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2018 PAVEMENT MANAGEMENT PROGRAM

Since 2015, the City has utilized a data-driven pavement management program to support objective decisions and develop cost-effective results. The following information is a summary of the process, and presents the 2018 paving and sidewalk improvement plan.

Program Funding

The annual funding for pavement and sidewalk improvement construction comes from three sources:

- \$1,200,000 from the Massachusetts Chapter 90 program for roadway repairs,
- \$1,700,000 from City funding for roadway and sidewalk repairs, and
- \$1,000,000 from City funding for Americans with Disabilities Act (ADA) sidewalk improvements including curb cuts, curb ramps, and slope compliance.

These repairs and improvements administered by the Engineering Department are reflected in the City's Capital Improvement Plan, and are in addition to routine maintenance administered by the Department of Public Works and Traffic and Parking Department, including pothole repairs and roadway striping replacement. Each year, data is collected and roadway repairs are reprioritized to develop construction contracts within those funding limits.

Roadway Prioritization

The Engineering Department, with the aid of an outside consultant, maintains a database that defines several characteristics for every City-owned street, and for sections of every longer street, in Somerville:

- Pavement Condition Index (PCI) describes the physical condition of the pavement with 100 being a newly paved road and 0 being a fully deteriorated road.
- Functional Classification Priority (FCP) defines the roadway use with higher scores assigned to major arteries and lower scores to residential side streets.
- Pavement Classification Priority (PCP) provides the ability to score roads with different pavement types such as concrete or cobble stone.
- Average Daily Traffic (ADT) assigns higher scores to roads with more traffic.





That data is used to calculate a Network Priority Ranking (NPR) for each road segment according to the following formula:

$$\text{NPR} = (0.40 \times \text{PCI}) + (0.50 \times \text{FCP}) + (0.30 \times \text{PCP}) + (0.10 \times \text{ADT})$$

The NPR drives the selection of roads for inclusion in the annual improvement contracts. Virtually all Somerville roads are asphalt; therefore, Pavement Classification is generally not a factor in determining prioritization. Functional Class receives the highest weight as it has been the City's policy to prioritize main roads that receive the most use by the greatest number of travelers. The Pavement Management Program includes five Functional Classes ranging from "Arterial" to "Residential Dead End", which is consistent with classifications used by the City for other transportation studies. Figure 1 provides the roadway classification (aka the FCP) for each street in the database. The factors used for Average Daily Traffic are also consistent with those used by the City for other transportation studies and are generally associated with the FCP categories. Unlike the other factors, which are relatively fixed for our roadway network, the Pavement Condition Index is constantly degrading as roads experience wear over time. Consequently, the PCI is updated every year.

Only public rights-of-way are included in the database and are used for determining pavement priority. Private roads are not included in the database, and conditions are not assessed. It has been the City's policy that private ways are eligible for paving if A) an adjacent public way is set to be paved under the a City contract, and B) all property owners sharing the private way agree to the City doing so. Similarly, roads owned and controlled by Massachusetts DOT, including Alewife Brook Parkway, Mystic Avenue and McGrath Highway, are not included in the City's Pavement Management Program.



