Detroit Water and Sewerage Department

Wastewater Master Plan

DWSD Project No. CS-1314

Physical Inspection of Lateral and Connector Sewers

Technical Memorandum
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Physical Inspection of Lateral and Connector Sewers

1. Introduction

This study was conducted on a representative number of lateral and connector sewer pipes within the City of Detroit limits. In order to properly assess the sewer system, an updated inventory of the sewer pipe network was assembled. Table 1 reflects the summary of the latest information available to help determine the magnitude of impact in this report. In areas where pipe lengths were listed but not fully described, "unknowns" were handled by allocating them by category and by group based upon the known information. Definitions of these groups are explained in Volume 2.

Table 1: DWSD Sewer Inventory 2003

Pipe Category	Miles of sewer
Lateral	2,258
Connector	559
Trunk	483
Interceptors in Detroit	44
Total Miles in Detroit	3,341
Interceptors outside of Detroit	39
GRAND TOTAL	**3,383**

In this report, over 50 miles of sewer in selected segments of an average length of 350 feet each were evaluated from existing physical records and new physical inspection.

2. Scope of Work

The purpose of this study was to identify and report the prevailing conditions of the lateral and connector sewer portion of the DWSD wastewater collections system in the City. From November 2001 through February 2002, interviews were conducted with DWSD maintenance and engineering personnel to gather known information about the sewer system. A review of file folders at Field Engineering, which contained TV inspection data from the 1990s, was also compiled.

A condition grade code was drafted based upon TV operators' comments and physical observation reports from field crews. This information was mapped over the sewer section map atlas for the City of Detroit. Data were obtained from the DWSD Maintenance Department's central communications center. Customer sewer service calls were plotted on the same map to determine if there were patterns of sewer problems in the City. A complete summary of this trial effort is presented in the technical memorandum on Lateral and Connector Sewers.

From this data, representative areas were selected for physical TV inspections and sewer segments were chosen from those areas, which are listed in Table 2. The first group of TV pilot inspections took place in June and July of 2002.

Table 2. Physical TV Inspection Results

Date of Inspection	Map Page	Tape No.	Location	Size	Material Type	Age	Shape	Approximate Length	Actual Length (ft)	Condition
	Phase I		Last Updated: 7/11/2002							
27-Jun-02	113 C	3	Between Chapel & Bentler/N. of Florence	18"	Clay	1928	Round		244	Excellent
27-Jun-02	113 C	3	Between Chapel & Bentler/N. of Florence	18"	Clay	1928	Round		316	Fair
28-Jun-02	28 B1	3	2nd Str North of Michigan Ave.	3'-2" x 4'-9"	Brick	1905	Egg		416	Fair
27-Jun-02	99 C	3	Between Stahelin & Brace at Belton	15"	Clay	1928			302	Fair
17-Jun-02	20 F	1	Alley between 15th & 16th and North of Poplar	15" x 20"	Brick	1883			270	Fair
17-Jun-02	29C	2	Trumbel & Sycamore	3'-6" x 4'-8"	Brick	1872	Egg	300'	889	Fair
19-Jun-02	89 A	2	Between Pennington & SanJuan at Pickford.	12"	Clay	1925			346	Fair
13-Jun-02	1 B	1	Between Lyon & Keller at Dearborn	18"	Cast-in-place	1982	Round		416	Good
14-Jun-02	64 F	1	N. of Waveney between Philip & Manistique	10"	Crock	1920			406	Good
18-Jun-02	26 C	2	Between Birchcrest & Fairfield at Margareta	12"	Clay	1921			369	Good
14-Jun-02	64 F	1	In Waveney between Barham & Wayburn	48"	Brick	1925			602	Good
14-Jun-02	64 F	1	N. of Waveney between Philip & Manistique	10"	Crock	1920			255	Good
13-Jun-02	1 B	1	Between Melville & Lyon at Leigh	15"	Cast-in-place	1982			187	Good
14-Jun-02	1 B	1	Between Melville & Lyon at Leigh	15"	Cast-in-place	1982			144	Good
18-Jun-02	26 C	2	Between Birchcrest & Fairfield at Margareta	15"	Clay	1921			250	Good
27-Jun-02	99 C	3	Between Stahelin & Brace at Belton	12"	Clay	1928			348	N.I.[1]
19-Jun-02	89 A	2	Between Pennington & SanJuan at Pickford.	15"	Clay	1925			346	N.I.[1]
17-Jun-02	20 F	1	Alley between 15th & 16th and North of Poplar	15" x 20"	Brick	1883			195	N.I.[1]
20-Jun-02	18 D	2	Between 24th & 23rd Ave. along the Park	10"	Vitreous Clay	1958			84	N.I.[1]
			Total						**6,385**	
	Phase II		Last Updated: 12/31/2002							
22-Nov-02	23D	D	Dexter Ave between Monterey & Cortland	4' 0" x 6' 0"	Brick	1920	Egg		560	Excellent
29-Oct-02	100C	C	Ashton between Rosemont & Fitzpatrick	24"	Concrete				250	Fair
24-Oct-02	105C	E1	Pembroke between Avon & Greenview	15"	Rein. Concrete	1930	Round		314	Fair
5-Nov-02	109B	B	Belton between Vaughn & Evergreen	18"	Concrete	1928			100.9	Fair
5-Nov-02	109B	B	Belton between Vaughn & Evergreen	18"	Concrete	1928			198	Fair
6-Nov-02	110F	B	Between Warwick & Artesian @ Joy	18"	Crock	1928			360	Fair
29-Oct-02	110F	C	W. Chicago Ave between Evergreen & Plainview	24"	Crock	1928			162	Fair
29-Oct-02	111C	C	Davison between Bentler & Chapel	15"	Concrete	1930			260	Fair
30-Oct-02	112A	C	Minoch at Fenkell	18"	Concrete	1928			344	Fair
30-Oct-02	112E	C	Kendall between Braille & Pierson	15"	Concrete	1928			357	Fair
31-Oct-02	114D	C	Burgess Ave at Grand River	18"	Rein. Concrete	1940			237	Fair
14-Nov-02	114D	B	Trinity Ave at Santa Clara	20"	Concrete	1929			155	Fair
4-Nov-02	119F	C	Plymouth Rd between Chatham & Outer	15"	Rein. Concrete	1928			364.5	Fair
25-Jan-00	121A	F	West Parkway Ave at Verne	18'	Vitreous Clay	1929			298	Fair
22-Nov-02	23C	D	Sturtevant Ave between Petosky & Holmer	12"	Crock	1939			297	Fair
14-Nov-02	26C	B	Clarita between Fairfield & Muirland	22"	Crock	1919			289	Fair
19-Nov-02	33B	A1	Hamilton between Richton & Monterey	12"	Crock				292	Fair
21-Nov-02	34B	A2	Second Ave between Puritan & Moss	18"	Vitreous Clay				271	Fair
6-Nov-02	101A	B	Fullerton at Mansfield	42"					138.6	Good
18-Nov-02	103B	A1	McNichols from Biltmore to St Mary's	4' 6"	Clay	1927	Cylindrical		890	Good
15-Oct-02	104F	E1	Thatcher Ave at Forrer	24"	Rein. Concrete				284	Good
16-Oct-02	104F	F	Santa Maria between Asbury Park Ave & Murray Hill	18"	Rein. Concrete	1927	Round		359	Good
16-Oct-02	104F	F	Santa Maria between Asbury Park Ave & Murray Hill	20"	Rein. Concrete				206	Good
22-Oct-02	105C	E1	Pembroke from Faust to Ashton	48"	Brick	1929	Cylindrical		723	Good

