

Item 4



February 14, 2024

Mr. Larry Roberts
Director of Public Works
Town of Weston
78 Old Hyde Road
Weston, CT 06883

Re: Pavement Management Services

Dear Mr. Roberts,

BETA Group, Inc. (BETA) is pleased to submit this proposal to continue providing pavement management services to the Town of Weston. BETA originally conducted pavement inspections using an automated approach for the Town in 2019 to establish the basis for a Townwide Pavement Management Program (PMP). The PMP ultimately served as the framework for developing a multi-year Capital Improvement Plan (CIP) and public presentations. Based on our recent discussion, it is our understanding that the Town is seeking to re-inspect the roadway network to reflect current pavement conditions. The PMP to be updated will be a GIS-centric platform to facilitate efficient data collection, thematic mapping and viewing via ESRI based tools. Ultimately, the PMP will provide the framework for data analysis, prioritization, and capital improvement planning for future roadway projects.

To complete this project, we have developed the following scope of work and related fees for your review and comment. As requested, we have included a series of inspection methods for your consideration.

SCOPE OF WORK

TASK 1 – SYSTEM UPDATE & ROAD INVENTORY CONFIRMATION

The system configuration/update process can be expedited due to BETA leveraging the existing database from the previous round of inspections completed in 2019. As part of this task, BETA will work with the Town to confirm the status of roadways prior to initiating the field inspection program. BETA will utilize the existing database from the last round of inspections coupled with the most current ConnDOT e911 information to ensure the list of roads to be inspected is up to date. The roadway network is already broken down to the segment level (typically intersection to intersection), but confirmation of the segmentation will also be included as part of this task. It is assumed that **approximately 81 centerline miles of Town Accepted roadways** will be included in the field inspection program.

Additionally, as part of this task, BETA will confirm with the Town that all roadway improvement projects completed since the last round of inspections have been uploaded into the database.

TASK 2 – FIELD DATA COLLECTION PROGRAM (OPTIONS)

BETA currently provides four options for carrying out pavement condition inspections. These options include three automated approaches (LiDAR, Image, Hybrid) as well as a manual inspection option that are all proven and effective. Our partnerships with vendors that provide automated services (Cylv.ai, RoadBotics and

Pavement Management Group) has allowed us to bolster the capabilities and efficiency for data collection. Any of the four options ensures the Town will receive accurate data for reporting and analysis.

****Please Note: The previous round of inspections for the Town was carried out using the RoadBotics approach.***

Option A: Manual Inspections

The required field inspections will be performed by an experienced BETA Field Team. Each individual roadway segment (typically intersection to intersection) will be evaluated and follow industry standards for establishing a 0-100 Road Surface Rating (RSR). Attribute and inspection related data will include the following:

Data that seldom changes:

- Street Name
- Street Segment Description (From/To)
- Pavement Material (Bituminous Concrete, Gravel, Chip Seal, Other)
- Length/Area of Segment (Feet, Miles, Square Yards)
- Width of Segment (Measured on foot using wheel)

Pavement Distress Data (Extent & Severity):

- Alligator Cracking
- Linear Cracking (Longitudinal/Transverse)
- Edge Cracking
- Patching/Potholes
- Roughness
- Rutting

Additional Roadway Features:

- Curbing (Location, Material, Average Reveal)
- Sidewalks (Location, Material)
- Presence of Line Striping (Double Yellow, Edgeline)

The pavement distress data will be identified by severity (High, Moderate, Low) and extent (0%-100%) for each paved roadway segment to allow for a RSR to be calculated on the fly. As part of this process, BETA will also confirm curb type, average reveal and roadway segments that have sidewalks that was populated from the prior assessment. Sidewalk material type and location will be coded to each respective roadway segment. Finally, a representative photo log will be created, capturing varying degrees of pavement conditions across representative locations throughout the Town.

