Proposal To Improve The Quality of BEM Roads

Curt Loomis 10-17-20

Big Elk Meadows Roads

As a member of the Long Range Planning Committee we were looking at how we could use funds, if we had extra income. I decided to do a deep dive into the road situation and called a number of companies and talked to the BEM Operations Manager to get this information.

- **Since the 2013 Flood, a lot of money has been invested in Big Elk Meadows making it a much better place to live**
- **One of the biggest issues left to address is the roads. I break this down into two categories:**
  - **The 2 mile long entry road**
  - **The 2.5 miles of interior roads**

Big Elk Meadows Entry Road

Current Issues with the Entry Road

- **Dust and washboards are the biggest issue. Due to the normal speeds a member drives on the entry road, at least 4-5 months of the year.**
- **At least 4 homes are significantly effected by the greater dust from the entry road before residents slow down to the lower speeds of the interior roads at Mirror Lake or up Hickory Dr.**
- **It is almost impossible to walk or ride a bike on the entry road due to the dust unless you wear a mask**
- **Cars need more maintenance to clean their filters and there is wear on suspensions from the bumps.**
- **The dust clouds can be so intense and with a low sun there is a potential for accidents**
- **The values of homes in the community would go up a bit having an entry road that provides a better entry experience without blinding dust clouds and bumps**
- **We have to grade the road on a regular basis to keep down the washboards and the more we grade, the more road base we have to add.**
- **The dust is suffocating. It hangs in the air and travels for blocks effecting the health of people breathing it.**

EPA Particle Pollution*

- **Coarse dust particles (PM_{10})** are 2.5 to 10 micrometers in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads.
- **Fine particles ($PM_{2.5}$)** are 2.5 micrometers in diameter or smaller, and can only be seen with an electron microscope. Fine particles are produced from all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes

- **HEALTH EFFECTS**

  People with heart or lung diseases, older adults and children are most likely to be affected by particle pollution exposure. However, even if you are healthy, you may feel temporary symptoms if you are exposed to high levels of particle pollution. Numerous scientific studies connect particle pollution exposure to a variety of health issues, including:
- irritation of the eyes, nose and throat
- coughing, chest tightness and shortness of breath
- reduced lung function
- irregular heartbeat
- asthma attacks
- heart attacks
- premature death in people with heart or lung disease

* https://cfpub.epa.gov/airnow/index.cfm?action=aqibasics.particle

Big Elk Meadows Entry Road

To cut dust and stabilize the roads we have a number of options:

(Stabilization means laying a road base that is a consistent depth without rocks sticking up in various places so the base is smooth)

- **Pave with Asphalt which would require a stabilization of the road bed before Asphalt could be applied.**
- **Stabilize the road bed and apply recycled Asphalt.**
- **Stabilize the road bed and add a material called Road Genesis that will not effect lake health and will bind the road bed and cut the dust.**
- **Apply a Chloride base solution like Mag Chloride to address dust only which may effect lake health and requires 2 or 3 applications over a year period. If you put it down, it does not stabilize the road and cut the bumps and the road can not be bladed until the next application. (I did not consider this option due to lack of stabilization and potential issues with the lakes.)**

Big Elk Meadows Entry Road Options Estimated 40 Year Cost*

Pave Road with Asphalt - $2,753,750 (Annual Cost per member $430)

- This would require Road Engineering
- Stabilize the Entry road before applying Asphalt
- Apply Asphalt
- Chip Seal Maintenance every 3-8 Years
- New Asphalt is recommended after 20 years

Pave Road with Recycled Asphalt – 1,753,750 (Annual Cost per member $274)

- This would require Road Engineering
- Stabilize the Entry road before applying Asphalt
- Apply Asphalt
- Chip Seal Maintenance every 3-8 Years
- New Asphalt is recommended after 20 years

Improve Road and Seal Surface - $255,551 (Annual Cost $39.93 per member)

- Stabilize the Entry road before applying product to seal surface
- The Product to seal surface will not effect the lakes
- Water will activate the product and allow it to rejuvenate
- Reapply a limited amount of new product once a year to tighten bond and cut any dust.