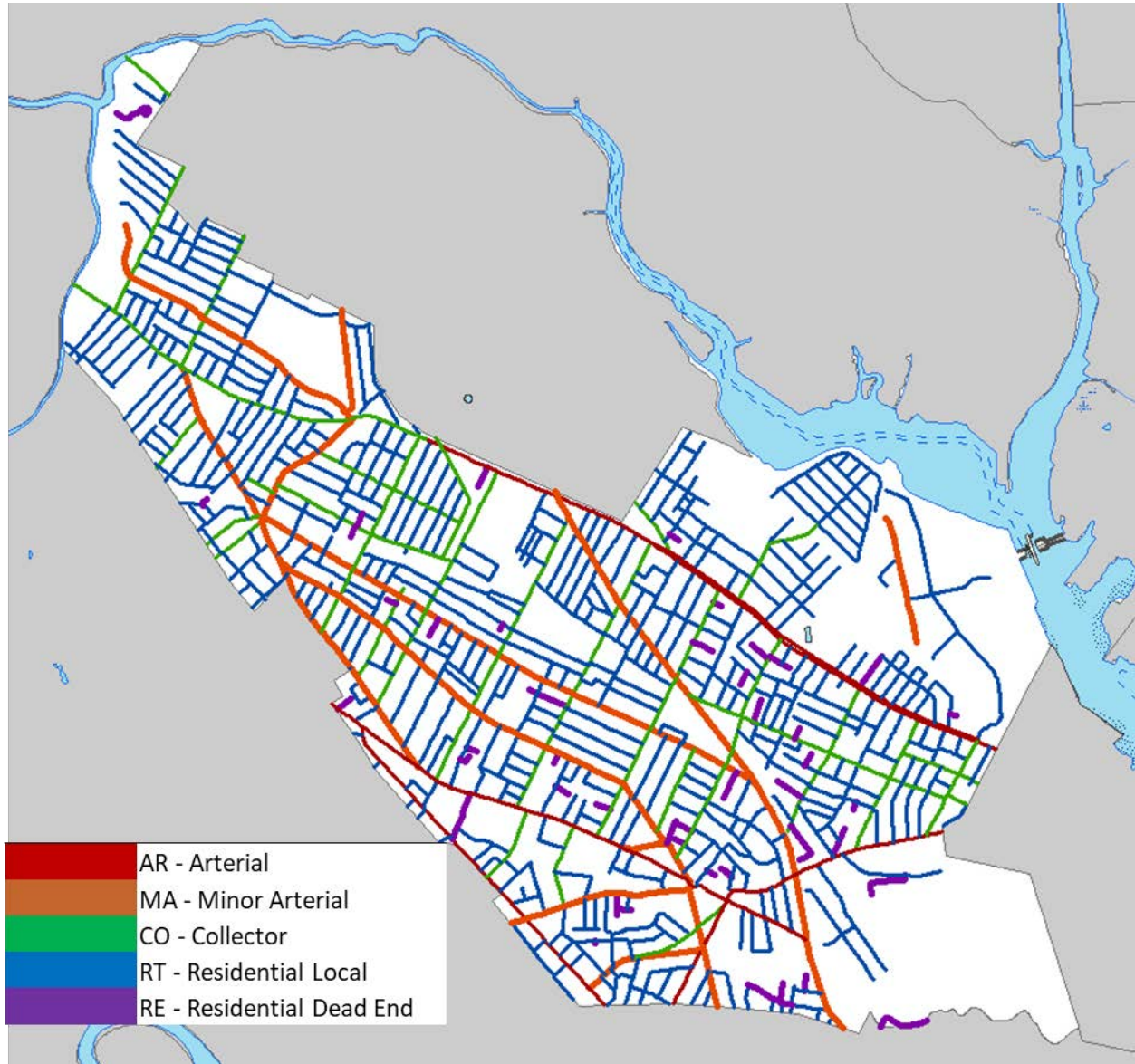


Figure 1 - Functional Classification Map

2018 Data Update

Since the initial data was collected in 2014, the City's consultant has conducted annual surveys to update the Pavement Condition Index (PCI). Our goal is to re-survey one third of the City each year. Figure 2 provides the limits of the survey and when the survey occurred. Generally, the eastern side of Somerville was surveyed in the fall of 2016, and the western end of the city was surveyed in the fall of 2017. The central portions of Somerville last surveyed in 2015 will be surveyed again in the fall of 2018.



