What Lurks Below

Utilizing Pipeline Condition Assessment Data in an “All Street” Capital Plan

Shawn Syde, P.E., City of New Bedford
Jesse Herman, P.E., CDM Smith

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CDM Smith

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Presentation Outline

- Background
- DPI Overview
- Asset Management Program
- Condition Assessment
- All Street CIP Process
- Next Steps

New Bedford at a Glance

- Incorporated in 1847
- Over 24 square miles
- Approximately 300 miles of roads, sewer and water mains
- Population of 95,000
- Once home to the largest whaling fleet in the world – “Whaling City”
- Currently America’s largest fishing port
- Infrastructure managed by Department of Public Infrastructure (DPI)

DPI at a Glance

- Department of Public Infrastructure
- Founded in 2003
- Comprised of traditionally separate City Departments
- $40 million dollar annual budget
- 165 employees
- Breadth of responsibilities



Historical Approach to Capital Upgrades

- Complete streets approach was used to the extent possible
- Projects based on known issues and needs
- Previously completed CIPs were old and out of date
- Developed in silos



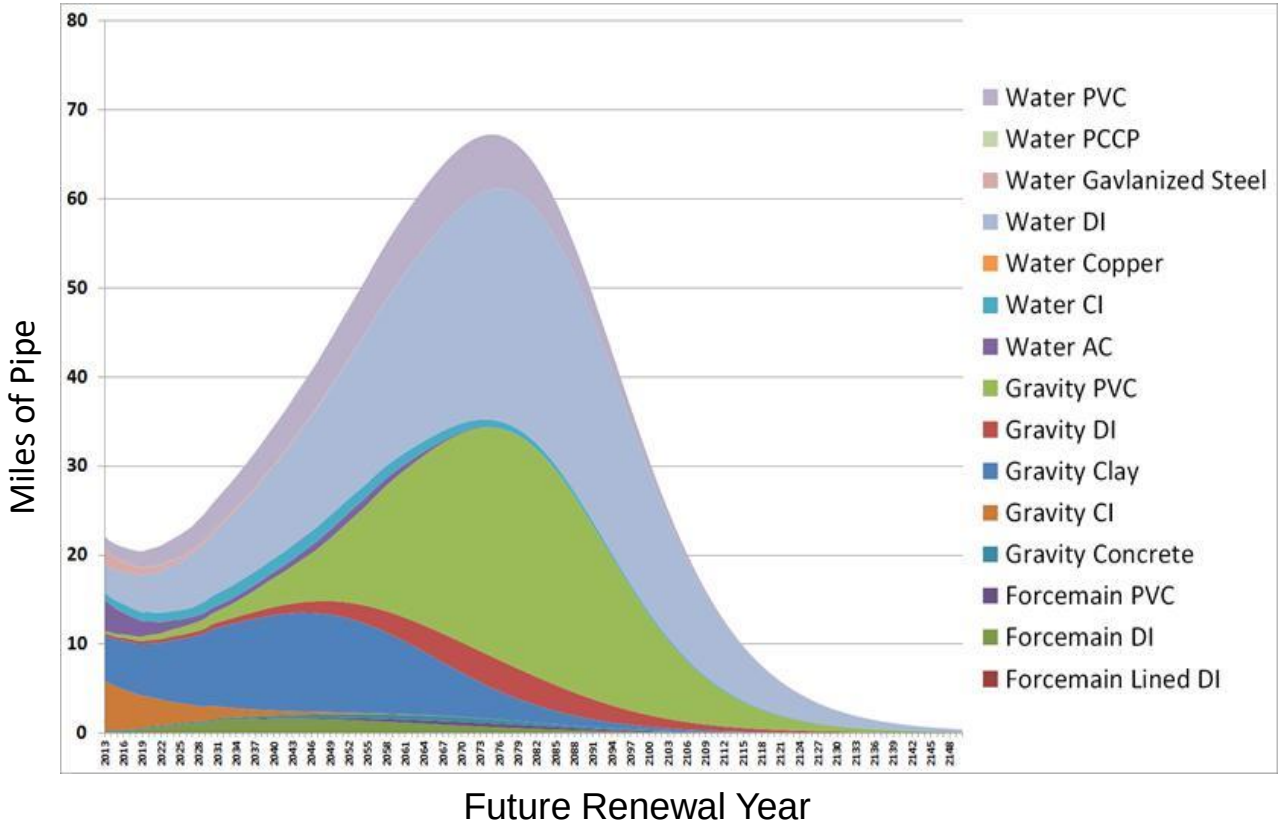

Capital Upgrade Program

- $1.2B in collection system upgrades
- $300M in water system upgrades
- $250M in roadway system upgrades
- 5 miles of gas main to replace annually (Eversource)

A planning process was needed to understand conflicts and maximize funding while minimize disturbance to City streets

