Engineering Report:

Lassen National Forest

Hat Creek Ranger District

Analysis of

National Forest System Road (NFSR)

34N13

for Motorized Mixed Use Designation

Forest: **Lassen** District: **Hat Creek**

Road Number: **34N13** Road Name: **Jelly Camp**

Introduction: This report documents the engineering analysis for a segment of 34N13 – Jelly Camp totaling 1.2 miles in length. This total route is a minor collector road connecting NFSR road 36N18 (Distinctive Route 18) on the west to NFSR road 33N13 on the east in the area of Halls Flat. Lassen National Forest (LNF) currently manages this road as open only to highway-legal vehicles.

The study segment was recommended in the LNF Travel Analysis (2008) for an engineering analysis of motorized mixed use. The purpose of this engineering analysis is to investigate the potentials, and associated risks, for transporting both highway-legal vehicles (motor vehicles, including the operators, that are licensed or certified for general operation on public roads within the State) and non-highway-legal vehicles (motor vehicles, including the operators, that are not licensed or certified for general operation on public roads within the State) from the beginning termini to the end termini.

The LNF Travel Analysis identified this road section as a potential connection for recreational off-highway vehicle (OHV) loop opportunities on the adjacent road network, which is currently managed as open to non-highway-legal vehicle use.

Study Segment road data from the forest transportation atlas:

Segment: Beginning Mile Post: 1.6 Ending Mile Post: 2.8

Traffic Service Level: ☐ A ☐ B ☒ C ☐ D

Objective Maintenance Level: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Operational Maintenance Level: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Maintenance by: **Forest Service (FS)**

Non-Forest Service ROW or jurisdiction? ☐ Yes ☒ No

Any road use agreements, maintenance agreements, or other encumbrances?

☐ Yes ☒ No

Description of agreements or encumbrances: None

Subject to Highway Safety Act? ☒ Yes ☐ No

Non-highway-legal vehicles currently permitted? ☐ Yes ☒ No

Would motorized mixed use be consistent with State and local laws?
☒ Yes ☐

The proposed segment would be consistent with California Vehicle Code (CVC), Combined Use Highways Designation (CVC Division 16.5, Chapter 2, Article 1, Section 38026) if limited to less than 3 consecutive miles on maintenance level 3+ roadways. Based on the CVC and Forest Service Region 5 guidelines, the designation of motorized mixed use requires California Highway Patrol notification prior to designation. Based on the response from the CHP commissioner, the Forest may reconsider the decision to designate MMU and/or may adjust mitigation measures needed for implementation.

Description of road management objectives (RMOs), existing use, and proposed use:

The road currently serves as a tie road between NFSR roads 36N18 and 33N13. The road is a single-lane road with turnouts.

NFSR 34N13 has traditionally served administration of the LNF, including fuels and vegetation management, commodity extraction, fire suppression, and recreation.

The road is considered a highway by the Forest Service and is managed in accordance with the Highway Safety Act. The road is managed for passenger car vehicles and is appropriately posted with horizontal route identification markers. Most of the year it is currently managed as open only to highway-legal vehicles.

The study segment is proposed for designation of motorized mixed use to allow both highway-legal and non-highway-legal vehicles to utilize the roadway. Operators of any motor vehicle would be required to be in possession of a valid state driver's license.

General Considerations:

All motor vehicle operators need to be cognizant of the applicable state laws, and how they pertain to each age group, vehicle type, and national forest system road classification (see next bullet).

Through authorities delegated by the Secretary, the Forest Service may restrict or control use to meet road management objectives (36 CFR 212.5). The LNF currently manages this road as a highway, in accordance with the Highway Safety Act. The road is therefore subject to the provisions of the California Vehicle Code (CVC) for highways.

State OHV Regulations: any motor vehicle must have a street-legal license plate to operate on highways. To operate on public lands, off of highways, motor vehicles must have either a street-legal license plate or a red sticker or a green sticker. For more information, see the CA State Parks Off-Highway Motor Vehicle Recreation site, available @ http://ohv.parks.ca.gov/

California has:

- -requirements for ATV safety
- -conditions for operating ATVs
- -OHV equipment requirements
- -OHV operation requirements

Summary of Findings:

Implementing the universal mitigation measures, especially improving sight distance by removing brush, maintaining proper signing, and providing better communication, will reduce crash probability.

Road hazard mitigation should be prioritized regardless of mixed use, along with implementing a comprehensive communication, management, and enforcement plan. Associated implementation costs will depend on the designated allowed use.

The road is maintained to a standard allowing efficient passenger car through traffic at speeds up to 40 mph for reasonable and prudent drivers on straightaways.

Designating the road segment for motorized mixed use, with mitigation, results in a risk assessment of low crash probability and high crash severity.

Factors Considered:

1. Operator considerations:

- The current use on NFSR 34N13 appears to be consistent with State law and Forest Service policy for operational maintenance level 3 roads.
- The roadbed is raised and appears to provide for sufficient drainage and passenger car travel.
- Commercial, recreational, and administrative traffic is expected along this segment.

