

**Technical Memorandum**

# **Phase 1 Part 2 CSO Control Plan Wellington Avenue CSO Facility**

## **Manhole Inspections**

*Prepared for:*

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## **INTRODUCTION**

This Manhole Inspections Technical Memorandum (TM) has been prepared to describe the investigation procedure used, results of the investigation, and recommendations for rehabilitation of observed defects for manholes in the four priority Sewer Catchment Areas, 1, 3, 4, and 7.

Manholes being inspected are typically constructed of brick which is consistent with the age of the system. In addition to the brick manholes, some have been constructed with block, parged block and precast concrete.

## **MANHOLE INSPECTION PROCEDURES**

The Phase I Part I CSO Control Plan included a recommendation that manhole inspections be performed in Sewer Catchment Areas determined to be priority inflow/infiltration (I/I) contributors. Manhole inspections were performed by Severn Trent Pipeline Services (STPS) under subcontract to Earth Tech (ET), between March and May, 2006.

During this procedure, the manholes were evaluated to determine the condition of the key components of the manholes and to observe and document any defects. Significant defects were also photographed. During this inspection period, 408 manholes in Sewer Catchment Areas 1, 3, 4, and 7 were inspected. Submitted with this report is the Manhole Inspection Report, Volumes I and II, which presents the manhole inspections for each of the catchment areas and 17 manholes along the Thames Street Interceptor in Sewer Catchment Area 6. These additional 17 manholes were inspected by STPS in January 2005, as part of Phase 1 Part 1.

The manhole inspections documented the following information:

- Manhole identification number
- Manhole cover type, number of holes in the cover, whether the cover was subject to ponding, whether the cover was damaged or not.
- Condition of manhole frame and grade
- Condition of the asphalt or ground surface around the manhole frame and cover
- Material and condition of the corbel, walls, floor, steps and all inverts
- Cracks or breaks in the walls, floor, corbel or invert
- Infiltration at any location
- Manhole depth

- High-water mark from surcharging
- Additional comments on the integrity of the corbel, steps, frame, cover, wall, inverts, and floor
- Size and type of pipe
- Offsets or misalignments
- Protruding taps
- Root intrusion
- Visible inflow/infiltration sources
- Type and depth of debris in pipe
- Sluggish or standing flow and wastewater backing up into the manhole
- Condition of pipe or corrosion

## **MANHOLE INSPECTION RESULTS**

Earth Tech reviewed the manhole inspection logs, and the following general observations were noted. Inspection result information is organized by defect and is enumerated in Table A-1. Detailed information at individual locations is included in the Manhole Inspection Report Logs in Appendix A. STPS inspected a total of 408 manholes revealing 290 with defects and in need of some rehabilitation. Of the 290 manholes requiring rehabilitation, many of them have multiple defects associated with them. Therefore, to quantify the work necessary, some manholes have been counted more than once below:

- 141 manholes have cracks in the asphalt surrounding them which may lead to inflow into the manhole through the manhole's frame, corbel and walls.
- 55 manholes are either set too high or too low to the surrounding pavement causing damage to the manhole by vehicle tires striking the frame at odd angles introducing problems to the rest of the manhole structure. During winter weather, manholes often are struck by snow plows causing chips and cracks in the manhole's frame/cover therefore increasing the likelihood of infiltration to a manhole.
- 16 manholes were found to have the wrong cover; (i.e., storm drain), cracks in the cover and frame, and manholes that are located in gutter lanes with ponding issues.
- 12 manholes had frames that were either offset, badly chipped or have pieces missing from them, (i.e., badly damaged). Frames that are missing pieces and/or are offset present

a significant source of inflow into the system and should be rehabilitated as soon as possible.

- 42 manholes were found with covers that have more than 4 lift holes in them, which may result in significant inflow during a wet weather event, especially when the manhole is located in gutters lines or in/near areas with ponding conditions.
- 65 corbels were found to be in a steady state of decay with bricks/mortar missing, cracks and deterioration associated with hydrogen sulfide gases that introduce structural weakness to the corbel and other parts of the manhole. Infiltration/inflow from this part of the manhole can be significant and rehabilitation is recommended. Of the damaged corbels, all are either totally comprised of bricks or brick with parged block that typically degrade with time and often need rehabilitation to remain functional.
- 7 manholes had walls that were leaking at the time of the inspections producing approximately 6,050 gallons per day (gpd) of infiltration. Sealing of the manholes with an appropriate grout or a cementitious lining will eliminate this source of infiltration. Also, 23 manholes had significant damage to their walls including missing bricks/mortar, root intrusion, cracking and hydrogen sulfide corrosion. The first three pose immediate sources of I/I, while the latter can be dangerous as the manhole can become structurally unsound due to the weakened state of the mortar and bricks.
- 30 floors of the manholes inspected had defects with their floors ranging from breaks/cracks and debris to improperly shaped bottoms:
  - 7 floors were either underwater and couldn't be inspected well or were covered with debris from surcharging
  - 7 manholes had mineral deposits which could point to sources of infiltration
  - 6 had defects being v-shaped bottoms, gaps and missing mortar/bricks
  - 10 Inverts were underwater or surcharged and couldn't be inspected
- When inspecting the invert of the manholes, 26 will require repairs because of v-shaped bottoms, broken pipe inlets/outlets or surcharging.

- 30 manholes had surcharge marks on the walls of the manhole. This occurs because of low capacity in the system, high flow during an event, or a blockage in the system from large debris and roots.
- During inspection, 5 manholes were found to be surcharged and could not be inspected fully.
- 123 manholes were observed to have steps in various stages of disrepair. Since manholes in the system tend to be made of brick, the steps are also made of brick and are no longer the recommended material to be used in this application.
  - 90 manholes had steps that were found to be unacceptable by the City’s current standards for manhole steps.
  - 20 were found to have steps that were broken and unusable
  - 13 manholes had steps that were metal and severely rusted and/or missing

**EVALUATIONS**

The following sections present the manhole locations and evaluations of the defects observed during the manhole inspections.

**Cracked Asphalt Around Manholes**

Manholes with cracked asphalt surrounding them can allow inflow to enter the manhole, especially where water ponds on the manhole cover and frame. Surface water can seep through the pavement, around the frame and into the manhole. Earth Tech recommends sealing all cracks around the manholes or demolition of the existing pavement and installation of new pavement. For replacement, at a minimum, the pavement should be saw cut to the limits of the manhole structure at a minimum and pavement removed. The sub grade should be compacted and hot mix asphalt patch installed and compacted using mechanical means. Refer to Table A-2 - Manholes with Damaged Pavement in the Appendix for location and description of manhole defect.

The estimated order of magnitude cost to perform asphalt repairs is presented below.

<b>Item</b>	<b>Unit</b>	<b>Cost</b>	<b>Number</b>	<b>Total Cost</b>
Asphalt Repair	EA	\$200	120	\$24,000

<sup>1</sup> 21 of the 141 manholes with cracks in the asphalt surrounding them are accounted for in repair items in later sections and are not included in this table

## Condition of Manhole Frame and Grade

12 manholes were observed to have damaged frames during the inspection. Frame damage typically occurs when the manhole is not flush with the surface of the pavement. Impacts from vehicles are substantially higher when the frame is higher or lower than the surrounding grade. For covers that are higher than the surrounding pavement, frames can be damaged during snow plowing. Earth Tech recommends that manholes below the grade of the roadway have their frames raised (to make the manhole flush with the road surface) and manholes above the grade of the roadway lowered by using a shorter frame or lowering of the existing one. Tables 1 and 2 (below) detail the manholes that are currently damaged and manholes that are either above or below existing grade.

**Table 1 - Manholes with Damaged Frames**

Location	Catchment Area	Manhole No.	Observed Defect
EDGAR COURT	1	088-37	1.5 INCH OFFSET
MEMORIAL DRIVE AT FREEBODY STREET	1	088-56	3 INCH CHIP
LIBERTY STREET	1	088-64	BROKEN
BOSS COURT	4	109-23	CRACKED EDGE
HARRISON AVENUE AT HARRISON LANE	7	127-55	PIECE MISSING
HARRISON AVENUE AT SULLIVAN STREET	7	127-60	CRACKED
HARRISON AVENUE AT MARCHANT STREET	7	128-81	PIECES MISSING
CARROLL AVENUE	7	139-43	3" CHIP
RUGGLES AVENUE	7	150-17	5 INCH OFFSET, PIECE MISSING
ALPOND DRIVE	3	174-1	CRACKED
ALPOND DRIVE AT JEFFREY DRIVE	3	174-2	CRACKED
THAMES ST AT CHURCH ST	6	079-44	CRACKED

The estimated order of magnitude cost to perform these repairs is presented below.

