



Fort Monmouth Economic Revitalization Planning Authority

Sanitary Sewer System Evaluation – Draft Final Report

Wednesday, August 19, 2009



Hatch Mott
MacDonald

www.hatchmott.com

Timeline Review

- Proposals submitted on 12/04/08
- Contract Awarded to HMM on 3/12/09
- HMM Began Work on 3/12/09
- Field Work Complete
- Analysis/Evaluation Complete
- Draft Final Report Complete 8/19/09

Sanitary Sewer System Evaluation

1. Manhole Inspections
2. Pump Station Inspections
3. Sewer Cleaning & CCTV Inspections
4. Flow Metering Results
5. Rehabilitation Recommendations
6. Proposed Redevelopment Review
7. Final Recommendations

Overview of Manhole Inspections

- MH inspection phase completed 4/30/09
- 358 MHs were inspected
 - 267 in Main Post
 - 91 in Charles Wood
- Draft report delivered 5/15/09

Manhole Inspection Findings

- A total of 358 MHs were inspected
 - 261 MHs (75%) with no defects
 - 44 MHs require various repairs
 - 21 MHs with estimated infiltration of 40,000gpd
 - 19 MHs Buried or not found
 - 13 MHs no longer connected to the system
 - Majority of MHs are of brick construction

Manhole Observations



Charles Wood – MH 1A (Guam Lane ROW)
Minor hydrogen sulfide (H₂S) corrosion observed on manhole walls and riser.



Charles Wood – MH 9 (Guam Lane)
View of 4-inches stagnant flow. Manhole appears to have no channel.



Charles Wood – MH 23 (Heliport ROW)
View of doghouse manhole with unenclosed pipe. Survey rod used to measure 12-inches of stagnant flow.



Main Post – MH 15A (Barkers Circle)
View of concrete slab placed over manhole; no frame or rim on manhole. HMM unable to remove slab.



Main Post – MH 68 (Parkers Creek ROW)
View of large root throughout manhole protruding from lower wall.



Main Post – MH 144 (Sherrill Avenue)
View of significant hydrogen sulfide (H₂S) corrosion throughout manhole.

Manhole Infiltration



Charles Wood – MH 44B (Hemphill Road)
Arrow points to estimated 2 gpm (3,000 gpd) wall leak to right of effluent pipe. Minor root intrusion from wall / bench junction.



Charles Wood – MH 14 (Satellite Road ROW)
Arrows point to estimated 7 gpm (10,100 gpd) from both pipe sleeves, wall / bench junction and benching.



Charles Wood – MH 46 (Corregidor Road)
Arrow points to estimated 3 gpm (4,300 gpd) from wall and bench junction.



Main Post – MH 9E (Riverside Avenue)
Estimated 2 gpm (3,000 gpd) from caps of both pipes.



Main Post – MH 21 (Barkers Circle)
Estimated 2 gpm (3,000 gpd) from sleeve of effluent pipe, benching, and wall and bench junction.



Main Post – MH 59 (Allen Court)
Estimated 1 gpm (1,500 gpd) from the sleeves of both influent pipes.

Manhole Rehabilitation Cost

- Estimated cost to rehabilitate Manholes is \$290,000.
- Rehabilitation to address 40,000 gpd of Infiltration

Overview of Pump Station Inspections

- Thirteen (13) pump stations inspected between 5/12/08 thru 5/29/09, 10 on Main Post, 3 on Charles Wood
- Draft report delivered 5/12/09
- General Assessment: Pump stations are functional but aged with numerous station in non-compliance with current NJAC or NEC codes

Pump Station Inspections



Main Post - PS No. 491

Located in the parking lot to the southwest of the Visitor's Center (behind bank).



Main Post - PS No. 400

Located at the northeast corner of Oceanport Avenue and Hazen Street.



Main Post - PS No. 257

Located off of Riverside Avenue opposite Buildings No. 275 and No. T580.



Main Post - PS No. 979

Located off of Murphy Drive between Buildings No. 902 and No. 905.



Main Post - PS No. 949

Located off of Anson Avenue between Buildings No. 975 and No. 976.



Main Post - PS No. 752

Located at the corner of Nicodemus Avenue and Alexander Avenue.

Pump Station Inspections



Main Post - PS No. 1221

Located at the corner of Avenue of Memories and Wilson Avenue.



Main Post - PS No. 1227

Located off of the Abey Avenue parking lot at the corner of North Drive.



Charles Wood - PS No. 2021A

Located on the Suneagles Golf Course.



Charles Wood - PS No. 2043

Located off of Megill Drive on perimeter of Suneagles Golf Course.



Charles Wood - PS No. 2018

Located within the basement of the "Suneagles Sports Bar" restaurant.



Charles Wood - PS No. 2603

Located north off Pinebrook Road with in former Family Housing Area.

Pump Station Inspections



Charles Wood - PS No. 210

Located in field off of the Guam Lane parking lot.

- Common Observations:
 - Site Security Fencing Limited
 - Pump Controls Inconsistent
 - Generators/ATS are Aged
 - Dry Wells Exposed to Wet Wells
 - Air Release Valves Missing
 - No Flow Meters
 - Concrete/Metal Corrosion
 - Electric/Telephone Service Upgrades Necessary
 - Upgrades Necessary for all to comply with NJDEP Codes and Municipal Standards

Pump Station Rehabilitation Cost Estimate

- Estimated Construction Cost to Address Pump Station Deficiencies - \$2,500,000 to \$3,000,000
- Coordinate Upgrades with Final Redevelopment Plans
- Coordinate with Respective Borough Sewer Department
- Detailed Design Required

Overview of CCTV Inspections

- Sewer cleaning and CCTV inspection completed 5/29/09, over 62,000 LF of pipe inspected
- Omitted TRWRA and Eatontown SA trunk sewers
- CCTV reports on 44 CDs
- PipeSmart GIS data base delivered 8/12/09

Example of CCTV Video

CCTV Inspection Results

- Main Post Inspections
 - 44,693 LF of 53,933 LF inspected
- Charles Wood Inspections
 - 17,557 LF of 23,868 LF inspected
- 80 CY of material removed during cleaning
- 87% of sewer material is VCP
- 40,000 gpd of Dry Weather Infiltration
- Draft Final Report delivered 8/12/09

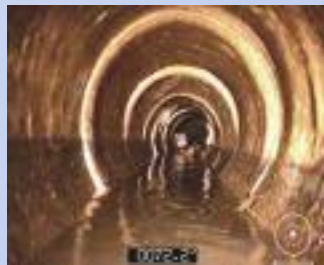
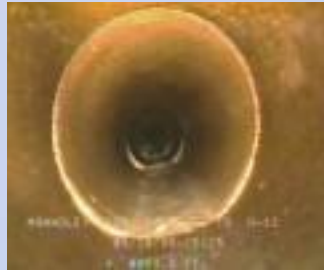
Condition of Existing System

- The existing system is mainly VCP with some PVC, CIP, ACP, CIP and steel piping
- Pipes range in size from 6 to 18-inches
- 66 sewers are recommended for various rehabilitation
- Frequent cleaning is necessary for 27 sewers
- Approx. 50% of sewers are in Grade 2 condition
- Total observed I/I was approx. 18,000 GPD