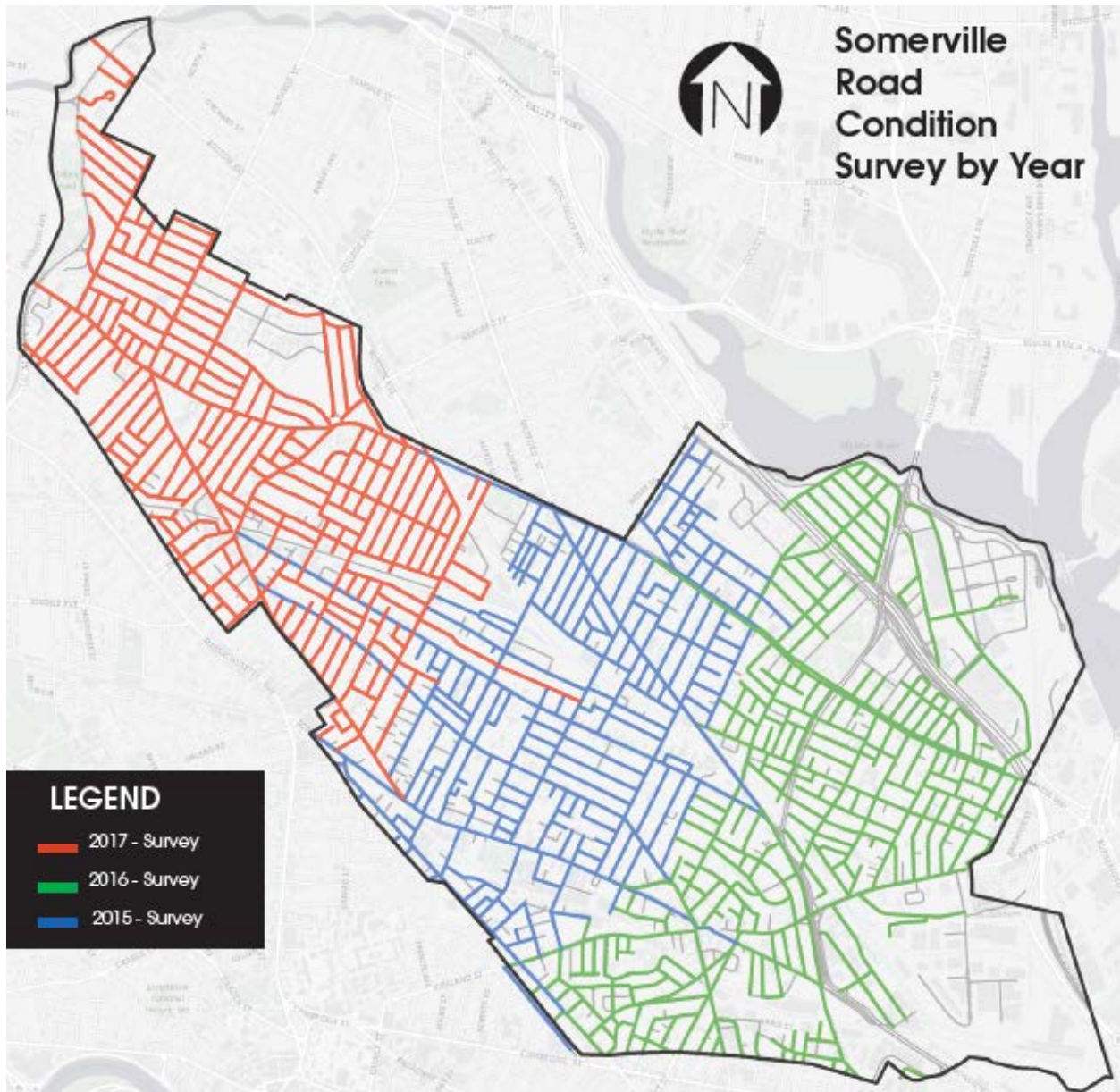


Figure 2 – Pavement Condition Index Survey Update

Based on this year's survey, the average PCI in Somerville equals 58.8 on a scale of 0 to 100. This score is fairly typical of municipalities in Massachusetts. But like a grade of 59%, could be considered an F, which is also consistent with infrastructure grades throughout the country.

The PCI also informs the engineering decision on the best approach to repair the road. Streets with very low scores will require full depth reconstruction or mill and pavement overlay. Streets with higher scores can be treated with crack sealing or pavement patching to extend their service life. Somerville has





adopted the approach that it will simultaneously fund both types of projects so that degraded roads can be addressed at the same time pavement is cost-effectively managed to prevent slightly impacted roads from becoming worse. Figure 3 illustrates the inverse relationship between pavement aging and management cost.

