

Technical Memorandum

To	Ridgefield WPCA	Page	1 of 9
CC	C. Fisher, J. O'Brien, M. Burke, J. Pennell		
Subject	Town of Ridgefield, CT Phase 2 Wastewater Facilities Plan Technical Memorandum No. 2 – Internal CCTV Inspection of Selected Mainline Sewers and Lateral Service Connections		
From	Jon Pearson/Alberto Angles		
Date	November 17, 2016		

INTRODUCTION

This Technical Memorandum summarizes the findings of the selected television inspection program conducted under the Phase 2 Wastewater Facilities Plan.

BACKGROUND

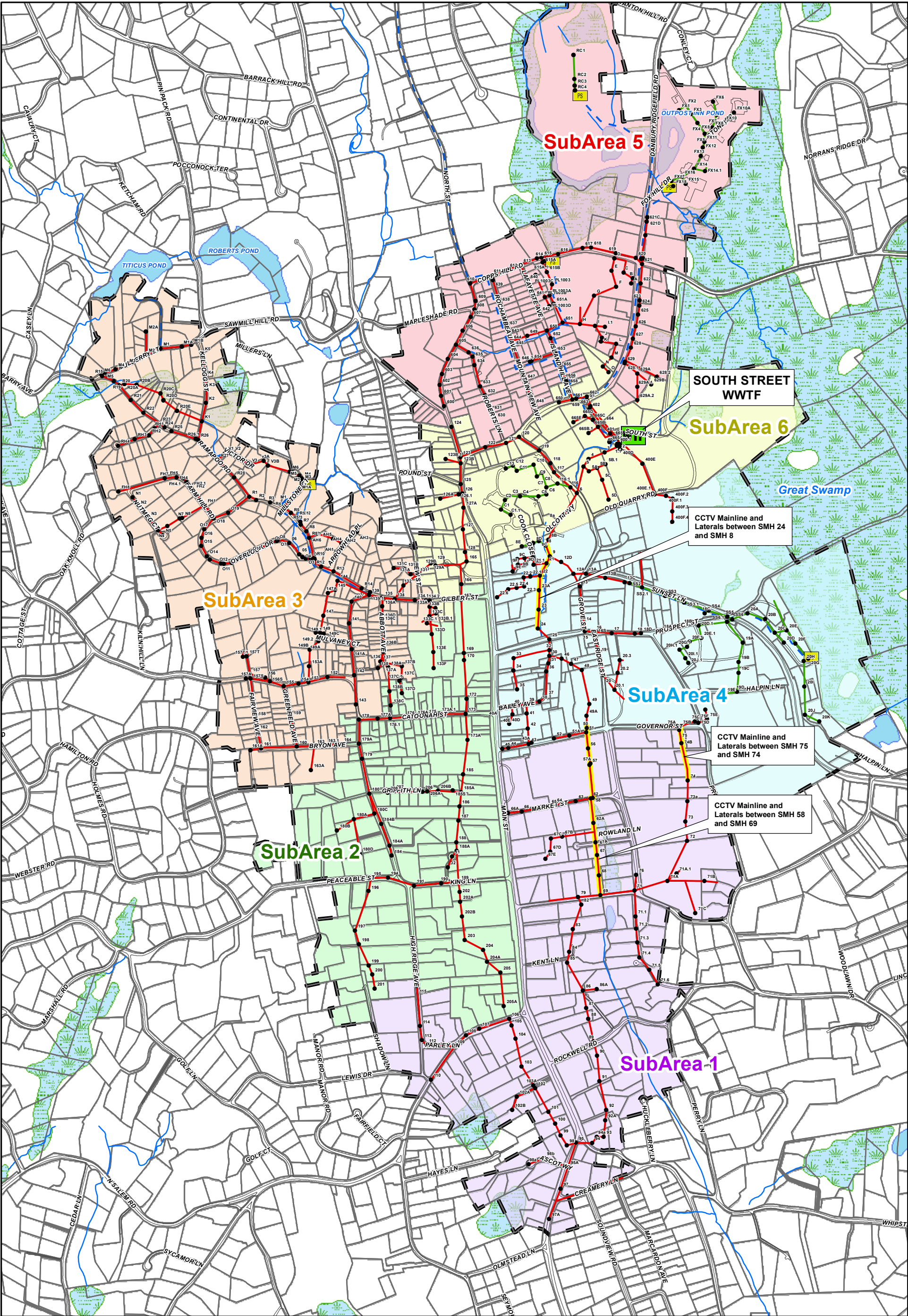
There has been previous discussions and speculation that some of the observed infiltration and inflow (I/I) in the collection system may be entering through some of the unusually long service connections present in Sewer District 1, particularly on both sides of Main Street. To assess the potential for laterals to contribute significant I/I, 14 manhole to manhole segments of mainline sewers were television inspected to observe leakage from both the mainline sewer and the lateral service connections. A lateral inspection camera was then deployed to further observe leakage from within the lateral service connections.

Lateral inspections can also sometimes confirm whether the buildings served by apparent leaking laterals have a sump pump that could be contributing the observed clean water flow. The extent of the lateral service connection that can be inspected varies with the number of bends and condition of the lateral service connection piping.

DATA COLLECTION

Field work consisted of closed circuit television (CCTV) inspection of selected mainline sewers and lateral service connections to identify infiltration sources. The criteria for selecting locations of the CCTV inspections included low-lying areas which may be subject to flooding, and those which have unusually long service connections. The locations of the CCTV inspection of mainline sewers and lateral service connections are indicated on Figure 1.

The field work was performed June 20 to June 21, 2016 by National Water Main Cleaning Company under subcontract to AECOM. The CCTV inspection work is described below. It was intended to



Drawn: BC 11/11/2016

Approved: AA 11/11/2016

Map Location

Legend

WWTf

Pump Station

CCTV Locations

Municipal Sewer

Private Sewer

Force Main

Roads

Streams

Sewer District 1 Boundary

Parcel/Polygon

Swamps

Waterbodies

05001,000

Feet

FIGURE 1: CCTV OF SELECTED
MAINLINE AND LATERAL SANITARY SEWERS
TECHNICAL MEMORANDUM NO.2
NOVEMBER 2016

RIDGEFIELD, CT

PHASE II WASTEWATER FACILITIES PLAN

G:\Projects\MUNI\60299267RID\Maps\Figure 1 - CCTV November 2016 Memo.mxd

conduct the CCTV inspections during high groundwater season. Typically the high groundwater period in the study area is between March 1 and June 30. However, due to drought conditions over the last several years groundwater during the period of field work was unusually low.

