

ROADWAY CONDITION ASSESSMENT VILLAGE OF OLD BENNINGTON

Bennington, Vermont
September 2019

Prepared for:

Village of Old Bennington
Bennington, VT 05201

Project No. 1007-004



Prepared by:

MSK Engineering and Design, Inc.
150 Depot Street
Bennington, Vermont 05201
(802) 447-1402



In association with:

MILONE & MACBROOM, INC.
1 South Main Street
Waterbury, Vermont 05676
(802) 882-8335



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1.0 INTRODUCTION

The Village of Old Bennington is interested in preserving the long-term health its roughly 2.5 miles of locally maintained roadway network. MSK Engineering and Design, Inc. (MSK) of Bennington, VT collaborated with Milone & MacBroom, Inc. (MMI) of Waterbury, VT to assess the condition of Village roadways and provide short and long-term recommendations for maintenance and pavement preservation. The Village overlaps a Historic District and prides itself in the appearance of its roadway corridors. Past upgrades to the Village roads have gone to great lengths and expense to provide infrastructure that incorporates aesthetics designed to complement the local character and celebrate the rich local history. This is readily evident to visitors and residents alike traveling along Monument Avenue and Walloomsac Road where the choice of construction materials and workmanship associated with roadside drainage installations serve to make a real statement about the sense of local pride. MSK, enjoying a local presence and long working history, was supported by MMI in this study effort given their firm’s range of experience in supporting communities focused on preservation of character.

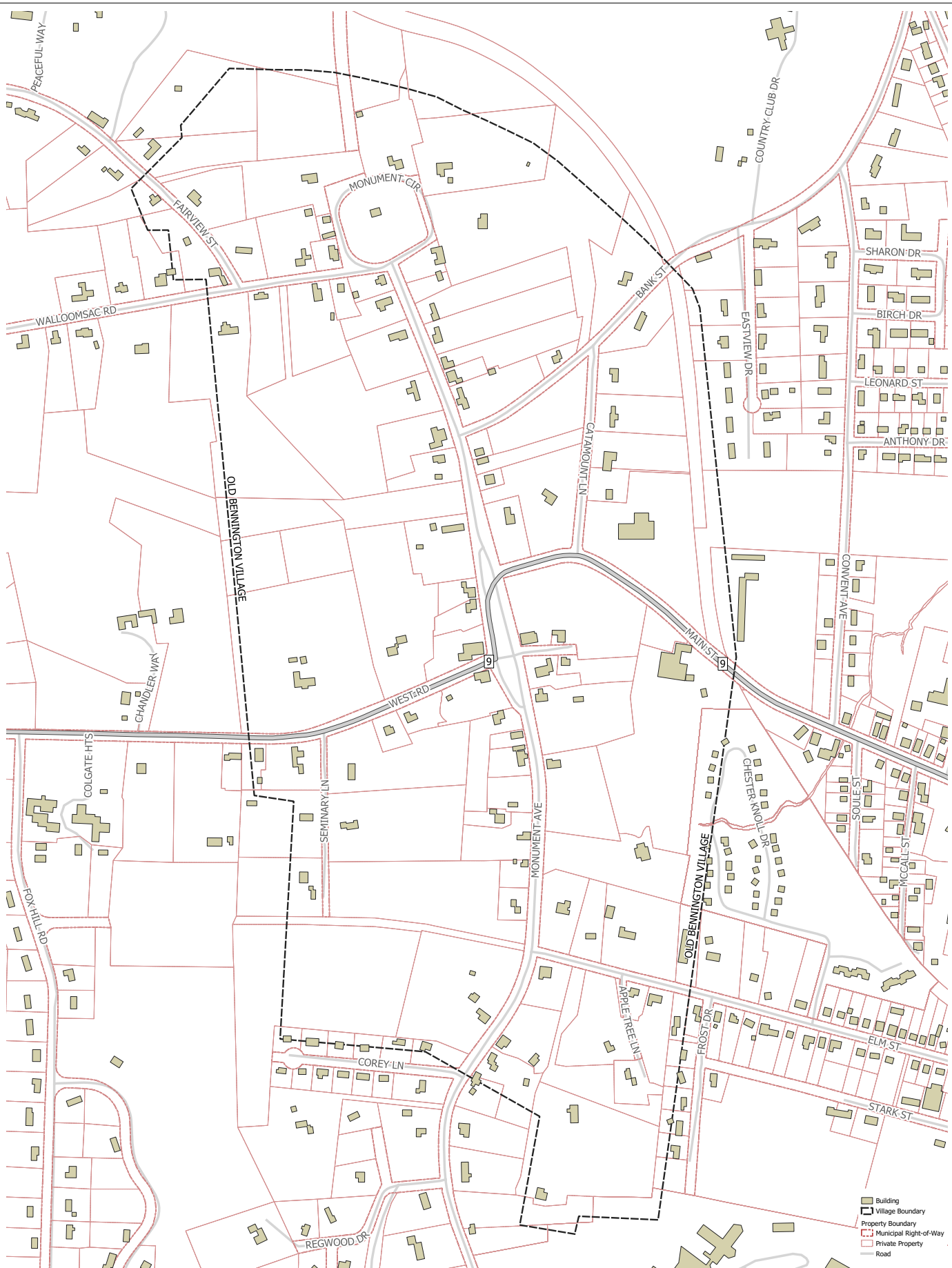
Village roads addressed in this study include:

**TABLE 1-1
Village Roadways***

Roadway	Approximate Length (ft.)
Monument Avenue	3,790
Elm Street	730
Seminary Lane	750
Park Way	265
One Way Spur (W. Main to Monument)	220
Church Lane	270
Catamount Lane	1,020
Bank Street	1,330
Walloomsac Road	1,110
Fairview Street	1,060
Monument Circle	1,450
Seminary Lane	750

* State-maintained roadways excluded

The following Figure 1-1 depicts the Village roadway network.



1 OLD BENNINGTON ROAD NETWORK




SHEET NUMBER	DRAWINGS THIS SHEET	
	NUMBER	DATE
M100	DESIGN	09/17/23
	CHECKED	

DRAWINGS THIS SHEET	
OLD BENNINGTON ROAD NETWORK	

VILLAGE OF OLD BENNINGTON
ROADWAY CONDITION ASSESSMENT
BENNINGTON, VT

REVISIONS	
NO.	DESCRIPTION



MSK ENGINEERING AND DESIGN, INC.
P.O. BOX 139, 150 DEPOT STREET
BENNINGTON, VERMONT 05201
PH: (802) 447-1402 FAX: (802) 445-1291

2.0 EXISTING CONDITIONS & RECOMMENDATIONS

On June 13, 2019 representatives of MSK and MMI conducted a joint field walking audit of the Village roadways. The purpose of this site visit was to ascertain and photo-document existing conditions. Once recorded, the dated photographs provide a benchmark for comparison of pavement condition over time. While drilled borings provide solid information about pavement composition and subsurface conditions, a visual assessment of roadways is productive by using surface indicators to tell a story. For instance, rutting and potholes may be indicative of base failure; edge cracking may be indicative of infiltration due to runoff at the shoulder; transverse cracks may indicate failure due to extended service life; alligator cracking may indicate the service life has been exceeded or the paving course was too thin; and longitudinal cracking may be associated with a failed paving seem or edge of underlying concrete base. The various signs of deterioration are caused by a range of conditions and variables. We strive to utilize all the information gathered in the field and interpret it to make a best recommendation.

