Chapter 2—Describing the Situation

The Analysis Area

The Malheur and Ochoco National Forest System Lands administered by the Malheur National Forest are located in central eastern Oregon. These lands are irregular in shape, but they are essentially a contiguous land unit. The Forest Lands include two long ridges or "fingers" located north and south of Fox, which extend west of US 395 from the main Forest into lands surrounded by land under other ownership. Inside the Forest Lands, there are some large blocks of land with private or other ownership, and numerous in-holdings (privately owned lands surrounded by National Forest System Lands). The two largest in-holdings occur in 1) an area with "checkerboard" ownership that is located southeast of Prairie City, and 2) areas in Logan Valley located south of Prairie City. There are also many smaller in-holdings, mostly related to old homesteads and patented mining claims. Many of the in-holdings have been the focus of past, current, and planned land exchange efforts.

The climate varies from semi-arid in the lower elevations to cool and humid in the high elevations. Well-known attractions include the Strawberry Mountain Wilderness and its lakes, Monument Rock Wilderness, Magone Lake, Delintment Lake, Yellowjacket Lake, and the North Fork and Malheur Wild and Scenic Rivers. The Forest is currently configured into three Ranger Districts, including the Blue Mountain, Emigrant, and Prairie City Ranger Districts. The Emigrant District includes the portion of the Ochoco National Forest that was formerly the Snow Mountain District (now administered by the Malheur National Forest). Federal, State, and County road systems traverse and pass through various areas on the Forest.

Significant numbers of Forest visitors use the road system in summer, fall, and spring for recreational use or other access. Most Forest roads are inaccessible (snowed in and not plowed) during the winter months. However, the open highway system transports a significant number of recreationists to sites that access cross-country skiing and snowmobile routes. Prominent transportation features include U.S. Highways 20, 26 and 395, State Highway 7, and many County roads.

History of Forest Transportation System Development

Prior to the introduction of the horse in the early 18th Century, human transportation on the Forest was limited to foot traffic. Archaeological and ethno-historic evidence suggests that an extensive network of trails was established on the Forest, and that these trails linked areas containing different resources with one another. These resources included fish, game, plant foods, obsidian and other tool stones, and plants used for fiber and wood. As a generalized model, winter villages were established in relatively mild low elevation locations and a variety of camps were established at higher elevations as the weather became milder and different resources became available. Trails linking the various resource sites together were generally located along ridgelines and open valleys. Exceptions were made when distance or water availability dictated that steeper routes were more efficient. The distribution of small archaeological sites on the Forest reveals these travel networks. Some segments of American Indian trails are documented on early maps of the area.

Most of the travel along these trails consisted of use by local American Indian families during their annual resource gathering activities. Much of this travel would have been limited to within 100-200 miles of the winter camps. There is evidence that travel and trade networks extended well beyond the area of local use. Obsidian from local Strawberry Mountain sources has been recovered as far north as North Cascades National Park and sites in western British Columbia. Most of the obsidian recovered from sites along the Columbia River east of The Dalles originated from this area. Obsidian artifacts from non-local sources have also been identified on the Forest. These have originated from as far to the east as Boise, to the south as Nevada, and to the west as the Cascades west of Eugene. One shell bead that originated from the coast of southern California has been recovered from the Emigrant Creek Ranger District. The introduction of the horse around 1720 increased the distance people would be willing to travel to and from the Forest, but most likely did not significantly alter the location of the trails used.

The first known Euro-American travel in the area now known as the Malheur National Forest were the journeys of Peter Skene Ogden and his parties of fur trappers in the middle 1820's (Davies 1961, Rich 1950, Williams 1971). Ogden led three groups of over 100 individuals through the area as part of the Snake River Expeditions for the Hudson Bay Company between 1825 and 1829. One last Snake River Expedition, led by John Work, moved rapidly through the area in 1831 (Haines 1971). The journals left by Ogden and Work provide the first written accounts of the Malheur country. Their routes took them through Malheur Forest land east of Prairie City towards Burnt River and on parts of the Silvies and Malheur River systems. During their travels these explorers mostly followed existing American Indian travel routes, generally led by Indian guides. The Oregon Trail and other early wagon routes bypassed the Malheur National Forest and no wagon or stage roads were constructed until after the discovery of gold in the 1860's.