2. Crash history:

No record of accidents

3. Observed Traffic volume and type:

Non-highway-legal vehicles:
☐ < 12 inch tread width ☐ < 50 inch tread width ☐ >50 inch tread width

Highway-legal vehicles:
☐ < 12 inch tread width ☐ < 50 inch tread width ☒ >50 inch tread width

☒ Passenger cars ☒ Commercial vehicles ☐ Recreation vehicles (RV's)

One administrative pickup, one grazing permittee pickup.

4. Speed - Anticipated average speed (85th percentile):

The road segment was driven at various speeds to simulate conditions encountered by a reasonable and prudent driver in a passenger car.

30 mph on the grade
40 mph on the straightaways

***based on observation and engineering judgment.**

5. Road surface type: coordinate

Segment has cinder surfacing and single lane traveled ways with turnouts. Segment is approximately 14 feet wide.

6. Intersections with other roads and trails:

The sight distances at the managed intersections are rated good

7. Other roadway factors:

- **There is evidence of cattle and cattle trails adjacent to the study segment**
- **A single-lane cattleguard within the segment forces a speed reduction**

8. Roadside conditions:

- **The segment has a design prism that is typical of through fill on the west and side hill construction with ditches and cross drain relief on the east.**

9. Risk without mitigation if designating the roadway "open to all motor vehicles":

Crash probability: ☐ High ☒ Med ☐ Low

Crash severity: ☒ High ☐ Med ☐ Low

Crash probability was assessed based on factors including:

- **Operator considerations, traffic volume, rates of speed, alignment, sight distance, traveled way surface and width, drainage, roadside conditions.**

Crash severity was assessed based on factors including:

- **Roadway geometry (embankments, slopes, horizontal and vertical alignments), speed, traffic types and difference in vehicle sizes, difference in speeds of OHVs and full-size passenger vehicles, potential path and objects encountered if a vehicle left the traveled way.**

Alternatives and Mitigation Measures:

Alternatives and mitigation measures are presented to assist with safe road management. They are to be considered, should the agency have the appropriate time, workload, and funding based on competing priorities. For all situations, the following mitigation measures apply:

- **Clear communication and education to the visitors on allowed uses, safe motor vehicle use, and natural resources (informational signing and kiosks, maps, website, etc.).**
- **Improved route identification signing. Repair and replace devices as needed.**
- **Clear brush and trees, especially along curves and at intersections, to improve sight distance.**
  warning: improved sight distance may result in higher speeds
- **Removal of roadside hazards such as boulders, trees, and debris.**
- **Combine the appropriate enforcement measures with the allowed uses for the road.**
- **Coordinate with other agencies to improve enforcement consistency.**
- **Utilize a monitoring program to better determine the appropriate management strategy for the types of use, new technologies, changes in visitor demands, and resource protection measures.**

In addition, these mitigation measures would apply to the following alternatives. Although the following alternatives are not comprehensive for the situation, they represent the most likely and/or practical options based on engineering judgment.

Alternative 1: **Designate the road segments as "open to highway-legal vehicles only". Continue to manage the road in accordance with maintenance level 3 standards.**

- **Maintain all roadway signing to MUTCD standards.**
- **Approximate Implementation Cost: $ 0**
- **Expected risk:**
  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☒ Med ☐ Low

Alternative 2: **Designate the road segment as "open to all motor vehicles", including highway legal and non-highway-legal vehicles. Continue to maintain the road in accordance with maintenance level 3 standards.**

- **Improve education and enforcement communication to explain the complexities of various allowed uses on the road.**
- **Install appropriate signs of a type approved by the Department of Transportation on and along the highway to identify and communicate the potential hazards related to motorized mixed use.**

- **Coordinate with the State and revise existing agreements with Caltrans as applicable.**
- **Notify the Commissioner of the California Highway Patrol and review their opinion.**
- **Approximate Implementation Cost: $ 3500**
  This does not account for the additional long-term annual maintenance cost increase associated with maintaining these critical safety corridors.
- **Expected risk:**

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☒ High ☐ Med ☐ Low

Alternative 3: **Designate the road as "open to all motor vehicles", including highway-legal and non-highway-legal vehicles. Downgrade the road segments in accordance with maintenance level 2 standards. This would require removing culverts and ditches, reconstructing the template and narrowing the roadway.**

- **Based on the quality of the road, the amount of thru traffic, this change would not be consistent with the road management objectives.**
- **Approximate Implementation Cost: $8000**
- **Expected risk:**

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☒ Med ☐ Low

Alternative 4: **Construct trail segments to allow non-highway-legal vehicles to bypass the road and access adjacent maintenance level 2 roads.**

- **The terrain in this area is on flat to steep slopes and would provide for a parallel trail system.**
- **Approximate implementation cost: $15,000**
  This does not include the planning, agreements, and long term maintenance costs associated with a new NFS trail.
- ***E*xpected risk:**

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☒ Med ☐ Low

Final Comments:

Signing on national forest system roads will conform to the standards presented in the FS sign and poster guidelines (available @ http://fsweb.wo.fs.fed.us/eng/roads_trails/signs_05/index.htm).
In addition, roads managed under the Highway Safety Act, including the study segments here, must comply with the standards in the MUTCD (available @ http://mutcd.fhwa.dot.gov/).
According to the Sign and Poster Guidelines for the Forest Service (2005):

The following priorities are to be used to minimize the potential conflicts of mixed use:

- Provide separate facilities.
- Separate use periods. Roads may be designated for separate use periods such as season, weekday/weekend, or day/night. Notify the public of the locations, effective dates, times, and duration that the roads may or may not be used. Provide appropriate signs as shown in Chapter 3A.
- Manage concurrent use.