* In todays dollars, Detailed Costs in Appendix For Asphalt Options

Sealed Entry Road Option Estimated 40 Year Cost*

Sealed Road Base (Assumes BEM personnel does the installation)			
Install Cost	**Costs**	**Notes**	
Water Truck	$ -	Big Elk Meadows Has this in Next Years Budget	
Rent Roller 1 Week	$ 2,270	BOMAG BW211 D5 84" Quote H&M Equipment, including Delivery and Pickup	
2- 6,000 Gallon Water Tanks	$ 10,000	initial purchase cost, stored out of sight when not used. Assumes we have trailer and pump	
4"Road Base	$ 91,667	4074 Tons at $22.5 per ton delivered to cover 2 mile entry road	
Binding Agent Delivered	$ 38,645	Road Genesis Environmentally Friendly, 4 coats initial application	
Total Initial Price	**$ 142,582**		
Annual Maintenance	**Cost**	**Note**	
Binding Agent	$ 6,348	One application every other year	
Road Base Savings	$ (3,375)	10 Truck Loads, 15 tons @ at $22.50 Ton,	
Total Annual Maintenance	**$ 2,973**		
40 Year Maintenance	**Cost**	**Note**	
	$ 255,551	**Total Cost**	
	$ 891.14	**initial Cost Per Member (Assumes 160 members)**	
	$ 39.93	**Annual Cost per member per year over 40 years in todays dollars**	

* In todays dollars

Road Genesis Surface

- Affordable RV Storage Entry Road 1/3 Mile, Weld County
- Applied 18 months ago $20K cost with 4” new road base
- 850 RV’s stored there, peak days 400 Round Trips on the road
- No dust, no loss of Road Base no movement after 16 Mo’s
- Only issue was where culvert failed

Big Elk Meadows Sealed Entry Road Proposed Action Plan

- Recommendation is to investigate using the Road Genesis solution as a long term method to improve our entry road. It is potentially the most cost effective option to accomplish our goals.
- After Big Elk Meadows buys a water truck, which is currently in the future budget, we will have all of the equipment required to do annual maintenance ourselves.
- I suggest we investigate this solution with a Crawl Walk Run approach to see, if it works in BEM
- I suggest we use a contractor to install a test strip on the entry road for 150' somewhere between the entry gate area and Mirror lake. Preferably on a steep section where washboards develop. We can watch see how it is installed and learn how to do it ourselves. (Detailed bid in the Appendix.)
- A bid for the test strip is in the Appendix at $4,345 assuming the contractor could use our grader.
- If after a 1 year test and this seems to work, retreat with new material and verify the longer term performance in our mountain environment
- After a second year and if there were funds, consider treating the whole Entry road or just a portion from the gate to Mirror Lake.

FAQ's/Questions

FAQ

- Would a rental roller work on our roads. The roller specked can handle over 45 degree grades. We don't need a roller unless there is an initial installation.
- The more moisture the better the agent rebinds with water.
- With BEM owning a water truck they could water the road occasionally during a long drought and it will rebind the road.
- We don't need to use treated water to mix with product, filtered lake water will do
- The product is delivered by a tanker truck and mixed 50/50 with water.
- Road Genesis Installation video and instructions below http://www.loomix.com/products/industrial-products/

Questions answered with a test strip

- Will the grade of the road effect the product
- Will winter plowing effect the product
- Will a heavy rain effect the product
- We put down sand for traction in the winter. Will we have to sweep it away in the spring?

Big Elk Meadows Entry Road Sealed Road Summary

Issues addressed, if we sealed the road :

- **Dust would be mitigated**
- **4 Homeowners along the entry road would not have to have dust all over their homes**
- **We could walk or ride bikes on the entry road during warmer months without effecting our health**
- **Cars would need less maintenance and the ride would be smooth**
- **The values of homes in the community would go up a bit with a more refined entry experience.**
- **We should not have to grade the entry road on a regular basis any more, freeing up Maintenance Personal and lowering grader wear and tear.**
- **We will save on our annual road base cost for the entry road.***

*Studies have shown one ton loss of aggregate per mile lost each year for each vehicle that travels the road on a daily regime. 100 vehicles yearly will result in a loss of approximately 200 tons of aggregate over two miles.