In the summer of 1862 a steady stream of miners passed through the John Day valley on their way to the recently discovered gold strikes near Florence, Idaho (Mosgrove 1980). These miners traveled informal routes from Yreka California and The Dalles, most likely following existing Indian trails. In June of that year at least two groups of miners discovered gold in Canyon Creek and over 1,000 miners moved into the area within one year. Three main travel routes brought miners and supplies into the area. The Yreka-Canyon City route passed near present day Hamilton and crossed the South Fork John Day River near the mouth of Magic Lantern Creek (Nielsen 1985). It continued north on the flats east of the South Fork until it dropped back to the river bottom from Jackass Mountain. The trail then continued along the river to the present site of Dayville and then along the Main Stem John Day to Canyon City. Somewhat amazingly, wagons were negotiating along this route as early as 1863. None of this trail crosses into the present Malheur National Forest. The second route to the Canyon City gold fields originated in The Dalles. This brought miners from the Willamette Valley and Portland. The majority of the supplies packed into the mining camps came along this route. It ran along the Main Stem John Day River after it entered the valley west of Dayville. None of this trail crosses the Malheur National Forest. The third major trail ran from the diggings in Idaho through the Burnt River area to the John Day valley near Prairie City. This was the least formal route and was used mainly by miners moving between the Idaho and Canyon City prospects. This route did pass through the Malheur Forest east of Prairie City, vaguely along the route of present day US 26, but the exact location of the trail, or trails, is unknown.

The success of the mines in the Canyon City area necessitated the construction of more significant wagon roads to allow for easier movement of people and goods. The main freight route was from The Dalles, and by 1864 four-horse stages were regularly carrying mail, supplies and passengers (Mosgrove 1980: 37). Military forts and roads were soon established to intervene between the miners and the local American Indians who had not yet ceded their lands to the government through treaties. Local citizens and the state government pushed for the construction of military roads to meet both military and civilian needs. The most ambitious of these was the Dalles Military Road that went from The Dalles to Fort Boise in Idaho, by way of Canyon City (Mosgrove 1980:49). After several delays this road was completed in 1869. A portion of the Dalles Military Road crosses the Forest in the Prairie City Ranger District. Part of this segment is the most intact historic wagon road remaining on the Malheur Forest. It is eligible for inclusion on the National Register of Historic Places. Another early wagon road went between Canyon City and Fort Harney, east of Burns (Nielsen 1985). This route went through several locations on the Emigrant Creek and Blue Mountain Ranger Districts. Unfortunately, most evidence of this road has been obscured by later road construction and logging. An alternative route used Road Gulch on the Blue Mountain Ranger District but no historic segments of this road have been identified on the ground (Mosgrove 1980: 39). Many smaller trails and wagon roads were established to run supplies between Canyon City and the gold mines along the Middle Fork John Day River and to Monument, Long Creek and Fox Valley (Nielsen 1990: 66). Several segments of these roads crossed the Blue Mountain Ranger District but most are now obscured. A possible exception is part of the old route to Long Creek located south of Hog Flat along Beech Creek (Nielsen 1990: 68).

Through the 1800's most travel into the Forest continued on horseback or by foot along existing trails. Much of the country was open enough that travel in a buckboards or a small wagon was feasible without formal trails. In 1908 the Malheur National Forest was established and began a slow but steady road building program. Most of these roads were established to facilitate fire protection and other administrative duties. A limited number of roads were constructed primarily to expedite recreational use of the Forest. By 1928 there were 383.5 miles of road on the Forest (Mosgrove 1980: 138). This was sufficient, in theory, to allow firefighters to reach any fire reported on the Forest within one hour. The pace of road building increased in the 1930's through the 1980's, as larger networks of roads were developed to support commercial timber harvest and, to a lesser extent, increased recreation. By the late 1980's over 8,000 miles of road existed on the Malheur (Malheur National Forest Plan 1990: appendix I).

Before trucks became large enough to efficiently haul timber, commercial timber harvest relied on the use of logging railroads. The first of these on the Malheur Forest was the Sumpter Valley Railroad that reached Prairie City from Baker City in 1909 (Mosgrove 1980: 133). Use of the railroad ended completely by 1947. The Oregon Lumber Company developed a network of spurs off this railroad, primarily on the Middle Fork John Day River, to haul lumber to mills in Baker and Bates. Many of these grades are on the Blue Mountain and Prairie City Ranger Districts and many segments of the line and associated historic features are identifiable today. The Forest Service has developed one segment of the Sumpter Valley Railroad near Dixie Summit as an interpretive trail. These railroad features are listed on the National Register of Historic Places.

A second logging railroad system extended north from Burns into the Bear Valley and Logan Valley areas (Mosgrove 1980: 133, 183-193). Construction on the Hines logging Railroad was begun in 1923 and timber was being hauled to the mill in Hines by 1930. The railroad continued to be used until the 1970's. Construction of this railroad was mandated through the purchase of the Bear Valley Timber Sale, the largest Forest Service timber offering in the continental United States (Langston 1995). Most of this railroad was constructed on parts of the Malheur National Forest. Many segments of the line and associated features are identifiable today. The railroad is considered eligible for inclusion on the National Register of Historic Places. Interpretive signs explaining the history of the railroad are located along US highway 395.

In summary, much of the existing road system was established long ago, with early roads predating formation of the National Forests. Most roads on the Forest were originally constructed for commercial access purposes including grazing, timber, and mineral extraction. Others were developed to access administrative sites, private property, recreation facilities, trailheads, power-line corridors, or construction for other administrative purposes.