Item	Unit	Cost	Number	Total Cost
Replacement of Frame	EA	\$1,400	10	\$14,000
Resetting of Frame	EA	\$1,200	2	\$2,400

**Table 2 - Manholes Above/Below Grade****Table 2A - Manholes Above Grade**

Location	Catchment Area	Manhole No.	Depth Above Grade (in)
BERKLEY AVENUE AT SYLVAN STREET	1	101-23	0.5
PARKER AVENUE AT SYLVAN STREET	1	101-25	0.5
BOSS COURT	4	109-23	0.5
HARRISON AVENUE AT MARCHANT STREET	7	128-81	0.5
MARCHANT STREET AT HARRISON AVENUE	4	128-82	0.5
EARL AVENUE	3	129-94	0.5
EARL AVENUE	3	129-97	0.5
ERNEST STREET	7	139-30	0.5
HAROLD STREET	7	139-35	0.5
VANDERBILT AVENUE	3	140-51	0.5
MCCORMICK ROAD	3	152-36	0.5
OCEAN HEIGHTS ROAD	7	162-61	0.5
ALPOND DRIVE	3	174-1	0.5
LIBERTY STREET	1	088-64	0.75
ALPOND DRIVE AT JEFFREY DRIVE	3	174-2	0.75
EDGAR COURT	1	088-51	1
PALMER STREET EASEMENT	7	128-68.2	1
PALMER STREET EASEMENT	7	128-68.3	1
ERNEST STREET	7	139-31	1.25
RUGGLES AVENUE AT OLD FORT ROAD	7	151-33	1.5
GEORGE STREET ROW TO GORDON STREET	3	140-53.1	2
KERINS TERRACE	3	118-124.2	3
RUGGLES AVENUE	7	150-17	5

**Table 2 - Manholes Above/Below Grade**  
**Table 2B - Manholes Below Grade**

Location	Catchment Area	Manhole No.	Depth Below Grade (in)
OLD BEACH ROAD AT FIR STREET	1	081-91	0.5
LIBERTY STREET AT OLD BEACH ROAD	1	081-93	0.5
EDGAR COURT	1	088-27	0.5
EAST BOWERY STREET AT FREEBODY STREET	1	094-48	0.5
ANNANDALE PLACE	1	102-13	0.5
PARKER AVENUE AT MIDDLETON AVENUE	1	102-3	0.5
WELLINGTON AVENUE AT HARBORVIEW DRIVE	4	109-33	0.5
WARD AVENUE	1	112-72	0.5
MORTON AVENUE	3	118-125	0.5
RUGGLES AVENUE	3	139-33	0.5
WEATHERLY AVENUE	3	140-55	0.5
VICTORIA STREET AT BELLVUE AVENUE	3	141-72	0.5
HIGHLAND PLACE	7	150-21	0.5
CARROLL AVENUE	3	151-31	0.5
PALMER STREET	7	128-68	0.75
STACEY STREET AT NORMAN STREET	7	139-39	0.75
CARROLL AVENUE AT JEFFREY DRIVE	3	163-71	0.75
CHAPEL STREET APARTMENT	1	088-63	1
ANNANDALE PLACE	1	102-14	1
SHEPARD AVENUE	3	131-11	1
RUGGLES AVENUE	3	141-77	1
PALMER STREET	7	128-68.1	1.5
RUGGLES AVENUE	3	139-32	1.5
HIGHLAND PLACE AT HAZARD ROAD ROW	7	150-20	1.5
RUGGLES AVENUE	3	141-69	2
HAZARD ROAD ROW	7	150-16	3
CARROLL AVENUE ROW TO MCCORMICK ROAD	3	151-35	10
THAMES ST AT TOURO	6	071-81	1
THAMES ST AT YOUNG ST	6	093-30	1
THAMES STREET AT WELLINGTON AVENUE	6	110-44	1
THAMES STREET AT NARRAGANSETT AVENUE	6	118-2	1

**Total Number of Manholes = 55 Manholes**

The estimated order of magnitude cost to perform these repairs is presented below.

Item	Unit	Cost	Number	Total Cost
Reset Frame/Cover	EA	\$1,200	54	\$64,800



## Mislabeled Covers, Holes and Cracks

Manhole covers with incorrect labels (i.e. storm), additional holes and cracks are recommended to be replaced. Replacement of cracked covers and covers with holes should be considered a priority. Removal of covers with additional holes and cracks will prevent extraneous flow from entering the sanitary sewer system and reduce the overall inflow entering the system, particularly in areas where surface runoff is directed towards the manhole. For example, on Chapel Street and Annandale Road, manholes are located in the gutter and surface runoff from the gutter can enter through the holes in the manhole cover. While mislabeled manhole covers can be a nuisance, replacement may be limited to covers which are damaged and permit inflow into the system. Remaining mislabeled covers can be replaced as part of the City's routine maintenance of the system. The following tables detail the defects of each manhole, their location and the catchment area where the manholes are located.

**Table 3 - Manholes with Damaged Covers, I/I Issues or Incorrectly Labeled**

Location	Catchment Area	Manhole No.	Description
LAWRENCE AVENUE AT VICTORIA STREET	3	142-10	12 INCH COVER
HARRISON AVENUE AT BRENTON ROAD	4	127-49	15-INCH COVER
SPRING STREET	3	140-45	18 INCH COVER, LIGHT CRACKED PAVEMENT SURROUNDING FRAME
CHAPEL STREET	1	088-31.1	BLIND FLANGE
CHAPEL STREET	1	088-34	BLIND FLANGE
CHAPEL STREET	1	088-68	BLIND FLANGE
ANNANDALE PLACE	1	102-14	COVER IN GUTTER LINE
EAST BOWERY STREET	1	102-8	COVER IS CRACKED
ANNANDALE ROAD	3	112-76	COVER LOCATED IN GUTTER LINE
ANNANDALE ROAD	3	112-77	COVER LOCATED IN GUTTER LINE
RED CROSS AVENUE	1	082-16	CRACKED COVER
PALMER STREET	7	128-72	PONDS INTO MANHOLE
NORMAN STREET	7	139-38	PONDS INTO MANHOLE
STACEY STREET AT NORMAN STREET	7	139-39	PONDS INTO MANHOLE
ANNANDALE ROAD AT DRESSER STREET	1	095-57	STORM COVER ON SEWER MANHOLE
RUGGLES AVENUE AT OLD FORT ROAD	7	151-33	SUNKEN COVER

**Total No. of Covers with Damage = 16**

The estimated order of magnitude cost to perform these repairs is presented below.

Item	Unit	Cost	Number	Total Cost
Replacement	EA COVER	\$200	3	\$600
Resetting Frame	EA	\$1,200	8	\$9,600
Manhole Replacement	EA	\$6,000	3	\$18,000

<sup>1</sup> Manholes 139-39 and 151-33 were previously accounted for in Table 2B.

**Table 4 - Covers with Perforations**

Location	Catchment Area	Manhole No.	Number of Holes	Approximate Hole Size (in)
COTTAGE STREET	1	081-3	6	1
REDWOOD STREET	1	081-4	6	1
MEMORIAL DRIVE	1	088-53	36	0.5
MEMORIAL BOULEVARD	1	089-5	5	1
MIDDLETON AVENUE AT MEMORIAL BOULEVARD	1	089-6	33	0.5
MEMORIAL DRIVE AT MIDDLETON AVENUE	1	089-7	13	0.5
EAST BOWERY STREET AT FREEBODY STREET	1	094-48	24	0.5
MIDDLETON AVENUE AT MERTON AVENUE	1	095-59	6	1
MIDDLETON AVENUE AT WEAVER AVENUE	1	095-69	24	1
MARCHANT STREET AT SIMMONS STREET	4	109-21	5	1
WELLINGTON AVENUE AT BOSS COURT	4	109-26.1	5	1
NARAGANSETT AVENUE AT OCHRE POINT AVENUE	3	112-67	7	0.5
CLINTON STREET AT WEST NARRAGANSETT AVENUE	4	117-90	14	0.5
ROSENEATH AVENUE AT CONNECTION STREET	4	117-95.1	6	1
ROSENEATH AVENUE AT WEST NARRAGANSETT AVENUE	4	117-96	10	0.5
POTTER STREET AT THAMES STREET	4	118-4	27	0.5
LUCAS AVENUE	4	118-9	6	1
LEROY AVENUE	3	119-27	11	0.5
HARRISON AVENUE	4	126-43	9	1
HARRISON AVENUE AT BRENTON ROAD	4	127-52	20	1
HARRISON AVENUE AT HARRISON LANE	4	127-54	6	1
MARCHANT STREET AT ATLANTIC STREET	4	128-76	14	1
HARRISON AVENUE AT COWSILL LANE	7	128-88.1	9	0.5
RUGGLES AVENUE	3	139-32	5	1
SPRING STREET	3	140-45	5	0.5
VANDERBILT AVENUE	3	140-51	5	0.5
VICTORIA STREET	3	141-2	6	1
RUGGLES AVENUE	3	141-69	6	1.5
RUGGLES AVENUE AT BELLEVUE AVENUE	3	141-73	19	1.5
RUGGLES AVENUE	3	141-77	43	2
RUGGLES AVENUE AT CARROLL AVENUE	3	151-27	5	1
CARROLL AVENUE ROW TO MCCORMICK ROAD	3	151-35	6	1
RUGGLES AVENUE AT MCCORMICK ROAD	3	152-44	5	1
CARROLL AVENUE ROW TO MCCORMICK ROAD	3	152-47	6	1
THAMES ST AT MARY ST	6	071-15	37	0.25
THAMES ST AT CHURCH ST	6	079-44	37	0.2
THAMES STREET AT ANN STREET	6	087-5	37	0.2

**Table 4 – Covers with Perforations (Continued)**

Location	Catchment Area	Manhole No.	Number of Holes	Approximate Hole Size (in)
THAMES ST AT FRANKLIN ST	6	087-23	32	0.2
THAMES STREET AT DEARBORN STREET	6	100-2	37	0.2
THAMES STREET AT POPE STREET	6	100-6	37	0.2
THAMES STREET AT WELLINGTON AVENUE	6	110-45	5	1
THAMES STREET AT NARRAGANSETT AVENUE	6	118-2	37	0.2

<sup>1</sup> Manhole 140-45 previously accounted for in Table 3.