Option B: Image Based (Automated, RoadBotics)

This process is performed autonomously utilizing smart phone technology. To generate pavement condition data, a smart phone device is mounted to a windshield that captures video along each roadway. The videos collected are extracted to generate images every 10-foot section of roadway. These images are then analyzed, using machine learning technology, to identify pavement surface damage such as cracks, potholes, seals, patches and pavement oxidation. This data is represented as spatially located points with photographs attached to each respective point and included in the final deliverable. The result is data that is then converted to an industry standard 0-100 scale (RSR) for reporting and analysis purposes.

Option C: Lidar Based (Automated, Cyvl.ai)

BETA will leverage its partnership with Cyvl.ai (Cyvl) to propose the latest in field data capture technology to collect pavement condition information. The required field inspections will be performed autonomously utilizing a lidar sensor mounted on a vehicle. The vehicle will conduct one pass per roadway segment and will use lidar technology to develop a point cloud. As the vehicle drives down the roadway, a 3D digital map is developed and all roadway assets within a 50' radius of the lidar sensor are scanned and populated. As part of the data collection, images will be captured, georeferenced and timestamped every 20' section of roadway. Once the data has been collected for all roads included in the project, Cyvl's proprietary algorithms and AI machine learning technology is run to identify pavement surface distresses such as cracks, potholes, seals, patches, and pavement oxidation. Upon completion of the data postprocessing, each roadway segment is rated using an industry standard 0-100 scale (RSR).

***Please note:** As Cyvl improves its algorithms over time, additional roadside assets such as traffic signs, street trees, utility poles and more may be able to be extracted from the point cloud for an additional fee to be determined. Cyvl also provides an option to capture 360 degree imagery for an additional \$10 per CL mile (\$1,600)*

Option D: Video/Paver Based (Hybrid, Pavement Management Group)

The required field inspections will be performed autonomously utilizing a GoPro camera mounted outside of the vehicle which captures High Definition (HD) videos of each roadway segment. The video is used for the pavement distress assessment and has the added benefit of allowing for condition review and network-level decision-making from the office. PMG adheres to the ASTM D6433-20 standard for assessing the condition of asphalt and concrete surfaces. Our skilled inspection team reviews high-definition video of each pavement section in conjunction with our proprietary artificial intelligence (AI) model to identify and document the distress types, severity levels, and quantities that are occurring.

The inventory and distress data go into the PAVERTM Pavement Management System (PMS) for a 0-100 score or RSR to be calculated for each roadway. The corresponding data and video logs will then be integrated into BETA's ManageMyRoads platform and deployed to the Town.

Regardless of the methodology used for data collection, BETA has developed a thorough data review process to ensure the quality of the pavement management data. This process includes comparing the current information to legacy pavement management data. An Excel based log can be created identifying roadway segments that were reviewed if requested.

TASK 3 – DATA ANALYSIS & PLANNING

The pavement management process is conducted with the intent to keep the roadway system in the best possible condition with the most efficient use of available funds. There are distinct advantages to managing the network's pavement condition and significant cost savings that can take place with preventative maintenance or rehabilitation measures rather than waiting until a road is in need of a more costly repair such as reclamation or reconstruction.

Utilizing the RSR, each roadway will be placed into a "repair category" which is designed to, in general, show the type of repair which should be performed on the roadway. An estimated unit cost will be associated with each repair category allowing for a network backlog of work to be calculated.

This initial backlog figure will act as the Town's benchmark for progress moving forward and will be classified into the following categories:

- No Maintenance Required
- Routine Maintenance (Crack Seal, Fog Seal)
- Preventative Maintenance (Microsurfacing, Chip Seal, Thin Asphalt Overlay)
- Minor Rehabilitation (Mill and Overlay, Hot-In-Place Recycling, Cold-In-Place Recycling)
- Major Rehabilitation (Full-Depth Reclamation, Reconstruction)

The Town will be able to utilize BETA as a resource with respect to the selection of specific repair methods, design standards and associated unit costs for consideration during the prioritization process. This will facilitate the establishment of a series of specific repair strategies, as mentioned above, to streamline the repair assignment and budgeting process. The Town will have the ability to refine these repair strategies annually by updating the roadway database as improvements are made. This will prove helpful to track the success rate of each repair type and associated unit costs at the segment level.

