

HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
ROAD EVALUATION REPORT



PART A: Part A may be completed by the applicant

Applicant Name: CHRIS DAZZI APN: 208-201-011

Planning & Building Department Case/File No.: _____

Road Name: DINSMORE / BEAR CREEK ROAD (complete a separate form for each road)

From Road (Cross street): ST. HWY 36

To Road (Cross street): CANYON ROAD on APN: 208-201-026
(SEE ATTACHED ROAD EVAL & RESOLUTION)

Length of road segment: 3.3 miles Date Inspected: 5-2-22

Road is maintained by: County Other _____
(State, Forest Service, National Park, State Park, BLM, Private, Tribal, etc)

Check one of the following:

Box 1 The entire road segment is developed to Category 4 road standards (20 feet wide) or better. If checked, then the road is adequate for the proposed use without further review by the applicant.

Box 2 The entire road segment is developed to the equivalent of a road category 4 standard. If checked, then the road is adequate for the proposed use without further review by the applicant.

An equivalent road category 4 standard is defined as a roadway that is generally 20 feet in width, but has pinch points which narrow the road. Pinch points include, but are not limited to, one-lane bridges, trees, large rock outcroppings, culverts, etc. Pinch points must provide visibility where a driver can see oncoming vehicles through the pinch point which allows the oncoming vehicle to stop and wait in a 20 foot wide section of the road for the other vehicle to pass.

Box 3 The entire road segment is not developed to the equivalent of road category 4 or better. The road may or may not be able to accommodate the proposed use and further evaluation is necessary. Part B is to be completed by a Civil Engineer licensed by the State of California.

The statements in PART A are true and correct and have been made by me after personally inspecting and measuring the road. A map showing the location and limits of the road being evaluated in PART A is attached.

Chris Dazzi
Signature

5/2/22
Date

Chris Dazzi
Name Printed

Important: Read the instructions before using this form. If you have questions, please call the Dept. of Public Works Land Use Division at 707-448-7205.

APN: 208-201-011

Road Assessment
Road Assessment Map



- Property Boundary (APN 208-201-011)
- Roadside Assessment Range
- Roadside
- State Highway 99
- Non-appurtenant Roads
- Class I Watercourse
- Class II Watercourse
- Class III Watercourse

SUBJECT PARCEL

APN: 208-201-011 "Subject Parcel" utilizes 1.12 miles of Canyon Road (from 208-201-026 below) to access site. This segment of road essentially functions as a private driveway for the subject parcel
See attached Road Eval & LSAA