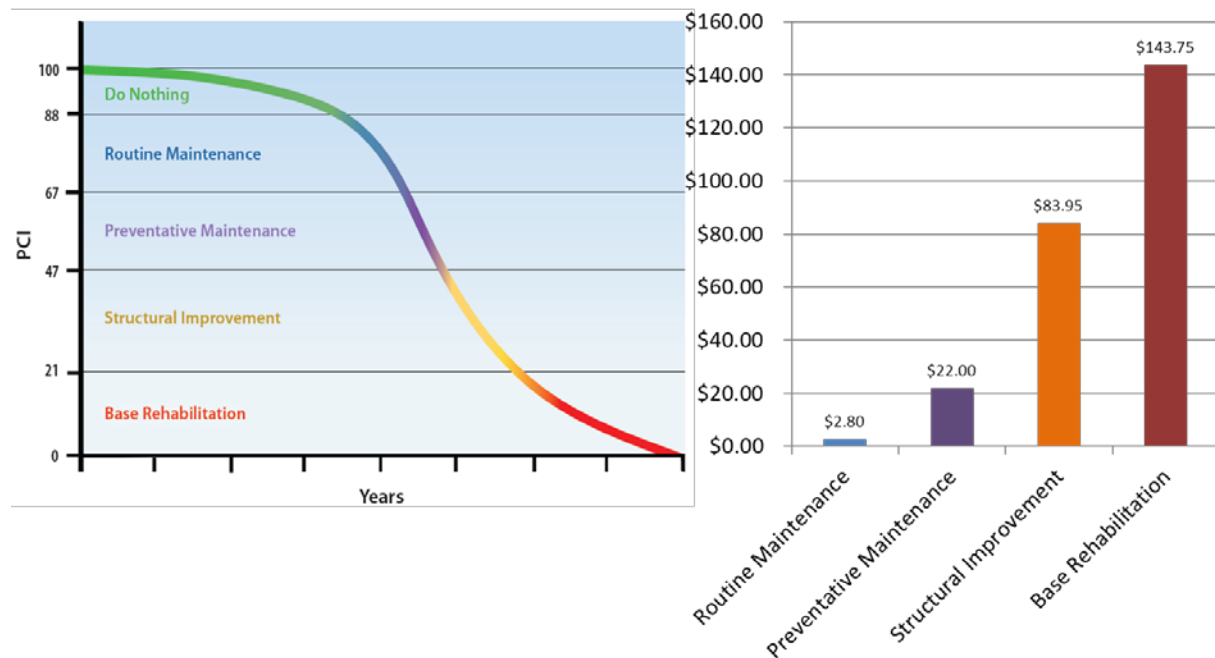


Figure 3 - Age - Condition - Solution - Cost Relationship





Figure 4 illustrates the PCI for each road in Somerville.