This task will include the following deliverables:

- Existing Conditions Reports
- Corresponding GIS Roadway Maps
- Summary of Findings
- Cost Benefit Value (CBV)

TASK 4 – SYSTEM DEPLOYMENT & SUPPORT SERVICES

BETA will update the Town's current ManageMyRoads Platform to its latest version for use in viewing and interacting with the pavement data collected. Other roadway asset data collected in previous years including signs and utility data can also be integrated into the platform to expand its use and serve as a standalone asset management site. Through the utilization of ArcGIS Online (AGOL), BETA has developed a platform that allows communities to view and utilize the asset data as a planning tool. In addition to the AGOL platform, BETA will continue to host all reports and maps in electronic format through a portal weblink.

The support services program is designed to act as an avenue for technical support for the Town. This typically includes tracking roadway improvements, candidate selection for maintenance and rehabilitation techniques, adjusting the Town's roadway improvement plan and other miscellaneous requests. Services that can be covered under this support agreement include but are not limited to:

- Updating the pavement management database with the most recent roadway paving history
- Assist with developing and/or updating Capital Improvements Plans (CIPs) based on budget requirements, unit prices and new priorities.
- Additional updates and customization to the AGOL ManageMyRoads Platform based on requests from the Town, including integrating other roadway assets and GIS layers.
- RSR Forecast Modeling
- System Training
- Miscellaneous GIS Requests

Please Note: We have assumed an allowance of 40 hours over the course of 12 months for this Task.

Mr. Larry Roberts
February 14, 2024
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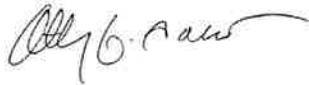
FEE PROPOSAL

For the purposes of this proposal, we have structured the fee as a **lump sum amount**, which is broken down into the following four (4) options below based on pavement inspection methodology.

Field Data Collection Methodology	Total Project Fee
Option A: Manual Inspections	\$ 25,500
Option B: Automated – Image Based (Roadbotics)	\$ 27,250
Option C: Automated – Lidar Based (Cycl.ai)	\$ 28,550
Option D: Automated – Video/Hybrid Approach (PMG)	\$ 37,250

Thank you for the opportunity to continue to assist the Town of Weston with the further development of its Pavement Management Program. If you have any questions or require additional information on this proposal, please feel free to contact me at **(508) 769-2807**.

Sincerely,
BETA GROUP, INC.



Anthony Garro
Senior Vice President
GIS & Asset Management Services

cc: Joe McGuire





Weston Road Paving Project Document for Discussion

Presented to the Board of Finance 2/8/24

Summary

- Road Surface Rating (RSR) is a numerical rating index (0-100) which is used to describe the general condition of a roadway segment. This analysis was done for the Town of Weston by the Beta Group (October 2023). This rating system serves to prioritize road paving initiatives for municipalities.
- Analysis of approximately 82 miles of town roads revealed that the weighted average (by road mileage) RSR for Weston is 66 with 37% of the roads requiring either major or minor rehabilitation at a cost estimate of \$12.45m to address all current road conditions.
- A multi-year approach is required to address the outstanding road issues. Road conditions were organized into RSR bands to develop a prioritization of the paving work to be done and a multi-year plan is proposed (draft for discussion) to address the outstanding road issues.
- By prioritizing the roads requiring major and minor rehabilitation in the next four years, we can achieve an RSR rating of >80 which puts the town in a position where a disciplined road maintenance plan going forward will require modest funds to keep our roads in good to excellent condition.