Structural Assessment

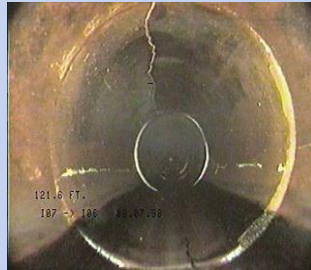
Vitrified Clay Pipe - Various Pipe Conditions

Grade 1



•No Defects

Grade 2



•Minor cracking
•Loss of some wall glazing
•Minor joint alignment problems

Grade 3



•Occasional fractures
•Longitudinal cracking
•Multiple Cracking
•Minor pipe sags
•0% - 5% Deformation

Grade 4



•Serious fractures
•Broken Pipes
•Moderate pipe sagging
•5% - 10% Deformation

Grade 5

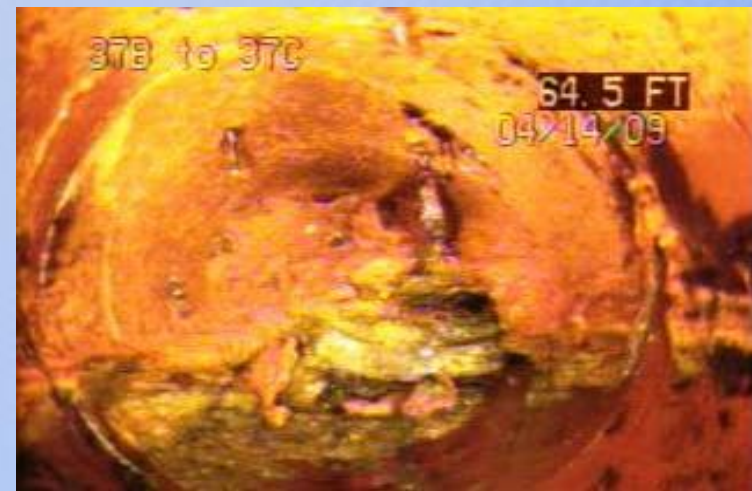


•Extensive fractures
•Large broken areas
•Collapsed sections
•Greater than 10% deformation

Pipe Observations (Charles Wood)



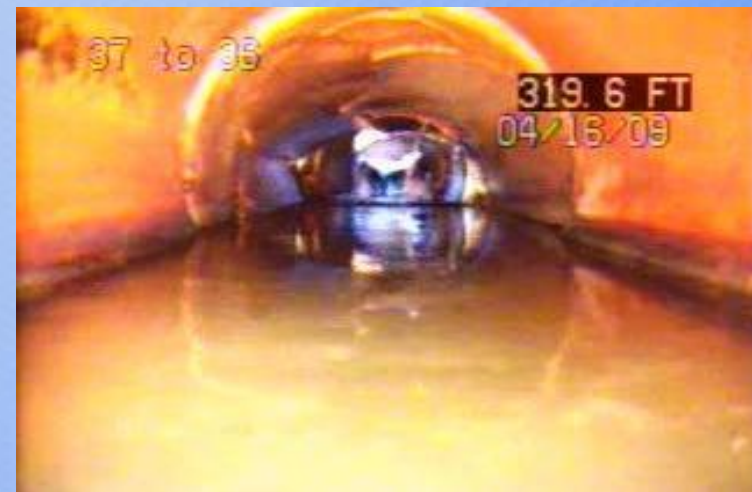
MH 2F to PS - Club House Area
Grade 3 to 4 Hydrogen sulfide corrosion throughout sewer.



MH 37C to 37B - Building 2700 Easement
Collapsed pipe 64.5 LF from MH 37B.



MH 5H to MH 5 - Megill Circle
Grade 4 fractured pipe section 145.6 LF from MH 5H.

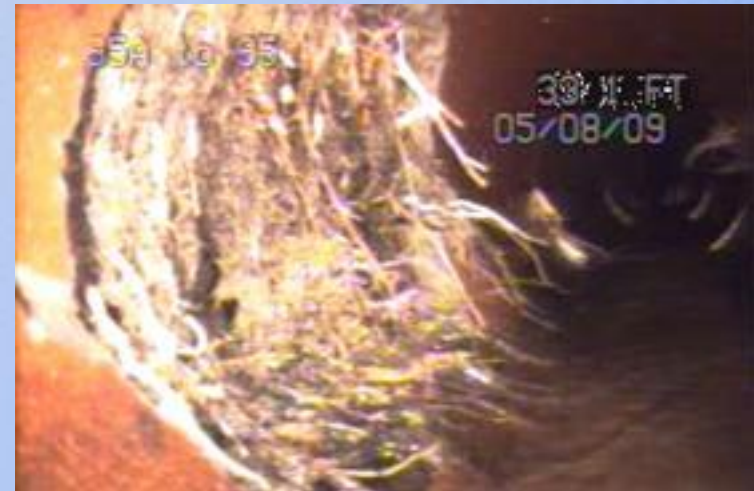


MH 37 to MH 36 - Building 2700 Watson Road
Grade 4 broken and collapsing pipe section with leak.

Pipe Observations (Main Post)



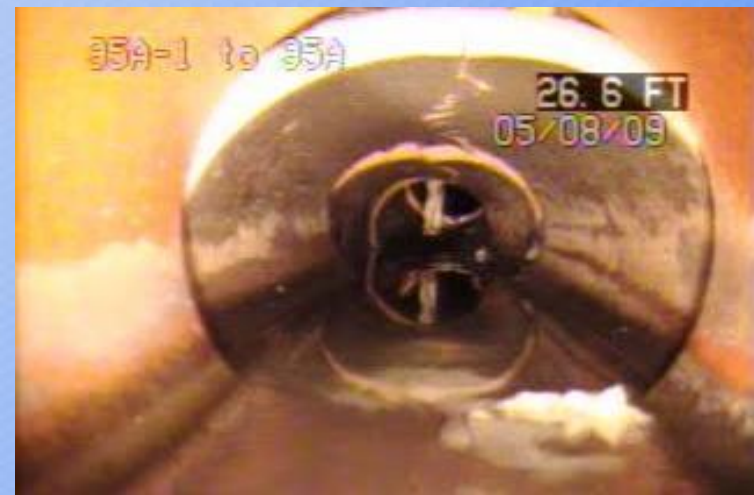
MH 42 to MH 43 - Apex Avenue
Grade 4 fractured pipe section with 15% loss of ovality.



MH 95A to MH 95 - Building 1075
Grade 4 hole with root mass protruding through.

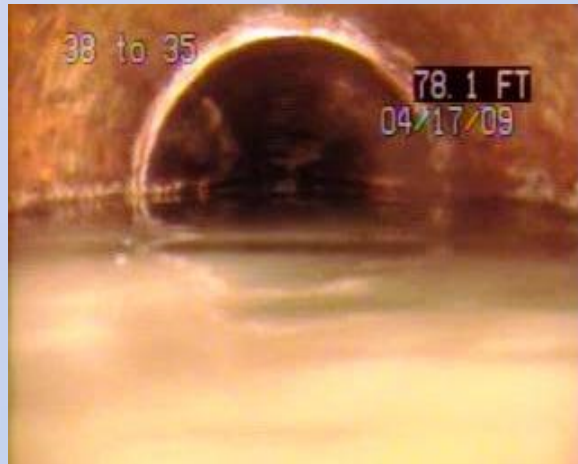


MH 21 to MH 18 - 1st Avenue
Grade 5 hole with outer soil and rocks visible.