The estimated order of magnitude cost to perform these repairs is presented below.

Replacement	Unit	Cost	Number	Total Cost
Cover	EA	\$200	41	\$8,200

### Material and Condition of the Corbel

65 manholes were observed to have defects or damage to the corbel. The defects typically consisted of missing bricks, missing mortar, hydrogen sulfide deterioration, cracking and root intrusion. Table A-3: Manholes with Damaged Corbels, in the Appendix, presents the defects noted with the manhole corbels during the inspections and where the manhole is located in the system.

The estimated order of magnitude cost to perform these repairs is presented below.

Replacement	Unit	Cost	Number	Total Cost
Root Control and Grout with Root Inhibitor	EA. MH.	\$650	4	\$2,600
Cementitious Lining and Associated Preparation work	VF (assumed 7')	\$1,800	4	\$7,200
Brick/Mortar Replacement with Grout	EA. MH	\$500	52	\$27,000

<sup>1</sup> Manholes 087-23 and 110-45 have been accounted for in Table 5 under cementitious lining.

<sup>2</sup> Manhole 110-45 has been accounted for in Table 8 under cementitious lining.

<sup>3</sup> Manhole 079-45 has been accounted for in Table 6 under cementitious lining.

## Material and Condition of the Walls

23 manholes were observed to have defects or damage to the manhole walls. Earth Tech recommends that all manholes with damaged walls, i.e. missing bricks, cracks, missing mortar and hydrogen sulfide damage, be rehabilitated to avoid further deterioration. The damage for these manholes is summarized in Table 5- Manholes with Wall Defects

**Table 5 - Manholes with Wall Defects**

Location	Manhole No.	Catchment Area	Material	Condition
OAKWOOD TERRACE	082-10	1	BRICK	LIGHT ROOTS
EDGAR COURT EASEMENT	088-29	1	BLOCK/PARGED	MISSING MORTAR, LEAKING, LIGHT ROOTS
TEWS STREET	088-65	1	BRICK	LIGHT ROOTS
PARKER AVENUE AT SYLVAN STREET	101-25	1	BRICK	MISSING MORTAR, MISSING BRICKS
WELLINGTON AVENUE	108-17.1	4	PRECAST	MISSING MORTAR, LIGHT ROOTS, DRIPPING
HALIDON AVENUE	116-83	4	PRECAST	HYDROGEN SULFIDE DETERIORATION
CLINTON STREET AT WEST NARRAGANSETT AVENUE	117-90	4	BRICK	MISSING MORTAR, MISSING BRICKS
HARRISON AVENUE	126-43	4	BRICK	MISSING MORTAR, HYDROGEN SULFIDE DETERIORATION
HARRISON AVENUE AT BRENTON ROAD	127-52	4	BRICK	MISSING BRICKS AND MORTAR, HYDROGEN SULFIDE DETERIORATION
HARRISON LANE	127-58	4	BRICK	MISSING MORTAR, LIGHT ROOTS
NORMAN STREET	128-67	7	BRICK	WET
PALMER STREET EASEMENT	128-68.3	7	BRICK	MISSING MORTAR, MISSING BRICKS
HARRISON AVENUE AT COWSILL LANE	128-88.1	7	BRICK	LEAKING, MISSING MORTAR
ERNEST STREET	139-30	7	BLOCK	MISSING MORTAR, MISSING BLOCKS
GEORGE STREET ROW TO GORDON STREET	140-53.1	3	BRICK	VERTICAL CRACKS
HIGHLAND PLACE AT HAZARD ROAD ROW	150-20	7	BLOCK	MISSING MORTAR, LIGHT ROOTS
RUGGLES AVENUE	151-34	7	BRICK	WET TO 1 FOOT, MORTAR PATCH
CARROLL AVENUE AT JEFFREY DRIVE	163-71	3	BRICK	MISSING MORTAR, MISSING BRICKS
THAMES ST AT PELHAM ST	079-45	6	BRICK	WET
THAMES ST AT FRANKLIN ST	087-23	6	BRICK	LT. VERTICAL CRACKING
THAMES STREET AT NEWTON COURT	093-37	6	BRICK	MINOR VERTICAL CRACKS
THAMES STREET AT POPE STREET	100-6	6	BRICK/PARGED	MINOR CRACKS
OCEAN HEIGHTS ROAD	162-64	7	BLOCK	MISSING MORTAR

The estimated order of magnitude cost to perform these repairs is presented below.

Repair	Unit	Cost	Number	Total Cost
Root Control and Grout	EA	\$650	11	\$7,150
Cementitious Lining and Associated Preparation work	VF (assumed 7')	\$1,800	6	\$10,800

<sup>1</sup> Manholes 082-10, 117-90 and 163-71 accounted for in Table A-3 under Brick/Mortar Replacement with Grout, Manhole 127-58 accounted for in Table A-3 under Root Control and Grout with Root Inhibitor, Manhole 127-52 accounted for in Table A-3 under cementitious lining, and Manhole 079-45 accounted for in Table 6 under cementitious lining.

### Observed Infiltration

Table 6 presents the manholes that were leaking during the time of the inspections. Earth Tech recommends sealing and grouting of the walls and inverts.

**Table 6 - Manholes with Leaking Walls/Inverts**

Location	Manhole No.	Date Inspected	Catchment Area	Material	Estimated Infiltration (gpm)
EDGAR COURT EASEMENT	088-29	5/17/2006	1	BLOCK/PARGED	2.0
ANNANDALE ROAD	095-58.1	5/16/2006	1	BLOCK	0.3
WELLINGTON AVENUE	108-17.1	5/17/2006	4	PRECAST	0.1
WELLINGTON AVENUE AT MARCHANT STREET	109-24	3/21/2006	4	BRICK	1.0
MORTON AVENUE	118-124	4/27/2006	3	BRICK	0.2
HARRISON AVENUE AT COWSILL LANE	128-88.1	5/17/2006	7	BRICK	0.5
THAMES ST AT PELHAM ST	079-45	1/4/2005	6	BRICK	0.1
WELLINGTON AVENUE AT BOSS COURT	109-26.1	3/21/2006	4	BRICK	0.5

The estimated order of magnitude cost to perform these repairs is presented below.

Repair	Unit	Cost	Number	Total Cost
Cementitious Lining and Associated Preparation work	VF (assumed 7')	\$1,800	3	\$5,400
Grout Invert	EA	\$600	1	\$600

<sup>1</sup> Manholes 088-29, 108-17.1 and 128-88.1 previously accounted for in Table 5 under cementitious lining.

<sup>2</sup> Manholes 118-124 accounted for in Table A-3 under Brick/Mortar Replacement with Grout

### Rehabilitation of Floors/Inverts

Rehabilitation of floors/inverts may consist of grouting or replacement of the entire manhole if it is found to be beyond the point of repair. For manholes that have v-shaped floors, brick and mortar can be used to make a proper channel/landing. Refer to Table 7 – Manholes with Floor Defects and Table 8 – Inverts with defects, below for a summarization of observations

**Table 7 - Manholes with Floor Defects**

Location	Manhole No.	Catchment Area	Material	Condition
CHAPEL STREET	081-92	1	BRICK	DIRT, V SHAPED BOTTOM
LIBERTY STREET AT OLD BEACH ROAD	081-93	1	POURED IN PLACE	WET, RAGS, DEBRIS
OAKWOOD TERRACE	082-11	1	BRICK	V SHAPED BOTTOM
RED CROSS AVENUE	082-16	1	CONCRETE	WET
OLD BEACH ROAD	082-8	1	POURED IN PLACE	WET
BOSS COURT	109-23	4	POURED IN PLACE	MINERAL DEPOSITS
WELLINGTON AVENUE AT MARCHANT STREET	109-24	4	POURED IN PLACE	BROKEN
GRAFTON STREET	109-30	4	POURED IN PLACE	MINERAL DEPOSITS
MARCHANT STREET AT POTTER STREET	117-103	4	POURED IN PLACE	CRACKED
STOCKHOLM STREET	117-104	4	POURED IN PLACE	MINERAL DEPOSITS
MARCHANT STREET AT WEST NARRAGANSETT AVENUE	117-99	4	COULD NOT INSPECT	UNDER WATER
HARRISON AVENUE	127-51	4	CNI	SURCHARGED
CHASTELLUX AVENUE	127-56	4	POURED IN PLACE	MINERAL DEPOSITS
HARRISON AVENUE	127-57	7	COULD NOT INSPECT	SURCHARGED
HARRISON AVENUE AT SULLIVAN STREET	127-61	7	BRICK	MINERAL DEPOSITS WHERE FLOOR MEETS WALL
NORMAN STREET	128-67	7	BRICK/PARGED	DIRT AND BRICKS
PALMER STREET	128-68	7	BRICK	MISSING BRICKS
OLD FORT ROAD	128-73	7	POURED IN PLACE	GAP BETWEEN FLOOR AND WALL
HARRISON AVENUE	128-88	7	BRICK	MISSING MORTAR WHERE WALLS MEET FLOOR, MINERAL DEPOSITS
ATLANTIC STREET	129-2	4	COULD NOT INSPECT	SURCHARGED
EARL AVENUE	129-94	3	COULD NOT INSPECT	UNDER WATER AND SOLIDS
ERNEST STREET	139-30	7	POURED IN PLACE	DIRT, MODERATE MINERAL DEPOSITS
NORMAN STREET	139-38	7	POURED IN PLACE	WET
SHIELDS STREET	140-60	3	COULD NOT INSPECT	UNDER WATER AND SOLIDS
HAZARD ROAD ROW	150-16	7	POURED IN PLACE	WET 1 INCH
RUGGLES AVENUE	150-17	7	POURED IN PLACE	WET
HAZARD ROAD ROW	150-19	7	BRICK	MISSING BRICKS AND MORTAR, LOOSE BRICKS
OCEAN HEIGHTS ROAD	162-63	7	POURED IN PLACE	WET
OCEAN HEIGHTS ROAD	162-64	7	POURED IN PLACE	LIGHT MINERAL DEPOSITS
OCEAN HEIGHTS ROAD	173-95	7	BRICK	MISSING BRICKS, MISSING MORTAR