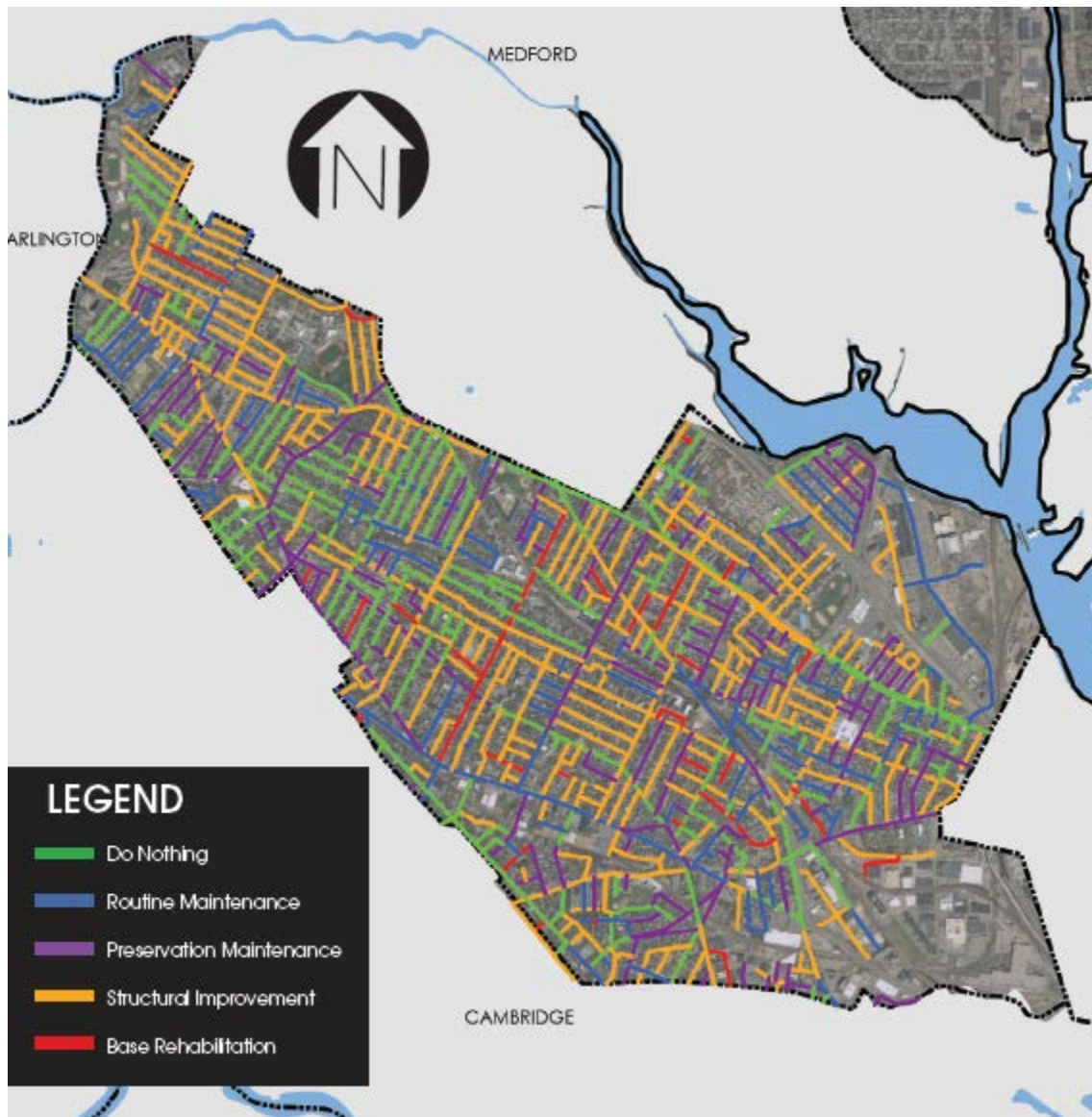


Figure 4 - 2018 PCI Map

Coordination with other Programs

Per Department of Public Works policy, once a road is resurfaced under the Pavement Management Program, that road remains on a moratorium for roadway opening for five years. Excavations in moratorium streets are discouraged, and when allowed require full pavement restoration a minimum of five feet on either side of any trenches with an overlay from curb-to-curb. Consistent with that policy for





private services, and in the interest of intelligent management of City funds, areas targeted for other infrastructure improvements in the next five years are excluded from eligibility in the Pavement Management Program.

The Union Square Infrastructure Improvement Program identifies several improvements to the City's combined sewer and drain system. The first project under that program, the Somerville Avenue Infrastructure and Streetscape Improvement Project, will begin construction in 2018. Two other projects, the Poplar Street Stormwater Pump Station Project and the Spring Hill Sewer Separation Project, will begin design in 2018. As that sewer-related capital investment program continues, several streets will be exempt from the Pavement Management Plan:

Roads in Sewer CIP for CY2018 to CY2022		
Route	From	To
Somerville Ave	Bow St	Medford St
School St	Summer St	Highland Ave
School St	Somerville Ave	Summer St
Central St	Summer St	Highland Ave
Central St	Somerville Ave	Summer St
Highland Ave	School St	Central St
Highland Ave	Central St	Cedar St
Oxford St	School St	Central St
Berkeley St	School St	Central St
Avon St	School St	Central St
Summer St	School St	Central St
Summer St	Central St	Bow St
Gibbens St	Central St	Benton Rd
Cambria St	Central St	Benton Rd
Westwood St	Central St	Benton Rd
Bow St	Washington St	Church St
Vinal Ave	Summer St	Highland Ave
Putnam St	Summer St	Highland Ave
Elm St	Cherry St	Somerville Ave
Somerville Ave	Cambridge Line	Bow St
Poplar St	Joy St	McGrath Hiwy
Fitchburg St	Linwood St	Dead End
Linwood St	Fitchburg St	McGrath Hiwy

The City's Capital Investment Plan for improving the water distribution system was initiated in 2013 and identifies several water mains for renewal or replacement. High-priority locations have been addressed,





and generally the pace of the program is dependent upon funding. In 2017, the two programs were coordinated, for example deferring pavement of Properzi Way until the water work was completed in 2017, and prioritizing water work in Pearl Street so pavement work can be completed shortly after 2018. There are no specific Water CIP-related exclusions to include for the 2018 Pavement Management Program analysis.