Upon designation and prior to allowing any mixed use, the Forest Supervisor is responsible for appropriately signing and mapping the route such that the dual traffic use is clear to all users.

Maps & Photos:

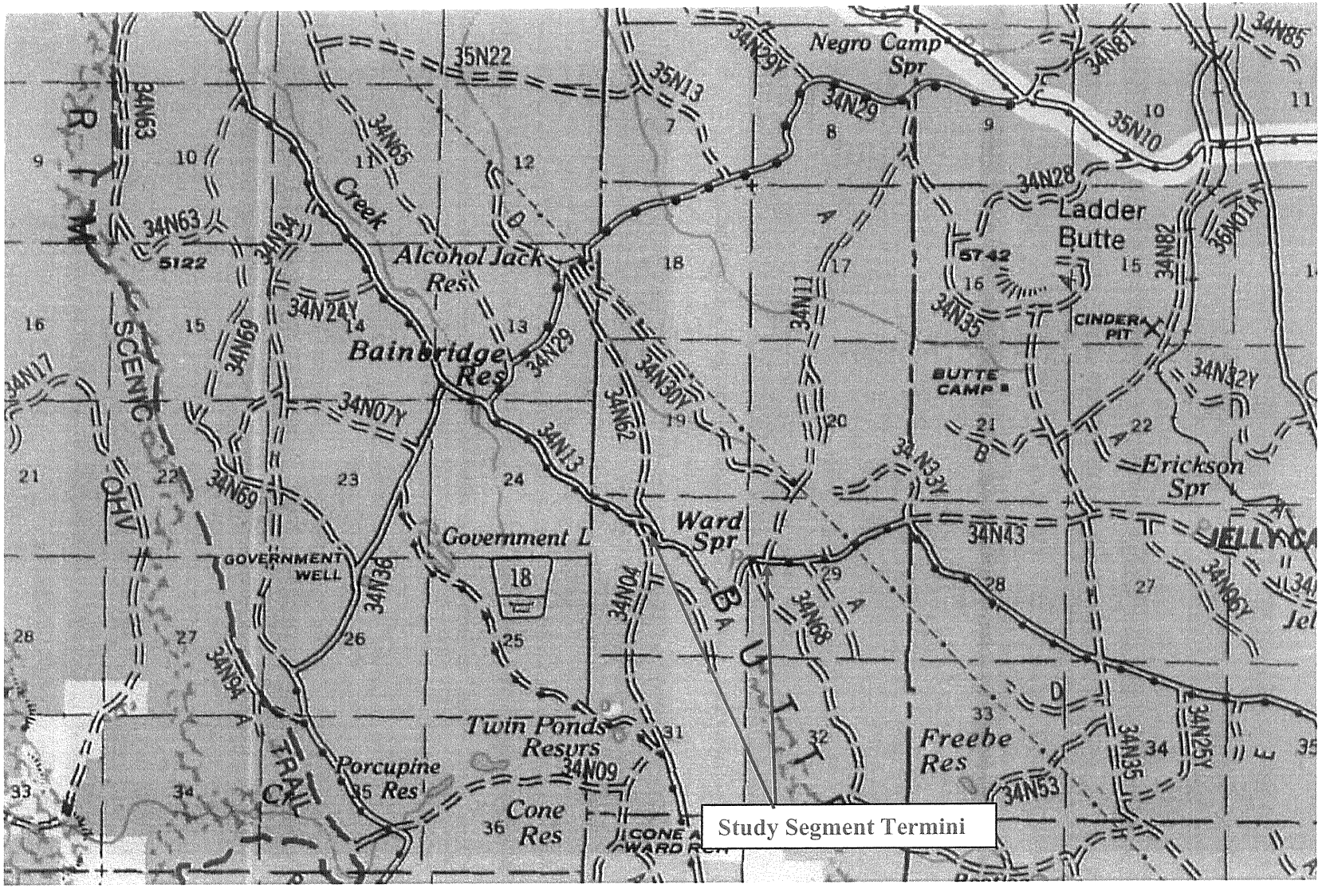

Figure 1: Map of road segments analyzed.

