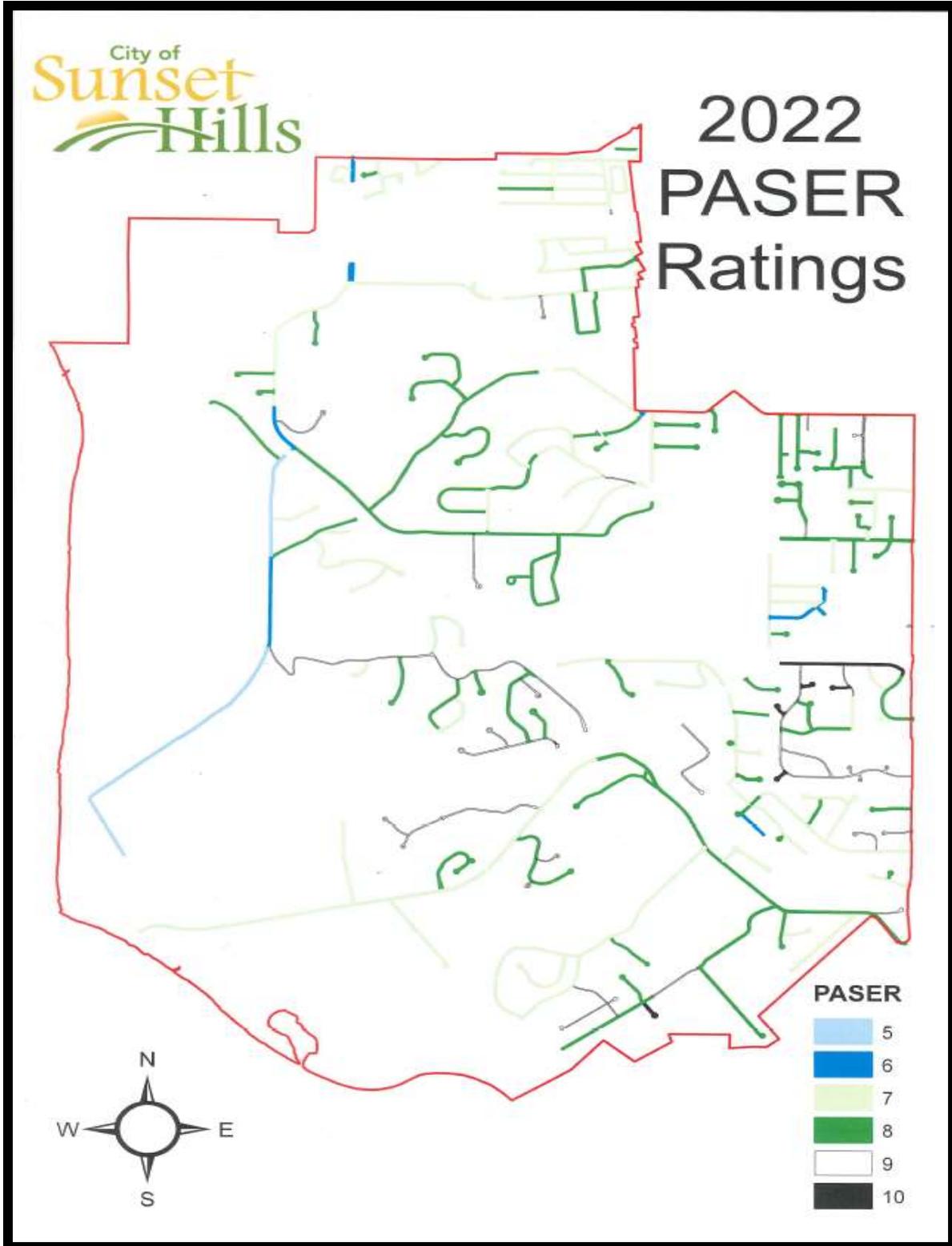


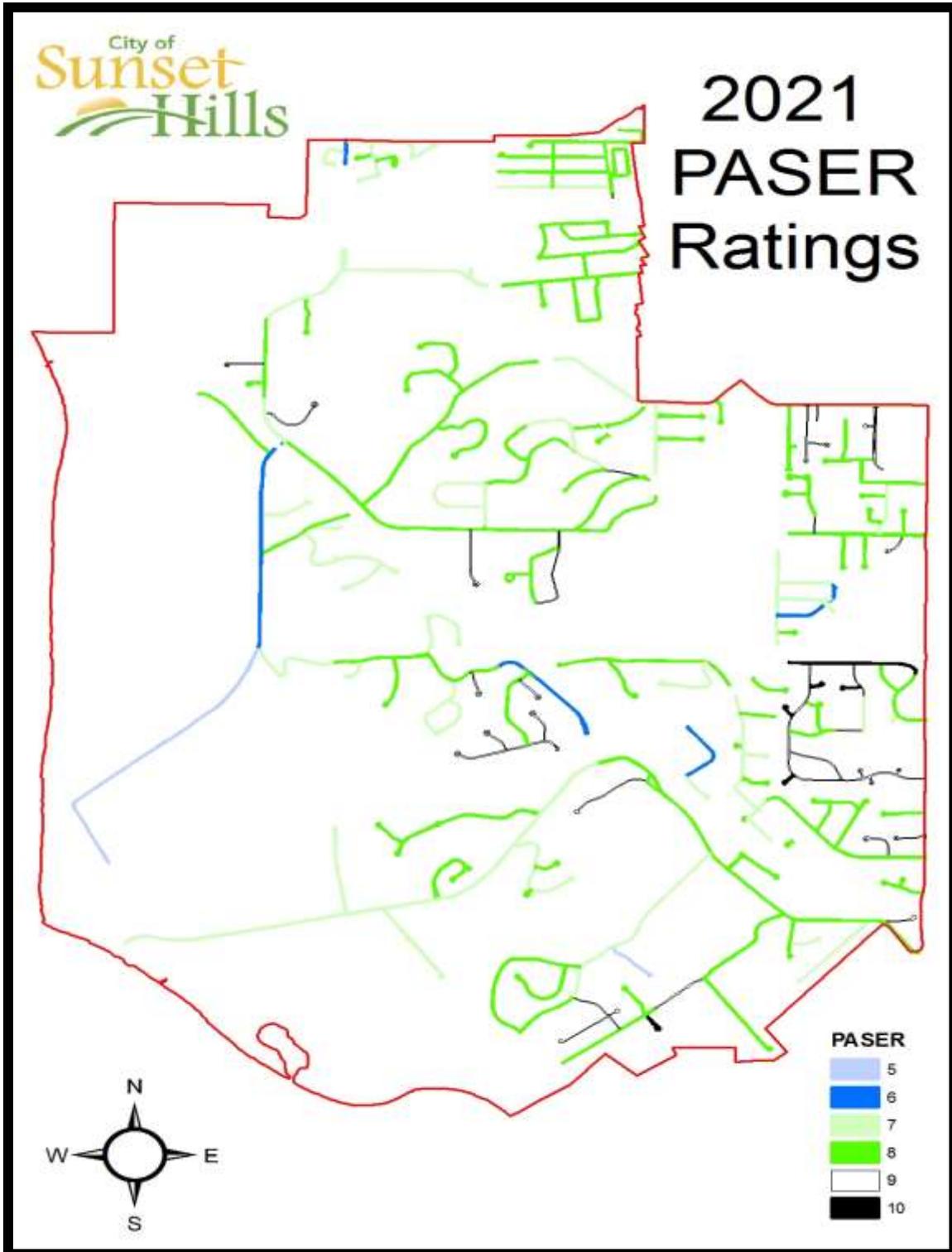
# City of Sunset Hills - 2022 Pavement Condition Results

Recently (3-1-22 to 3-4-22), City pavement was inspected for PASER ratings. As in past years, this data was input into the Pavement Management System, related into GIS, parsed into an Excel spreadsheet, and results graphed. This report will summarize the results with some commentary. Here are the results mapped for 2022:



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As opposed to last year, you'll note a relocation of the lower rated pavement in the 5-6 PASER range since we were able to get Weber Hill & Bridal Trail chip-sealed in 2021. Some of the W. Watson/Rott corridor shifted from 6's to the lighter blue of a 5 PASER. Also, aging Nova chip streets in Sunset Manor and the Richview subdivision are moving from the darker green of an 8 into the lighter green of a 7 PASER.



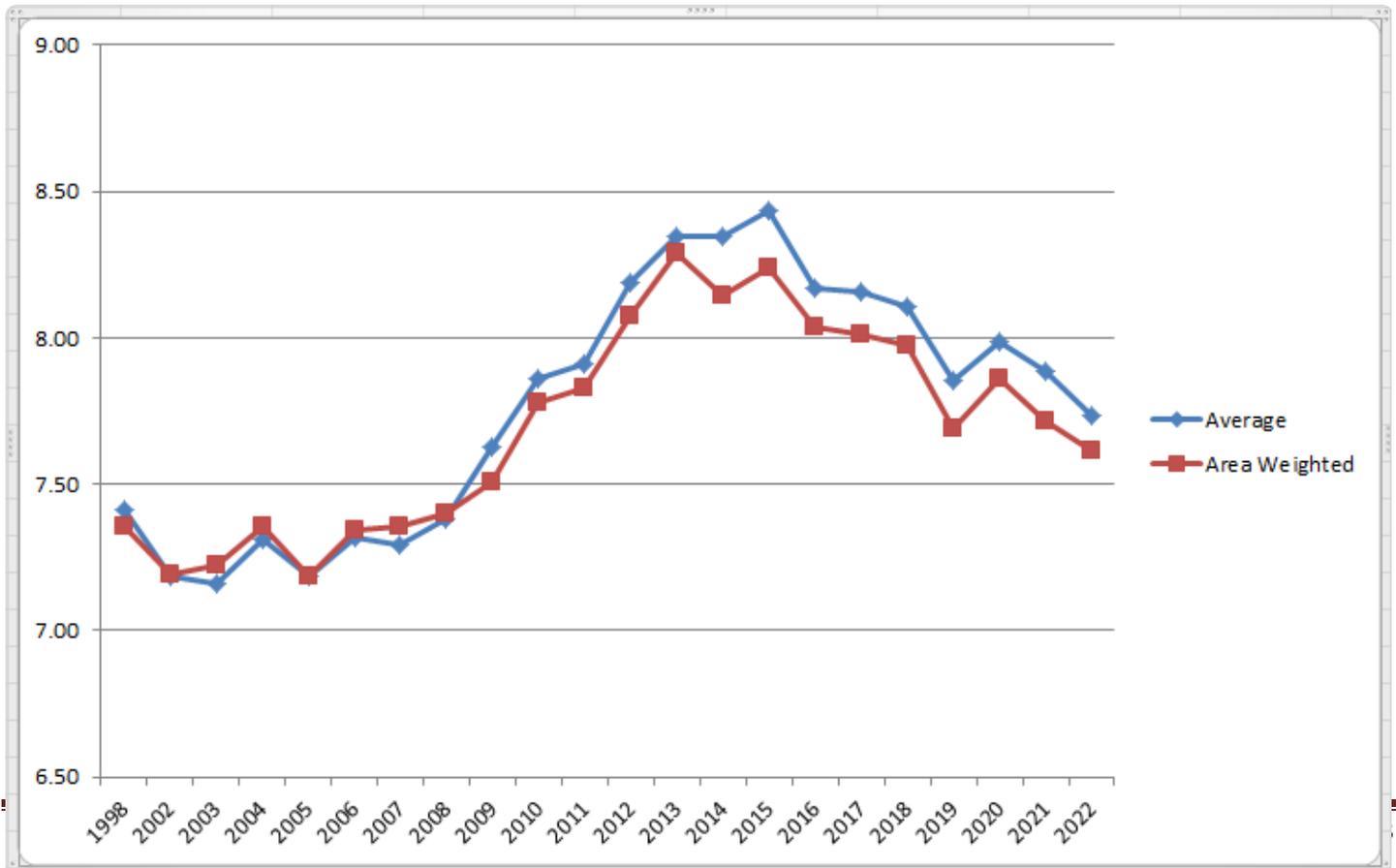
# City of Sunset Hills - 2022 Pavement Condition Results