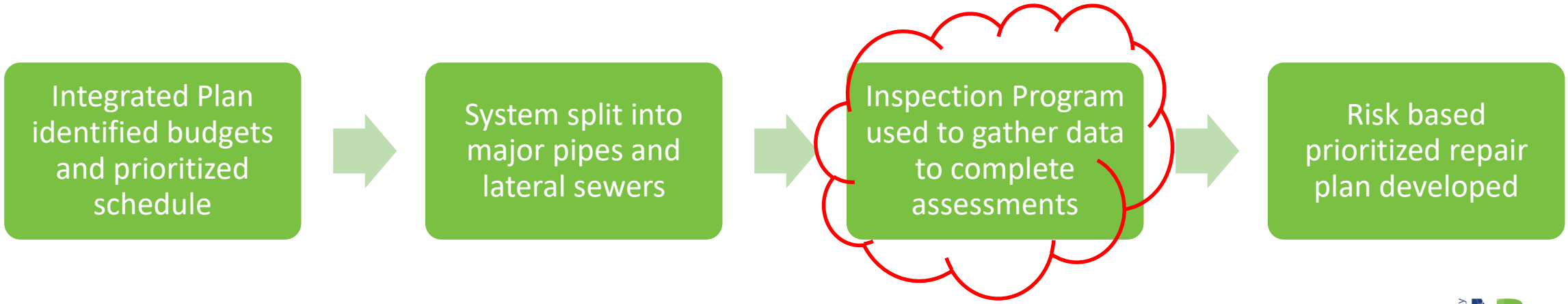
Funding for Long Term Planning

- City is moving to data driven, technology-based approach to system O&M and capital planning
- Program targets several planning and compliance needs
- Helps improve system mapping
- Results are a defendable CIP based on risk with annual allocations of funding aligned with various CIPs



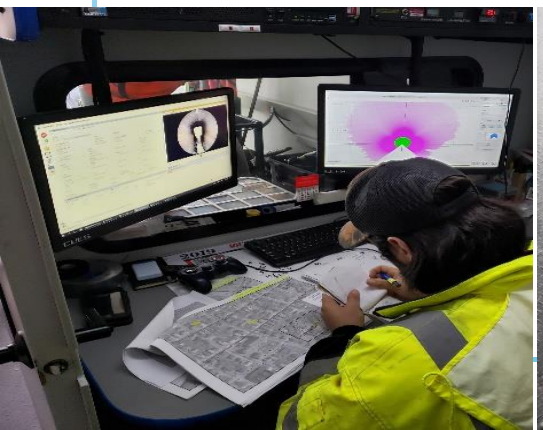
Priority of Integrated Capital Plan

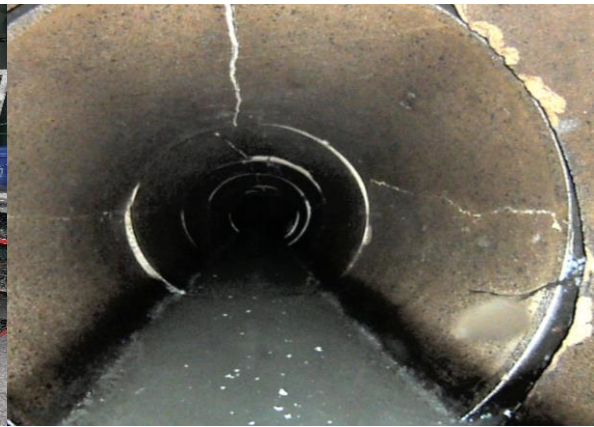
- 2017 Integrated Capital Plan
  - 28.1 miles of critical sewers
  - 12.6 miles of brick sewers
  - 215 miles of lateral sewers
- Upwards of $90M estimated to implement system repairs
- Approach to prioritizing repairs to collection system needed to maximize limited funding.



Pipe Inspection Program

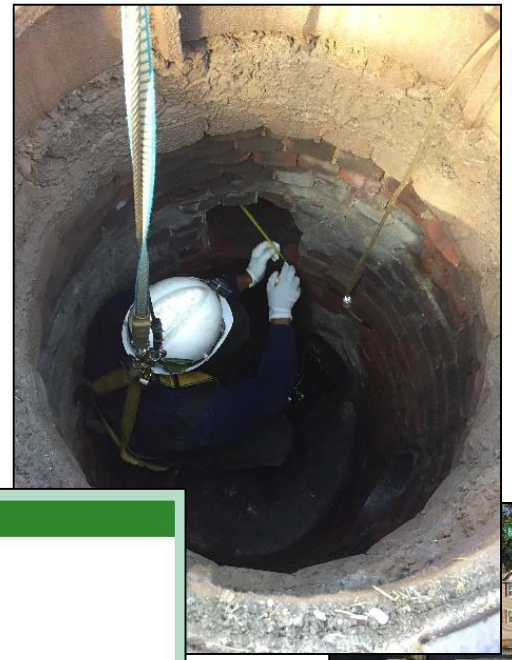
- 28.1 miles of interceptor ranging in size from 8-in to 84-in
- 12.6 miles of brick pipe ranging in size from 10-in to 54-in
- NASSCO PACP Version 7.0 pipe inspections
- Multi-sensor inspection (CCTV, Sonar, LIDAR)
- Pipe cleaning