CCTV Inspection of Selected Mainline Sewers

Internal television inspection of approximately 2,650 linear feet of mainline sewer was performed to identify specific pipeline defects or infiltration sources within a length of sewer from one manhole to another (pipe segment). Where necessary to perform the work, pipe segments were cleaned by a high pressure jet to remove minor obstructions and to clean the pipe walls so that if defects are present they can be visually detected. Internal inspection was then accomplished by utilizing a self-propelled crawler camera. Defects within the mainline sewers, such as structural problems, inflow/infiltration, root intrusion, and grease build-up were recorded on logs for each pipe segment. A copy of the CCTV inspection report for mainline sewers including logs and videos is included as Attachment A.

CCTV Inspection of Selected Lateral Service Connections

Internal television inspection of 10 lateral service connections was performed to identify specific defects or infiltration sources within each lateral service connection. During the CCTV of the mainline sewers, a lateral inspection camera was deployed from the mainline camera rig to further observe leakage within the lateral service connections that showed evidence of leaking or the presence of a sump pump.

The lateral inspection unit is a self-leveling camera mounted on the self-propelled crawler camera. A lateral launcher guides the camera into the lateral service connection from the mainline sewer. The length of a lateral service connection that can be inspected may be limited depending on the number of bends and condition of the service lateral piping. Defects within the lateral service connection, such as structural problems, inflow/infiltration, root intrusion, and grease build-up were recorded on logs (referred to as Satellite Reports) for each lateral service connection televised. A copy of the CCTV inspection report for lateral service connections including logs and videos are included as Attachment A.

ANALYSIS

CCTV Inspection of Selected Mainline Sewers

The results of the CCTV inspection of selected mainline sewers were reviewed by AECOM. Table 1 presents a summary of the infiltration sources and defects discovered during the CCTV inspection of selected mainline sewers. As indicated in Table 1, infiltration, or evidence of infiltration, was observed in 7 of the 14 pipe segments inspected. The quantity of infiltration entering the mainline sewers was estimated based on a visual assessment of each infiltration source. The total quantity of infiltration identified from the defects listed in Table 1 is estimated to be approximately 22,000 gpd. With the exception of minor seepage in the mainline sewers, all of the infiltration was observed to be emanating from either leaks where the lateral service connection meets the mainline sewer or from lateral service connections observed to be running with a constant flow of clear water.

TABLE 1. SUMMARY OF MAINLINE SEWER DEFECTS

Sewer Sub area	From MH	To MH	Street Name	Pipe Length (ft)	Pipe Dia (in)	Mainline Sewer			Lateral Service Connections		
						Debris	Evidence of Leakage	Est. Leak (gpd)	Break-in Conn.	Min Depos/ Leak	Est. Leak (gpd)
4	24	23	Prospect St.	204.4	12		x	10	x	x	1,450
4	23	23A	Prospect St.	204.4	12						
4	23A	22	Prospect St.	172.9	12				x	x	7,210
4	22	21	Prospect St.	155.9	12						
4	9	21	Grove St.	86.4	12						
4	9	8B	Grove St.	136	12						
4	8B	8	Grove St.	56	12						
1	75A	74B	Governor St.	192.9	8	x			x		
1	74B	74	Governor St.	375.4	8		x	10	x	x	4,320
1	67A	67	Rowland Ln. Easement	140.7	10				x	x	20
1	67A	62A	Rowland Ln. Easement	220.8	10				x	x	2,890
1	62A	62	Rowland Ln. Easement	268.5	10	x			x	x	40
1	69	68	Rowland Ln. Easement	215.3	10	x					
1	68	67	Rowland Ln. Easement	225.8	10				x	x	5,770
Totals:				2655				20			21,700

CCTV Inspection of Selected Lateral Service Connections

The results of the CCTV inspection of selected lateral service connections were reviewed by AECOM. Table 2 presents a summary of the infiltration sources and defects discovered during the CCTV inspection of selected lateral service connections. As indicated in Table 1, infiltration was observed in 9 out of the 10 lateral service connections inspected. Two lateral service connections which exhibited evidence of infiltration were not able to be inspected due to protruding service connections. One is located 47 feet downstream of SMH 24 on pipe segment SMH 24 to SMH 23, and the other is located 90 feet downstream of SMH 23A on pipe segment SMH 23A to SMH 22. No evidence of sump pump activity was observed during the CCTV of lateral service connections.

Based on the areas observed, the long lateral service connections in low lying areas do appear to be contributing infiltration to the collection system. The estimated flow of 22,000 gpd however is small compared to the direct inflow sources that have been identified by other field efforts. The various I/I sources located during the field investigations will be ranked and an Inflow Reduction Plan developed as part of the Phase 2 Wastewater Facilities Plan.

REHABILITATION ALTERNATIVES

Sewer Rehabilitation

There are two general methodologies available for rehabilitating sewers; dig-and-replace and trenchless technologies. Dig-and-replace involves locating a defective pipe or pipe segment(s), excavating, and either repairing or replacing as necessary. Trenchless technologies require little or no excavation as repairs are made internal to the existing pipe using existing manholes for access. These techniques may also be used to repair leaking service connections.

Dig-and-Replace. Dig-and-replace is typically used when there are multiple defects in a given sewer and/or when the structural integrity of the line is in question. This method may be used when entire manhole to manhole sewer lengths exhibit multiple defects such as cracks, separated joints and breaks, and for individual pipe segments (i.e., spot repairs) when there is a single defect. For example, if there is a section of collapsed pipe, but the rest of the line is in excellent condition, only the collapsed section needs to be replaced.

Joint Testing and Sealing (Trenchless). In the event of leaking or cracked joints, testing and sealing may be effective in reducing infiltration if the pipe is in structurally sound condition. Subsequent to hydraulic cleaning, each joint along the length of the sewer is pressure tested with air. If the joint fails the test, a chemical grout is applied to prevent infiltration from entering the system from that source.

Internal Spot Repairs (Trenchless). Where pipe is broken or cracked, spot repairs may be performed utilizing chemical grout, similar to joint sealing, or epoxy compounds for greater strength. Short cured-in-place liners or rigid sleeves may also be used for spot repair of more significant defects.

Root Control (Trenchless). Trees and shrubs adjacent to sewer lines often cause damage to sewer pipes with their roots. The roots may enter the pipe by separating joints or, under extreme conditions,

TABLE 2. SUMMARY OF CCTV INSPECTION OF SELECTED LATERAL SERVICE CONNECTIONS

Subarea	From MH	To MH	Street Name	Inspection Station ⁽¹⁾ (ft)	Dist Tv'd up Service (ft)	Defects	Comments	Rehabilitation
4	23A	22	Prospect St.	70	56	MD, OSJ, Heavy INF, Debris	Possible daylight beyond inspection	Line
4	23A	22	Prospect St.	90	2	PSC, INF	Could not inspect due to PSC	See note 2
1	75A	74B	Governor St.	80	14	Tuberculated pipe	Necks down @ 14 ft. (may be old cesspool)	NA
1	74B	74	Governor St.	85	3	INF	Capped	NA
1	74B	74	Governor St.	96	64	Roots, OSJ, INF		Line
1	74B	74	Governor St.	245	54	Roots, OSJ, INF		Line
1	67A	62A	Rowland Ln. Easement	168	24	Roots, INF		Line
1	62A	62	Rowland Ln. Easement	164	6	INF	Capped	NA
1	68	67	Branchville Rd. Easement	217	63	Roots, INF, Debris		Line
1	68	67	Branchville Rd. Easement	108	49	INF		Line
1	MH67	6"LAT	Branchville Rd. Easement	-	33	Roots	6" lateral extending west from MH 67	Line

- Notes:
1. Entry indicates the distance from the manhole listed in the column titled "From MH".
 2. Rehabilitation methods are listed in Table 3 and include the cutting protruding service connection, grouting the connection at the mainline sewer, and inspecting.