If this report gets too detailed, uninteresting, or generally takes you too far into the weeds, I will try to give a bullet-point conclusion toward the end of this document to try to summarize the points made. We have some real concerns that can effectively be overcome, assuming we employ some cost effective tactics to keep our road network from becoming a much more costly asset to maintain.

Again, for 2022, it was anticipated that we would see some drop off in pavement quality due to limited resources allocated toward contracted work and the inability of our concrete contractor to complete over half the selected slab replacements in 2021, due to staffing shortages aligned with the Covid-19 economy. This will again place added emphasis on the targeted nature for project selection in 2022.

The highest area of degradation this year was the asphalt over concrete portion of the street network. Concrete seemed to be holding up pretty well. Once again I'll credit this to our in-house street department efforts to stave off the lack of contracted maintenance. The asphalt over concrete part of our network took a fairly significant hit this year with the noted degradation in Sunset Manor & Richview subdivisions. The Nova Chip application is merely a surface improvement like a chip seal, but is a bit more rigid and will not try to re-congeal over cracks in the pavement below. Both surface treatments will provide a reasonably good seal of asphalt pavement, thus extending pavement life by reducing the ability water to get to the sub-base and degrade pavement structure via freeze-thaw processes. Asphalt over concrete pavement also continues to provide in-house forces with a bit of follow-up work because of exposed concrete curb spalling, especially in front of driveways.

## Network-wide

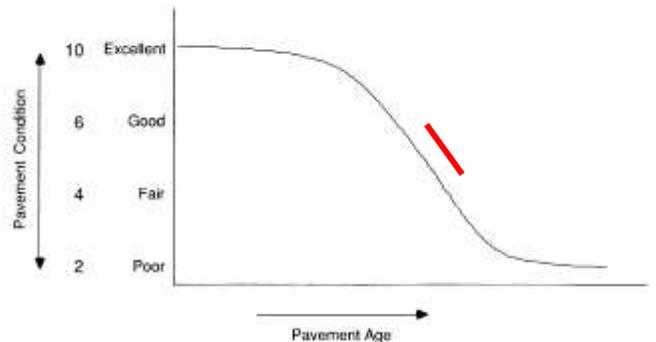


## City of Sunset Hills - 2022 Pavement Condition Results

The “Network-wide” graph confirms that we lost ground as earlier stated. Previous gains with chip seal to the asphalt portion of the City network will be dubious with a 40% reduction of this activity with the budgeted \$60K amount allocated for 2022. Hopefully we can continue to educate the public on why chip seals are the right application for the asphalt network. Again, this policy helps seal the pavement, deterring water from getting to the sub-base and creating structural failures via freeze-thaw processes in the winter months. The smaller ¼” aggregate chips seals have performed well, but again the limiting factor is the fact that chip seals are a “surface treatment” that will not enhance the structure of pavement. We are noting a re-congealing of the soft chip-seal material into the cracks of pavement below. We remain impressed with chip seals as a means to minimize, if not eliminate crack-seal maintenance of asphalt pavements. Also, we appreciate a couple of benefits of this chip seals where storm water grades are not negatively impacted and the process does not create ADA transition challenges. If you figure a 5 year rotation of chip seals to a particular asphalt pavement, with up to 2 re-applications, this represents a possible 15-year extension of a 20-year pavement life of a typical asphalt pavement. 35 years for 20, at a reasonable cost, that is substantial.

We expected to make gains in the concrete street network with \$300k of contracted, selected slab replacements in 2021. What we found was an increase of about 50% in the unit price of concrete work from about \$50/SY to \$75/SY and staffing shortages by the successful contractor really hurt this project last year. We are hearing this may still be a problem in 2022 with further anticipated increases in unit costs due to the current economic climate. While our in-house crew under Jerry Eime & Jason Miller continue to assist in this area, we are growing concerned that as a maintenance operation, we may be too reliant upon an activity that should be relegated to contract assignment. As stated before, our maintenance-oriented 11 man crew replaces about 50 slabs per year, with a current estimated contracted value of \$108K, up from just \$80K in last year’s report. With material cost running an estimated \$50K against that, the Street Department has been saving the City roughly \$58K per year with what would otherwise be considered a fixed cost.

