Water Resources Control Board.

OPERATION AND MAINTENANCE PROGRAM REQUIREMENTS

A. Requirements

The California State Water Resources Control Board issued Order No. 2006-0003, Statewide General Waste Discharge Requirements for Wastewater Collection Agencies 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 or that creates a nuisance as defined in California Water Code Section 13050(m).

The implementation of a comprehensive operation and maintenance program is a very important component of a wastewater collection agency's responsibility in minimizing the possibility of sanitary sewer overflows, and possible discharge of untreated sewage to surface water streams. A significant additional benefit of an operation and maintenance program is the extended useful life of the existing assets.

Operation and Maintenance Program is one element of the Sewer System Management Plan required by the Order, as detailed in the Provisions (Section D.13).

The following provisions of the Order provide the requirements for the Operation and Maintenance Program:

D.8 The Enrollee shall properly, manage, **operate, and maintain** all parts of the sanitary sewer system owned or operated by the Enrollee, and shall ensure that the system operators (including employees, contractors, or other agents) are adequately trained and possess adequate knowledge, skills, and abilities.

D.13(iv)(a) Maintain an **up-to-date map of the sanitary sewer system**, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities.

D.13(iv)(b) Describe **routine preventive operation and maintenance activities** by staff and contractors, including a system for **scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas.** The Preventative Maintenance (PM) program should have a **system to document scheduled and conducted activities**, such as work orders.

D.13(iv)(c) Develop a **rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency**. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. **Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects**. Finally, the

rehabilitation and replacement plan should include a **capital improvement plan that addresses proper management and protection of the infrastructure assets**. The plan shall include a **time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan.**

D.13(iv)(d) **Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained.**

D.13(iv)(e) **Provide equipment and replacement part inventories, including identification of critical replacement parts.**

B. Elements of the Operation and Maintenance Program

The City's Operation and Maintenance Program consists of the following sections:

Section I.	**Map of the Sewer Collection System and Stormwater Conveyance Facilities**
Section II.	**Routine Preventive Operation and Maintenance Activities**
Section III.	**Rehabilitation and Replacement Plan**
Section IV.	**Training Program**
Section V.	**Equipment and Replacement Parts Inventories**
Section VI.	**Funding Schedule**

SECTION I

MAP OF THE SEWER COLLECTION SYSTEM AND STORMWATER CONVEYANCE FACILITIES

The City has developed an GIS based mapping system for its sanitary sewer collection system and sewer pump stations, as well as the storm water conveyance facilities.

The GIS file includes:

- Manholes with identification number
- Flow direction
- Inverted siphons
- Pump stations
- Force mains
- Frequent maintenance locations
- Tributary area boundaries
- Connection points to Los Angeles County Sanitation District facilities
- Local storm water facilities

The map of the system illustrating the frequent maintenance locations and siphons is included as Figure I-1.

The City's Sewer GIS includes pipes with pipe identification numbers, size, slope, length, material, year of construction, upstream and downstream invert elevations, street location, and associated plan numbers. The Sewer GIS also includes structures with structure identification numbers, and rim elevations.

New maps and atlas sheets are currently being developed based upon the Sewer GIS.

Legend

- City Boundary
- Sewer Manholes
- Sewer Pump Station
- City of Norwalk Sewer
- City of Norwalk Force Main
- Los Angeles County Sanitation District Sewer
- Catchbasins
- Los Angeles County Storm Drain
- City of Norwalk Storm Drain
- Storm Drain Tributary Area

N

0 600 1,200 2,400 Feet

San Gabriel River

North Fork Coyote Creek

Curtis & King P.S.

Harvard / Godley P.S.

Bloomfield / Molette P.S.

City of Norwalk
Operation and Maintenance Plan

Map of Sewer System and Storm Drains

Figure I-1

SECTION II

ROUTINE PREVENTIVE OPERATION AND MAINTENANCE ACTIVITIES

The City performs routine operation and maintenance activities in order to provide a high level of service to its customers, extend the useful life of its assets, and prevent overflows.

The primary preventative operations and maintenance work involve:

1. Identification of portions of the system that need frequent attention (frequent maintenance locations) through primarily CCTV inspection of the system
2. Condition assessment of the gravity system based upon CCTV inspection
3. Visual inspection of manholes by City staff
4. Cleaning of the entire system every two years
5. Cleaning of the frequent maintenance locations every six months
6. Inspection of all pump stations twice weekly, monthly, quarterly, and following most holidays and significant sporting events.

A. Closed Circuit Television (CCTV) Inspection

The City contracts out CCTV inspection work. The CCTV inspection for the SSMP covers approximately 100,154 feet or 12.6 percent of the gravity system. The deficiencies found by the CCTV inspections are addressed in Section III Rehabilitation and Replacement Program of this document. The remainder of the system will be inspected and assessed over the next seven years as funding becomes available. In order to meet the requirements of the Order properly, as CCTV inspection and condition assessments are completed, the Capital Improvement Program will be updated to address the critical areas as soon as possible. The hot spot list will be modified based upon the information developed from these inspections and assessments.

Planning and scheduling of subsequent CCTV inspections and accompanying condition assessment work will be based upon the results of the latest inspection and assessment work.

CCTV Inspection Contractor: Empire Pipe Cleaning and Equipment Inc.
1788 N. Neville Street
Orange, CA 92865
(714) 639-8352

The staff of Empire Pipe Cleaning and Equipment, Inc. (Empire) conducting work for the City of Norwalk is required to be certified in Pipeline Assessment Certification Program (PACP) and National Association of Sewer Service Companies (NASSCO) pipeline and manhole inspection and assessment, as well as in confined space entry procedures.

B. Sewer System Cleaning

The routine gravity system cleaning is contracted out. The entire system is cleaned once every two years, and the frequent maintenance locations are cleaned once every 180 days or two times a year. System cleaning is performed by contract with the use of a hydroflush truck.

Sewer Cleaning Contractor: Empire Pipe Cleaning and Equipment Inc.
1788 N. Neville Street
Orange, CA 92865
(714) 639-8352

The staff of Empire Pipe Cleaning and Equipment Inc. conducting work for the City of Norwalk is required to be certified and trained in confined space entry procedures.

C. Lift Station Maintenance

The City owns and operates three (3) sewer lift stations. The City staff inspects each pump station on Mondays and Thursdays, cleaning/deragging check valves, cleaning the Hydroranger level sensors, washing the wet well walls and pumps, checking the amperage of each leg, and recording the elapsed time meters. The City staff also cleans the lift stations following most holidays and major sporting events, such as the Superbowl. Monthly and quarterly inspections are also performed for specific equipment. The forms used in the biweekly, monthly, and quarterly inspections are shown in Figure II-1 and II-2. The City staff is trained in confined space entry procedures. Maintenance of the pumps and motors is contracted out.

Lift Station Maintenance Contractor: Jimini Systems, Inc.
25295 Cinnamon Rd.
Lake Forest, CA 92630
(949) 770-7654

The staff of Jimini Systems conducting work for the City of Norwalk will be required to be certified in accordance with the CWEA Program commensurate with their responsibilities.

D. Sewer Repair and Replacement

Sewer repair and replacement work is contracted out on an as needed basis.

Sewer Repair and Replacement Contractors:

Doty Brothers Construction Company
11232 E. Firestone Boulevard
Norwalk, California 90650
(562) 864-6566

Precision Pipeline, Inc.
12340 Firestone Boulevard
Norwalk, CA 90650
(562) 864-3875

The staff of contractors conducting work for the City of Norwalk will be required to be certified in accordance with the CWEA Program commensurate with their responsibilities.

City of Norwalk
Bloomfield Sewer Lift Station Maintenance Records
For the Month of _____, 20____

Ademco I.D. #:_____ Telephone #:_____

Station Volts: L1-L2_____ L2-L3_____ L1-L3_____ Motor HP: 1_____ 2_____

PRESSURE SWITCH SETTINGS

PS1 - Duty	_____ On Level	_____ Off Level
PS2 - Standby	_____ On Level	_____ Off Level
PS3 - Highwater	_____ On Level	_____ Off Level

Full Load Amps (FLA): _____ _____ _____ _____

Phase Rotation: _____ _____ _____

Ademco Alarm Tested:
(date) _____ _____ _____ _____

Dial Tone: _____ _____ _____ _____ _____ _____

HOURMETER READING						
Date	Time	Name	Pump 1	Average	Pump 2	Average
Average Reading for Month of _____ #1_____ #2_____						

Roto Float Tested (date) _____ _____ _____ _____ (*roto float that controls pump in dry pit)
Station Interior _____ _____ _____ _____ _____ _____ _____ _____
Station Exterior _____ _____ _____ _____ _____ _____ _____ _____
Flush Wetwell: (date) _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Pumps: Vent Lines Clear _____ _____Yes _____ _____No
Pumps Alternate _____ _____Yes _____ _____No
Standby Operate _____ _____Yes _____ _____No
Air Compressor: #1 #2
Serviced/Repaired _____ _____
Belts Replace _____ _____
Filters Replaced _____ _____
Check Relief Valve _____ _____
On @_____P.S.I./ Off @_____P.S.I.
Sump Pump: Inspect/Test Run _____ (date) _____
Clean Sump Hole _____ (date) _____
Standby Generator Set: (date) _____ _____ _____ _____
Inspected by: _____ Date: _____
(*Refer to Preventive Maintenance Form for more inspecting details)

MONTHLY INSPECTION

Magnetic Starters (clean/inspect) Pump #1_____ Pump #2_____

Circuit Breakers Exercised: _____Yes _____No (all) Date: _____

Valves:

Gate Valves Exercised: _____Yes _____No Number Exercised: _____ Date:_____

Condition of Valves: Gate _____ Check _____

Leaks or Deterioration of Pipes: _____

QUARTERLY MAINTENANCE INSPECTION

April, August, and December

Motors: Date _____

Voltage (voltmeter while units run)

#1: L1 to L2 _____ L2 to L3 _____ L1 to L3 _____

#2: L1 to L2 _____ L2 to L3 _____ L1 to L3 _____

#3: L1 to L2 _____ L2 to L3 _____ L1 to L3 _____

#4: L1 to L2 _____ L2 to L3 _____ L1 to L3 _____ HYDROGEN SULFIDE (PPM)

Amperes: Date _____

#1: L1_____ L2_____ L3_____

#2: L1_____ L2_____ L3_____

Previous Read:

#1: L1_____ L2_____ L3_____

#2: L1_____ L2_____ L3_____

Megger: Date _____

#1: T1_____ T2_____ T3_____

#2: T1_____ T2_____ T3_____

Previous Read:

#1: T1_____ T2_____ T3_____

#2: T1_____ T2_____ T3_____

Comments: _____

_____

_____

Inspected by:_____ Date _____

SECTION III

REHABILITATION AND REPLACEMENT PROGRAM

A. Description of Sewer System

i. Collection System

The City's sewer system service area consists of all lands within its corporate boundaries (9.35 square miles) as well as a portion of the City of Santa Fe Springs at the northern and southeastern abutment to the City. The City provides wastewater collection service to approximately 108,200 residents, through 20,640 residential, 2,580 commercial and 2,580 industrial sewer service connections.

The sewer collection system consists of approximately 151 miles of gravity sewer pipes. Pipe sizes range from 8-inches to 21-inches in diameter. The gravity sewer pipes collect the wastewater from the service area and convey it to the Los Angeles County Sanitation District's (LACSD) trunk sewers, or to one of the City's three sewer lift stations – Curtis & King Lift Station (No. 1), Bloomfield & Molette Lift Station (No. 2), and Harvard and Gridley Lift Station (No. 3).