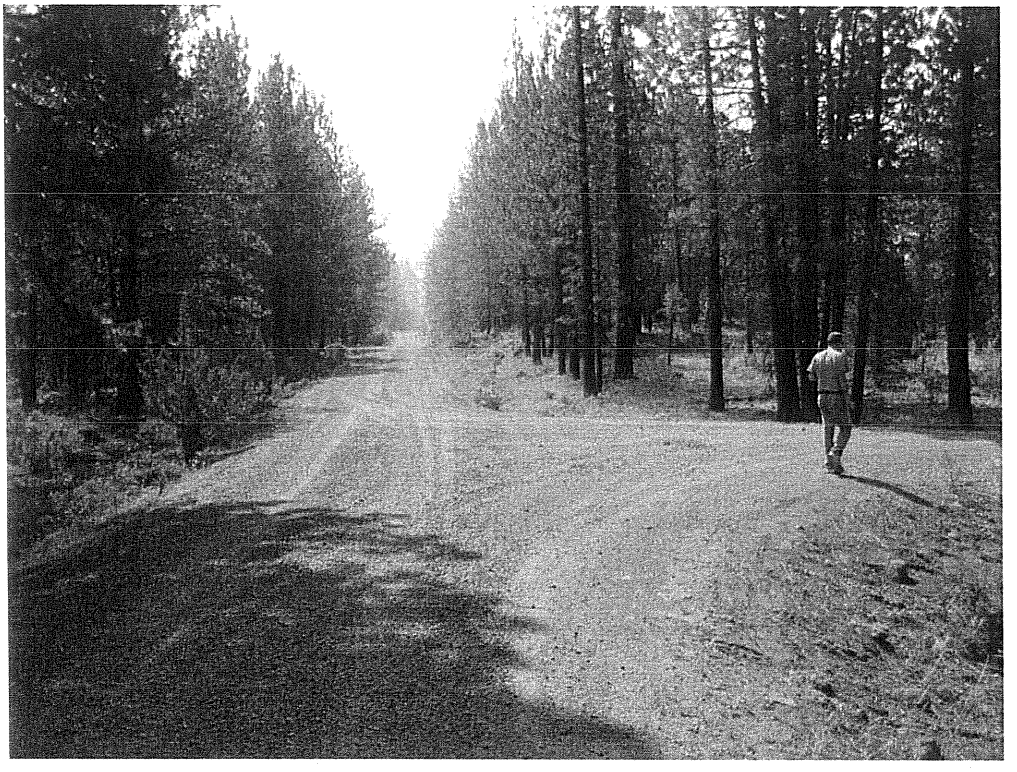

Figure 2: Intersection with NFSR 34N62 (right) and the study segment (behind).

Figure 3: Study segment straightaway.

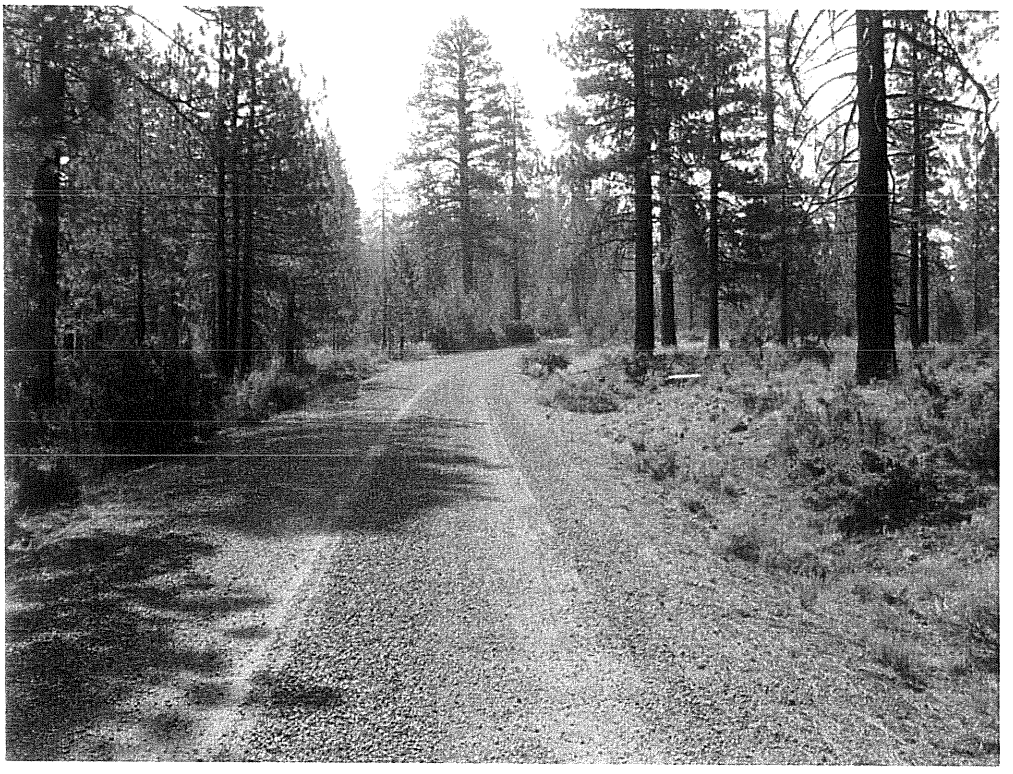

Figure 4: Curve within the study segment.

Figure 5: Roadside conditions.

Figure 6: More roadside conditions.

Figure 7: Cattleguard crossing.

Figure 8: Looking back at the study segment and the intersection with NFSR 34N11.

Figure 9: Forest road destination signing.