As a result, the road system has had many additions, upgrades, and other changes through the years to the present. Arterial, collector, and local roads have been added, with numerous additions in the 1970s and 1980s. Limited road construction continued in the 1990's to present, but recent additions include only a relatively small number of roads, reflecting an overall decline in timber harvest activities and entry into areas not previously roaded.

The extensive road network that has been developed continues to serve for commercial, recreational, and administrative purposes, and also provides key access to private lands. There are currently about 9670 miles of inventoried, classified National Forest System (NFS) roads administered by the Malheur National Forest. The three ranger districts, Blue Mountain, Emigrant, and Prairie City, share management of the road system. The Oregon counties of Crook, Grant, Harney, and Baker also have roads that are within or provide public access to the National Forest.

Forest Plan Objectives

General

Both the 1990 Malheur and 1989 Ochoco Forest Plans list the following goal for the Forest transportation systems:

- Plan, design, operate, and maintain a safe and economical transportation system providing efficient access for the movement of people and materials involved in the use and protection of the National Forest lands.

The Malheur Forest Plan has a second goal listed for the transportation system:

- Plan, design, construct and maintain roads to the minimum level necessary to meet resource objectives including, but not limited to, objectives for timber harvest and removal, big-game habitat needs (including security needs), high quality recreation opportunities and firewood cutting opportunities.

Arterials and collectors are the roads used to provide primary access to large portions of NFS lands. Arterials normally serve as connections between towns, major county roads, or state highways and are main thoroughfares through the Forest. Collectors link large areas of the Forest to arterials or other main highways.

Appendix A in the 1990 Malheur and Ochoco Forest Plans includes schedules of planned capital improvement construction and reconstruction for the planning period (Table A-8, pages A 14 through A 16 in the Malheur Forest Plan, and Appendix A11, page A-33 in the Ochoco Forest Plan). About 4 miles of new construction and 260 miles of reconstruction through Capital Investment funding were planned in the first decade of the Malheur Forest Plan. About 13 miles of new construction and 150 miles of reconstruction were planned in the first decade of the Ochoco Forest Plan. To date, less than half of the planned projects have been accomplished. Declining timber sales and reduced capital investment programs are the primary reasons for not meeting forest plan expectations.

General direction in the 1990 Malheur Forest Plan (pages IV 42-43) states that road management objectives will be prepared for all proposed and existing roads, and that all roads should be maintained to maintenance levels established in the road management objectives. The Malheur did prepare RMOs for each OML 3-5 road and for the "encourage use" OML 2 roads. The remaining OML 2 roads are generally covered only with a single generic RMO document. Many of the current RMO documents are outdated and need to be reviewed and revised if appropriate. The OML for most arterial road segments is currently 3 or higher, and the minimum maintenance level for all collector roads is level 2. Current OML levels for all of the roads included as part of the potential minimum primary road system are listed in the road tables in Appendix A).

According to the current inventory, the Forest is not succeeding at maintaining all of the current OML 3 through 5 roads to standard as envisioned in the 1990 Forest Plans because available funding is not adequate for this amount of maintenance activity. This is the national-scale problem that prompted the Chief of the Forest Service to issue new road management direction on January 12, 2001.

The Malheur Forest Plan (Chapter IV, page 23) includes projections for total road miles, total road miles maintained for passenger cars (OML 3-5), total road miles maintained for high clearance vehicles (OML 2), and total road miles placed in a year round closure status (OML 1) or decommissioned by the end of the first decade (1999). Table 2 is based on a INFRA query (1/04), and included only road miles on Malheur Forest lands (not Ochoco); but the numbers in the table illustrate trends relative to the Forest Plan goals. The table indicates that the Malheur has generally met these Forest Plan goals for roads. However, it is evident that the total Forest road miles in 1999 was less than the plan anticipated. This is in large part a reflection of the reduction in timber harvest activities and associated road building over the past decade.

Table 2 – Malheur National Forest – Road Miles

MALHEUR FOREST PLAN GOALS	LOW CLEARANCE VEHICLES	HIGH CLEARANCE VEHICLES		
	Open Miles	Open Miles	Decommissioned or year round closure miles	Total Forest Miles
1990	1200	6806	564	8570
1999	1200	5300	2688	9188
Actual (2002)	1127	4962	2793	8403 (open and closed) + 481 (decommissioned)

Road Densities

The Malheur Forest Plan **(**Chapter IV, Desired Future Conditions) provides direction to address road related concerns for fish and wildlife. This issue was addressed by establishing maximum road density goals for summer range, winter range, and wildlife emphasis areas by the end of the first decade (1999):

- Summer Range – 3.2 miles/square mile
- Winter Range – 2.2 miles/square mile
- Wildlife Emphasis Areas – 1.5 miles/square mile

The plan indicates road densities are to be monitored and evaluated on a watershed basis (5^{th} level HUC). The plan also states that access management planning will strive for 1.5 miles/square mile on summer range and 1.0 miles/square mile on winter range "unless these densities do not allow for a healthy and productive forest as envisioned in the desired future condition, or interfere with access to private land."