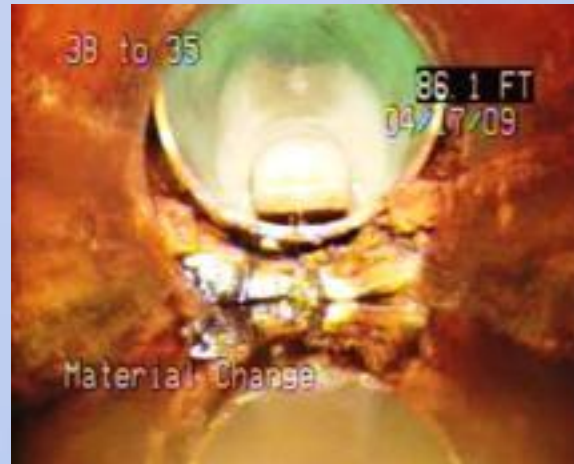


MH 95A-1 to MH 95A - Building 1075
Pipe deformed 20%.

Hydraulic Observations (Charles Wood)



MH 38 to 35 – BLDG 2700 Watson Road
50% backwater condition in pipe due to offset joint further downstream.



MH 38 to 35 – BLDG 2700 Watson Road
Joint offset 1.5-inches 86.1 LF from MH 38 causing 50% backwater condition in pipe.



MH 30 to 29 – BLDG 2700 Easement
PBSC protruding 2-inches into mainline 113 LF from MH 30.



MH 31 to 30 – BLDG 2700 Easement
View of metal bar protruding through mainline 128 LF from MH 30 trapping debris.



MH 32 to 31 – BLDG 2700
PBSC protruding 6-inches into mainline 60.4 LF from MH 32.



MH 32B to 32A – BLDG 2700
View of metal bar protruding through mainline 39.9 LF from MH 32B.

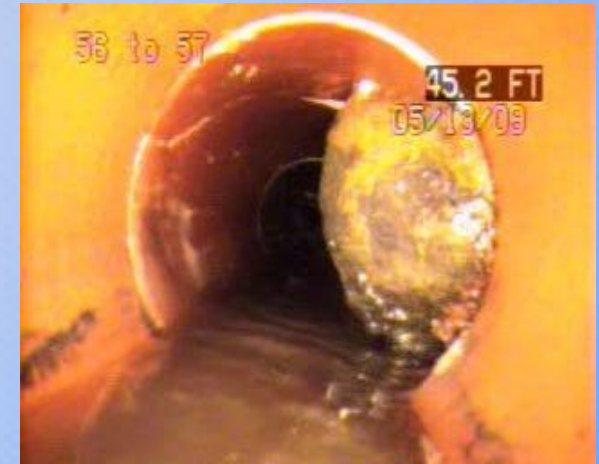
Hydraulic Observations (Main Post)



MH 14 to 15 – BLDG 208 Easement
Pipe changes shape from circular to rectangular 197.3 to 212.3 LF from MH 15.



MH 26 A to 26 – Alley
View of camera entering 50% pipe sag due to offset joint 320.3 LF from MH 26A.



MH 56 to 57 – Signal Avenue
PBSC protruding 4-inches into mainline 46.7 LF from MH 56.



MH 96A to 96 – BLDG 1075
View of 50% sag from MH 96A to 15.1 LF downstream.



MH 151 to PS – Avenue of Memories
View of pipe offset 6-inches at pipe material change junction 159.2 LF from MH 151.

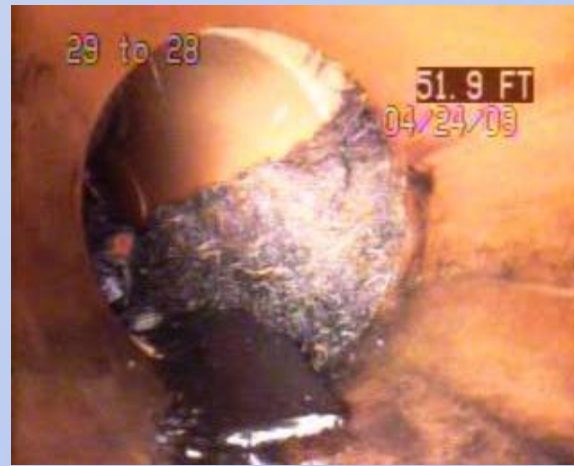


MH 170C to 170B – Avenue of Memories
View of unknown utility pipe crossing through sanitary sewer 22 LF from MH 170C.

Infiltration Observations



Charles Wood: MH 5M to 5L – Megill Drive
Joint with 30% root mass (indication of leak)
167.4 LF from MH 5L.



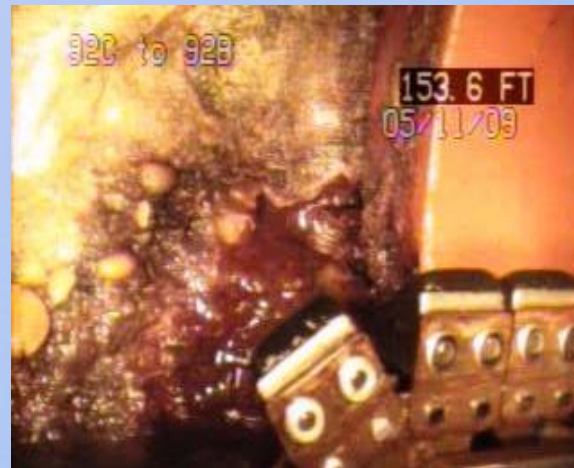
Charles Wood: MH 29 to 28 – BLDG 2700
Joint with 35% root mass (indication of leak)
54.7 LF from MH 29.



Charles Wood: MH PS – Hemphill Road
Sleeve leak at influent pipe (150 gpd).



Main Post: MH 79 to 78 – Easement
Estimated 150 gpd from joint 64 LF from
MH 79.



Main Post: MH 92B – Alexander Avenue
Sleeve leak at influent pipe (720 gpd).



Main Post: MH 104 to 103 – BLDG 702
View of intermittent joints with mineral
deposits.

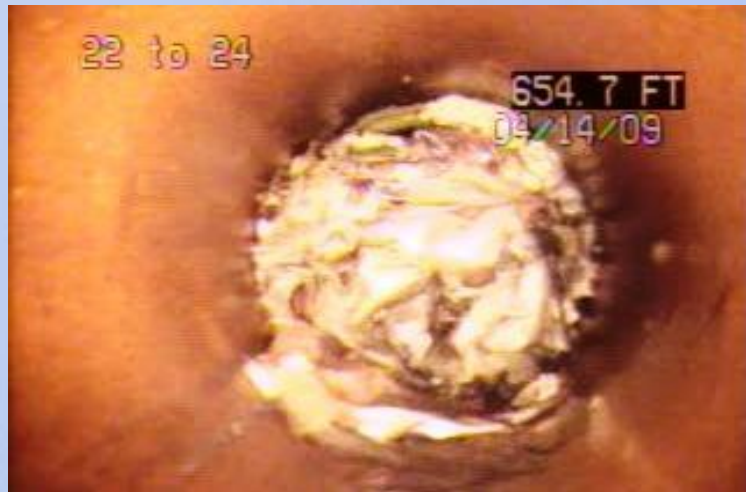
Maintenance Observations (Part 1)



Charles Wood: MH 2F to PS - Club House Area
Grease accumulation (25%) 189.6 LF from MH 2F.