The gravity sewer system was constructed, mostly of vitrified clay pipe (VCP), between 1950 and the present.

ii. Lift Stations

The City owns and operates three wastewater lift stations.

Curtis & King Lift Station (No. 1)

The Curtis & King Lift Station is a wet well dry well station located at 15402 Curtis & King Road. The current lift station was constructed in 1989 during the construction of the I-105, Century Freeway. It was upgraded in 2008 with new dry pit submersible vortex pumps, and ultrasonic level transducer, back-up float switches, and a new pump control panel.

Service Area

The 143 acre service area (gross area), shown on Figure III-1, is located between the San Gabriel River to the west and the San Gabriel (I-605) Freeway to the east. The Union Pacific Railroad extends along the northerly boundary. The tributary area includes a small single family residential area south of the Glenn Andersen Freeway (I-105), which is along Branscomb Street, Angell Street, and Newmire Avenue north of Branscomb Street.

Legend

- Sewer Manholes
- Curtis and King Sewer Pump Station
- City Boundary
- City of Norwalk Sewer
- City of Norwalk Force Main
- Curtis and King PS Tributary Area

LEIBACHER
SHARON
AV.
FOIX AV.
NEWMIRE
OHM AV.
AV.
DOWNEY NORWALK RD
RD
SOLO ST
DR
NEWMIRE
RD
AV.
AV.
SPRY
CT.
PIUMA
EVEREST
NORDESTA
MEADOW
RD
DEL RIO
LEEDS
HOXIE
IMPERIAL HWY
AV.
PL.
(PVT.)
LYNDORA
CURTIS & KING RD
LYNDORA
ST.
CHEDDAR ST.
CHEDDAR ST.
BORSON ST
ANGELL ST
Curtis & King P.S.
AV.
BRANSCOMB
AV.
AV.
AV.
PRISCILLA ST
NEWMIRE AV
CURTIS & KING RD
NEWMIRE AV
N
0 200 400 800 Feet
1" = 400'

City of Norwalk
Operation and Maintenance Plan

Curtis and King Lift Station Tributary Area

Figure III-1

The tributary area land use includes 80 net acres of single family residential (572 units), 5 net acres of high density residential, and 18 net acres of commercial. The commercial area is located along Imperial Highway east of Curtis & King Road. The high density residential areas are along the south side of Imperial Highway west of Curtis & King Road, and along the east side of Curtis & King Road south of Imperial Highway.

Tributary Flows

The existing average dry weather flow tributary to the pump station is estimated at 122 gallons per minute based upon a unit flow factor of 1800 gallons per day per acre (gpd/ac) for single family residential areas, 3200 gpd/ac for high density residential land use, and 1000 gpd/ac for commercial land use. The existing peak dry weather flow and peak wet weather flow is estimated at 232 gpm and 365 gpm, respectively.

The ultimate average, peak dry weather, and peak wet weather flows are estimated at 126 gpm, 241 gpm, and 379 gpm, respectively. The unit flow factors were increased to 1870 gpd/ac for single family residential areas, 3300 gpd/ac for high density residential areas, and 1050 gpd/ac for commercial areas.

Wet Well

The wet well is an epoxy lined 7 foot diameter reinforced concrete structure, which is 8 feet in height. Its bottom elevation is 75.17 feet. The 3 foot diameter manhole shaft extends from the top of the wet well to the surface (elevation 95.00 ft). Its capacity is 287 gallons per foot. The invert elevation is 75.17 feet, and the top elevation is 95.00 feet. The invert elevation of the 15-inch influent sewer, which enters the wet well from the west, is 80.29 feet at the wet well entrance.

The volume available between the high water alarm elevation of 80.67 feet and the centerline of the influent sewer (80.92 ft) is 215 gallons. This provides less than one minute of storage during the peak dry weather flow, and the peak wet weather flow before the influent sewer is surcharged. The desired emergency storage volume of 14,100 gallons cannot be provided in the wet well. The emergency storage volume should be increased following a detailed study of the tributary system and the storage available in the system.

Access to the wet well is through a ladder and a 24-inch manhole cover over the shaft. The wet well has a 4-inch diameter gravity ventilation pipe that extends from near its top to above the superstructure roof.

Dry Well

The dry well is a 14 foot square reinforced concrete structure. The pumps are located approximately 3 feet from the north wall.

The sump pump is located at the northwest corner.

The dry well ventilation is provided by a 6-inch diameter duct that extends to 3 feet above the floor, and a blower located at the north east corner of the superstructure.

Minor cracking of the northerly reinforced concrete wall, shown on Photo III-1, was observed during the field investigation conducted on October 22, 2008.

Photo III-1
Minor Cracking on Dry Well Wall

Superstructure

The superstructure is a reinforced concrete building above the dry well. It houses the motor control center, lighting panel, automatic dialer, mono-crane, and the ventilation blower. A 6'x4' access hatch with aluminum grating is located over the pumps. The structure has double doors on the northwest corner, and a single door on the south east corner. The stairs are located to the southeast corner of the building. Natural light is provided through glass blocks at the south west corner.

Pumps

The lift station has two dry pit submersible vortex pumps, each rated at 500 gpm capacity, 15 feet of TDH at 1150 rpm. The lead pump is set to start at 4.5 feet and stop at 2.0 feet. The minimum cycling time within this 2.5 foot operating range is approximately 5.7 minutes (10.5 starts per hour) with one pump out of service. The pumps are alternated following each shut down. Therefore, pump cycling would be reduced to 5.2 starts per hour if both pumps are available. This is still near the upper end of the desired number of starts. When the emergency storage is evaluated, the possibility of reducing the cycling time should be evaluated.

The firm capacity of the pump station is 500 gpm which exceeds the existing and ultimate estimated peak wet weather flows of 365 gpm and 379 gpm. Therefore, the existing pump station firm capacity is adequate.

Suction Piping

Suction pipes are 6-inch in diameter. They extend from the bottom of the wet well (elevation 75.17 ft) to the dry well with a flexible coupling between the two structures, and a wall flange at the dry well wall.. The isolation valves are 6-inch plug valves.

Discharge Piping

Discharge pipes are 6-inch diameter ductile iron. They include lever and spring check valves in the vertical run, followed by plug isolation valves. Check valves in the vertical run are not desirable. The two discharge pipes confluence at a 6-inch horizontal header located along the north wall. The original installation included a flow meter, which is no longer operational.

Force Main

The 6-inch CIP force main is 50 feet long. It discharges sewage to a City drop manhole located directly west of the pump station on Curtis & King Road. The sewage is then conveyed south and east through the City's collection system until it drops into an LACSD trunk sewer at Leffingwell Road and Studebaker Road.

The force main centerline elevation of 90.25 feet remains the same between the dry well and the terminal manhole. There is no bypass pumping facility at the lift station.

Controls

The operation of the lift station is controlled by the wastewater level in the wet well, as sensed by a Milltronics Hydroranger 200 ultrasonic sensor. A back-up float switch system is also provided.

The operational settings are as follows:

Lead Pump On	4.5 ft
Lead Pump Off	2.0 ft
Lag Pump On	5.0 ft
Lag Pump Off	2.0 ft
High Level Alarm	5.5 ft
Low Level Alarm	1.33 ft

The settings can be changed through the Siemens controller housed in the Pump Control Panel enclosure. High and low level alarms are activated by float switches.

Telemetry

The lift station has a telephone dialer, which dials an outside service (ADT) in case of an alarm condition. These include phase and power failure, high and low wet well levels, motor seal failure, and intrusion into the motor control center. Alarm conditions also activate an exterior red light and a bell.

Outside service notifies the City personnel for verification of the alarm condition, and corrective action.

Power Service

The electric power is provided through an underground service to the electric meter located on the south wall of the superstructure. The service is 120/240 volt, 3 phase, 4 wire, and 100 amps.

The City maintains a portable diesel engine generator at the station. The manual transfer switch is located adjacent to the electric service on the south wall of the superstructure.

Condition Evaluation

The lift station is currently in good condition. No immediate improvements are needed for condition. However, a bypass pumping facility should be added, and emergency storage should be provided to allow sufficient response time.

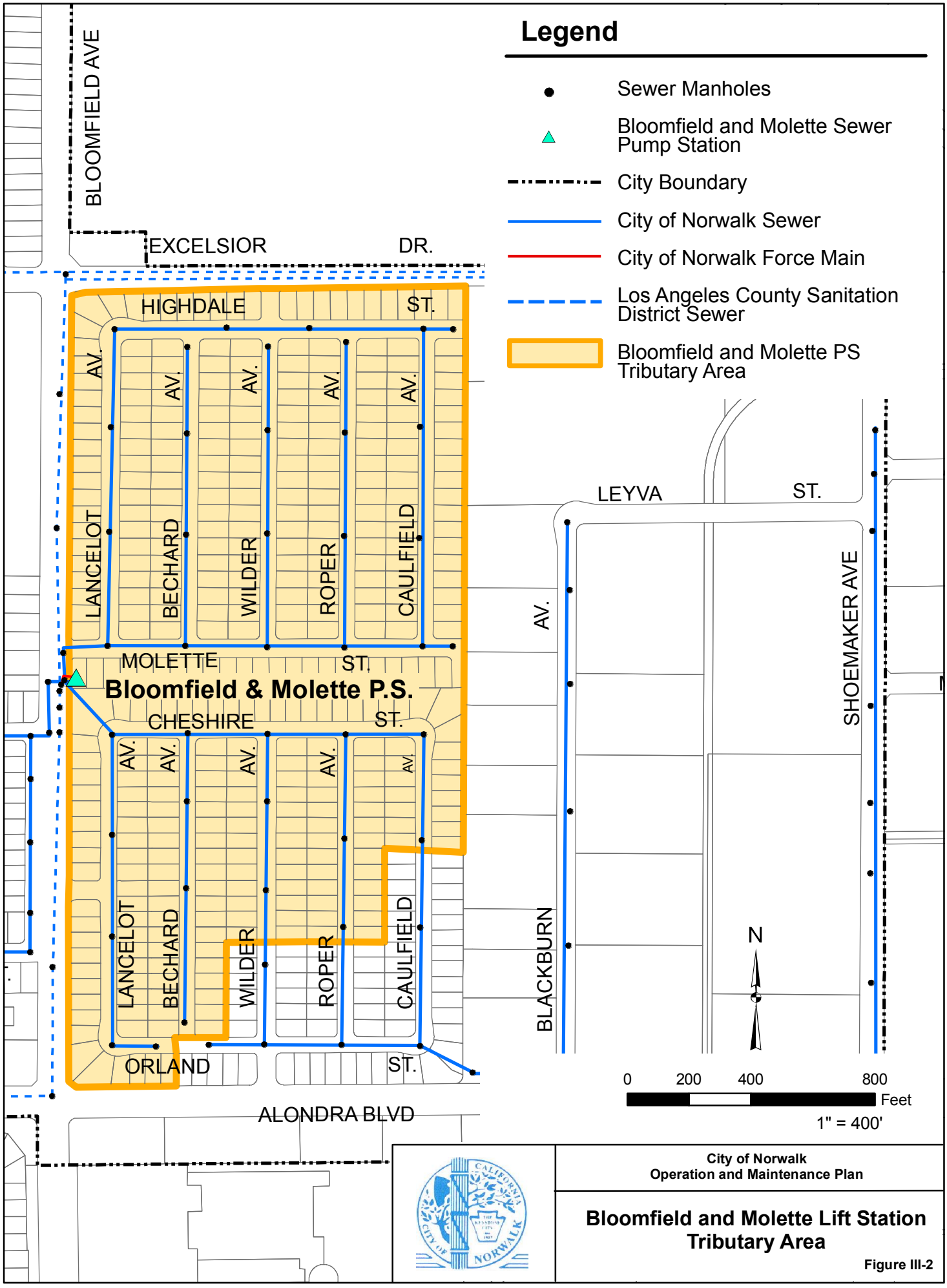
Bloomfield / Molette Lift Station (No. 2)

The Bloomfield/Molette Lift Station is a submersible station located at 15402 Bloomfield Avenue (east of Bloomfield Avenue and south of Molette Street).