We continue to see a negative impact to the further delay in the completion of the City Campus Paving project. While City Hall and Community Center areas are still in great shape from work in 2019, the remainder of the campus continues to alligator the asphalt pavement. This pavement is past the end of its service life. Areas continue to pop out and pothole. More patching will continue to be required. Further deference of this project is not advisable. Again, we are past the “end of life” area of the Quality versus Time curve regarding the performance of this pavement.



I may have to defend this to members if the Public Works committee, but West Watson/Rott continues to perform and should make it through this year until reconstruction planned for 2023 (Highway 30 to Weber Hill) and potentially 2025 for points north. Those projects will be accomplished via an LPA funding grant through MoDOT and East West Gateway. While the City will front the cost of that project, it will have an 80% reimbursement through the program.

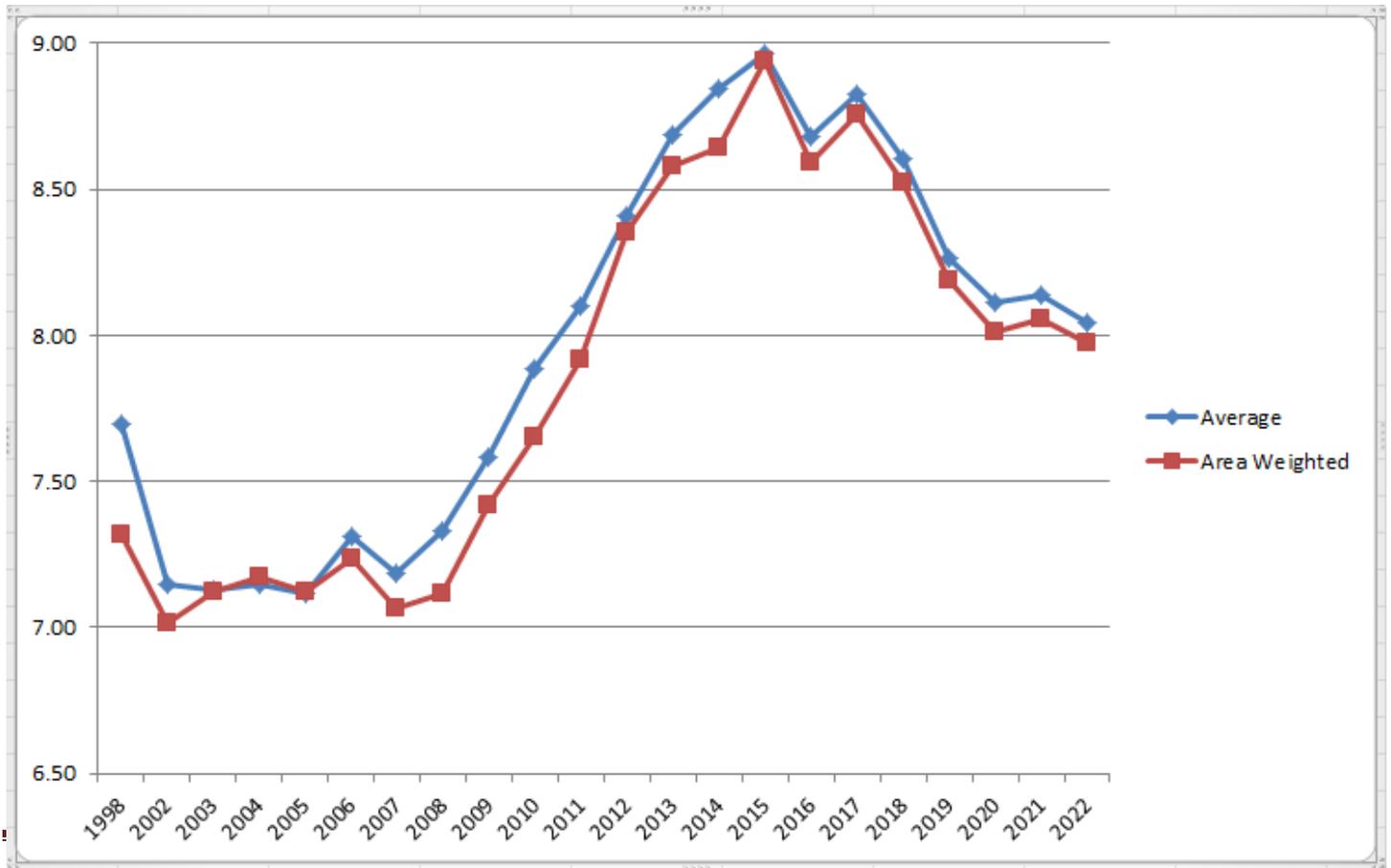
While we continue to “up the game toward asphalt street maintenance,” a further refinement of that would be the consideration of no longer trying to crack seal asphalt pavements, but chip sealing them instead. This conclusion is

## City of Sunset Hills - 2022 Pavement Condition Results

drawn from the consideration that joint sealing concrete pavement is a more quantifiable and effective process while asphalt pavement can more effectively be sealed via chip seals. This will also further augment the objective of a sustainable maintenance program complimentary for both concrete and asphalt related pavements. For those new to this report, in recent years, the Public Works Department noticed that several asphalt pavements were starting to fall into the “need for renovation via contracted work” category. Some of these were lengthy pavement sections. We mitigated more severe degradation (as promised) with small aggregate Chip Seals, as approved as a maintenance activity by the Public Works Committee in June of 2017. We have received a few isolated complaints regarding “knock-off” of the small aggregate Chip Seals, but the Street Department has been keenly reactive to these matters. This level of response allowed the apt perception that small aggregate Chip Seals are indeed the proper application for asphalt street pavement maintenance. This point needs apt and further communication to the public so the success thus far does not wain via inaccurate perception(s) of the benefits and proper application of ¼” aggregate chip seals. The chip seals from recent years continue to show excellent performance. Again, three chip seals, in successive 5-year intervals, should theoretically extend a normal 20-year asphalt service life to 35 years.