Prepared by:
Chris Bielecki, Supervisory Civil Engineer

Engineering Report:

Lassen National Forest

Hat Creek Ranger District

Analysis of

National Forest System Road (NFSR)

34N29

for Motorized Mixed Use Designation

Forest: **Lassen** District: **Hat Creek**

Road Number: **34N29** Road Name: **Bainbridge**

Introduction: This report documents the engineering analyses for 2 segments of NFSR 34N29, one 0.27 miles in length and the other 0.75 miles in length. This total route is a tie road connecting NFSR roads 35N10 (distinctive route 22) on the north to 34N13 on the south. Lassen National Forest (LNF) currently manages this road as open only to highway-legal vehicles.

The study segments were recommended in the LNF Travel Analysis (2008) for an engineering analysis of motorized mixed use. The purpose of this engineering analysis is to investigate the potentials, and associated risks, for transporting both highway-legal vehicles (motor vehicles, including the operators, that are licensed or certified for general operation on public roads within the State) and non-highway-legal vehicles (motor vehicles, including the operators, that are not licensed or certified for general operation on public roads within the State) from the beginning termini to the end termini.

The LNF Travel Analysis identified these road sections as potential connections for recreational off-highway vehicle (OHV) loop opportunities on the adjacent road network, which is currently managed as open to non-highway-legal vehicle use.

Study Segment information from the forest transportation atlas:

Segment 1: NFSR 34N35 to NFSR 34N47 0.75 miles

Segment 2: NFSR 34N62 to NFSR 34N30Y 0.27 miles

Traffic Service Level: ☐ A ☐ B ☒ C ☐ D

Objective Maintenance Level: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Operational Maintenance Level: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Maintenance by: **Forest Service (FS)**

Non-Forest Service ROW or jurisdiction? ☐ Yes ☒ No

Any road use agreements, maintenance agreements, or other encumbrances?

☐ Yes ☒ No

Description of agreements or encumbrances: None

Subject to Highway Safety Act? ☒ Yes ☐ No

Non-highway-legal vehicles currently permitted? ☐ Yes ☒ No

Would motorized mixed use be consistent with State and local laws?
☒ Yes ☐ No

The proposed segment would be consistent with California Vehicle Code (CVC), Combined Use Highways Designation (CVC Division 16.5, Chapter 2, Article 1, Section 38026) if limited to less than 3 consecutive miles on maintenance level 3+ roadways. Based on the CVC and Forest Service Region 5 guidelines, the designation of motorized mixed use requires California Highway Patrol notification prior to designation. Based on the response from the CHP commissioner, the Forest may reconsider the decision to designate MMU and/or may adjust mitigation measures needed for implementation.

Description of road management objectives (RMOs), existing use, and proposed use:

The road currently serves as a tie road between NFSR roads 35N10 and 34N13. The road is a single-lane road with turnouts.

NFSR 34N29 has traditionally served administration of the LNF, including fuels and vegetation management, commodity extraction, fire suppression, and recreation.

The road is considered a highway by the Forest Service and is managed in accordance with the Highway Safety Act. The road is managed for passenger car vehicles and is NOT appropriately posted with horizontal route identification markers. Most of the year it is currently managed as open only to highway-legal vehicles.

The study segment is proposed for designation of motorized mixed use to allow both highway-legal and non-highway-legal vehicles to utilize the roadway. Operators of any motor vehicle would be required to be in possession of a valid state driver's license.

General Considerations:

All motor vehicle operators need to be cognizant of the applicable State laws, and how they pertain to each age group, vehicle type, and national forest system road classification (see next bullet).

Through authorities delegated by the Secretary, the Forest Service may restrict or control use to meet road management objectives (36 CFR 212.5). The LNF currently manages this road as a highway, in accordance with the Highway Safety Act. The road is therefore subject to the provisions of the California Vehicle Code (CVC) for highways.

State OHV Regulations: any motor vehicle must have a street-legal license plate to operate on highways. To operate on public lands, off of highways, motor vehicles must have either a street-legal license plate or a red sticker or a green sticker. For more information, see the CA State Parks Off-Highway Motor Vehicle Recreation site, available @ http://ohv.parks.ca.gov/

California has:

- -requirements for ATV safety
- -conditions for operating ATVs
- -OHV equipment requirements
- -OHV operation requirements

Summary of Findings:

Implementing the universal mitigation measures, especially improving sight distance by removing brush, maintaining proper signing, and providing better communication, will reduce crash probability.

Road hazard mitigation should be prioritized regardless of mixed use, along with implementing a comprehensive communication, management, and enforcement plan. Associated implementation costs will depend on the designated allowed use.

The road is maintained to a standard allowing efficient passenger car through traffic at speeds up to 35 mph for reasonable and prudent drivers on straightaways.

Designating the road segments for motorized mixed use, with mitigation, results in a risk assessment of low crash probability and high crash severity for segment 1 and a risk assessment of low crash probability and moderate crash severity for segment 2.

Factors Considered:

1. Operator considerations:

- The current use on NFSR 35N29 appears to be consistent with State law and Forest Service policy for operational maintenance level 3 roads.
- The roadbed is raised and appears to provide for sufficient drainage and passenger car travel.
- Commercial, recreational, and administrative traffic is expected along this segment.

2. Crash history:

No record of accidents

3. Observed Traffic volume and type:

Non-highway-legal vehicles:
☐ < 12 inch tread width ☐ < 50 inch tread width ☐ >50 inch tread width

Highway-legal vehicles:
☐ < 12 inch tread width ☐ < 50 inch tread width ☐ >50 inch tread width

☐ Passenger cars ☐ Commercial vehicles ☐ Recreation vehicles (RV's)

None was observed during field investigation to the site.