The performance of a roadway can be judged by pavement condition, ride-ability and longevity. The primary forces affecting the performance and longevity of any roadway are typically subsurface soil conditions, traffic loading, and both surface and ground water. For optimal performance, subgrade soils should be able to withstand traffic loading and shall be free of frost-susceptible materials which are prone to heaving due to freeze/thaw conditions. Uncontrolled surface runoff can be erosive along the pavement edge and may cause icing on the pavement. Surface water may combine with ground water to infiltrate subgrade soils contributing to freeze/thaw issues, weakening the overall pavement section and affecting its ability to resist traffic loading. Oftentimes it is necessary to address roadside, subsurface, and/or drainage issues in conjunction with rehabilitating the paved surface. The following section will address pavement conditions by roadway and will go on to recommend short-term maintenance strategies and long-term construction repairs.

2.1 Monument Avenue

2.1.1 Observations

The pavement condition at Monument Avenue in the vicinity of Elm Street is very good. Proceeding north from the Village boundary the pavement is generally in good condition. There is a granite cobble paved drainage swale along the west side of the roadway and while the swale itself is in very good condition, there is little longitudinal pitch on the swale so standing water was observed. In many instances the edge of swale is higher than the adjacent pavement such that runoff from the roadway is not being effectively intercepted by the swale. Runoff is conveyed via wheel ruts in the roadway indicating a degree of potential base failure.



Shoving of the pavement can also be observed on approach to the "Stop" sign in the southbound direction on Monument Street at Elm Street.

Shoving is rutting in connection with braking on the incline and also indicates a degree of base failure. Similar to the condition described above, this rutting actually prevents runoff from the pavement from being conveyed to the granite cobble paved swale.



Monument Avenue north of Elm Street, having been previously rehabilitated, is in good to very good condition.

North of Church Lane and paralleling West Main Street/Route 9, Monument Avenue is in good condition. Surprisingly, with the specimen trees located along the frontage of the Old First Church the root systems appear to have had little impact on the pavement over time. We suspect this segment of roadway may have had a thin overlay applied as the condition of the surface is very smooth but longitudinal cracking is occurring throughout and could be reflective cracking from underlying pavement. The curb reveal along the west side has been diminished, supporting the notion of an overlay. The concrete curb bordering the green has begun to deteriorate and long term it will have to be replaced.

At the north end of the green near West Main Street, cracking along this segment of roadway parallels the edge of pavement a consistent ± 4 ft. Based on the consistent offset, the cracking may indicate the edge of an underlying concrete road base. Hairline cracks have formed in the gutters at the south end near Church Lane. Roadway cores would answer some questions regarding roadway composition.

For Monument Avenue north of the green and on approach to Monument Circle, the pavement is generally in very good condition. The primary issue with this roadway segment is longitudinal cracking along the roadway centerline and edges paralleling the granite cobble drainage swale. It is assumed the centerline cracking is caused by an underlying paving seam or joint. It is typical, over time, for such cracking to occur. The reason for the edge cracking isn't as clear from the surface indicators, however it may be caused by runoff infiltrating the granite cobble drainage swale, saturating and weakening the road base. The cracking is fairly consistent for the length of the roadway segment, however, in some areas the edge cracking has progressed to pavement failure. The roadway shape is consistent and the pavement smooth.



2.1.2 Recommendations

This roadway may be reclaimed in the vicinity of Elm Street as a way to improve the structural integrity of the road base given the rutting and shoving observed. While pulverized material would need to be removed for new paving to match existing grades at the roadside swale, reclaiming the roadway would provide the opportunity to reshape the cross section. It is recommended that the cross slopes generally be increased in order to ensure conveyance of runoff to the gutters and the granite cobble paved swale.

It is probably not practical nor completely necessary to replace the granite cobble paved swales to improve longitudinal pitch, nor is there a lot of opportunity to do so given the adjacent topography. That being the case and while the swale does tend to have standing water during

normal rainfall events, certainly runoff from larger storm events will flow toward the inlets as the depth of flow in the swale builds.

North of Elm Street the roadway should be inspected periodically for cracking and shall be sealed accordingly to prevent the intrusion of surface runoff as a measure to extend pavement longevity. Should cracking begin to expand to a point where crack sealing becomes unsightly, the Village might consider a fine aggregate slurry seal which will address crack filling while coating the entire width of the road for a uniform appearance. The sealing process will also serve to rejuvenate the oxidized surface and restore flexibility which could increase the longevity of the pavement. Given the amount of bicycle traffic this area is accustomed to, care should be exercised to specify an aggregate size and finish conducive to bicycle safety.

Along the frontage of the Old First Church, crack sealing should be performed in the short-term. Long-term, this segment of roadway may be milled and overlaid, and the concrete curb should be replaced along the green.

North of the green the longitudinal cracks should be sealed along both the center line and the gutters. This preventive maintenance will help prevent surface water runoff infiltration and associated weakening of the road base.

Where the edge cracking has progressed to pavement failure, saw-cutting, pavement removal and patching may be required. The construction detail for patching along the granite cobble drainage swale might include a revamped interface between the granite cobbles and pavement and/or a haunched or thickened pavement section at the gutter for added strength.

Long-term, the service life for this roadway segment can be extended by performing a mill and overlay. The cobble stone drainage swales will require periodic maintenance to replace cracked or missing mortar in order to protect the integrity of the system.

Summary	
Pavement Condition	Very Good
Maintenance Priority	High
Reconstruction Priority	Low
Recommendations: Crack sealing, chip seal, minor pavement patching.	

2.2 Elm Street

2.2.1 Observations

The condition of the pavement on this segment of roadway is generally fair. Crack sealing has been performed on the roadway which is a good sign the Village has attempted to preserve the facility service life. It appears the roadway was previously overlaid but due to the severity and extent of longitudinal cracking, the paved section has probably begun to exceed its useful service life. It is presumed that much of longitudinal cracking occurs along the paving seam where surface water intrusion may have occurred over time. A concrete sidewalk and curb running along the north side of the road is in very good condition.



The overall plane of the roadway on approach to the Village boundary is generally smooth, however the roadway lacks sufficient crown. Some minor rutting has formed along wheel paths such that during normal rainfall events runoff is conveyed along these ruts rather than the gutter. On approach to Monument Avenue the roadway has several surface drainage issues that should be resolved. The roadway is sloped to the north encouraging sheet flow over the sidewalk and discharge to a wet area on private property. Due to differential settlement between the pavement and concrete sidewalk edge, sheet flow runoff from normal rainfall events doesn't occur across the sidewalk. Runoff tends to pool on the pavement and sidewalk leading to icing in cold weather directly affecting longevity of the pavement along the edge.

The paved width on Elm Street narrows between the Village boundary and Monument Avenue. At the easterly limit of the Village there is a catch basin on the north side of the roadway which aligns with the wider roadway segment such that bypass gutter flow from the west bypasses the inlet during normal rainfall events.