Rating the Conditions of the Weston Roads

- **Road Surface Rating (RSR)** is a numerical rating index (0-100) which is used to describe the general condition of a roadway segment. This analysis was done for the Town of Weston by the Beta Group. Rating system serves to prioritize road paving initiatives for municipalities.
 - **RSR 0-50:** Road surface in poor to fair condition (potholes, loose pavement, multiple repairs, alligating of pavement, cracks throughout) requiring major rehabilitation.
 - **RSR 50-65:** Road surface in fair condition (pothole repairs, cracks, alligating of pavement) requiring minor rehabilitation.
 - **RSR 65-80:** Road surface in good condition where preventative maintenance is recommended.
 - **RSR 80-90:** Road surface in good to excellent condition where routine maintenance is recommended
 - **RSR 90-100:** Road surface is in excellent condition where no maintenance is recommended.
- Beta Group analyzed all roads in the Town of Weston in October 2023. The purpose was to create a roadmap for prioritizing road work. By performing timely maintenance on the roadway, it has been shown that it will avoid costly repairs down the road.

The State of Weston Roads

- The weighted average (by road mileage) RSR for Weston is 66 with 37% of the roads requiring either major or minor rehabilitation.
- The estimated cost of addressing all roads is estimated at \$12.45 million; all work must be carefully prioritized and planned over several years.
- Disciplined and timely ongoing maintenance is essential given the cost/mile differential between maintaining good roads and rehabilitating roads that have been neglected.

	Low RSR Band	High RSR Band	Length (Miles)	RSR (weighed)	%	Cost (\$m)	Cost/mile (\$,000)
Major Rehabilitation	0	50	16.6	36	20%	8.06	487.0
Minor Rehabilitation	50	65	14.2	58	17%	2.21	156.2
Preventative Maintenance	65	80	22.9	69	28%	2.09	91.3
Routine Maintenance	80	94	12.9	89	16%	0.09	6.7
No Maintenance Required	94	100	15.8	97	19%	0.00	0.0
	Accepted Asphalt Roads		82.2		Total	12.45	
	Private Roads		19.7				
	State Roads		11.4				
	Gravel Roads		1.5				
	Total Roads		114.8				

All road condition data and cost estimates from Beta Group, October 2023

Addressing the Roads / Multi Year Plan / No RSR Migration

- Paving Plan prioritizes RSR<65 (Major and Minor Rehabilitation) in the first four years.
- Some prioritization of selected roads where RSR>65, however most of the work on the fair and good roads to be done in FY 29 and beyond.
- Cost estimate assumes that there is **no RSR migration for the good roads** while the high priority roads are addressed (i.e. the 15.8 miles of roads requiring no maintenance today).

Cost Estimates for Paving by Fiscal Year

	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	Total
Major Rehabilitation	\$3,577,237	\$2,671,462	\$1,461,020	\$348,066					\$9,057,785
Minor Rehabilitation	\$501,145	\$331,525	\$284,373	\$1,095,867					\$2,212,911
Preventative Maintenance	\$553,129		\$87,973	\$62,869	\$1,390,998				\$2,094,968
Routine Maintenance						\$87,683			\$87,683
No Maintenance									\$0
Total	\$4,631,510	\$3,002,987	\$1,833,367	\$1,506,802	\$1,390,998	\$87,683			\$12,453,347

RSR (weighted)	25.2	44.6	49.7	50.3	69.8	88.9	100.0	100.0	100.0
Avg. RSR (unweighted)	35.3	41.8	46.3	54.0	68.7	93.8	100.0	100.0	100.0

Coverage Amount in Miles by Fiscal Year

	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	Total
Major Rehabilitation	7.5	5.4	2.8	0.7					16.3
Minor Rehabilitation	1.5	2.1	1.7	6.0					11.2
Preventative Maintenance	3.6		1.1	0.7	17.6				22.9
Routine Maintenance						12.9			12.9
No Maintenance									15.8
Total	12.5	7.4	5.5	7.4	17.6	12.9			79.0

Does not include 3.2 miles of road covered by state grant

All road condition data from Beta Group, October 2023

Addressing the Roads / Multi Year Plan / RSR Migration

- Paving Plan prioritizes RSR<65 (Major and Minor Rehabilitation) in the first four years.
- Some prioritization of selected roads where RSR>50, however most of the work on the fair and good roads to be done in FY 29 and beyond.
- Cost estimate assumes that the good road conditions deteriorate at a conservative rate of 1.5 RSR per year; this will add approximately \$1.8m in today's dollars to the overall project as many of the good roads will require additional maintenance in FY 29 and FY 30.

