Edelweiss
Master Roads Plan Update

Prepared by:
Edelweiss Roads Committee

Approved by:
Edelweiss Board of Directors

May, 2025

Acknowledgments

This plan was developed by Board members, Edelweiss staff and full- and part-time residents of the Edelweiss community.

The Board wishes to thank all who participated in the development of the 2025 Roads Plan Update including the following Roads Committee members:

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Introduction

This plan was prepared in response to a series of issues that impact the Edelweiss Community Road System. It updates the 2007 Roads Master Plan developed by the Long-Range Planning Committee and the 2020 Road Plan Master Roads Plan Update.

This Roads Committee (RC) met over the course of about one year to update the 2020 Roads Plan. After deliberation and review by the Edelweiss Maintenance Commission Board of Directors, the plan was submitted to the membership prior to the 2025 Annual Meeting held in May. This plan should be reviewed at least every five years and recommendations be updated, as needed. Most of the short-term recommendations from the 2020 Roads Plan Update are complete.

The plan is broken into the following sections:

- Background
- Issues and Goals
- Analysis and Recommendations
- Implementation

Background

There are 26 roads in the Edelweiss community with a total combined length of about eight miles. The roads vary in width from an average of 10 feet to over 25 feet. In 2025, the roads provided access to approximately 203 homes (about 76 homes are occupied year-round) and 90 undeveloped lots. All of the roads are gravel and in various stages of good to poor condition except for a paved section at the entrance to Edelweiss. This asphalt extends approximately 10 feet past the intersection of Highland Road and Homestead Road on Highland Road and approximately 250 feet past this intersection on Homestead Road. This asphalt was originally laid in 1995 and overlaid in about 2014[1]. In 2024, EMC spent $27,000 to improve drainage at the entrance.

Except for spot repairs, major repairs to roads in Edelweiss have historically been limited. One exception was a project in about 2008 that cost $100,000. These funds, obtained through a low interest loan from the Okanogan County Electrical Co-op (OCEC) were used to invest in additional gravel, grading and application of Lignin Sulfonate (lignin) on approximately 1.1 miles of Highland Drive and Homestead Road. The loan was paid off through user fees.

In the summer of 2017, Edelweiss began a waterline replacement project in cooperation with the OCEC who was replacing electrical lines that were buried in the roads. That project was intended to take place over approximately 10 years, with Edelweiss funding from a special water assessment. As part of the project, road surfaces would be improved and the road widened as needed.

Originally, the plan was to improve about ½-mile of road each year. For the first few years, the EMC accomplished its annual goal of ½-mile of waterline replacement with road improvements. In more recent years, the progress has been much slower. This is in great part to the lack of participation by OCEC who has indicated it now has higher priorities. The original estimates for the waterline replacement and associated road improvements were based on sharing the significant excavation costs with OCEC. With OCEC now out of the project and construction costs escalating, completion of the project within the original schedule and estimated cost is uncertain, at best.

In 2018, the Board passed a resolution to address parking in the road. Specifically, the resolution was intended to address vehicles obstructing traffic on any road within Edelweiss or causing an obstruction or physical hazard to be placed on any road within Edelweiss. It also stated that vehicles temporarily parked alongside an Edelweiss road shall be parked safely, shall not obstruct the road or any private driveway, and shall not obstruct drivers' lines of sight on the road alongside which they are parked.[2]

[1] Jeff Samdal and Associates, Inc, Professional Reserve Study for Edelweiss, July 31, 2018, page 19.

[2] Parking Rules Resolution, Edelweiss Board, October 15, 2018

Road Maintenance

Winter: EMC staff apply sand to the roads in the winter to improve traction, as needed, using a sand spreader in the back of the Edelweiss pickup. To spread one load of sand on the roads takes approximately ½-hour and may take up to five loads of sand to complete. Edelweiss used to have eight roadside sand boxes for individuals to apply extra sand to the roads, as needed. Most of the boxes were not used. In 2022, the number of boxes was reduced to three: a box at the Rock Rose Road and Homestead Road intersection, Mustard Mountain, and on River Road. In 2025, staff installed another container filled with sand at the entrance.

Snow Removal is completed by a contractor. The contract for snow removal states that snow will be removed when it accumulates more than 4". In 2025, the snow removal contract was for a lump sum of $52,000 with increases of 3% for future years. To improve efficiency, the contractor would like to plow the portion of East Fawn Road (USFS Road 100) from Highland Meadow Road to Mustard Mountain Road. This would mean the contractor would not have to backtrack or turnaround, thus saving time. Some residents use this route for ski access to the Rendezvous and would prefer no winter maintenance. The Board will decide on this request by Winter 2025-2026.

Rock Rose Road and the West end of Trillium Road beyond the houses receive minimal maintenance due to steep terrain and function primarily as emergency access routes.

Summer: In 2025, $45,000 was budgeted from user fees for summer road maintenance. Another source of road improvement funds includes $3,000 collected prior to constructing each new home. It is generally unknown how much will be collected from this funding source until spring or summer. In 2024, approximately $11,0000 was collected as part of the new-home construction fees. Once Edelweiss reaches full build-out, these road impact funds will no longer be available; however, the potential damage to roads due to the construction activity will be reduced also.

Summer road maintenance has included application of a dust palliative, grading, minor spot repairs, and improvements to drainage. In the Summer of 2023, the Forest Service made major improvements to the portion of East Fawn Creek Rd (FS 100) between Goat Creek Road and Mustard Mountain Road. These improvements have enabled Edelweiss residents to use FS100 as their primary access road. The Forest Service has requested Edelweiss to help maintain FS100. This request is unresolved.

Road Inventory

To better understand the existing conditions of the roads in Edelweiss, in the summer of 2019, the committee completed an inventory of the roads that considered the following criteria:

Roadway Use and Location

- Average width
- Road intersections
- Houses adjacent to the road
- Access to facilities

Signage

- Signs about Dust
- Speed signs
- Informational signs

Safety

- Number of reflective house numbers
- Sight Distance problems
- Vegetation Encroachments

Roadway Surface Condition

- Roadway Crown
- Washboards
- Potholes
- Surface material
- Dust
- Drainage
- Culverts
- Erosion

The results of the road inventory are included in Appendix A.

Right of Way

A careful review of the Edelweiss Plats was completed to determine the amount of Right of Way (ROW) for each of the roads in the subdivision. A ROW is a type of easement granted or reserved over the land for purposes such as roads. Ideally, a road would be in the middle of the ROW, but that is often not the case. Generally, road ROW's in Edelweiss vary from 30'-60'as shown in Table 1 and illustrated in the following table.

TABLE 1. WIDTH IN FEET OF EDELWEISS COMMUNITY ROAD PLATTED RIGHTS-OF-WAY.

Road Name	ROW
Ayer's Court	60’
Bitterbrush Road	60’
Blue Grouse Lane	20’
Cassal Road	60’
Cottonwood Road	30’
Crabapple Road (Homestead to Trillium)	40’
Crabapple Road (Homestead to Upper Meadow)	30’
Drake Drive	60’
Eagles Nest Road	30’
East Fawn Creek Road	66’
Elderberry Road	30”
Fawn Road	30’
Heather Road	30’
Highland Meadow Road	60’
Highland Rd	60’
Homestead Rd	60’
Laney Lane	60’
Lupine Road	30’
Mustard Mt. Road	60’
Quaking Aspen Road	30’-40’
Reservoir Way	64.34’
River Road	30’
Rock Rose Road	30’
Sunflower Lane	30’
Trillium Road	30-60’
West Fawn Road	60’
Wintergreen Road	30’

Issues and Goals

The following issues were developed by the RC and confirmed by the Board. Based on these issues a list of goals and recommendations were developed.

Issues:

Issues were categorized according to Health and Safety, Road Conditions and Funding as shown in Table 2. EMC Transportation issues.

TABLE 2. EMC TRANSPORTATION ISSUES

Health & Safety	Dust from roadways can cause respiratory issues and limit visibility.
	Many drivers exceed the speed limit.
	Narrow roads do not allow safe travel for fire department trucks.
	Vegetation along roads could contribute to fire danger.
	Limited sight-distance and other safety issues could cause accidents.
Road Condition	Trespass accelerates road deterioration.
	Lack of adequate drainage causes erosion and poor road surface condition.
	If all roads are not graded annually, they can become substandard, having extensive washboards and potholes.
Funding	There is a lack of funding for significant road improvements.
	East and West Fawn Creek Roads were vastly improved by the USFS in 2023; however, no money has been allocated for on-going maintenance.
	The waterline replacement and road improvement project is likely to be more expensive and take much longer than planned.

Based on a consideration of the issues the following goals were developed.