2.2.2 Recommendations

Because of the prominent drainage issues observed, the pavement should be warped at the Village limit line for the catch basin to more effectively intercept gutter flow.

Regrading of the roadway approach to Monument Avenue with a normal crown and replacement of the sidewalk with a six-inch curb is recommended. The curb will require installing a traditional catch basin inlet with new discharge to private property via a drainage easement, unless the new pipe can be connected to a downgradient catch basin. This can be expected to better shed runoff from the roadway and reduce the potential for icing across the roadway and sidewalk.

The catch basin inlet in the yard at 120 Elm Street is low in comparison to adjacent grade and should be raised in connection with any roadway rehabilitation efforts.

Elm Street may be reclaimed. Pulverizing and incorporating ground asphalt layers into the granular road base would enhance the strength of the road base. Upon reclamation, pulverized/blended material will have to be removed in order to maintain existing elevations at the edges of roadway upon final paving. Reclamation is preferred over mill and overlay as the procedure allows for both shaping and regrading of the road base to remove rutting, achieve desired crown and permits compaction of the reclaimed road base which is important in order to restore integrity of the pavement section.

Summary	
Pavement Condition	Fair
Maintenance Priority	Low
Reconstruction Priority	High
Recommendations: Coring, reclamation, curbing, drainage repairs.	

2.3 Seminary Lane

2.3.1 Observations

The road is narrow and the roadside edges generally well-maintained along private properties. The roadway is not curbed and does not have a formal drainage system. For much of the road length a narrow gravel shoulder parallels the paved edges. In other areas lawn abuts the edge of roadway. The pavement is in poor condition with a lot of distress and the surface exhibiting longitudinal and edge cracking throughout. The roadway was cut for a sewer installation and the trench repair is evident.



2.3.2 Recommendations

Based on the widespread and nearly complete pavement failure, this road may have to be reconstructed. Pavement coring should be performed to determine subbase and subgrade conditions. If ground water is affecting the longevity of the pavement, then a free draining subbase layer may be required but should daylight on the fill side in order to allow for evacuation of water from the pavement section.



Summary	
Pavement Condition	Poor
Maintenance Priority	Low
Reconstruction Priority	Moderate
Recommendations: Coring, reconstruction, reclamation.	

2.4 Park Way

2.4.1 Observations

Park Way is a short, northbound one-way connection between Monument Avenue and West Main Street. In general, the pavement is in good condition. The roadway is curbed along the green on the east side but there is no curbing along the west edge of the roadway. The concrete curb along the green is in varying levels of disrepair with deterioration of the concrete in several places. A concrete sidewalk parallels the westerly edge of the roadway with a narrow strip of grass/earth between the sidewalk and pavement.



The roadway does not have any catch basin inlets along the westerly edge, and it appears the narrow strip between the sidewalk and the curb is routinely subject to parked vehicles. Much of the grass that can be seen in online imagery dating back to 2012 no longer thrives and has become bare earth. Given there are no drainage inlets, this area tends to collect runoff and can get quite muddy when subject to wheel loading. There is some edge cracking of the pavement where this condition persists. There is a catch basin inlet at the southern end of this short roadway segment near the terminus of the green and intersection of Monument Avenue.

2.4.2 Recommendations

The exposed earth/muddy condition along the west side of the roadway should be addressed. One option is to install an asphalt curb on the pavement and topsoil and seed the area between sidewalk and curb. Given the narrow width of the roadway, this may preclude on-street parking. If the loss of parking is an issue for the Village, then the area may be infilled with granite cobbles mortared in place on a compacted gravel or concrete base. This would match the aesthetics of the drainage swales along Monument Avenue. Both solutions would require the area to be pitched toward the roadway in order to drain effectively. It may be prudent to install a catch basin inlet in the flat section and pipe the discharge to the existing catch basin near Monument Avenue.

The concrete curb at the green should be replaced. Reinforcing bars are exposed in some places and the concrete is deteriorating at the curb joints.

Long-term the service life for this roadway may be extended by performing a mill and overlay.

Summary	
Pavement Condition	Good
Maintenance Priority	Medium
Reconstruction Priority	Low
Recommendations: Curbing, partial reconstruction, minor drainage improvements, mill and overlay.	

2.5 One Way Spur (West Main Street to Monument Avenue)

2.5.1 Observations



This segment of roadway provides access to one residence and serves as a short bypass for northbound traffic to avoid the West Main Street/Monument Avenue intersection. The roadway frames a small amount of green. There is concrete curbing along the east side of the roadway along the green and a granite cobble drainage swale borders the west edge of the roadway. While the pavement is generally in good condition, there is progressive edge cracking along the western side adjacent to the granite cobble drainage swale.

2.5.2 Recommendations

Where the edge cracking has progressed to pavement failure, saw-cutting may be required for pavement removal and patching. The construction detail for patching along the granite cobble drainage swale might include a revamped interface between the granite

cobbles and pavement and/or a haunched or thickened pavement section at the gutter for added strength.

Long-term, the service life for this roadway segment can be extended by performing a mill and overlay. The cobble stone drainage swales will require periodic maintenance to replace cracked or missing mortar in order to protect the integrity of the system.

Summary	
Pavement Condition	Good
Maintenance Priority	High
Reconstruction Priority	Moderate
Recommendations: Minor pavement patching, mill and overlay, minor cobble treatment/repair.	

2.6 Church Lane

2.6.1 Observations

Providing access to the cemetery and to residential properties, Church Lane is narrow and somewhat steep. The roadway does not have traditional curbing and there is no drainage infrastructure, so runoff is generally uncontrolled. Small rocks line the southern edge of pavement and appear to function as a means for containing gutter flow but there is no curb on the north side of the road. The pavement exhibits edge cracking along the north side and moderate, random longitudinal cracking in various locations. Where the northern edge of pavement meets lawn, the exposed pavement channels the runoff. It is likely the edge cracking is caused by surface water infiltration along the gutter which typically results in a weakened road base. While the pavement shows distress, there is limited evidence of base failure throughout.



2.6.2 Recommendations

Overlaying the roadway is not a viable option due to the severity of many of the cracks. We would expect those cracks to reflect through to the new pavement. Given the roadway gradient, the town should consider curbing the roadway to protect the paved edges from erosion and surface runoff intrusion into the road base.

The road should be milled to remove all existing asphalt layers as this would give the opportunity to compact the road base prior to repaving. While the roadway may be reclaimed, it is not clear there would be tremendous benefit given the lack of evidence regarding base failure. In the short-term, the town should seal and fill cracks. It is possible the town may have to do a spot repair to address pavement on the north side where edge cracking is significant prior to addressing the full roadway.



Summary	
Pavement Condition	Medium
Maintenance Priority	High
Reconstruction Priority	Moderate
Recommendations: Minor pavement patching, crack sealing, chip seal.	