The current lift station was constructed in 1999 by converting the dry well of the previous lift station to the current wet well. A valve vault housing the check valves and isolation valves, as well as a bypass pumping connection was added.

Service Area

The 65 acre service area (gross area), shown on Figure III-2, is located east of Bloomfield Avenue between Excelsior Drive and Alondra Boulevard. The easterly boundary is located east of Caulfield Avenue between Excelsior Drive and north of Hayford Street, then moves westerly along the lot lines between Caulfield Avenue, Roper Avenue, Wilder Avenue, Bechard Avenue to Alondra Boulevard. The entire tributary land use is single family residential.



City of Norwalk
Operation and Maintenance Plan

Bloomfield and Molette Lift Station Tributary Area

Figure III-2

Tributary Flows

The existing average dry weather flow tributary to the pump station is estimated at 88 gpm based upon a unit flow factor of 1800 gpd/ac for single family residential areas. The existing peak dry weather flow and peak wet weather flow is estimated at 172 gpm and 264 gpm, respectively.

The ultimate average, peak dry weather, and peak wet weather flows are estimated at 92 gpm, 179 gpm, and 275 gpm, respectively. The unit flow factor was increased to 1870 gpd/ac for a single family residential area.

Wet Well

The wet well is a polyurethane lined rectangular reinforced concrete structure of 10'-6" width and 9'-6" length. Its capacity is 746 gallons per foot. The invert elevation is 55.17 feet, and the top elevation is 75.50 feet. The invert elevation of the 10-inch diameter influent sewer is 59.8 feet at the wet well entrance.

The volume available between the high water alarm elevation of 59.00 feet and the centerline of the influent sewer (60.22 ft) is 597 gallons. This provides only four (4) minutes of storage during the peak dry weather flow, and three (3) minutes of storage during the peak wet weather flow before the influent sewer is surcharged. The desired emergency storage volume is 6,730 gallons, which would result in a high water level of 67.55 feet in the wet well, if the influent sewer system storage is not included. While this lift station has a standby generator and a manual transfer switch that can power it during a commercial power outage, the existing storage does not provide adequate response time for connecting the generator and placing it in service. The emergency storage volume should be increased following a detailed study of the tributary system and the storage available in the system.

Access to the wet well is through a ladder at the north east corner of the wet well, which has a 2'-0"x2'-6" hatch over it. Access to the pumps is through a double leaf hatch located over the pumps at the west end of the wet well.

Pumps

The lift station has two slide rail submersible vortex pumps, each rated at 200 gpm capacity, 15 feet of TDH at 1150 rpm.

The lead pump is set to start at 57.75 feet and stop at 56.75 feet. The minimum cycling time within this one foot operating range is approximately 30 minutes (two starts per hour) even with one pump out of service, which is well within the desired range (less than 6 starts per hour). The pumps are alternated following each shut down.

The firm capacity of the pump station is 200 gpm which exceeds the estimated ultimate peak dry weather flow of 179 gpm. However, it is less than the estimated ultimate peak wet weather flow of 275 gpm. When the pumps are replaced, the capacity should be increased to 300 gpm so that the entire peak wet weather flow can be pumped by a single pump.

Force Main

The 6-inch Class 350 DIP force main is approximately 42 feet long. It discharges sewage to a City manhole located on Bloomfield Avenue, before being conveyed by gravity to a 48-inch VCP trunk sewer belonging to the LACSD flowing north to south on Bloomfield Avenue.

The force main invert elevation of 71.92 feet in the valve vault is higher than the terminal invert elevation of 68.78. An air release and vacuum relief valve is not present.

The discharge piping includes a 4-inch female Camlock adaptor for force main by-pass in the valve vault, which can be used in case of force main failure past the valve vault. However, there is not an isolation valve downstream of the bypass connection.

Controls

The operation of the lift station is controlled by the wastewater level in the wet well, as sensed by a level transducer. The bubbler system that was part of the previous installation is maintained for connection if the ultrasonic sensor fails.

The operational settings are as follows:

Lead Pump On	2.58 ft
Lead Pump Off	1.58 ft
Lag Pump On	3.33 ft
Lag Pump Off	1.58 ft
High Level Alarm	3.83 ft
Low Level Alarm	1.43 ft

The settings can be changed through the Mercoid Pump Controller housed in the Pump Control Panel enclosure. High and low level alarms are activated by float switches. The actual field settings appear to be lower than the settings indicated on the plans, with the pump off levels lower than desirable. These should be verified and reset if necessary.

Telemetry

The lift station has a telephone dialer, which dials an outside service (ADT) in case of an alarm condition. These include phase and power failure, high and low wet well levels, motor seal failure, and intrusion into the motor control center. Alarm conditions also activate an exterior red light and a bell.

Outside service notifies the City personnel for verification of the alarm condition, and corrective action.

Power Service

The electric power is provided through an overhead service to the utility pole located in the south east corner of the property. The service is 120/240 volt, 3 phase, and 4 wire. The City maintains a portable diesel engine generator at the station. The generator cables are stored in the motor control center enclosure. The generator connection is located on the north side of the enclosure, and the manual transfer switch is located within the enclosure.

Condition Evaluation

The lift station is currently in good condition. No immediate improvements are needed for condition. The emergency storage should be evaluated and increased to provide 30 minutes of storage during the peak wet weather flows.

Harvard / Gridley Pump Station No. 3

The Harvard/Gridley Lift Station is a submersible station located at 11402 Harvard Avenue, at the north easterly corner of its intersection with Gridley Road.

The current lift station was constructed in 1997. It consists of an 8-foot diameter wet well with two slide rail submersible vortex pumps; a valve vault containing the discharge check and isolation valves and a force main bypass connection; and a 6-inch ductile iron force main.

Service Area

The 130 acre service area (gross area), shown on Figure III-3, is located between Alondra Boulevard to the north and 166th Street to the south. Cerritos College property forms the westerly boundary. Easterly boundary is along the east of Flallon Avenue and Maidstone Avenue. The tributary land use consists of 117.9 acres of single family residential (715 dwelling units), 2.4 acres of high density residential, 4.8 acres of mobile home park (52 units), and 4.9 acres of commercial.

Tributary Flows

The existing average dry weather flow tributary to the pump station is estimated at 90 gpm based on 1800 gpd/ac for low density residential areas, 3200 gpd/ac for high density residential areas, and 1000 gpd/ac for commercial land uses. The existing peak dry weather flow and peak wet weather flow is 172 gpm and 264 gpm, respectively.

The ultimate average, peak dry weather, and peak wet weather flows are estimated at 93 gpm, 182 gpm, and 280 gpm, respectively. The unit flow factors were increased to 1870 gpd/ac for low density residential areas, 3300 gpd/ac for high density residential areas, and 1050 gpd/ac for commercial areas.

Legend

- Sewer Manholes
- Harvard & Gridley Sewer Pump Station
- City Boundary
- City of Norwalk Sewer
- City of Norwalk Force Main
- Los Angeles County Sanitation District Sewer
- Harvard & Gridley PS Tributary Area

FAIRFORD
GRAYSTONE
LONGWORTH
HAYFORD
ST.
ALONDRA BLVD
HAYFORD
160TH
ALGARDI
161ST
162ND
163RD
CHESTERTON
164TH
CEDARVALE
165TH
AV.
BAYLOR DR
COLLEGE
DR
DARTMOUTH
DR
ELMHURST
JERSEY
AV.
ELMHURST DR
CHESTERTON ST.
FACULTY DR
CEDARVALE ST
HARVARD DR
FLALLON
PIONEER BLVD
MAIDSTONE
AV.
RD
ALORA
GRAYSTONE
LONGWORTH
HARVEST
GRIDLEY
SYLVANWOOD
MCRAE
GARD
166TH ST
Harvard & Gridley P.S.

N

0 200 400 800 Feet

1" = 400'

City of Norwalk
Operation and Maintenance Plan

Harvard and Gridley Lift Station Tributary Area

Figure III-3

Wet Well

The wet well is a polyurethane lined reinforced concrete structure with diameter of 8 feet. Its capacity is 375 gallons per foot. The invert elevation is 39.70 feet, and the top elevation is 66.90 feet. The invert elevation of the 12-inch diameter influent sewer is 50.77 feet at the wet well entrance.

The volume available between the high water alarm elevation of 46.70 feet and the centerline of the influent sewer (51.27 feet) is 1,716 gallons. This provides only five (5) minutes of storage during the peak dry weather flow, and four (4) minutes of storage during the peak wet weather flow before the influent sewer is surcharged. The desired emergency storage volume is 12,750 gallons, which cannot be provided within the existing wet well. Because the City would have to transport a generator to this site in case of a commercial power outage, the emergency storage volume should be increased following a detailed study of the tributary system and the storage available in the system.

Access to the wet well is through a 48 inch diameter opening over the pumps. This opening has two concentric manhole covers (Alhambra Plate A-1516).

There is an 8-inch overflow line between the manhole just upstream (south) of the wet well (invert elevation 62.70 feet) and the force main terminal manhole (invert elevation 62.50 feet).

Pumps

The lift station has two 7.5 HP slide rail submersible vortex pumps, each rated at 380 gpm capacity, 24 feet of TDH at 1150 rpm.

The lead pump is set to start at 4 feet and stop at 2 feet. The minimum cycling time within this two foot operating range is approximately 7.9 minutes (7.5 starts per hour) with one pump out of service. This exceeds the recommended 6 starts per hour for this size motor. The pumps are alternated following each shut down. Therefore, when both pumps are available, they would start less than four times per hour. Therefore, if one pump is out for service and a spare pump has not been installed the start setting should be changed to 4.6 feet to keep the pump cycling to less than 6 per hour.

The firm capacity of the pump station is 380 gpm which exceeds the existing and ultimate estimated peak wet weather flows of 182 gpm and 280 gpm. Therefore, the existing pump station firm capacity is adequate.

Force Main

The 6-inch Class 350 DIP force main is approximately 70 feet long between the valve vault and the terminal manhole. It discharges sewage to a City manhole located at the intersection of Gridley Road and Harvard Avenue.

The force main has the same invert elevation of 61.48 feet between the wet well and the terminal manhole.

The discharge piping includes a 4-inch female Camlock adaptor for force main by-pass in the valve vault, which can be used in case of force main failure past the valve vault. However, there is not an isolation valve downstream of the bypass connection.

Controls

The operation of the lift station is controlled by the wastewater level in the wet well, as sensed by a transducer. The bubbler system that was part of the previous installation is maintained for connection if the transducer fails.

The operational settings are as follows:

Lead Pump On	4.00 ft
Lead Pump Off	2.00 ft
Lag Pump On	5.60 ft
Lag Pump Off	2.00 ft
High Level Alarm	7.00 ft
Low Level Alarm	1.00 ft

The settings can be changed through the Mercoid Pump Controller housed in the Pump Control Panel enclosure. High and low level alarms are activated by float switches.

Telemetry

The lift station has a telephone dialer, which dials an outside service (ADT) in case of an alarm condition. These include phase and power failure, high and low wet well levels, motor seal failure, and intrusion into the motor control center. Alarm conditions also activate an exterior red light and a bell.