Goals:

1) Suppress dust originating from roads.
2) Eliminate/reduce safety hazards.
3) Improve road surfaces.
4) Promote road improvements for fire suppression efforts.
5) Provide members with funding options that improve future road conditions.

Analysis and Recommendations

This section summarizes and analyzes each road issue in Edelweiss. This section is organized by Health and Safety, Road Conditions and Funding. Recommendations are also listed to address each issue and include Short-Term (0-5 years), Medium-Term (5-10 years) and Long-Term (greater than 10 years) recommendations.

Health and Safety

The following section focuses on transportation issues relating to health and safety, including dust, fire escape routes, excessive speeds, sight distance issues, and road widths.

Issue - Dust from roadways can cause respiratory issues and limit visibility.
Dust is particle pollution. The Environmental Protection Agency (EPA) states that particle pollution is linked to several health problems, including coughing, wheezing, reduced lung function, asthma attacks, heart attacks and strokes, resulting in increased hospital admissions and emergency room visits. Dust along Edelweiss's main roads and concerns about its impact to health is a common complaint among residents. For more information about dust please see Appendix B.

For approximately five years, Edelweiss contracted to have Lignin Sulfonate (Lignin) applied for dust control twice in the summer on the main roads in Edelweiss. With two applications this product was effective in reducing dust and hardening the surface. However, due to a major price increase in 2023 and 2024 only one application of Lignin was applied in those years. The cost for the one application was approximately $46,000 and dust reduction was minimal and short-lived.

Alternatives to Lignin under consideration include Earthbind[3] Stabilizer currently available through a local contractor (Cascade Concrete). Earthbind, like Lignin, is an environmentally safe product but only requires one application and does not need the roads watered prior to application. One Earthbind application on the same roads where Lignin was applied last year would have cost about $30,500, which is a savings of approximately $16,000. Given that experience has shown the need for two applications of Lignin, the potential savings are even higher.

Applying additional gravel to a dirt road surface can also reduce dust. Gravel provides a hard surface protecting soils from vehicle wheels. Gravel does not reduce the strength of air currents caused by vehicles themselves, so traffic can still blow loose soil particles into the air. Without a good road base of crushed aggregate, traffic will push surface gravel down into the ground, especially when the road is wet. If the road surface does not have enough fine material to cement the surface gravel in place, traffic will push the gravel away from the driving lanes. The type of gravel applied is important, but we are limited in what is available. The last time a major resurfacing project took place was in 2008, at a cost of $100,000 (see Background Information).

Another option to reduce dust is to pave or chip-seal the road. This option is discussed further in the Road Condition section. The application of water as a dust suppressant was dismissed due to water right restrictions for this type of use and its short-term effectiveness.

Short-Term Recommendations

- Communicate to members EMC's plans for dust reduction.
- Apply Earthbind, the dust suppressant used by Cascade Concrete on one or more test sections and analyze results.
- If Earthbind proves effective, continue to budget and apply annually.
- Improve the surface of roads to include additional gravel where needed to improve dust control and roadway condition as existing funding allows.
- Monitor effectiveness of gravel to reduce dust.
- Send out reminders to members about the need to obey the speed limits to reduce dust and road deterioration.

Medium/Long Term Recommendations –

- Continue to monitor effectiveness of Earthbind and/or other methods of dust-supression.
- Analyze paving and continued gravel surface options to reduce dust.

Issue - <u>Many drivers exceed the speed limit.</u>
Exceeding the speed limit is a serious issue in Edelweiss. Not only is it a safety concern for pedestrians and vehicles, but in the summer, it contributes to dust, washboards and potholes. Traffic volume is increasing due to further build-out of the community.

The previous road plan considered ways to reduce speeds along Edelweiss roadways including traffic calming. In about 2007, four removable plastic speed bumps were installed on Edelweiss roadways. Several problems were caused by the speed bumps; they required large trucks with trailers to stop and put their vehicles in 4WD, holes formed near the speed bumps, they were a safety concern for bicyclists, and they had to be removed for winter snow plowing and summer grading.[4] Previous road plans concluded

[3] https://www.enviroad.com/products/dust-control/earthbind-stabilizer-for-dust-control/

[4] Interview with Craig Hook, Operations Manager, Winter 2020.

that "community awareness and persistent advocacy by the membership continues to be the most effective and efficient means of approaching this issue."[5] In 2024, several signs were installed on EMC roads to reduce speed as shown in Figure 1.

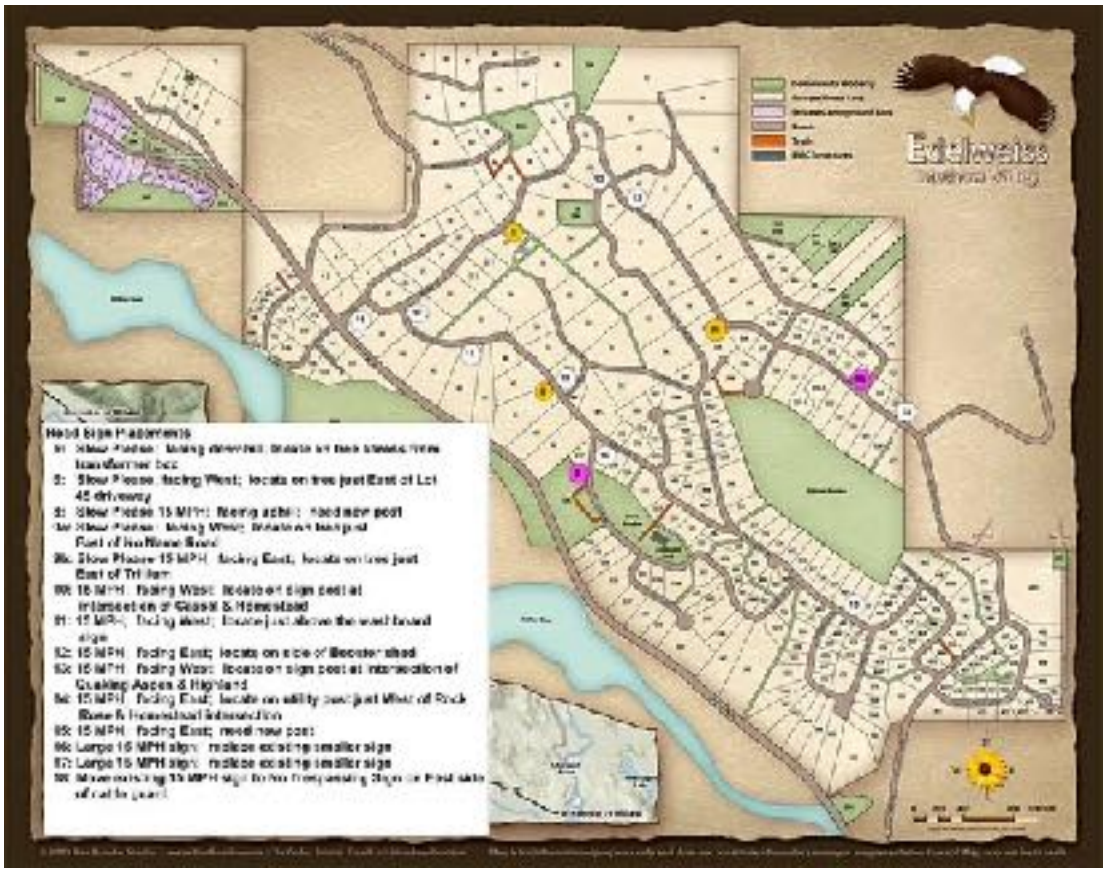


FIGURE 1. MAP OF SIGNS

In addition, wooden 15 mph road signs, many of which were deteriorated and hard to read, were refurbished and reinstalled.

Potential improvements to the current speed limit signs were considered. One option is to use lettering on the paved section near the entrance similar to Figure 2. This option was thought to be infeasible due to a lack of local contractor and the presence of sand would soon erase the lettering.

FIGURE 2. EXAMPLE OF SPEED LIMIT ON PAVEMENT

[5] 2007 and 2020 Edelweiss Master Road Plans.

FIGURE 3. EXAMPLE OF RADAR SPEED FEEDBACK SIGN

Another option is to install a radar speed feedback sign similar to Figure 3 Radar Speed Feedback sign**.** Research indicates these devices may be effective at reducing vehicle speed. The cost to buy a radar speed-feedback unit is about $3,600 or about $400 to rent for one month. There may be opportunities to share costs with one or more other Homeowner Associations (HOAs) in the Methow Valley. Due to the high costs of the radar speed signs, this option was not considered practical, at this time, without the cooperation of other HOAs

Short-Term Recommendations

- Send out regular reminders to members about the need to obey the speed limits to improve safety, reduce dust, and limit road deterioration. Include a recommendation for homeowners using contractors to remind them to obey the speed limits.
- Monitor effectiveness of speed signs installed in 2024 and determine if additional signage is needed.