The Ochoco Forest Plan (Chapter 4, Section 3, Transportation System) provides direction for the road system to be "at the lowest density which will meet long-term resource needs."

Recent studies from eastern Washington (Schiess and Krogstad, 2000) indicate that road density alone is a poor indicator of sediment delivery to streams, and that other factors (e.g. road surfacing and use) may be far more important. An alternative to relying on road density standards is to identify the actual road impacts through an analysis process like a roads analysis or watershed analysis, and to monitor accomplishments of the restoration needs identified through the analysis. Monitoring accomplishment of the restoration needs is more meaningful than measuring changes in road densities, and has the potential to provide much greater benefits to affected resources.

Federally Designated Forest Highways

The analysis area contains many Forest Highways designated under the Public Lands Highways program of the Transportation Equity Act for the 21st Century (TEA21). These routes include State, County, and Forest Service owned roads qualifying for federal funding for improvement or enhancement. They provide access to and within the lands administered by the Malheur National Forest. These roads are listed in the following table:

Table 3 – Federally Designated Forest Highways

Forest Highway Route No. & Name	Description	County
FH 33 Pendleton-John Day (US 395)	From jct. with Grant County Rd. 20 (Middle Fork John Day River Road) northerly to the Grant-Umatilla County Line and northerly to a jct. with Umatilla County Rd. 1417 approx. 8 miles north of Ukiah.	Grant Umatilla
FH 34 Pendleton-John Day (South-Section - US 395)	From Jct. with Grant County Rd. 20 (FH115) southerly to a jct. with US 26 (FH 36) in John Day	Grant
FH 35 Burns-John Day (US 395)	From jct. With Forest Road 47 east and north to jct. With US 26.	Harney Grant
FH 36 John Day (US 26)	From jct. With Fields Creek Road (Forest Road 21) east to Grant/Baker County Line and further east to Jct. with Forest Rd. 16.	Grant Baker

Forest Highway Route No. & Name	Description	County
FH 115 Middle Fork John Day (Grant County Road 20)	From jct. With US 395 approx. 13 miles north of Long Creek southeasterly to jct. With SR 7.	Grant
FH 116 Keeney Fork Road (Grant County Road 18)	From jct. With US 395 at Long Creek easterly on County Rd. 18, southeasterly and southerly on County Rd. 18 to jct. With US 26.	Grant
FH 117 Pleasant Hill Road (Grant County Road 49)	From jct. With US 26 approx. 2 miles east of Mount Vernon southerly to a jct. With Forest Rd. 49	Grant
FH 118 Logan Valley Road (Grant County Road 62)	From city limits on east side of Prairie City southeasterly to a jct. with Forest Rd. 16 at Summit Prairie	Grant
FH 119 Canyon Creek Road (Grant County Road 65)	From jct. With US 395 approx. 11 miles south of John Day southeasterly to the Malheur N.F. boundary.	Grant
FH 120 Prineville Logdell Highway (State Highway 380, Crook County Road 112, and Grant County Roads 63 and 67)	From jct. With US 26 southeast and east to Crook-Grant County line east and northeast to jct. With US 395	Grant Crook
FH 121 Burns-Izee (North Section – Grant County Road 68)	From a jct. With County Rd. 63 approx. 2 miles southeast of Izee southerly to the north boundary of the Malheur N. F.	Grant
FH 122 Weberg Road (Crook County Road 318 and Grant County Road 69)	From jct. With County Rd. 63 approx. 1 mile west of the Crook-Grant County Line south easterly to the jct. with Forest road 41.	Grant Crook
FH 126 Burns-Izee Rd. (South Section – Harney County Road 127)	From jct. With US 395 approx. 1 mile south of Hines westerly then northerly to south boundary of the Malheur N. F. near the Campbell Ranch.	Harney

Forest Highway Route No. & Name	Description	County
FH 127 Fort Harney Road (Harney County Road 102)	From jct. With US 20 approx. 13 miles east of Burns northerly to a jct. with FR 28 near Fort Harney Site.	Harney
FH 128 Pine Creek Road (Harney County Road 306)	From jct. With US 20, 27 miles east of Burns north and northwesterly to the south boundary of MNF north of Van.	Harney
FH 148 Whitney-Tipton (State Highway 7)	From jct. with US 26 at Austin Junction northeasterly to Grant-Baker County Line. Continues easterly and northerly into Baker County.	Grant Baker
FH 150 Silver Creek (Harney County Road 138)	From Jct. With US 20 approx. 2 miles west of Riley, northerly and northwesterly to jct. With Forest Road 45	Harney
FH 235 Burns Drewsey Road (US 20)	From Jct. with US 395 easterly to Jct. with Drewsey Road	Harney

Forest Highway funding can be used for planning, design, and construction or reconstruction of these designated routes. Other work can include parking areas, interpretive signing, acquisitions of scenic easements or sites, sanitary and water facilities, and pedestrian and bicycle paths.