Table 2 continued. Physical TV Inspection Results

Date of Inspection	Map Page	Tape No.	Location	Size	Material Type	Age	Shape	Approximate Length	Actual Length (ft)	Condition
6-Nov-02	109D	B	Sawyer near Braile Ave and Spinoza	12"	Vitreous Clay				423	Good
31-Oct-02	112E	C	Acacia between Plainview & Auburn	12"	Crock	1928			381	Good
12-Nov-02	114B	B	Glenco Ave at Stout	3' 6"	Brick		Cylindrical		480	Good
31-Oct-02	114D	C	Burgess Ave at Grand River	20"	Rein. Concrete	1940			160	Good
12-Nov-02	114D	B	Pierson Ave at Santa Clara	24"	Concrete	1937			284	Good
14-Nov-02	115F	B	Pembroke between Evergreen & Vaughn	30"	Concrete	1950			309	Good
25-Oct-02	121A	F	West Parkway Ave at Verne	15"	Vitreous Clay	1929			293	Good
25-Oct-02	121A	F	West Parkway Ave at Verne	12"	Vitreous Clay	1929			305	Good
22-Nov-02	23C	D	Sturtevant Ave between Petosky & Holmer	12"	Clay	1939			247	Good
15-Nov-02	23C	B	Leslie Ave at Old Mill Place	2' 6" x 3' 9"	Brick	1922	Egg		469	Good
22-Nov-02	23D	D	Burlingame at Cascade	2' 8" x 4' 0"	Brick		Egg		278	Good
15-Nov-02	24D	A1	Doris at Holmur Ave	3' 6"	Brick	1924	Cylindrical		500	Good
21-Nov-02	24D	A2	Livernois between Oakman & Ewald Circle	15"	Crock	1919			450	Good
21-Nov-02	26C	A2	Livernois between Thatcher & Curtis	6' 3"	Brick	1925	Cylindrical		552	Good
20-Nov-02	33B	A1	Hamilton between Richton & Monterey	10"	Crock				453	Good
21-Nov-02	33B	A2	Woodward between Tyler & Avalon	3' 0" x 4' 6"	Brick				323	Good
28-Oct-02	90B		Wisconson at Florence	15"	Crock	1924			349	N.I.[1]
28-Oct-02	90D		Fenkell between Ilene & Griggs	18"	Crock	1925			364	Good
28-Oct-02	100C		W. Chicago between Stahelien & Brace	24"	Vitreous Clay				263	N.I.[1]
4-Nov-02	101A	C	Davison at Forrer	36"			Culvert		73	N.I.[1]
29-Oct-02	101E	C	Plymouth Rd between Longacre & Rutland	24"	Crock				420	N.I.[1]
21-Oct-02	103B	E1	Santa Maria between Lindsay & Oakfield	20"	Vitreous Clay	1927	Round		192	N.I.[1]
21-Oct-02	103D	E1	Midland between Ashton & Rosemont	8"	Vitreous Clay				635	N.I.[1]
23-Oct-02	105C	E1	Hessel Ave between Rosemont & Ashton	18"	Rein. Concrete	1930	Round		104	N.I.[1]
5-Nov-02	109B	C	Off Joy between Pierson & Braile	21"	Concrete	1930			148.3	N.I.[1]
29-Oct-02	111C	C	Burt Rd at Davison	12"	Vitreous Clay	1927			474	N.I.[1]
30-Oct-02	112E	C	Acacia between Plainview & Auburn	12"	Crock	1928			136	N.I.[1]
18-Nov-02	114B	A1	N. of Clarita Ave between Plainview & Westmorland	18"	Vitreous Clay	1929			0	N.I.[1]
1-Nov-02	114B	C	In Braile Ave South of 7 Mile Rd	24"	Rein. Concrete	1939			143	N.I.[1]
22-Nov-02	23C	D	Holmer Ave between Clements & Grand	15"	Rein. Concrete	1919			198	N.I.[1]
20-Nov-02	33B	A2	Hamilton between Richton & Monterey	18"	Crock				67	N.I.[1]
20-Nov-02	34B		Hamilton between Pilgrim & Midland	10"	Crock					N.I.[1]
			Total						**17,183**	
			Total Feet Inspected							**23,568**