4. Speed - Anticipated average speed (85th percentile):

The road segments were driven at various speeds to simulate conditions encountered by a reasonable and prudent driver in a passenger car.

Segment 1: 35 mph based on observation and engineering judgment.
Segment 2: 30 mph based on observation and engineering judgment.

5. Road surface type: coordinate

Segments have cinder surfacing and single lane traveled ways with turnouts. Segments are approximately 12-16 feet wide.

6. Intersections with other roads and trails:

The sight distances at the managed intersections are rated good

7. Other roadway factors:

N/A

8. Roadside conditions:

- **The segment has a design prism is typical of side hill construction with inboard ditch plus x-drain relief. Ditch line has considerable buildup of vegetation.**

9. Risk without mitigation if designating the roadway "open to all motor vehicles":

Segment 1

Crash probability: ☐ High ☒ Med ☐ Low

Crash severity: ☒ High ☐ Med ☐ Low

Segment 2

Crash probability: ☐ High ☒ Med ☐ Low

Crash severity: ☐ High ☒ Med ☐ Low

Crash probability was assessed based on factors including:

- **Operator considerations, traffic volume, rates of speed, alignment, sight distance, traveled way surface and width, drainage, roadside conditions.**

Crash severity was assessed based on factors including:

- **Roadway geometry (embankments, slopes, horizontal and vertical alignments), speed, traffic types and difference in vehicle sizes, difference in speeds of OHVs and full-size passenger vehicles, potential path and objects encountered if a vehicle left the traveled way.**

Alternatives and Mitigation Measures:

Alternatives and mitigation measures are presented to assist with safe road management. They are to be considered, should the agency have the appropriate time, workload, and funding based on competing priorities. For all situations, the following mitigation measures apply:

- **Clear communication and education to the visitors on allowed uses, safe motor vehicle use, and natural resources (informational signing and kiosks, maps, website, etc.).**
- **Improved route identification signing. Repair and replace devices as needed.**
- **Clear brush and trees, especially along curves and at intersections, to improve sight distance.**
  warning: improved sight distance may result in higher speeds
- **Removal of roadside hazards such as boulders, trees, and debris.**
- **Combine the appropriate enforcement measures with the allowed uses for the road.**
- **Coordinate with other agencies to improve enforcement consistency.**
- **Utilize a monitoring program to better determine the appropriate management strategy for the types of use, new technologies, changes in visitor demands, and resource protection measures.**

In addition, these mitigation measures would apply to the following alternatives. Although the following alternatives are not comprehensive for the situation, they represent the most likely and/or practical options based on engineering judgment.

Alternative 1: **Designate the road segments as "open to highway-legal vehicles only". Continue to manage the road in accordance with maintenance level 3 standards.**

- **Maintain all roadway signing to MUTCD standards.**
- **Approximate Implementation Cost: $ 0**
- **Expected risk:**
  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☒ Med ☐ Low

Alternative 2: **Designate the road segments as "open to all motor vehicles", including highway legal and non-highway-legal vehicles. Continue to maintain the road in accordance with maintenance level 3 standards.**

- **Improve education and enforcement communication to explain the complexities of various allowed uses on the road.**
- **Install appropriate signs of a type approved by the Department of Transportation on and along the highway to identify and**

- **Coordinate with the State and revise existing agreements with Caltrans as applicable.**
- **Notify the Commissioner of the California Highway Patrol and review their opinion.**
- **Approximate Implementation Cost: $ 5000**
  This does not account for the additional long-term annual maintenance cost increase associated with maintaining these critical safety corridors.
- **Expected risk:**

  Segment 1

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☒ High ☐ Med ☐ Low

  Segment 2

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☒ Med ☐ Low

Alternative 3: **Designate the road as "open to all motor vehicles", including highway-legal and non-highway-legal vehicles. Downgrade the road segments in accordance with maintenance level 2 standards. This would require removing culverts and ditches, reconstructing the template and narrowing the roadway.**

- **Based on the quality of the road, the amount of thru traffic, this change would not be consistent with the road management objectives.**
- **Approximate Implementation Cost: $ 10,000 per mile**
- **Expected risk**

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☒ Med ☐ Low

Alternative 4: **Construct trail segments to allow non-highway-legal vehicles to bypass the road and access adjacent maintenance level 2 roads.**

- **The terrain in this area is on moderate slopes and would provide for a parallel trail system.**

- **Approximate implementation cost: $12,000 per mile**
  This does not include the planning, agreements, and long term maintenance costs associated with a new NFS trail.