Cost Estimates for Paving by Fiscal Year

	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	Total
Major Rehabilitation	\$ 3,577,237	\$2,671,462	\$ 1,461,020	\$ 348,066					\$ 8,057,785
Minor Rehabilitation	\$ 501,145	\$ 331,525	\$ 284,373	\$1,095,867	\$ 1,700,000				\$ 3,912,911
Preventative Maintenance	\$ 553,129		\$ 87,973	\$ 62,869		\$ 1,136,000			\$ 1,839,970
Routine Maintenance						\$ 219,000	\$ 125,300	\$ 74,100	\$ 418,400
No Maintenance									\$ -
Total	\$ 4,631,510	\$ 3,002,987	\$ 1,833,367	\$ 1,506,802	\$ 1,700,000	\$ 1,355,000	\$ 125,300	\$ 74,100	\$ 14,229,068

Coverage Amount in Miles by Fiscal Year

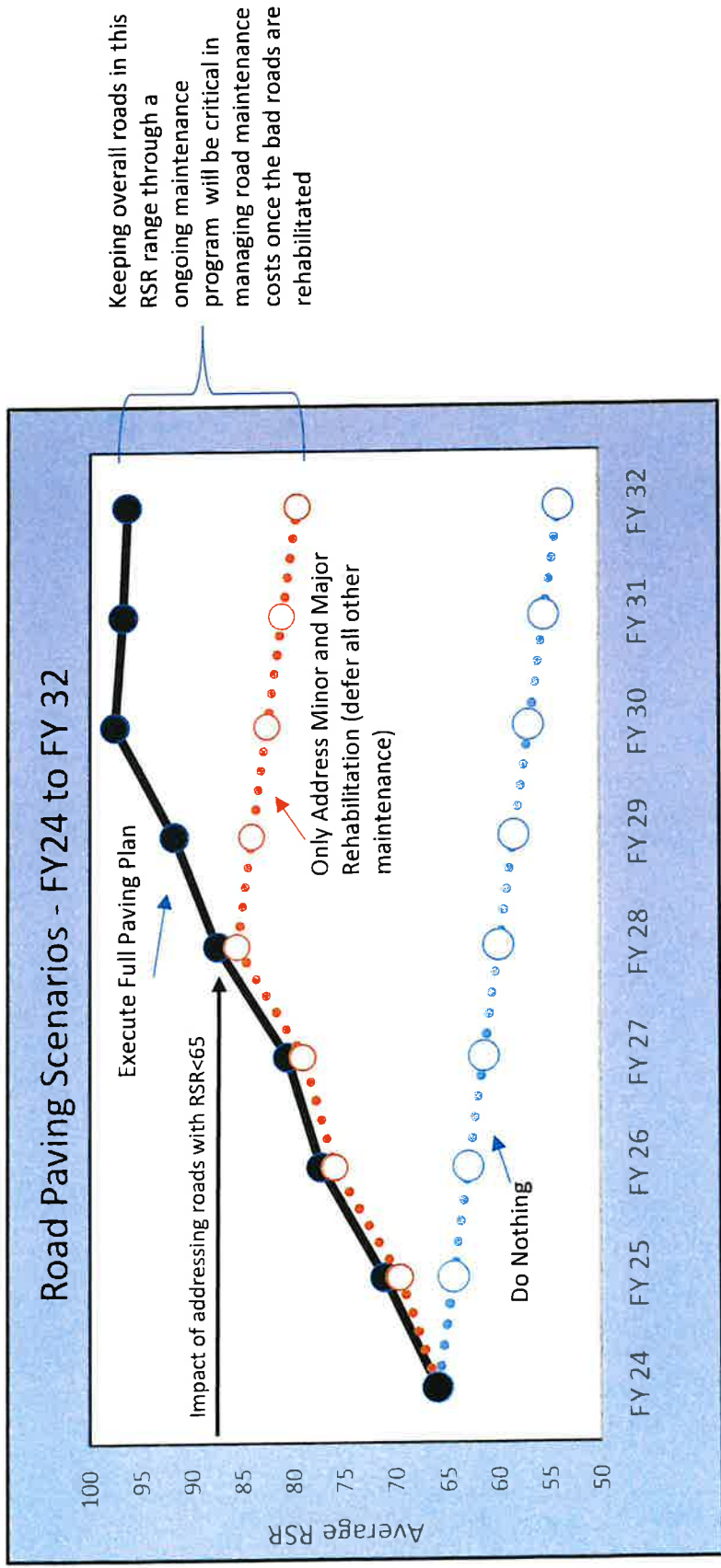
	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	Total
Major Rehabilitation	7.5	5.4	2.8	0.7					16.3
Minor Rehabilitation	1.5	2.1	1.7	6.0	10.0				21.2
Preventative Maintenance	3.6		1.1	0.7		14.2			19.5
Routine Maintenance						21.9	12.5	7.4	21.9
No Maintenance									
Total	12.5	7.4	5.5	7.4	10.0	36.1	12.5	7.4	78.9