2.7 Catamount Lane

2.7.1 Observations

The pavement exhibits signs of failure throughout, including edge cracking and longitudinal cracking. In some places cracking is severe. The surface and shape of the roadway, however, remains consistent, so widespread base failure is not suspect. While there is a ditch along the west side of the roadway adjacent to an open field at the northerly end of Catamount Lane, runoff isn't effectively conveyed to the ditch. Severe edge cracking along the west side leads us to believe runoff infiltrating from the field may be affecting the longevity of the pavement. There is no formal drainage system in the roadway.

The paved edge along the east side where the roadway is in a fill section is not well supported and the paved edge has failed in places.



There is edge cracking along the roadway from Bank Street to West Main Street.

2.7.2 Recommendations

Coring should be conducted to confirm road base conditions. While the pavement has failed throughout, the roadway may be a candidate for reclamation if sufficient road base material is found. Long-term, roadway reclamation should be considered. Should the existing road base be deficient in coarse aggregate, it is possible that the road can be reclaimed with a crushed stone layer then added on top and reclaimed a second time to incorporate the stone into the overall road cross section. This can be a cost-effective method to strengthen the reclaimed road base.

The roadway should be properly crowned, and the western edge of pavement sloped to improve sheet flow to the drainage swale. Wherever possible, roadside ditching should be considered to convey runoff while preserving the integrity of the pavement. This will require identifying suitable discharge points. Wherever pavement is in a fill section, the roadway should be properly backfilled with topsoil and seeded to turf for support of the paved edge.

Summary	
Pavement Condition	Poor
Maintenance Priority	Low
Reconstruction Priority	High
Recommendations: Coring, reclamation, drainage improvements.	

2.8 Bank Street

2.8.1 Observations

In general, Bank Street is in poor condition overall. This roadway may be considered the worst in the Village judging by pavement condition, traffic volume, and level of work necessary to improve the roadway to an acceptable level. The roadway gradient descends fairly sharply departing from its intersection with Monument Avenue. There is widespread pavement failure evidenced by visible cracking throughout. The northern edge of the roadway is protected by a cobble drainage swale or roadside treatment which appears to have accumulated sediment over time. While the edge is protected by stone, the shape of the swale provides limited conveyance. Cross slope on the travel lanes is generally limited. The roadway is not curbed and there is no formal storm drain system.

East of Catamount Lane, it appears the roadway has a thin overlay which may vary from ½-inch to one inch in thickness. The overlay exhibits widespread cracking. It appears the overlay was not “cut-in” at the intersection of Catamount Lane, rather, it may have been “feathered” to match. In this area, delamination of the overlay has occurred. Granite stone curbing at the intersection of Catamount Lane directs runoff, uncontrolled, to a drainage ditch.

A catch basin near the driveway at #32 Bank Street doesn’t appear to be located effectively and runoff appears to bypass the inlet and run down the driveway.



2.8.2 Recommendations

Given the condition of the roadway, Bank Street should be fully rehabilitated or reconstructed. While the pavement has deteriorated or failed throughout, the roadway does not exhibit extensive potholes or rutting so base failure may not be present. Pavement coring should be performed to determine whether the road base is suitable for reclamation, a process which could provide savings over full-depth reconstruction. Should the existing road base be deficient in coarse aggregate, it is possible that the road can be reclaimed with a crushed stone layer then added on top and reclaimed a second time to incorporate the stone into the overall road cross section. This can be a cost-effective method to strengthen the reclaimed road base. The roadway should be properly crowned to effectively convey runoff.

Given the roadway's gradient, particularly along its western end, the Village should consider installing curbing and a formal piped storm drain system. This would require identifying and establishing a discharge point, which may require environmental permits and potentially a private property easement depending on the discharge location. If the Village prefers to convey runoff via roadside swales, then the swales should be properly armored, with periodic check dams incorporated to attenuate velocities and resist erosion. Discharge points will have to be identified along the swales. Any swales should be maintained, kept free from sediment and debris accumulation.

The driveway ramp at 32 Bank Street should be reconstructed with a paved lip and a rise in order to prevent road runoff from entering the driveway.

Curbing at the intersection of Catamount Lane should be extended to safe termini at all corners. The drainage ditch just east of the intersection should be properly protected with rounded stone or other form of stabilization.

Summary	
Pavement Condition	Poor
Maintenance Priority	Low
Reconstruction Priority	High
Recommendations: Coring, reclamation/reconstruction, drainage improvements.	

2.9 Walloomsac Road

2.9.1 Observations

The pavement is generally in good or very good condition although cracks are starting to develop throughout. Cracking generally occurs at the center line, which is the presumed paving seam. The roadway is flanked on both sides with granite cobble drainage swales, and edge cracking parallels the cobble stone treatment similar to the condition occurring along Monument Avenue.



2.9.2 Recommendations

Longitudinal cracks should be sealed along both the center line and the gutters. This preventive maintenance will help prevent surface runoff infiltration weakening the road base.

Ultimately where edge cracking may progress prior to the roadway requiring rehabilitation, saw-cutting, pavement removal and patching will be required. The construction detail for patching along the granite cobble drainage swale might include a revamped interface between the granite cobbles and pavement and/or a haunched or thickened pavement section at the gutter for added strength.

Long-term, the service life for this roadway segment can be extended by performing a mill and overlay. The cobble stone drainage swales will require periodic maintenance to replace cracked or missing mortar in order to protect the integrity of the system.

Summary	
Pavement Condition	Good
Maintenance Priority	Low
Reconstruction Priority	Moderate
Recommendations: Minor pavement patching, mill and overlay, minor cobble treatment/repair.	

2.10 Fairview Street

2.10.1 Observations

The granite cobble drainage swale from Walloomsac Avenue terminates on the easterly corner of Fairview Street and the pavement is in very good condition. The first 25 feet or so of Fairview Street were repaved in connection with work performed on Walloomsac Avenue. The pavement on Fairview Street exhibits cracking throughout, but in general widespread base failure is not suspect. The exception to this observation is at a low point on Fairview Street just north of the intersection with Walloomsac Avenue. At this location there are several potholes in the roadway and the pavement has failed over a roughly ± 100 -foot segment. The roadway is in a cut section on the east side and there does not appear to be any provision for drainage from east to west. Based on field observations runoff from the is infiltrating the road base and flowing west toward the lower elevation. It is believed that this section of road may be constantly wet with no provisions to evacuate water from the road base.

North of this area the remainder of the pavement exhibits distress throughout. In some locations multiple overlays are apparent.



2.10.2 Recommendations

Coring should be conducted to confirm road base conditions. While the pavement has failed throughout, the roadway may be a candidate for reclamation if sufficient road base material is found. Long-term, roadway reclamation should be considered. Should the existing road base be deficient in coarse aggregate, it is possible that the road can be reclaimed with a crushed stone layer then added on top and reclaimed a second time to incorporate the stone into the overall road cross section. This can be a cost-effective method to strengthen the reclaimed road base. While the roadway may be a good candidate for reclamation, the area where base failure has occurred may require full-depth reconstruction.

The roadway should be properly crowned, and a formal piped storm drain system should be considered for the low area described above. The installation of a drainage system will require establishing a discharge point. An easement will be needed if the discharge point is located on private property. If a formal drainage system cannot be installed, the village may consider a stone envelope under the roadway which will permit flows from east to west but the resulting seepage onto the adjacent private property may not be desirable or may have to be intercepted with a ditch. The benefit of the stone envelope, however, is that it would not involve a single, potentially erosive, point discharge.