Notes

[1] N.I. = Needs Investigation

[2] Recommendation Codes

5	GOOD	Pipe is in good condition
4	CLN-L	Needs Light Cleaning
3	CLN-H	Needs Heavy Cleaning
2	RPR	Needs Point Repair
1	LN-F	Needs to be lined with Fully Deteriorated condition

The group of inspections took place in October 2002. The criteria for selection included varying diameters and varying material types within the lateral and connector sewer categories. A detailed plan was developed and implemented to locate, identify, clean, and televise these segments.

The CDM team was assisted by the following groups. Tucker Young Jackson Tull provided field coordination for the physical inspection and summary data for the trunk and interceptor groups. Spalding & DeDecker compiled field record information from DWSD's TV record files. Inland Waters provided cleaning and televising equipment and personnel. Superior Engineering provided expert condition evaluation of the televised data.

3. Results

The sewer system often required significant cleaning before useful televised data could be recorded. The following is a list of the most significant problems found:

- Presence of roots
- Presence of mineral deposits and calcification
- Structural cracks in the sewer pipes
- Shifted tiles and offset joints
- Presence of grease
- Static flow where minimum grade or settlement had occurred
- Accumulation of solids which appeared to be a combination of sludge and grit which entered the system through open storm drains or from developed openings in the pipe system
- Presence of solid debris

The percentage of "Excellent", "Good", "Fair", and "Needs Investigation"(N.I.) grades for the sewer segments inspected were found to be consistent with the condition grades of sewers televised during the 1990s by DWSD. Table 3 shows the results of the analysis of existing inspection data. Table 4 represents a combined comparison of the findings of the two pilot TV inspections and the previous inspection data on file at DWSD. Appendix A is the summary of the condition evaluation conducted by Superior Engineering. A map of the areas in the City of Detroit where physical inspections took place. is located within the WWMP GIS database.

Table 3. Analyses of Existing Inspection Data – DWSD Flat Files Inspection Summary

Category	North		West		East		Central		Total	
	Segments	Percentage	Segments	Percentage	Segments	Percentage	Segments	Percentage	Segments	Percentage
Excellent	9	5.4%	7	3.9%	16	9.4%	6	4.8%	38	5.9%
Good	74	44.6%	95	53.4%	105	61.8%	67	53.6%	341	53.4%
Fair	63	38.0%	48	27.0%	30	17.6%	32	25.6%	173	27.1%
Needs Investigation	20	12.0%	28	15.7%	19	11.2%	20	16.0%	87	13.6%
TOTAL Segments Inspected	**166**		**178**		**170**		**125**		**639**	

Note: Data from February, 2002.

Table 4. Comparison of All Inspection Records

Source	Segments	Excellent	Good	Fair	Needs Investigation
DWSD Files					
North	166	5.4%	44.6%	38.0%	12.0%
West	178	3.9%	53.4%	27.0%	15.7%
East	170	9.4%	61.8%	17.6%	11.2%
Central	125	4.8%	53.6%	25.6%	16.0%
TV Pilot Inspection Ph I	19	5.3%	42.1%	31.6%	21.1%
TV Pilot Inspection Ph II	56	1.8%	42.9%	30.4%	25.0%
Combined Condition	**714**	**5.6%**	**52.2%**	**27.5%**	**14.7%**

4. Analysis

The cost of cleaning a sewer in preparation for TV inspection can be broken down into two groups.

- Light cleaning: One to two passes with a jetter accomplished at a cost of less than $3.25 per linear foot.
- Heavy Cleaning: Multiple passes, removing solids and sludge, and loosening solids attached to the pipes by the use of high-pressure swirling water (aka tornado jetting) accomplished for less than $9.00 per linear foot. Costs can be higher in larger pipe diameters.

To successfully accomplish a system-wide evaluation of the sewers, it would be necessary to inspect each pipe segment with some sort of televising equipment. Plans to accomplish such a task must include the preliminary step of cleaning the sewer in order to obtain a useable televised report. Some older sewers have outlived their expected useful life and are still very much intact. Other sewers are showing extreme stress and require rehabilitation very soon in order to maintain uninterrupted sewer service to customers. Conditions appear to be worse in residential backyards where shallower pipes are affected by tree roots. Soil conditions appear to be a major factor in the aging of the sewers and light sandy soil locations produced numerous reports of failing joints with evidence of both infiltration and sedimentation.