Legend:

- OSJ - Offset Joint
- INF - Infiltration
- MD - Mineral Deposits
- RTS - Roots
- PSC - Protruding Service Connection
- NA - No Action

breaking pipe. The resultant openings allow infiltration to enter the sewer system. Further, the roots can block the pipe and restrict flow in the pipe. When this occurs, the roots may be removed by grinding and cutting. After removal, an herbicide is applied to kill the roots in the immediate vicinity of the pipe. Resultant root damage may be repaired with other trenchless technologies where appropriate. In areas where root control is completed, pipe joints are often grouted to reduce future root penetration.

Sewer Relining (Trenchless). In sewer lines where there are multiple cracks, breaks and defective joints, it can be cost-effective to reline the pipe. Relining is an attractive alternative when conventional dig-and-replace is too disruptive for a given location (i.e., located within a busy roadway or within an improved property) and where the sewer line is relatively deep. There are several methods available for relining. They range from mortar linings which are spun onto the interior surface of the existing pipe to tube liners which are cured-in-place. Insituform® is one example of cured-in-place pipe relining technology. Relining cannot be used in sewer lines where pipe segments are collapsed. Some companies also have relining methods which can be used on lateral service connections. This may be accomplished via the mainline sewer, but may require access to the lateral service connection either from inside the building or through installation of a cleanout on the lateral service connection.

SUMMARY AND ESTIMATED COSTS

Mainline Sewer Rehabilitation

As summarized in Table 1, a number of infiltration sources and defects were observed in the mainline sewers inspected. These defects included pipe defects either actively leaking or with evidence of previous leakage, debris in the lines, and lateral service connections leaking at the connection to the mainline sewer. Table 3 presents a summary of the estimated costs for mainline sewer repairs, including allowances for engineering and contingencies. As indicated, mainline sewer rehabilitation generally includes cleaning to remove sediment and debris, and localized internal spot repairs. Mainline sewer repairs also include cutting and sealing protruding break-in service connections, sealing and retesting where the lateral service connection meets the mainline sewer, and inspecting laterals. The total estimated cost of the mainline sewer rehabilitation is approximately \$22,000.

Lateral Service Connection Rehabilitation

The CCTV inspection of selected lateral service connections shows that infiltration enters the sewer system through lateral service connections even during drought conditions. In fact, as shown in the "Totals" row at the bottom of Table 1, the estimated infiltration entering the sewer system from the lateral service connections within the sewers that were televised is substantially greater than the estimated infiltration entering the sewer system from the mainline sewer (21,700 gpd versus 20 gpd, respectively).

The typical methods to rehabilitate a lateral service connection to remove infiltration are similar to those employed for mainline sewers: Joint testing and sealing; Excavation and replacement, and; Lining.

TABLE 3. SUMMARY OF MAINLINE SEWER REHABILITATION COSTS

Sewer Sub area	From MH	To MH	Street Name	Pipe Length (ft)	Pipe Dia (in)	Mainline Sewer		Mainline Sewer Repairs at Lateral Service Connections		
						Clean (ft)	Localized Spot Repair (#)	Cut & Grout (#)	Seal & Retest (#)	Inspect (#)
4	24	23	Prospect St.	204.4	12		1	2		1
4	23	23A	Prospect St.	204.4	12					
4	23A	22	Prospect St.	172.9	12			1		1
4	22	21	Prospect St.	155.9	12					
4	9	21	Grove St.	86.4	12					
4	9	8B	Grove St.	136	12					
4	8B	8	Grove St.	56	12					
1	75A	74B	Governor St.	192.9	8	193			2	
1	74B	74	Governor St.	375.4	8		1		4	
1	67A	67	Rowland Ln. Easement	140.7	10				3	
1	67A	62A	Rowland Ln. Easement	220.8	10				3	
1	62A	62	Rowland Ln. Easement	268.5	10	269			4	
1	69	68	Rowland Ln. Easement	215.3	10	215				
1	68	67	Rowland Ln. Easement	225.8	10			1	1	
Total =						677	2	4	17	2
Unit Cost =						\$ 6	\$ 450	\$ 1,300	\$ 520	\$ 1,250
Sub-Total Cost =						\$ 4,367	\$ 900	\$ 5,200	\$ 8,840	\$ 2,500
Total Cost =										\$21,807

Joint testing and sealing is the least expensive method for rehabilitating a lateral service connection. However, lateral service connection joint testing and sealing can seal only a limited length of lateral service connection, approximately 20 feet, from the mainline sewer. The cost of full excavation and replacement will vary depending upon the length of the lateral service connection, the depth of pipe, the need for dewatering of groundwater, the extent of the above ground reinstatement work that would need to be performed to improved lawns and shrubbery, sidewalk and pavement replacement in the road, and traffic control. A lateral service connection can be lined approximately 80 to 100 feet from the mainline sewer, with cost dependent on the length, configuration, and diameter of the lateral service connection.

As indicated in Table 2, the method for rehabilitating the 7 leaking lateral service connections identified in this study is cured-in-place lining. For the purpose of estimating the cost of rehabilitating the lateral service connections, an average lateral service connection length of 100 feet has been assumed. The total estimated cost of the lateral service connection rehabilitation, including allowances for engineering and contingencies, is approximately \$88,000.

It is important to note that the I/I sources identified in the lateral service connections are located on private property. In Ridgefield, the Town owns the mainline sewer and manholes, and each property owner owns the lateral service connection from the mainline sewer to the house. With the large percentage of I/I emanating from private property, the Town needs to implement a policy and procedure regarding correction of privately owned I/I sources. Information on a sample private inflow source removal program that is currently in use by the Town of Greenwich, CT was included in Technical Memorandum No. 1 of the Ridgefield Phase I Wastewater Facilities Plan.

Table 4 presents a summary of the estimated costs for the components of the mainline sewer and lateral service connection rehabilitation. The costs presented in this table are planning level cost estimates for budgeting purposes. A more accurate estimate of the anticipated costs may be determined during the design phases of the recommended program.

