Virginia City Highlands
Property Owners' Association
P.O Box 686 • Virginia City • NV • 89440
775-847-7000 (phone) www.vchpoa.org

List of Annual Repair, Restoration and Improvements (LARRRI) and Road Maintenance Plan - 2009

Presented by:
VCHPOA Roads Committee

Roads Committee

The Roads Committee was formed in 2008 to oversee the gravel road maintenance.

The mission of the Roads Committee is to maintain and improve the quality of the gravel roads throughout the Virginia City Highlands (VCH) , 1-acre properties, with the most efficient practices available.

The Roads Committee will utilize the Road Management Guidelines and Road Maintenance Plan, and propose revisions to the plan based on the performance of the implemented road maintenance techniques.

Roads Committee Members:

Steve Morrow, Committee Chairman
Bob Moore, Roads Manager
Harry Stanley, Member
James Stewart, Member
Lenny Wenrick, Member
Jed Margolin, Member

All LARRRI and Road Maintenance Plan decisions are made by the Roads Committee members and require a majority vote of the Committee before presentation to the Board for approval.

- **2006 – 2007 LARRRI**
- **Fall 2006 Projects**
  - X **Repair, reshape and rip rap ditches as needed along length of Sazarac Rd**.
    - Labor – 2 people for eight 8hr days. Approx Cost: $3,200
    - Rip rap stone. Approx Cost: Free, donated.
    - Equipment – Loader. Approx Cost: Fuel Only $150
    - Equipment – Backhoe for 1 day. Approx Cost: $1000
  - ***Total Budget + 20%: $4,350.00***
  - X **Install 6 Culverts to Improve Drainage.**
    - Labor – 2 people for three 8hr days. Approx Cost: $1,200
    - Equipment – Backhoe for 3 days. Approx Cost: $1,200
    - Material – 6-18" Culverts 20' long. Approx Cost: $3,000
  - ***Total Budget + 20%: $6000.00***

- **Spring 2007**
  - X **Spring Maintenance grading ****funding from operating budget**
    - Labor – 1 person for 15 days. Approx Cost $3000
    - Equipment
      - Motor Grader 15 day fuel only. Approx Cost $500
  - ***Total Budget + 10%: $3,850.00***
  - X **Rebuild Empire Rd, Sazarac Rd, Agate Rd. and as much of Clemons* and Panhandle* , approximately 15,000 total linear feet.**
    - Labor – 2 people for thirteen 8hr days. Approx Cost: $4,400
    - Equipment
      - Compactor rental for 13 days. Approx Cost: $2400
      - Backhoe Rental. Approx Cost: $2400
      - Motor Grader 13 days fuel only: Approx Cost: $700
      - Water Truck 13 days fuel only: Approx Cost: $500
        - » Material – 3/4" Road Base. Approx Cost $78,000
  - ***Total Budget + 10%: $97,250.00***

- **Funding**
  - **Fall 2006: $15,350**
  - **Spring 2007: $97,250**

- **Total for 2006-2007: $112,600**
- **Adopted July 22, 2006 at the Annual Meeting of the owners.**

Additional 2007 Road Work

- 2007 annual meeting minutes
- Perform work on approximately 3.38 miles on road including:

- Sazarac, Empire, Panhandle and Clemens

2008 Road Work

Road Rebuild Work

- Import: ¾ inch road base
- Existing road scarified to greatest depth allowable and blended with imported road base
- Moisture conditioned
- Graded
- Compacted (Vibratory drum roller)

2008 Road Rebuild Inventory

- Hermit
- Calaveras
- Bonanza
- Highland / Highland Spur
- Crestview / Fey
- Delta, Sutro and Colt

(Approximately 3.7miles)

- Dortort: Scarified, moisture conditioned, graded and compacted. (no import rock)

Magnesium Chloride ($MgCl_2$)

- Test application to approximately 3 miles
- Agate, Empire, Dortort, Sazarac, Clemens (from Empire to Panhandle) and Panhandle
- Omitted application to the hills on Sazarac and Empire ($MgCl_2$ can get slick when wet)

Magnesium Chloride ($MgCl_2$)

Lessons Learned:

- Applying water to the treated roads, approximately 1 application per 3-4 weeks would have increased the overall performance and longevity of the $MgCl_2$.
- $MgCl_2$ can get slick when wet, when there is an increased amount of fines (clay) on the surface of the road. Dortort was noted as being slick following snow melt or rain events.
- Roads that exhibit slick conditions would require the addition of more rock in the upper surface of the road to mitigate this in the future.