5. Recommendations

Based upon the findings of this condition study, Table 2 lists the recommended action to be taken where needed on the portion of the sewer system actually inspected in this report. This representative data is also being used in Volume 4 to provide estimates and goals for maintaining the DWSD sewer system over the span of the Master Plan. Recommendations for action on these findings have been broken down into five groups coded by the numbers 1 through 5:

■ 5	GOOD	Pipe is in good condition	(04%)
■ 4	CLN-L	Needs Light Cleaning	(16%)
■ 3	CLN-H	Needs Heavy Cleaning	(45%)
■ 2	RPR	Needs Point Repair	(11%)
■ 1	LN-F	Needs to be Lined	(24%)

The Recommendations column in Table 2 is included to advise DWSD of the areas where immediate rehabilitation is required.
The summary findings show that 4% of the lateral and connector sewer system is in good condition (Group 5) and can maintain service with routine light cleaning maintenance in the future. An estimated 16% of the system currently needs light

cleaning (Group 4), which would involve one or two passes with the water jetter. Approximately 45% of the physically inspected area needs heavy cleaning (Group 3) in order to restore normal service and maximum capacity to the lateral and connector sewers tested. Approximately 11% of the system needs point repair construction (Group 2) and 24% of the sewer inspected should be considered for rehabilitation (Group 1) with cured-in-place-pipe (CIPP) in the near future to prevent flow stoppage or collapse.

During the course of gathering data for the lateral and connector sewer condition assessment, several key areas of the DWSD collection system operation emerged as parts of the system that were critical for daily operation and the ability to provide continuous uninterrupted sewer service to the customers. As a follow-up to this study, consideration of the following is recommended:

1. The Communications Center at the Central maintenance yard - Important information about how the sewer system is functioning is gathered on a daily basis through the Communications Center from the users of the system. This service activity is useful in tracking problem areas in the system as well as to provide an incident reference to events such as significant weather changes. It is recommended that a comprehensive review of the operation and recording of service activity be conducted to effectively support day-to-day management decisions in both the engineering and maintenance departments. From this review, a set of enhanced procedures would be outlined for implementation on a per-call basis that give decision makes positive support for focusing maintenance and repair efforts.

2. During the physical inspection portion of this study, numerous incidents of manholes having "at risk" conditions were observed. It is recommended that a comprehensive manhole inspection plan be developed for the entire sewer service area to assess and compile knowledge of the structures that may be adversely effecting the operation of the sewer system. Conducting a pilot area where the forms and procedure for assessing these conditions can be established should precede this study. After conducting a representative area, a service area-wide plan would be developed.

3. Extensive information has been gathered to identify, as nearly as possible, an inventory list of the sewer segments, which make up the Detroit service area. One of the key elements of the cost of cleaning the system [a critical step for completing the recommendations of the master plan] is to identify the sewer segments by pipe size by billing district. As the diameter of the pipes increases, so does the cost of maintenance and these features vary throughout the City based upon terrain, volume of flow, and type of development. From this recommended step, DWSD would have a data table and a graphic representation for planning and management purposes.

4. The most common form of sewer rehabilitation in the DWSD sewer system to date has been the CIPP solution. From this recent study, it has become apparent that there are places where construction repair will need to be done

before this solution can be applied. An example is a sewer pipe that is experiencing major deflection. The lining of this pipe would not bring back the intended capacity. Methods of construction repair such as pipe-bursting, or sleeving may be required to return that pipe path to its intended shape capacity before lining could be conducted. Another example would be where structural failure or collapse had occurred and an open-cut construction repair may be needed before lining can take place. This recommendation is to develop a flow chart for alternative forms of sewer repairs that can be used to prepare critically failing sewer segments for CIPP rehabilitation.

5. Modern technology and the availability of the high-tech desktop computer have brought about a simpler and more cost-effect means of record keeping and accomplishing daily standard practices performed by the employees of DWSD. Videotape data that is collected by TV inspection is cumbersome and time-consuming to review, analyze and put into useful management practice. This recommendation is to develop and deliver to DWSD, in standard DVD-ROM format, a prototype digital image of the observed conditions inside the sewer segments. The data collected from the underground televising equipment is being used to determine approaches to maintenance plans, rehabilitation plans, and to resolve issues that arise from customer complaints. This data would easily be used by any personnel with the need to know or who can effectively respond to the service needs. This data can also protect the integrity of the DWSD maintenance operation.

These plans and recommendations are cost effective ways of providing immediate assistance to the DWSD operation to help prepare for implementing the recommendations of the 50-year master plan for the Detroit sewer system.

Appendix A

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CDM PILOT VIDEO REVIEW INSPECTION REPORT

Tape A1 & A2

1) MH: 24D04014320 – 24D03714315, 42" Brick, Street: Doris

Observations:

- Debris grease medium throughout the line
- Mineral deposits throughout the line
- No radial view done
- TV is cloudy for initial 200'-0"

Recommendation:

- Re-TV for initial 200'-0"
- Needs cleaning throughout the line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

2) MH: 103B16216950 – 103B16916815, 54" Brick, Street: Biltmore

Observations:

- Mineral deposits throughout the line
- No radial view done

Recommendation:

- Needs cleaning throughout the line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

3) MH: 114B19718930 – 114B19718960, 18" VCP, Street: Westmorland

Observations:

- Inspection abandoned at 4.9' (Sewer capped)

Recommendation:

- Need full video for the entire pipe

4) MH: 33B00212105 – 33B00212165, 12" Crock, Street: Hamilton

Observations:

- Roots light throughout the line
- Mineral deposits at joints and service connection
- Protruding service connections at 11.20' and 130.20'
- Offset joints throughout the line
- Longitudinal cracks light at 109.9',140' & 205.30'
- No radial view done
- Inspection abandoned at 292.10' due to bricks and heavy roots in way

Recommendation:

- Video to review remaining portion
- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

5) MH: 34B00215905 – 34B00215950, 10" Crock, Street: Hamilton

Observations:

- Offset joints throughout the line
- Roots light to medium throughout the line
- Multiple cracks severe at 133.50' at protruding service connection to 143'
- Surface cracks from 145' to 160'
- No radial view done
- Protruding service connection at 42.60', 133.50' & 369.20'
- Tape run out at 369.20' and continues in Tape-A2

Recommendation:

- Needs to do point repair at 133.60 and at service connection
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

6) MH: 33B00013130 – 33B00012840, 3'x4'-6" Brick, Street: Woodward

Observations:

- Report says Manhole at 286.30', need to check if it is buried
- Inspection abandoned at 323.30' due to Mineral at service connection
- Mineral deposits medium on pipe surfaces
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

7) MH: 34B00916105 – 34B00916160, 18" VCP, Street: Moss & Puritan

Observations:

- Roots medium to heavy throughout the line at joints & service connections
- Protruding service connection at 14.40' & 121.30'
- No radial view done
- Inspection abandoned at 212.70' due to heavy roots in way

Recommendation:

- Needs heavy cleaning and complete TV remaining line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

8) MH: 26C06918015 – 26C06918090, 6'-3" Brick, Street: Livernois & Thatcher

Observations:

- Camera under water at 552.10'
- No radial view done
- Inspection abandoned due to camera under water

Recommendation:

- Needs cleaning and Re-TV to rest of the line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

9) MH: 24D13902780 – 24D13902630, 15" VCP, Street: Monica & Ewald Circle

Observations:

- Mineral deposits at joints medium
- Protruding service connection at 247.80'
- No radial view done
- Obstruction-debris silt at 232.20'
- Offset joints medium
- Severe off-set joint @ 326.40'

Recommendation:

- Needs cleaning and remove the obstruction at 232.20'
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

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CDM PILOT VIDEO REVIEW INSPECTION REPORT

Tape B

1) MH: 109B20008205 – 109B20008215, 18" Concrete, Street: Belton

Observations:

- Mineral deposits light throughout the line
- No radial view done
- Longitudinal crack at 6.2'
- Exposed aggregate (deep)

Recommendation:

- Needs to be lined with Fully Deteriorated condition due to deep exposed aggregates
- Medium priority on lining

2) MH: 109B20008205 – 109B20008170, 18" Concrete, Street: Belton

Observations:

- Debris heavy throughout the line
- Exposed aggregate (deep)
- Infiltration at 149.80'
- No radial view done

Recommendation:

- Needs to be lined with Fully Deteriorated condition due to deep exposed aggregates
- Need to repair infiltration at 149.80'
- Medium priority on lining

3) MH: 101A15912605 – 101A15912620, 42" Concrete, Street: 96 Service Dr.

Observations:

- Inspection ends at 138.60'
- Report says hole in pipe at 12 O'clock at 27.40'. It is unable to see in TV.
- No radial view done

Recommendation:

- This pipe is in good condition
- Cleaning required at low priority

4) MH: 110F19008810 – 110F19008880, 18" Concrete, Street: Artesian

Observations:

- Multiple cracks severe throughout the pipe
- Roots light throughout the pipe
- Longitudinal cracks at 7.60' for 6' length
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

5) MH: 109D20707610 – 109D20707670, 12" VCP, Street: Sawyer

Observations:

- Offset joints throughout the line
- Debris grease light at 330' to 420'
- Multiple cracks at 127.20' light
- No radial view done
- Longitudinal cracks at 125.40'
- Mineral deposits on pipe surfaces light

Recommendation:

- Debris grease need to be cleaned from 330'-420'
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

6) MH: 114D20717650 – 114D20717530, 24" Concrete, Street: Pierson

Observations:

- Exposed aggregate medium
- Rod at 179'
- Mineral deposits medium on pipe surfaces
- No radial view done
- Pipe changes material to VCP at service connections

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

7) MH: 114B20218105 – 114B20418110, 42" Brick, Street: Glenco

Observations:

- Mineral deposits light to heavy on pipe surfaces
- Debris at the pipe bottom throughout the pipe
- No radial view done

Recommendation:

- Needs heavy cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

8) MH: 114D20917305 – 114D20917390, 20" Concrete, Street: Trinity

Observations:

- Heavy debris throughout the pipe
- Mineral deposits at the joints
- Exposed aggregates (medium)
- No radial view done
- TV unclear from 200' to 296'

Recommendation:

- Needs heavy cleaning and Re-TV to complete the line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

9) MH: 115F20119550 – 115F20119915, 30" Concrete, Street: Pembroke

Observations:

- Mineral deposits throughout the pipe
- Debris at bottom medium throughout the pipe
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

10) MH: 26C03318915 – 26C03318990, 22" Crock, Street: Clarita Ave.