Does not include 3.2 miles of road covered by state grant

All road condition data from Beta Group, October 2023

Impact of Paving Plan on RSR

- Addressing the roads requiring major (RSR < 50) and minor (50 < RSR < 65) rehabilitation will have a significant impact on the overall road rating for the town.
- Avoiding large costly repairs will require an annual and properly funded maintenance program that becomes a permanent fixture in the capital budget.



Comparison with Beta Group February 2020 Report

- Overall RSR has not changed materially from the February 2020 report by Beat Group; significant reduction (7.5m) in roads requiring Minor Rehabilitation.
- Local Roadway conditions remained stable with RSR reductions observed in Collector and Cul de Sac / Dead End roads.

Beta Group – October 2023

Road Conditions	Low RSR Band	High RSR Band	Length (Miles)	%	Cost (\$m)	Cost/mile (\$,000)
Major Rehabilitation	0	50	16.6	20%	8.06	487.0
Minor Rehabilitation	50	65	14.2	17%	2.21	156.2
Preventative Maintenance	65	80	22.9	28%	2.09	91.3
Routine Maintenance	80	94	12.9	16%	0.09	6.7
No Maintenance Required	94	100	15.8	19%	0.00	0.0
			Accepted Asphalt Roads	82.2	Total 12.45	
			Private Roads	19.7		
			State Roads	11.4		
			Gravel Roads	1.5		
			Total Roads	114.8		

Road Type	Miles	RSR
Collector Roadways	14.7	66.8
Local Roadway	49.4	69.0
Cul de Sac / Dead End	18.0	57.5
Weighted RSR		66.1