Magnesium Chloride ($MgCl_2$)

Lessons Learned:

- Residual $MgCl_2$ has been observed to be in the road surface following the 2009 Spring road regrading work.

- In order to be effective for the long term, $MgCl_2$ would have to be applied on an annual basis on some the roads with occasional watering.

2009 Roads Evaluation

- Roads Committee toured all 13.9 miles of roads over two weeks following Spring grading touch up work.
- Based on Spring 2009 observations:
  - Several roads require full road rebuild with the importation of 3/4in road base.
  - Several roads will need grading, moisture conditioning and roller compacting without the addition of new rock.

2009 Roads Evaluation

- General road crown and ditch work will be performed as a part of the road preparation work.
- Major culverts will be maintained as necessary.
- Should be noted that all of the residents are responsible for maintaining the culverts that are associated with their own property.

2009 Roads Evaluation

- It was also determined that to improve the quality of our roads over the long term that a dust suppression and road stabilization program be implemented as part of the annual road plan.

- The Roads Plan calls for the use of dust suppression and road stabilization products if necessary.

- Reduce the dust to maintain the fines (clay) in the road necessary to bind the sand in gravel in the road.

2009 Roads Evaluation

- Less Import rock required
- Hold moisture in the soil matrix which provides for a longer service life for the treated road surface.
- No dust and better roads makes our community a better place to live.

2009 Roads Evaluation

- Three dust suppression / road stabilization (DS/RS) products are being evaluated:
  - Magnesium Chloride ($MgCl_2$),
  - Ammonium Lignosulfonate (Lignin) and
  - $MgCl_2$ / Organic Polymer Blend (Durablend)

Magnesium Chloride ($MgCl_2$)

- Pulls moisture from the atmosphere
- Holds on to moisture from watering
- Builds up over time - additive
- Acts to stabilize road surface by maintaining the fines and moisture
- Should water every few weeks or as needed to increase product longevity
- Less expensive per application
- Chlorides can mobilize into ditches

Ammonium Lignosulfonate (Lignin)

- Non-Chloride
- GLUES the road together - not hygroscopic - not as slick
- More viscous, does not penetrate as easily, surfactants required
- Does not require water until in begins to break down and dust is present

Ammonium Lignosulfonate (Lignin)

- Watering will temporarily suppress dust, will not hold the moisture
- Can become brittle
- Some residual lignin builds up over time – additive
- Suppliers say that it works as well as $MgCl_2$
- Higher cost per application
- Ammonia can mobilize into ditches

DuraBlend

- DuraBlend is $MgCl_2$ with an organic polymer added to reduce the amount and mobility of the $MgCl_2$
- Stays in the road longer by design
  - More residual
  - Last as long as full mag application
- ½ the magnesium chloride
- Better friction in moisture conditions, less slick
- Reduces dust and helps to stabilize the road
- Enhanced bonding ability
- Reduces migration of chloride—both vertically and horizontally

Dust Suppression / Road Stabilization Product Costs

Lignin	Envirotech	GE
Per truck, 1.2 mi	$11,500	$15,150
5.5 miles (rail car)	$29,100	$70,965
11 miles (2 rail cars)	$58,200	$141,930
13.9 miles	$73,531	$179,348

Mag Chloride	Envirotech	Allied Washoe
per mile	$3,897	$4,223
5 miles (major roads per Road Plan)	$19,485	$21,114
8 miles	$31,176	$33,782.40
13.9 miles	$54,168	$58,696.92

DuraBlend	Envirotech
per mile	$3,362
5 miles (major roads per Road Plan)	$16,810
6 miles	$20,172
13.9 miles	$46,732

2009 LARRRI & Road Plan

Road Rebuild

Alpine
Appaloosa
Applegate
Bowie
Clemens
Goodman
Grizzley
Harte
Morgan
Mustang
Palamino
Pine Nut
Prospect
Saddleback
Silverado
Stallion

3.5 miles

- Import ¾ in base
- Scarify
- Moisture condition
- Grade, crown
- Roller compact