### Concrete Pavement

The downward trend of the concrete pavement (network wide) apparently resumed this year after being stemmed in-house last year. Again, this was the result of less than half of the completion of the 2021 contracted slab replacement. We dropped into the high 7’s on the PASER scale. (2021/8.06 – 2022/7.97)



## City of Sunset Hills - 2022 Pavement Condition Results

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We are attempting to address a concern with spalling concrete close to the joints of slabs. You may recall this was a prevalent problem in the Grandview subdivision. In-house, we are cutting these areas out, full depth, laterally across the entire width of the slab, drilling and placing rebar into the old existing slabs, re-pouring new concrete in the areas, finishing this flush into the old slabs, and placing a 2" groove back where the old joint was previously located to maintain original slab geometry. This is a very labor intensive operation, but replacement of both structurally sound slabs is cost prohibitive under contract. In the past, we've tried milling these areas out and replacing them with concrete or asphalt with little success. The Public Works Department continues to keep our collective eyes open for other possible solutions to this concrete joint-spall problem.

We've also noted that we are getting behind on joint sealing concrete pavement due to other road maintenance activities. We are looking into the possibility of contracting this activity out in an effort to catch up and keep sub-surface water to a minimum on concrete pavement. Again, this activity minimizes water getting into the sub-base and causing structural issues due to winter time freeze-thaw.

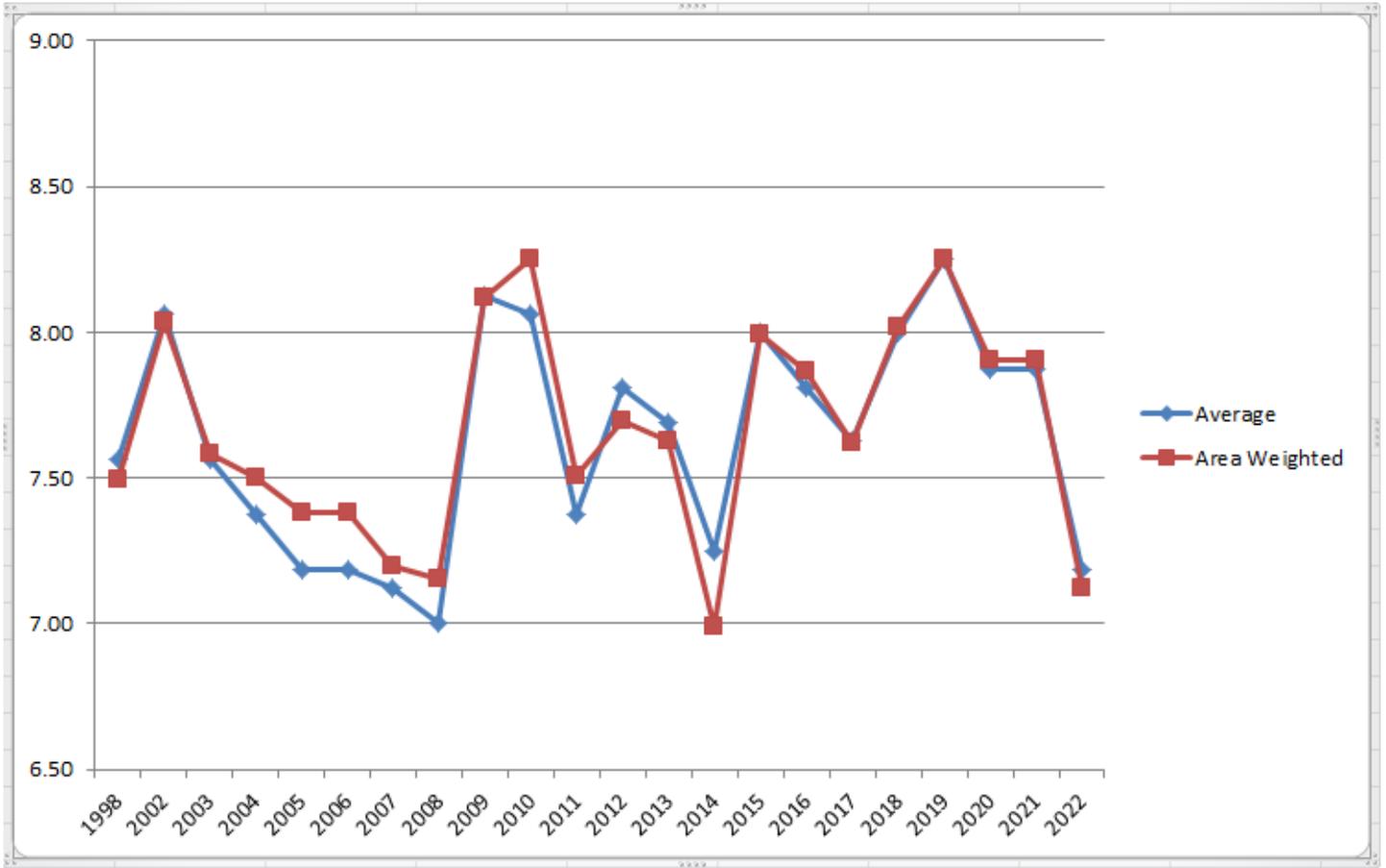
We again expect to spread out contract slab replacement in 2022 rather than a concentrated section of the City. We are not sure how much current economic forces will impact this effort, but we are anticipating even higher unit pricing in 2022. Concrete represents a substantial portion of our street network. There are 109 sections of concrete pavement, including 312,413 SY, or 44% of the City's street network. Any move of the average Concrete PASER will affect a more general trend of our overall performance of Pavement Management.