Summary	
Pavement Condition	Poor
Maintenance Priority	Low
Reconstruction Priority	High
Recommendations: Coring, reclamation, drainage improvements.	

2.11 Monument Circle

2.11.1 Observations

Monument Circle appears to have been meticulously maintained over the years. The pavement is smooth and generally in good or very good condition. Judging by the transverse and longitudinal crack patterns, it is believed this roadway has an underlying concrete base and anecdotally, we understand this is the case. Many of the larger cracks have been filled or sealed. The paved surface has been treated with a fine mix for a smooth and comfortable finish. Where sections have spalled, the thickness of the fine mix can be seen. Concrete curbing around the center island has deteriorated in numerous locations exposing reinforcing bars. The parking lot adjacent to the circle is in very good condition.



2.11.2 Recommendations

This pavement has not yet reached its useful service life. Typically, a roadway in this condition could be simply overlaid, however that would diminish curb reveal. It may be more cost-effective to simply mill the pavement and then overlay with bituminous concrete. The fine mix finish could then be re-applied.

An alternative approach would be to replace the concrete curbing, repair the sawcut edge, address any cracks in the asphalt, and then re-apply the fine mix finish for a uniform surface. The fine mix should be researched and studied to determine whether it will adhere to the weathered surface or whether any scarification or other preparatory measures would have to be taken, such

as a fine milling after all patching and repairs. Any cracks that may form in the parking lot should be addressed over time.

Summary	
Pavement Condition	Good
Maintenance Priority	High
Reconstruction Priority	Low
Recommendations: Crack sealing, chip seal, mill and overlay, curbing.	

3.0 SUMMARY

Municipalities that enjoy success in terms of their ability to manage a healthy roadway network tend to practice the principles of *pavement preservation*. The condition of any new or reconstructed roadway will begin to degrade over time due to weather and traffic conditions. While many roadways last well beyond 20 years before requiring major reconstruction, a 20-year service life is a typical and reasonable target. Towns that are successful in prolonging the service life and deferring related major expenditures tend to implement scheduled maintenance regimens aimed at preservation. We offer the following recommendations:

- a. With surface water intrusion being one of the primary causes of premature pavement failure, crack sealing is one of the most cost-effective ways to preserve and extend the service life of an existing facility. If a large amount of crack sealing is required, a chip seal is recommended to prevent surface water intrusion, lower oxidation of the pavement surface, and extend the useful life of the pavement. The Village roads should be inspected on an annual basis to determine the need for crack or chip sealing.
- b. Roadside ditching and installation of underdrains where needed is also an important step in limiting the intrusion of water into the road base. Where possible, free draining roadway subbase should be daylighted.
- c. Mill and overlay of pavement top course, where applicable, should be performed prior to deterioration of the base course.
- d. Backing up pavement edges with stabilized soil (either compacted gravel or topsoil and turf) sloped to drain away from the roadway is key to protecting pavements from deterioration due to edge cracking, particularly where runoff may be conveyed along the gutter or where vehicles may have a tendency to traverse or park on the edge of the road.
- e. Future paving should consider notch or wedge joints (longitudinal) designed to limit the extent of longitudinal cracking at the paving seams due to shrinkage and surface water intrusion over time.

Important Note

It is important to note that the recommendations made herein are based on limited visual observations and are for the purpose of high-level planning and budgeting. All pavement recommendations should be verified through a test pit or pavement boring program in order to confirm existing conditions such as pavement thickness, road base type and subgrade conditions. Traffic volumes and characteristics should be further explored in order to confirm pavement cross section design. Recommendations relating to issues regarding drainage and grading should be confirmed by field survey and designed accordingly.

The following tables provide a high-level cost opinion for each roadway based on the general recommendations made herein and 2019 expected construction costs. An inflation rate of 3-5% should be assumed for each successive year. Table 2-1 provides a cost estimate based on recommended remediations. Table 2-2 provides cost estimates for each different option. For example, Church Lane is recommended to have a surface treatment performed at an estimated cost of \$20,000.00. If the road is not properly maintained and progresses to ultimate failure, reclamation may be required, and the cost would be expected to increase by a factor of two. The roads are listed by priority of reconstruction, with higher priority roads at the top of the list.

Appendix A provides the cost estimate approach for each of the roads. Estimated quantities in the top section are based on the different remediation options and associated restoration work. The lower section provides the different repair options by summing the items in the above table applicable to the option. A 40 percent contingency is included to address minor items and engineering including coordination, survey, engineering, and inspection services.

TABLE 2-1
Concept Level Cost Opinion Per Recommendations

Village Roadway	Recommendation	Opinion of Cost	Maintenance Priority	Reconstruction Priority
Bank Street	Coring, Reclamation, Drainage Repairs, Grading, Curbing	\$281,000.00	LOW	HIGH
Fairview Street	Coring, Reclamation, Drainage Repairs, Grading	\$220,000.00	LOW	HIGH
Elm Street	Coring, Reclamation, Curbing, Drainage Repairs	\$148,000.00	LOW	HIGH
Seminary Lane	Coring, Reclamation, Drainage Repairs	\$114,000.00	LOW	HIGH
Church Lane	Crack Sealing, Minor Pavement Patching, Roadside Grading	\$16,000.00	HIGH	MEDIUM
Catamount Lane	Coring, Reclamation, Drainage Repairs	\$183,000.00	LOW	HIGH
Park Way	Curbing, Partial Reconstruction, Drainage Repairs	\$45,000.00	MEDIUM	LOW
Walloodsac Road	Mill and Overlay, Drainage Improvements	\$123,000.00	LOW	MEDIUM
Monument Circle	Surface Sealing	\$90,000.00	HIGH	LOW
Monument Avenue North	Crack Sealing, Minor Pavement Patching, Drainage Repairs	\$132,000.00	HIGH	LOW
Monument Avenue South	Crack Sealing, Minor Pavement Patching, Sidewalks, Drainage Repairs	\$202,000.00	HIGH	LOW

*Costs in 2019 dollars; excludes engineering, inspection and easement

**TABLE 2-2
Concept Level Cost Opinion of Different Options**

Village Roadway	OPTION					
	Roadway Reclamation	Mill & Overlay	Drainage Improvements	Roadside Grading	Sidewalks & Curbs	Surface Treatment
Bank Street	\$239,128	\$126,882	\$24,661	\$16,551	\$1,400	\$95,583
Fairview Street	\$193,339	\$103,036	\$13,720	\$13,316	\$0	\$76,897
Elm Street	\$138,985	\$74,729	\$3,360	\$16,676	\$5,670	\$54,717
Seminary Lane	\$103,522	\$56,261	\$0	\$9,582	\$0	\$40,245
Church Lane	\$36,920	\$21,576	\$0	\$2,489	\$0	\$13,067
Catamount Lane	\$169,804	\$90,779	\$0	\$12,818	\$1,890	\$67,293
Park Way	\$24,913	\$15,322	\$19,040	\$1,244	\$35,560	\$8,167
Walloomsac Road	\$205,667	\$109,456	\$13,440	\$14,187	\$0	\$81,928
Monument Circle	\$227,441	\$120,795	\$3,640	\$17,298	\$90,230	\$90,813
Monument Avenue North	\$306,050	\$161,734	\$8,960	\$42,560	\$0	\$122,892
Monument Avenue South	\$358,884	\$189,248	\$31,220	\$50,027	\$26,460	\$144,452

*Costs in 2019 dollars; excludes engineering, inspection and easement

Budget Planning

Higher priority roads for reconstruction are listed from observations discussed in this report and expected short term performance. Higher priority roads display increased amounts of pavement failure indicators such as alligator cracking or edge cracking, resulting in water intrusion and road base failure. These roads should be considered for full restoration, as surface treatments will not be structurally and economically effective due to extensive failure. Lower priority roads such as Monument Avenue are currently in acceptable shape but will require yearly review and spot treatments such as crack sealing to prolong the life of the roadway.