  Crash probability: ☐ High ☐ Med ☒ Low

  Crash severity: ☐ High ☐ Med ☒ Low

Final Comments:

Signing on national forest system roads will conform to the standards presented in the FS sign and poster guidelines (available @ http://fsweb.wo.fs.fed.us/eng/roads_trails/signs_05/index.htm).
In addition, roads managed under the Highway Safety Act, including the study segments here, must comply with the standards in the MUTCD (available @ http://mutcd.fhwa.dot.gov/).
According to the Sign and Poster Guidelines for the Forest Service (2005):

The following priorities are to be used to minimize the potential conflicts of mixed use:

- **Provide separate facilities.**
- **Separate use periods. Roads may be designated for separate use periods such as season, weekday/weekend, or day/night. Notify the public of the locations, effective dates, times, and duration that the roads may or may not be used. Provide appropriate signs as shown in Chapter 3A.**
- **Manage concurrent use.**

Upon designation and prior to allowing any mixed use, the Forest Supervisor is responsible for appropriately signing and mapping the route such that the dual traffic use is clear to all users.

Maps & Photos:

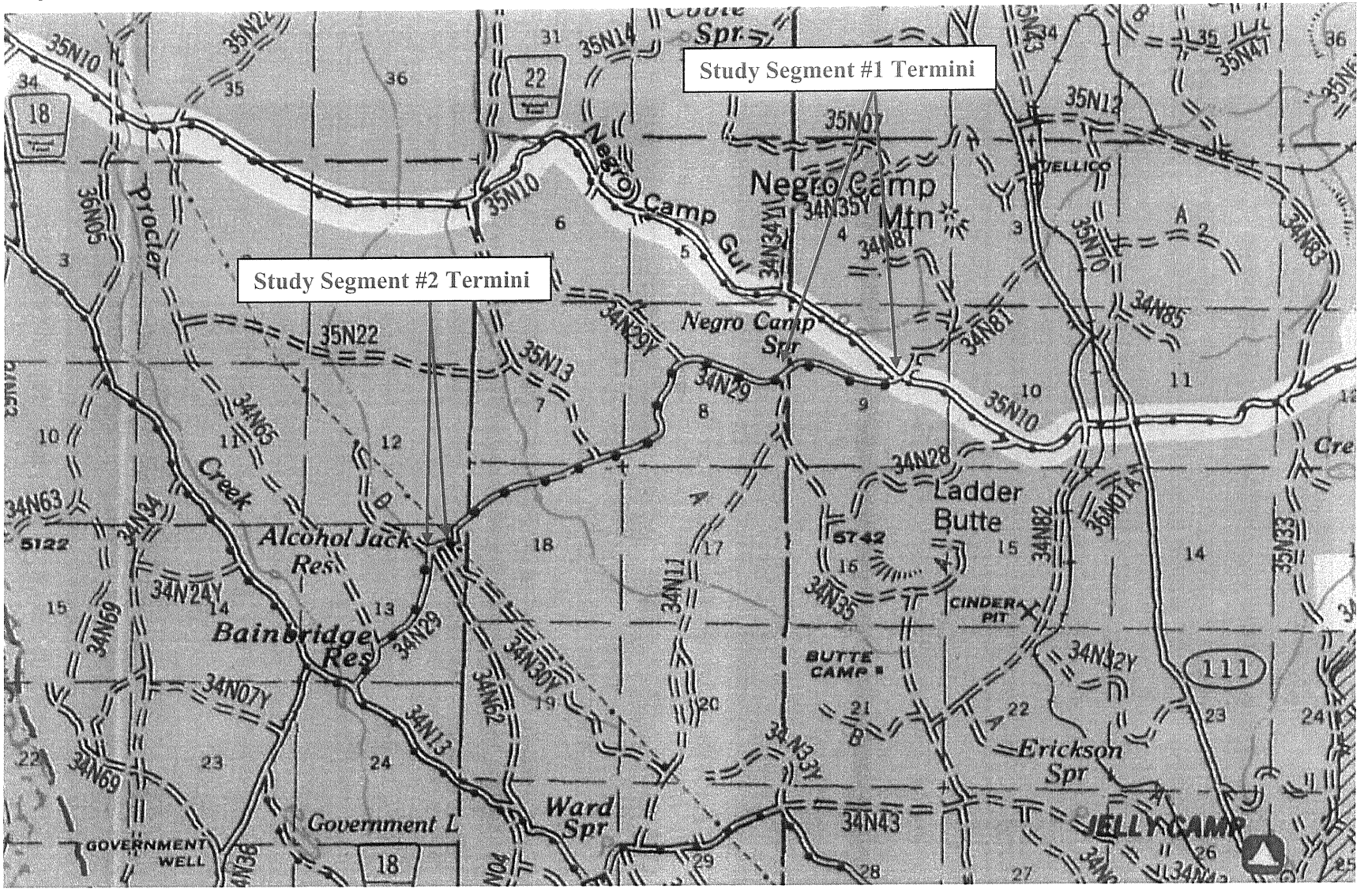

Figure 1: Map of road segments analyzed.

Figure 2: Looking at study segment 1 from NFSR 35N10.