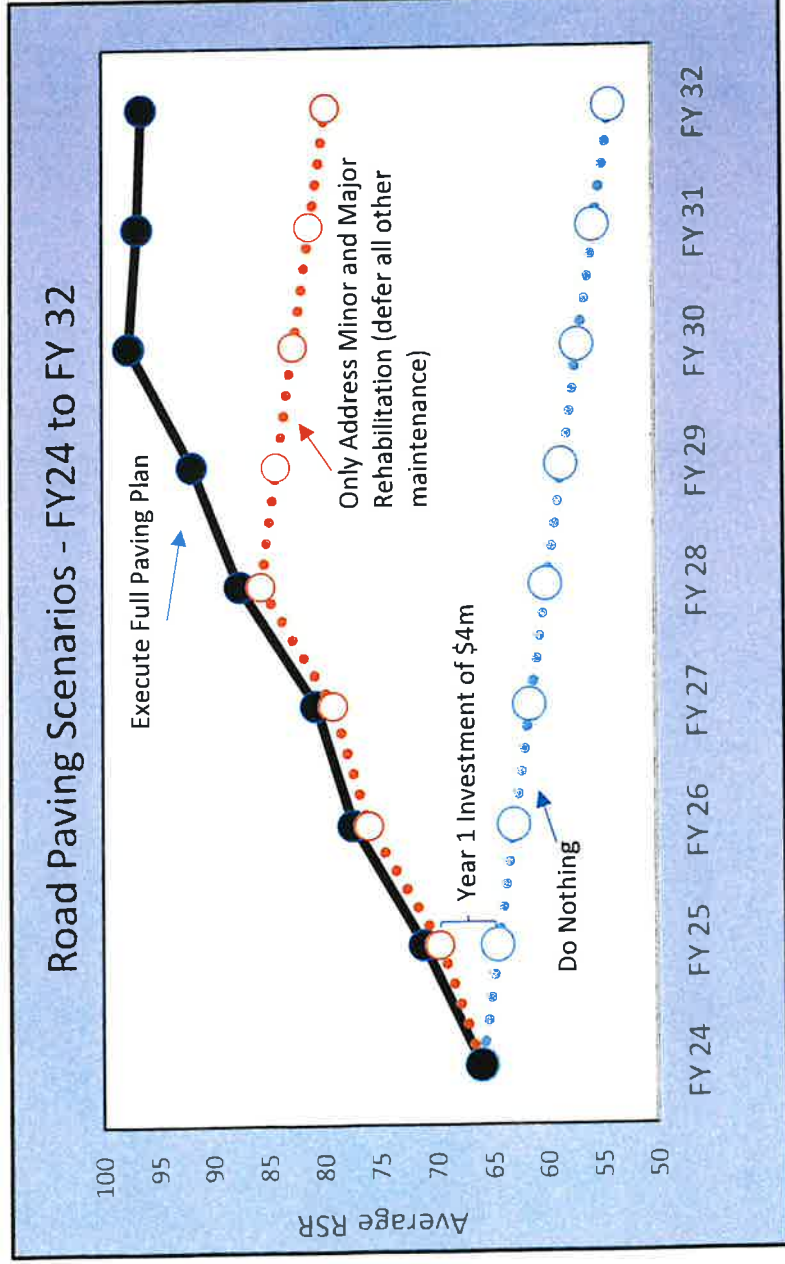
Beta Group – February 2020

	Low RSR Band	High RSR Band	Length (Miles)	%	Cost (\$m)	Cost/mile (\$,000)
Major Rehabilitation	0	50	15.3	19%	7.97	522.2
Minor Rehabilitation	50	65	22.7	28%	4.16	183.1
Preventative Maintenance	65	80	26.6	33%	2.17	81.5
Routine Maintenance	80	94	7.2	9%	0.05	6.6
No Maintenance Required	94	100	9.2	11%	0.00	0.0
			Accepted Asphalt Roads	81.0	Total 14.35	
			Private Roads	19.7		
			State Roads	11.4		
			Gravel Roads	1.5		
			Total Roads	113.6		

Road Type	Miles	RSR
Collector Roadways	10.6	73.0
Local Roadway	49.8	68.6
Cul de Sac / Dead End	20.7	60.8
Weighted RSR		67.2

Beta Group February 2020 Scenario Context

- **Beta Group Scenario A:** Annual investment of \$930K / year for 10 years (\$9.3m) to achieve an aggregate RSR of 70.5
- **Beta Group Scenario B:** Three-year investment of \$2.8m (RSR increase to 67.5) followed by a year 4 investment of \$2.8m to achieve an aggregate RSR of 70.
- **Beta Group Scenario C:** Three-year investment of \$1.5m (RSR decrease to 65.5) followed by a year 4 investment of \$3.5m to achieve an aggregate RSR of 70.
- Chart Below shows that a Year 1 investment of \$4.0m for Major and Minor Rehabilitation will achieve an aggregate RSR of 70; consistent with the Beta Group Scenario analysis performed in February of 2020.