Big Elk Meadows Entry Interior Roads

- Dust on the interior roads is lower due to the lower speeds cars travel. However due to the unprecedented drought in the summer of 2020, the speed limit was lowered to 10 MPH to lessen dust in all of the BEM interior roads
- However we still have some issues in certain areas. Should the Road Genesis solution work on the exterior road we could treat areas of significant concern and high traffic.
- The product could also be used for one time dust control in key areas without trying to stabilize the roads. Product cost is not that expensive.

Big Elk Meadows Roads Wrap Up

- We have an issue that effects everyone in BEM
- This approach provides an extremely affordable way to investigate a solution to see, if it works and then as future budgets dictate, consider expansion to more areas.

<u>Funding Options for Phase 1 Test Strip</u>

- BEM finds $4,345 in the current budget to do a test strip
- Assuming the BEM board likes the presentation, a summary could be presented to the members to see, if members would provide contributions to pay for the test strip. This would also help the board gauge how important this issue is to the members.

<u>Funding Options for Phase 2 Implantation on Entry Road</u>

- BEMA does a one time special assessment to fund initial installation $891 per member
- BEMA applies for and gets a grant
- BEMA LRPC provides ideas to generate new funds for this project
- BEMA get's loan to fund the initial installation (A $145K loan for 10 Years at 6% interest would a payment of $1,609 per month, $19,308 per year. Or $121 per member per year, if this was added to the annual dues.)

Appendix

Big Elk Meadows Roads Appendix – Bid for 150' Test Strip Two Different Products

January 2, 2020

Curt Loomis
Big Elk Meadows
751 Hickory Lane Drive
Lyons, CO

Re: Rapid Energy Scope of Work & Bid

150 ft. Test Strip with Road Genesis		
Trucking & Material	$2,400	
Road Genesis and Application		$1,695
Blade, Roller and Mobilization		$2,750
Total:		**$6,845**

If we use BEM's Grader, that would save about $2,500.00 for the machine and hauling for a total of **$4,345.**

The products should perform well in the shady and hilly areas. We may have to add a little extra product around tight corners and shady areas.

Big Elk Meadows Roads Appendix –Asphalt 40 Year Cost Estimate

Asphalt		
Install Cost	Costs	Notes
Road Engineering	$ 20,000	Need to verify Estimate
Road Base	$ 71,875	Assumes 125 Truck Loads at $575@ assume BEMA installs Road Base
Asphalt and Spread	$ 1,000,000	Assume $500K per mile, 4" Asphalt 24' Wide
3rd Party Roadwork		TBD
Total Price Asphalt	$ 1,091,875	
Annual Maintenance	Cost	Note
Seal Cracks	$ 5,000	Need to Verify
Fix Potholes	$ 10,000	Need to Verify
Chip Seal (Optional)	TBD	Usually you put down Chip Seal 3-5 Years after initial Installation of Asphalt and then every 6-8 Years
40 Year Maintenance	Cost	Note
	$ 2,753,750	Life is approx. 20 Years so factor replacement in 20 Years Amount in Current Dollars
	$ 6,824.22	initial Cost Per Member (Assumes 160 members)
	$ 430.27	Annual Cost per member per year over 40 years in todays dollars

Big Elk Meadows Roads Appendix – Recycled Asphalt 40 Year Cost Estimate

Recycled Asphalt		
Install Cost	Costs	Notes
Road Engineering	$ 20,000	Need to verify Estimate
Road Base	$ 71,875	Assumes 125 Truck Loads at $575@ assume BEMA installs Road Base
Asphalt and Spread	$ 500,000	Assume $500K per mile, 4" Asphalt 24' Wide
3rd Party Roadwork		TBD
Total Price Asphalt	$ 591,875	
Annual Maintenance	Cost	Note
Seal Cracks	$ 5,000	Need to Verify
Fix Potholes	$ 10,000	Need to Verify
Chip Seal (Optional)	TBD	Usually you put down Chip Seal 3-5 Years after initial Installation of Asphalt and then every 6-8 Years, Cost $5.00 Yard
40 Year Maintenance	Cost	Note
	$ 1,753,750	Life is approx. 20 Years so factor replacement in 20 Years Amount in Current Dollars
	$ 3,699.22	initial Cost Per Member (Assumes 160 members)
	$ 274.02	Annual Cost per member per year over 40 years in todays dollars