TABLE 4. SUMMARY OF ESTIMATED COSTS

Component	Total Estimated Cost
Mainline Sewer Rehabilitation	\$22,000
Lateral Service Connection Rehabilitation	\$88,000
Total	\$110,000

As previously noted, the television inspection activities have been conducted under the Phase 2 Wastewater Facilities Plan to further locate sources of I/I. Other activities to locate I/I sources conducted under the Facilities Plan include smoke testing, house-to-house inspections, manhole inspections, and dyed water testing and tracing. The rehabilitation alternatives presented herein along with those arising from the other activities to locate I/I will be incorporated into an Inflow Reduction Plan in the Phase 2 Facilities Plan Report that will present an approach for the Town to reduce collection system inflow.

Attachment A

National Water Main Cleaning Company, Mainline and Lateral CCTV Inspection Report



***CCTV Inspection of Sewers
In the Town of
Ridgefield, Connecticut***

6/20/2016 – 6/21/2016

AECOM

NATIONAL WATER MAIN CLEANING CO.

Specializing in today's needs for environmental protection



**PROJ INFO**

PROJ NAME:

PROJECT NUM:

RESPONSIBLE:

DATE:
07/22/2016

CLIENT
RESPONSIBLE:
DEPARTMENT:
PO BOX:
STREET:
CITY, ST ZIP:
TELEPHONE:
FAX:
MOBILE:
E-MAIL:

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Project Manager, Water

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E-MAIL:

CONTRACTOR
RESPONSIBLE:
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CITY, ST ZIP:
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National Water Main Cleaning Co
Jim Falconieri
TV Inspection

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Rocky Hill, CT
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boston@nwmcc.com



The Environmental
Protection Specialists

National Water Main Cleaning Co

1000R Elm Street

Rocky Hill, CT

Tel: 860.372.4199, Fax: 781-828-2473

INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 1	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: AEC005-7	PRESET:	CLEANED: N No Pre-Cleaning	TOT (:

STREET: PROSPECT ST	MAP #1: N Not Controlled	MH: 24
CITY: RIDGEFIELD CT	MAP #2:	MH: 23
LOCALE: G Parking Lot	TAPE #: TV227-062016	TV'D LGTH: 204.4 ft
INSPECT REASON: F Routine Asseessment	PIPE SIZE: 12"	C Circular
SECTION TYPE: SS Sanitary	MATERIAL:	L Lined JT LGTH:
AREA:	LINING:	
	RSRVD:	
REMARK: THEATER PARKING LOT		

1:475	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	46.90	TB	Tap Break-In, at 12 o'clock, 6, within 8 inch: NO, Remark: 98% BLOCK	
	57.50	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, at 10 o'clock, within 8 inch: YES	
	106.20	TB	Tap Break-In, at 03 o'clock, 6, within 8 inch: NO	
	187.00	TB	Tap Break-In, at 12 o'clock, 6, within 8 inch: NO, Remark: PVC	
	204.40	AMH	Downstream Manhole, Survey Ends	



INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 2	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: AEC005-7	PRESET:	CLEANED: N No Pre-Cleaning	TOT (:

STREET:	PROSPECT ST	MAP #1:	N Not Controlled	MH:	23
CITY:	RIDGEFIELD CT	MAP #2:		MH:	23A
LOCALE:	D Easement/Right of Way	TAPE #:	TV227-062016	TV'D LGTH:	204.4 ft
INSPECT REASON:	F Routine Asseessment	PIPE SIZE:	12"	C Circular	
SECTION TYPE:	SS Sanitary	MATERIAL:		L Lined	JT LGTH:
AREA:		LINING:			
		RSRVD:			
REMARK:	CHANGED D/S MH # AFTER VIDEO				

1:475

POSITION	CODE	OBSERVATION	RATE
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23

0.00

AMH Upstream Manhole, Survey Begins

23A

204.40

AMH Downstream Manhole, Survey Ends



The Environmental
Protection Specialists

National Water Main Cleaning Co

1000R Elm Street

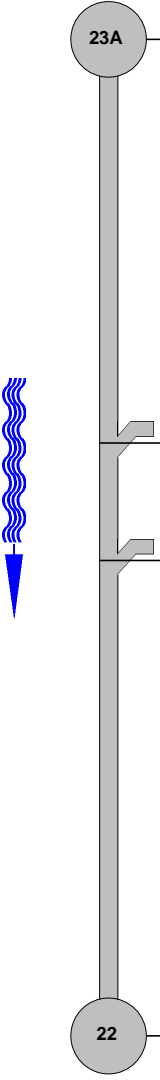
Rocky Hill, CT

Tel: 860.372.4199, Fax: 781-828-2473

INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 3	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: AEC005-7	PRESET:	CLEANED: N No Pre-Cleaning	TOT (:

STREET: PROSPECT ST	MAP #1: N Not Controlled	MH: 23A
CITY: RIDGEFIELD CT	MAP #2:	MH: 22
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 172.9 ft
INSPECT REASON: F Routine Assessment	PIPE SIZE: 12" C Circular	
SECTION TYPE: SS Sanitary	MATERIAL: L Lined JT LGTH:	
AREA:	LINING:	
	RSRVD:	
REMARK:		

1:400	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	70.00	TB	Tap Break-In, at 09 o'clock, 6, within 8 inch: NO; POSSIBLE INFILTRATION UPTOP	
	90.40	TB	Tap Break-In, at 10 o'clock, 4, within 8 inch: NO	
	172.90	AMH	Downstream Manhole, Survey Ends	

DATE:
06/20/2016

WORK #:

WEATHER:
1 Dry

OPERATOR:
CARLOS C.

SECTION NR:
4

SECTION NAME:

PRESENT:

VEHICLE:

CAMERA:
AEC005-7

PRESET:

CLEANED:
N No Pre-Cleaning

TOT (:

STREET: PROSPECT ST

MAP #1: N Not Controlled

MH:	22
-----	----

CITY: RIDGEFIELD CT

MAP #2:

MH: 21

LOCALE: **D Easement/Right of Way**

TAPE #: TV227-062016

TV'D LGTH: 155.9 ft

INSPECT REASON: **F Routine Asseessment**

PIPE SIZE: 12" C Circular

SECTION TYPE: **SS Sanitary**

MATERIAL: L Lined JT LGTH:

AREA:

LINING:

RSRVD:

REMARK:

1:350

POSITION

CODE

OBSERVATION

RATE

22

0.00

AMH

Upstream Manhole, Survey Begins

21

155.90

AMH

Downstream Manhole, Survey Ends

TOT (:

REMARK:

RATE

9

0.00

AMH

Downstream Manhole, Survey Begins

21

86.40

AMH

Upstream Manhole, Survey Ends

DATE:
06/20/2016

WORK #:

WEATHER:
1 Dry

OPERATOR:
CARLOS C.