Outside service notifies the City personnel for verification of the alarm condition, and corrective action.

Power Service

The electric power is provided through an underground service, which starts at a utility pole on the west side of Gridley Road north of Harvard Drive. The utility meter and the manual transfer switch are located behind the motor control center within the same outside enclosure. The service is 120/240 volt, 3 phase, and 4 wire. The City does not have a standby generator at this site. However, a portable generator connection is available.

Condition Evaluation

The lift station is eleven years old, and is generally in good condition. No immediate improvements are needed for condition. The emergency storage should be evaluated and increased to provide 30 minutes of storage during the peak wet weather flows.

B. Closed Circuit Television Inspections

Empire Pipe Cleaning and Equipment, Inc. performed CCTV inspection work on approximately 100,154 feet of pipe between May 2008 and August 2008. Thirty-two (32) DVDs with inspection reports for 427 reaches were produced. Each inspection report lists the service connections and deficiencies by location in the inspected pipe. Photographs of the identified deficiencies are included in the inspection reports.

The locations of the sewers with completed CCTV inspections are shown on Figure III-4. The locations were selected to give a good overall representation of the City's gravity sewer system. Some of the known hot spots were included in this first year of inspection. The CCTV inspected sewer pipes range in size from 8-inches to 15-inches in diameter. All pipes inspected were made of vitrified clay pipe.

National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) coding procedures formed the basis of the inspection work and reports prepared by Empire.

Legend

- Tributary Area Boundary
- City of Norwalk Sewer
- LACSD Sewer
- CCTV Location 2008

N

1000' 500' 0' 1000' 2000'

APROX. SCALE IN FEET

CCTV Locations 2008
Figure III–4

C. Inspection Report Database Summary

An Inspection Report Database Summary (see Table III-1) was developed utilizing the CCTV inspection written reports. This Database Summary contained a tabulation of the deficiencies identified in the written reports, including the following information:

- Media Label (DVD Identification)
- Inspection Identification
- Run Number
- Drainage Area Identification
- CCTV Date
- Location (Street Name)
- Upstream Manhole, Downstream Manhole and Sewer Pipe Identification Numbers
- Direction of Camera
- Pipe Size and Material
- CCTV Inspected Length of Pipe
- Deficiency Tabulation using PACP codes

D. Review of Representative CCTV Recordings

The Inspection Report Database Summary was used in selecting the recordings to be reviewed in detail. The pipe reaches selected for detailed review were primarily those that showed the most severe structural problems and multiple deficiencies, as well as severe operation and maintenance issues.

First, any reaches that listed deficiencies such as deformed pipe, hole in pipe, broken pipe, and large offset joint were selected for review. These deficiencies can be a cause of sanitary sewer collapse, overflow or exfiltration into the surrounding soil and may need immediate attention. Next, reaches that had numerous or multiple deficiencies such as fractures, cracks, roots, deposits, obstructions, sags, camera underwater, and survey abandoned were selected. Finally, several reaches without listed deficiencies were selected in order to develop insight into the overall condition of the CCTV inspected system.

Recordings for 10,637 feet of pipe (10.6% of total inspected) were selected and reviewed in detail.

E. Condition Grading

The PACP condition grading system was used to assign a condition rating for structural defects and operation and maintenance defects for each reach of pipe. The rating provides the ability to quantitatively measure the difference in pipe condition between one inspection and subsequent inspections, and to prioritize among different pipe segments. A grade of 1 to 5 is assigned to each defect based on potential for further deterioration or pipe failure. Pipe failure is defined as when it can no longer convey the design capacity.

Table III-1
CCTV Database Summary

Media Label (DVD No)	Inspection No.	Run Number	Drainge Area	DVD Watched? (Y)	Street Name	CCTV Date	Pipe ID	Manhole Start	Manhole End	Direction of Camera	Pipe Size (in)	Pipe Mat	CCTV Length (ft)	Crack C L 2	Crack C C 1	Crack C M 3	Crack C S 2	Fracture F L 3	Fracture F C 2	Fracture F M 4	Broken B SV 5	Broken B VV 5	Joint J OM 3	Point Repair RP 4	Sags 2	Total Structural Defects	Total Structural Defect Score	Structural Defect Index	O&M: Deposits D AGS 2	%	AE 2	%	Other 3	%	Roots (R) Fine (F) B 2	Fine (F) L 1	Fine (F) J 1	Fine (F) C 1	Medium (M) B 4	Medium (M) L 3	Medium (M) J 3	Ball (B) B 5	Ball (B) L 4	Ball (B) C 4	Vermin R 2	Total O&M Defects	Total O&M Defect Score	O&M Defect Index	Construction Features: Tap (Lateral) T FD 2	T BI 3	T BA	Line L D 2	Line L L 2	Miscellaneous M SA	M CU 4	M MC	Structural Priority	Structural Ranking	O&M Ranking	Comments	Recommendation
R311-006	3	003	1	Y	Graystone Ave	5/30/2008	24A-23	24A	23	D/S	8	VCP	163.6			1				1	1	1				4	17	4.3																		0	0	0.0									Severe	1			Replace
R311-012	10	010	16e	Y	Front St	6/9/2008	101-7	101	7	D/S	8	VCP	296.7								1	1				2	10	5.0																		0	0	0.0									Severe	2			Replace or Spot repair
R311-017	1	001	47b	Y	Hayford St	6/20/2008	49-48	49	48	D/S	8	VCP	334.2	5	1	10		3		3						22	62	2.8																		0	0	0.0									Major	3			Replace
R311-010	10	010	16e	Y	Firestone Blvd	6/5/2008	81-80	81	80	D/S	8	VCP	275.2	2	1	6		1		2					7	19	48	2.5																		0	0	0.0							2		Major	4			Replace
R311-020	12	001	47b	Y	Barwall St	7/18/2008	32-31	32	31	U/S	8	VCP	353.7	13		3		4								20	47	2.4																		0	0	0.0									Major	5			Replace
R311-007	11	004	12	Y	Ohm Ave	6/2/2008	285-284	285	284	D/S	8	VCP	344.9	3		8		6								17	48	2.8												1						1	3	3.0									Major	6	69		Replace
R311-028	3	008	12	Y	Imperial Hwy	7/30/2008	153-152	153	152	D/S	8	VCP	194.3	1	8	4			1	2						16	32	2.0																		0	0	0.0									Major	7			Replace
R311-004	7	009	1	Y	Longworth Ave	5/27/2008	40-39	40	39	D/S	8	VCP	221.5	1		3		3	1	1						9	26	2.9																		0	0	0.0									Major	8			Replace
R311-018	11	011	47b	Y	Nava St	7/16/2008	44-43	44	43	D/S	8	VCP	350.7	21	1	8		2								32	73	2.3																		0	0	0.0									Major	9			Replace
R311-019	4	004	47b	Y	Nava St	7/17/2008	43-42	43	42	D/S	8	VCP	354.3	17		14		1		1						33	83	2.5																		0	0	0.0									Major	10			Replace
R311-007	14	001	12	Y	Foix Ave	6/2/2008	222-221	222	221	D/S	8	VCP	332.5		1	5		4								10	28	2.8									6					1				7	11	1.6									Major	11	1		Immediately clear ball roots and later replace
R311-026	9	009	39	Y	Firestone Blvd	7/28/2008	3-2	3	2	D/S	8	VCP	352.2	12	2	6		1		1						22	51	2.3									8									8	8	1.0								1	Major	12	81		Replace
R311-005	7	010	1	Y	Graystone Ave	5/28/2008	27-26	27	26	D/S	8	VCP	353.9	5		4		3								12	31	2.6																		0	0	0.0									Major	13			Replace
R311-004	15	001	6	Y	Easement	5/27/2008	2-1	2	1	D/S	12	VCP	349.7		1	57										58	172	3.0									1									1	1	1.0									Major	14	95		Replace
R311-032	5	008	52a	Y	Harvard Dr	8/7/2008	2-1	2	1	D/S	10	VCP	205.6					1	2							3	7	2.3																		0	0	0.0									Major	15			Replace
R311-004	3	013	6	Y	Easement	5/27/2008	3-2	3	2	D/S	12	VCP	348.2			48										48	144	3.0																		0	0	0.0									Major	16			Replace
R311-019 2	1	010	47b	Y	Barwall St	7/17/2008	33-32	33	32	D/S	8	VCP	333.6	26		16										42	100	2.4																		0	0	0.0									Major	17			Replace
R311-030	13	001	38c	Y	Dartmoor Ave	8/1/2008	28-27	28	27	D/S	8	VCP	267.4			32				1						33	100	3.0																		0	0	0.0									Major	18			Replace
R311-005	6	011	1	Y	Easement	5/28/2008	10-9	10	9	D/S	15	VCP	291.1	3		35										38	111	2.9																		0	0	0.0									Major	19			Replace
R311-005	14	003	1		Harvest Ave	5/28/2008	47-5	47	5	D/S	8	VCP	232.2	1		4		3								8	23	2.9																		0	0	0.0			1						Moderate	20			
R311-007	12	003	12		Ohm Ave	6/2/2008	286-285	286	285	D/S	8	VCP	307.5		1	3		2		1						7	20	2.9																		0	0	0.0									Moderate	21			
R311-015	9	007	38c		Easement	6/19/2008	44-42	44	42	U/S	8	VCP	367.3					1	2							3	7	2.3																		0	0	0.0			1					4	Moderate	22			
R311-018	7	007	47b	Y	Hayford St	7/16/2008	48-47	48	47	U/S	8	VCP	355	7		3				3						13	35	2.7																		0	0	0.0									Moderate	23			
R311-018	8	008	47b		Hayford St	7/16/2008	47-46	47	46	D/S	8	VCP	353.5	10	1	13		1								25	63	2.5																		0	0	0.0									Moderate	24			
R311-008	5	005	12		Newmire Ave	6/3/2008	37-35	37	35	D/S	8	VCP	242.6		5	26										31	83	2.7																		0	0	0.0			1						Moderate	25			
R311-007	8	007	12		Downey Norwalk Rd	6/2/2008	223-215	223	215	D/S	8	VCP	326.1	6	3	9		1								19	45	2.4																		0	0	0.0			2						Moderate	26			
R311-018	9	009	47b		Hayford St	7/16/2008	46-13	46	13	D/S	8	VCP	353.7	8	1	9				1						19	48	2.5																		0	0	0.0									Moderate	27			
R311-002	4	014	6		Easement	5/21/2008	7-6	7	6	D/S	8	VCP	197.4		1	21										22	64	2.9																		0	0	0.0									Moderate	28			
R311-019	2	002	47b		Lowemont St	7/17/2008	39-38	39	38	D/S	8	VCP	352.9	8	3	10										21	49	2.3																		0	0	0.0									Moderate	29			
R311-020	7	006	47b		Molette St	7/18/2008	27-26	27	26	D/S	8	VCP	355	9		11										20	51	2.6																		0	0	0.0									Moderate	30			
R311-008	4	004	12		Newmire Ave	6/3/2008	30-29	30	29	D/S	8	VCP	107.7	8	3	7										18	40	2.2																		0	0	0.0									Moderate	31			
R311-019	8	008	47b	Y	Cheshire St	7/17/2008	35-34	35	34	D/S	8	VCP	353.8	8		10										18	46	2.6													1		1			2	7	3.5									Moderate	32	7		Notify homeowners of ball roots in laterals
R311-020	8	005	47b		Molette St	7/18/2008	28-27	28	27	D/S	8	VCP	353.8	5	4	9										18	41	2.3																		0	0	0.0									Moderate	33			
R311-028	2	009	12		Imperial Hwy	7/30/2008	152-151	152	151	D/S	8	VCP	134.6	2	3	12										17	43	2.5																		0	0	0.0									Moderate	34			
R311-007	13	002	12	Y	Foix Ave	6/2/2008	221-220	221	220	D/S	8	VCP	253.3	6		8		1								15	39	2.6									5				1		1			7	12	1.7			1						Moderate	35	8		Notify homeowners of ball roots in laterals; root treat and cut
R311-002	3	015	6		Easement	5/21/2008	6-5	6	5	D/S	8	VCP	202.3		2	14										16	44	2.8																		0	0	0.0									Moderate	36			
R311-008	6	006	12		Newmire Ave	6/3/2008	35-34	35	34	D/S	8	VCP	208.8		2	14										16	44	2.8								1										1	1	1.0									Moderate	37	106		
R311-008	3	003	12		Newmire Ave	6/3/2008	37-30	37	30	D/S	8	VCP	252	2	3	10										15	37	2.5																		0	0	0.0									Moderate	38			
R311-031	12	001	38c		Easement	8/4/2008	33-32	33	32	D/S	8	VCP	274.7			15										15	45	3.0								1	7			1						9	11	1.2			1						Moderate	39	58		Root treat and cut
R311-003	1	017	6		Easement	5/22/2008	4-3	4	3	D/S	12	VCP	271.9		2	12										14	38	2.7								1										1	1	1.0									Moderate	40	107		
R311-003	6	012	6		Bombardier Ave	5/22/2008	72A-4	72A	4	D/S	8	VCP	270.8			14										14	42	3.0									31									31	31	1.0									Moderate	41	79		Root treat and cut
R311-019	9	009	47b		Cheshire St	7/17/2008	34-16	34	16	D/S	8	VCP	355.3	3	3	8										14	33	2.4																		0	0	0.0									Moderate	42			
R311-020	6	007	47b		Molette St	7/18/2008	26-18	26	18	D/S	8	VCP	355.2	3	1	10										14	37	2.6																		0	0	0.0									Moderate	43			
R311-018	10	010	47b		Nava St	7/16/2008	45-44	45	44	D/S	8	VCP	337.2	7		6				1						14	36	2.6																	1	1	2	2.0									Moderate	44			
R311-008	7	007	12		Newmire Ave	6/3/2008	34-33	34	33	D/S	8	VCP	175.4		2	10				1						13	36	2.8																		0	0	0.0			1						Moderate	45			
R311-018	12	012	47b		Lowemont St	7/16/2008	41-40	41	40	D/S	8	VCP	346.5	8	2	2				1						13	28	2.2								1	2									3	3	1.0									Moderate	46	89		
R311-005	10	007	1		Graystone Ave	5/28/2008	30-29	30	29	D/S	8	VCP	302.4	6		1		2								9	21	2.3																		0	0	0.0									Moderate	47			
R311-006	8	008	12		Newmire Ave	5/30/2008	288-287	288	287	D/S	8	VCP	276.1			7		1		1						9	28	3.1																		0	0	0.0									Moderate	48			
R311-004	11	005	1		Gridley Rd	5/27/2008	50-3	50	3	D/S	8	VCP	312.8		1	6				1						8	23	2.9																		0	0	0.0									Moderate	49			
R311-005	8	009	1		Graystone Ave	5/28/2008	28-27	28	27	D/S	8	VCP	353.1	4		3			1							8	19	2.4																		0	0	0.0	1								Moderate	50			
R311-026	7	011	39		Firestone Blvd	7/28/2008	23-22	23	22	U/S	8	VCP	274.1	7				1								8	17	2.1																		0	0	0.0									Moderate	51			
R311-001	9	004	6		Easement	5/19/2008	10-9	10	9	D/S	8	VCP	234.6	2	1	10										13	35	2.7												1			2			3	11	3.7									Moderate	52	37		Notify homeowners of ball roots in laterals
R311-002	11	007	6		Easement	5/21/2008	77-76	77	76	D/S	8	VCP	90.3		3	10										13	33	2.5																		0	0	0.0									Moderate	53			
R311-008	1	001	12		Angell St	6/3/2008	32-30	32	30	D/S	8	VCP	353	7		6										13	32	2.5																		0	0	0.0									Moderate	54		Original CCTV data said D/S MH was MH 31. D/S MH is actually MH 30.	
R311-020	11	002	47b		Barwall St	7/18/2008	31-30	31	30	D/S	8	VCP	353.2	10	2	1										13	25	1.9																		0	0	0.0									Moderate	55			
R311-001	11	002	6		Easement	5/19/2008	11-10	11	10	D/S	8	VCP	146.9	3		9										12	33	2.8												1						1	3	3.0									Moderate	56	70		
R311-001	12	001	6	Y	Easement	5/19/2008	12-11	12	11	D/S	8	VCP	163	2	2	8										12	30	2.5								1			1							2	5	2.5									Moderate	57	6		Root treat and cut
R311-008	9	009	12		Newmire Ave	6/3/2008	33-23	33	23	D/S	8	VCP	239.8		2	10										12	32	2.7																		0	0	0.0									Moderate	58			
R311-019	3	003	47b		Lowemont St	7/17/2008	38-15	38	15	D/S	8	VCP	353.8	5		7										12	31	2.6															1			1	4	4.0									Moderate	59	46		Notify homeowners of ball roots in laterals
R311-025	6	014	39		Greenstone Ave	7/25/2008	8-7	8	7	D/S	8	VCP	235	1	4	7										12	27	2.3									3									3	3	1.0									Moderate	60	87		Root treat and cut
R311-031	11	002	38c		Easement	8/4/2008	32-31	32	31	D/S	8	VCP	220.7			12										12	36	3.0								1	7									8	8	1.0									Moderate	61	82		Root treat and cut
R311-002	12	006	6		Easement	5/21/2008	78-77	78	77	D/S	8	VCP	97		2	9										11	29	2.6								1										1	1	1.0									Moderate	62	108		
R311-005	3	002	1		Harvest Ave	5/28/2008	48-47	48	47	D/S	8	VCP	228.6	6	2	3										11	23	2.1																		0	0	0.0									Moderate	63			
R311-019	6	006	47b		Cheshire St	7/17/2008	37-36	37	36	D/S	8	VCP	342.1	8	2	1										11	21	1.9																		0	0	0.0									Moderate	64			
R311-023	1	009	47b		Pioneer Blvd	7/23/2008	8-7	8	7	D/S	8	VCP	240.4			11										11	33	3.0																		0	0	0.0									Moderate	65			
R311-006	1	001	6		Easement	5/30/2008	1-C795	1	C795	D/S	12	VCP	344.2		1	9									4	14	36	2.6																		0	0	0.0							2		Moderate	66			
R311-008	2	002	12		Branscomb St	6/3/2008	38-37	38	37	D/S	8	VCP	288.4	9		1										10	21	2.1																		0	0	0.0									Moderate	67			
R311-019	5	005	47b		Nava St	7/17/2008	42-14	42	14	D/S	8	VCP	352.2	4		6										10	26	2.6																		0	0	0.0									Moderate	68			
R311-026	8	010	39		Firestone Blvd	7/28/2008	2-1	2	1	D/S	8	VCP	140.3	2	2	6										10	24	2.4																		0	0	0.0									Moderate	69			
R311-005	11	006	1		Graystone Ave	5/28/2008	31-30	31	30	D/S	8	VCP	252.1	6		3										9	21	2.3																		0	0	0.0			1						Moderate	70			
R311-010	2	002	16e		Sproul St	6/5/2008	78-77	78	77	D/S	8	VCP	345.3	4		4	1									9	22	2.4								3										3	3	1.0									Moderate	71	104		