**Table 8 – Inverts with Defects**

Location	Manhole No.	Catchment Area	Material	Condition
RED CROSS AVENUE	082-14	1	CONCRETE	8 INCH GAP AT VCP
OAKWOOD TERRACE AT RHODE ISLAND AVENUE	082-9	1	BRICK	V SHAPED BOTTOM
RED CROSS AVENUE AT MEMORIAL BOULEVARD	089-1	1	VCP	BROKEN
MIDDLETON AVENUE AT MEMORIAL BOULEVARD	089-6	1	NONE	SUMP
WELLINGTON AVENUE	109-26	4	BRICK/PIP	MINERAL DEPOSITS
WELLINGTON AVENUE AT BOSS COURT	109-26.1	4	BRICK	MISSING MORTAR, MINERAL DEPOSITS
MARCHANT STREET AT POTTER STREET	117-103	4	VCP	MINERAL DEPOSITS
HARRISON AVENUE	127-51	4	CNI	SURCHARGED
HARRISON AVENUE	127-57	7	CNI	SURCHARGED
PALMER STREET	128-68	7	VCP	MISSING PIECES OF VCP
PALMER STREET	128-68.1	7	BRICK	MISSING BRICKS
ATLANTIC STREET	129-2	4	CNI	SURCHARGED
SHIELDS STREET	140-60	3	CNI	UNDER WATER AND SOLIDS
RUGGLES AVENUE	141-74	3	CNI	UNDER WATER
OCEAN HEIGHTS ROAD	162-64	7	ACP	LIGHT MINERAL DEPOSITS
THAMES ST AT MARY ST	071-15	6	BRICK	SUBMERGED
THAMES ST AT CHURCH ST	079-44	6	CNI	SUBMERGED
THAMES ST AT PELHAM ST	079-45	6	BRICK	SUBMERGED
THAMES STREET AT ANN STREET	087-5	6	CNI	SUBMERGED
THAMES ST AT FRANKLIN ST	087-23	6	BRICK	WET WITH MINERAL DEPOSITS
THAMES ST AT YOUNG ST	093-30	6	BRICK	SUBMERGED
THAMES STREET AT NEWTON COURT	093-37	6	BRICK	SUBMERGED
THAMES STREET AT DEARBORN STREET	100-2	6	BRICK	LIGHT MINERAL DEPOSITS
THAMES STREET AT POPE STREET	100-6	6	BRICK	WET WITH MINERAL DEPOSITS
THAMES STREET AT WELLINGTON AVENUE	110-45	6	BRICK	LIGHT MINERAL DEPOSITS
THAMES STREET AT WEBSTER STREET	118-8	6	CNI	SUBMERGED

The estimated order of magnitude cost to perform these repairs is presented below.

Repair (Includes Inverts and Floors)	Unit	Cost	Number	Total Cost
Grout	EA	\$600	40	\$24,000

<sup>1</sup> Manholes 128-68, 138-73, 173-95, 150-17, 162-63, 082-9, 128-68, 093-30 and 100-2 previously accounted for in Table A-3 under cementitious lining.

<sup>2</sup> Manholes 139-30, 087-23, 093-37, 100-6, 110-45 previously accounted for in Table 5. Manholes 079-45 and 071-15 accounted for in Tables 6 and 7.

### **Surcharged Manholes/Evidence of Surcharge**

During the manhole inspections, 5 manholes were surcharged and could not be inspected. These manholes are recommended to be pumped out and inspected by the Collection System Operator. Possible causes of this include large debris, roots, large flows upstream momentarily overwhelming that segment of pipe, and/or damage to the structures downstream causing flow to build up in that manhole. Possible solutions include: water jetting downstream to clear up any blockage, bypass pumping and full repair of downstream structures, rehabilitation of pipes to clear roots and leaks, and upgrade of the system's capacity to handle the increase of influent flow. Table 9 presents the locations where manholes were found to be surcharged. Table 10 presents that manholes that had evidence of surcharging such as leaking joints, root intrusion, heavy grease and missing mortar in their connecting pipe sections. Earth Tech recommends that any surcharging problems that are attributed to these causes should be rehabilitated using water-jetting, root control measures and sealing/grouting measures to prevent surcharging of the system.

**Table 9 – Manholes With Evidence of Surcharge**

<b>Location</b>	<b>Manhole No.</b>	<b>Catchment Area</b>	<b>Distance to Downstream Manhole (ft)</b>	<b>Downstream Manhole</b>	<b>Height of Surcharge (ft)</b>
CHAPEL STREET	088-68	1	147	088-46	4
MORTON AVENUE AT MIDDLETON AVENUE	095-60	1	33	TEE	2
MIDDLETON AVENUE AT SYLVAN TERRACE	102-4	1	200	102-3	7
MARCHANT STREET AT GRAFTON STREET	109-22	4	186	109-20	4
WELLINGTON AVENUE	109-26	4	-	PS	6
WELLINGTON AVENUE AT CLINTON STREET	109-35	4	219	109-24	5
WELLINGTON AVENUE AT HOUSTON AVENUE	109-35.1	4	243	109-35	4
HOUSTON STREET	109-36	4	257	109-35.1A	3
WARD AVENUE	112-72	1	-	112-74	5
HALIDON AVENUE	116-83	4	285	116-82	8
MARCHANT STREET AT STOCKHOLM STREET	117-102	4	171	117-101	7
MARCHANT STREET AT POTTER STREET	117-103	4	174	117-102	5
MARCHANT STREET AT LUCAS AVENUE	117-106	4	156	117-103	8
CONNECTION STREET AT MARCHANT STREET	117-107	4	145	117-106	4
MARCHANT STREET AT WEST NARRAGANSETT AVE.	117-99	4	216	109-22	6
OLD FORT ROAD	128-73	7	174	128-74	1
OLD FORT ROAD	128-75	7	221	128-79.1	4
HARRISON AVENUE AT MARCHANT STREET	128-81	7	251	128-79	6
ATLANTIC STREET	129-2	4	364	128-76	5
CARROLL AVENUE	129-4	7	107	118-13	2
VICTORIA STREET AT BELLVUE AVENUE	141-72	3	220	141-66	2
HAZARD ROAD ROW	150-16	7	173	150-20	3
HAZARD ROAD ROW	150-19	7	-	-	3.3



**Table 9 – Manholes With Evidence of Surcharge (Continued)**

Location	Manhole No.	Catchment Area	Distance to Downstream Manhole (ft)	Downstream Manhole	Height of Surcharge (ft)
RUGGLES AVENUE	151-24	7	16	151-27	5
RUGGLES AVENUE	151-34	7	70	151-27	5
CARROLL AVENUE	163-65	3	212	163-72	1
CARROLL AVENUE	174-5	3	11	PS	2
THAMES STREET	071-1	6	502	WEST	4.5'
THAMES ST AT TOURO	071-81	6	77	071-1	5.5
THAMES STREET AT WELLINGTON AVENUE	110-44	6	7	110-45	5

<sup>1</sup> No cost is associated with a previous surcharge event. This table is provided as a reference for manholes that need to be monitored more closely in the future.

<sup>2</sup> (-) No information was provided in the Severn Trent Manhole Inspection Report

**Table 10 - Surcharged Manholes**

Location	Manhole No.	Date Inspected	Catchment Area	Distance to Downstream Manhole (ft)	Downstream Manhole
TEWS STREET	088-65	3/24/2006	1	-	-
HARRISON AVENUE	127-51	3/20/2006	4	217	127-52
HARRISON AVENUE	127-57	3/20/2006	7	280	127-60
ATLANTIC STREET	129-2	3/21/2006	4	364	128-76
VICTORIA STREET AT BELLVUE AVENUE	141-72	3/23/2006	3	220	141-66

## COST SUMMARY

Table 11 presents a summary of the manhole repairs and an order of magnitude cost for rehabilitation.