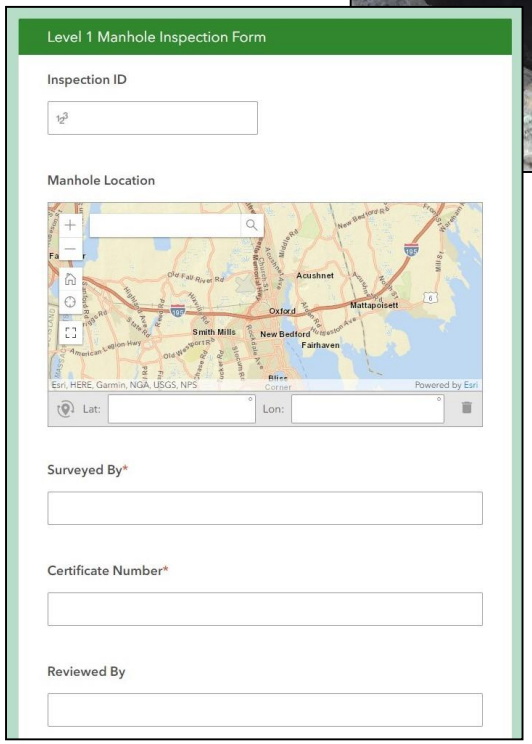


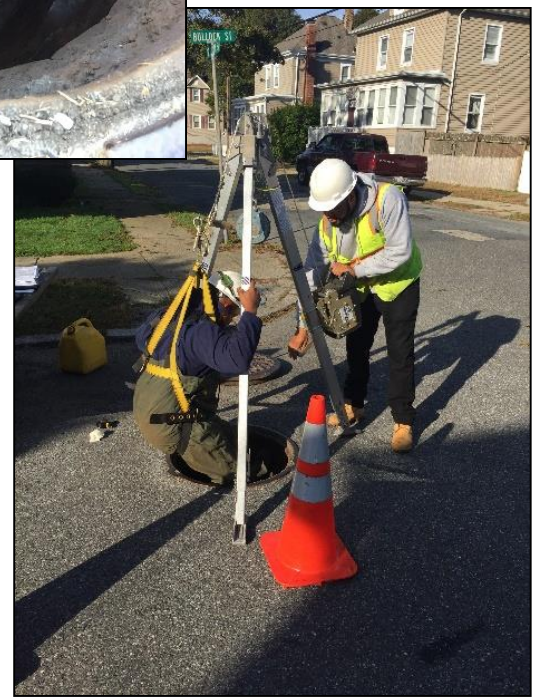



Manhole Inspection Program

- 675 manholes targeted for inspection
- NASSCO MACP Version 7.0
- Level 1 inspection on approximately 475 manholes
- Level 2 inspection on approximately 150 manholes
- Used tablet technology (Survey123) linked to the City's GIS system