The grades are as follows:

5 – Immediate Attention	Defects requiring immediate attention
4 – Poor	Severe defects that will become Grade 5 defects within the foreseeable future
3 – Fair	Moderate defects that will continue to deteriorate
2 – Good	Defects that have not begun to deteriorate
1 – Excellent	Minor or no defects

A truly continuous defect is defined as a defect that extends more than 3 feet. A repeated continuous defect is defined as a defect that occurs in a length of pipe in at least 75 percent of the joints (i.e. 3 out of 4 joints).

The joint length (distance between pipe joints) of the pipes for each reach is included in the summary. For the truly and repeated continuous defects, the number of defects was calculated by dividing the length of continuous defect by the joint length. Each unit in the number of defects represents an occurrence of defect or a joint length of defective pipe.

The grade values for the most common defects are shown in Table III-2. For defects with variable grade values dependent on the degree of deficiency of the defect, an estimated average value was used.

The pipe rating is calculated by multiplying the number of occurrences of each defect by its condition grade and summing them. Ratings are calculated separately for structural defects and O&M defects.

The pipe ratings index is an indicator of the distribution of defect severity. It is calculated by dividing the pipe rating by the number of defects. Ratings indexes are calculated for structural and O&M defects separately.

Figure III-5 shows the number of reaches where an identified deficiency was found at least once within the reach. It provides a general sense of the magnitude of the problems that were found in the portion of the City's collection system that was CCTV inspected in 2008. The problems identified most often were cracks (191 reaches, 45% of total inspected) and fine roots (84 reaches, 20% of total inspected).

Figure III-6 plots the number of reaches versus the highest deficiency grades found in each reach. For example, there were 2 reaches found with at least one structural deficiency grade of 5 and 1 reach found with at least one operation and maintenance deficiency grade of 5.

Table III-2
Defect Codes and Condition Grades

Structural Defects		Grade
Crack - circumferential	CC	1
Crack - longitudinal	CL	2
Crack - multiple	CM	3
Crack - spiral	CS	2
Fracture - circumferential	FC	2
Fracture - longitudinal	FL	3
Fracture - multiple	FM	4
Fracture - spiral	FS	3
Broken - soil visible	BSV	5
Broken - void visible	BVV	5
Hole - soil visible	HSV	5
Hole - void visible	HVV	5
Deformed - horizontal	DH	5
Deformed - vertical	DV	5
Collapsed	XP	5
Joint Offset - medium	JOM	3[a]
Joint Offset - large	JOL	5[b]
Joint Separated - medium	JSM	1
Joint Separated - large	JSL	2
Joint Angular	JA	2
Surface Damage	S	2
Lining Failure	LF	3
Point Repair - defective	RPPD	4
Sags	MWLS	2

[a]PACP grade is 1. Grade is increased for this report.

[b]PACP grade is 2. Grade is increased for this report.