- Send known speeders a letter reminding them to slow down.

Medium/Long-Term Recommendation

- If speed continues to be an issue, consider renting or buying a handheld or portable speed radar unit in an effort to monitor the extent of speeding and to determine if measures to reduce speed are effective.

Issue - Narrow roads do not allow safe travel for fire department trucks. Roads in Edelweiss generally vary from 12' to 24' with few turnouts. According to research and local fire response input, a fire access road should be a minimum unobstructed width of 20'.[6] Narrow roads can also be dangerous for safe passage of two vehicles.

The anticipated road improvements associated with the waterline replacement project in many cases should result in wider roads. To assist in prioritizing road improvements for fire access and to eliminate insufficient road widths on major roads, the RC analyzed information from the road inventory. The RC classified roads according to the number of lots served and their importance in exiting the Edelweiss Community and providing emergency services to the community. The RC then used the classification information to prioritize improvements. This was especially important as the waterline replacement and road improvement project moves forward and there are opportunities to select the order of road improvements.

Roads were classified according to the following:

1 - Primary Roads - Generally these major roads provide direct access to over 20 homes, have more than 5 road intersections, with assumed Average Daily Traffic (ADT) of 50 vehicles or more or have other significant features. In 2025, there were 203 homes in Edelweiss.[7]Highland and Homestead Roads are classified as primary roads. Homestead Road provides access to more than 120 homes, and Highland is used to access more than 60 homes. The west end of Cassal Road is also considered a primary road because it provides access to the pool which is a major attraction in the summer. Other primary roads are West and East Fawn Creek Roads. Although both are USFS Roads, their importance as potential fire-escape routes elevates them to primary roads. Highland Meadow Road connects to Homestead Road and provides access to East Fawn Creek Road and therefore is also classified as a primary road. Thus, approximately 3 miles classify as Primary Roads.

Primary roads, particularly Highland and Homestead Roads, should receive the most immediate maintenance and should have minimum widths of 20' with 2' shoulders wherever possible. Generally, these roads already meet these standards. However, Highland Road, downhill from the pump house near Quaking Aspen and Trillium, does not meet this desired width, and it is considered a high priority for improvement. In other instances, such as Highland Road east of Crab Apple Road, it may be impractical to reconstruct the road to this desired width.

2 - Secondary Roads - Generally, these important roads intersect a primary road, provide direct access to over 10 homes, have 2 or more road intersections and may provide vital fire escape routes. Examples of secondary roads include Bitterbrush Road, Crab Apple Road, East end of Cassal Road, Mustard Mountain Road, and Quaking Aspen Road. Secondary Roads should be at least 18 feet wide with 2' shoulders. Approximately 2 miles classify as Secondary Roads.

3 - Local Roads - These are all of the remaining roads in Edelweiss. These generally are dead end roads, serve fewer than 10 homes and have low traffic volumes. These roads should be a minimum of 12' wide with 2' shoulders. Approximately 3 miles classify as local roads.

Table 3. Road Classification Summary outlines the Road Classification system developed for Edelweiss Roads and indicates the desired width and deficiencies. There are design difficulties, ROW or other issues which may prevent some roads from meeting the desired road widths. The road classification, along with road width and right-of-way information, is shown in Figure 4. Edelweiss Road ROW, Classification and roadway Width Map.

[6] Port Ludlow Fire and Rescue, Guidelines for Fire Apparatus Access Roads, Driveways & Bridges, http://plfr.org/about-plfr/docs/PLFR-Fire-Apparatus-Access-Requirements.pdf

[7] Personal communication between Nicole McCullough and Pitkin Thomas.

Table 3. Road Classification Summary

Road Classifications/ Mileage	Road Names	Desired Road Design	Width Deficiencies
Primary Roads/3 miles	1) Highland Rd 2) Homestead Rd 3) West end of Cassal Rd 4) West and East Fawn Roads 5) Highland Meadow Rd	20' wide, 2' shoulders	1)Highland Rd West of Quaking Aspen 2)Highland Rd East of Crab Apple* 3)Highland Meadow Rd*
Secondary Roads/2 miles	1) Bitterbrush Rd 2) Crab Apple Rd 3) East End of Cassal Rd 4) Highland Meadows Rd 5) Mustard Mountain	18' wide, 2' shoulders	1) Highland Meadows Rd* 2) Portions of East End of Cassal Rd*
Local Roads/3 miles	All other roads	12' wide, 2' shoulders	1) Drake Rd 2) Fawn Rd* 3) Heather Rd* 4) Laney Lane* 5) Reservoir Rd* 6) Sunflower Rd 7) Trillium Rd 8) Rock Rose Rd above Pressure Reducing Valve (PRV) vault.*

*Road widening not recommended at this time due to limited right of way, topography or other factors.

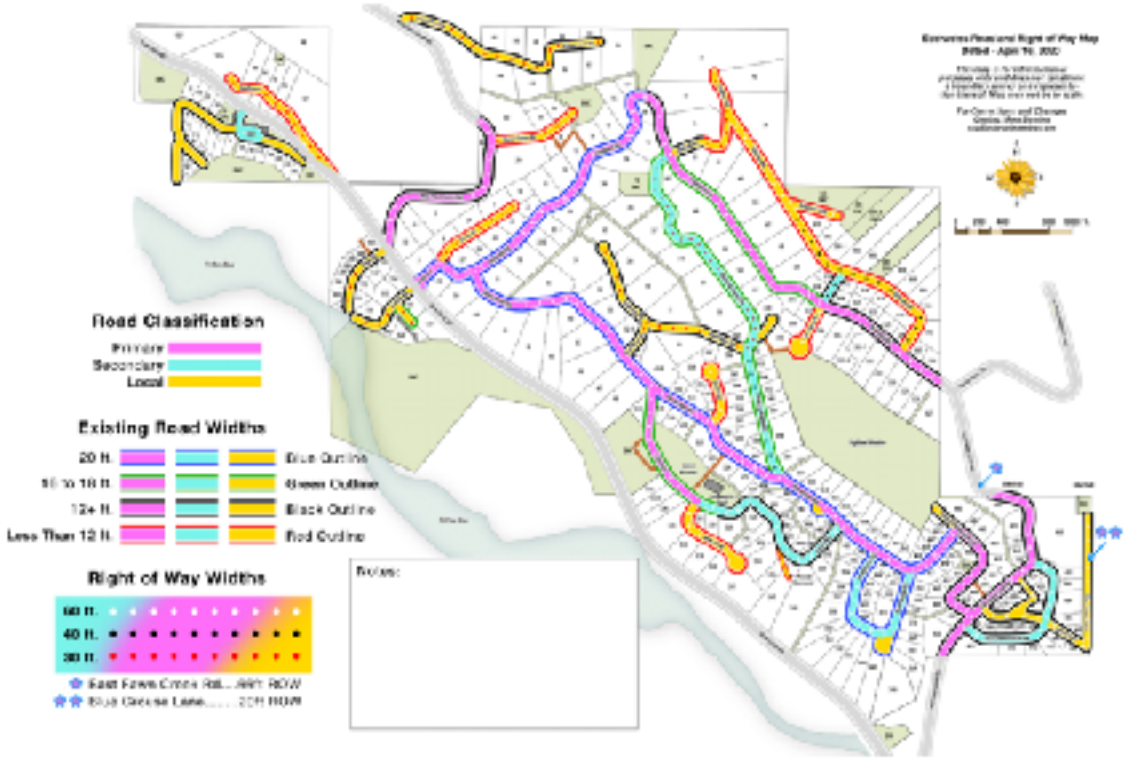


FIGURE 4. MAP OF EDELWEISS ROAD ROW CLASSIFICATION AND ROADWAY WIDTH

Short-Term Recommendations

- Prioritize work on roads with width deficiencies as much as possible.
- Identify appropriate areas for turnouts to accommodate emergency vehicles and widen roads in these area as funding and opportunities allow.

Medium and Long-Term Recommendations

- Continue to maintain road widths.

Issue - Vegetation along roads could contribute to fire danger. The road inventory done in 2019 identified that most roadways in Edelweiss have vegetation close to or encroaching upon the roadway, reducing sight-distances and increasing fire risk. Roads where there is a significant gap in vegetation can act as a firebreak to slow or stop the progress of fire.