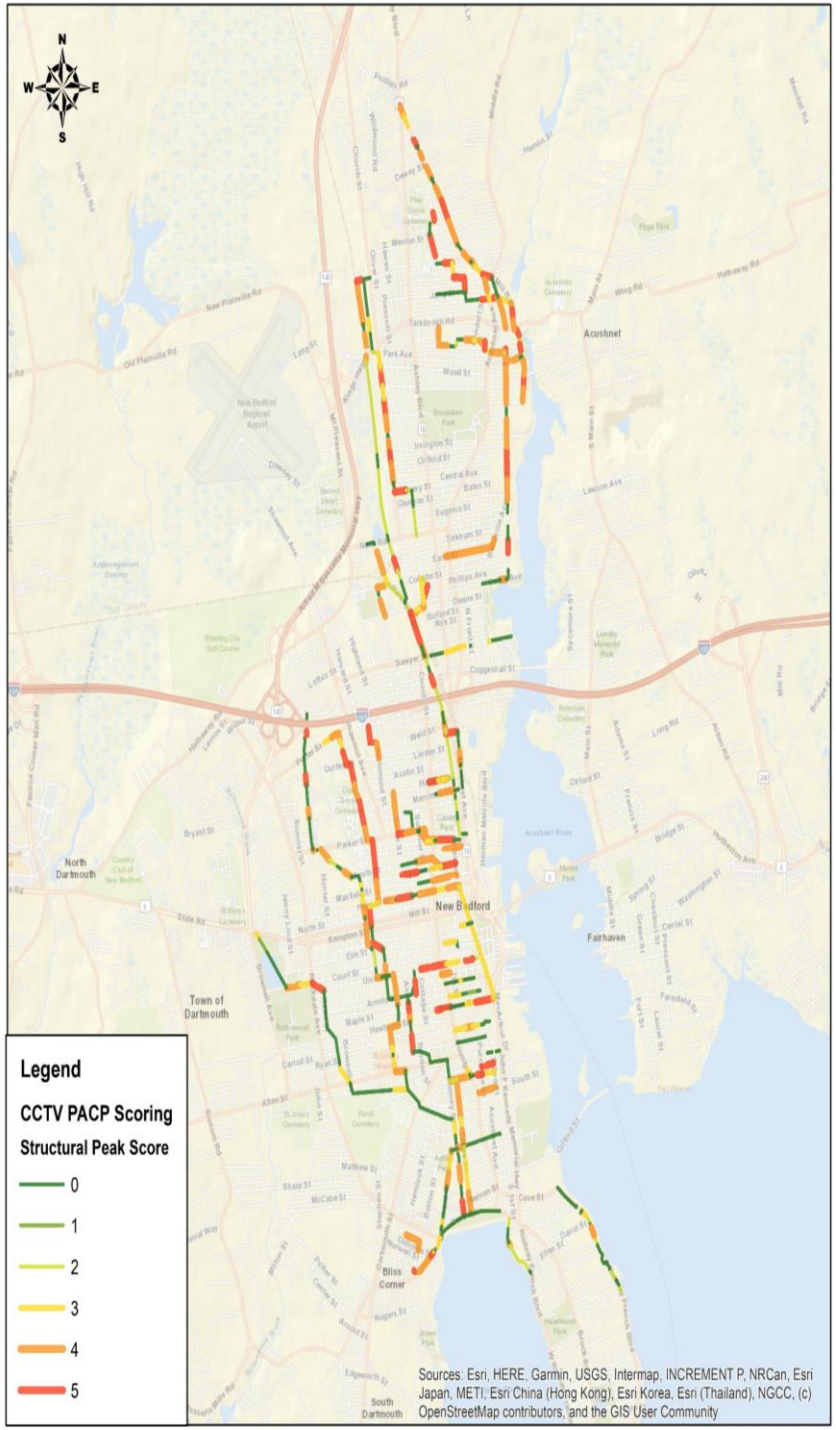




Inspection Program Results

- 35.4 miles of pipe ultimately inspected
- 639 manholes inspected
- 19,580 defects found including one collapsed sewer
- Brick pipes were found to have numerous cross bores
- Heavy debris
- 400 locations with infiltration

Program Results (Cont.)



The Good, the Bad and the Ugly

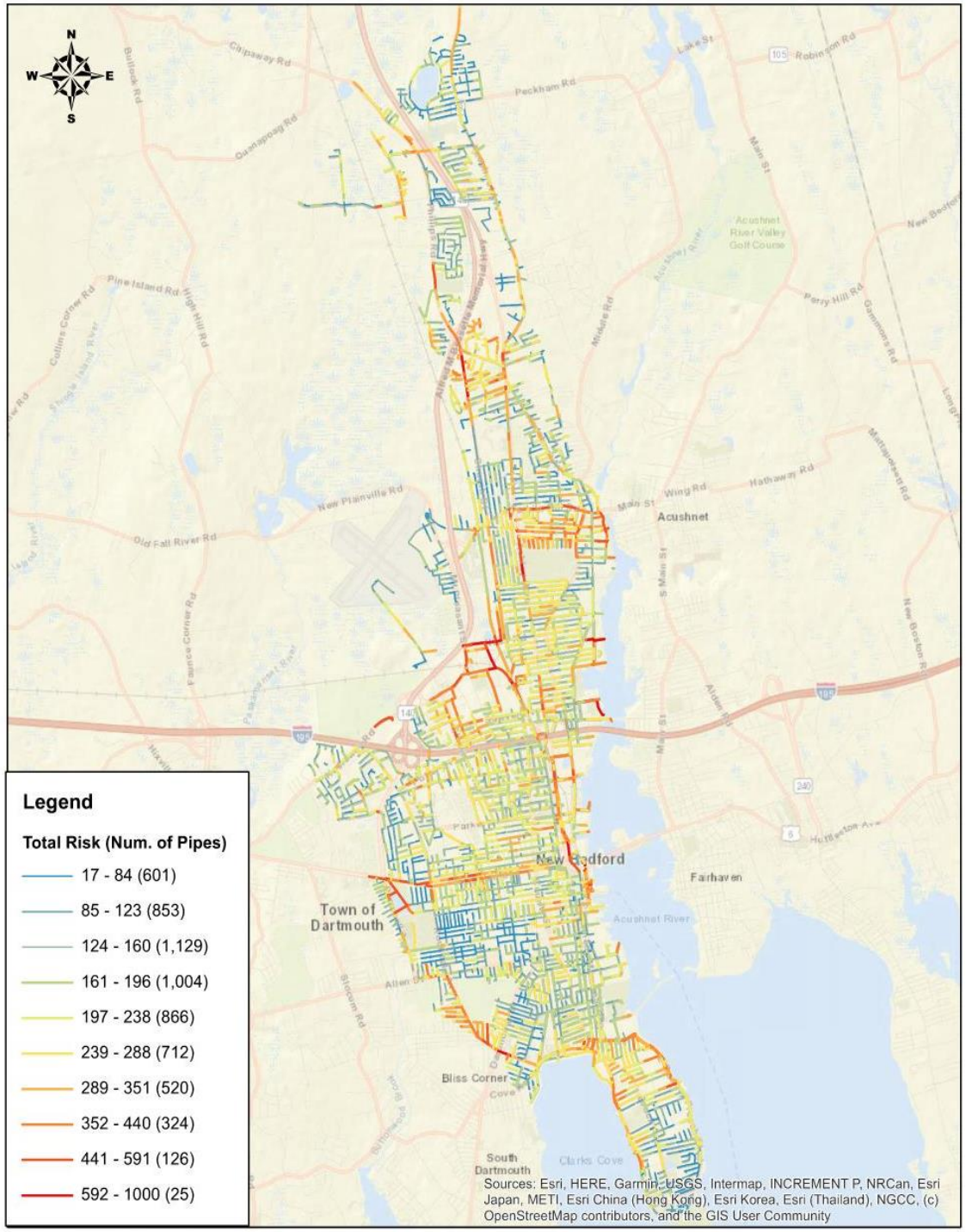
- Look out for hidden program costs – police details!!
- Mapping inconsistencies – missing assets and system configuration
- Program duration – it takes a long time to inspect 40 miles of pipe!
- Heavy cleaning needed in many locations
- Manhole inspections – access issues and resulting loss of time
- Be prepared for **LOTS** of data – 2 TB collected to date
- Communication is key – weekly updates on location and work to be completed