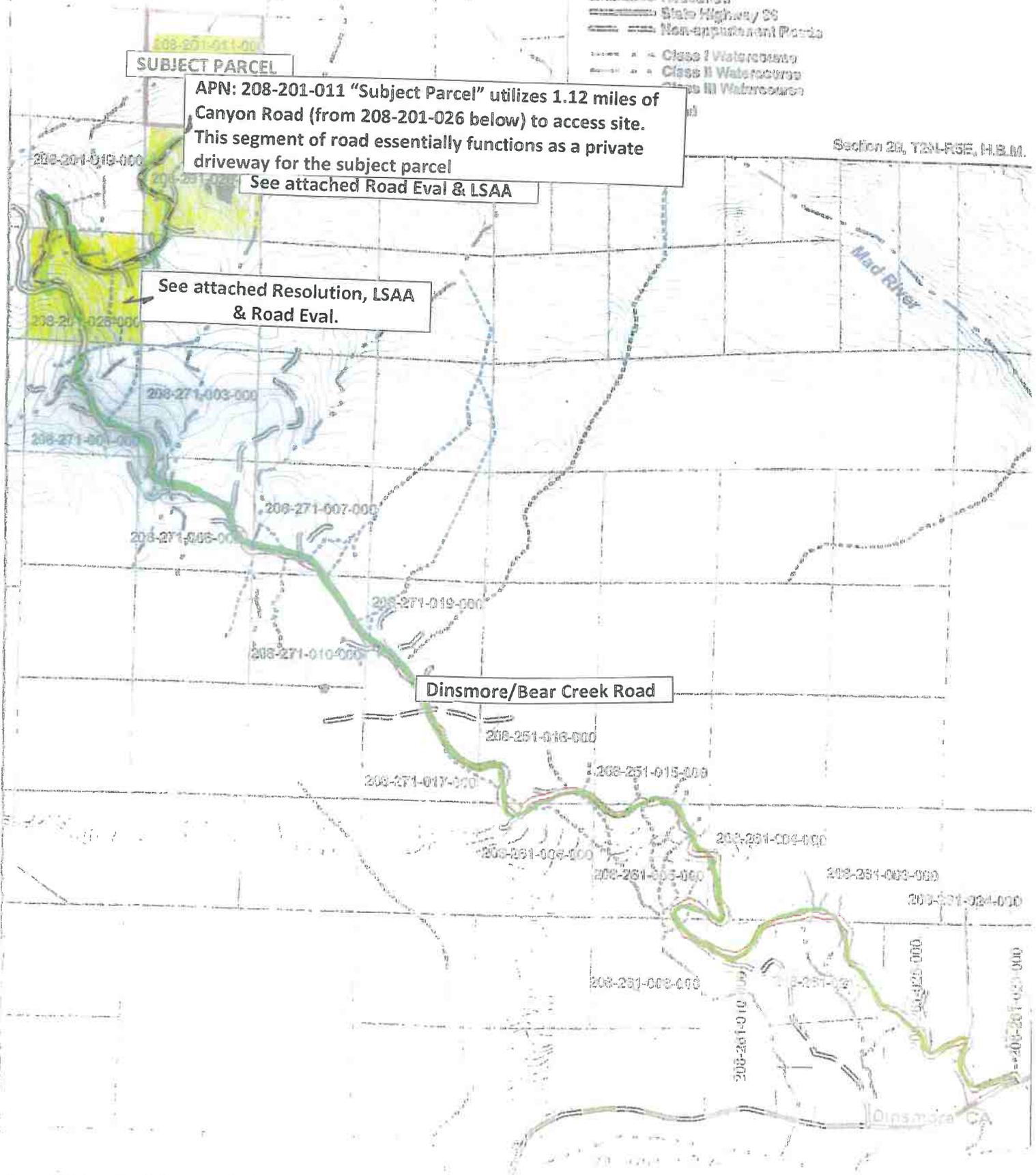
See attached Resolution, LSAA & Road Eval.

Section 29, T2N-R3E, H.B.M.

Mad River

Dinsmore/Bear Creek Road

Dinsmore CA



RESOLUTION OF THE PLANNING COMMISSION
OF THE COUNTY OF HUMBOLDT

Resolution Number 22-029

Record Number PLN-11241-CUP

Assessor's Parcel Numbers: 208-201-026

Resolution by the Planning Commission of the County of Humboldt certifying compliance with the California Environmental Quality Act and conditionally approving the Full Moon Farms Inc., Conditional Use Permit and Special Permits.

WHEREAS, Full Moon Farms Inc., submitted an application and evidence in support of approving a Conditional Use Permit for the continued operation of an existing 19,661 square feet (sq. ft.) of outdoor commercial cannabis cultivation, and appurtenant drying activities; a Special Permit for the continued use of two (2) spring diversions on-site; a Special Permit for the removal and restoration of an on-stream pond; and a Special Permit to allow the relocation of five (5) water tanks outside of streamside management areas on-site;

WHEREAS, the County as lead agency, prepared an Addendum to the Mitigated Negative Declaration (MND) prepared for the Commercial Medical Land Use Ordinance (CMLLUO) adopted by the Humboldt County Board of Supervisors on January 26, 2016. The proposed project does not present substantial changes that would require major revisions to the Mitigated Negative Declaration. No new information of substantial importance that was not known and could not be known at the time was presented as described by §15162(c) of CEQA Guidelines; and

WHEREAS, the Humboldt County Planning Commission held a duly-noticed public hearing on **February 17, 2022**, and reviewed, considered, and discussed the application for a Conditional Use Permit and Special Permits and reviewed and considered all evidence and testimony presented at the hearing.

Now, THEREFORE BE IT RESOLVED, that the Planning Commission makes all the following findings:

FINDING: **Project Description:** The application is a Conditional Use Permit for 19,661 sq. ft. of pre-existing outdoor cannabis cultivation. Water for irrigation is sourced from two (2) spring diversions on-site under Water Right Certificate H100541. A Special Permit is being requested to allow the continued use of the spring diversions, and to relocate water tanks outside of the streamside management area (SMA) for a spring and a class III stream on-site. An additional Special Permit is required for the removal of an on-stream pond and restoration of the stream. A total of 194,500 gallons of water storage for irrigation exists, and two (2) 2,500 gallon tanks are designated for fire suppression. Annual water usage is 124,000 gallons (6.3 gal/sq. ft./year). Drying and curing will occur on-site and trimming will occur off-site at a licensed processing facility. Two (2) employees will be utilized. Electricity is sourced from two (2) portable generators.