Charles Wood: MH 5E-1 to 5E – Megill Circle
Heavy tuberculation throughout sewer.



Charles Wood: MH 24 to MH 22 – Radiac Way
Larger paper accumulation 655 LF from MH 22.



Main Post: MH 26A to MH 26 - Alley
Rocks stuck in PBSC 91.5 LF from MH 26A.

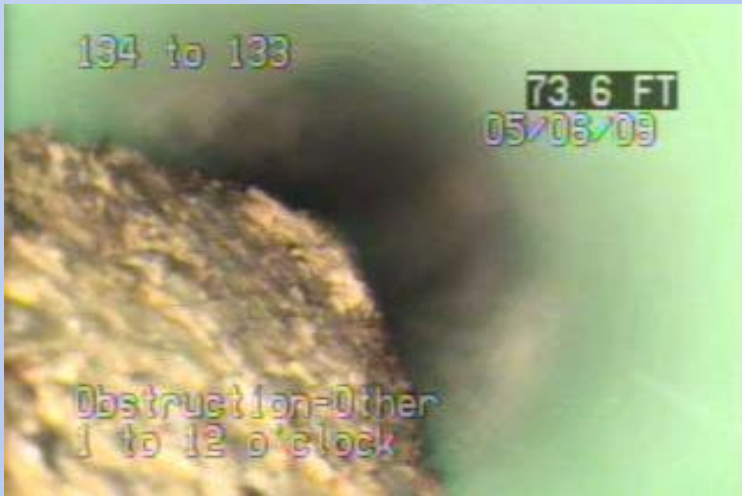
Maintenance Observations (Part 2)



Main Post: MH 21 to MH 18 – 1st Avenue
Grease accumulation (30%) along pipe crown.



Main Post: MH 22 to MH 21 – 1st Avenue
Heavy tuberculation 103.6 to 129 LF from MH 22.



Main Post: MH 134 to MH 133 – Battery Ave. Easement
View of sediment/debris accumulation.



Main Post: MH 170 to MH 169 – Derum Avenue
View of manhole run stuck in pipe.

Recommendations Based Upon CCTV Inspections

- Complete excavation and replacement of five (5) sewer reaches
- Complete CIPP lining of two (2) sewer reaches
- Grouting of multiple holes/defects/joints
- Chain flail to remove heavy tuberculation accumulation in four (4) sewer reaches

Pipeline Rehabilitation Construction Cost Estimate

- Estimated cost to rehabilitate sewer pipe defects - \$ 420,000 - \$450,000
- Sewer rehabilitation to be cross checked against Planned Redevelopment

Pipe Smart Data System

- Pipe smart data base delivered on August 13, 2009
- Summary of all CCTV inspection comments
- Data base for record purposes and future reference
- GIS compatible
- GIS mapping required

Sample "PipeSmart" Data Sheet

Fort Monmouth Economic Revitalization Planning Authority
Sanitary Sewer Evaluation Project
Fort Monmouth, NJ - Main Post & Charles Wood Areas
HMM Job No. 255261 AB01

Pipe Data Report for Project: FMERPA PS Database
 Printed: August 10, 2009 7:33am

	<u>Upstream Structure</u>	<u>Downstream Structure</u>
Pipe Number	43A	43B
Pipe Type	Sanitary Sewer	
Address / Street	Hemphill Road	
Location		

Inspection:		Pipe:	
Inspection Type	TV	Pipe Material	PVC
Inspector(s)	MW Office	Pipe Roughness	0.00
Starting Date/Time	4/6/2009 1:53:09PM	Pipe Slope	0.00
Ending Date/Time		Pipe Diameter [in]	8
Weather Condition	Rain, Light	Total Pipe Length [ft]	228.6
Ground Condition		Length Measured As	Structure Base Centers
Surface Over Pipe		Flow Depth [in]	0.00
Percent (%) Paved	0	Flow Direction	
View Direction	Against Flow	Joint Spacing [ft]	3.0

Video Tape ID	CWCD 1	Depth From Top of Structure to Invert: [ft]	
Tape Start Index		Upstream End	0.00
Tape End Index		Downstream End	0.00

Comments:
 Pipe is in Grade 1 structural condition. Minor grease accumulation 73.2 to 98.3 LF from MH 43B.
 RECOMMENDATION: None.

Supplemental Pipe Data:			
TV Contractor	Oswald Ent.	Cond, Structural	Grade 1
TV Operator ID	John Read	Cond, Hydraulic	Grade 1
TV Contract #		Cond, Infiltration	Grade 1
Pipe Shape	Circular	Cond, Maintenance	Grade 2
Pipe Width [in]	8.00	TV Incomplete	No
Pipe Height [in]	8.00	Incomplete Reason	
Buildings to Left	0	Pipe Isolated	No
Buildings to Right	0	Weir GPD	0.0
Length, Map [ft]	0.0	Re-TV Required	No
Length, Rolatape [ft]	0.0	Reversal Required	No
Length, Contractor [ft]	228.6	Cleaning Required	No