Order the Work

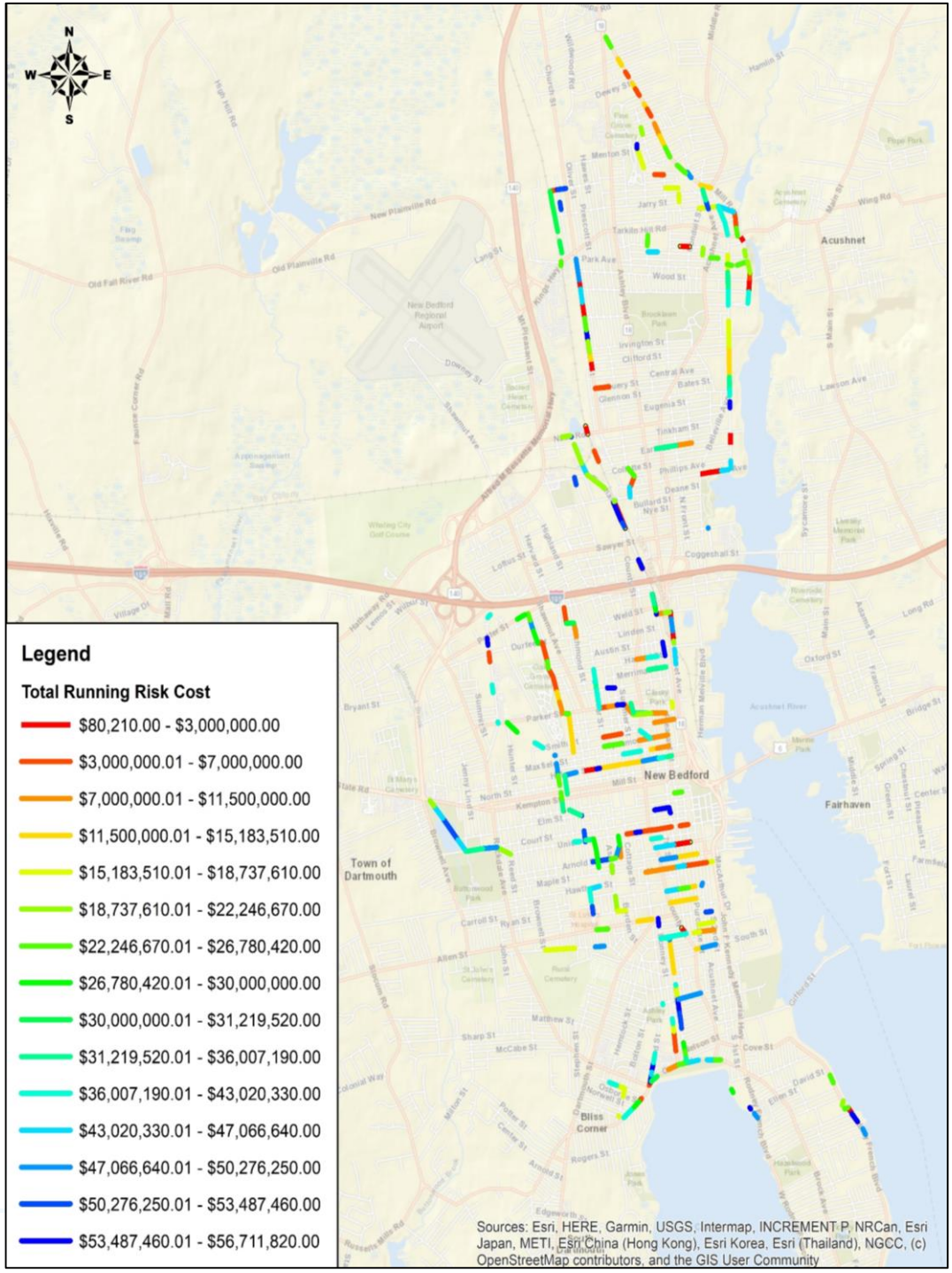
- Utilize risk modeling to prioritize pipelines and manholes
- Risk model includes over 30 factors
  - Consequence of failure
  - Likelihood of failure
  - Hydraulics, etc.

Factor ID	Criteria	Factor Description	Recommended Potential Weight: Relative Factor Weight 1 Negligible / None	2 Minor	3 Moderate	4 Substantial	5 Extreme
Damage or Disruption Factors							
C1	Damage or Disruption to Sensitive Locations	Some locations are more sensitive to flooding damage or disruption with potential for loss of life, or disruption to important areas such as hospitals, schools, police, fire, government buildings and hotels.					5
C2	Damage or Disruption to Critical Roadways and Highways	Disruption to roadways that are critical (evacuation routes, emergency service routes or highways, etc.) due to a water main failure.				4	
C3	Damage or Disruption to Roadways using Street Classes	Roadways of different travel classes should be ranked differently for water main failure damage			3		
C4	Damage or Disruption to Railway	Damage to railway bed due to washing it out or causing slowdown in service due to flooding.			3.5		
C5	Damage or Disruption to Other Utilities	Damage to electrical vaults and wastewater forcemains due to washing out the bedding for larger diameter sewers greater or equal to 16		2.5			
Service Outage Factors							
C6	Service Outage - Priority Customers	Some locations are more sensitive to flooding damage or disruption with potential for loss of life, or disruption to important areas such as hospitals, schools, police, fire, government buildings and hotels.					5
~~C7~~	~~Service Outage - Number of Customers~~	~~Number of customers out of service due to a pipe failure.~~				4	
C8	Service Outage - Customer Demand	The amount of user demand affected by a pipe outage and isolation.			3		
C9	Service Outage - Low/Negative Pressure	Pressure in any pipe drops below key service standards due to a pipe failure.			3		
C10	Fire Flow Capacity	Firefighting capacity or ability is impacted by the failure of a pipe.			3		