In 2022, the Firewise Committee and the Board took an active role in reducing vegetation near the sides of the road as well as the canopy above the roads. A special assessment was approved by the members to reduce vegetation along the roadways. Washington State Department of Natural Resources funding was also used. This project took place throughout the community in the summer of 2021 and 2022.

Short, Medium and Long-Term Recommendations

- Continue to support efforts by the Firewise Committee to reduce vegetation along roadways.
- Encourage vegetation removal along roadways as part of the waterline replacement and road improvement project.

Issue – Limited sight distance and other safety issues could contribute to accidents. There are a few areas that residents have identified as roadway safety concerns. These include

- In icy conditions, several roads can be excessively icy and impassable due to the steep grade including Highland Road at the curve below Quaking Aspen, Rock Rose and Homestead intersection, West Cassal and Homestead intersection, and the hill on Homestead Road by Quaking Aspen Road.
- Highland Road at the curve below Quaking Aspen Road is narrow, and the large trees on the private lot located on the inside of the curve can cause sight distance issues.
- Cassal Road (east end) has a steep curve which could cause an accident for inattentive or speeding drivers. Recently reflectors were installed.
- A sight distance problem was identified at the intersection of Rock Rose Road and Homestead Road, particularly in the winter when driving conditions on Rock Rose are icy. This issue was reduced in 2021 when a large tree was removed but can still pose a safety problem particularly in icy conditions.
- Piles of snow at intersections can obscure oncoming vehicles.

The RC discussed each of the safety issues and made the following recommendations.

Short-Term Recommendations

- Prioritize the narrow Highland Road section in future OCEC/Edelweiss waterline replacement and road improvement project.
- Monitor effectiveness of reflectors at the curve on the east end of Cassal Road.
- Apply gravel when icy conditions dictate, particularly on Homestead, Highland and Rock Rose Roads.
- Work with lot owner on the inside curve of Highland Road to remove larger trees and FireWise the lot.

Medium/Long-Term Recommendations

- Continued vigilance.

Road Condition

Issue - Trespass accelerates road deterioration. Edelweiss residents pay for road maintenance throughout the community. Non-residents sometimes use the roads to access the Rendezvous area, particularly hunters and vehicles with bicycles including bicycle-tour groups in vans. The previous plan identified trespass as a serious issue. The 2020 Road Plan analyzed and confirmed trespass was an issue. In 2023, signs discouraging trespass on private roads were placed prominently. However, since the USFS Road improvement project on East Fawn Road in 2023, most of the recreational trespass has shifted to East Fawn Road. Residents in the Mustard Mountain area have noticed an increase in traffic since the road was improved. Some of the increased traffic may be due to other Edelweiss residents using East Fawn Road in lieu of the main entrance to Edelweiss.

Short-, Medium-, and Long-Term Recommendations

- Monitor the effectiveness of measures to reduce trespassing through Edelweiss and reevaluate options, as needed.

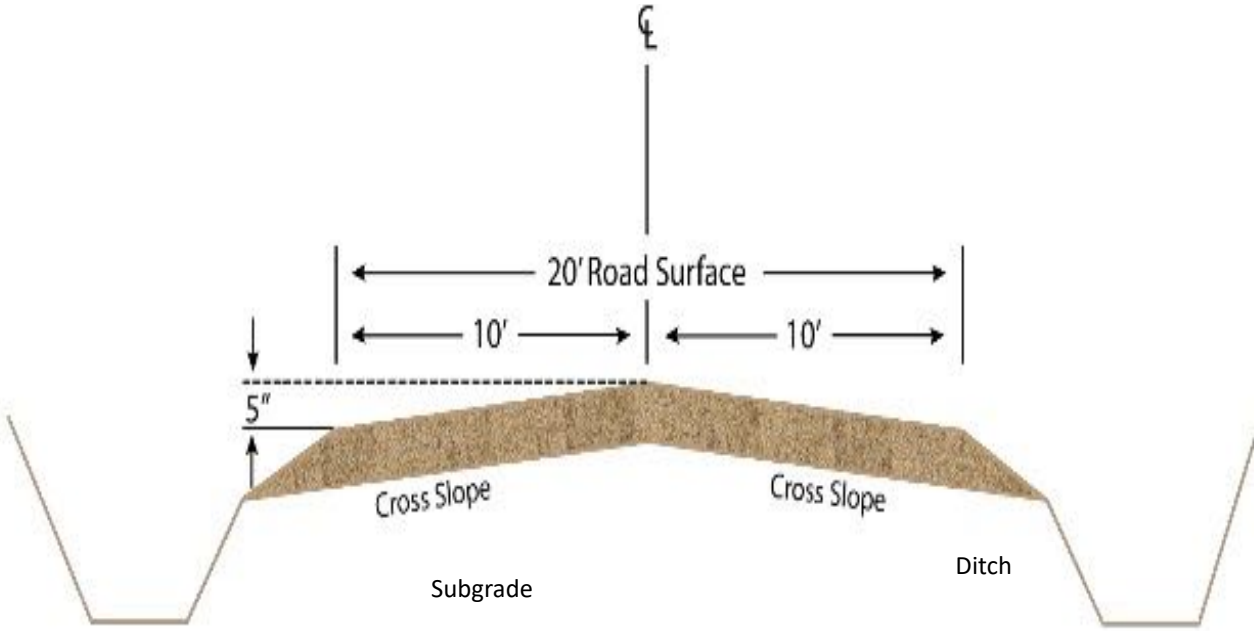
Issue - Lack of adequate drainage causes erosion and poor road surface condition

Drainage is critical in maintaining roads and preventing poor surface condition.[8]

> "In many ways, all the most important steps of gravel road construction are related to drainage. Roads that allow water to properly drain off the surface and out of roadbed soils are much easier to maintain and therefore less costly. Conversely, gravel roadways with poor drainage can never fully be maintained. Any standing water on or adjacent to the road will compromise its integrity."[9]

Gravel roads are typically constructed with a slope from the centerline of the road to the edge of the road

FIGURE 5. BASIC GRAVEL ROAD CROSS SECTION FOR A TWENTY-FOOT ROAD



Note: 4% crown is equivalent to 1/2 inch per foot drop on the cross slope.

(called a crown) so that water can drain off the surface into the ditch. When the slope is too flat, the water can pond on the road, causing ruts and potholes. A basic cross section for a twenty-foot road is shown in

[8] https://www.epa.gov/sites/production/files/201510/documents/2003_07_24_nps_gravelroads_sec1_1.pdf

[9] https://blog.midwestind.com/7-crucial-factors-building-great-gravel-road/

Figure 4. Basic Gravel Road Cross Section for a Twenty Foot Road. A road constructed to these standards is generally easier and cheaper to maintain.

The road inventory showed that most of the roads in Edelweiss have poor drainage. In some cases, ditches are present, but they are clogged or are non-existent. Over the years, drainage ditches have filled to the point that the Edelweiss road system has an inferior system of managing storm water and spring freeze/thaw cycles. One of the primary contributors to this problem is the community's winter sanding operations which eventually end up filling drainage ditches. "Runoff" damage is most evident where potholing and wash boarding is prevalent. This results in the need for more frequent grading, especially on Homestead Road and Highland Road which experience the most traffic, receive the most frequent sanding, and therefore have the worst drainage in Edelweiss. Additionally, the community has not required all homeowners to install culverts where driveways are built to access the road. Where ditches do exist, this causes a drainage barrier or "stop" and contributes greatly to the amount of road damage from runoff.[10] There is also concern with the lack of a crown which is discussed further in the next section. Edelweiss staff clean out culverts with a shovel but do not have equipment for cleaning out and shaping ditches.

The 2018 Reserve Study recommends an annual budget of $4,000 for storm system expenditures with adjustments as necessary to respond to the need. [11] Little money was spent on this issue until late summer 2024, when a drainage improvement project was completed at the main entrance to Edelweiss. The project included new culverts, rock and holding ponds and cost approximately $27,000.

Short-Term Recommendations

- Support new language from the Architectural Guidelines regarding drainage for new construction projects.
- Clean out obstructed drainage ditches and culverts.
- Monitor effectiveness of drainage improvement at the entrance and make recommendations based on that review.
- Improve drainage when upgrading roads with the waterline replacement and road improvement project.

Medium and Long-Term Recommendations

- Consult with an engineer about potential drainage improvements in the subdivision.
- Perform drainage improvements as recommended by the engineers and as funding allows.

Issue – <u>If all roads are not graded annually, they can become substandard forming washboards and potholes.</u>

Ideally, a road should have a sufficient slope from the centerline to the edge to allow water to effectively drain off of the road. When a road has a good crown, it can usually be maintained by routine blading with proper equipment and adding gravel where necessary, but sometimes major grading and reshaping is necessary due to prolonged wet weather or unusually heavy traffic.