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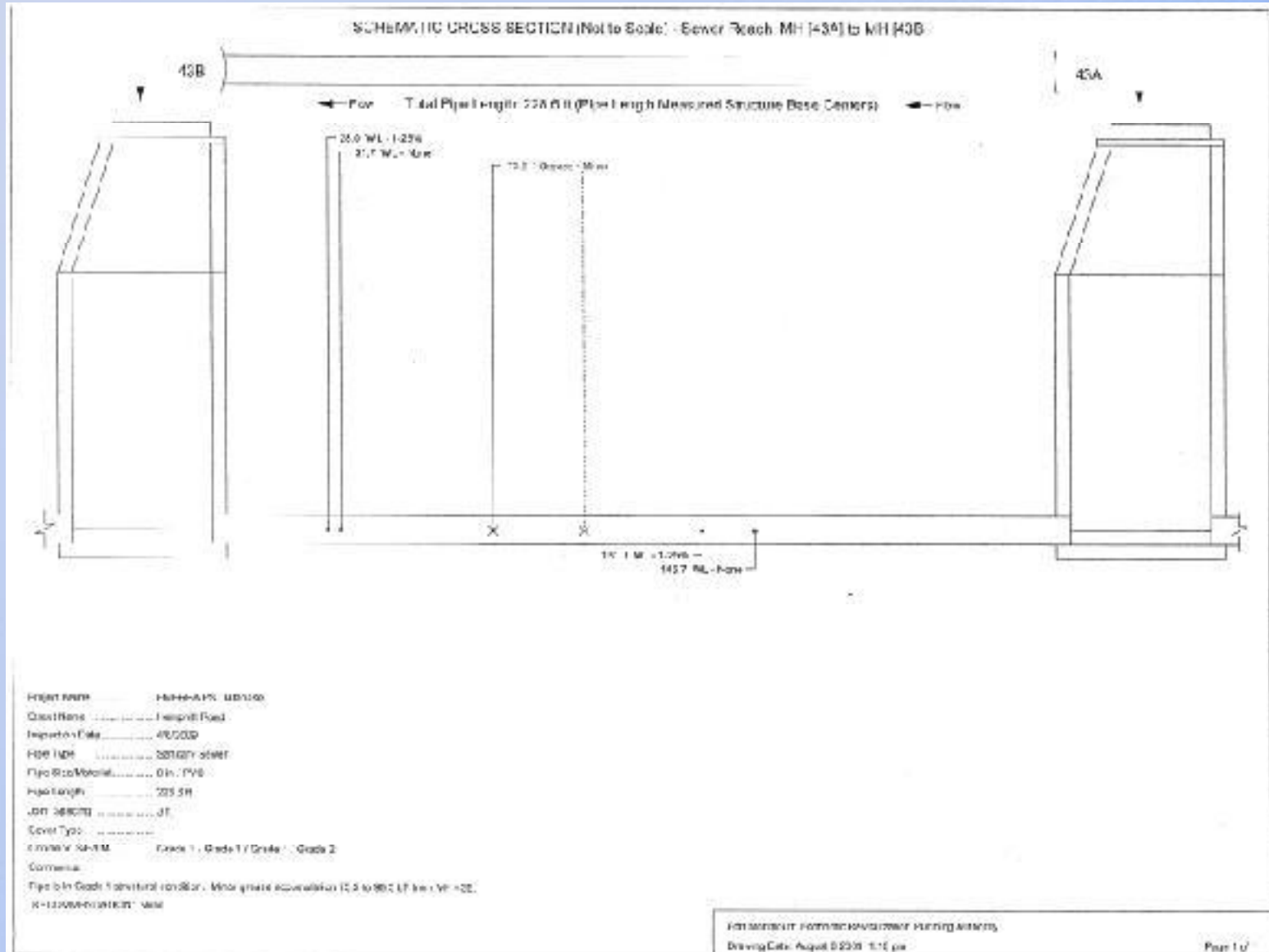
Pipe Data Report for Project: FMERPA PS Database
 Printed: August 10, 2009 7:33am

	<u>Upstream Structure</u>	<u>Downstream Structure</u>
Pipe Number	43A	43B

Pa	End	Other Observation	Dist (ft)	Run	Co	Wdia
29.0		W/L - 1-25%				1-1.0"
31.7		W/L - 1-25%				
73.2	98.3	Grease Accum			Minor	1.0"
73.2		W/L - 1-25%				
98.3		W/L - 1-25%				

Total Number of Observations 5
 Total Length (ft) 200

Sample "PipeSmart" Cross Section



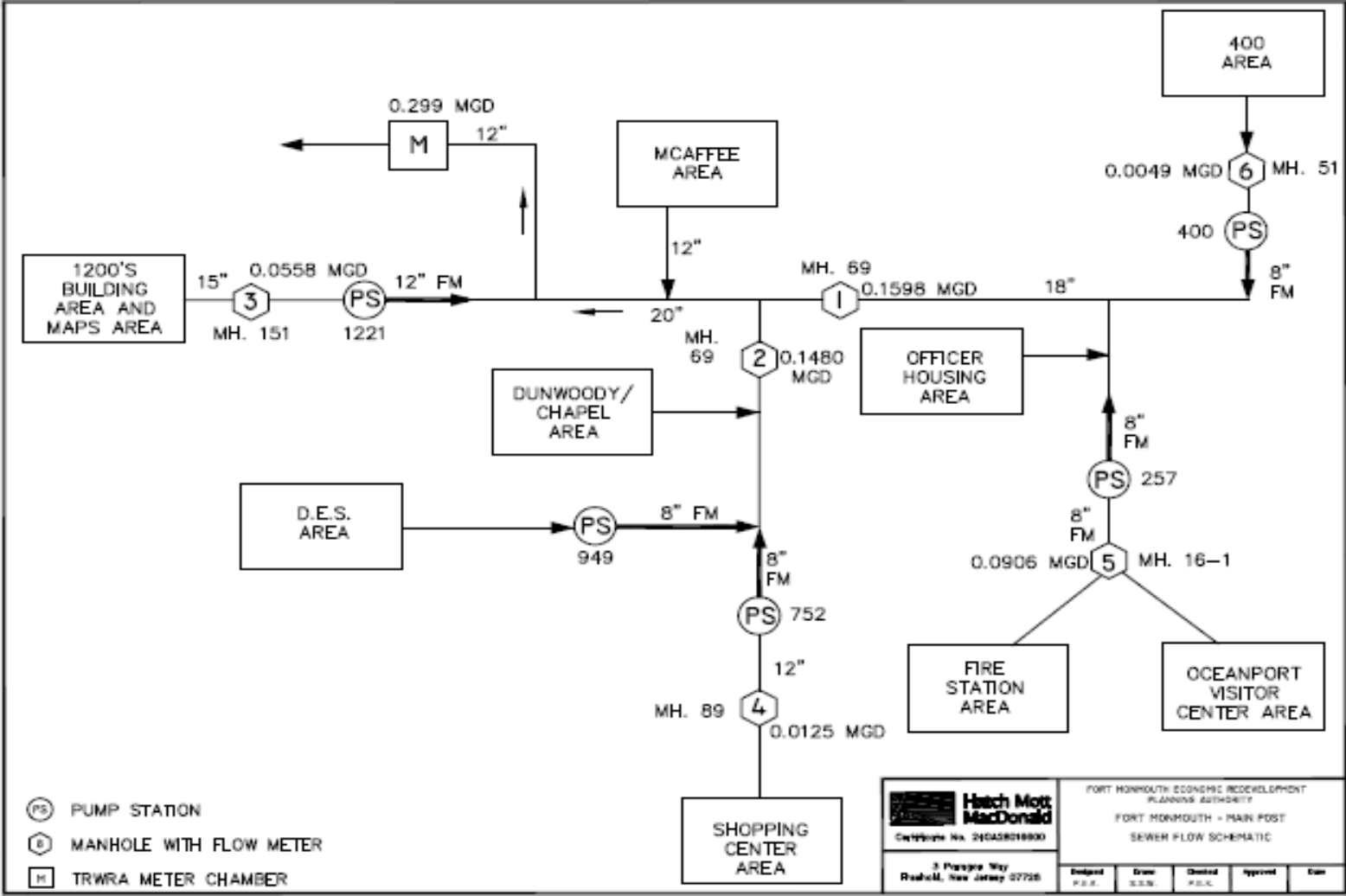
Overview of Flow Metering

- Ten (10) flow meters installed 5/28/09 (6 on Main Post, 4 on Charles Wood)
- Flow metering concluded 6/26/09
- Data obtained for two (2) TRWRA billing meters
- Water consumption records obtained from NJAW

