TOWN OF RICO
INCORPORATED OCTOBER 11, 1879
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RE: Analysis of Road Paving and Maintenance Costs in the Town of Rico

The Town of Rico is considering whether it can cost-effectively pave and maintain Town roads, whether independently or as part of the Voluntary Cleanup Program (VCUP) negotiated with Atlantic Richfield Company (AR).

PAVING AS AN ELEMENT OF THE VCUP AGREEMENT:

The VCUP is being funded by AR. From the outset, it's important to understand that remediation of the roads (and yards) under the VCUP has from its inception been offered by AR as a like/kind or replacement-in-kind clean-up. Accordingly, and as explained further below, AR has not agreed, and will not agree, to pave the road and alley segments to be remediated under the VCUP. The one additional improvement the Town has negotiated as part of the VCUP is financial assistance associated with the design and construction of portions of a Town-wide stormwater management system so that the clean road material placed during remediation does not wash away, defeating the remediation effort.

PAVING BY THE TOWN:

The figure below was provided in a Kentucky Transportation Center study titled "When to Pave a Gravel Road" that was published by the EPA in 2015."[1] Yearly gravel road maintenance is around $1,400 per mile, with expenses higher in one year due to regraveling the surface in that year. The combined cost per mile of gravel road maintenance over a six-year period is $18,065 per mile. Chip seal, the cheapest maintenance for paved roads, costs $20,533 per mile to construct and has a 6-year life span. Estimated maintenance over that time could be $4,300, making the total cost over six years $24,833. It's important to remember that the Town currently maintains our gravel roads with Town public works staff and equipment. The paved road maintenance figures below do not factor in the cost of in-house labor/equipment vs. subcontracted labor/equipment.

[1] Source: https://www.epa.gov/sites/default/files/2015-10/documents/2003_07_24_nps_gravelroads_appd_0.pdf.

YEAR	1	2	3	4	5	6	TOTALS
GRADING							
Equipment	270	280	290	300	310	320	1,770
Labor	90	100	110	120	130	140	690
REGRAVEL							
Materials	–	–	4,000	–	–	–	4,000
Equipment	–	–	2,500	–	–	–	2,500
Labor	–	–	2,300	–	–	–	2,300
STABILIZATION/DUST CONTROL							
Materials	800	900	1,200	920	950	975	5,745
Equipment	30	35	70	40	50	60	285
Labor	100	110	150	125	140	150	775
Totals	1,290	1,425	10,620	1,505	1,580	1,645	$18,065

Figure 16: Gravel Road Maintenance Cost Per Mile

Let's consider the cost of a double surface treatment operation and the projected cost of maintaining it before anything major has to be done to the pavement (end of pavement life). We see in Figure 17 that the estimated cost to double surface treat one mile of road is $20,533. Estimated maintenance costs over a six-year period could be:

Patching	$1,800	Total maintenance	$4,300
Striping	$500	Construction	$20,533
Sealing	$2,000	Total cost over six years	$24,833
	$4,300		

When we compare this cost to the cost of maintaining an average mile of gravel road over the same period of six years ($18,065), we find a difference in dollar costs of $6,768.It is not cost beneficial to pave in this hypothetical example, even without considering the costs of road preparation (#7).

This is not a foolproof method, but it does give us a handle on relative maintenance costs in relation to paving costs and pavement life. The more accurate the information,the more accurate the comparisons will be. The same method can be used in helping to make the decision to turn paved roads back to gravel.

Option	Life	Cost Per Mile	Cost/Mile Per Year	Calculations	Maintenance Per Mile/Year
Chip Seal-Double Surface Treatment	6 yrs.	$20,533	$3,422	Based on price of $1.75 per sy; 20 ft. wide x 5,280 ft. = 105,600 sf 105,600 sf ÷ 9 = 11,733 sy s $1.75 = $20,533	?
Bituminous Concrete-Hot Mix	12 yrs.	$58,080	$4,840	Based on estimated price of $30 per ton; 1 sy of stone and hot mix/ cold mix 1" thick weighs about 110 lbs. Therefore 3" = 330 lbs. per sy. 11,733 sy (1 mile of pavement) s 330 lbs. = 3,871,890 lbs. 3,871,890 lbs. = 1936T x $30 = $58,080	?
Cold Mix	8 yrs.	$48,390	$6,048	At $30 per ton, using same formula as hot mix, 2 1/2" of cold mix equals 1,613T x $30 = $48,390	?