With the current on-going road upgrades associated with the waterline replacement and road improvement project, roads are often improved and widened. It is necessary for the roads to be reshaped and that they have adequate slope and surface material.

After significant discussion the RC was in general agreement that all Edelweiss roads should be sufficiently maintained to allow access to dwellings. Additionally, some roads can also serve as secondary emergency exit routes, e.g. Rock Rose Road. USFS Road 100 (East Fawn Creek Road and West Fawn Creek Road) have their own set of unique circumstances, primarily due to management by the USFS, which were discussed previously and are analyzed later in this plan.

[10] 2007 Edelweiss Master Road Plan

[11] Jeff Samdal and Associates, Inc, Professional Reserve Study for Edelweiss, July 31, 2018, page 19

Edelweiss currently has a 2022 light duty John Deere tractor with a "box scraper" mounted on it. A box scraper in essence "planes" the road to a flat surface and is sometimes used in Edelweiss to smooth the road surface, particularly those with severe washboards. Over time, the use of the box scraper on the roads can flatten the crown that was originally designed for the roads. This contributes to water ponding on the surface causing potholes and an increase in wash-boarding. The problem appears to be cyclical in nature. The more roads are graded with the box scraper, the flatter the roads become, the more and deeper potholes appear, the sooner wash-boarding returns, thus, requiring more grading to maintain acceptable road standards. Local road contractors have said that it is necessary to dig to a significant depth and reshape the road.

While the box scraper has other uses, it is not intended to replace road work that can be done with a grader. A grader has an adjustable blade, a longer wheelbase, significantly more weight, and generally cost more than $200,000.[12] A grader also can require costly repairs and may require a trailer and truck to haul it.

One option that the Board supported was the purchase in 2025 of a quasi-grader-blade attachment for the new John Deere tractor. According to the dealer, the blade should be able to make minor adjustments to the road surface, preserving, not eliminating the crown of the road.

One solution to poor surface conditions discussed above is to pave or chip seal the roads. However, there is some debate on whether to pave all, some, or none of the remaining gravel roads with asphalt. Reasons cited for not paving the roads include the following:

- High initial costs associated with paving options
- Likely increased vehicle speeds which could endanger pedestrians and increase the likelihood for vehicular accidents
- Excavation for new or repaired connections with water lines and/or electrical services to homes adjacent to the paved road
- Paved surfaces could be more slippery and require more sanding
- Difficulty of finding a contractor to patch the pavement, since there are no paving contractors in the Methow Valley
- Cost of patching and maintaining the paved surface
- Crumbling at the edges of the pavement due to heavy vehicles
- Many members believe gravel roads are more compatible with the rural nature of the area.

Based on estimates from the 2018 Reserve Study, with a 3% escalation factor per year, to pave only the more heavily used roads of Highland Road, Homestead Road and Cassal Road to the pool, the costs would be approximately $1,404,269 or $4,776 per lot as shown in Table 4. Estimated Paving Costs for 24' roads. If the width were reduced to 20', these costs would be reduced by approximately 5 percent and result in a cost of $3,980 per lot. The life span of a paved road is approximately 15-25 years with an application of a thin overlay every 7-10 years.

[12] https://www.costowl.com/b2b/construction-equipment-new-motor-graders-cost.html

Table 4. Estimated Paving Costs for 24' Roads

Road Segment	Linear feet	20 Foot Road			24 Foot Road		
		Sq ft	Total Costs	Cost per lot*	Sq ft	Total Costs	Costs per lot*
Homestead to Cessal	1,840	36,800	$179,564	$611	44,160	$215,501	$733
Cessal to Pool	1,100	22,000	$107,360	$365	26,400	$128,832	$438
Homestead from Cessel to Highland Meadows	3,250	65,000	$317,200	$1,079	78,000	$380,640	$1,295
Highland, Entrance to Quaking Aspen	3,000	60,000	$292,800	$996	72,000	$351,360	$1,195
Highland, Quaking Aspen to CG	2,800	56,000	$273,280	$930	67,200	$327,936	$1,115
TOTAL	11,990	239,800	$1,170,224	$3,980	287,760	$1,404,269	$4,776

*Assumes 294 lots

Another option is applying chip seal. Chip sealing is a process of covering a gravel road with a layer of liquid asphalt and then a layer of small rocks embedded in the asphalt. It prevents water from penetrating the road surface, improves skid resistance and suppresses road dust. Chip seals are typically used on rural roads carrying lower traffic volumes.[13] The life of a chip-seal road is usually much shorter than an asphalt surface, and, in this area, is more typically used on top of an asphalt surface to extend its life.

While paving Edelweiss roads may be the eventual solution, this concept has not been well-received by members of the community. When polled in ~2014, there were only four members in favor of paving the roads. The membership survey done in 2023 indicated there was more support for paving (particularly in the worst sections) but the vast majority of residents still were not in favor of any paving. Increased speeds and costs were primary concerns. Whether or not paving is the eventual solution, upgrades to the existing roads would need to be completed prior to any paving activities. Road improvements associated with the waterline and road improvement project would also need to be completed prior to paving. The question of whether to chip seal or pave the main roads with asphalt is premature at this time.

At its October 2024 EMC Boad Meeting, the Roads Committee recommended that there not be Lignin applied to Edelweiss roads in 2025, due to its high cost and recent disappointing results. The Roads Committee is working with the Board on a combination of scenarios for road maintenance that would concentrate on grading and maintaining only the major arterials (Homestead, Highland and campground) with additional gravel added where needed. Additional maintenance operations may be possible using Edelweiss' recently purchased grader blade. Operations are significantly constrained by budget and accelerating costs of contracted labor and materials.

Short-Term Recommendations:

- Direct contractor upgrading roads (in association with the waterline and road improvement project), to reconstruct roads with appropriate slope and quality and quantity of surface material.
- Do a test of Earthbind on a section of a primary arterial.
- Starting in June or July, 2025, grade the arterial roads and campground roads in Edelweiss and apply gravel as needed either using a contractor or existing staff and tractor with a grader blade. In October of 2025, review the effectiveness of the grading to determine if it should continue into the next year
- Continue to provide nominal maintenance to all roads, including Trillium and Rock Rose Road to allow emergency exit/access only.

[13] https://careertrend.com/how-6931284-chip-seal-gravel-road.html

Medium/Long-Term Recommendations

- Conduct a cost-benefit analysis to determine if chip seal or paving roads or portions of roads in Edelweiss is a worthwhile and sustainable option.
- Share results of the cost-benefit analysis with the community.
- If supported by the community, develop funding scenarios and implement a project to pave or chip seal main roads in Edelweiss.

Funding

Issue - There is a lack of funding for significant road improvements.

Edelweiss roads are an important part of the infrastructure of Edelweiss and require maintenance and improvements to meet the needs of the community. The needs outlined in this plan such as dust control, access for fire protection, and safety have increased due to more traffic than in the past. As Edelweiss grows, these needs are likely to continue to grow. Some maintenance can be provided by Edelweiss staff, but most improvements require hiring outside contractors.

The RC discussed several funding mechanisms should significant road improvements be needed. These included special assessments, conventional, and other types of bank loans. With the current special assessments for the waterline and road improvement project and the reserve funds, RC members believed it unlikely there would be support for any additional special assessments at this time without compelling evidence of the need. Conventional bank loans and would be unlikely to be successful because of the lack of low-income residents. It is not expected that this situation will change in the near future.

Short-Term Recommendations

- Continue to include road maintenance funds in the annual budget and adjust to meet appropriate cost of living increases.
- Continue to budget adequate funds to make improvements to the roads to meet the standards as per this plan in each annual waterline and road improvement project.
- Develop cost-benefit analyses of various surface treatments over a twenty-year lifespan. Treatments such as Lignin, Earthbind, asphalt, chip seal, and asphalt/chip seal in combination should be evaluated.
- Survey members to determine if there is support to increase funding for road improvements.

Medium/Long- Term Recommendations

- Continue to include road maintenance funds in the annual budget and adjust to meet appropriate cost of living increases.
- Continue to budget adequate funds to make improvements to the roads to meet the standards as per this plan in each annual waterline and road improvement project.
- Based on the cost-benefit analysis, develop alternative funding options.

Issue – East and West Fawn Creek Roads were vastly improved by the USFS in 2023; however, no money has been allocated for on-going maintenance. Both roads are important fire escape routes, East Fawn Creek Road, (USFS Road 100) is closed in the winter. West Fawn Creek Road is closed in the winter beyond Eagle's Nest Road. West Fawn Creek Road provides access to about fifteen homes.