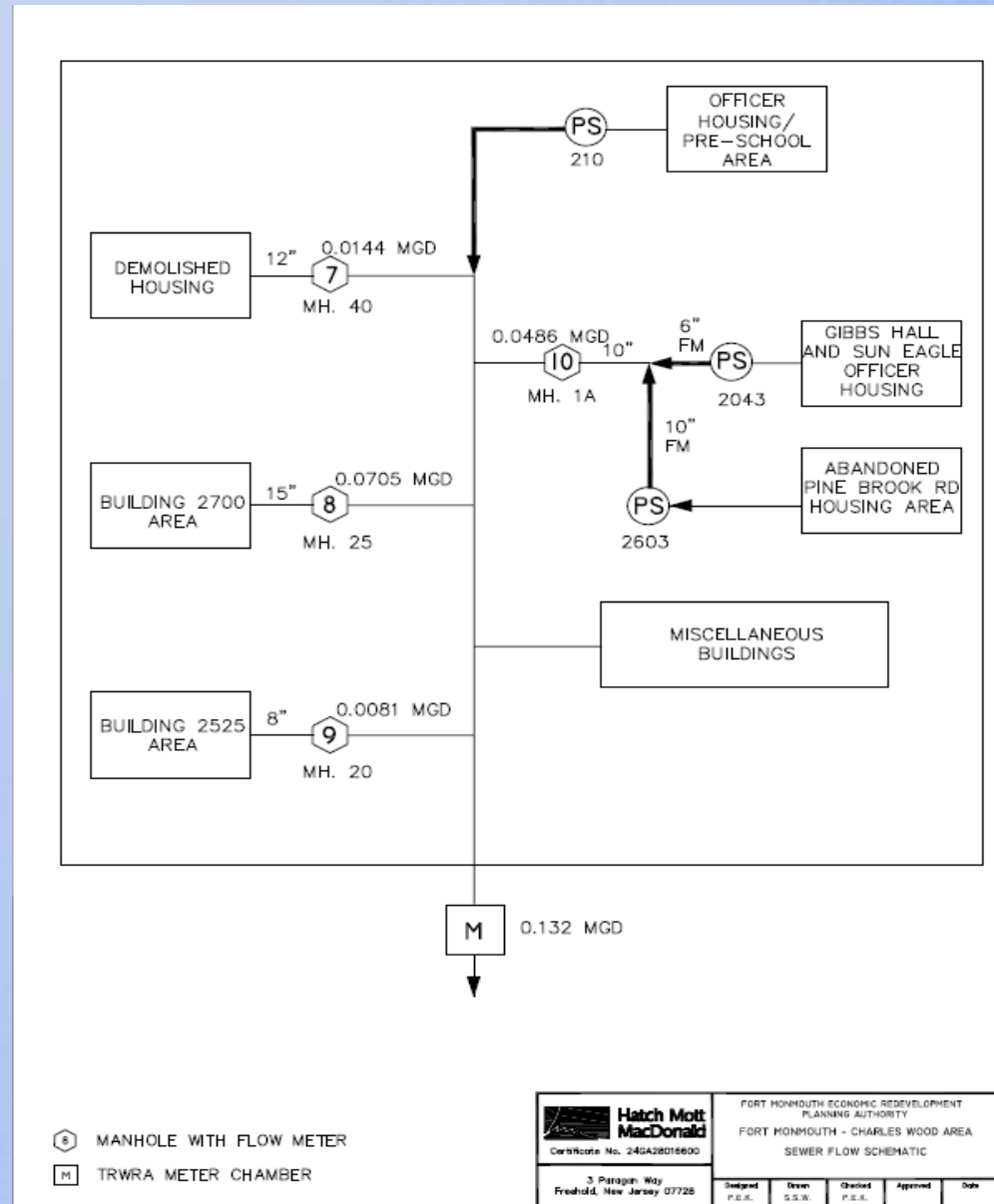
Overview of Flow Metering (Cont.)

- Dry weather I/I estimated at 80,000 GPD (25% of ADF)
- ADF during metering was 0.505 MGD
- ADF over past 3-years was 0.390 MGD
- Water usage at 0.343 MGD
- I/I may account for approx. \$200,000/year in sewage treatment costs

Flow Schematic (Main Post)



Flow Schematic (Charles Wood)



Cost Summary of Recommended Rehabilitation for Existing Sewer System

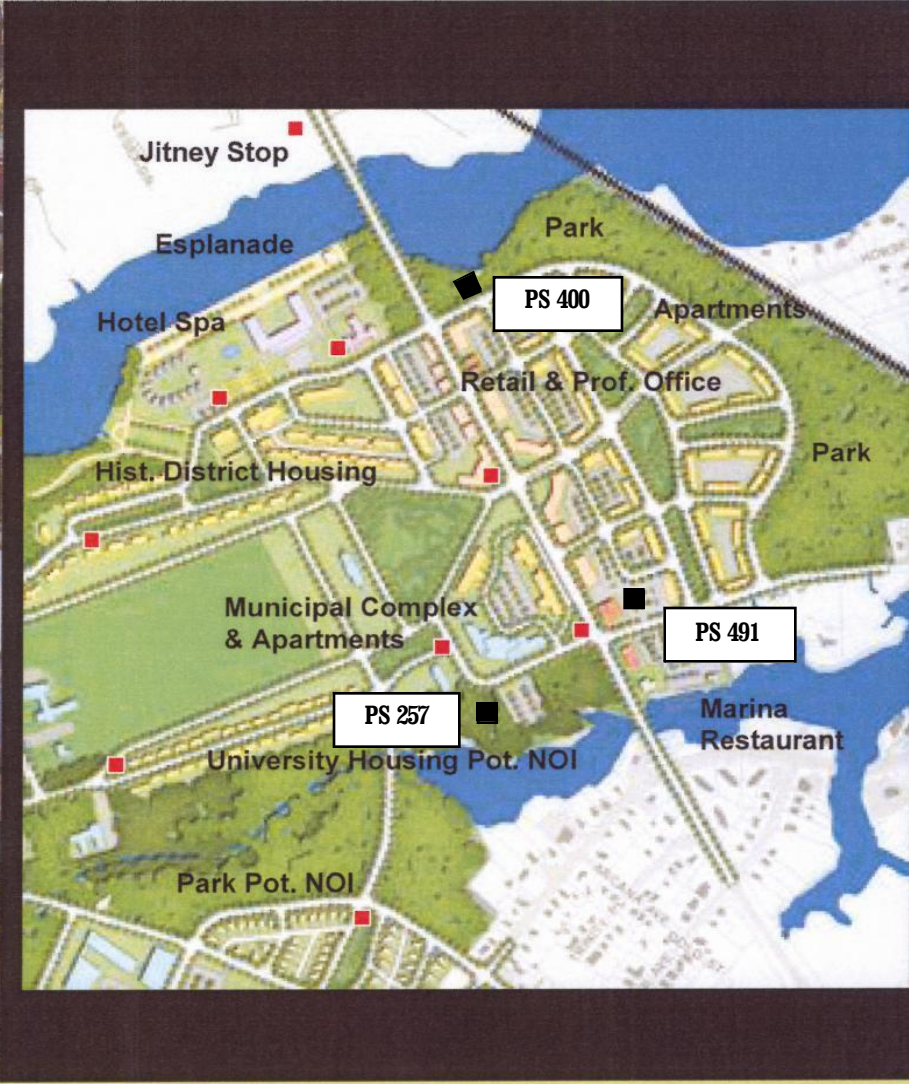
- Manhole Rehabilitation - \$290,000
- Pipeline Rehabilitation - \$450,000
- Pump Station Rehabilitation - \$2,500,000 - \$3,000,000

Proposed Redevelopment Review

- Projected future wastewater from Redevelopment
- Overlay Preliminary Redevelopment Centers on Sewer System Configuration
- Compare redevelopment concept layout (roads, buildings, green areas, etc...) against location of existing sewers
- Redevelopment layout primary concern
- Construct new sewers where existing sewer layout are in non-conformance with Redevelopment planning layout.