Scenic Byways and Scenic Corridors

Scenic Byways are paved roads that are generally safe, open year-round, and used by passenger car or motor coach. Portions of U.S. Highway 26, and Oregon State Highway 7 that pass through the Forest are part of the Journey Through Time Oregon State Scenic Byway, designated in 1996. The designated route from Baker City to Austin Junction is along Oregon Highway 7, and from Austin Junction through the communities of Prairie City, John Day, and Dayville is along U.S. Highway 26. From Dayville, it continues along U.S. Highway 26 into Picture Gorge, and then on Oregon Highway 19 and segments of other highways to a terminus just across the Oregon/Washington border at the Maryhill Museum of Art.

Other types of road designations include Scenic Corridors. The Bureau of Land Management and the Forest Service jointly manage the Devine Canyon Scenic Corridor, which is located on a section of U.S. Highway 395 north of Burns.

Public Forest Service Roads

The Forest Service has been working closely with the Federal Highway Administration in recent years to develop a new Public Forest Service Road Program that is similar to the Forest Highway Program. This program would also be funded under the Federal Lands Highway Program using Highway Trust Funds under TEA21 (or the next Transportation Bill to be voted on in 2004). By definition, a Public Forest Service Road (PFSR) is a Forest Service road that is "open to public travel", as in the definition of our Highway Safety Act roads. However, not all Highway Safety Act roads can qualify as Public Forest Service Roads. To qualify as a PFSR, the road must be a maintenance level 3, 4, or 5 road under the jurisdiction of the Forest Service, have relatively high traffic counts, provide unrestricted or “seamless” access, and serve a compelling public need. Using these criteria, only some of the Forest arterials have been submitted PFSR designation. It is not anticipated that many additional roads would meet the qualification criteria.

Table 4 lists the potential PFSR roads that the Forests have submitted for the first round of funding (2004 - 2006) of this new program. Whether the program is approved, funded, and at what level is still uncertain.

Table 4 – Potential Public Forest Service Road Projects.

ROAD	PROJECT NAME	LENGTH	FOREST PRIORITY	REGIONAL PRIORITY	ESTIMATED COST (M$)*
13	Forest Road 13	16.5	3	42	**$4,055**
15	Forest Road 15 Segment 1	6.4	4	53	**$1,368**
15	Forest Road 15 Segment 2	2.1	4	54	**$1,066**
16	Forest Road 16	60.2	1	20	**$12,655**
17	Forest Road 17	11.0	5	62	**$2,070**
21	Forest Road 21	25.2	6	71	**$3,462**
28	Forest Road 28	21.4	7	80	**$3,808**
31	Forest Road 31	34.0	8	82	**$4,223**
37	Forest Road 37	30.2	9	85	**$10,250**
41	Forest Road 41	41.8	11	91	**$13,186**
43	Forest Road 43	24.2	10	88	**$11,453**
45	Forest Road 45 (South)	23.8	12	93	**$10,276**
47	Forest Road 47	15.4	2	78	**$6,590**

* Includes combined Capital Improvement and Deferred Maintenance costs from INFRA PFSR project tables.

Basic Types or Categories of Road Maintenance

National Forest Road System maintenance is divided into three basic categories. These include annual maintenance, deferred maintenance, and capital improvement:

Annual Maintenance – is work performed to maintain serviceability, or to repair failures during the year in which they occur. This includes preventative and/or cyclic maintenance performed in the year in which it is scheduled to occur. Annual maintenance includes cyclic activities that need to occur in cycles of 10 years or less. Includes replacement of signs, brushing, blading, drainage maintenance, and surface maintenance and replacement. It does not include replacement of structures such as culverts, guardrails, or cattleguards. Annual maintenance activities that do not occur on schedule accumulate over time as deferred maintenance costs.

Deferred Maintenance – includes maintenance that was not performed when it should have been or when it was scheduled, and which therefore, was put off or delayed for a future period. This type of maintenance could include activities related to code compliance, Forest Plan Direction, Best Management Practices, Biological Evaluations, regulatory requirements, and standards that are not met on schedule. Replacement of culverts for fish passage is considered a deferred maintenance item in INFRA.

Capital Improvement – Includes the construction, installation, or assembly of a new fixed asset, or the significant alteration, expansion or extension of an existing fixed asset to accommodate a *change of purpose*. Capital Improvement funds are normally only expended on roads that are already OML 3, 4, or 5, or to bring a lower standard road up to one of those Operational Maintenance Levels.