I just got off the phone (2pm – Monday, March 7, 2022) and our contractor from last year is asking that we rebid the slabs that they could not finish last year. I've asked them for a letter detailing what was explained to me over the phone for more detail. I'm being told we could help our packages to the tune of about 4-5% in unit cost if we go back to the 6 sack mix from the 7 sack. We specified the 7 sack mix when Kelpo Contracting added it (cost free) to get cars in and out of driveways in 3 days as opposed to a week and opening to traffic in a week as opposed to 10 days. We liked that the stronger mix concrete helped reduce resident construction stress toward quicker driveway access times. This may be something we are forced to relent upon, monitor out 7-day breaks closely and see if we can get residents in and out in 3 days with a 6 sack mix.

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# City of Sunset Hills - 2022 Pavement Condition Results

## Asphalt over Concrete Pavement



Asphalt over Concrete is a relatively small portion of our street network with 16 sections representing 51,920 SY, or 7% of the City's pavement. Dramatic moves of the Average PASER in this section of street pavement are anticipated each inspection year for these street sections. The last Nova Chip project in the City was now four years ago with the Richview subdivision. Nova Chip will reflect cracks in just a few years, so again we should anticipate the application of Chip Seal on these pavements in a couple of years. We understand there will be a need to separate out Nova pavements from regular asphalt pavements for first Chip Seal applications in the bid package. This is due to the porosity of the Nova Chip pavement requiring a higher amount of binder for the Chip Seal. Drops in the pavement quality were noted in the Sunset Manor & Richview subdivisions and account for the significant drop of the average PASER for the Asphalt over Concrete network of streets. (2021/7.91 – 2022/7.12)

# City of Sunset Hills - 2022 Pavement Condition Results

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## Full Depth Asphalt Pavement

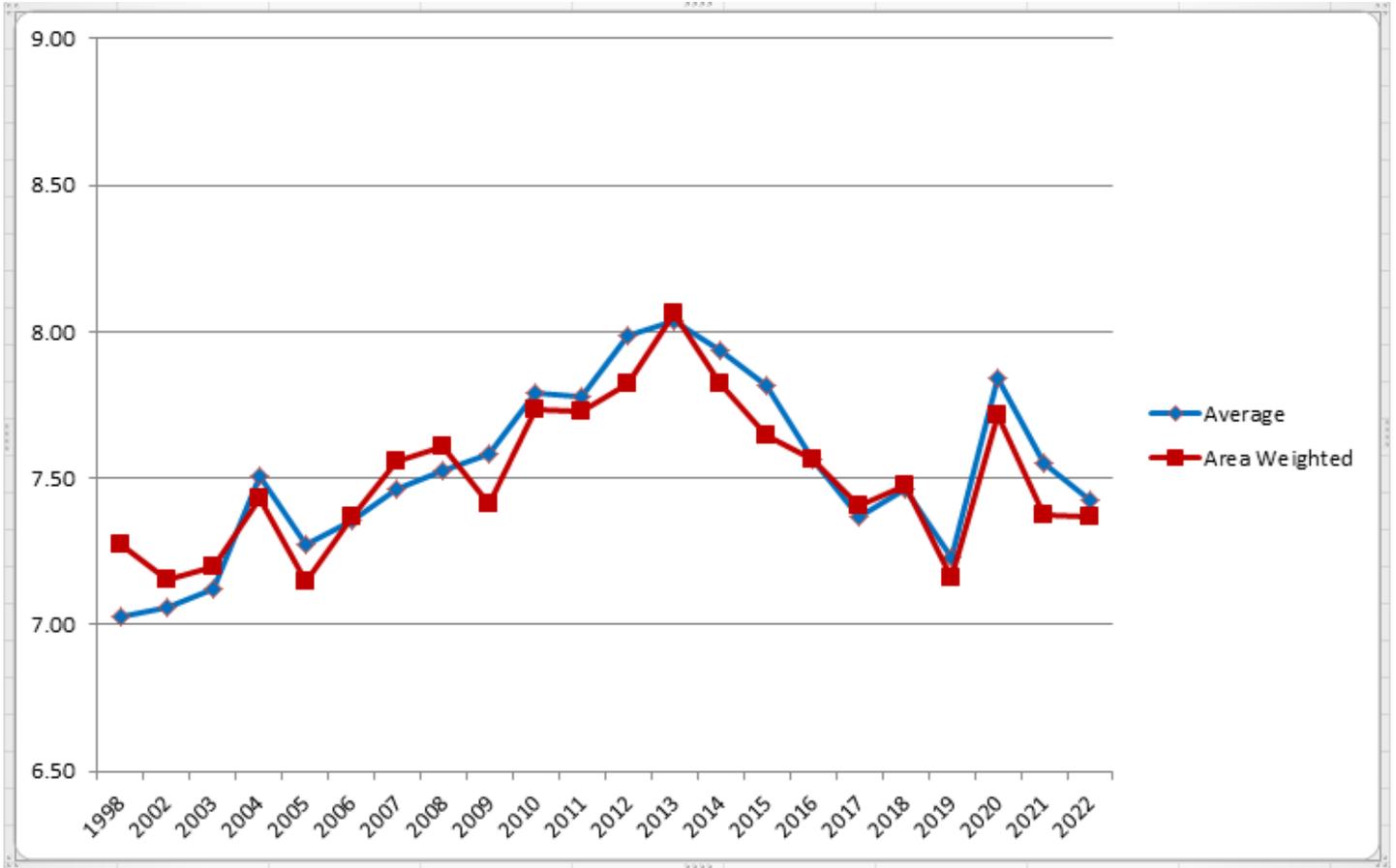
The following is repeated from previous reports for the benefit of anyone new to the Public Works Committee. *Asphalt pavement was challenging for the City to maintain since the "Say Yes" capital improvement program of the late 90's. We perform a number of industry leading activities designed to extend pavement life with CRF Seals, Reclamite, and now the small aggregate Chip Seals. The most effective of these was found to be a small aggregate form of the Chip Seal with 1/4" in lieu of 3/8" sieved rock. In the study of these treatments, the small aggregate Chip Seal has very little loose rock (aka "knock-off") after a week. Also, pavement markings can be re-established in a couple of weeks with temporary tabs laid down in the interim.*