Lower cost maintenance items (crack sealing, catch basin resets, swale re-establishment, etc.) along with annual service contract costs should be provided through the existing annual budget.

The repair costs of each of the roads should be expected to be distributed over a 20-year period, with two projected high repair costs recommended within the first ten years. The 20-year period is based on the common life expectancy of a road and can be extended with efficient and effective road maintenance techniques. The two recommended high repair costs within the next 10 years includes the restoration work for Bank Street and Fairview Street. A reserve account and grant research/procurement are recommended for Monument Avenue and Monument Circle. These roads have a higher traffic loading design and aesthetic importance which, in turn, creates a higher expected construction cost that the Village may find difficulty in funding with annual revenues.

Failure to implement a road management program can result in expedited pavement failures, higher construction costs, and the potential to overwhelm budgets set for maintenance and reconstruction. By implementing pavement preservation techniques and budgeting for future road reconstruction, the Village can ensure a safe and orderly road network for both the residents and the public.

APPENDIX A

OPINIONS OF PROBABLE COST BASED ON DIFFERENT REPAIR OPTIONS

Monument Avenue North					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 18,789.57
B	Road Reclamation	SY	4180	\$ 4.00	\$ 16,720.00
C	Road Milling	SY	4180	\$ 4.00	\$ 16,720.00
D	Common Excavation	CY	464	\$ 8.00	\$ 3,715.56
E	Geotextile for Roadbed Separator	SY	4180	\$ 2.00	\$ 8,360.00
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	116	\$ 35.00	\$ 4,063.89
H	Bituminous Concrete Pavement 4 inches	TON	953	\$ 200.00	\$ 190,608.00
I	Bituminous Concrete Pavement 2 inches	TON	477	\$ 200.00	\$ 95,304.00
J	Turf Restoration	SY	3800.0	\$ 8.00	\$ 30,400.00
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Sidewalks and curbing	LF	0.0	\$ 65.00	\$ -
M	Drainage Improvements/Catch Basin Reset	EACH	8.0	\$ 800.00	\$ 6,400.00
N	Drainage Improvements/CPEP Pipe Installation	LF	0.0	\$ 90.00	\$ -
O	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	66.9	\$ 420.00	\$ 28,089.60
P	Surface Treatment Slurry Seal	TON	209.0	\$ 420.00	\$ 87,780.00

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 218,607.44	\$ 306,050.42
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 115,524.00	\$ 161,733.60
3	Drainage Improvements (Items M,N)	LS	1	\$ 6,400.00	\$ 8,960.00
4	Roadside Grading (Item J)	LS	1	\$ 30,400.00	\$ 42,560.00
5	Sidewalks and Curbs (Item L)	LS	1	\$ -	\$ -
6	Surface Treatment (Item P Typical)	LS	1	\$ 87,780.00	\$ 122,892.00

Monument Avenue South					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 23,739.15
B	Road Reclamation	SY	4913.333333	\$ 4.00	\$ 19,653.33
C	Road Milling	SY	4913.333333	\$ 4.00	\$ 19,653.33
D	Common Excavation	CY	546	\$ 8.00	\$ 4,367.41
E	Geotextile for Roadbed Separator	SY	4913	\$ 2.00	\$ 9,826.67
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	136	\$ 35.00	\$ 4,776.85
H	Bituminous Concrete Pavement 4 inches	TON	1120	\$ 200.00	\$ 224,048.00
I	Bituminous Concrete Pavement 2 inches	TON	560	\$ 200.00	\$ 112,024.00
J	Turf Restoration	SY	4466.7	\$ 8.00	\$ 35,733.33
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	420.0	\$ 45.00	\$ 18,900.00
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	11.0	\$ 800.00	\$ 8,800.00
O	Drainage Improvements/CPEP Pipe Installation	LF	150.0	\$ 90.00	\$ 13,500.00
P	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	78.6	\$ 420.00	\$ 33,017.60
Q	Surface Treatment Slurry Seal	TON	245.7	\$ 420.00	\$ 103,180.00

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 256,345.59	\$ 358,883.83
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 135,177.33	\$ 189,248.27
3	Drainage Improvements (Items N,O)	LS	1	\$ 22,300.00	\$ 31,220.00
4	Roadside Grading (Item J)	LS	1	\$ 35,733.33	\$ 50,026.67
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ 18,900.00	\$ 26,460.00
6	Surface Treatment (Item Q Typical)	LS	1	\$ 103,180.00	\$ 144,452.00

Elm Street					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 8,561.80
B	Road Reclamation	SY	1861.111111	\$ 4.00	\$ 7,444.44
C	Road Milling	SY	1861.111111	\$ 4.00	\$ 7,444.44
D	Common Excavation	CY	207	\$ 8.00	\$ 1,654.32
E	Geotextile for Roadbed Separator	SY	1861	\$ 2.00	\$ 3,722.22
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	52	\$ 35.00	\$ 1,809.41
H	Bituminous Concrete Pavement 4 inches	TON	424	\$ 200.00	\$ 84,866.67
I	Bituminous Concrete Pavement 2 inches	TON	212	\$ 200.00	\$ 42,433.33
J	Turf Restoration	SY	1488.9	\$ 8.00	\$ 11,911.11
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	90.0	\$ 45.00	\$ 4,050.00
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	3.0	\$ 800.00	\$ 2,400.00
O	Drainage Improvements/CPEP Pipe Installation	LF	0.0	\$ 90.00	\$ -
P	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	29.8	\$ 420.00	\$ 12,506.67
Q	Surface Treatment Slurry Seal	TON	93.1	\$ 420.00	\$ 39,083.33

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 99,274.85	\$ 138,984.78
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 53,377.78	\$ 74,728.89
3	Drainage Improvements (Items N,O)	LS	1	\$ 2,400.00	\$ 3,360.00
4	Roadside Grading (Item J)	LS	1	\$ 11,911.11	\$ 16,675.56
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ 4,050.00	\$ 5,670.00
6	Surface Treatment (Item Q Typical)	LS	1	\$ 39,083.33	\$ 54,716.67