Maintenance Activities and Frequencies

There are national protocols related to information in the INFRA database, which include recommended frequencies for some maintenance activities and recommended cost estimates to accomplish them. They are used to project the estimated costs for annual and deferred maintenance, and for capital improvements. The actual frequency for a specific road will vary depending on many variables including traffic volume, surface type and condition, and other factors. If a Forest or Region uses other frequencies (as a basis for cost estimates in INFRA) or adds other work items they are directed to document deviations. Some of these standard frequencies are listed in Table 5:

Table 5 – Road Maintenance Frequencies

Maintenance Frequencies	OML 1-2	OML 3-5
Reshape/Blading-aggregate	Every 5 years	Annual
Aggregate Replacement	Every 50 years	Every 10 years
Asphalt – Crack Seal		Every 3 years
Asphalt – Chip Seal		Every 10 years
Asphalt - Overlay		Every 25 years
Brushing	Every 5-10 years	Every 1-4 years

The maintenance frequencies listed in Table 5 are general, and depending on the amount and type of use on a specific road, some activities may need to be done either more or less often. And some maintenance activities can be deferred for a period of time without any immediate or serious consequences. But it is important to consider that when some maintenance activities are deferred beyond a critical point, the condition of a road or facility can deteriorate to a point that it can no longer be maintained to standard. When that point is reached it will require capital improvements to restore the road to its former standard and serviceability.

For example, if a BST surface is severely breaking up, it is too late for a chip seal to do much good. Or if an aggregate surfaced road has deteriorated to the point where rutting extends into the subgrade materials, surface rock replacement is unlikely to restore the structural strength needed for the road.

The Costs of Maintaining the Classified Road System

The three maintenance categories for each system road are input and tracked in the INFRA database. Information that is currently in the Malheur database, including both activity frequencies and unit costs does not strictly follow the national protocols such as those listed in Table 5. One reason for this is that not every level 2 road on every Forest in every Region has the same type or amount of use. Another reason is that much of the information has been input over time with evolving direction from different road managers. Despite the fact that the numbers are not necessarily "pure", the information currently in INFRA still allows a reasonable projection of overall costs associated with maintaining the classified road system.

An understanding of the relative costs involved in maintaining roads to standard is essential understanding the magnitude of the funding problem the Forest faces. The discrepancy between the amount of funding available for road maintenance activities and the size and condition of the system that needs maintenance is large. As a result of the very limited budget in recent years, an estimated 80% of the available maintenance funds have been expended on the OML 3-5 roads. The reality is that much of the needed annual maintenance work continues to be deferred, and especially on OML 2 roads. Consequently, the deferred maintenance backlog continues to grow.

Costs Associated with Surface Maintenance and Replacement (Excluding Blading)

Most native service roads, if used other than during dry or frozen conditions cannot tolerate much traffic without rutting causing other resource problems. Consequently, if the serviceability of a road needs to be extended, some type of "improved" surface or pavement structure is needed. Depending on the type and strength of the structural improvements, the periods when a given road can be used without incurring damage can be extended accordingly. But it is important to keep in mind that the Forest does not have any "all weather roads", or roads that have been constructed to a standard that can handle heavy commercial use under all conditions without incurring structural damage.

A large part of the total costs associated with road maintenance on improved roads are those related to replacing or protecting improved road surfaces. Historically, the Forest routinely applied or replaced road surfaces through road maintenance and improvement activities associated with large timber sales. The Forest currently collects deposits for replacement of surfacing on crushed-aggregate surfaced roads and for surface related work on asphalt surface roads when the roads are used commercially. But with the decline in commercial harvest from the Forest, the amount collected is relatively small. Most of the current traffic on Forest roads is from recreational or administrative use.

The costs in tables 6, 7, and 8 in the next section of this document were calculated by Forest personnel based on recent cost guides and local experience, so they are slightly different than costs in the INFRA database.

Surface Rock Replacement Costs for Aggregate Surfaced Roads

With a few exceptions, most OML 2 roads on the Malheur do not have any planned or scheduled surface rock replacement. So the only time surface rock replacement is likely to occur is if a project evolves that is large enough to warrant it and pay the associated costs (usually a large timber sale). On OML 3 or higher aggregate surfaced roads, surface replacement is typically scheduled (in INFRA) to occur at 10- or 20-year intervals depending on the level of traffic or amount of use. On the Malheur Forest, most of the roads (over 90%) are listed in INFRA as having a 20-year surface replacement interval; the others are listed as having either 10 or 15 intervals.

On a high use road scheduled for surface replacement every 10 years, these costs would be “pro-rated” as an annual maintenance cost. On a road where surface replacement is scheduled at 20-year intervals, it could either be pro-rated as an annual maintenance cost or tracked as a deferred maintenance item. In either case, Table 4 displays typical cost estimates in terms of costs per mile and annual costs per mile based on 10 and 20-year replacement intervals:

Table 6 – Surface Rock Replacement Costs Estimates

ROAD TYPE	REPLACEMENT CYCLE	COST/MILE	ANNUAL COST/MILE
Single Lane with Turnouts	10 years	$93,000	$9,300
Single Lane with Turnouts	20 years	$93,000	$4,650
Double Lane	10 years	$130,000	$13,000
Double Lane	20 years	$130,000	$6,500

The costs in this table include estimated overhead and administrative costs of 45%.