*Via the blessing of the Public Works Committee in June of 2017, we've come up with the means to stem the proliferation of cracks in asphalt pavement via small aggregate chip seals. This process seals asphalt pavement so that winter freeze-thaw cycles have minimal effect on diminishing pavement structural integrity. Water will be kept from getting sub-surface. Construction duration is much shorter minimizing the stress on our residents and overall, Chip Seals (as a general maintenance activity) performed on an "every few year" basis, will keep our asphalt network performing on an improved level. The consideration here is full depth asphalt represents 82 lengthy sections of street. This is 351,408 SY, or 49% of our street network. One thing to consider, as chip seals represent a surface treatment, we need to continue the process and look for regular re-application to keep the structural integrity of the asphalt street network from falling off the end of the qualitative performance curve.*

*Anyone who might want to see the increased performance of a small aggregate chip seal over the 3/8" aggregate chip seal can see this demonstrated at the intersection of Oleander and Oleander Court. Oleander Court has the old style chip seal while Oleander Drive has the smaller 1/4" aggregate. Both of these surface treatments were placed in 2011.*

*From recent Chip Seal Projects, residents also have access to Maple, Robyn, Sunny Creek, Crooked Creek, Limestone Spur, Fox Glen, Denny, Hadley Hill,, Weber Hill, Mentz Hill Acres, and Zachary's Ridge for reference on how these pavement look and are performing. The application of this maintenance activity has now been made from high-end subdivisions (i.e. – Zachary's Ridge, Sunny Creek, Weber Hill, and Fox Glen) to un-curbed connector routes with poor storm handling capabilities (i.e. Robyn and Maple). The value of Chip Seals should now be readily viewable to all the residents of Sunset Hills as a viable and needed maintenance activity for asphalt pavements.*

## City of Sunset Hills - 2022 Pavement Condition Results



General trends on the Asphalt pavement graph above showed a significant upward spike with the work performed in 2019 when we were able to perform small aggregate chip seals on a number of longer connector routes in the City. Again, in that chip seals are a surface treatment, a lack of continuity in application will likely be reflected in the overall performance of the asphalt portion of the street network. Our budget (\$60K) for 2022 is lower than we would like to be able to perform for the Asphalt network of streets. It is imperative to properly seal the pavement to keep from having to apply more substantive repair costs if not full replacement of these pavements.

While the 2019 project included only 9 sections of the street network, the value of this improvement impacted 62,176 SY of asphalt pavement, or roughly 7% of the entire asphalt related network. Whether you view it by section or area impacted, we made substantial strides in being able to maintain our asphalt network of streets with the application of small aggregate chip seals.

# City of Sunset Hills - 2022 Pavement Condition Results

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## Conclusion

### Bullet-point summary

- The largest physical asset the City of Sunset Hills maintains is the road network, roughly calculated at value of \$825M (in today's maintenance dollars) for 47 centerline miles of asphalt (44%), concrete (49%), and asphalt over concrete (7%).
- For seven years, we've noted a declining average PASER rating over the entire street network (8.24/2015 to 7.61/2022) indicating we have been underfunding contracted road maintenance activity.
- Most street sections are still in reasonably good structural shape, but sealing the surface to keep water from going sub-surface and causing structural failure from freeze-thaw forces is paramount.
- **Concrete Notes:**
  - Concrete represents 44% of the street network where PASER ratings have declined in the past seven years. (8.94 / 2015 to 7.97 / 2022)
  - We used to be able to contract out to keep 1/3 of our concrete streets at a 9 PASER by replacing all slabs that were broken into 3 or more pieces.
  - Concrete unit pricing has risen 50% in recent years (\$50/SY to \$75). We might be able to achieve a 5% savings if we go back to using a 6 sack mix. We went to a 7-sack (stronger) mix to reduce resident stress to get them back into their driveways in 3 days versus a full week to achieve concrete strength.
  - Replacement is difficult work. Last year's contract could not be properly staffed with the Covid 19 economy.
  - Added concern over spalling joints in subdivisions like Grandview that we hope to address with in-house forces.
  - We need to improve our joint-sealing efforts on concrete streets in-house and maybe look to contracting this activity out if we can't get more streets caught up.
- **Asphalt Notes:**
  - Asphalt represents 49% of the street network where PASER ratings have moved up and down with some sizeable projects, but overall have declined for the past 9 years. (8.07/2013 to 7.37/2022)
  - In 2017, the Public Works Committee adopted small aggregate (¼" rock) Chip Seals as a pavement life extension policy for asphalt streets.
    - We performed numerous asphalt pavement maintenance activities before settling and proving that the small aggregate chip seals were the best option for keeping cracks to a minimum and thus water from going sub-surface on asphalt pavements.