*These costs must be determined before any conclusions can be reached regarding the most cost-effective pavement method. The thinner the pavement, the greater the maintenance cost. Traffic, weather conditions, proper preparation before paving and many other factors can affect maintenance costs. No Kentucky data exists upon which to base estimates of maintenance costs on low volume roads of these paving options; and, therefore, we offer no conclusion as to the "best" way to pave.

Figure 17: Paving Options (Costs and road life are estimates and may vary)

One thing to consider is that user cost is always greater for gravel roads as materials are harder on tires, suspension, engine wear due to dust, etc.[2]

[2] Source: https://www.maine.gov/mdot/mlrc/docs/technical/WhenshouldIPaveaGravel%20Road.pdf.

"Traffic volume and weight directly affect road longevity. Several agencies recommend that roads with less than 50 average daily traffic (ADT) be unpaved."[3] Asphalt Pavement Solutions LLC recommends paving a road if it is travelled by more than 100 ADT, as that is the threshold where gravel road maintenance generally costs more than paved road maintenance.[4] The figure below from a University of New Hampshire tech memo shows that the cost of maintenance for gravel roads does not surpass the cost of asphalt (bituminous) until there are 100 ADT.[5]

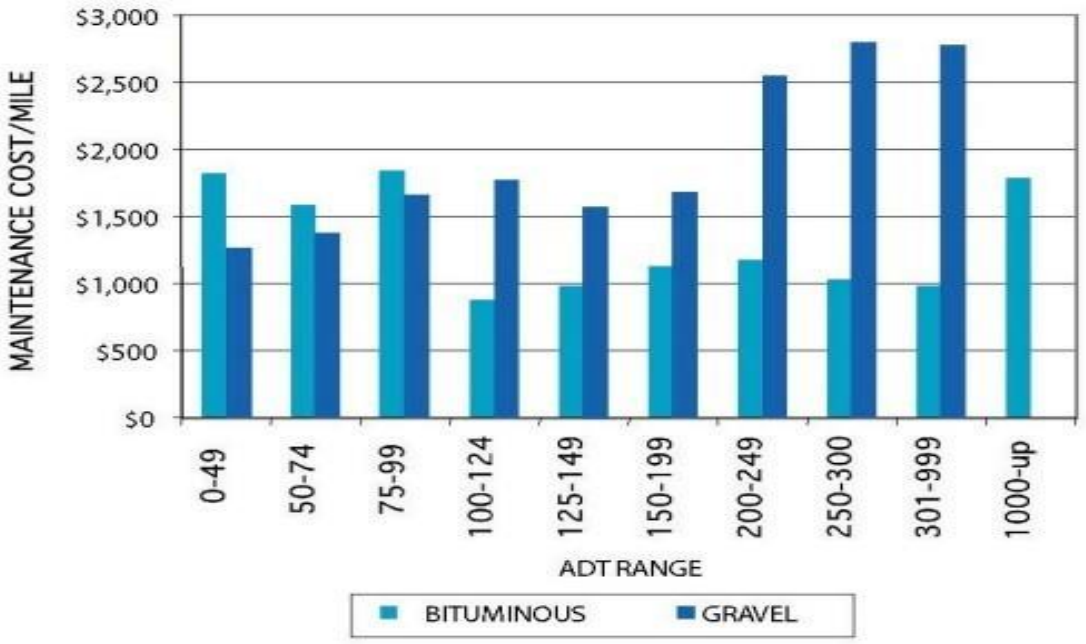

Figure 2. Maintenance Costs/Mile at Various Traffic Levels for One County

A traffic counter was installed at the intersection of Mantz and Commercial for a period of 10 days during the end of June. Average daily traffic at that intersection was 35.25 vehicles. An additional traffic counter was installed on Silver Street at the Silver Creek bridge crossing for a period of 10 days starting July 1, 2024. Average daily traffic on this section of Silver Street was 28 vehicles.