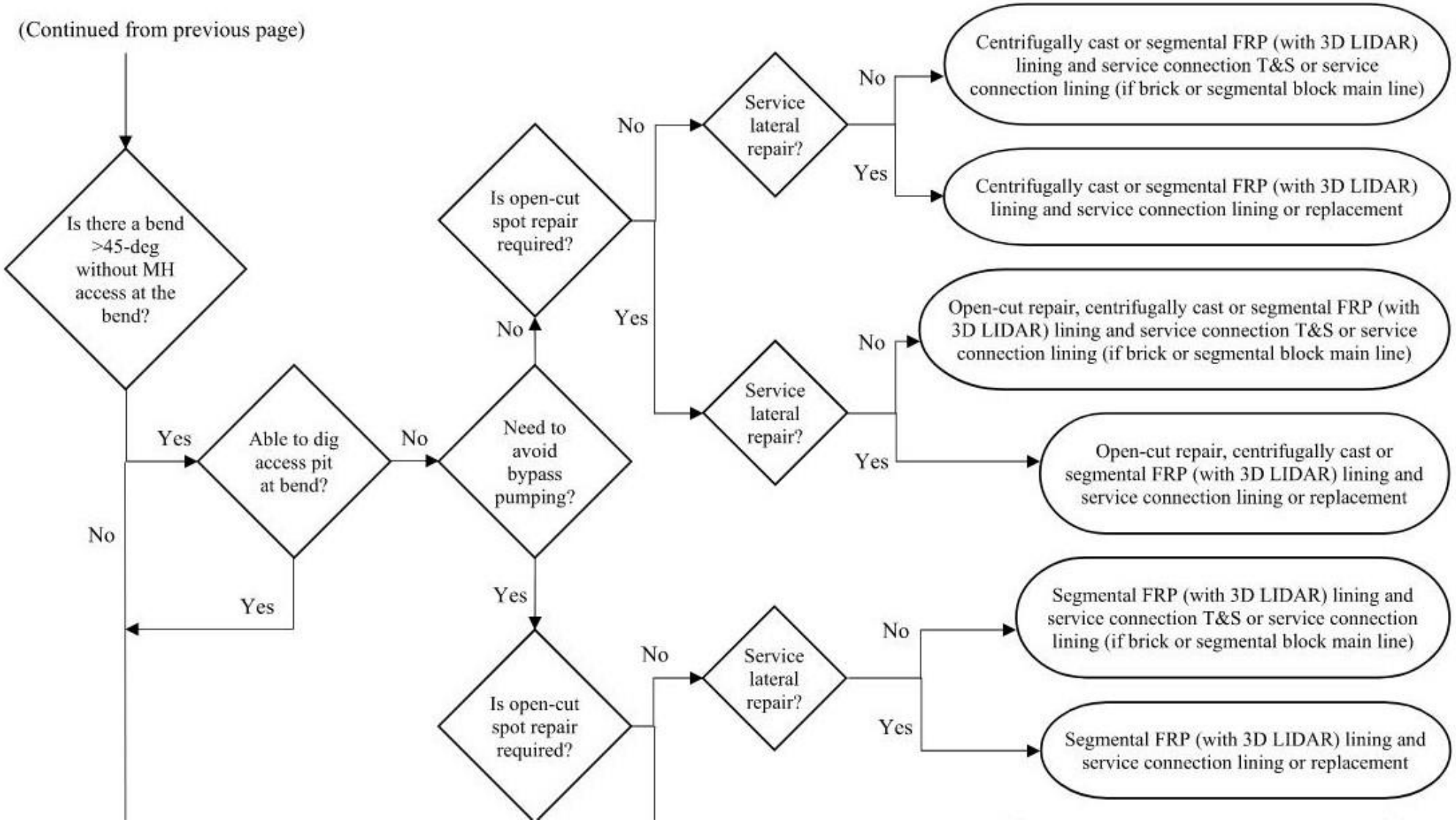


Bringing it all Together

- Order the work by:
  - Worst condition issues
  - Then ordered by risk rank
- Develop running costs for the work based on the “risk based” order
- Phase the work over multiple years based on budget