SECTION NR:
6

SECTION NAME:

PRESENT:

VEHICLE:

CAMERA:
AEC005-7

PRESET:

CLEANED:
N No Pre-Cleaning

TOT (:

STREET: GROVE ST

MAP #1: N Not Controlled

MH:	9
-----	---

CITY: RIDGEFIELD CT

MAP #2:

MH: 8B

LOCALE: **D Easement/Right of Way**

TAPE #: TV227-062016

TV'D LGTH: 136 ft

INSPECT REASON: **F Routine Asseessment**

PIPE SIZE: 12" C Circular

SECTION TYPE: **SS Sanitary**

MATERIAL: L Lined JT LGTH:

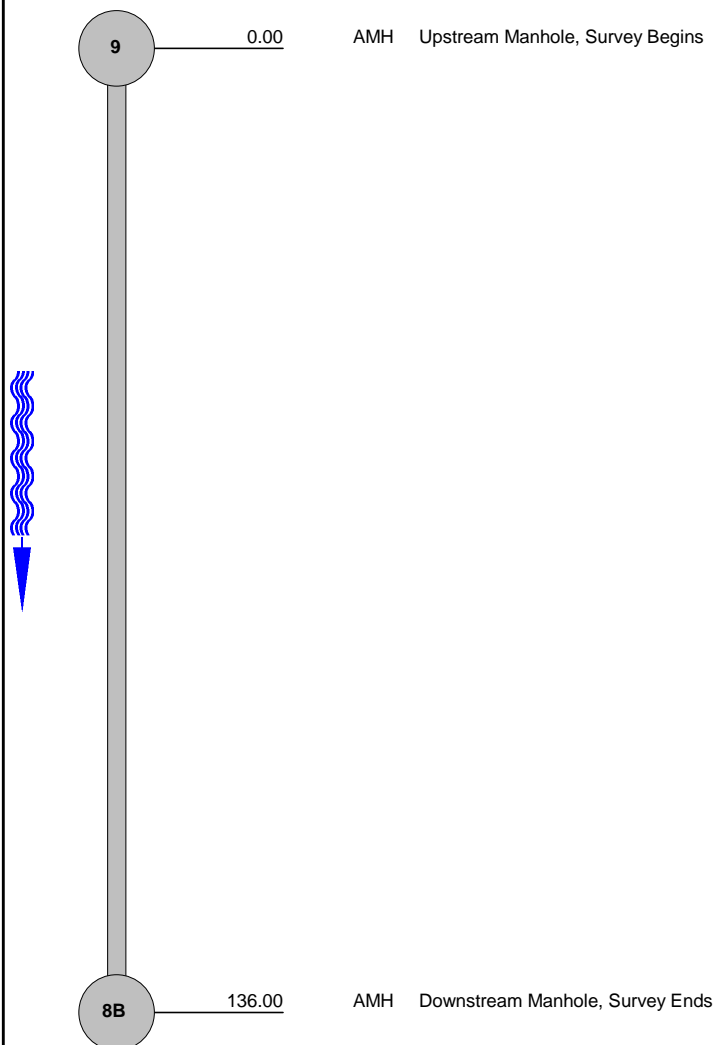
AREA:

LINING:

RSRVD:

REMARK:

1:325	POSITION	CODE	OBSERVATION	RATE
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DATE:
06/20/2016

WORK #:

WEATHER:
1 Dry

OPERATOR:
CARLOS C.

SECTION NR:
7

SECTION NAME:

PRESENT:

VEHICLE:

CAMERA:
AEC005-7

PRESET:

CLEANED:
N No Pre-Cleaning

TOT (:

STREET: GROVE ST

MAP #1: N Not Controlled

MH:	8B
-----	----

CITY: RIDGEFIELD CT

MAP #2:

MH: 8

LOCALE: **D Easement/Right of Way**

TAPE #: TV227-062016

TV'D LGTH: 56 ft

INSPECT REASON: F Routine Asseessment

PIPE SIZE: 12" C Circular

SECTION TYPE: **SS Sanitary**

MATERIAL: L Lined JT LGTH:

AREA:

LINING:

RSRVD:

REMARK:

1:125

POSITION

CODE

OBSERVATION

RATE



0.00

AMH Upstream Manhole, Survey Begins



56.00

AMH Downstream Manhole, Survey Ends



The Environmental
Protection Specialists

National Water Main Cleaning Co

1000R Elm Street

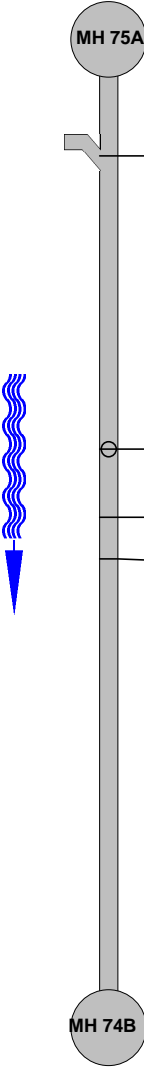
Rocky Hill, CT

Tel: 860.372.4199, Fax: 781-828-2473

INSPECTION REPORT

DATE: 06/21/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 8	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: AEC005-7	PRESET:	CLEANED: N No Pre-Cleaning	TOT (:

STREET: GOVERNOR ST	MAP #1: N Not Controlled	MH: MH 75A
CITY: RIDGEFIELD CT	MAP #2:	MH: MH 74B
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 192.9 ft
INSPECT REASON: F Routine Asseessment	PIPE SIZE: 8" C Circular	
SECTION TYPE: SS Sanitary	MATERIAL: VCP Vitrified Clay Pipe	JT LGTH:
AREA:	LINING:	
	RSRVD:	
REMARK:		

1:450	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	22.70	TB	Tap Break-In, at 02 o'clock, 4, within 8 inch: YES, Remark: PVC	
	80.10	TB	Tap Break-In, at 12 o'clock, 4, within 8 inch: YES, Remark: PVC	
	93.30	DAGS	Deposits Attached Grease, 15 % of cross sectional area, from 08 to 03 o'clock, within 8 inch: YES	
	101.40	DAGS	Deposits Attached Grease, 30 % of cross sectional area, from 09 to 03 o'clock, within 8 inch: YES	
	192.90	AMH	Downstream Manhole, Survey Ends	



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SATELLITE REPORT

	SECTION NR: 8	SECTION NAME:	TV'D LGTH: 192.9 FT	MH: MH 75A	MH: MH 74B
	MATERIAL: VCP Vitrified Clay Pipe	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: GOVERNOR ST	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/21/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: LAT AT 80' FRM MH 75	POSITION: 80.10	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 4
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062116