The City is currently developing a master plan for Central Hill including the High School, City Hall and the Central Library. Similarly, the City is working with developers to identify additional developments in the Assembly Square area. Those planning efforts could result in recommended streetscape changes to improve multi-modal transportation. Consequently, the following segments are excluded from the Pavement Management Plan analysis:

Roads Subject to Planning Studies		
Route	From	To
Middlesex Ave	Mystic Ave	Fellsway
Highland Ave	School St	Medford St

The 2017 Pavement Management Program contract for resurfacing was not completed in calendar year 2017; therefore, there are a number of streets scheduled for resurfacing in calendar year 2018. Similarly, the Cedar Street Sewer Separation Project and the Beacon Street Roadway Project are multi-year projects that include streetscape components to be completed in calendar year 2018. Therefore, the following streets are included in other contracts and do not need to be included in the 2018 Pavement Management Program:

Roads Under Contract for Pavement in CY2018		
Route	From	To
Bolton St	Oak St	Houghton St
Cedar St	Highland Ave	Broadway
Hardan Rd	Powder House Blvd	Southerly
Powder House Blvd	Burnham St	Curtis St
Powder House Blvd	Curtis St	North St
Powder House Blvd	North St	Alewife Brook Pkwy
Smith Ave	Beacon St	Line St
Sycamore St	Pembroke St	Evergreen Ave
White St	Elm St	Cambridge Townline
Cedar St	Highland Ave	Elm St
Hall St	Cedar St	Cherry St
Beacon St	Cambridge Line	Oxford St





Work performed in 2017 is also considered in the evaluation. In 2017, the following streets were paved under the Pavement Management Program:

Roads Paved in CY2017		
Route	From	To
Powder House Blvd	Powder House Rotary	Burnham St
Josephine Ave	Morrison Ave	Kidder Ave
Lowell St	Somerville Ave	Medford St
Dane St	Somerville Ave	120' S Of Village St
Day St	Cambridge Townline	Elm St
Porter St	Summer St	Highland Ave
Washington St	Boston St	Prospect St

Following gas main construction in 2015 and 2016, National Grid completed permanent trench patches in Broadway between McGrath Highway and Central Street. Per City policy, the warrantee period on those repairs is two years. To maintain the benefit of that warrantee and avoid patches in newly paved roadway should the National Grid trenches develop an issue, the following segments are exempt from the Pavement Management Program through 2019:

Trench Repairs Performed by National Grid in CY2017, Defer from 5-Year Plan		
Route	From	To
Broadway (E)	Montgomery Ave	Mcgrath Hwy
Broadway (E)	Sargent Ave	Montgomery Ave
Broadway (E)	School St	Sargent Ave
Broadway (E)	Central St	School St
Broadway (W)	Mcgrath HWY	130' E OF MARSHALL ST

2018 Program

Based on the data updated in 2017 and funding targets, seven streets are planned for inclusion in the mill and overlay contract. This is the most significant remediation effort that addresses streets in deteriorated condition. As has been the case in the past, in addition to the repaving, these streets will receive newly constructed concrete sidewalks with the intent to maximize ADA compliance. Curb cuts and ADA ramps will be added where they are missing, and slopes will be made ADA compliant to the maximum extent possible. The following specific segments will be included in the 2018 contract:





Roads to Bid for Pavement in CY2018		
Route	From	To
Broadway	Josephine Av	Wilson Av
East Albion St	Moreland St	Fremont St
Medford St	Central St	115' N Of Glenwood Rd
Medford St	Lee St	Central St
Medford St	School St	Lee St
Properzi Way (S)	Hanson St	Beacon St
Roseland St	Cambridge Townline	Beacon St
Ward St	Medford St	Harding St
Medford St	South St	250' S Of Somerville Ave
Medford St	Cambridge Townline	South St

All of the streets included in the 2018 contract are public rights-of-way. Pavement management for private ways is generally the responsibility of the abutters to that private way. However, it has been a matter of policy that if a private way adjoins a street on the paving list, it is possible for that private way to be added to the city's paving contract, provided the abutters unanimously approve that addition. While previous years' contracts have included such additions, this year's does not.

Once completed, the streets that receive the full-width repaving will be placed on the five-year moratorium list, and road openings to install new utilities will be prohibited except in the cases of emergencies. If new utilities or service connections are constructed within that five-year timespan, the owner of that utility is required to perform a full-width restoration of the pavement rather than simple trench patching. The Engineering Department routinely coordinates with the utility companies to be sure that all of their planned upgrades occur in advance of our paving program. This coordination was completed in 2017 for the list above.