Actual costs would vary with the size and scope of the project, and are based on placement of a four-inch thick layer of dense graded crushed aggregate on a 10-mile long road segment with an average haul distance of about 12 miles.

Costs were also calculated for surface rock replacement using a grid-rolled type aggregate. Materials suitable for grid-rolled aggregates are usually relatively coarse, so those costs were calculated based on a six-inch thick layer of aggregate. Because of the additional volume of materials requiring hauling and placement, on a similar 10-mile long project, the cost per mile was virtually the same as the costs in the table (for a four-inch layer of crushed aggregate).

Surface Maintenance or Replacement Costs on Roads with Bituminous Surface Treatments (BST)

This type of road surface is originally constructed by applying two or more thin layers of rock chips and asphalt cement. The type of work needed to maintain this type of surface is typically a single layer chip seal after approximately 8 years, and a double layer seal at year 15.

Table 7 – BST Surface Maintenance/Replacement Costs

ROAD TYPE	CHIP SEAL COST/MILE*	CHIP SEAL ANNUAL COST/MILE
Single Lane with Turnouts	$78,000	$5,200
Double Lane	$109,000	$7,267

The figures in the table include estimated overhead and administrative costs of 45%.
*Costs per mile are calculated based on one single and one double seal for a 15-year period (three layers total).

Costs would vary with the size and scope of the project; these costs are based on placement of a single layer surface treatment at 8 years, and a double layer surface treatment at year 15, on a large project (10 miles or greater in length).

Surface Maintenance or Replacement Costs on Roads with Asphalt Surfaces (Hot or Cold Mix Asphalt Concrete)

On roads with these types of surfaces, a chip-seal coat would normally be scheduled every 10 years, and a two-inch asphalt overlay would be scheduled every 20 years:

Table 8 Asphalt Chip Seal and Overlay Costs

ROAD TYPE	CHIP SEAL COST/MILE	CHIP SEAL ANNUAL COST/MILE	OVERLAY COST/MILE	OVERLAY ANNUAL COST/MILE	TOTAL ANNUAL COST/MILE
Single Lane with Turnouts	$26,000	$2,600	$114,000	$5,700	$8,300
Double Lane	$36,350	$3,635	$155,500	$7,775	$11,410

The figures in the table include estimated overhead and administrative costs of 45%.

Costs would vary with the size and scope of the project; these costs are based on placement of a single layer chip-seal every 10 years and a two-inch thick layer of hot-mix asphalt every 20 years on a large project (10 miles or greater in length).

Total Costs to Maintain and Retain Existing Surface Types on Improved Surface Roads

Many Forest roads have objective maintenance levels (INFRA) that are different from the current OML. A comparison between Tables 9 and 10 indicates that there are not many differences between the current OML 3-5 roads and the ObML 3-5 roads. The most significant difference between current OML and ObML is that a large number of OML 2 roads have an ObML of 1. From a historical perspective, decisions about whether or not these roads should remain open have been deferred for future analyses and NEPA decisions. Because surface rock replacement on OML 1 or 2 roads is not typically a “planned event” on the Malheur, they do not have much impact the total cost differences between Tables 9 and 10, which are essentially the same.

Table 9 displays the estimated annual costs for surface rock replacement on aggregate roads and for chip seals and overlays on BST and asphalt surface roads, if the Forest were to maintain current surface types on OML 3-5 roads over time:

Table 9 – Costs to maintain current OML 3-5 road surfaces.

OML LEVEL	TOTAL MILES	LANE MILES	ANNUAL SURFACE REPLACEMENT COSTS
1	2637	2638	N/A
2 (native)	4537	4537	N/A
2 (rock)	1275	1281	N/A
3 (native)	57	57	N/A
3 (rock)	802	823	3,768,000
3 (BST)	25	25	130,000
4 (rock)	109	125	534,800
4 (BST)	127	189	788,500
4 (asphalt)	82	157	913,500
5 (asphalt)	19	32	195,800
All	9670		6,330,600

The costs include estimated overhead and administrative costs of 45%. The costs for aggregate surfaced roads are calculated based on a 20-year replacement cycle.

Table 10 displays the estimated annual costs for surface rock replacement on aggregate roads and for chip seals and overlays on BST and asphalt surface roads, if the Forest were to implement changes from the current operational maintenance levels to the objective maintenance levels:

Table 10 – Surface Costs to maintain current ObML road surfaces

OBML LEVEL	TOTAL MILES	LANE MILES	ANNUAL SURFACE REPLACEMENT COSTS
1	6763	6768	N/A
2 (native)	870	870	N/A
2 (rock)	805	810	N/A
3 (native)	64	64	N/A
3 (rock)	818	834	3,833,300
3 (BST)	25	25	130,000
4 (rock)	97	129	510,250
4 (BST)	127	189	788,500
4 (asphalt)	82	157	913,500
5 (asphalt)	19	32	195,800
All	9670		6,371,350

The costs for aggregate surfaced roads are based on a 20-year replacement cycle. The costs include estimated overhead and administrative costs of 45%.