REMARK: **TV LAT AT 80' FRM U/S MH 75**

1:50	POSITION	CODE	OBSERVATION	RATE
	LAT AT 80' FRM MH 75A	0.00	ATC Tee Connection, at 12 o'clock, 4, 4, Remark: TV LAT AT 80' FRM U/S MH 75	
		2.20	MMC Material Change, CAS Cast Iron	
		2.90	SAPC Surface Aggregate Projecting Chemical, from 12 to 12 o'clock, within 8 inch: YES	3
		14.00	MSA Survey Abandoned, Remark: END AT WYE	



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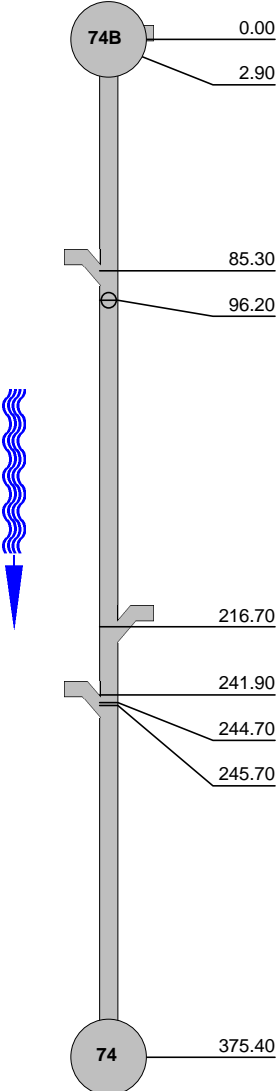
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INSPECTION REPORT

DATE: 06/21/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 9	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: AEC005-7	PRESET:	CLEANED: N No Pre-Cleaning	TOT (:

STREET: GOVERNOR ST	MAP #1: N Not Controlled	MH: 74B
CITY: RIDGEFIELD CT	MAP #2:	MH: 74
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 375.4 ft
INSPECT REASON: F Routine Assessment	PIPE SIZE: 8" C Circular	
SECTION TYPE: SS Sanitary	MATERIAL: VCP Vitrified Clay Pipe	JT LGTH: 2'
AREA:	LINING:	
	RSRVD:	
REMARK: D/S MH CHANGED # AFTER VIDEO		

1:850	POSITION	CODE	OBSERVATION	RATE
		AMH	Upstream Manhole, Survey Begins	
		TB	Tap Break-In, at 09 o'clock, 4, within 8 inch: YES, Remark: PVC	
		TB	Tap Break-In, at 02 o'clock, 4, within 8 inch: NO, Remark: PVC, DRIPPING AT TEE	
		TB	Tap Break-In, at 01 o'clock, 6, within 8 inch: NO, Remark:PVC, DRIPPING AT TEE	
		TB	Tap Break-In, at 10 o'clock, 4, within 8 inch: NO, REMARK; PVC	
		MMC	Material Change, PVC Polyvinyl Chloride	
		TF	Tap Factory Made, at 03 o'clock, 6, within 8 inch: YES	
		MMC	Material Change, VCP Vitrified Clay Pipe	
		AMH	Downstream Manhole, Survey Ends	



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SATELLITE REPORT

	SECTION NR: 9	SECTION NAME:	TV'D LGTH: 375.4 FT	MH: 74B	MH: 74
	MATERIAL: VCP Vitrified Clay Pipe	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: GOVERNOR ST	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/21/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 85' FRM MH 74B	POSITION: 85.30	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 4
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062116

REMARK: **LAT AT 85' FRM U/S MH 74B**

1:25 POSITION

CODE OBSERVATION

RATE

	0.00	ATC	Tee Connection, at 02 o'clock, 4, 4, Remark: LAT AT 85' FRM U/S MH 74B
	3.00	MSA	Survey Abandoned, Remark: CAPPED



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SATELLITE REPORT

	SECTION NR: 9	SECTION NAME:	TV'D LGTH: 375.4 FT	MH: 74B	MH: 74
	MATERIAL: VCP Vitrified Clay Pipe	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: GOVERNOR ST	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/21/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 96' FRM MH 74B	POSITION: 96.20	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 6
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062116

REMARK: **LAT AT 96' FRM U/S MH 74B**

1:150 POSITION

CODE OBSERVATION

RATE

96' FRM MH 74B 0.00

ATC Tee Connection, at 01 o'clock, 6, 6, Remark: LAT AT 96' FRM U/S MH 74B

JOL Joint Offset Large, Remark: CHANGE TO VCP 2

64.00

MSA Survey Abandoned, Remark: EOC



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SATELLITE REPORT

	SECTION NR: 9	SECTION NAME:	TV'D LGTH: 375.4 FT	MH: 74B	MH: 74
	MATERIAL: VCP Vitrified Clay Pipe	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: GOVERNOR ST	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/21/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 245' FRM MH74B	POSITION: 244.70	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 6
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062116