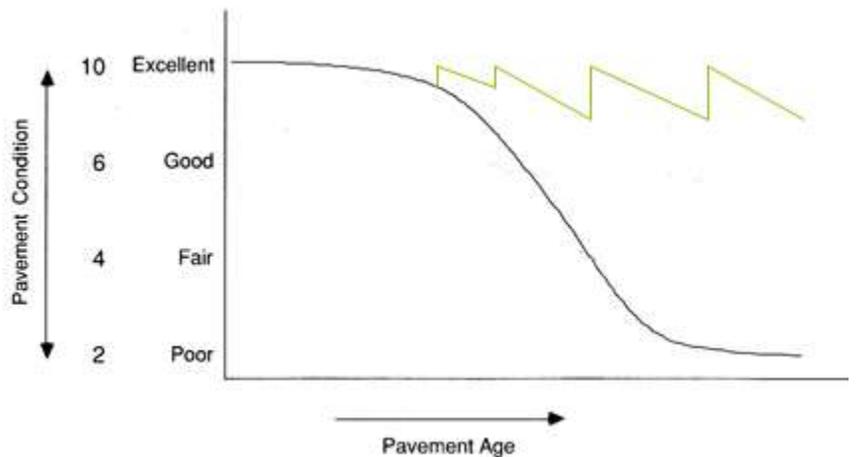
## City of Sunset Hills - 2022 Pavement Condition Results

- As a non-structural maintenance activity, a 5-year rotation of chip seal applied 3 times should theoretically extend a 20 year pavement life to 35 years at a reasonable cost.
  - Chip seals should virtually eliminate the need to crack seal asphalt pavements, which can prove difficult to quantify, and can frustrate personnel (what to seal and what to leave?)
  - Most asphalt pavements are still in decent structural shape to where a non-structural chip seal become most applicable as a maintenance activity.
  - ¼" aggregate chip seals have proven acceptable to Sunset Hills residents with very little “knock-off.”
- **Asphalt over Concrete Notes:**
    - Asphalt over Concrete represents 7% of the street network where PASER ratings vary widely with degradation and project selection.
    - Pavement for the most part is treated like a full-depth asphalt street and again, chip seals will eventually prove most effective in keeping these streets that are for the most part structurally sound from going down too fast.

Hopefully the notes above do a decent job of summarizing the details called out in this year’s report. I have to be honest; much of my conclusion comments from last year are mirrored in 2022. Below is an updated version of those comments.

Most of the City street network continues to enjoy relatively good structural pavement integrity. We are starting to note that more pavement seem to be trending toward the “contracted work” of pavement in the 5 or 6 PASER rating area. Generally speaking, once pavement goes past the 5-6 PASER range, you need to start planning on the complete replacement of the street since structural pavement loss becomes more prevalent.

Like the Fram Oil Filter commercials of old, “You can pay me now, or you can pay me later” should be part of determining our modus operandi. Less costly efforts to keep our pavement (across the board) properly sealed so water does not get into the sub-base and destroy the structural integrity, is the general concept here. Each bump up in pavement quality will extend substantially, pavement service life well into the future. This costs the City much less than what would be possible under a “let it go until it fails” philosophy.



## City of Sunset Hills - 2022 Pavement Condition Results

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Smaller, less costly surface treatments like chip seals for asphalt pavement and selected slab replacements for concrete pavements, need annual, uninterrupted funding to remain effective. To give an idea of the annual savings we are achieving here, figuring a 20 year pavement life for asphalt and a 25 year for concrete, Sunset Hills has:

	SF	Annual area	\$ to maintain	Assumptions
<b>Concrete</b>	2748713	109948.52	\$ 916,237.67	Annual budget @ \$75/SY
<b>Asphalt</b>	3072670	153633.5	\$ 2,987,318.06	Annual budget @ \$175/SY (8"X / 2"C thicknesses)
<b>A over C</b>	467276	23363.8	\$ 454,296.11	Annual budget @ \$175/SY (6" Concrete / 2"C asphalt thicknesses)
	6288659		\$ 4,357,851.83	

*(Updated to 2022 Maintenance Dollars)*

To be clear, there are some broad strokes in the assumptions to put the numbers together that you see above. Also, asphalt is highly dependent on oil pricing and you know the general trend in the price of oil at this time. Overall, this indicates we are currently & roughly funding 17% of the annual cost to fully replace City pavement(s). I would say that keeping our road network in the 7 PASER range may indicate how effective the City has been at targeting effective maintenance policies via the Pavement Management process performed in-house.

The point to consider, we would quickly head toward a \$4.3 million annual budget if we continue to under fund annual road maintenance budgets. It is imperative that we do all we can to maintain the current structural integrity of our pavement.

So there you have my Fram Oil filter-toting-mechanic’s analogy. For the next 2 years, you can count on my assistance to keep Sunset Hills ahead of the curve with regard to Pavement Management. If there are questions, suggestions, need for clarifications, or the need to add anything to this report, please do not hesitate to contact me.