TOWN OF WESTON, CONNECTICUT

PRO FORMA DEBT AMORTIZATION SCHEDULES

\$8,000,000 - TOWNWIDE ROAD PROJECTS

PREPARED BY:



January 16, 2024

TOWN OF WESTON, CONNECTICUT

PROPOSED \$8,000,000 TOWNWIDE ROAD PROJECTS

ASSUMPTIONS

- ❖ Issuance cost for bonds and notes to be capitalized into each issuance. Estimated cost of issuance range for bonds is \$80,000 to \$100,000 and for notes is \$40,000 to \$60,000.
- ❖ All rates are based on market as of 1/9/2024 and adjusted as follows:

Issue Date	20 Yr Bond	1 Yr Note
1/9/2024 (Mkt)	3.250%	3.200%
May-2024	3.250%	3.200%
May-2025	3.250%	2.000%
May-2026	3.250%	2.000%
May-2027	3.250%	2.000%

Disclosure: Munistat Services, Inc. is providing the information contained in this document for discussion purposes as municipal advisor to the Town of Weston, CT. Future interest rates are dependent upon many factors such as, but not limited to, interest rate trends, tax rates, supply, changes in laws, rules and regulations, as well as changes in credit quality. The effect of such changes and assumptions may be material and could affect the projections. These projections should be viewed with these potential changes in mind as well as the understanding that there may be interruptions in the market or no market may exist at all.

**TOWN OF WESTON, CT
 PROPOSED \$8,000,000 TOWNWIDE ROAD PROJECTS
 PRO FORMA DEBT AMORTIZATION
 TOTAL DEBT SERVICE**

DEBT SERVICE SCHEDULE - EXISTING PRINCIPAL & INTEREST

FISCAL YEAR	TOTAL EXISTING DEBT SERVICE
2023-24	\$ 2,967,825
2024-25	864,250
2025-26	350,875
2026-27	363,875
TOTAL	\$ 4,546,825

**TOWN OF WESTON, CT
PROPOSED \$8,000,000 TOWNWIDE ROAD PROJECTS
PRO FORMA DEBT AMORTIZATION
SCENARIO A**

DEBT SERVICE SCHEDULE - PRINCIPAL & INTEREST

FISCAL YEAR	EXISTING DEBT SERVICE		Estimated Townwide Road Projects Note Issue @ 3.20% Issue Date - 5/15/2024		Estimated Townwide Road Projects Note Issue @ 2.0% Issue Date - 5/15/2025		Estimated Townwide Road Projects Bond Issue @ 3.25% Issue Date - 5/15/2026		TOTAL ESTIMATED TOWNWIDE ROAD PROJECTS DEBT SERVICE	TOTAL ESTIMATED COMBINED DEBT SERVICE	
				Interest		Interest	Principal	Interest			
2023-24	\$	2,967,825							\$	2,967,825	
2024-25		864,250	\$	128,000				295,000	128,000	992,250	
2025-26		350,875			\$	120,000		275,000	120,000	470,875	
2026-27		363,875					400,000	255,000	695,000	1,058,875	
2027-28							400,000	235,000	675,000	675,000	
2028-29							400,000	215,000	655,000	655,000	
2029-30							400,000	195,000	635,000	635,000	
2030-31							400,000	182,000	615,000	615,000	
2031-32							400,000	169,000	595,000	595,000	
2032-33							400,000	156,000	582,000	582,000	
2033-34							400,000	143,000	569,000	569,000	
2034-35							400,000	130,000	556,000	556,000	
2035-36							400,000	117,000	543,000	543,000	
2036-37							400,000	104,000	530,000	530,000	
2037-38							400,000	91,000	517,000	517,000	
2038-39							400,000	78,000	504,000	504,000	
2039-40							400,000	65,000	491,000	491,000	
2040-41							400,000	52,000	478,000	478,000	
2041-42							400,000	39,000	465,000	465,000	
2042-43							400,000	26,000	452,000	452,000	
2043-44							400,000	13,000	439,000	439,000	
2044-45							400,000		426,000	426,000	
2045-46							400,000		413,000	413,000	
TOTAL	\$	4,546,825	\$	128,000	\$	120,000	\$	8,000,000	\$	11,083,000	
										\$	15,629,825