REMARK: **LAT AT 245' FRM U/S MH74B**

1:150 POSITION

CODE OBSERVATION

RATE

245' FRM MH74B 0.00

ATC Tee Connection, at 03 o'clock, 6, 6, Remark: LAT AT 245' FRM U/S MH74B

3.40

JOL Joint Offset Large, Remark: CHANGE TO VCP

2

64.00

MSA Survey Abandoned, Remark: EOC



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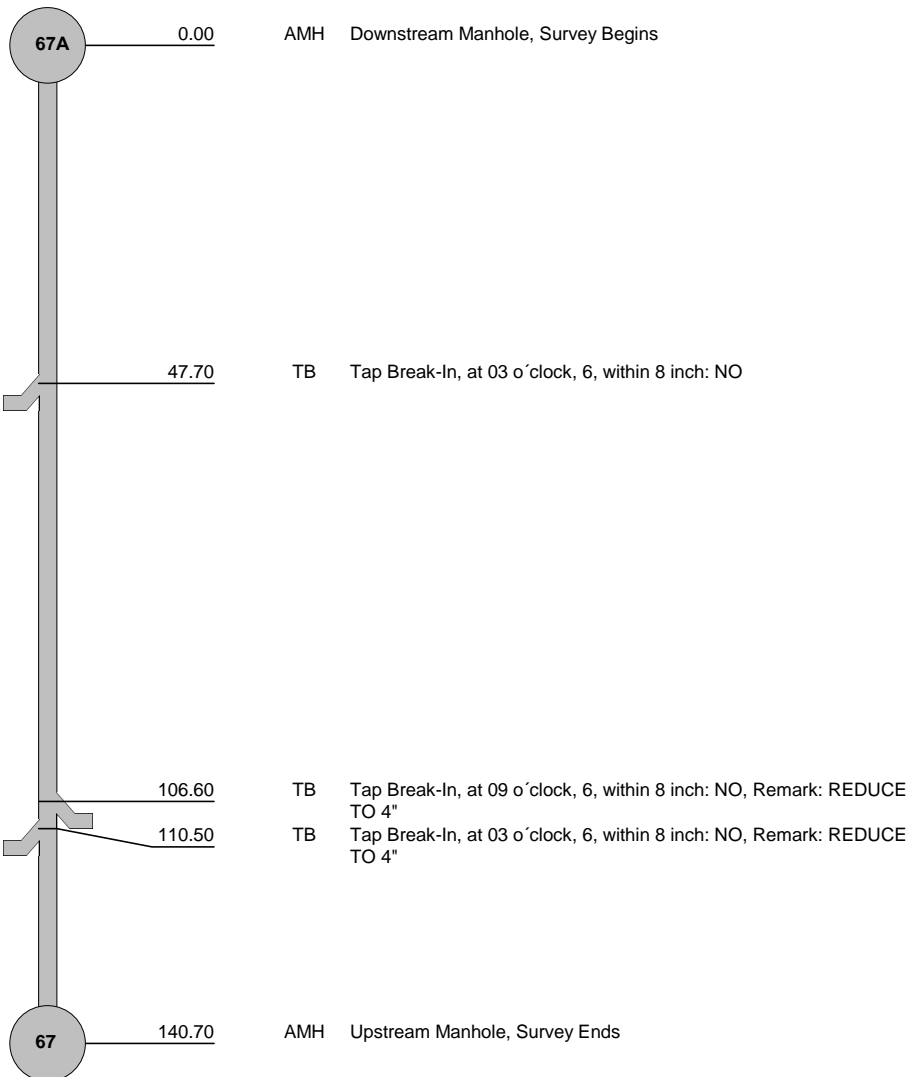
INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 10	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: ACE005-7	PRESET: 06/20/2016	CLEANED: J Jetting	TOT (:

STREET: ROWLAND LN EASEMENT	MAP #1: N Not Controlled	MH: 67A
CITY: RIDGEFIELD CT	MAP #2:	MH: 67
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 140.7 ft
INSPECT REASON: INVERT IS ABOUT 8" SMALL	PIPE SIZE: 10" C Circular	
SECTION TYPE: SS Sanitary	MATERIAL: L Lined JT LGTH:	
AREA:	LINING:	
	RSRVD:	

REMARK:

1:325 POSITION CODE OBSERVATION RATE





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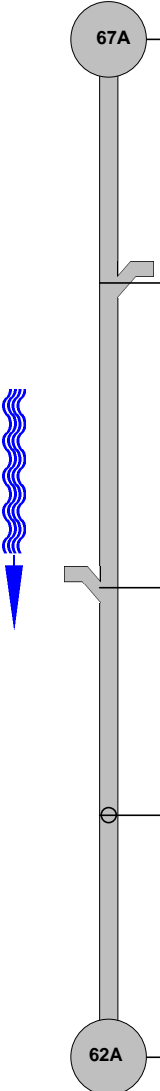
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INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 11	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: ACE005-7	PRESET: 06/20/2016	CLEANED: J Jetting	TOT (:

STREET: ROWLAND LN EASEMENT	MAP #1: N Not Controlled	MH: 67A
CITY: RIDGEFIELD CT	MAP #2:	MH: 62A
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 220.8 ft
INSPECT REASON: INVERT IS ABOUT 8" SMALL	PIPE SIZE: 10" C Circular	
SECTION TYPE: SS Sanitary	MATERIAL: L Lined JT LGTH:	
AREA:	LINING:	
	RSRVD:	
REMARK:		

1:500	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	52.80	TB	Tap Break-In, at 09 o'clock, 6, within 8 inch: NO, Remark: REDUCE TO 4" PVC	
	119.00	TB	Tap Break-In, at 02 o'clock, 6, within 8 inch: NO, Remark: REDUCE TO 4" PVC	
	168.30	TB	Tap Break-In, at 12 o'clock, 6, within 8 inch: NO, REMARK; 90 DEGREE TURN PVC	
	220.80	AMH	Downstream Manhole, Survey Ends, REMARK LINER GOES THROUGH	



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SATELLITE REPORT

	SECTION NR: 11	SECTION NAME:	TV/D LGTH: 220.8 FT	MH: 67A	MH: 62A
	MATERIAL: L Lined	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: ROWLAND LN EASEMENT	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/20/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 168' FRM MH 62	POSITION: 168.30	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 6
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062016

REMARK: **LAT AT 168' FRM MH 62**

1:75 POSITION

CODE OBSERVATION

RATE

	168' FRM MH 67A	0.00	ATC	Tee Connection, at 12 o'clock, 6, 6, Remark: LAT AT 168' FRM MH 62
		8.00	MMC	Material Change, PVC Polyvinyl Chloride
		11.00	RTJ	Roots Tap Joint, from 10 to 12 o'clock, 15 %, within 8 inch: YES
		18.00	RMJ	Roots Medium Joint, from 10 to 12 o'clock, 60 %, within 8 inch: YES
		23.00	RBB	Roots Ball Barrell, from 12 to 12 o'clock, 100 %, within 8 inch: YES
		24.00	MSA	Survey Abandoned, Remark: ENDS AT ROOTBALL



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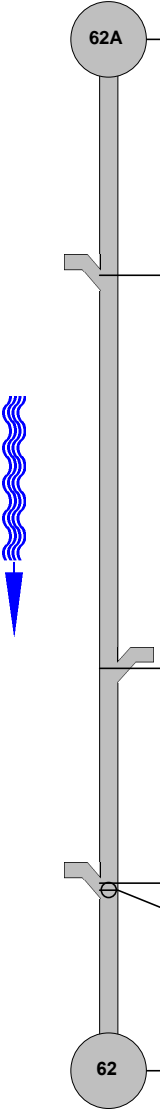
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INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 12	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: ACE005-7	PRESET: 06/20/2016	CLEANED: J Jetting	TOT (:

STREET: ROWLAND LN EASEMENT	MAP #1: N Not Controlled	MH: 62A
CITY: RIDGEFIELD CT	MAP #2:	MH: 62
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 268.5 ft
INSPECT REASON: INVERT IS ABOUT 8" SMALL	PIPE SIZE: 10" C Circular	
SECTION TYPE: SS Sanitary	MATERIAL: L Lined JT LGTH:	
AREA:	LINING:	
	RSRVD:	

REMARK:

1:600	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	61.50	TB	Tap Break-In, at 03 o'clock, 6, within 8 inch: NO, Remark: REDUCE TO 4" PVC, DRIPPING AT TEE	
	163.70	TB	Tap Break-In, at 09 o'clock, 6, within 8 inch: NO, Remark: ENCRUSTATION AT THE TEE	
	219.70	TB	Tap Break-In, at 03 o'clock, 6, within 8 inch: NO, Remark: REDUCE TO 4" PVC	
	221.40	TB	Tap Break-In, at 12 o'clock, 6, within 8 inch: NO	
	268.50	AMH	Downstream Manhole, Survey Ends	