The Colona Montrose CDOT lane extension project is a similar distance to the amount of roads in Rico. (The project was bid in 2022 and is a straight road with fewer intersections, slopes, etc., so these estimates are lower, and they are not at current market prices.) The Colona Montrose project was bid at $25 per ton of class 2 fill/prep, $27 per ton of class 6 fill/prep and $280 per ton of asphalt installed.

[3] Source: https://www.maine.gov/mdot/mlrc/docs/technical/WhenshouldIPaveaGravel%20Road.pdf.
[4] Source: https://www.asphaltpavementsolutions.com/to-pave-or-not-to-pave/.
[5] Source: https://t2.unh.edu/sites/default/files/media/2022-11/to-pave-or-not-to-pave.pdf.

After speaking with Williams Construction, a local road construction company, Rico would need to do a full depth reclamation of our roads. According to Willams, full depth reclamation/preparation for purposes of paving would require milling or excavating down the top 12 inches, replacing at least 6 inches with class 2 aggregate and then 3 inches with class 6 aggregate. Asphalt depth recommended is 6 inches minimum; the less depth, the more maintenance required.

The estimated tons calculations below were generated using United Companies online material calculators with the assumption that the Town has 4 miles of roads at an average of 24 feet in width of traveled way:

Class 2 aggregate = 14,100 tons
Class 6 aggregate = 7,100 ton
Asphalt = 19,000 tons
Class 2 aggregate installed = $352,500
Class 6 aggregate installed = $191,700
Asphalt installed = $5.32 million

Rough estimate cost based on actual 2022 bid numbers = 5.87 million. This price does not include the cost of milling or striping. The current cost for these materials being delivered to Rico is actually higher than United Companies' estimate. For example, Class 6 Aggregate in Rico currently costs up to $55 per ton, increasing the cost of installed asphalt by almost $300,000.

We have inquired as to whether in the lead soils remediation (VCUP) context, more of the existing road material can be left in place if the roads were to be paved. Paving the roads as part of remediation would still require removing and disposing of the top 9-12 inches of milled materials. We understand at this juncture that paving as part of remediation would not mean removal of less materials and in fact could result in additional excavation in order to correctly install paved roads. AR has also reminded us that paving is not within the scope of road remediation work included in or otherwise contemplated by the Rico Townsite VCUP Plan that has already been developed and approved by the State. As noted above, the VCUP remediation contemplates like/in-kind replacement of roads/yards to be remediated consistent with the existing infrastructure. Only 19% (approximately 6700 feet) of Rico's roads and alleys require remediation under the VCUP.

Additionally, paved roads would also require a more robust stormwater management system than that required for Rico's gravel roads. For the existing unpaved road system, the initial estimated cost for a stormwater management system in the Town's central area, which excludes outlying areas that are hydrologically separate, namely Piedmont, West Rico, and Silverglance, is approximately $4 million. This number is not based on bids. Rico has negotiated for AR's financial assistance associated with the design and construction of portions of the stormwater management system, since Rico will be responsible for maintaining the remediated cap on the roads once the remediation work is done. To manage runoff from a paved road system, additional controls, to include larger drainage ditches and curbs/gutters may be required. This could increase stormwater system costs significantly.

Based on the above research, paving Rico's roads is not warranted at this time. ADT on Town roads is below the threshold at which gravel road maintenance generally costs more than paved road maintenance. The Town currently lacks funds for both installation and maintenance of paved roads, and no cost savings would be realized by paving the roads in conjunction with the VCUP. However, understanding that many Town residents are interested in paved roads, the Town Board may put road paving on its work plan to start moving in that direction, independent of the VCUP. Interim steps may include paving of some but not all roads, road assessments to pay for initial paving of roads, and a mill levy increase to cover maintenance of roads.