Previous years have included a crack sealing contract. This is a lower-cost effort that can be considered preventative maintenance. The revised data and funding targets provide the following list of streets for inclusion in the 2018 contract:

Roads to Bid for Crack Sealing in CY2018		
Route	From	To
Morrison Ave	Cedar St	Willow Ave
Curtis St	Broadway (E)	Medford City line
Campbell Park	Meacham Rd	Kingston St
Kingston St	Meacham Rd	Cambridge City line
Hancock St	Highland Ave	Lexington Ave
Warwick St	Cedar St	Clyde St
Clifton St	Appleton St	Morrison Ave





Roads to Bid for Crack Sealing in CY2018		
Route	From	To
Clyde St	Cedar St	Warwick St
Lexington Ave	Cedar St	Willow Ave
Capen St	Mystic Valley Pkwy	End Of Public Way
Winter St	College Ave	Holland St
Pearson Ave	Morrison Ave	Boston Ave (S)
Westminster St	Broadway (E)	Electric Ave
Spencer Ave	Cedar St	Hancock St
Waterhouse St	Broadway (E)	Cambridge City line
Wilson Ave	Broadway (E)	Dead End
Thorndike St (S)	Dead End	Kingston St
Corinthian Rd	Broadway	Cady Ave
Walker St	Broadway (E)	Leonard St
Hooker Ave	Victoria St	Dead End
Leonard St	Broadway (E)	Powder House Blvd
Farragut Ave	Broadway (E)	Hooker Ave
Garrison Ave	Broadway (E)	Hooker Ave

Pavement patching is another lower-cost alternative that can be used on streets with lower PCI but do not require a full-width and full-length repaving. Pavement patching essentially utilizes localized milling and pavement overlay to correct areas where pavement is degraded and match into areas with acceptable pavement. This method has not been used in Somerville to date, so this year it will be included as a pilot to determine if the method meets the City's long-term goals. Based on the data, the following streets will be included in the 2018 contract:

Roads to Bid for Pavement Patching in CY2018		
Route	From	To
Kidder Ave	Willow Ave	Boston Ave (S)
Henry Ave	Highland Ave	Lexington Ave
Newberne St	Appleton St	Morrison Ave
Appleton St	Willow Ave	Liberty Ave
Woodstock St	Victoria St	Alewife Brook Pkwy
Hillsdale Rd	Medford City line	Conwell Ave
Endicott Ave	Broadway (E)	Hooker Ave
Hamilton Rd	North St	Russell Rd
Chapel St	College Ave	Chandler St
Howard St	Thorndike St	Gorham St





Roads to Bid for Pavement Patching in CY2018		
Route	From	To
Thorndike St (N)	Holland St	Dead End
Boston Ave (N)	Medford City line (E)	Medford City line (W)
Cutter Ave	Elm St	Highland Ave
Lovell St	Broadway (E)	Electric Ave
Herbert St	Chester St	Day St
Cady Ave	Simpson Ave	Dead End
Glendale Ave	Cameron Ave	Yorktown St
Belknap St	Broadway (E)	Hamilton Rd

Preliminary Future Plan

Pavement condition will be surveyed again starting in the fall of 2018, and the prioritization will be updated again to define next year's plan. However, based on the current data, the table below presents the streets anticipated to be included in future years' mill and overlay contracts:

Future Repaving Plan			
Year	Route	From	To
2019	College Ave	Broadway	Medford City line
	College Ave	Elm St	Broadway
	Holland St	Dover St	Broadway (E)
2020	Highland Ave	Cherry St	Ellington Rd
	Mount Vernon St	Pearl St	Washinton St
	Washington St (E)	Webster Ave	Line St
	Webster Ave	Prospect St	Cambridge City line
2021	Pearl St	100' E Of Walnut St	Skilton Av
	Pearl St	Crescent St	Franklin St
	Pearl St	Cross St	100' E Of Walnut St
	Pearl St	Franklin St	Cross St
	Washington St (W)	Boston City line	100' E Of Joy St
2022	Broadway	College Ave	Josephine St
	Broadway	Wallace St	College Ave
	Broadway	Westminster St	Wallace St
	Newton St	Webster Ave	Marion St





Future Repaving Plan			
Year	Route	From	To
2023	Cameron Ave	Holland St	Cambridge City line
	Langmaid Ave	Broadway (W)	Heath St
	North St	Broadway (E)	Medford City line
	Summer St	120' E Of Belmont St	120' E Of Cedar St
	Summer St	120' E Of Cedar St	Willow Ave