Operational & Maintenance / Construction Feature Defects		Grade
Deposits Attached - encrustation barrel	DAE	2
Deposits Attached - grease	DAGS	2
Deposits Attached - other	DAZ	3
Deposits Settled	DS	2
Deposits Ingress	DN	2
Roots Fine - barrel	RFB	2
Roots Fine - lateral	RFL	1
Roots Fine - joint	RFJ	1
Roots Fine - connection	RFC	1
Roots Tap - barrel	RTB	3
Roots Tap - lateral	RTL	2
Roots Tap - joint	RTJ	2
Roots Tap - connection	RTC	2
Roots Medium - barrel	RMB	4
Roots Medium - lateral	RML	3
Roots Medium - joint	RMJ	3
Roots Medium - connection	RMC	3
Roots Ball - barrel	RBB	5
Roots Ball - lateral	RBL	4
Roots Ball - joint	RBJ	4
Roots Ball - connection	RBC	4
Infiltration - weeper	IW	2
Infiltration - dripper	ID	3
Infiltration - runner	IR	4
Infiltration - gusher	IG	5
Obstacles	OB	4
Vermin	V	1
Tap (Lateral) factory made - defective	TFD	2
Tap (Lateral) break in - intruding	TBI	3
Tap (Lateral) break in - defective	TBD	3
Line	L	2
Intruding Sealing Material - ring hanging	ISSRH	4
Intruding Sealing Material - ring	ISSR	4
Miscellaneous - camera underwater	MCU	4
Miscellaneous - camera blocked	MSA	0

Figure III-5
Sewer Reaches with Identified Deficiencies

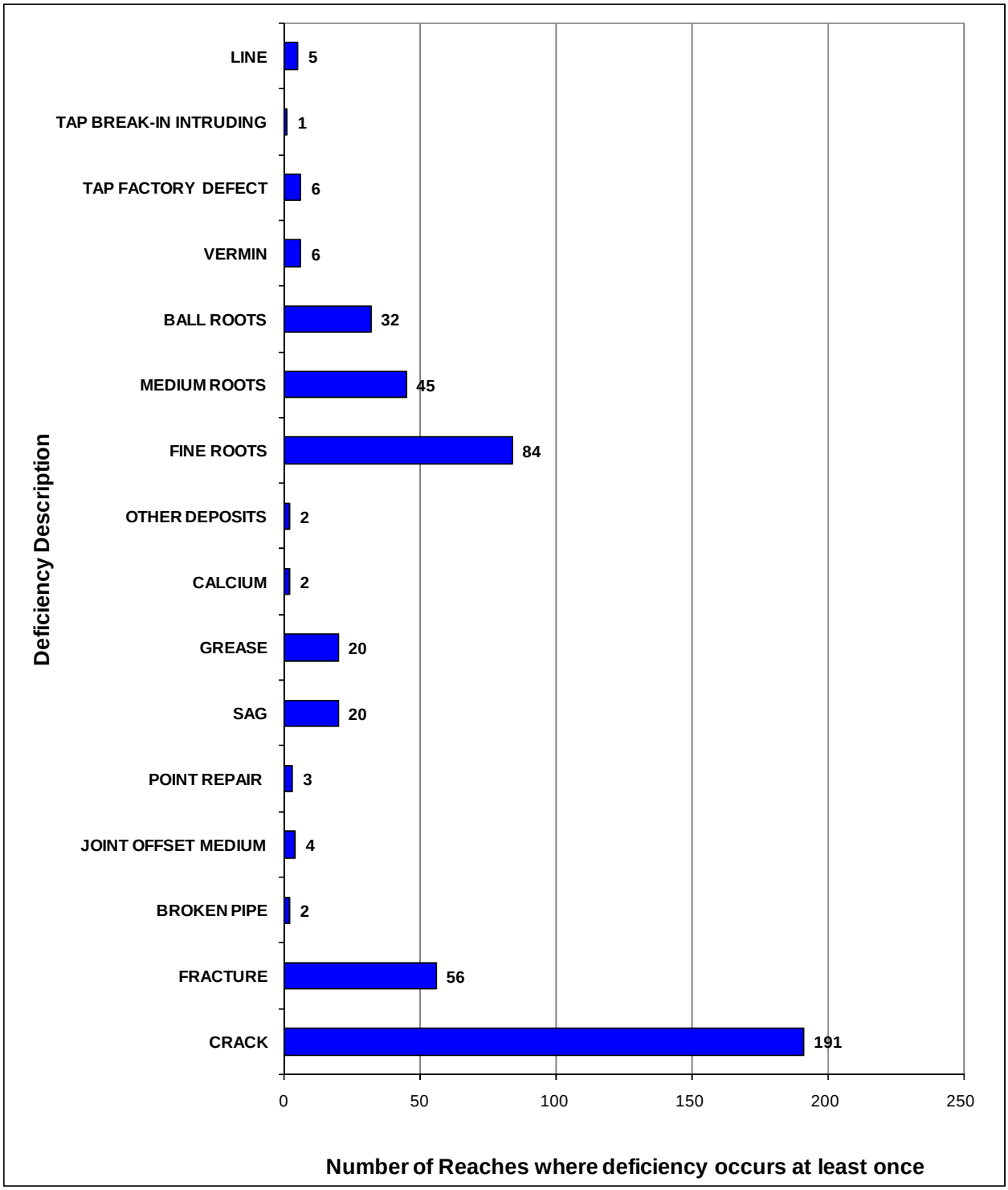
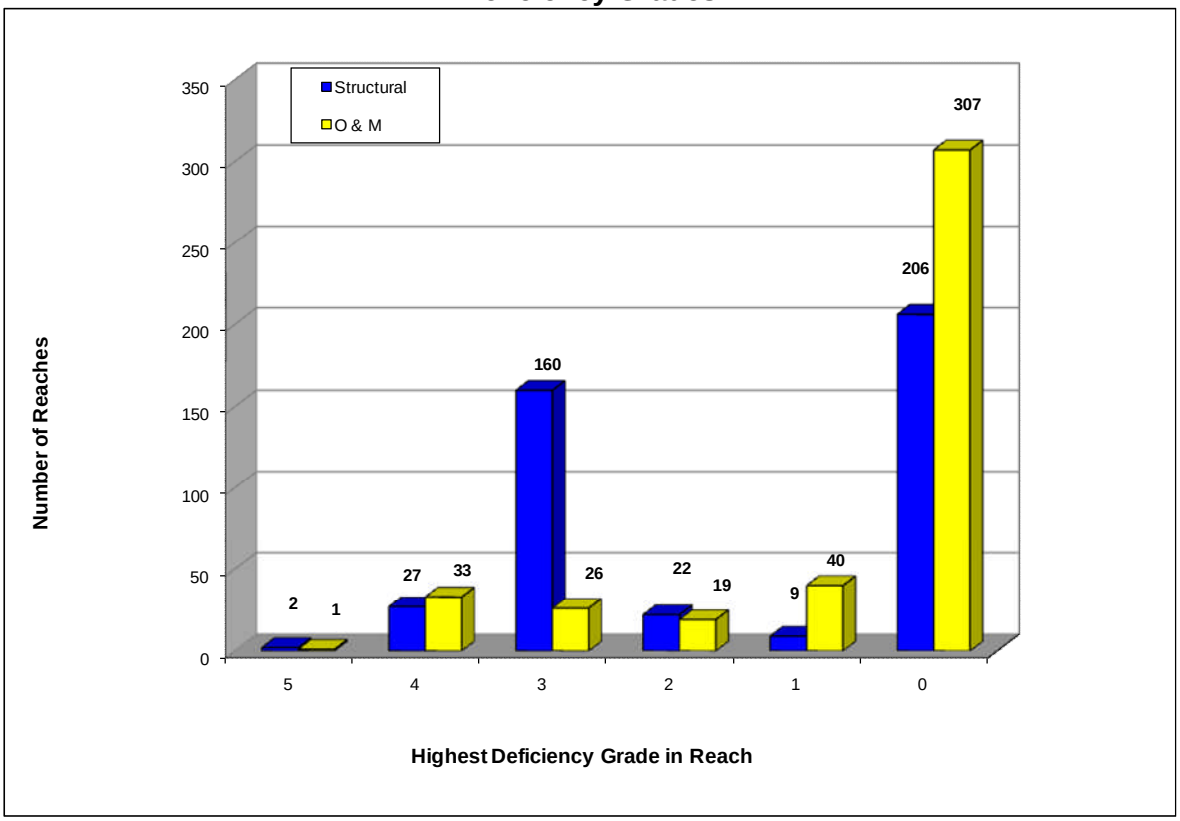


Figure III-6
Deficiency Grades



F. Rehabilitation/Replacement Priorities

The purpose of CCTV inspections and this study is to determine the condition of the City's existing gravity sewers, and formulate a rehabilitation plan for the defective sewers. The rankings provide a good indication as to which pipes are in poor condition, but cannot be relied upon solely to prioritize improvement projects. The priorities are selected primarily with consideration of the health and safety of the public and protection of the environment by minimizing the possibility of sanitary sewer overflows and leakage. The pipe capacity, location of particular defects, and the tributary areas/wastewater flow rates are other considerations used in formulating the final capital improvement project priorities.

The initial priorities for improvements to the sewers are based on the severity of the pipe defects. The six (6) categories utilized in this report are as follows:

a. Severe Condition – This category primarily includes structural defects of deformed pipe, hole in pipe, broken pipe, and large joint offsets.

b. Major Condition – This category primarily includes structural defects of multiple fractures, medium joint offsets and major sags. Pipes with a large number of cracks are also included.

c. Moderate Condition – Pipes in this category have fractures, cracks, small and medium joint offsets, and sags.

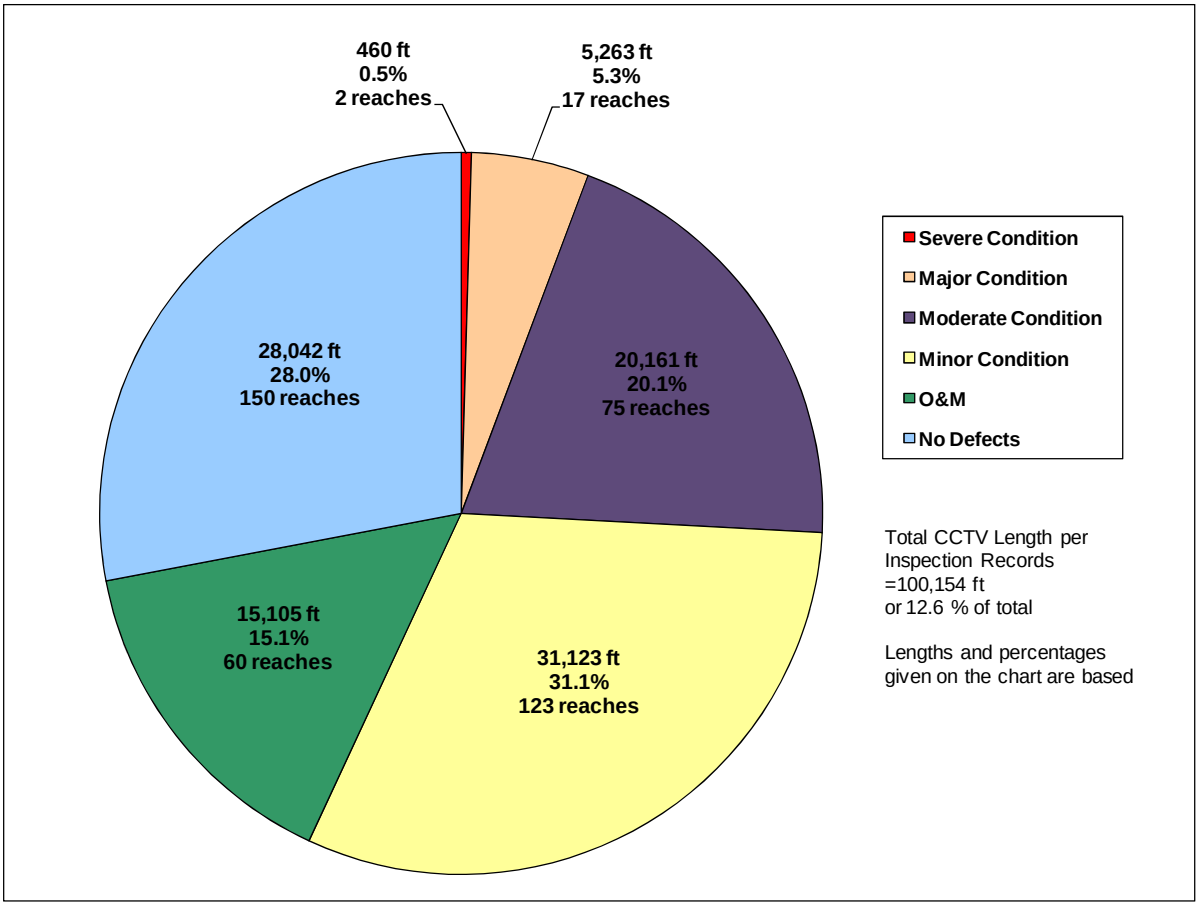
d. Minor Condition – Pipes in this category have slight sags, cracks, and small joint offsets.

e. O&M – This condition is for operational and maintenance problems and construction feature defects. There are no structural defects.

f. No Defects – This condition is for the pipe with no structural, operation and maintenance or construction feature defects.