In addition to providing access to Edelweiss residents in the eastern part of the subdivision, East Fawn Creek Road provides access to USFS lands and trails in the Rendezvous area. It also could serve as vital access for Edelweiss residents in case of fire. The improvements in 2023 to this road reduced trespass on Homestead Road and Highland Roads by recreational users and hunters who previously have used subdivision roads instead of U.S. Forest Road 100.

Staff has contacted and met with USFS personnel to discuss maintenance of U.S. Forest Road 100.

Short/ Medium/Long-Term Recommendation

- The board should continue open communication with the USFS and monitor possible funding opportunities for maintaining both East and West Fawn Creek Roads.
- Review maintenance needs for East and West Fawn Creek Roads during the annual budget process and allocate maintenance funding as needed.

Issue – The waterline replacement and road improvement project is likely to be more expensive and take much longer than planned.

Currently, funds are allocated through the water line improvement project to widen and resurface roads. However, the funding to complete the waterline replacement and road improvement project is inadequate in part due to lack of participation by OCEC in the excavation costs.

Short-Term Recommendations

- Coordinate with the Finance Committee to ensure road priorities are included in the plans for the waterline replacement and road improvement project.
- Encourage Edelweiss residents to apply for a position on the OCEC board to improve the potential for OCEC participation in cost share of the excavation costs.
- Inform residents about the potential lack of funding to complete the project and need to analyze future funding options.

Implementation Update

Tables 5 and 6 summarize the recommended short- and medium- to long-term actions shown in the previous section. Further refinement of the implementation plan will need to occur during Plan updates.

Table 5. Summary of Issues and Short-term Recommended Actions

Issue	Short Term Actions
1. Dust from Roadways can cause respiratory issues and limit visibility.	Communicate to members EMC's plans for dust reduction.
	Apply Earthbind, the dust suppressant used by Cascade Concrete, on one or more test
	If Earthbind proves effective, continue to budget and apply annually.
	Improve the surface of roads to include additional gravel where needed to improve dust control and roadway condition as existing funding allows.
	Monitor effectiveness of gravel to reduce dust.
	Send out reminders to members about the need to obey the speed limits to reduce dust and
2. Many drivers exceed the speed limit.	Send out regular reminders to members about the need to obey the speed limits to improve safety, reduce dust, and limit road deterioration. Include a recommendation for homeowners using contractors to remind them to obey the speed limits.
	Monitor effectiveness of speed signs installed in 2024 and determine if additional signage is
	Send known speeders a letter reminding them to slow down.
3. Narrow Roads do not allow safe travel for fire department trucks.	Prioritize work on roads with width deficiencies as much as possible.
	Identify appropriate areas for turnouts to accommodate emergency vehicles and widen roads in these area as funding and opportunities allow
4. Vegetation along roads could contribute to fire danger	Continue to support efforts by the Firewise Committee to reduce vegetation along roadways.
	Encourage vegetation removal along roads as part of the waterline replacement and road
5. Limited sight-distance and other safety issues could cause accidents	Prioritize the narrow Highland Road section in future OCEC/Edelweiss waterline replacement
	Monitor effectiveness of reflectors at the curve on the east end of Cassal Road.
	Apply gravel when icy conditions dictate, particularly on Homestead, Highland and Rock Rose
	Work with lot owner on the inside curve of Highland Road to remove larger trees and firewise
6. Trespass accelerates road	Monitor the effectiveness of measures to limit trespassing and reevaluate options, as
7. Lack of adequate drainage causes erosion and poor road surface condition	Support new language from the Architectural Guidelines regarding drainage for new
	Clean out obstructed drainage ditches and culverts.
	Monitor effectiveness of drainage improvement at the entrance and make recommendations
	Improve drainage when upgrading roads with the waterline replacement and road
8. If all roads are not graded annually, they can become substandard and extensive washboards and potholes form.	Direct contractor upgrading roads (in association with the waterline and road improvement project), to reconstruct roads with appropriate slope and quality and quantity of surface
	Starting in June or July 2025, grade the arterial roads and campground roads in Edelweiss and apply gravel as needed either using a contractor or existing staff and tractor with a grader blade. In October of 2025, review the effectiveness of the grading to determine if it should
Issue	**Short Term Actions**
9. There is a lack of funding for significant road improvements.	Continue to include road maintenance funds in the annual budget and adjust to meet
	Continue to budget adequate funds to make improvements to the roads to meet the standards as per this plan in each annual waterline and road improvement project.
	Develop cost-benefit analyses of various surface treatments over a twenty-year lifespan. Treatments such as Lignin, Earthbind, asphalt, chip seal, and asphalt/chip seal in combination
	Survey members to determine if there is support to increase funding for road improvements.

10. E and W Fawn Creek Roads were vastly improved by the USFS in 2023; however, no money has been allocated for on-going maintenance.	The board should continue open communication with the USFS and monitor possible funding opportunities for maintaining both East and West Fawn Creek Roads.
	Review maintenance needs for East and West Fawn Creek Roads during the annual budget process and allocate maintenance funding as needed.
11. The waterline replacement and road improvement project is likely to be more expensive and take much longer than planned.	Coordinate with the Finance Committee to ensure road priorities are included in the plans for the waterline replacement and road improvement project.
	Inform residents about the potential lack of funding to complete the project and need to

TABLE 6. SUMMARY OF ISSUES AND LONGER-TERM RECOMMENDED ACTIONS

Issues:	Medium- and Long-Term Actions
1. Dust from Roadways can cause respiratory issues and limit visibility.	Continue to monitor effectiveness of Earthbind and/or other methods of suppressing dust.
	Analyze paving and continued gravel surface options to reduce dust
2. Many drivers exceed the speed limit.	If speed continues to be an issue, consider renting or buying a handheld orportable speed radar unit in an effort to monitor the extent of speeding and to determine if measures to
3. Narrow Roads do not allow safe travel for fire department	Continue to maintain road widths
4. Vegetation along roads could contribute to fire danger	Continue to support efforts by the Firewise Committee to reduce vegetation along
	Encourage vegetation removal along roads as part of the waterline replacment and road
5. Limited sight-distance and other safety issues could cause	Continued vigilance
6. Trespass accelerates road deterioration	Monitor the effectiveness of measures to limit trespassing and reevaluate options, as needed.
7. Lack of adequate drainage causes erosion and poor road surface condition	Consult with an engineer about potential drainage improvements in the subdivision.
	Perform drainage improvements as recommended by the engineers and as funding allows.
8. If all roads are not graded annually, they can become substandard and extensive washboards and potholes form.	Conduct a cost-benefit analysis to determine if chip seal or paving roads or portions of roads in Edelweiss is a worthwhile and sustainable option.
	Share results of the cost-benefit analysis with the community.
	If supported by the community, develop funding scenarios and implement a project to pave or chip seal main roads in Edelweiss.
9. There is a lack of funding for significant road improvements.	Continue to include road maintenance funds in the annual budget and adjust to meet appropriate cost of living increases .
	Continue to budget adequate funds to make improvements to the roads to meet the standards as per this plan in each annual waterline and road improvement project.
	Based on the cost-benefit analysis of surface treatments, develop alternative funding
	Budget for engineer to look at drainage
10. No money has been allocated for on-going maintenanced of USFS Road 100.	The board should continue open communication with the USFS and monitor possible funding opportunities for maintaining both East and West Fawn Creek Roads.
	Review maintenance needs for East and West Fawn Creek Roads during the annual budget process and allocate maintenance funding as needed.