Observations:

- Mineral deposits throughout the pipe
- Roots heavy at 98' & 178'

- Roots medium throughout the pipe
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

11) MH: 23C04712620 – 23C04812615, 2'-6"x3'-9" Brick, Street: Leslie

Observations:

- Mineral deposits throughout the pipe
- Debris at bottom medium throughout the pipe
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

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CDM PILOT VIDEO REVIEW INSPECTION REPORT

Tape C

1) MH: 100C09318240 – 100C09318203, 24" Concrete, Street: Ashton

Observations:

- TV Vision is not clear initial 60'
- Exposed aggregate (medium)
- No radial view done
- Longitudinal cracks at many places about 20'

Recommendation:

- Re-TV for initial 60'
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

2) MH: 110F19809505 – 110F19809510, 24" Crock, Street: Chicago

Observations:

- Offset joints medium throughout the pipe
- Grease light on pipe surface
- Longitudinal cracks about 5' length
- Infiltration from joints at three places at 151', 154' & 157'
- No radial view done

Recommendation:

- Needs cleaning throughout the line
- Need to repair infiltration at joints
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

3) MH: 101E17011760 – 101E17011710, 24" Crock, Street: Longacre

Observations:

- Longitudinal cracks about 15' length
- Multiple cracks severe between 210'-220', pipe shape deformed to egg shape

- Multiple cracks at other places about 25' length
- Roots at joints medium to heavy throughout the pipe
- No radial view done

Recommendation:

- Needs to clean the pipe
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

4) MH: 111C20912990 – 111C20912910, 12" VCP, Street: Burt

Observations:

- Debris heavy throughout the pipe
- Longitudinal cracks about 8' at various places
- Multiple cracks at 215', 324' & 398' medium about 10' length
- Offset joints light throughout the pipe
- Camera is under water at 42'
- No radial view done
- Vision is unclear at couple of place due to debris

Recommendation:

- Needs cleaning
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

5) MH: 111C21413530 – 111C21413595, 15" Concrete, Street: Bentler Ave.

Observations:

- Roots light to heavy throughout the line
- Exposed aggregate medium throughout the pipe
- No radial view done
- Protruding service connection at 17.30'

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

6) MH: 112E20714105 – 112E20714050, 15" Concrete, Street: Kendall

Observations:

- Exposed aggregate deep throughout the pipe
- Offset joints throughout the pipe
- Mineral deposits medium on pipe surfaces & joints
- No radial view done

- Rod at 112'
- Camera is under water at 285' & 307.7'

Recommendation:

- Needs heavy cleaning
- Needs to be lined with Fully Deteriorated condition
- Medium priority on lining

7) MH: 112A19515360 – 112A19515330, 15" Concrete, Street: Minoch

Observations:

- Mineral deposits heavy at joints throughout the pipe
- Exposed aggregate deep throughout the pipe
- No radial view done
- Debris heavy at the bottom 100' to 110'
- Heavy sludge at 135'
- Camera is under water at 270'
- Vision unclear at 159.6' and from 335'-343' due to debris

Recommendation:

- Needs heavy cleaning
- Needs to be lined with Fully Deteriorated condition
- Medium priority on lining

8) MH: 112E19614190 – 112E196141150, 12" Crock, Street: Auburn

Observations:

- Inspection abandoned at 7.9' due to throttle
- Reverse set up done
- Camera under water from 10'-17'
- Roots medium at joints throughout the pipe
- Rod at 77'
- Roots heavy at 136'
- Inspection abandoned in reverse set up at 136' due to roots heavy
- Inspection continued from 136' in next attempt
- Protruding service connection at 376'
- Offset joints medium throughout the pipe

Recommendation:

- Needs heavy cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

9) MH: 114D21517275 – 114D21517230, 18" RCP, Street: Burgess

Observations:

- Mineral deposits medium throughout the pipe
- Exposed aggregate (deep)
- No radial view done
- Infiltration light at 68.9'
- Camera is under water from 113' to 120'
- Pipe material changes at 87' for one pipe
- Vision unclear from 180' to 230'

Recommendation:

- Needs cleaning
- Re-TV from 180' to 230'
- Needs to be lined with Fully Deteriorated condition
- Medium priority on lining

10) MH: 114D21517230 – 114D21517201, 20" RCP, Street: Burgess

Observations:

- Mineral deposits at joints medium throughout the pipe
- Vision is cloudy throughout the pipe
- Inspection continued from end of previous lines footage

Recommendation:

- Needs cleaning
- Re-TV entire pipe for further observation

11) MH: 114B20718950 – 114B20718990, 24" RCP, Street: Braile

Observations:

- Vision is too cloudy throughout the pipe
- Inspection abandoned at 260.6' from upstream manhole due to debris in way
- Reverse inspection attempted up to 143.2' from downstream manhole but the vision is still too cloudy

Recommendation:

- Needs Re-TV entire line after cleaning for further observation

12) MH: 119F22411330 – 119F22411490, 15" RCP, Street: Chatham

Observations:

- Mineral deposits at joints medium throughout the pipe
- Exposed aggregate (light)
- No radial view done
- Camera is under water at 200'

Recommendation:

- Needs cleaning
- Pipe is in good condition

13) MH: 101A15812905 – 101A15712910, 36" Concrete, Street: Davison Ave.

Observations:

- Scaling on sides medium
- Debris at bottom heavy throughout the pipe
- Pipe makes 90° turn at 14.7' and not at 24' as said in report
- Inspection ends at 83.50' bulkhead
- Reverse set up attempted and inspection ends at 73.20' the point where previous inspection stopped

Recommendation:

- Needs heavy cleaning in forward and reverse set up
- Need to see at pipe bottom after cleaning
- No comment on lining at this moment

14) MH: 109B20708690 – 109B20708640, 21" Concrete, Street: Pierson

Observations:

- Mineral deposits medium throughout the pipe
- Debris/sludge heavy throughout the pipe
- Roots heavy throughout the pipe
- Vision is not clear in pipe to see the pipe surfaces
- No radial view done
- Camera is under sludge at 100'-120', 130'-138' & 140'-148'
- Inspection abandoned at 148.30' due to heavy sludge

Recommendation:

- Needs heavy cleaning
- Re-TV entire line for further observation
- No comments on lining at this moment

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CDM PILOT VIDEO REVIEW INSPECTION REPORT

Tape D

1) MH: 23D04711411– 23D04811449, 2'-8"x4' Brick, Street : Burligame & Broad st.