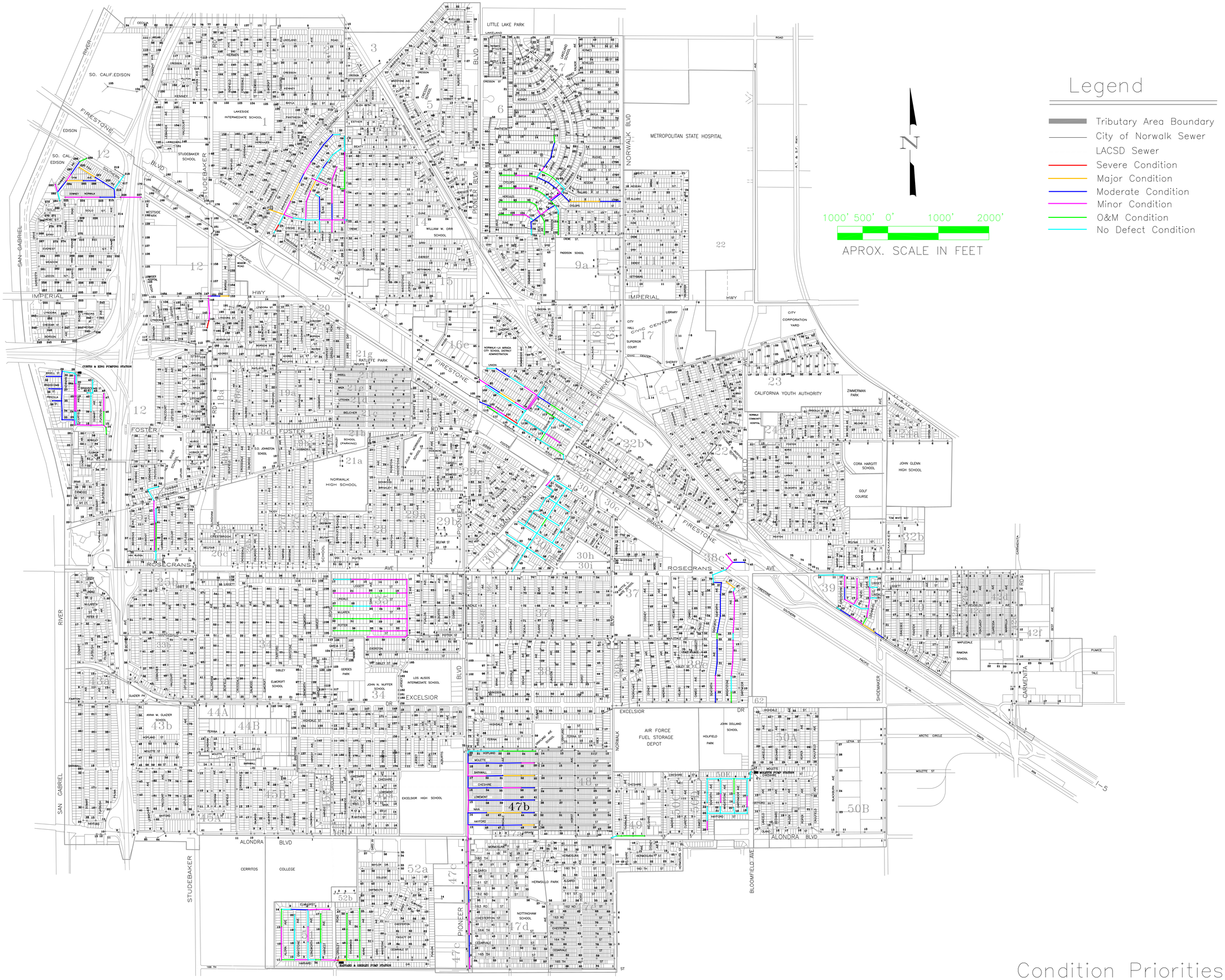
Figure III-7 shows the distribution of the condition ratings assigned to the CCTV Inspections. Figure III-8 shows the CCTV locations, color coded by rehabilitation/replacement priority.

Figure III-7
CCTV Inspection Priority Ratings



G. Replacement and Rehabilitation of Defective Sewers

The preliminary replacement and rehabilitation projects recommended are shown in Table III-1. These planning level recommendations are based upon the ranking and pipe defects from the CCTV Inspection Report, and reviews of recordings. Actual improvements will be designed based upon further detailed reviews of each recording, taking into consideration other factors such as location, age and flow capacity of the pipe, existing utilities, and concurrent infrastructure construction projects.



Condition Priorities
Figure III–8

H. Rehabilitation and Replacement Capital Improvement Program

The City will address the "Severe" and "Major" collection system deficiencies, and improve the pump stations. Table III-3 lists the project priorities assigned to the 19 reaches of collection system identified as in "Severe" or "Major" condition, as well as planning level implementation costs based upon October 2008 dollars. The collection system construction estimates are based upon replacement at $45 per diameter inch per foot of pipe. Implementation cost is determined by adding 35 percent of construction cost to cover engineering, inspection, and administration. The total estimated cost of upgrading the sewers with severe or major condition priorities is $3,099,884.

The City's comprehensive capital improvement program will include the rehabilitation and replacement improvements recommended by the Operation and Maintenance Plan and the System Evaluation and Capacity Assurance Plan (SECAP). The SECAP is currently under development. This Operation and Maintenance Plan will be updated as additional CCTV inspections are completed.

I. Follow-up CCTV Inspection and Condition Assessment Program

a. Portions of the system rated to be in **Severe Structural Deficiency** condition will be inspected **annually** and evaluated to determine if immediate corrective action is needed.

b. Portions of the system rated to be in **Major Structural Deficiency** condition will be CCTV inspected and evaluated once every **three (3) years**

c. Portions of the system rated to be in **Moderate Structural Deficiency** condition will be CCTV inspected and evaluated once every **five (5) years**

d. Portions of the system rated to be in **Minor Structural Deficiency** condition will be CCTV inspected and evaluated once every **ten (10) years**

e. Portions of the system with **no structural deficiencies** will be CCTV inspected and evaluated once every **ten (10) years**

f. Portions of the system with **Operational and Maintenance** deficiencies, except the **Hot Spots**, will be CCTV inspected and evaluated once every **four (4) years.**

g. **Hot Spots**, except siphons, will be CCTV inspected and evaluated after each cleaning.

As structural deficiency mitigation projects are implemented, their condition will be reclassified, and they will be included in the appropriate category for follow up CCTV inspection and condition assessment work.

Table III-3
Structural Replacement and Rehabilitation Program

Media Label (DVD No)	Inspection No.	Run Number	Drainge Area	DVD Watched? (Y)	Street Name	CCTV Date	Pipe ID	Manhole		Direction of Camera	Pipe			Structural Priority	Structural Ranking	O&M Ranking	Recommendation	Cost ($)
								Start	End		Size (in)	Mat	CCTV Length (ft)					
R311-006	3	003	1	Y	Graystone Ave	5/30/2008	24A-23	24A	23	D/S	8	VCP	163.6	Severe	1		Replace	79,510
R311-012	10	010	16e	Y	Front St	6/9/2008	101-7	101	7	D/S	8	VCP	296.7	Severe	2		Replace or Spot repair	144,196
R311-017	1	001	47b	Y	Hayford St	6/20/2008	49-48	49	48	D/S	8	VCP	334.2	Major	3		Replace	162,421
R311-010	10	010	16e	Y	Firestone Blvd	6/5/2008	81-80	81	80	D/S	8	VCP	275.2	Major	4		Replace	133,747
R311-020	12	001	47b	Y	Barwall St	7/18/2008	32-31	32	31	U/S	8	VCP	353.7	Major	5		Replace	171,898
R311-007	11	004	12	Y	Ohm Ave	6/2/2008	285-284	285	284	D/S	8	VCP	344.9	Major	6	69	Replace	167,621
R311-028	3	008	12	Y	Imperial Hwy	7/30/2008	153-152	153	152	D/S	8	VCP	194.3	Major	7		Replace	94,430
R311-004	7	009	1	Y	Longworth Ave	5/27/2008	40-39	40	39	D/S	8	VCP	221.5	Major	8		Replace	107,649
R311-018	11	011	47b	Y	Nava St	7/16/2008	44-43	44	43	D/S	8	VCP	350.7	Major	9		Replace	170,440
R311-019	4	004	47b	Y	Nava St	7/17/2008	43-42	43	42	D/S	8	VCP	354.3	Major	10		Replace	172,190
R311-007	14	001	12	Y	Foix Ave	6/2/2008	222-221	222	221	D/S	8	VCP	332.5	Major	11	1	Replace	161,595
R311-026	9	009	39	Y	Firestone Blvd	7/28/2008	3-2	3	2	D/S	8	VCP	352.2	Major	12	81	Replace	171,169
R311-005	7	010	1	Y	Graystone Ave	5/28/2008	27-26	27	26	D/S	8	VCP	353.9	Major	13		Replace	171,995
R311-004	15	001	6	Y	Easement	5/27/2008	2-1	2	1	D/S	12	VCP	349.7	Major	14	95	Replace	254,931
R311-032	5	008	52a	Y	Harvard Dr	8/7/2008	2-1	2	1	D/S	10	VCP	205.6	Major	15		Replace	124,902
R311-004	3	013	6	Y	Easement	5/27/2008	3-2	3	2	D/S	12	VCP	348.2	Major	16		Replace	253,838
R311-019 2	1	010	47b	Y	Barwall St	7/17/2008	33-32	33	32	D/S	8	VCP	333.6	Major	17		Replace	162,130
R311-030	13	001	38c	Y	Dartmoor Ave	8/1/2008	28-27	28	27	D/S	8	VCP	267.4	Major	18		Replace	129,956
R311-005	6	011	1	Y	Easement	5/28/2008	10-9	10	9	D/S	15	VCP	291.1	Major	19		Replace	265,265
												Total	**5,723**				**Total**	**3,099,884**