Fort Monmouth Redevelopment Approx. Future ADF Projections

- Oceanport Neighborhood Center - 145,000 GPD
- Education/Medical Campus - 130,000 GPD
- Green Industry Campus - 60,000 GPD
- Rt. 35 Lifestyle Center/Tech Incubator - 160,000 GPD
- Business/Town Center (Eatontown) - 100,000 GPD
- Business/Town Center (Tinton Falls) - 160,000 GPD
- **Total Future ADF - 755,000 GPD**



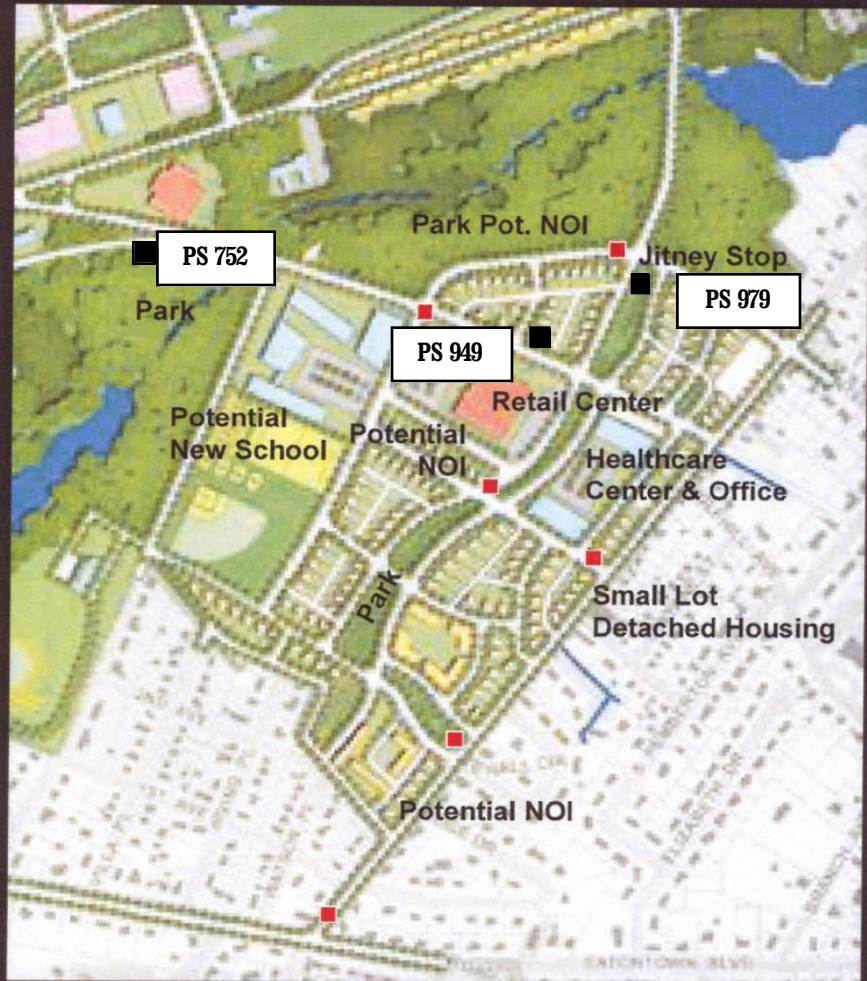
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Historic Oceanport Neighborhood Center



Recommendations for Oceanport Neighborhood Center

- **PS 400** – Re-utilize existing PS and force main. Rehabilitate as recommended.
- **PS 491** - Existing PS is in conflict with redevelopment. Demolish existing PS and sewers. Construct new sewer system.
- **PS 257** – Re-utilize existing PS, FM and gravity sewers. Rehabilitate as recommended. Confirm capacity w/ Final Redevelopment Plans.
- **Gravity** - Hotel/spa should re-utilize existing 8” gravity sewer upon rehabilitation.



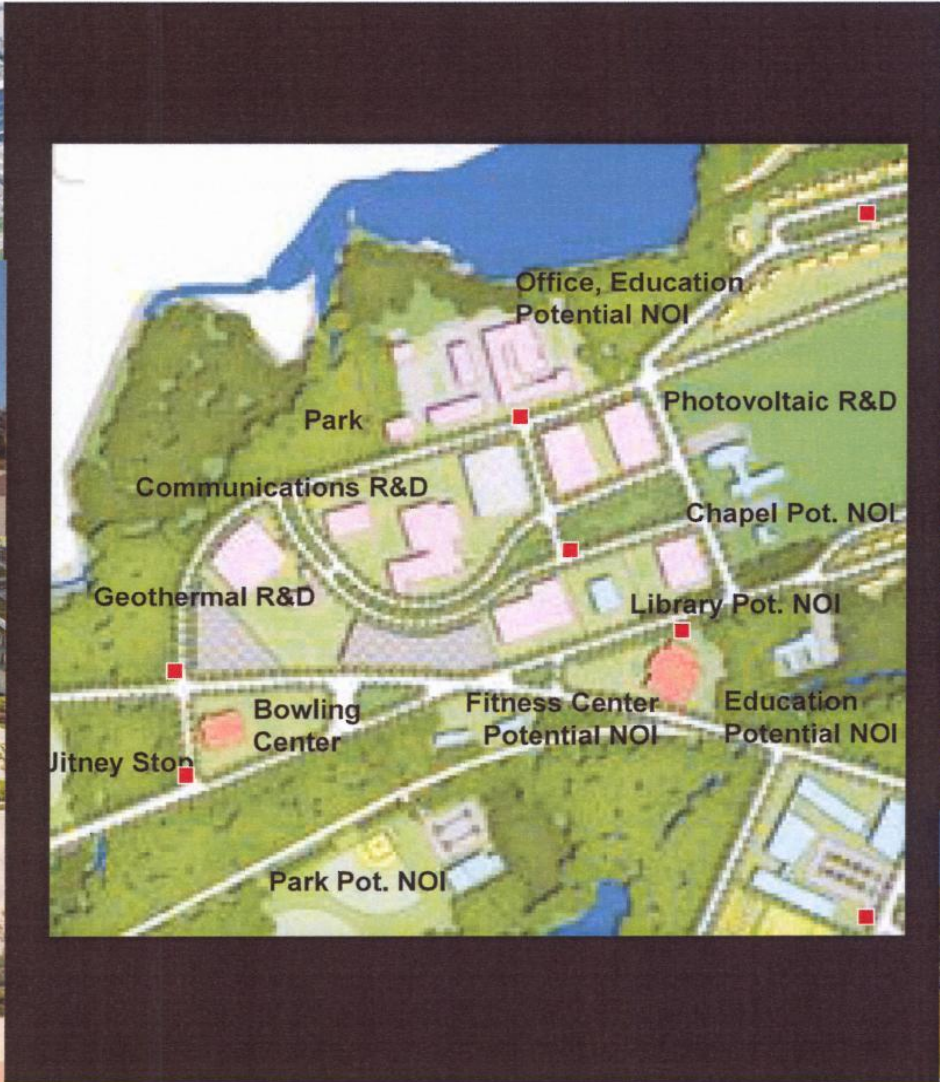
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Education – Medical Campus



Recommendations for Education/Medical Campus

- **PS 979** – Not in conformance with Redev. Plans. Abandon/Demolish.
- **PS 949** – Not in conformance with Redev. Plans. Abandon/Demolish.
- **PS 752** – Not in conformance with Redev. Plans. Abandon/Demolish.
- **Ex. Gravity Sewers** – Ex. Gravity sewers do not conform to concept roadway layout. Abandon and build new sewer system.