Rehabilitation Scenarios



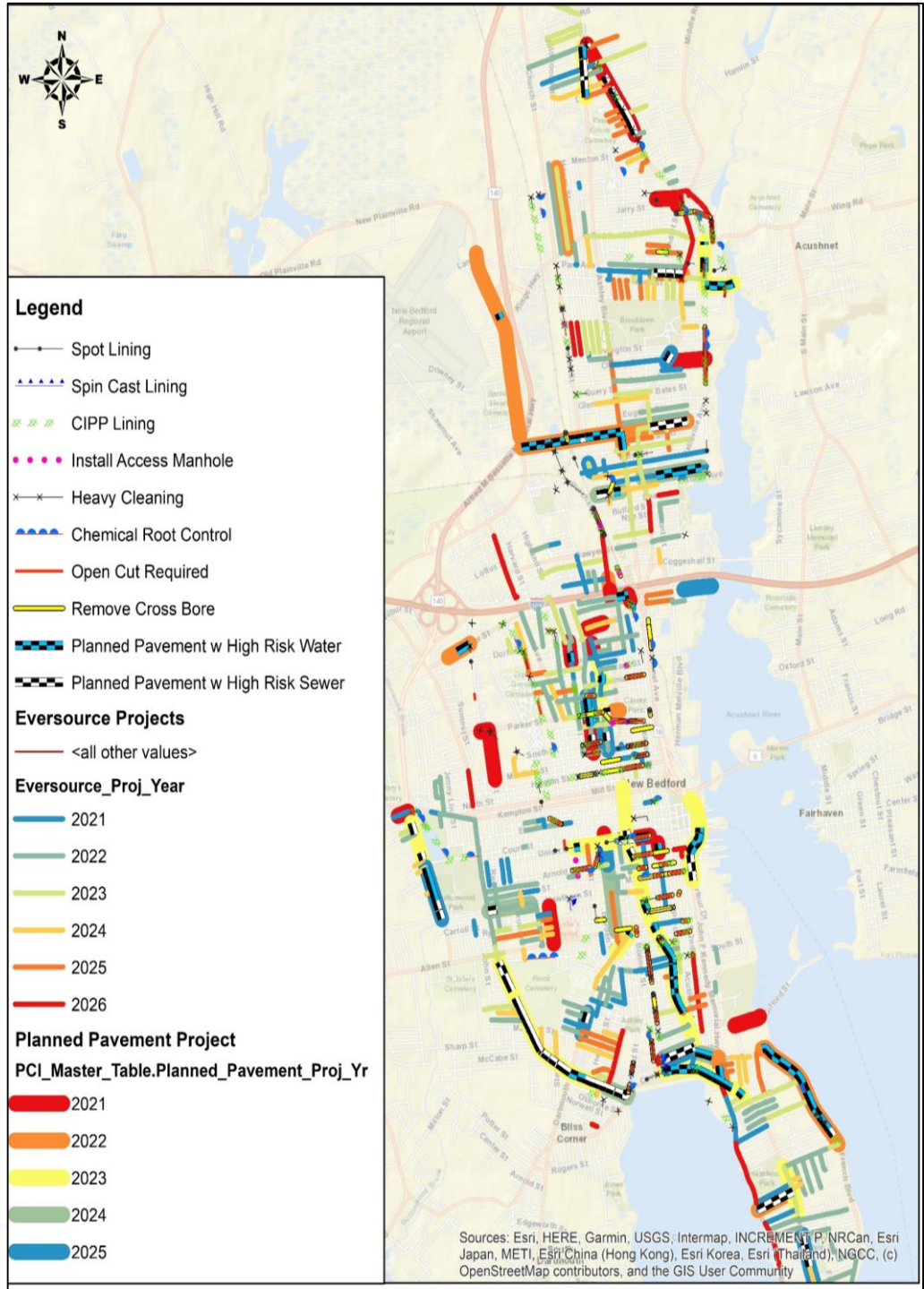
Various Scenarios

- Total work in multiple phases over multiple years
- Each project in a database with costs for that project
- Can reorder and develop different phases on the fly

Project Phase	PACP Pipe Level	Total Pipe Length (lf)	Total Project Construction Cost	Reinspection Cost
1	5	25,101	$11,480,270	
		Subtotal	$11,480,270	
2	5	17,522	$8,217,390	$253,190
	4	32,296	$23,920,870	$557,940
	3	16,051	$8,812,740	$295,410
	2	6,941	$4,280,550	$142,970
		Subtotal	$45,231,550	$1,249,510
3	5	2,414	$0	$41,690
	4	6,241	$0	$136,110
	3	23,823	$0	$500,590
	2	30,848	$0	$672,400
	1	5,222	$0	$121,020
	0	20,596	$0	$341,210
		Subtotal	$0	$1,350,790
		TOTAL	$56,711,820	$2,600,300

A Path Forward!

- Now know what the larger sewer needs are
- Have a street-scan based street pavement plan
- Know where gas company is going to work
- Have risk model for water system needs
- "All streets CIP" brings it all together to coordinate work