J. Operation and Maintenance Priorities

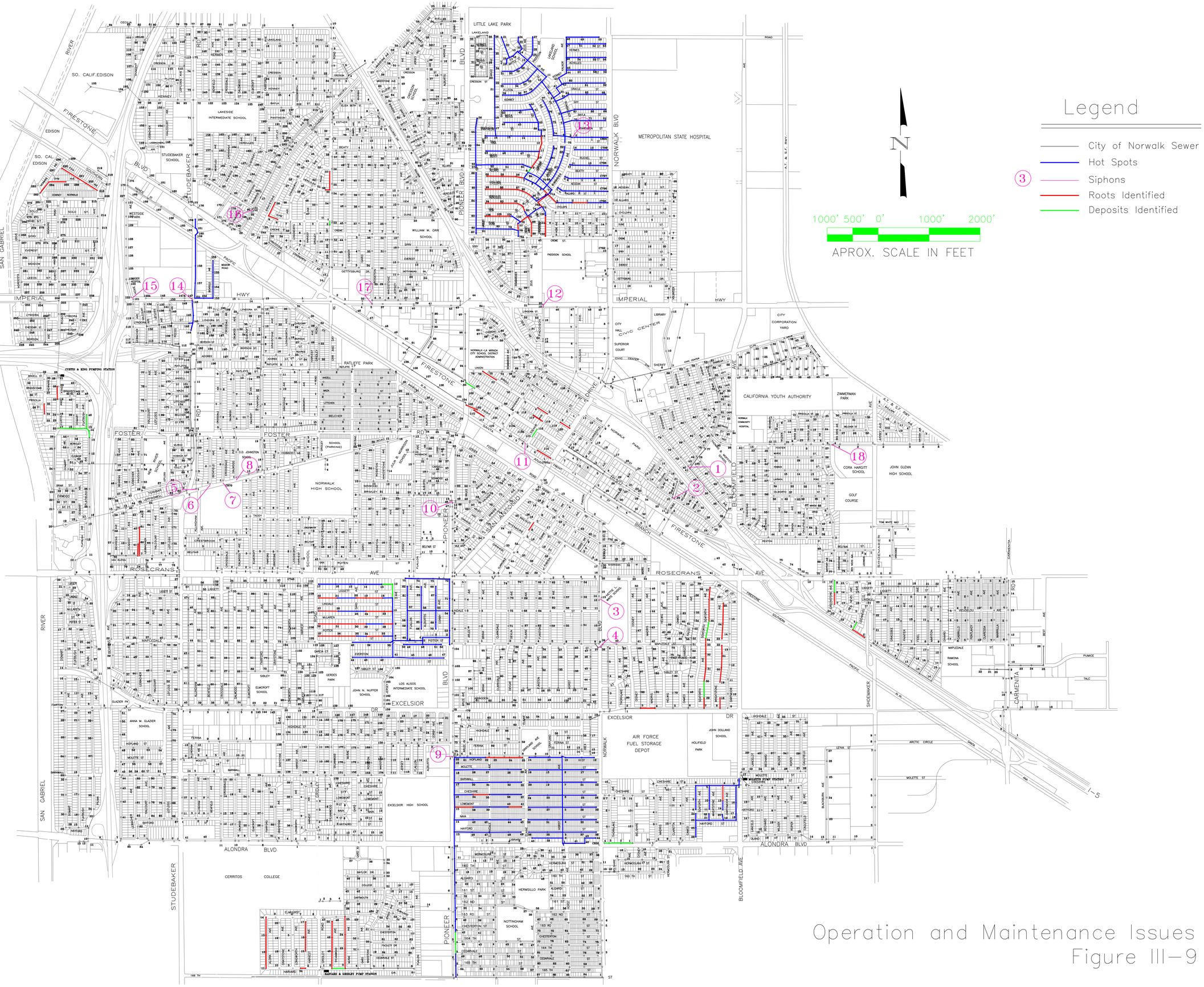
The operation and maintenance condition and rankings were considered separately. The operation and maintenance priorities are listed in Table III-1.

Figures III-9 illustrates the locations of roots, grease, deposits, and obstacles that were found through CCTV inspections. These conditions, along with siphons, are the cause of many of the frequent maintenance areas (hot spots). The siphons and City hot spots are also shown on Figure III-9.

Any loss in cross sectional pipe area is a potential cause of back ups and sewer overflows. Therefore, those maintenance issues that cause a reduction in cross sectional area are given higher priority over others.

Accordingly, ball roots are given a high priority. Ball roots are defined as roots that have formed a mass and in doing so are greatly to severely restricting the flow. The cross sectional area lost is greater than 50 percent. As CCTV inspections are completed, the City will cut all the ball roots, and apply chemical treatment as necessary. These locations will be re-inspected within six months to assess the success of the effort. A root control program will then be formulated based upon this, and subsequent inspections. Those pipes with obstructions and/or deposits are also given a high priority depending on the percentage of the pipe that is blocked.

The locations listed in Table III-4 have been added to the City's Hot Spot list as part of its preventative maintenance program. Although no spills have occurred at some of these locations, the presence of sags, grease, deposits, and other defects may cause spills in the future. These locations will be re-inspected within six months following the initial cleaning effort, and a long term maintenance program will then be formulated.



Operation and Maintenance Issues
Figure III–9

Table III-4
Locations to add to Hot Spots

Media Label (DVD No)	Inspection No.	Run Number	Drainge Area	DVD Watched? (Y)	Street Name	CCTV Date	Pipe ID	Manhole Start	Manhole End	Direction of Camera	Pipe Size (in)	Pipe Mat	Pipe CCTV Length (ft)	Operational and Maintenance: Deposits D AGS	Deposits D %	Deposits D AE	Deposits D %	Deposits D Other	Deposits D %	Roots (R) Fine (F) B	Fine (F) L	Fine (F) J	Fine (F) C	Medium (M) B	Medium (M) L	Medium (M) J	Ball (B) B	Ball (B) L	Ball (B) C	Vermin R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index	O&M Ranking	Recommendation
														2		2		3		2	1	1	1	4	3	3	5	4	4	2					
R311-024	12	017	47b	Y	Pioneer Blvd	7/24/2008	5-4	5	4	D/S	8	VCP	244.6	1	25	1	10														2	4	2.0	2	Clear deposits
R311-001	8	005	6	Y	Easement	5/19/2008	9-8	9	8	D/S	8	VCP	118.7	3	5						1			1							5	11	2.2	4	Root treat and cut; Clear deposits
R311-011	11	011	16e	Y	Kalnor Ave	6/6/2008	115-113	115	113	D/S	8	VCP	169.2			1	15														1	2	2.0	10	
R311-009	15	015	12	Y	Foster Rd	6/4/2008	16-15	16	15	D/S	12	VCP	276.6	35	10																35	70	2.0	11	Clear deposits
R311-016	3	002	49	Y	Alondra Bvld	6/20/2008	2-3	2	3	D/S	8	VCP	230.4	20	10																20	40	2.0	12	Clear deposits
R311-009	16	016	12	Y	Foster Rd	6/4/2008	15-14	15	14	D/S	12	VCP	79.4	4	10							1									5	9	1.8	13	Clear deposits
R311-024	11	018	47b	Y	Pioneer Blvd	7/24/2008	4-3	4	3	D/S	8	VCP	240.4	1	10																1	2	2.0	14	Clear deposits
R311-010	14	014	1	Y	Orr And Day Rd	6/5/2008	2-1	2	1	U/S	8	VCP	242.3	1	10							1									2	3	1.5	15	Clear deposits
R311-016	4	001	49		Alondra Bvld	6/20/2008	1-2	1	2	D/S	8	VCP	213.9	32	5																32	64	2.0	16	Clear deposits
R311-028	10	001	35		Jersey Ave	7/30/2008	12-11	12	11	D/S	8	VCP	271.6	31	5						1										32	63	2.0	17	Clear deposits
R311-015	14	002	12		Flatbush Ave	6/19/2008	46-15	46	15	D/S	8	VCP	301.9	31	5																31	62	2.0	18	Clear deposits
R311-016	2	003	49		Alondra Bvld	6/20/2008	3-4	3	4	D/S	8	VCP	129.2	24	5																24	48	2.0	19	Clear deposits
R311-031	9	004	38c		Easement	8/4/2008	30-29	30	29	D/S	8	VCP	213.1	23	5							6			2			1			32	62	1.9	20	Notify homeowners of ball roots in laterals; Root treat and cut; Clear deposits
R311-009	14	014	12		Foster Rd	6/4/2008	17-16	17	16	D/S	12	VCP	289.7	13	5							1									14	27	1.9	21	Clear deposits
R311-015	15	001	12		Flatbush Ave	6/19/2008	14-13	14	13	D/S	12	VCP	188.2	7	5																7	14	2.0	22	Clear deposits
R311-026	10	008	39		Lochnevis Ave	7/28/2008	4-3	4	3	U/S	8	VCP	148.1	7	5																7	14	2.0	23	Clear deposits
R311-032	6	007	52a		Harvard Dr	8/7/2008	3-2	3	2	D/S	10	VCP	256.6	5																	5	10	2.0	24	Clear deposits
R311-015	2	014	38c	Y	Easement	6/19/2008	35-34	35	34	D/S	8	VCP	334.9	2	5							5			1			1			9	16	1.8	25	Notify homeowners of ball roots in laterals; Root treat and cut; Clear deposits
R311-027	1	013	35		Alley	7/29/2008	13-12	13	12	D/S	8	VCP	302.7	1	5																1	2	2.0	26	Clear deposits
R311-025	7	013	39		Greenstone Ave	7/25/2008	9-8	9	8	D/S	8	VCP	234.3	1	5																1	2	2.0	27	Clear deposits
R311-011	1	001	16e		Firestone Blvd	6/6/2008	83-82	83	82	U/S	8	VCP	310.6	1	5							1									2	3	1.5	28	Clear deposits

SECTION IV

TRAINING PROGRAM

A. Collection System Maintenance Staff Program

The California Water Environment Association's (CWEA) Training Program is the current industry standard for training and certifying sewer collection system maintenance staff. This program provides four Grades of certification, each of which is appropriate for the level of knowledge and responsibility needed for maintaining the collection system.

Currently, City of Norwalk maintenance staff receives on the job training. In the future, the City plans to supplement this training with the CWEA training program.

B. Contractor Staff Training and Certification

The City will require contract staff and contractor staff who will perform flow monitoring, CCTV inspection, maintenance, repair, or replacement on the collection system, including the pump stations and force mains, to possess adequate level of training and certifications appropriate for their duties. The contract documents requesting these services shall require the submittal of resumes and/or training programs of the contractor personnel proposed for the work.

Determination of the appropriate grade shall be the responsibility of the contractor. However, this will be subject to approval or revision by the City's contract manager.

C. Safety Program and Safety Training

City maintenance supervisors conduct monthly safety training and lockout-tagout training, as well as pre-job safety tailgate meetings. Additional safety training by private agencies is provided as needed.

Traffic control training and confined space entry training is conducted every two years by a private agency. Driver safety training is provided on an as needed basis (by a private agency) as follow-up to any driving related incidents.

SECTION V

EQUIPMENT AND REPLACEMENT PARTS INVENTORIES

The major items of sewer maintenance equipment owned by the City include the following:

Vehicles

1 - Vactor Truck
2 - Service Trucks

Pump Station Equipment

1 – Spare pump for the Harvard and Gridley Lift Station
1 – Spare motor for the Harvard and Gridley Lift Station
1 – 30 HP Multi Quip Whisper Generator for manual transfer of power
10 – Bubblers

Sewer Spill Containment Equipment

- Sand bags
- Absorbent

Safety Equipment

- Blowers
- Tripods
- Harness
- Gas detectors
- Large crowd control barricades
- Traffic cones
- Arrow boards
- Light towers
- Caution tape
- Flashlights

All other equipment is rented or purchased as necessary from one of the following contractors:

Material Suppliers

Western Water Works
11232 Firestone Boulevard
Norwalk, CA 90650

S&J Supply Company, Inc.
13105 Florence Avenue
Santa Fe Springs, CA 90670
(562) 944-7433

Equipment Rental, including pumps, pipes, and hose

PDQ Rentals
Santa Fe Springs
10826 Shoemaker Avenue
Santa Fe Springs, CA 90670
(562) 944-3206

SECTION VI

FUNDING SCHEDULE

The City of Norwalk will complete a rate study concurrent with the completion of its short term and long term capital improvement program (CIP). This study will recommend a wastewater generation based rate structure that will generate sufficient revenues for proper operation and maintenance of the collection system, and implement the selected CIP.