Seminary Lane					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 6,010.65
B	Road Reclamation	SY	1369	\$ 4.00	\$ 5,475.56
C	Road Milling	SY	1369	\$ 4.00	\$ 5,475.56
D	Common Excavation	CY	152	\$ 8.00	\$ 1,216.79
E	Geotextile for Roadbed Separator	SY	1369	\$ 2.00	\$ 2,737.78
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	38	\$ 35.00	\$ 1,330.86
H	Bituminous Concrete Pavement 4 inches	TON	312	\$ 200.00	\$ 62,421.33
I	Bituminous Concrete Pavement 2 inches	TON	156	\$ 200.00	\$ 31,210.67
J	Turf Restoration	SY	855.6	\$ 8.00	\$ 6,844.44
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	0.0	\$ 45.00	\$ -
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	0.0	\$ 800.00	\$ -
O	Drainage Improvements/CPEP Pipe Installation	LF	0.0	\$ 90.00	\$ -
P	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	21.9	\$ 420.00	\$ 9,198.93
Q	Surface Treatment Slurry Seal	TON	68.4	\$ 420.00	\$ 28,746.67

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 73,944.54	\$ 103,522.36
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 40,186.22	\$ 56,260.71
3	Drainage Improvements (Items N,O)	LS	1	\$ -	\$ -
4	Roadside Grading (Item J)	LS	1	\$ 6,844.44	\$ 9,582.22
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ -	\$ -
6	Surface Treatment (Item Q Typical)	LS	1	\$ 28,746.67	\$ 40,245.33

Park Way					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 3,284.18
B	Road Reclamation	SY	278	\$ 4.00	\$ 1,111.11
C	Road Milling	SY	278	\$ 4.00	\$ 1,111.11
D	Common Excavation	CY	31	\$ 8.00	\$ 246.91
E	Geotextile for Roadbed Separator	SY	278	\$ 2.00	\$ 555.56
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	8	\$ 35.00	\$ 270.06
H	Bituminous Concrete Pavement 4 inches	TON	63	\$ 200.00	\$ 12,666.67
I	Bituminous Concrete Pavement 2 inches	TON	32	\$ 200.00	\$ 6,333.33
J	Turf Restoration	SY	111.1	\$ 8.00	\$ 888.89
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	220.0	\$ 45.00	\$ 9,900.00
M	Sidewalks	LF	310.0	\$ 50.00	\$ 15,500.00
N	Drainage Improvements/Catch Basin Reset	EACH	2.0	\$ 800.00	\$ 1,600.00
O	Drainage Improvements/CPEP Pipe Installation	LF	200.0	\$ 60.00	\$ 12,000.00
P	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	4.4	\$ 420.00	\$ 1,866.67
Q	Surface Treatment Slurry Seal	TON	13.9	\$ 420.00	\$ 5,833.33

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 17,794.75	\$ 24,912.65
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 10,944.44	\$ 15,322.22
3	Drainage Improvements (Items N,O)	LS	1	\$ 13,600.00	\$ 19,040.00
4	Roadside Grading (Item J)	LS	1	\$ 888.89	\$ 1,244.44
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ 25,400.00	\$ 35,560.00
6	Surface Treatment (Item Q Typical)	LS	1	\$ 5,833.33	\$ 8,166.67

Church Lane					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 2,047.47
B	Road Reclamation	SY	444.4	\$ 4.00	\$ 1,777.78
C	Road Milling	SY	444.4	\$ 4.00	\$ 1,777.78
D	Common Excavation	CY	49	\$ 8.00	\$ 395.06
E	Geotextile for Roadbed Separator	SY	444	\$ 2.00	\$ 888.89
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	12	\$ 35.00	\$ 432.10
H	Bituminous Concrete Pavement 4 inches	TON	101	\$ 200.00	\$ 20,266.67
I	Bituminous Concrete Pavement 2 inches	TON	51	\$ 200.00	\$ 10,133.33
J	Turf Restoration	SY	222.2	\$ 8.00	\$ 1,777.78
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	0.0	\$ 45.00	\$ -
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	0.0	\$ 800.00	\$ -
O	Drainage Improvements/CPEP Pipe Installation	LF	0.0	\$ 90.00	\$ -
P	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	7.1	\$ 420.00	\$ 2,986.67
Q	Surface Treatment Slurry Seal	TON	22.2	\$ 420.00	\$ 9,333.33

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 26,371.60	\$ 36,920.25
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 15,411.11	\$ 21,575.56
3	Drainage Improvements (Items N,O)	LS	1	\$ -	\$ -
4	Roadside Grading (Item J)	LS	1	\$ 1,777.78	\$ 2,488.89
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ -	\$ -
6	Surface Treatment (Item Q Typical)	LS	1	\$ 9,333.33	\$ 13,066.67

Catamount Lane					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 9,885.72
B	Road Reclamation	SY	2288.9	\$ 4.00	\$ 9,155.56
C	Road Milling	SY	2288.9	\$ 4.00	\$ 9,155.56
D	Common Excavation	CY	254	\$ 8.00	\$ 2,034.57
E	Geotextile for Roadbed Separator	SY	2289	\$ 2.00	\$ 4,577.78
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	64	\$ 35.00	\$ 2,225.31
H	Bituminous Concrete Pavement 4 inches	TON	522	\$ 200.00	\$ 104,373.33
I	Bituminous Concrete Pavement 2 inches	TON	261	\$ 200.00	\$ 52,186.67
J	Turf Restoration	SY	1144.4	\$ 8.00	\$ 9,155.56
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	30.0	\$ 45.00	\$ 1,350.00
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	0.0	\$ 800.00	\$ -
O	Drainage Improvements/CPEP Pipe Installation	LF	0.0	\$ 90.00	\$ -
P	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	36.6	\$ 420.00	\$ 15,381.33
Q	Surface Treatment Slurry Seal	TON	114.4	\$ 420.00	\$ 48,066.67

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 121,288.77	\$ 169,804.27
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 64,842.22	\$ 90,779.11
3	Drainage Improvements (Items N,O)	LS	1	\$ -	\$ -
4	Roadside Grading (Item J)	LS	1	\$ 9,155.56	\$ 12,817.78
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ 1,350.00	\$ 1,890.00
6	Surface Treatment (Item Q Typical)	LS	1	\$ 48,066.67	\$ 67,293.33

Bank Street					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 14,128.00
B	Road Reclamation	SY	3251.1	\$ 4.00	\$ 13,004.44
C	Road Milling	SY	3251.1	\$ 4.00	\$ 13,004.44
D	Common Excavation	CY	361	\$ 8.00	\$ 2,889.88
E	Geotextile for Roadbed Separator	SY	3251	\$ 2.00	\$ 6,502.22
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	90	\$ 35.00	\$ 3,160.80
H	Bituminous Concrete Pavement 4 inches	TON	741	\$ 200.00	\$ 148,250.67
I	Bituminous Concrete Pavement 2 inches	TON	371	\$ 200.00	\$ 74,125.33
J	Turf Restoration	SY	1477.8	\$ 8.00	\$ 11,822.22
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	0.0	\$ 45.00	\$ -
M	Sidewalks	LF	20.0	\$ 50.00	\$ 1,000.00
N	Drainage Improvements/Catch Basin Reset	EACH	1.0	\$ 800.00	\$ 800.00
O	Drainage Improvements/CPEP Pipe Installation	LF	50.0	\$ 90.00	\$ 4,500.00
P	Drainage Improvements/Type I Stone Installation	CY	246.3	\$ 50.00	\$ 12,314.81
Q	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	52.0	\$ 420.00	\$ 21,847.47
R	Surface Treatment Slurry Seal	TON	162.6	\$ 420.00	\$ 68,273.33