**Table 11– Order Of Magnitude Estimate of Cost  
Manhole Rehabilitation**

Item	Unit	Assumption	Unit Price	Table A-2 Cracked Asphalt	Table 1 Damaged Frames	Table 2 MH's Above/Below	Table 3 Damaged Covers	Table 4 Cover with Holes	Table A-3 Damaged Corbels	Table 5 Wall Defects	Table 6 Leaking Walls/Inverts	Tables 7 and 8 Floor/Invert Defects	Table 9 Previously Surcharged	Table 10 Surcharged Manholes	Totals
Grout	EA. MH.	Assumed price includes materials and labor including associated preparation work	\$600								1	40	N/A	N/A	\$24,600
Root Control and Grout with Root Inhibitor	EA. MH.	Material, time and labor including associated preparation work	\$650						4	11			N/A	N/A	\$9,750
Cementitious Lining and Associated Preparation work	VF	Assumed Manhole Depth of 7 VF	\$1,800						4	6	3		N/A	N/A	\$23,400
Brick/Mortar Replacement with Grout	EA. MH	Assumed price includes materials, time and labor including associated preparation work	\$500						52				N/A	N/A	\$26,000
Cover Replacement	EA COVER	Materials	\$200				3	41					N/A	N/A	\$8,800
Resetting Frame	EA. MH.	Material, time and labor including associated preparation work	\$1,200		2	54	8						N/A	N/A	\$76,800
Manhole Replacement	EA. MH.	Material, time and labor including associated preparation work	\$6,000				3						N/A	N/A	\$18,000
Replacement of Frame	EA. MH.	Material, time and labor including associated preparation work	\$1,400		10								N/A	N/A	\$14,000
Asphalt Repair	EA. MH.	Material, time and labor	\$200	120									N/A	N/A	\$24,000

	Total Work =	\$225,350
	Contingency 25% =	\$56,400
	Engineering 15% =	\$33,800
	Total =	\$315,550
<b>Estimated Cost to Rehabilitate Manholes in Catchment Areas 1, 3, 4, and 7 =</b>		<b>\$320,000</b>

## CONCLUSIONS AND RECOMMENDATIONS

Based on the amount of infiltration that was observed during the manhole inspections (approximately 6,500 gpd), it does not appear that a full scale manhole rehabilitation program is warranted to reduce infiltration. Since the manholes that were inspected were not significant sources of infiltration/inflow their rehabilitation can be scheduled for routine implementation. The information gained from these inspections provides the City with a comprehensive database of manhole defects that can be repaired in association with other rehabilitation work that may be undertaken in these areas.

Earth Tech recommends that the repairs to the manholes be implemented as part of the City's routine maintenance of the wastewater collection system. These repairs are recommended to be performed based on the following prioritization as presented in Table 12.

**Table 12**  
**Manhole Rehabilitation**  
**Prioritization of Repairs**

<b>Priority</b>	<b>Repair Item</b>	<b>Defect Repaired</b>	<b>Benefits</b>
1	Cover Replacement	Covers with Holes	Reduction of inflow
2	Grout and Brick and Mortar Replacement with Grout	Leaking Walls/Inverts, Floor/Invert Defects, Damaged Corbels	Reduction of infiltration, improved structural soundness
3	Cementitious Lining of Manholes	Damaged Corbels, Wall Defects, Leaking Walls/Inverts	Reduction of infiltration, improved structural soundness
4	Root Control and Grout with Root Inhibitor	Damaged Corbels and Wall Defects	Reduction of infiltration, improved structural soundness
5	Resetting/replacement of Manhole Frames and Covers, Asphalt Repair and Manhole Replacement	Cracked Asphalt, Damaged Frame/Covers, Manholes Above/Below Grade, Manhole Replacement	Reduction of infiltration/inflow, can be done in conjunction with scheduled roadway repaving

## Manhole Inspection Summary Tables

Prepared by:

Earth Tech

Date:

August 30, 2006

Table A-1: All Defects

MH #	Grade Problems Above/Below	Difference Amount	Lift Quantity Problems	Cover problems	Surcharge Current Problem (in)	Surcharge Marks To-	Frame Problems	Corbel Defects	Walls Leaking (gpm)	Wall Defects	Floor Defects	Invert Leaks (GPM)	Invert Defects	Step Defects
071-1						4.5		LOOSE BRICKS, LOOSE MORTAR						
071-15			37					MISSING MORTAR					SUBMERGED	
071-81	BELOW	1				5.5		MISSING MORTAR, MISSING BRICKS						
079-44			37				CRACKED	MISSING BRICKS, STONE AND MORTAR					SUBMERGED	
079-45								MISSING MORTAR	0.1	WET			SUBMERGED	
081-26.1														UNACCEPTABLE BY CURRENT STANDARDS
081-3			6	CRACKED PAVEMENT SURROUNDING FRAME										
081-4			6	CRACKED PAVEMENT SURROUNDING FRAME										RUSTED, UNACCEPTABLE BY CURRENT STANDARDS
081-4.1								CRACKING						
081-5								BROKEN BRICKS, MISSING MORTAR						UNACCEPTABLE BY CURRENT STANDARDS
081-6														
081-91	BELOW	0.5												
081-92											DIRT, V SHAPED BOTTOM			UNACCEPTABLE BY CURRENT STANDARDS
081-93	BELOW	0.5									WET, RAGS, DEBRIS			UNACCEPTABLE BY CURRENT STANDARDS
082-10								MISSING MORTAR, BROKEN BRICKS		LIGHT ROOTS				
082-11								BROKEN BRICKS, LOOSE MORTAR			V SHAPED BOTTOM			
082-13														
082-14													8 INCH GAP AT VCP	
082-16				CRACKED COVER							WET			
082-8											WET			
082-9								DETERIORATED BRICK					V SHAPED BOTTOM	
087-23			32					STEEL RUSTED		L.T. VERTICAL CRACKING			WET WITH MINERAL DEPOSITS	RUSTED
087-3A														
087-5			37					MISSING MORTAR, MISSING BRICKS					SUBMERGED	
088-25								MISSING MORTAR, MISSING BRICKS						
088-27	BELOW	0.5												
088-28														
088-29									2.0	MISSING MORTAR, LEAKING, LIGHT ROOTS				
088-30				CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
088-31														UNACCEPTABLE BY CURRENT STANDARDS
088-31.1				BLIND FLANGE				MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
088-34				BLIND FLANGE										UNACCEPTABLE BY CURRENT STANDARDS
088-37							1.5 INCH OFFSET							UNACCEPTABLE BY CURRENT STANDARDS
088-38														UNACCEPTABLE BY CURRENT STANDARDS
088-46														UNACCEPTABLE BY CURRENT STANDARDS
088-51	ABOVE	1												
088-52														
088-53			36	CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, BROKEN BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
088-56				CRACKED PAVEMENT SURROUNDING FRAME			3 INCH CHIP							UNACCEPTABLE BY CURRENT STANDARDS
088-57				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
088-63	BELOW	1						MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
088-64	ABOVE	0.75		CRACKED PAVEMENT SURROUNDING FRAME			BROKEN							
088-65					1					LIGHT ROOTS				UNACCEPTABLE BY CURRENT STANDARDS
088-68				BLIND FLANGE		4								UNACCEPTABLE BY CURRENT STANDARDS
089-1													BROKEN	
089-3				CRACKED PAVEMENT SURROUNDING FRAME										
089-4														BROKEN
089-5			5	CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
089-6			33	CRACKED PAVEMENT SURROUNDING FRAME									SUMP	
089-7			13	CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
089-7.1				CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
089-70														
093-30	BELOW	1						MISSING MORTAR, MISSING BRICKS					SUBMERGED	



Table A-1: All Defects

MH #	Grade Problems Above/Below	Difference Amount	Lift Quantity Problems	Cover problems	Surcharge Current Problem (in)	Surcharge Marks To-	Frame Problems	Corbel Defects	Walls Leaking (gpm)	Wall Defects	Floor Defects	Invert Leaks (GPM)	Invert Defects	Step Defects
111-60				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
112-67			7	CRACKED PAVEMENT SURROUNDING FRAME										
112-70								MISSING MORTAR, MISSING BRICKS						
112-71				CRACKED PAVEMENT SURROUNDING FRAME										
112-72	BELOW	0.5		CRACKED PAVEMENT SURROUNDING FRAME		5		MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
112-74				CRACKED PAVEMENT SURROUNDING FRAME										
112-74.1				CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, MISSING BRICKS						MISSING STEPS
112-75				CRACKED PAVEMENT SURROUNDING FRAME										
112-76				COVER LOCATED IN GUTTER LINE										
112-77				COVER LOCATED IN GUTTER LINE										
116-81				CRACKED PAVEMENT SURROUNDING FRAME										
116-82				CRACKED PAVEMENT SURROUNDING FRAME										
116-83				CRACKED PAVEMENT SURROUNDING FRAME		8				HYDROGEN SULFIDE DETERIORATION				BROKEN
116-84				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
117-102				CRACKED PAVEMENT SURROUNDING FRAME		7								
117-103				CRACKED PAVEMENT SURROUNDING FRAME		5					CRACKED		MINERAL DEPOSITS	
117-104				CRACKED PAVEMENT SURROUNDING FRAME							MINERAL DEPOSITS			DETERIORATED
117-105				CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
117-106				CRACKED PAVEMENT SURROUNDING FRAME		8								UNACCEPTABLE BY CURRENT STANDARDS
117-107				CRACKED PAVEMENT SURROUNDING FRAME		4								BROKEN BRICKS
117-90			14					MISSING MORTAR, MISSING BRICKS		MISSING MORTAR, MISSING BRICKS				
117-92				CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, MISSING BRICKS						
117-95.1			6											BROKEN
117-96			10											UNACCEPTABLE BY CURRENT STANDARDS
117-98														BROKEN
117-99						6		MISSING MORTAR, MISSING BRICKS			UNDER WATER			
118-10				CRACKED PAVEMENT SURROUNDING FRAME										
118-117				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
118-118				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
118-119														UNACCEPTABLE BY CURRENT STANDARDS
118-124								MISSING MORTAR, MISSING BRICKS	0.2					UNACCEPTABLE BY CURRENT STANDARDS
118-124.2	ABOVE	3												
118-125	BELOW	0.5		CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
118-126				CRACKED PAVEMENT SURROUNDING FRAME										
118-2	BELOW	1	37					MISSING MORTAR, MISSING BRICKS						
118-27				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
118-4			27	CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
118-5								MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
118-6				CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
118-8													SUBMERGED	
118-9			6	CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
119-27			11	CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
120-31														UNACCEPTABLE BY CURRENT STANDARDS
120-32				CRACKED PAVEMENT SURROUNDING FRAME										
120-33				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
120-34														UNACCEPTABLE BY CURRENT STANDARDS
120-35														
120-36				CRACKED PAVEMENT SURROUNDING FRAME										
126-43			9	CRACKED PAVEMENT SURROUNDING FRAME						MISSING MORTAR, HYDROGEN SULFIDE DETERIORATION				
126-44				CRACKED PAVEMENT SURROUNDING FRAME										
127-48				CRACKED PAVEMENT SURROUNDING FRAME										
127-49				15" COVER										
127-51				CRACKED PAVEMENT SURROUNDING FRAME		4					SURCHARGED		SURCHARGED	
127-52			20	CRACKED PAVEMENT SURROUNDING FRAME				MISSING BRICKS AND MORTAR, HYDROGEN SULFIDE		MISSING BRICKS AND MORTAR, HYDROGEN SULFIDE DETERIORATION				UNACCEPTABLE BY CURRENT STANDARDS