Appendix A. 2019 Road Inventory

	Roadway Use and Characteristics					
Road Name	***Length (miles)***	***Average Width/***	***Rd Intersections***	***Houses along route***	***Turn outs***	***Comments***
Ayer's Court	0.05	12.0	2	2	0	
Bitterbrush Road	0.25	20.0	2	15	0	Rd with shoulders 20"
Blue Grouse Lane	0.23	12.0	1	2	0	Access to Reservoir well house
Cassal Road (east end to west end)	0.50	17.6	2	13	3	access to pool, wide spots about 20' could be used for turnouts
Cottonwood Road	0.04	18.0	1	2	0	
Crab Apple Road	0.06	12.0	2	2	0	Shoulders about 4', more at intersections
Drake Dr	0.08	10.0	1	5	0	2' shoulders
Eagles Nest Road	0.20	12.0	2	7	0	Intersects with W Fawn, side road near top
East Fawn Road	0.35	12.0	3	5	0	provides access to pump house
Elderberry Road	0.14	12.0	1	4	1	turnaround at end of rd., access to trail
Fawn Road	0.14	10.0	1	3	1	small parking area at start
Heather Road	0.03	9.5	1	0	0	
Highland Meadow Road	0.23	12.0	2	8	0	Few 18' wide spots
Highland Rd (Ent to Switchback)	0.54	20.0	1	8	1	First 625' paved, Access to Highland Booster
Highland Road (SBk to CrabApple)	0.47	16.0	2	1	0	Width narrows from 20-13' after Q.A., no shoulders steep dropoff
Highland Road (CrabApple to CattleG.)	0.59	12.0	2	11	0	Width narrows E of Trillium from 14 to 12', 3-6'pkg by Trillium

	Roadway Use and Characteristics (Continued)					
Road Name	***Length (miles)***	***Average Width/***	***Rd Intersections***	***Houses along route***	***Turn outs***	***Comments***
Homestead Rd (Highland to Rk Rose)	0.43	20.0	2	5	0	Wide area near curve
Homestead Road (Rk Rose to Quaking A)	0.33	30.0	2	8	2	Access Pool, Lower Meadow, Turnouts at lots #60 #56 approx 20k-70'
Homestead Road (QA to Bitter B NE end)	0.24	25.0	5	12	0	
Homestead Road (NE BB to Homestead M.)	0.10	20.0	1	3	0	Upper Meadow Path
Laney Lane	0.14	11'	1	5	0	Turn around at end of Road
Lupine Road	0.12	14.5	1	3	0	
Mustard Mt. Road	0.26	12.0	3	9	0	

Quaking Aspen Road	0.80	18.0	2	17	1	At least 1 wide spot in road could be used as turnaround,
Reservoir Way	0.08	7'	1	0	1	Leads to reservoir, Turnaround
River Road	0.13	13.2	0	8	0	
Rock Rose Road	0.3	12.0	2	3	0	Rd narrows to 8-10' beyond 3rd house, wide spot by lot 2
Sunflower Lane	0.19	10.0	1	2	0	
Trillium Road (W/Crabapple)	0.46	10.5	3	10	0	narrow rd w parked cars restrict width
Trillium Road (E/Crabapple)	0.21	11	2	8	0	11.5' for first 350' then 10'
West Fawn Road	0.34	12.0	2	4	0	
Wintergreen Road	0.14	10.0	1	3	0	
TOTAL	8.17					

	Road Surface					
Road Name	***Crown***	***Wash-boar***	***Potholes***	***Loose***	***Rx in Rd***	***Comments***
Ayer's Court	No	No	over 25%,	No	Over 25%	
Bitterbrush Road	< 3"	No	No	Yes	Minor,	
Blue Grouse Lane	No	No	No	No	Minor, 2-4"	Width, condition deteriorate closer to reservoir
Cassal Road	No	Yes	Yes	Yes		Washboards > 20' and > 3"deep, soft gravel, potholes 12-4 inches ,5% of rd, Side ditches above rd grade 1st 600', loose
Cottonwood Road	No	No	No	Yes	Minor, 2-4 and	
Crabapple Road	No	10-2	No	Yes	Minor, 2-4"	bad washboard, 1/2 up from Highland
Drake Dr	No	5-10'	No	Yes	Minor,	Lack of surfacing, washboard at Homestead
Eagles Nest Road	No	5-10'	<5%, 1-4"	No	Minor, 2-4"	Lack of surfacing, side rd- 8' width, minor 2-4' rx and 5' washboards
East Fawn Road	No	>20'	>25%, +4"	No	Major, 4-8"	Road in very poor condition
Elderberry Road	No	No	<5%	No	No	
Fawn Road	No	No	<5%	Yes	Minor, 1-4"	
Heather Road	No	No	No	No	No	No gravel, compact dirt
Highland Meadow Road	No	<5%, 1-3"	No	Yes	Occasional	Rx in Road minor, 4-8"
Highland Rd (Ent to Switchback)	Yes, 1-3"	1-3"	No	No	No	Washboards at entrance, corners, switchback
Highland Road (SBk to Crabapple)	No	>20', 1-3"+	>25%	No	No	Water project on rd, washboards and seasonal potholes worse W of pump house
Highland Road (Crapple to	Yes, 1-3"	No	No	No	No	Surface material OK except in erosion areas
	Road Surface (Continued)					

Road Name	*Crown*	*Wash-boar*	*Potholes*	*Loose grav*	*Rx in Rd*	*Comments*
Homestead Rd (Highland to Rk Rose)	No	Yes	Yes	Yes	Minor, 2-4"	WB extreme and persistent on curve section
Homestead Road (Rk Rose to Quaking A)	No	Yes	No	Yes	No	Surface material appears adequate
Homestead Road (QA to Bitter B NE end)	No	Yes	Yes	Yes	Yes	36' of 2-4" rocks in Rd
Homestead Road (NE BB to Homestead M.)	No	No	No	Yes	No	Surface material appears adequate
Laney Lane	No	No	No	No	No	minimum gravel but appears adequate
Lupine Road	Yes,<3"	No	No	Yes	No	
Mustard Mt. Road	No	Yes	Yes	Yes	Yes	20' WB, 5-25% Potholes, Some 2-4"rx
Quaking Aspen Road	Yes, 3-6"	No	No	No	No	West part of road recently resurfaced, very good shape, Eastern part of road still good but less surfacing
Reservoir Way	No	No	No	No	Y, Major	Significant ruts and rocks in road
River Road	Yes	No	No	Yes	No	Surface material seems adequate
Rock Rose Road	No	Yes	Yes	Yes	Yes	Major WB, Potholes, Rocks in road beyond 3rd house
Sunflower Lane	No	Yes	<5%	No	Yes	Overall surface material lacking, occasional 2-4" rocks WB >20',
Trillium Road (W/ Crabapple)	No	Yes	< 5%	No		Lots of loose rk in WB area by Heather/W end (200')
Trillium Road (E/ Crabapple)	No	Yes	No	No	Yes	WB uphill from Highland only, Minor 2-4" Rk
West Fawn Road	Yes	Yes	<5%	Yes	Yes	Occasional 2-8" rk, overall surfacing lacking
Wintergreen Road	<3"	Yes	No	No	Yes	Minor WB at E Fawn Crk, minor rutting

	Drainage/Erosion			Signs				
Road Name	***# of culverts***	***Drainage Ditches***	***Erosion***	***Dust***	***Speed***	***Info***	***Wooden***	***Comments***
Ayer's Court	0	minimum	Major	0	0	Dead end	1	Erosion in middle of rd, extends to Mustard Mtn.
Bitterbrush Road	0	Present, clogged	Yes	0	0	0	*0*	*Majorr erosion at E. end, culvert needed at 16 Bitterbrush*
Blue Grouse Lane	0	Mostly non-existent	No	0	0	0	0	
Cassal Road	2	Non-existent first 600'	Yes	0	3	0	1	Culverts clogged, erosion first 600'
Cottonwood Road		Mostly non-existent	No	0	0	0	0	
Crabapple Road	0	Present but clogged	Minor	0	0	0	0	Entire rd steep, erosion where ditching inadequate
Drake Dr	0	Mostly non-existent	Minor	1	0	0	0	Wooden dust sign
Eagles Nest Road	0	Mostly non-existent	Major in section	0	0	0	0	channel in rd by Lot 24, 4"-8"rx
East Fawn Road	0	Mostly non-existent	Major	0	1	1, Pvt. Comm.	1	Erosion particularly bad S. of MM and Highland M
Elderberry Road	0	adequate	No	0	0	1, Dead End	1	
Fawn Road	0	Mostly non-existent	No	0	0	1, Dead End	1	
Heather Road	0	None	No	0	0	0	0	
Highland Meadow Road	1	Minimum	Minor	0	0	0	0	Erosion near E. Fawn Rd.
Highland Rd (Ent to Switchback)	2	Adequate	No	0	1	0	0	
Highland Road (SBk to Crabapple)	4	Yes, but clogged	Yes	0	0	0	0	Hard to determine condition due to Water project
Highland Road (Crapple to CattleG.)	0	Yes, but clogged	Minor	0	0	0	0	
	Drainage/Erosion			**Signs (Continued)**				
Road Name	***# of culverts***	***Drainage Ditches***	***Erosion***	***Dust***	***Speed***	***Info***	***Wooden***	***Comments***
Homestead Rd (Highland to Rk Rose)	1	Yes, but clogged	No	1	1	1	1	
Homestead Road (Rk Rose to Quaking A)	2	Present but clogged	Minor	1	0	0	0	No drainage at bottom of hill (@#56), erosion near QA
Homestead Road (QA to Bitter B NE end)	7	Present but clogged	None	0	1	0	1	2 culverts not functioning
Homestead Road (NE BB to Homestead M.)	3	Present but clogged	None	0	0	0	0	
Laney Lane	0	None	None	0	0	1	1	Wooden Dead End sign
Lupine Road	0	Mostly non-existent	None	0	0	0	0	
Mustard Mt. Road	0	Mostly non-existent	Major	0	0	Dead end	1	water from Ayers Ct causing erosion in rd