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 170,805.79	\$ 239,128.11
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 90,629.78	\$ 126,881.69
3	Drainage Improvements (Items N,O,P)	LS	1	\$ 17,614.81	\$ 24,660.74
4	Roadside Grading (Item J)	LS	1	\$ 11,822.22	\$ 16,551.11
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ 1,000.00	\$ 1,400.00
6	Surface Treatment (Item R Typical)	LS	1	\$ 68,273.33	\$ 95,582.67

Walloomsac Street					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 12,344.71
B	Road Reclamation	SY	2786.7	\$ 4.00	\$ 11,146.67
C	Road Milling	SY	2786.7	\$ 4.00	\$ 11,146.67
D	Common Excavation	CY	310	\$ 8.00	\$ 2,477.04
E	Geotextile for Roadbed Separator	SY	2787	\$ 2.00	\$ 5,573.33
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	77	\$ 35.00	\$ 2,709.26
H	Bituminous Concrete Pavement 4 inches	TON	635	\$ 200.00	\$ 127,072.00
I	Bituminous Concrete Pavement 2 inches	TON	318	\$ 200.00	\$ 63,536.00
J	Turf Restoration	SY	1266.7	\$ 8.00	\$ 10,133.33
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	0.0	\$ 45.00	\$ -
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	12.0	\$ 800.00	\$ 9,600.00
O	Drainage Improvements/CPEP Pipe Installation	LF	0.0	\$ 90.00	\$ -
P	Drainage Improvements/Type I Stone Installation	CY	0.0	\$ 50.00	\$ -
Q	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	44.6	\$ 420.00	\$ 18,726.40
R	Surface Treatment Slurry Seal	TON	139.3	\$ 420.00	\$ 58,520.00

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 146,904.96	\$ 205,666.95
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 78,182.67	\$ 109,455.73
3	Drainage Improvements (Items N,O,P)	LS	1	\$ 9,600.00	\$ 13,440.00
4	Roadside Grading (Item J)	LS	1	\$ 10,133.33	\$ 14,186.67
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ -	\$ -
6	Surface Treatment (Item R Typical)	LS	1	\$ 58,520.00	\$ 81,928.00

Fairview Street					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 11,636.93
B	Road Reclamation	SY	2615.6	\$ 4.00	\$ 10,462.22
C	Road Milling	SY	2615.6	\$ 4.00	\$ 10,462.22
D	Common Excavation	CY	291	\$ 8.00	\$ 2,324.94
E	Geotextile for Roadbed Separator	SY	2616	\$ 2.00	\$ 5,231.11
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	73	\$ 35.00	\$ 2,542.90
H	Bituminous Concrete Pavement 4 inches	TON	596	\$ 200.00	\$ 119,269.33
I	Bituminous Concrete Pavement 2 inches	TON	298	\$ 200.00	\$ 59,634.67
J	Turf Restoration	SY	1188.9	\$ 8.00	\$ 9,511.11
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	0.0	\$ 45.00	\$ -
M	Sidewalks	LF	0.0	\$ 50.00	\$ -
N	Drainage Improvements/Catch Basin Reset	EACH	1.0	\$ 800.00	\$ 800.00
O	Drainage Improvements/CPEP Pipe Installation	LF	100.0	\$ 90.00	\$ 9,000.00
P	Drainage Improvements/Type I Stone Installation	CY	0.0	\$ 50.00	\$ -
Q	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	41.8	\$ 420.00	\$ 17,576.53
R	Surface Treatment Slurry Seal	TON	130.8	\$ 420.00	\$ 54,926.67

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 138,099.40	\$ 193,339.15
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 73,596.89	\$ 103,035.64
3	Drainage Improvements (Items N,O,P)	LS	1	\$ 9,800.00	\$ 13,720.00
4	Roadside Grading (Item J)	LS	1	\$ 9,511.11	\$ 13,315.56
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ -	\$ -
6	Surface Treatment (Item R Typical)	LS	1	\$ 54,926.67	\$ 76,897.33

Monument Circle					
Item	Item Description	Unit	Est. Qty.	ESTIMATED BID VALUES	
				Unit Cost	Ext. Amt.
A	Mobilization/Demobilization	LS	1		\$ 16,541.16
B	Road Reclamation	SY	3088.9	\$ 4.00	\$ 12,355.56
C	Road Milling	SY	3088.9	\$ 4.00	\$ 12,355.56
D	Common Excavation	CY	343	\$ 8.00	\$ 2,745.68
E	Geotextile for Roadbed Separator	SY	3089	\$ 2.00	\$ 6,177.78
F	Subbase Coarse graded gravel	CY	0	\$ 15.00	\$ -
G	Subbase of Fine Graded Crushed Gravel	CY	86	\$ 35.00	\$ 3,003.09
H	Bituminous Concrete Pavement 4 inches	TON	704	\$ 200.00	\$ 140,853.33
I	Bituminous Concrete Pavement 2 inches	TON	352	\$ 200.00	\$ 70,426.67
J	Turf Restoration	SY	1544.4	\$ 8.00	\$ 12,355.56
K	Traffic Control	LS	1.0	\$ 3,500.00	\$ 3,500.00
L	Curbing	LF	1410.0	\$ 45.00	\$ 63,450.00
M	Sidewalks	LF	20.0	\$ 50.00	\$ 1,000.00
N	Drainage Improvements/Catch Basin Reset	EACH	1.0	\$ 800.00	\$ 800.00
O	Drainage Improvements/CPEP Pipe Installation	LF	20.0	\$ 90.00	\$ 1,800.00
P	Drainage Improvements/Type I Stone Installation	CY	0.0	\$ 50.00	\$ -
Q	Surface Treatment Paver Placed Surface Treatment (PPST)	TON	49.4	\$ 420.00	\$ 20,757.33
R	Surface Treatment Slurry Seal	TON	154.4	\$ 420.00	\$ 64,866.67

	CONSTRUCTION OPTION	UNIT	EST QTY	TOTAL COST	40% Contingency. Minor Items and Engineering
1	Roadway Reclamation (Items B,D,G,H,K)	LS	1	\$ 162,457.65	\$ 227,440.72
2	Mill and Overlay (Items C,I,K)	LS	1	\$ 86,282.22	\$ 120,795.11
3	Drainage Improvements (Items N,O,P)	LS	1	\$ 2,600.00	\$ 3,640.00
4	Roadside Grading (Item J)	LS	1	\$ 12,355.56	\$ 17,297.78
5	Sidewalks and Curbs (Items L,M)	LS	1	\$ 64,450.00	\$ 90,230.00
6	Surface Treatment (Item R Typical)	LS	1	\$ 64,866.67	\$ 90,813.33