EDAW | AECOM

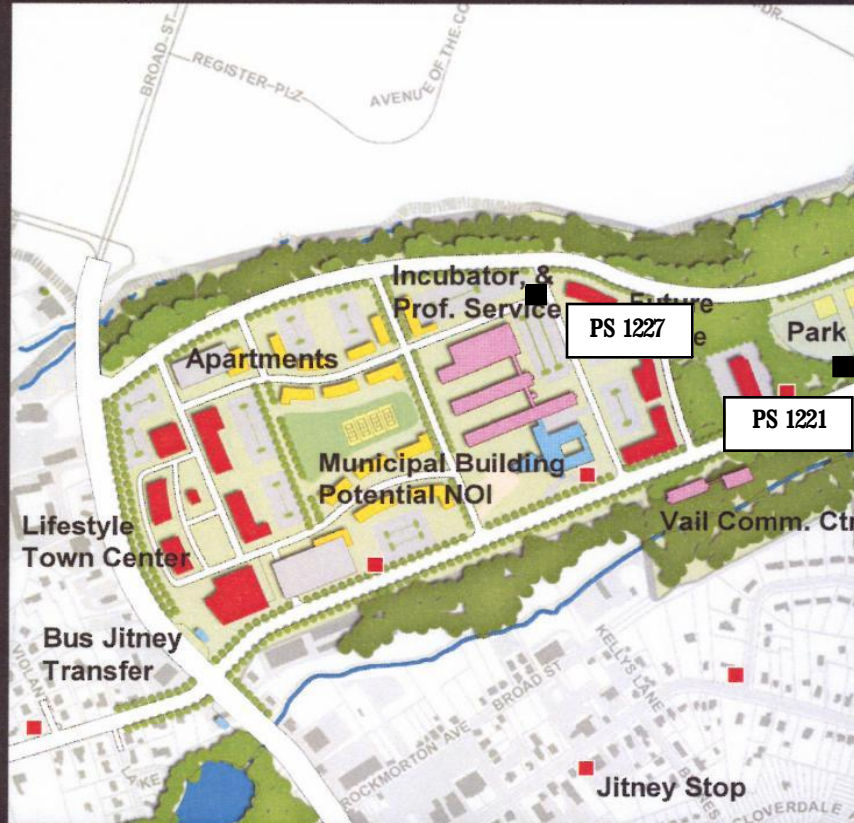
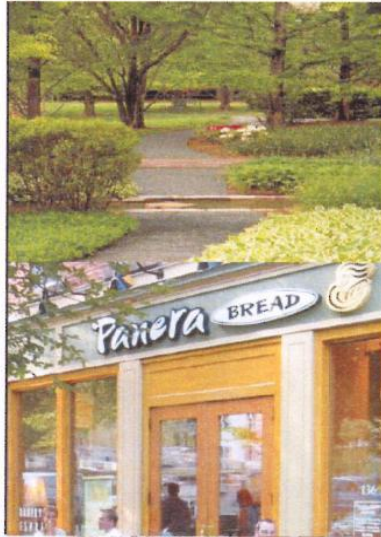
Green Industry Campus (GPV Park)



FORT MONMOUTH

Recommendations for Green Industry Campus (GPV Park)

- Portions of ex. 8" gravity sewer to be re-used. Rehabilitate as recommended.
- New 8" sewers needed to serve new buildings.
- Ex. 20" and 18" main sewers oversized. Further evaluate ability to install 12" and 10" replacement sewers.
- Ex. TRWRA meter will serve as future Oceanport meter station.



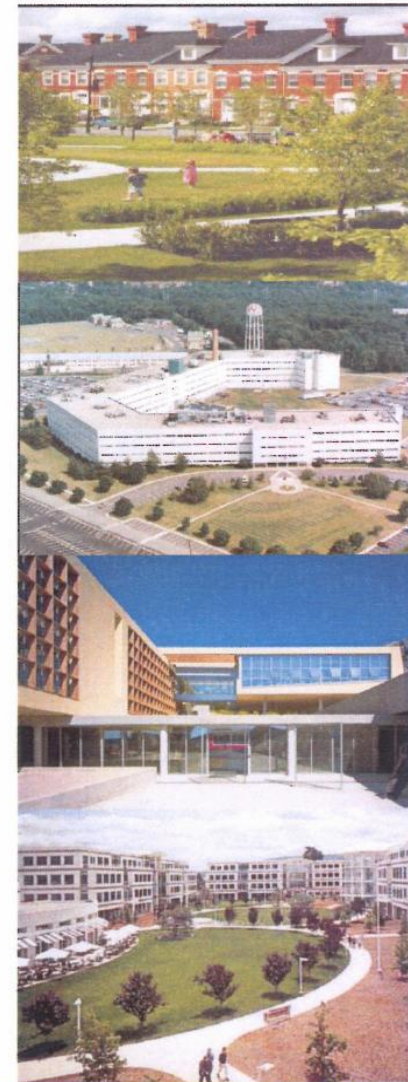
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Rt. 35 Lifestyle Center – Tech Incubator



Recommendations for Rt. 35 Lifestyle Center/Tech Incubator

- Ex. PS 1221 is in poor condition
- Ex. 18" main sewer is oversized
- Ex. Discharge needs to be disconnected from Oceanport system.
- Redevelopment concept shows many new buildings
- Recommend new gravity sewer with direct connection to ex. Eatontown Mill Brook Interceptor. Abandon PS and gravity system.



EDAW | AECOM

Mixed-Use Business & Town Center



Recommendations for Mixed-Use Business & Town Center

➤ Eatontown Area:

- PS2043 (Pinebrook Housing) – Abandon existing gravity and PS system. Construct new to meet redevelopment. Connect into ex. Eatontown sewers.
- PS2012A (Gibbs Hall) – Maintain sewer system, rehabilitate PS and sewers as recommended.
- PS 2603 (Officer Housing) – Abandon PS, construction new PS with Hotel/Conference Center construction.
- TRWRA Connection – Investigate connection of new PS 2603 with TRWRA sewer near Bldg 2044. Construct new meter station.

Recommendations for Mixed-Use Business & Town Center

- Tinton Falls Area:
 - PS210 – Re-use gravity sewers and PS. Rehabilitate as recommended.
 - Bldg 2700 – Abandon ex. gravity sewers. Reconnect to sewer serving bldg 2525.
 - Bldg 2525 – Re-use ex. Sewers. Rehabilitate as recommended.
 - New Development – Construct new sewers to service proposed new construction. Connect to ex. Bldg 2525 sewer.