Table A-1: All Defects

MH #	Grade Problems Above/Below	Difference Amount	Lift Quantity Problems	Cover problems	Surcharge Current Problem (in)	Surcharge Marks To-	Frame Problems	Corbel Defects	Walls Leaking (gpm)	Wall Defects	Floor Defects	Invert Leaks (GPM)	Invert Defects	Step Defects
127-53				CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
127-54			6	CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
127-55							PIECE MISSING							
127-56											MINERAL DEPOSITS			
127-57				CRACKED PAVEMENT SURROUNDING FRAME	4						SURCHARGED		SURCHARGED	
127-58								MISSING MORTAR, LIGHT ROOTS		MISSING MORTAR, LIGHT ROOTS				
127-60				CRACKED PAVEMENT SURROUNDING FRAME			CRACKED							DETERIORATED
127-61											MINERAL DEPOSITS WHERE FLOOR MEETS WALL			
128-67										WET	DIRT AND BRICKS			UNACCEPTABLE BY CURRENT STANDARDS
128-68	BELOW	0.75						MISSING MORTAR, MISSING BRICKS			MISSING BRICKS		MISSING PIECES OF VCP	UNACCEPTABLE BY CURRENT STANDARDS
128-68.1	BELOW	1.5											MISSING BRICKS	
128-68.2	ABOVE	1								MISSING MORTAR, MISSING BRICKS				UNACCEPTABLE BY CURRENT STANDARDS
128-68.3	ABOVE	1												
128-69				CRACKED PAVEMENT SURROUNDING FRAME										
128-71				CRACKED PAVEMENT SURROUNDING FRAME				LOOSE BRICKS AND MORTAR, BROKEN BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
128-72				PONDS INTO MANHOLE				MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
128-73						1		MISSING MORTAR, MISSING BRICKS			GAP BETWEEN FLOOR AND WALL			UNACCEPTABLE BY CURRENT STANDARDS
128-74														UNACCEPTABLE BY CURRENT STANDARDS
128-75						4								RUSTED, UNACCEPTABLE BY CURRENT STANDARDS
128-76			14	CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
128-79				CRACKED AND MISSING PAVEMENT SURROUNDING				MISSING BRICKS AND MORTAR, CRACKED BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
128-79.1								MISSING MORTAR, MISSING BRICKS						
128-81	ABOVE	0.5		CRACKED PAVEMENT SURROUNDING FRAME		6	PIECES MISSING							
128-82	ABOVE	0.5		CRACKED PAVEMENT SURROUNDING FRAME										
128-83				CRACKED PAVEMENT SURROUNDING FRAME										
128-86														
128-87				CRACKED PAVEMENT SURROUNDING FRAME										
128-88				CRACKED PAVEMENT SURROUNDING FRAME							MISSING MORTAR WHERE WALLS MEET FLOOR.			
128-88.1			9	CRACKED PAVEMENT SURROUNDING FRAME					0.5	LEAKING, MISSING MORTAR				UNACCEPTABLE BY CURRENT STANDARDS
128-90														UNACCEPTABLE BY CURRENT STANDARDS
128-91														
128-92				CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, MISSING BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
128-92.1				CRACKED PAVEMENT SURROUNDING FRAME										
129-1														RUSTED, UNACCEPTABLE BY CURRENT STANDARDS
129-2					1	5					SURCHARGED		SURCHARGED	
129-3								MISSING MORTAR, MISSING BRICKS						
129-4						2		DETERIORATED BRICKS						UNACCEPTABLE BY CURRENT STANDARDS
129-93				LIGHT CRACKED PAVEMENT SURROUNDING FRAME										
129-94	ABOVE	0.5									UNDER WATER AND SOLIDS			
129-95				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
129-97	ABOVE	0.5		CRACKED PAVEMENT SURROUNDING FRAME										
130-6														UNACCEPTABLE BY CURRENT STANDARDS
131-10				CRACKED PAVEMENT SURROUNDING FRAME										
131-11	BELOW	1		CRACKED PAVEMENT SURROUNDING FRAME										
131-14				CRACKED PAVEMENT SURROUNDING FRAME										UNACCEPTABLE BY CURRENT STANDARDS
131-15				CRACKED PAVEMENT SURROUNDING FRAME										
131-7														
139-28				CRACKED PAVEMENT SURROUNDING FRAME										BROKEN
139-29				CRACKED PAVEMENT SURROUNDING FRAME										
139-30	ABOVE	0.5								MISSING MORTAR, MISSING BLOCKS	DIRT, MODERATE MINERAL DEPOSITS			
139-31	ABOVE	1.25												
139-32	BELOW	1.5	5	CRACKED PAVEMENT SURROUNDING FRAME				MISSING MORTAR, MISSING BRICKS						BROKEN
139-33	BELOW	0.5		CRACKED PAVEMENT SURROUNDING FRAME										DETERIORATED
139-35	ABOVE	0.5						MISSING MORTAR, MISSING BRICKS						DETERIORATED







**Table A-2: Manholes with Damaged Pavement**

Location	Catchment Area	Manhole No.	Description
CARROLL AVENUE AT HARRISON AVENUE	1	128-79	CRACKED AND MISSING PAVEMENT SURROUNDING FRAME
COTTAGE STREET	1	081-3	CRACKED PAVEMENT SURROUNDING FRAME
REDWOOD STREET	1	081-4	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL DRIVE AT EDGAR COURT	1	088-30	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL DRIVE	1	088-53	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL DRIVE AT FREEBODY STREET	1	088-56	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL BOULEVARD AT HAYDEN COURT	1	088-57	CRACKED PAVEMENT SURROUNDING FRAME
LIBERTY STREET	1	088-64	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL BOULEVARD AT RHODE ISLAND AVENUE SOUTH	1	089-3	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL BOULEVARD	1	089-5	CRACKED PAVEMENT SURROUNDING FRAME
MIDDLETON AVENUE AT MEMORIAL BOULEVARD	1	089-6	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL DRIVE AT MIDDLETON AVENUE	1	089-7	CRACKED PAVEMENT SURROUNDING FRAME
MEMORIAL DRIVE	1	089-7.1	CRACKED PAVEMENT SURROUNDING FRAME
EAST BOWERY STREET AT FREEBODY STREET	1	094-48	CRACKED PAVEMENT SURROUNDING FRAME
FREEBODY STREET	1	094-49	CRACKED PAVEMENT SURROUNDING FRAME
MIDDLETON AVENUE	1	095-54	CRACKED PAVEMENT SURROUNDING FRAME
MIDDLETON AVENUE AT MERTON AVENUE	1	095-59	CRACKED PAVEMENT SURROUNDING FRAME
MORTON AVENUE AT MIDDLETON AVENUE	1	095-60	CRACKED PAVEMENT SURROUNDING FRAME
WEAVER AVENUE	1	095-68	CRACKED PAVEMENT SURROUNDING FRAME
MIDDLETON AVENUE AT WEAVER AVENUE	1	095-69	CRACKED PAVEMENT SURROUNDING FRAME
SYLVAN TERRACE	1	101-24	CRACKED PAVEMENT SURROUNDING FRAME
PARKER AVENUE AT SYLVAN STREET	1	101-25	CRACKED PAVEMENT SURROUNDING FRAME
EAST BOWERY STREET AT MIDDLETON AVENUE	1	102-1	CRACKED PAVEMENT SURROUNDING FRAME
SLOCUM STREET AT ANNANDALE ROAD	1	102-10	CRACKED PAVEMENT SURROUNDING FRAME
ANNANDALE PLACE	1	102-13	CRACKED PAVEMENT SURROUNDING FRAME
MIDDLETON AVENUE AT BERKLEY AVENUE	1	102-2	CRACKED PAVEMENT SURROUNDING FRAME
PARKER AVENUE AT MIDDLETON AVENUE	1	102-3	CRACKED PAVEMENT SURROUNDING FRAME
MIDDLETON AVENUE AT SYLVAN TERRACE	1	102-4	CRACKED PAVEMENT SURROUNDING FRAME
SYLVAN TERRACE	1	102-5	CRACKED PAVEMENT SURROUNDING FRAME
ANNANDALE ROAD AT PARKER AVENUE	1	102-6	CRACKED PAVEMENT SURROUNDING FRAME