- Improve ditches

Description	Mileage	Cost
Proposed road rebuild	~3.5	**$53,125**
(costs estimated from 2008 rates, includes rock, all labor and rental costs)		

2009 LARRRI & Road Plan

- Rework the remaining roads throughout highlands 1 acres
  - Approximately 10.4 miles

- Moisture condition
- Grade, crown
- Roller compact

- Improve ditches

Road Work	10.4 miles	**$13,428**

2009 LARRRI & Road Plan

- Dust Suppression and Road Stabilization
  - Reduce dust and keep the fines (clay) in the road
  - Increase road stability and longer service life
- Propose applying
  - 3.6 miles of $MgCl_2$
  - 9.8 miles of DuraBlend

Mixed quote: Mag, Durablend

3.6 miles of Magnesium Chloride	**$14,023**
9.8 miles of DuraBlend	**$33,047**
Total	**$47,070**

2009 LARRRI & Road Plan

Description	Mileage	Cost
Proposed Road Rebuild	3.5 miles	**$53,125**
(costs prorated from 2008 rates, includes rock, all labor and rental costs)		
Proposed DS/RS Application	13.4 miles	**$47,070**
VCHPOA Support – Road Work	10.4 miles	**$12,883**
*water truck costs per month to maintain DS/RS estimated to be around $500/month	6 month	**$3,000**
Estimated Total Costs – Spring 2009		**$116,078**
Total Available Roads Budget – As of April 2009		**$145,500**
Remaining Roads Budget for Capital Improvements		**$29,422**

Dust Suppression / Road Stabilization Product (DS/RS)

2009 LARRI & Road Maintenance Plan unanimously agreed upon by the Roads Committee following several weeks of evaluation and discussion.

2010-2011 LARRRI & Road Plan

Table 2: Main Gravel Roads (Road Plan)

Name	**Length (ft)**	
Empire	8,000	
Sazarac	4,700	
Clemons	2,200	
Panhandle	300	
Agate	900	
Adobe	3,200	
Dortort	3,300	
Crestview	3,200	
Total	**25,800 ft**	(~ 5 miles)

- Annual option would be to budget for approx. 5 miles of roads for DS/RS
  - 5 miles of main roads
- Additional 2 miles budgeted for trouble spots in need

<u>Costs for DS/RS options</u>

- 7 miles, DuraBlend = $23,534
- 7 miles, Mag Chlor = $27,279
- 7 miles, Lignin = $52,100
- **7 miles ET820 = $35,000 (80% mag 20% lignin)**

2010-2011 LARRRI & Road Plan

Cost to prepare all 13.9 of the roads:

- **Moisture conditioning**
- **Grading**
- **Compacting**

(~ $17,000)

Roads Committee recommends using the ET820 product, blend of 80% Magnesium Chloride and 20% Lignin for future applications.

- **Assume ET820 @ $35,000 for 7 miles**

- **Costs to water for ~ 6 months (~$3,000)**

- **Estimated 2010-2011 costs ~ $55,000**

(Does not include other standard maintenance including snow plowing other grading, culvert and ditch maintenance, etc.)

2012+ LARRRI & Road Plan

Cost to rebuild approximately 1 mile of road:

- **Scarify**
- **Import rock material**
- **Moisture condition**
- **Grade**
- **Compact**

Based on 2008 prices ~ $15,000 per mile

Beginning in 2012, the Roads Committee recommends performing the proposed 2010-2011 work on an annual basis in addition to rebuilding approximately 1 mile of road per year.

Estimated annual cost $70,000 (2009 prices)

Important Reminders

- **Speed Limits**
  - **15 mph speed limit on 1 acre gravel roads.**
  - **Lower speeds leads to less dust to longer road service life.**
- **4 X 4**
  - **Utilize 4 wheel drive on steeper grades.**

- **Please feel free to attend Road Committee and/or Board meetings to share your ideas on improving the quality of our gravel roads.**

Virginia City Highlands
Property Owners' Association
P.O Box 686 • Virginia City • NV • 89440
775-847-7000 (phone) www.vchpoa.org

Thank You

VCHPOA Roads Committee Members:

Steve Morrow, Committee Chairman
Bob Moore, Roads Manager
Harry Stanley, Member
James Stewart, Member
Lenny Wenrick, Member
Jed Margolin, Member