Observations:

- Mineral deposits on pipe surface throughout the pipe
- Protruding service connection at 181.90'
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

2) MH: 23D03712212 – 23D03712107, 4'-0"x6'-0"" Brick, Street: Dexter & Cortland

Observations:

- Mineral deposits on pipe surface throughout the pipe
- No radial view done

Recommendation:

- Needs cleaning throughout the line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

3) MH: 23C04012305 – 23C04012330, 12" Clay, Street: Sturtevant & Petoskey

Observations:

- Roots light throughout the pipe
- Mineral deposits at joints medium
- Separated joints medium throughout the pipe
- Longitudinal cracks at 137'-150', 180-183', 190'-193' and 220'-232 at 6 O'clock
- No radial view done

Recommendation:

- Needs to clean the pipe
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

4) MH: 23C04012330 – 23C03812310, 12" Clay, Street: Sturtevant & Petoskey

Observations:

- Roots medium at joints throughout the pipe
- Mineral deposits medium at joints throughout the pipe
- Separated joints medium throughout the pipe
- Circumferential cracks at 66' medium
- Longitudinal cracks at 76'-82', 159-162' at 6 O'clock & 12 O'clock
- Rod at 278.1'
- Mineral deposits heavy at 276'-287'
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

5) MH: 23C04313645 – 23C03713650, 15" VCP, Street: Petoskey & Grand

Observations:

- Roots light to medium at joints throughout the line
- Hose pipe in line from 30'-48'
- Rope in pipe from 70'-183'
- Debris at bottom throughout the pipe
- Vision unclear at 178'-185' due to debris stuck to camera
- Camera under water at 197'
- No radial view done
- Inspection abandoned at 198' due to heavy debris

Recommendation:

- Needs heavy cleaning
- Need TV to complete remaining part of the pipe
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

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CDM PILOT VIDEO REVIEW INSPECTION REPORT

Tape E1 & E2

1) MH: 104F15618005 – 104F15618001, 24" RCP, Street: Thatcher

Observations:

- Debris/Scale at bottom throughout the pipe
- Mineral deposits at bottom throughout the pipe
- No radial view done

Recommendation:

- Needs cleaning
- Pipe is in good condition

2) MH: 010416317101 - 010416317150, 20" RCP, Street: Muray Hill

Observations:

- Roots light throughout the pipe
- Mineral deposits throughout the pipe
- No inspection report for this pipe
- Inspection abandoned at 187' due to roots in way

Recommendation:

- Needs cleaning throughout the line
- Need to complete remaining TV
- Pipe is OK, however need to review remaining part of the pipe

3) MH: 103B17317101 – 103B17317350, 20" VCP, Street: Lindsay

Observations:

- Offset joint at 22.5', water flows backward
- Offset joints light throughout the pipe
- Pipe is 1/3 full of water so can not see at bottom surface of the pipe
- Mineral deposits at joints
- No radial view done
- Inspection abandoned at 56.30'

Recommendation:

- Needs to clean the pipe

- Needs to be lined with Fully Deteriorated condition
- Medium priority on lining

4) MH: 103D18215790 – 103D18215710, 8" VCP, Street: Midland

Observations:

- Mineral deposits on pipe surfaces throughout the pipe
- Pipe 1/3 full of water, so can not see at bottom surface
- Camera is shaking at many places hence need to see the condition at bottom of the pipe
- Camera is under water at 54' and foam observed on water surface at this point
- Multiple cracks at 80' & 180' to 187' about 8' length, also at 200'-207', 212'-237'
- No radial view done
- Vision is unclear initial 150' due to shaking of camera
- Inspection abandoned at 251.30' due to pipe broken

Recommendation:

- Needs heavy cleaning
- Need to review condition of pipe at bottom
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

5) MH: 105C18419901 – 105C18219950, 48" Brick, Street: Pembroke

Observations:

- Inspection report says 51" VCP, however TV says 48" VCP
- Pipe broken at 280' at 6 O'clock (275' to 283') bricks loose
- Mineral deposits medium throughout the pipe
- Debris medium throughout the pipe
- No radial view done
- Inspection abandoned at 723.1'
- Reverse set up attempted and ends at 87.30' where camera run out of coax

Recommendation:

- Needs cleaning
- Need to re-check the size of sewer
- TV says VCP however it is a Brick line
- Needs to be lined with Partial Deteriorated condition
- Low priority on lining

6) MH: 105C18220250 – 105C18220290, 15" RCP, Street: Faust

Observations:

- Roots heavy throughout the pipe
- Camera under water at 35'-41' and 137'-43'
- Vision unclear at 41' due to debris stuck to camera
- Pipe is 1/3 full of water and hence unable to see the condition of pipe at bottom
- No radial view done
- Rod at 112'
- Tape run out at 314' and continued in next tape E2

Recommendation:

- Needs heavy cleaning
- Need to review at bottom of the pipe after cleaning
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