Quaking Aspen Road	0	Mostly non-existent	None	0	0	0	0	
Reservoir Way	0	None	Minor	0	0	0	0	Ruts in road caused by erosion
River Road	0	Mostly non-existent	No	0	0	0	0	
Rock Rose Road	0	Mostly non-existent	Yes	0	0	0	0	Drainage issues by TS house
Sunflower Lane	0	Mostly non-existent	N	0	0	0	0	
Trillium Road (W/Crabapple)	0	Mostly non-existent	No	0	0	0	0	Need sign by Heather about steep grade
Trillium Road (E/Crabapple)	0	Mostly non-existent	Major	0	0	0	0	Erosion for 300' E of Highland
West Fawn Road	0	Mostly non-existent	Major	2	4	0	2	Appears water in rd during high water events
Wintergreen Road	0	Mostly non-existent	Minor	0	0	0	0	
TOTAL								

	Safety				
Road Name	***Dust issue***	***No reflectvie house #***	***Sight Distance***	***Vegetation encroachment***	***Comments***
Ayer's Court	No	1	No	Medium	
Bitterbrush Road	Minor	4	No	Medium	Middle section has some canopy issues
Blue Grouse Lane	No	2	No	Medium	
Cassal Road	Minor	7	Yes	Medium	Sight Distance issue at Jankowsky's (11,100 - 1,500' from, east end of Cassal, 2 houses had no numbers, 1 conflicted with county assessor number
Cottonwood Road	No	2	No		Short Road, Low traffic
Crabapple Road	Major	1	No	Medium	
Drake Dr	Minor	1	Yes	Low	Sight distance issue at intersection with Homestead and curve on Drake
Eagles Nest Road	Minor	3	No	Low	
East Fawn Road	Minor	4	No	Low	
Elderberry Road	No	1	No	Medium	
Fawn Road	No	2	1	Medium	
Heather Road	No	N/A	No	Medium	Rd goes to one vacant lot
Highland Meadow Road	No	2	No	Medium	
Highland Rd (Ent to Switchback)	Yes, Major	6	No	Low	
Highland Road (SBk to Crabapple)	Yes, Major	0	Yes	Medium	

Highland Road (Crapple to CattleG.)	Major	7	No	Low	Shoulder minimal, tight to pass except low speeds
	Safety (Continued)				
Road Name	***Dust issue***	***No reflectvie***	***Sight Distance***	***Vegetation encroachment***	***Comments***
Homestead Rd (Highland to Rk Rose)	Major	1	No	Medium	
Homestead Road (Rk Rose to Quaking A)	Major	3	Yes	Medium	Difficult to see traffic on Rock Rose when traveling west
Homestead Road (QA to Bitter B NE end)	Major	4	No	Medium	
Homestead Road (NE BB to Homestead M.)	Major	2	No	Medium	
Laney Lane	No	0	No	Low	
Lupine Road	No	2	No	Medium	Appears to have very low traffic
Mustard Mt. Road	Minor	1	No	Medium	
Quaking Aspen Road	Minor	9	No	Low- Medium	Low vegetation concerns at area recently rehabilitated, some encroachment on E. end
Reservoir Way	Nno	0	No	Medium	
River Road	No	5	No	Medium	
Rock Rose Road	Minor	2	Yes	Medium	Sight distance issue at intersection with Homestead
Sunflower Lane	No	1	No	High	
Trillium Road (W/ Crabapple)	Minor	5	Yes	Medium	Sight Distance issue at 130 degree turn by Heather Rd
Trillium Road (E/ Crabapple)	Minor	4	No	Medium	Dust can be more concern when traffic higher
West Fawn Road	Major	3	No	Medium	
Wintergreen Road	No	3	No	Medium	
TOTAL					

Appendix B. Dust Information

EPA classifies particle pollution as coarse particles, between 2.5 and 10 micrometers, abbreviated as PM10, and as fine particles, 2.5 micrometers in diameter and smaller, called PM2.5. Road dust and some agricultural operations are typical sources of PM10 for Edelweiss residents, whereas woodstoves, engine exhaust, and wildfires are Edelweiss' most likely sources of PM 2.5. Currently, there are no monitors in Edelweiss to measure particle pollution from roads.

EPA has established National Ambient Air Quality Standards (NAAQS) under its Clean Air Act authority for both PM2.5 and PM10. The standard for PM10 is 150 microgram per cubic meter (150 $\mu g/m^3$) averaged over 24 hours (not to be exceeded more than once per year averaged over 3 years). The standard for PM2.5 is 35 $\mu g/m^3$ averaged over 24 hours, with an annual average not to exceed 12 $\mu g/m^3$. The EPA uses the Air Quality Index (AQI) as a tool to translate measurements of air concentrations (NAAQS) into measurements of relative hazard for the public.

The Central Regional Office of the Department of Ecology (Union Gap, WA) is the official air quality monitoring entity for the portion of Washington State that includes Edelweiss. The nearest official air quality measuring station to Edelweiss is located at US Forest Service offices on West Chewuch Rd, Winthrop. It measures PM2.5 (units of air quality index or AQI), visibility (miles), and backscatter (an indication of particulates less than PM2.5). The nearest official measurements of PM10 (like our road dust) are in Colville and Yakima. Washington's PM10 exceedances are most often related to dust storms in the Columbia basin.

In addition to official measurements of air quality, individuals can also take their own measurements, either by grabbing a sample or by continuously monitoring. Grab sampling can be inexpensive and quick, but it is difficult to compare a short-term measurement to an average daily concentration.

Continuous monitoring has the advantage of providing a daily average, but it tends to be more expensive and time-consuming than a grab sample. Most non-official measurements tend to lack the scientific rigor required for comparison to NAAQS, but they can be effective in identifying trends and qualitative comparisons.

The Methow Citizens Advisory Council has several continuously operating air quality monitors that are part of the Purple Air network.[14] The Purple Air Network is low cost air quality sensor network providing real time measurement of air quality on a public map. There are two purple outdoor air monitors in Edelweiss: one at 8 Homestead Road and another on Elderberry Road. There are also at least four purple air monitors in the vicinity of the Edelweiss Community located at: Last Ranch on Highway 20, Gunn Ranch, Mazama Trailhead, and Upper Rendezvous. A single Flex – Air Quality Monitor sensor costs $289 plus shipping and requires Wi-Fi connection to the internet. Purple Air monitors use lasers to count the number and size of particles. They report results as AQI, which is appropriate for determining a relative degree of hazard, but not appropriate to determine compliance with NAAQS without additional and expensive laboratory analysis.

[14] https://www2.purpleair.com

Appendix C. Bibliography

2007 Edelweiss Master Road Plan, Edelweiss Planning Committee, 2007

2020 Edelweiss Master Road Plan, Edelweiss Roads Committee, 2020

7 Crucial Factors to Building Great Gravel Roads, Frank Elswick, March 30, 2016, https://blog.midwestind.com/7-crucial-factors-building-great-gravel-road/

Dust Control Field Guide for Gravel Driving Surfaces Prepared by Robert L. McHattie, MCE, P.E., for Alaska Department of Transportation, Research, Development & Technology Transfer, July 2015

Effectiveness of Radar Speed Feedback Signs & Other Traffic Calming Techniques, Addison County Regional Planning Commission, September, 2013.

Guidelines for Fire Apparatus Access Roads, Driveways & Bridges, Port Ludlow Fire and Rescue, http://plfr.org/about-plfr/docs/PLFR-Fire-Apparatus-Access-Requirements.pdf

How to Chip Seal a Gravel Road, Mark Schaefer, *Updated July 05, 2017* https://careertrend.com/how-6931284-chip-seal-gravel-road.html

Jeff Samdal and Associates, Inc, Professional Reserve Study for Edelweiss, July 31, 2018

Lignin Sulfonate Dust Control, Pacific Dust Control, June 1, 2019

Parking Rules Resolution, Edelweiss Board, October 15, 2018

Paving Edelweiss Gravel Roads, How – How Much and Why? Gil Lund, May 25 2013

Purple Air: Real Time Air Quality Monitoring https://www2.purpleair.com

https://www.costowl.com/b2b/construction-equipment-new-motor-graders-cost.html

https://www.enviroad.com/products/dust-control/earthbind-stabilizer-for-dust-control/

https://www.enviroad.com/dust-control/ligninsulfonate

https://www.epa.gov/sites/production/files/2015-10/documents/2003_07_24_nps_gravelroads_sec1_1.pdf