**Table A-2: Manholes with Damaged Pavement**

Location	Catchment		Description
	Area	Manhole No.	
MERCHANT STREET AT SIMMONS STREET	4	109-20	CRACKED PAVEMENT SURROUNDING FRAME
MERCHANT STREET AT GRAFTON STREET	4	109-22	CRACKED PAVEMENT SURROUNDING FRAME
WELLINGTON AVENUE AT MERCHANT STREET	4	109-24	CRACKED PAVEMENT SURROUNDING FRAME
MERCHANT STREET	4	109-24.1	CRACKED PAVEMENT SURROUNDING FRAME
WELLINGTON AVENUE AT BOSS COURT	4	109-28	CRACKED PAVEMENT SURROUNDING FRAME
GRAFTON STREET	4	109-30	CRACKED PAVEMENT SURROUNDING FRAME
WELLINGTON AVENUE AT CLINTON STREET	4	109-35	CRACKED PAVEMENT SURROUNDING FRAME
SIMMONS STREET	4	110-38	CRACKED PAVEMENT SURROUNDING FRAME
THAMES STREET AT WELLINGTON AVENUE	6	110-44	CRACKED PAVEMENT SURROUNDING FRAME
WARD AVENUE	1	111-59	CRACKED PAVEMENT SURROUNDING FRAME
WARD AVENUE AT CLAY STREET	1	111-60	CRACKED PAVEMENT SURROUNDING FRAME
NARAGANSETT AVENUE AT OCHRE POINT AVENUE	3	112-67	CRACKED PAVEMENT SURROUNDING FRAME
NARAGANSETT AVENUE AT ANNANDALE ROAD	3	112-71	CRACKED PAVEMENT SURROUNDING FRAME
WARD AVENUE	1	112-72	CRACKED PAVEMENT SURROUNDING FRAME
NARRAGANSETT AVENUE	1	112-74	CRACKED PAVEMENT SURROUNDING FRAME
NARRAGANSETT AVENUE	1	112-74.1	CRACKED PAVEMENT SURROUNDING FRAME
NARAGANSETT AVENUE	3	112-75	CRACKED PAVEMENT SURROUNDING FRAME
HALIDON AVENUE	4	116-81	CRACKED PAVEMENT SURROUNDING FRAME
HALIDON AVENUE	4	116-82	CRACKED PAVEMENT SURROUNDING FRAME
HALIDON AVENUE	4	116-83	CRACKED PAVEMENT SURROUNDING FRAME
HALIDON AVENUE	4	116-84	CRACKED PAVEMENT SURROUNDING FRAME
MERCHANT STREET AT STOCKHOLM STREET	4	117-102	CRACKED PAVEMENT SURROUNDING FRAME
MERCHANT STREET AT POTTER STREET	4	117-103	CRACKED PAVEMENT SURROUNDING FRAME
STOCKHOLM STREET	4	117-104	CRACKED PAVEMENT SURROUNDING FRAME
STOCKHOLM STREET	4	117-105	CRACKED PAVEMENT SURROUNDING FRAME
MERCHANT STREET AT LUCAS AVENUE	4	117-106	CRACKED PAVEMENT SURROUNDING FRAME
CONNECTION STREET AT MERCHANT STREET	4	117-107	CRACKED PAVEMENT SURROUNDING FRAME
CLINTON STREET	4	117-92	CRACKED PAVEMENT SURROUNDING FRAME
CONNECTION STREET	4	118-10	CRACKED PAVEMENT SURROUNDING FRAME
CAREY STREET	4	118-117	CRACKED PAVEMENT SURROUNDING FRAME

**Table A-2: Manholes with Damaged Pavement**

Location	Catchment Area	Manhole No.	Description
CAREY STREET	4	118-118	CRACKED PAVEMENT SURROUNDING FRAME
MORTON AVENUE	3	118-125	CRACKED PAVEMENT SURROUNDING FRAME
STOCKHOLM STREET	4	118-126	CRACKED PAVEMENT SURROUNDING FRAME
THAMES STREET	4	118-27	CRACKED PAVEMENT SURROUNDING FRAME
POTTER STREET AT THAMES STREET	4	118-4	CRACKED PAVEMENT SURROUNDING FRAME
THAMES STREET AT CAREY STREET	4	118-6	CRACKED PAVEMENT SURROUNDING FRAME
LUCAS AVENUE	4	118-9	CRACKED PAVEMENT SURROUNDING FRAME
LEROY AVENUE	3	119-27	CRACKED PAVEMENT SURROUNDING FRAME
LAWRENCE AVENUE AT LEROY AVENUE	3	120-32	CRACKED PAVEMENT SURROUNDING FRAME
LEROY AVENUE AT LAWRENCE STREET	3	120-33	CRACKED PAVEMENT SURROUNDING FRAME
LAWRENCE AVENUE	3	120-36	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE	4	126-43	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE	4	126-44	CRACKED PAVEMENT SURROUNDING FRAME
HALIDON AVENUE AT HALIDON TERRACE	4	127-48	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE	4	127-51	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE AT BRENTON ROAD	4	127-52	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE	4	127-53	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE AT HARRISON LANE	4	127-54	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE	7	127-57	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE AT SULLIVAN STREET	7	127-60	CRACKED PAVEMENT SURROUNDING FRAME
MORGAN STREET	7	128-69	CRACKED PAVEMENT SURROUNDING FRAME
PALMER STREET	7	128-71	CRACKED PAVEMENT SURROUNDING FRAME
MARCHANT STREET AT ATLANTIC STREET	4	128-76	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE AT MARCHANT STREET	7	128-81	CRACKED PAVEMENT SURROUNDING FRAME
MARCHANT STREET AT HARRISON AVENUE	4	128-82	CRACKED PAVEMENT SURROUNDING FRAME
MARCHANT STREET	4	128-83	CRACKED PAVEMENT SURROUNDING FRAME
EASTNOR ROAD	4	128-87	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE	7	128-88	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE AT COWSILL LANE	7	128-88.1	CRACKED PAVEMENT SURROUNDING FRAME
HARRISON AVENUE AT GILROY STREET	7	128-92	CRACKED PAVEMENT SURROUNDING FRAME

**Table A-2: Manholes with Damaged Pavement**

Location	Catchment Area	Manhole No.	Description
HARRISON AVENUE	7	128-92.1	CRACKED PAVEMENT SURROUNDING FRAME
VAUGHAN AVENUE	3	129-95	CRACKED PAVEMENT SURROUNDING FRAME
EARL AVENUE	3	129-97	CRACKED PAVEMENT SURROUNDING FRAME
SHEPARD AVENUE	3	131-10	CRACKED PAVEMENT SURROUNDING FRAME
SHEPARD AVENUE	3	131-11	CRACKED PAVEMENT SURROUNDING FRAME
LAWRENCE AVENUE	3	131-14	CRACKED PAVEMENT SURROUNDING FRAME
SHEPARD AVENUE	3	131-15	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE AT FLORENCE AVENUE	7	139-28	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE	7	139-29	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	3	139-32	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	3	139-33	CRACKED PAVEMENT SURROUNDING FRAME
HAROLD STREET AT RICHMOND PLACE	7	139-36	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE	7	139-43	CRACKED PAVEMENT SURROUNDING FRAME
VICTORIA STREET AT COGGESHALL AVENUE	3	140-46	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	3	140-49.1	CRACKED PAVEMENT SURROUNDING FRAME
VANDERBILT AVENUE	3	140-51	CRACKED PAVEMENT SURROUNDING FRAME
FLORENCE AVENUE	7	140-58	CRACKED PAVEMENT SURROUNDING FRAME
WEATHERLY AVENUE	3	140-61	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	3	141-70	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT BELLEVUE AVENUE	3	141-73	CRACKED PAVEMENT SURROUNDING FRAME
COGGESHALL AVENUE AT RUGGLES AVENUE	4	141-77	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT LAWRENCE AVENUE	3	142-4	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	3	142-5	CRACKED PAVEMENT SURROUNDING FRAME
BINNEY STREET	3	151-25	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT CARROLL AVENUE	3	151-27	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT FLORENCE AVENUE	3	151-28	CRACKED PAVEMENT SURROUNDING FRAME
GOOSEBERRY ROAD AT DAMON STREET	3	151-29	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE AT GOOSEBERRY ROAD	3	151-30	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE	3	151-30.1	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE	3	151-31	CRACKED PAVEMENT SURROUNDING FRAME