7) MH: 105C18619950 – 105C18619910, 18" RCP, Street: Fargo

Observations:

- Pipe 1/3 full of water
- Longitudinal crack at 87' at 12 O'clock however TV becomes cloudy and difficult to see it
- No radial view done
- Inspection abandoned at 104.90' due to heavy roots

Recommendation:

- Needs heavy cleaning
- Need to complete TV for further review
- Can not give comment on lining part

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CDM PILOT VIDEO REVIEW INSPECTION REPORT

Tape F

1) MH: 104F16317390 – 104F16317150, 18" RCP, Street: Murray Hill

Observations:

- Roots light/medium at joints & service connections
- Debris/Scale light to heavy throughout the pipe
- Mineral deposits light throughout the pipe
- Rod in the pipe at 91'
- Camera under water at 310'-330' due to heavy debris in way
- Exposed aggregate (Medium)
- No radial view done

Recommendation:

- Needs cleaning
- Needs to be lined with Partial Deteriorated condition
- Medium priority on lining

2) MH: 104F16317150 – 104F16317101, 20" RCP, Street: Murray Hill

Observations:

- Roots heavy at service connection throughout the pipe
- Exposed aggregate (deep)
- No radial view done
- Camera under water at 107'
- Separated joint medium at 187'

Recommendation:

- Needs heavy cleaning throughout the line
- Needs to be lined with Fully Deteriorated condition
- Medium priority on lining

3) MH: 103B17317101 – 103B17317150, 20" VCP, Street: Lindsay

Observations:

- Debris at bottom throughout the pipe
- Roots heavy at service connection and joints throughout the pipe
- Camera under water at 147' & 153' – 181'
- Pipe 1/3 full of water

- TV says RCP but looks like VCP, need to check
- No radial view done
- Inspection visible up to 152.90'.
- Inspection abandoned at 181'

Recommendation:

- Need rest of the video
- Needs heavy cleaning
- Pipe is in good condition

4) MH: 103D18215790 – 103D18215710, 8" VCP, Street: Midland

Observations:

- Multiple cracks throughout the pipe
- Roots heavy throughout the pipe
- Camera is shaking up to initial 15'
- Longitudinal cracks at 174' on top
- Debris grease throughout the pipe
- Protruding service connection at 502.20'
- No radial view done
- Inspection abandoned at 511.60' due to multiple crack severe
- Reverse set up attempted and abandoned at 124.20'

Recommendation:

- Need to review rest of the pipe
- Needs heavy cleaning
- Needs to be lined with Fully Deteriorated condition
- High priority on lining

5) MH: 103B17317101 – 103B17317150, 20" VCP, Street: Lindsay

Observations:

- Roots at joints light throughout the pipe
- Debris at bottom medium throughout the pipe
- Longitudinal cracks at 82'-87', 92'-96' & 118' for one pipe at 6 O'clock
- No radial view done
- Inspection abandoned at 192' due to heavy roots

Recommendation:

- Needs heavy cleaning
- Need to complete TV remaining part of pipe
- Needs to be lined with Fully Deteriorated condition

- Medium priority on lining

6) MH: 121A23216750 – 121A23216690, 12" VCP, Street: West Parkway Ave.

Observations:

- Heavy roots bundle cleaned & removed
- Debris heavy throughout the pipe
- Roots heavy throughout the pipe
- Vision unclear at 100'-110' due to debris stuck to camera
- Mineral deposits at joints medium throughout the pipe
- Pipe changes material at 70'-74' to RCP
- No radial view done

Recommendation:

- Needs heavy cleaning
- Pipe is in good condition, however can be lined to avoid root infiltration

7) MH: 121A23216690 – 121A23216540, 15" VCP, Street: West Parkway Ave.

Observations:

- Roots light throughout the pipe
- Mineral deposits light throughout the pipe
- No radial view done

Recommendation:

- Needs cleaning
- Pipe is in good condition

8) MH: 121A23216540 – 121A23216180, 18" VCP, Street: West Parkway Ave.

Observations:

- MH written in report does not match with TV. TV says 121A23216690 – 121A23216540 which was already done in previous line
- Roots heavy at 225' and along joints throughout the pipe
- Camera under water at 235'-244'
- Mineral deposits light throughout the pipe
- No radial view done

Recommendation:

- Needs heavy cleaning
- Need to check MH notification
- Pipe is in good condition, however can be lined to avoid root infiltration

Sewer Pipe Photos

Shown By Material Type
Displayed By Grade

Brick Sewer Pipe

36”



Excellent Condition

48”



Good Condition

I/I through missing mortar in joints

42” X 56”



Fair Condition

Heavy Calcified Deposits that can be removed with heavy cleaning

No Brick sewers were observed which required “Needs Investigation”.

Clay(VCP) Sewer Pipe

8”



Excellent Condition

Camera light shows bell joints intact and walls clean

12”



Good Condition

Root and slightly offset joint

20”



Fair Condition

Moderate roots and open joints

8”



Needs Investigation

Heavy roots and broken pipe

“Crock”(VCP Glazed) Sewer Pipe

18”



Excellent Condition

12”



Good Condition

Sediment deposits at open joints

8”



Fair Condition

Structural cracks and bad tap

12”



Needs Investigation

Pipe nearly collapsed

Concrete Sewer Pipe

15”



Excellent Condition

30”



Good Condition

Protruding tap and light corrosion

24”



Fair Condition

Severe structural cracks and I/I

15”



Needs Investigation

Root mass forms total blockage