Total Maintenance Costs for the Existing Road System

From 1998 through 2003, the Forest has conducted road condition surveys to determine the actual cost of maintaining the road system to standard. Work items were also recorded to determine the cost of road maintenance work deferred in previous years due to lack of funding. Finally, road improvement work necessary to bring the roads up to the desired standards was identified and documented.

The costs in tables 11 and 12 that follow are based on average costs from year 2000 and 2001 surveys for maintenance Level 1 and 2 roads, and on average costs from year 2002 and 2003 surveys for level 3-5 roads. The older surveys were used for level 1 and 2 roads because there were very few roads in these maintenance classes surveyed in 2002 and 2003.

Costs to Maintain to Operational Maintenance Levels (current RMOs)

A summary of estimated Annual and Deferred Maintenance funds needed to maintain classified roads to current ***operational*** maintenance level standards and complete proposed Capital Improvements is displayed in Table 11:

Table 11– Estimated Annual and Deferred Maintenance costs to maintain the road system to OML, and Capital Improvement Costs to complete planned Capital Improvements.

OML	Total Miles	**Annual Maintenance**		**Deferred Maintenance**		**Capital Improvements**	
LEVEL		$/mile	Total $	$/mile	Total $	$/mile	Total $
1	**2638**	**400**	**1,055,200**	**660**	**1,741,080**		
2	**5812**	**830**	**4,823,960**	**1,720**	**9,996,640**		
3	**883**	**6,320**	**5,580,560**	**26,000**	**22,958,000**	**16,405**	**14,485,944**
4	**317**	**18,500**	**5,864,500**	**170,000**	**53,890,000**	**150,276**	**47,637,492**
5	**19**	**18,500**	**351,500**	**170,000**	**3,230,000**	**396,100**	**7,525,900**
All	**9670**		**17,675,720**		**91,815,720**		**69,649,336**

The costs in this table are from INFRA and include estimated overhead and administrative costs of 45%.

Costs to Maintain to Objective Maintenance Levels (current RMO's)

Table 12 displays the same type of costs if the current ***objective*** maintenance levels were implemented, and allow a comparison of costs between the two:

Table 12 – Estimated Annual and Deferred Maintenance costs to maintain the road system to ObML, and Capital Improvement Costs to complete planned Capital Improvements.

ObML	Total Miles	**Annual Maintenance**		**Deferred Maintenance**		**Capital Improvements**	
LEVEL		$/mile	Total $	$/mile	Total $	$/mile	Total $
1	**6,768**	**400**	**2,695,200**	**660**	**4,466,880**		
2	**1,672**	**830**	**1,387,760**	**1,720**	**2,875,840**		
3	**906**	**6,320**	**5,725,920**	**26,000**	**23,556,000**	**16,405**	**14,862,930**
4	**305**	**18,500**	**5,642,500**	**170,000**	**51,850,000**	**150,276**	**45,834,180**
5	**19**	**18,500**	**351,500**	**170,000**	**3,230,000**	**396,100**	**7,525,900**
All	**9670**		**15,802,880**		**85,978,720**		**68,223,010**

The costs in this table are from INFRA and include estimated overhead and administrative costs of 45%.

Comparing the two tables indicates that annual maintenance costs could be reduced by $2,000,000 and deferred maintenance costs by almost $6,000,000 if current objective maintenance levels were all implemented across the board.

Recent and Foreseeable Road Maintenance Budgets

For 2004, the allocated road maintenance budget for planning, construction, and maintenance of roads is estimated at $790,000 (The budget allocation averaged about $1,000,000 per year from 1997 to 2002). This funding covers many aspects of road maintenance and management including the organization necessary to accomplish the overall program and associated overhead costs. The net result is that only about half of this funding is available to accomplish annual on-the-ground maintenance activities. In the past few years the Forest has been able to supplement road maintenance funding through the Title II funding program (approximately $290,000 in 2002, and $440,000 in 2004). But that funding source will expire in 2006 unless the program is extended or renewed.

Appropriated road funding has historically been supplemented to varying degrees by road construction and maintenance work performed by timber purchasers through the commercial timber sale program. That program and the associated funding opportunities have declined drastically in the past decade.

So the projected costs to maintain the entire road system to standard are much higher than the current and likely future funding can support. Because of this large funding shortfall, there is a need to identify and prioritize the minimum primary road system necessary for access and management of the National Forest Lands. There is also a need to identify which roads are critical to maintain for low clearance vehicles or passenger cars. A major part of this road analysis was focused on answering these two questions: Which roads comprise the potential minimum primary road system, and which of those roads need to continue to be maintained suitable for passenger car use (OML 3, 4, or 5).