**Table A-2: Manholes with Damaged Pavement**

Location	Catchment		Description
	Area	Manhole No.	
CARROLL AVENUE	3	151-32	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	7	151-34	CRACKED PAVEMENT SURROUNDING FRAME
MCCORMICK ROAD	3	152-36	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT SHIELDS STREET	3	152-43	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE	3	152-43.1	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT MCCORMICK ROAD	3	152-44	CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE AT WEATHERLY AVENUE	3	152-45	CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE	3	163-72	CRACKED PAVEMENT SURROUNDING FRAME
OCEAN HEIGHTS ROAD	7	173-95	CRACKED PAVEMENT SURROUNDING FRAME
ALPOND DRIVE	3	174-1	CRACKED PAVEMENT SURROUNDING FRAME
ALPOND DRIVE AT JEFFERY DRIVE	3	174-2	CRACKED PAVEMENT SURROUNDING FRAME
JEFFERY DRIVE	3	174-3	CRACKED PAVEMENT SURROUNDING FRAME
JEFFERY DRIVE	3	174-4.1	CRACKED PAVEMENT SURROUNDING FRAME
ALPOND DRIVE	3	175-12	CRACKED PAVEMENT SURROUNDING FRAME
SPRING STREET	3	129-93	LIGHT CRACKED PAVEMENT SURROUNDING FRAME
RUGGLES AVENUE NEAR GEORGE STREET	3	140-48	LIGHT CRACKED PAVEMENT SURROUNDING FRAME
COGGESHALL AVENUE AT RUGGLES AVENUE	3	140-77	LIGHT CRACKED PAVEMENT SURROUNDING FRAME
CARROLL AVENUE	3	163-65	LIGHT CRACKED PAVEMENT SURROUNDING FRAME
JEFFERY DRIVE	3	174-4	LIGHT CRACKED PAVEMENT SURROUNDING FRAME
HIGHLAND PLACE	7	150-21	MISSING PAVEMENT SURROUNDING FRAME
OCEAN HEIGHTS ROAD	7	162-61	MISSING PAVEMENT SURROUNDING FRAME

**Total No.= 141 Manhole with Damaged pavement**

**Table A-3: Manholes with Damaged Corbels**

Location	Catchment Area.	Manhole No.	Material	Condition of Corbel
REDWOOD STREET	1	081-4.1	PRECAST/PARGED	CRACKING
OLD BEACH ROAD AT COTTAGE STREET	1	081-5	BRICK	BROKEN BRICKS, MISSING MORTAR
OAKWOOD TERRACE	1	082-10	BRICK	MISSING MORTAR, BROKEN BRICKS
OAKWOOD TERRACE	1	082-11	BRICK	BROKEN BRICKS, LOOSE MORTAR
OAKWOOD TERRACE AT RHODE ISLAND AVENUE	1	082-9	BRICK	DETERIORATED BRICK
LIBERTY STREET AT DOWNING STREET	1	088-25	BRICK	MISSING MORTAR, MISSING BRICKS
CHAPEL STREET	1	088-31.1	BRICK	MISSING MORTAR, MISSING BRICKS
MEMORIAL DRIVE	1	088-53	BRICK	MISSING MORTAR, BROKEN BRICKS
CHAPEL STREET APARTMENT	1	088-63	BRICK	MISSING MORTAR, MISSING BRICKS
BERKLEY AVENUE AT SYLVAN STREET	1	101-23	BRICK	MISSING MORTAR, MISSING BRICKS
PARKER AVENUE AT SYLVAN STREET	1	101-25	BRICK	MISSING MORTAR, MISSING BRICKS
ANNANDALE PLACE	1	102-14	BRICK	MISSING MORTAR, LIGHT ROOTS
PARKER AVENUE AT MIDDLETON AVENUE	1	102-3	BRICK	MISSING MORTAR, MISSING BRICKS
WELLINGTON AVENUE	4	108-19	POURED IN PLACE	DETERIORATED
MARCHANT STREET AT SIMMONS STREET	4	109-21	BRICK	MISSING MORTAR, MISSING BRICKS
CLINTON STREET	4	109-34	BRICK	MISSING MORTAR, MISSING BRICKS
NARAGANSETT AVENUE	3	112-70	BRICK	MISSING MORTAR, MISSING BRICKS
WARD AVENUE	1	112-72	BRICK	MISSING MORTAR, MISSING BRICKS
NARRAGANSETT AVENUE	1	112-74.1	BRICK	MISSING MORTAR, MISSING BRICKS
CLINTON STREET AT WEST NARRAGANSETT AVENUE	4	117-90	BRICK	MISSING MORTAR, MISSING BRICKS
CLINTON STREET	4	117-92	BRICK	MISSING MORTAR, MISSING BRICKS
MARCHANT STREET AT WEST NARRAGANSETT AVE.	4	117-99	BRICK	MISSING MORTAR, MISSING BRICKS
MORTON AVENUE	3	118-124	BRICK	MISSING MORTAR, MISSING BRICKS
MORTON AVENUE	3	118-125	BRICK	MISSING MORTAR, MISSING BRICKS
THAMES STREET	4	118-5	BRICK	MISSING MORTAR, MISSING BRICKS
THAMES STREET AT CAREY STREET	4	118-6	BRICK	MISSING MORTAR, MISSING BRICKS
HARRISON AVENUE AT BRENTON ROAD	4	127-52	BRICK	MISSING BRICKS AND MORTAR, HYDROGEN SULFIDE DETERIORATION
HARRISON LANE	4	127-58	BRICK	MISSING MORTAR, LIGHT ROOTS
PALMER STREET	7	128-68	BRICK	MISSING MORTAR, MISSING BRICKS
PALMER STREET	7	128-71	BRICK	LOOSE BRICKS AND MORTAR, BROKEN BRICKS
PALMER STREET	7	128-72	BRICK	MISSING MORTAR, MISSING BRICKS
OLD FORT ROAD	7	128-73	BRICK	MISSING MORTAR, MISSING BRICKS
CARROLL AVENUE AT HARRISON AVENUE	7	128-79	BRICK	MISSING BRICKS AND MORTAR, CRACKED BRICKS
OLD FORT ROAD	7	128-79.1	BRICK	MISSING MORTAR, MISSING BRICKS
HARRISON AVENUE AT GILROY STREET	7	128-92	BRICK	MISSING MORTAR, MISSING BRICKS
CARROLL AVENUE	7	129-3	BRICK	MISSING MORTAR, MISSING BRICKS
CARROLL AVENUE	7	129-4	BRICK	DETERIORATED BRICKS
RUGGLES AVENUE	3	139-32	BRICK	MISSING MORTAR, MISSING BRICKS
HAROLD STREET	7	139-35	BRICK	MISSING MORTAR, MISSING BRICKS
VANDERBILT AVENUE	3	140-51	BRICK	MISSING MORTAR, MISSING BRICKS
GORDON STREET AT VANDERBILT AVENUE	3	140-52	BRICK	MISSING MORTAR, MISSING BRICKS
KERINS TERRACE AT GORDON STREET	3	140-53	BRICK	MISSING BRICKS
WEATHERLY AVENUE	3	140-55	BRICK	MISSING MORTAR, CRACKED AND MISSING BRICKS
RUGGLES AVENUE	7	150-17	BRICK/PARGED	MISSING BRICKS AND MORTAR, LIGHT ROOTS
HIGHLAND PLACE AT HAZARD ROAD ROW	7	150-20	BRICK	LIGHT ROOTS
BINNEY STREET	3	151-25	BRICK	MISSING BRICKS AND MORTAR, BROKEN BRICKS
MCCORMICK ROAD	3	152-36	BRICK	MISSING MORTAR, LOOSE AND MISSING BRICKS
OCEAN HEIGHTS ROAD	7	162-63	BRICK	MISSING MORTAR, MISSING BRICKS
CARROLL AVENUE AT ALPOND DRIVE	3	163-67	PARGED	CRACKED
ALPOND DRIVE	3	163-69	PARGED	CRACKED
CARROLL AVENUE AT JEFFREY DRIVE	3	163-71	BRICK	MISSING MORTAR, MISSING BRICKS
OCEAN HEIGHTS ROAD	7	173-95	BRICK	MISSING MORTAR, LOOSE BRICKS
THAMES STREET	6	071-1	BRICK	LOOSE BRICKS, LOOSE MORTAR
THAMES ST AT MARY ST	6	071-15	BRICK	MISSING MORTAR
THAMES ST AT TOURO	6	071-81	BRICK	MISSING MORTAR, MISSING BRICKS
THAMES ST AT CHURCH ST	6	079-44	BRICK/STONE	MISSING BRICKS, STONE AND MORTAR
THAMES ST AT PELHAM ST	6	079-45	BRICK	MISSING MORTAR
THAMES STREET AT ANN STREET	6	087-5	BRICK	MISSING MORTAR, MISSING BRICKS
THAMES ST AT FRANKLIN ST	6	087-23	BRICK/STEEL	STEEL RUSTED
THAMES ST AT YOUNG ST	6	093-30	BRICK	MISSING MORTAR, MISSING BRICKS
THAMES STREET AT DEARBORN STREET	6	100-2	BRICK/PARGED	MISSING MORTAR, BROKEN BRICKS
THAMES STREET AT POPE STREET	6	100-6	BRICK/PARGED	MISSING MORTAR, MISSING BRICKS
THAMES STREET AT DEAN STREET	6	100-6A	BRICK/PARGED	MISSING MORTAR, MISSING BRICKS
THAMES STREET AT WELLINGTON AVENUE	6	110-45	BRICK/STEEL	RUSTED STEEL
THAMES STREET AT NARRAGANSETT AVENUE	6	118-2	BRICK	MISSING MORTAR, MISSING BRICKS

65 Total Manholes with Corbel Problems