Implementing the CIP

- Phased implementation approach

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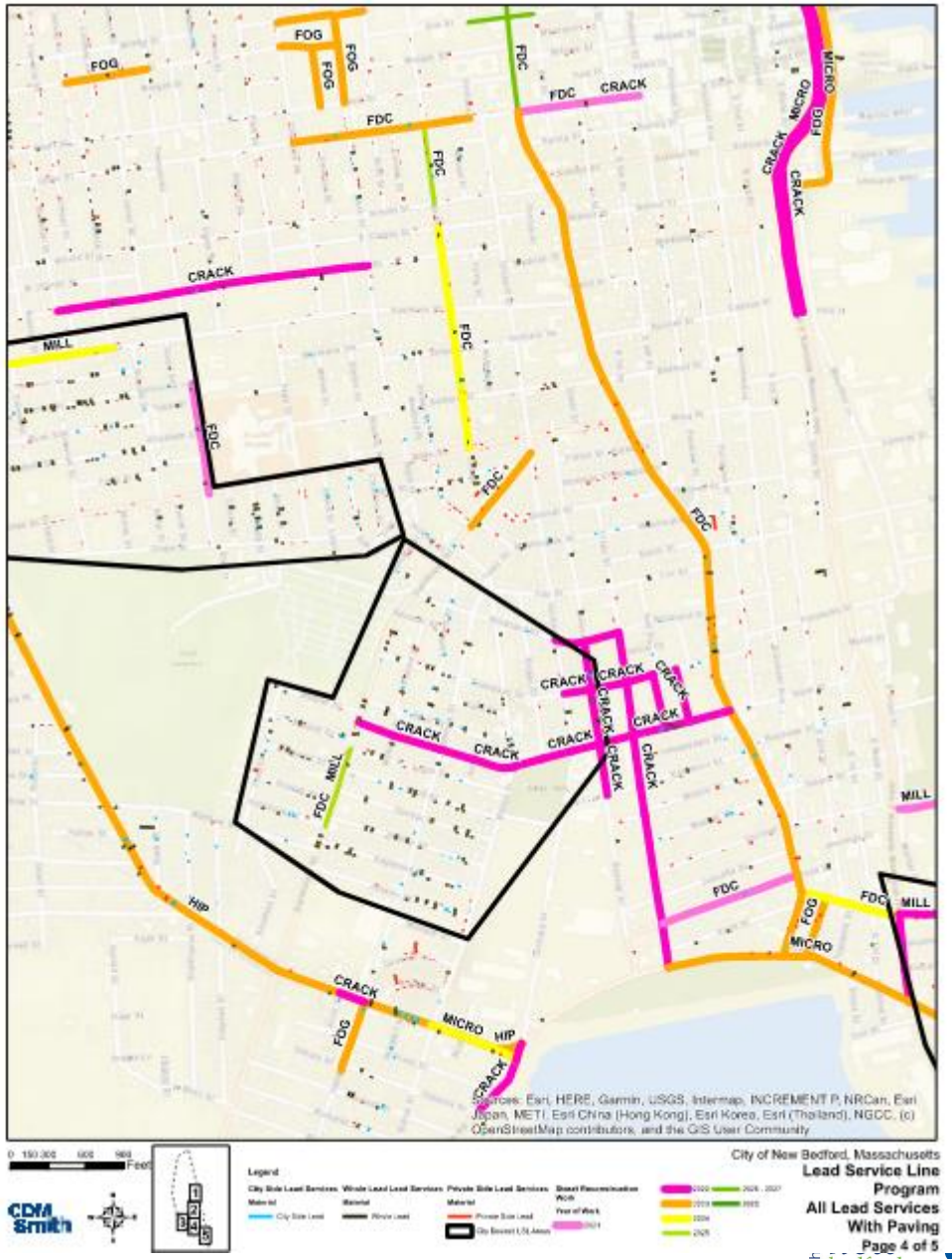
- Phased implementation approach
- Align first phase of sewer rehabilitation work with water, gas, and roadway improvements
- Refining wastewater and water CIPs and rates
- Continued update of data and systems



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Water Partnership with CDM Smith

Jesse Herman, P.E.
CDM Smith
hermanjd@cdmsmith.com

James Carolan, PMP
CDM Smith
carolanjr@cdmsmith.com

Shawn Syde, P.E.
City Engineer
shawn.syde@newbedford-ma.us

Jamie Ponte
Commissioner
Jamie.ponte@newbedford-ma.us

Questions?

Next Steps

- Continued roll out of all streets CIP approach
- Align first phase of sewer rehabilitation work with water, gas, and roadway improvements
- Refining wastewater and water CIPs and rates
- Continued update of data and systems

YEARLY ROADWAY BUDGET (FY22)	$	3,952,493			
		Budget Number		Planned Spending	
COLD PLANING/ MILLING/ FDC (EVERSOURCE)	$	309,000	$	477,624	155%
FULL DEPTH	$	2,561,993	$	320,000	12%
HOT/COLD-IN-PLACE RECYLING	$	-	$	1,380,670	#DIV/0!
MILL AND OVERLAY	$	-	$	142,272	#DIV/0!
MICRO SURFACING	$	824,000	$	1,101,836	134%
FOG SEAL	$	-	$	-	#DIV/0!
CRACK SEAL	$	103,000	$	93,214	90%
SIDEWALK	$	-	$	428,000	#DIV/0!
LINE PAINTING	$	154,500	$	-	0%
WATER	$	540,800	$	1,219,000	225%
TOTAL	$	4,493,293	$	5,162,615	115%
		REMAINING BUDGET - WATER	$	(678,200)	
		REMAINING BUDGET - ROADS	$	8,878	

WARD	SPENDING BY WARD	%
1	$ 916,927	11%
2	$ 1,471,778	17%
3	$ 347,578	4%
4	$ 3,937,435	45%
5	$ 641,433	7%
6	$ 1,397,204	16%
LINE PAINT	$ -	
Total	$ 8,712,355	100%

Funding Source	Budget	Total Dollars	%
Road Bond	$2,188,000	$1,938,070	89%
Ch 90	$1,764,493	$1,651,434	94%
Water	$540,800	$1,219,000	225%

City of New Bedford, MA