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SATELLITE REPORT

	SECTION NR: 12	SECTION NAME:	TV'D LGTH: 268.5 FT	MH: 62A	MH: 62
	MATERIAL: L Lined	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: ROWLAND LN EASEMENT	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/20/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 166' FRM MH62A	POSITION: 163.70	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 6
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062016

REMARK: **LAT AT 166' FRM MH 62A**

1:25 POSITION

CODE OBSERVATION

RATE

166' FRM MH62A 0.00

ATC Tee Connection, at 09 o'clock, 6, 6, Remark: LAT AT 166' FRM MH 62A



6.00

MSA Survey Abandoned, Remark: LAT IS CAPPED



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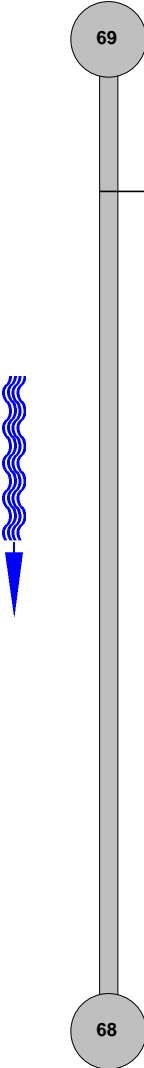
INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 13	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: ACE005-7	PRESET: 06/20/2016	CLEANED: J Jetting	TOT (:

STREET: BRANCHVILLE RD EASEMENT	MAP #1: N Not Controlled	MH: 69
CITY: RIDGEFIELD CT	MAP #2:	MH: 68
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 215.3 ft

INSPECT REASON:	PIPE SIZE: 10" C Circular
SECTION TYPE: SS Sanitary	MATERIAL: L Lined JT LGTH:
AREA:	LINING:
	RSRVD:

REMARK:

1:500	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	32.90	LFZ	Lining Failure Other, from 11 to 01 o'clock, within 8 inch: NO, Remark: DEFORMED	
	215.30	AMH	Downstream Manhole, Survey Ends	



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INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 14	SECTION NAME:
PRESENT:	VEHICLE:	CAMERA: ACE005-7	PRESET: 06/20/2016	CLEANED: J Jetting	TOT (:

STREET: BRANCHVILLE RD EASEMENT	MAP #1: N Not Controlled	MH: 68
CITY: RIDGEFIELD CT	MAP #2:	MH: 67
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 225.8 ft
INSPECT REASON:	PIPE SIZE: 10"	C Circular
SECTION TYPE: SS Sanitary	MATERIAL:	L Lined JT LGTH:
AREA:	LINING:	
	RSRVD:	
REMARK:		

1:525	POSITION	CODE	OBSERVATION	RATE
	0.00	AMH	Upstream Manhole, Survey Begins	
	15.90	LFZ	Lining Failure Other, at 10 o'clock, within 8 inch: NO, Remark: DEFORMED	
	95.90	D	Deformed, 15 %	5
	108.30	TB	Tap Break-In, at 09 o'clock, 8, within 8 inch: NO, Remark: OFFSET, INTRUDING 15%	
	177.60	D	Deformed, 10 %	4
	216.60	TB	Tap Break-In, at 02 o'clock, 4, within 8 inch: NO, Remark: OVERCUT AND OFFSET	
	225.80	AMH	Downstream Manhole, Survey Ends	



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SATELLITE REPORT

	SECTION NR: 14	SECTION NAME:	TV'D LGTH: 225.8 FT	MH: 68	MH: 67
	MATERIAL: L Lined	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: BRANCHVILLE RD EASEMENT	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/20/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 108' FRM MH 68	POSITION: 108.30	MATERIAL: PVC Polyvinyl Chloride	PIPE SIZE: 8
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062016

REMARK: **LAT AT 108' FRM U/S MH 68**

1:125 POSITION

CODE OBSERVATION

RATE

108' FRM MH 68 0.00

ATC Tee Connection, at 09 o'clock, 8, 8, Remark: LAT AT 108' FRM U/S MH 68



49.00

MSA Survey Abandoned, Remark: EOC



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SATELLITE REPORT

	SECTION NR: 14	SECTION NAME:	TV'D LGTH: 225.8 FT	MH: 68	MH: 67
	MATERIAL: L Lined	PIPE SIZE: C Circular	LINING:	SECTION TYPE: SS Sanitary	
	CITY: RIDGEFIELD CT	STREET: BRANCHVILLE RD EASEMENT	LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	

	DATE: 06/20/2016	WEATHER: 1 Dry	CLEANED: N No Pre-Cleaning	STREET:
	SECTION NAME: 216' FRM MH 68	POSITION: 216.60	MATERIAL: VCP Vitrified Clay Pipe	PIPE SIZE: 4
	OPERATOR: CARLOS C.	VEHICLE:	CAMERA:	TAPE #: 227-062016

REMARK: **LAT AT 216' FRM U/S MH 68**

1:150 POSITION

CODE OBSERVATION

RATE

216' FRM MH 68 0.00

ATC Tee Connection, at 02 o'clock, 4, 4, Remark: LAT AT 216' FRM U/S MH 68



63.00

MSA Survey Abandoned, Remark: EOC



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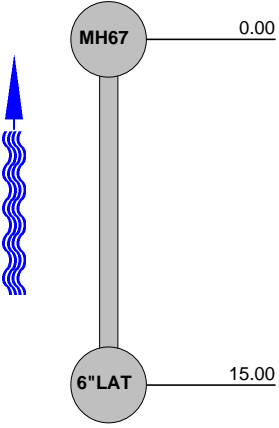
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INSPECTION REPORT

DATE: 06/20/2016	WORK #:	WEATHER: 1 Dry	OPERATOR: CARLOS C.	SECTION NR: 15	SECTION NAME: 6" LAT
PRESENT:	VEHICLE:	CAMERA: ACE005-7	PRESET: 06/20/2016	CLEANED: J Jetting	TOT (:

STREET: BRANCHVILLE RD EASEMENT	MAP #1: N Not Controlled	MH: MH67
CITY: RIDGEFIELD CT	MAP #2:	MH: 6" LAT
LOCALE: D Easement/Right of Way	TAPE #: TV227-062016	TV'D LGTH: 15 ft
INSPECT REASON:	PIPE SIZE: 6"	C Circular
SECTION TYPE: SS Sanitary	MATERIAL:	L Lined JT LGTH:
AREA:	LINING:	
	RSRVD:	
REMARK:		

1:100	POSITION	CODE	OBSERVATION	RATE
		AMH	Manhole, Remark: 6" LAT AT MH67	
		RMJ	Roots Medium Joint, from 12 to 05 o'clock, 15 %, within 8 inch: YES	