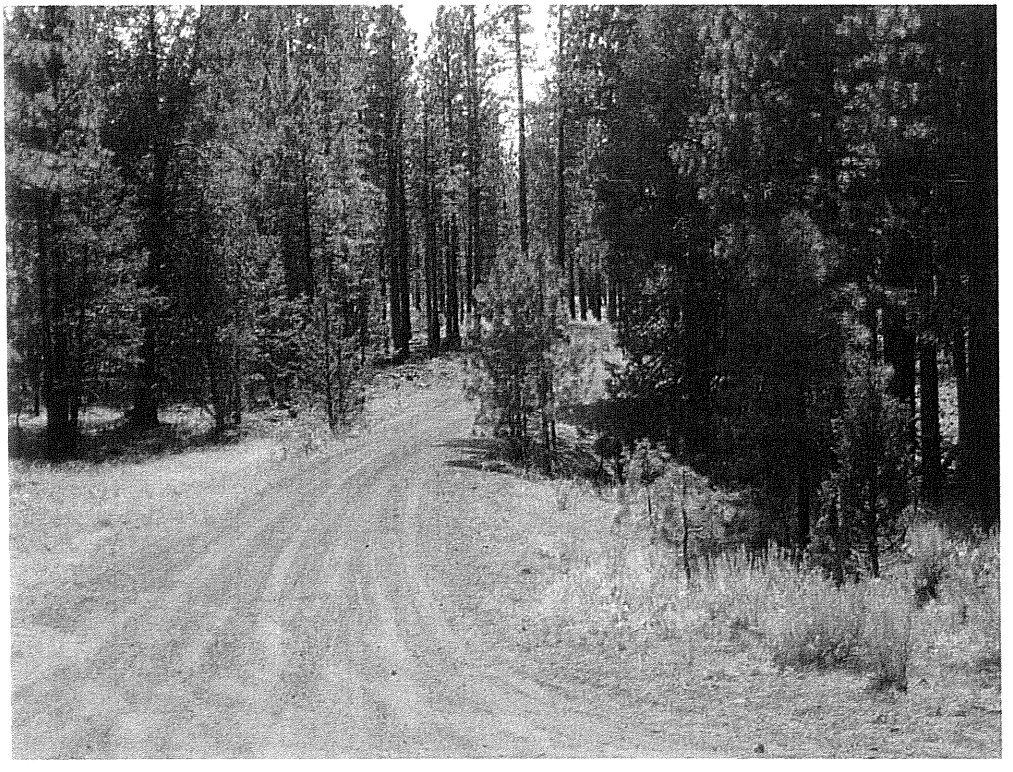

Figure 3: Beginning of study segment 1, from the intersection with NFSR 35N10.

Figure 4: Entering a curve along study segment 1.

Figure 5: Straightaway along study segment 1.

Figure 6: Looking at study segment 1 from the intersection with NFSR 34N35.

Figure 7: Forest route destination signing, segment 1.

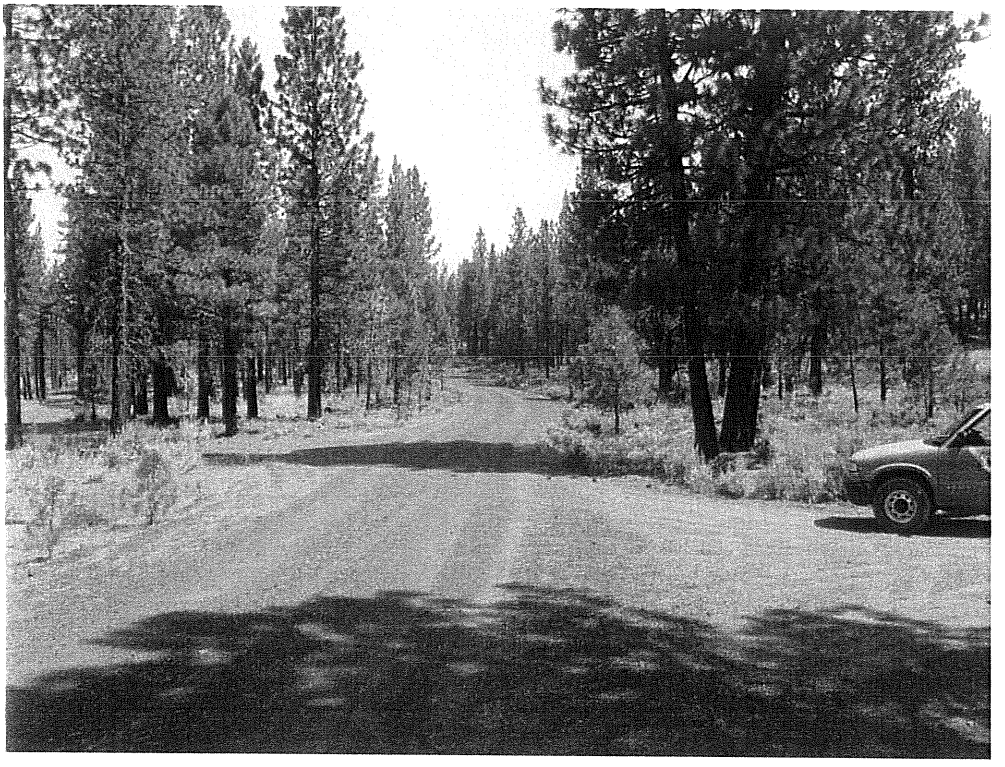

Figure 8: Looking at study segment 2, with the intersections of NFSR 34N62 (right) and NFSR 34N29D (left).

Figure 9: Curve along study segment 2.

Figure 10: Looking back at study segment 2, with the intersection of NFSR 34N30Y (left).