EVIDENCE: Project File: PLN-11241-CUP

2. FINDING: **CEQA.** The requirements of the California Environmental Quality Act have been complied with. The Humboldt County Planning Commission has considered the Addendum to and the Mitigated Negative

Declaration (MND) prepared for the Commercial Medical Marijuana Land Use Ordinance (CMMLUO) adopted by the Humboldt County Board of Supervisors on January 26, 2016.

EVIDENCE:

- a) Addendum Prepared for the proposed project.
- b) The proposed project does not present substantial changes that would require major revisions to the previous MND. No new information of substantial importance that was not known and could not be known at the time was presented as described by §15162(c) of CEQA Guidelines.
- c) A Water Resources Protection Plan was prepared by Timberland Resource Consultants, dated September 20, 2018, to show requirements to meet compliance with the North Coast Regional Water Quality Control Board Order No. 2015-0023.
- d) A Notice of Applicability letter showing enrollment is the State Water Board's General Order No. WQ 2019-001-DWQ, under WDID 1_12CC418732. The applicant is conditioned to provide a Site Management Plan to show site requirements in order to meet compliance with the State Water Board General Order No. WQ 2019-001-DWQ.
- e) The applicant has obtained a Streambed Alteration Agreement (SAA 1600-2019-0590-R1) with the CDFW for the use and maintenance of two (2) spring diversions on-site, upgrade of four (4) culverts, and the removal and restoration of an on-stream pond. The applicant is conditioned to provide a Stream Restoration Plan approved by CDFW to the Planning Division when available, in the timeframe of the signed compliance agreement.
- f) No tree removal has occurred or is proposed as part of the project.
- g) A Cultural Resources Investigation & Report was prepared by Mark Arsenault, M.A., RPA with Arsenault & Associates, dated March 29, 2019. The Cultural Resource Survey found that no cultural resources were identified within the project area, and recommends protocols for Inadvertent Discovery.
- h) A Road Evaluation Report Form was submitted for Bear Creek Road, and Dinsmore Road designating it as being developed to a Category 4 road standard. It has been determined that the access road meets the functional capacity for the project.

FINDINGS FOR CONDITIONAL USE PERMIT AND SPECIAL PERMITS

3. FINDING

The proposed development is in conformance with the County General Plan, Open Space Plan, and the Open Space Action Program.

HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
ROAD EVALUATION REPORT

PART A: Part A may be completed by the applicant

Applicant Name: BRIAN HALL APN: 208-201-026

Planning & Building Department Case/File No.: APPS: 11241

Road Name: DINSMORE RD (complete a separate form for each road)

From Road (Cross street): ST. Hwy 36

To Road (Cross street): BEAR CRK RD

Length of road segment: 0.6 miles Date Inspected: 12-5-18

Road is maintained by: County Other
(State, Forest Service, National Park, State Park, BLM, ~~Private~~, Tribal, etc)

Check one of the following:

Box 1 The entire road segment is developed to Category 4 road standards (20 feet wide) or better. If checked, then the road is adequate for the proposed use without further review by the applicant.

Box 2 The entire road segment is developed to the equivalent of a road category 4 standard. If checked, then the road is adequate for the proposed use without further review by the applicant.

An equivalent road category 4 standard is defined as a roadway that is generally 20 feet in width, but has pinch points which narrow the road. Pinch points include, but are not limited to, one-lane bridges, trees, large rock outcroppings, culverts, etc. Pinch points must provide visibility where a driver can see oncoming vehicles through the pinch point which allows the oncoming vehicle to stop and wait in a 20 foot wide section of the road for the other vehicle to pass.

Box 3 The entire road segment is not developed to the equivalent of road category 4 or better. The road may or may not be able to accommodate the proposed use and further evaluation is necessary. Part B is to be completed by a Civil Engineer licensed by the State of California.

The statements in PART A are true and correct and have been made by me after personally inspecting and measuring the road.

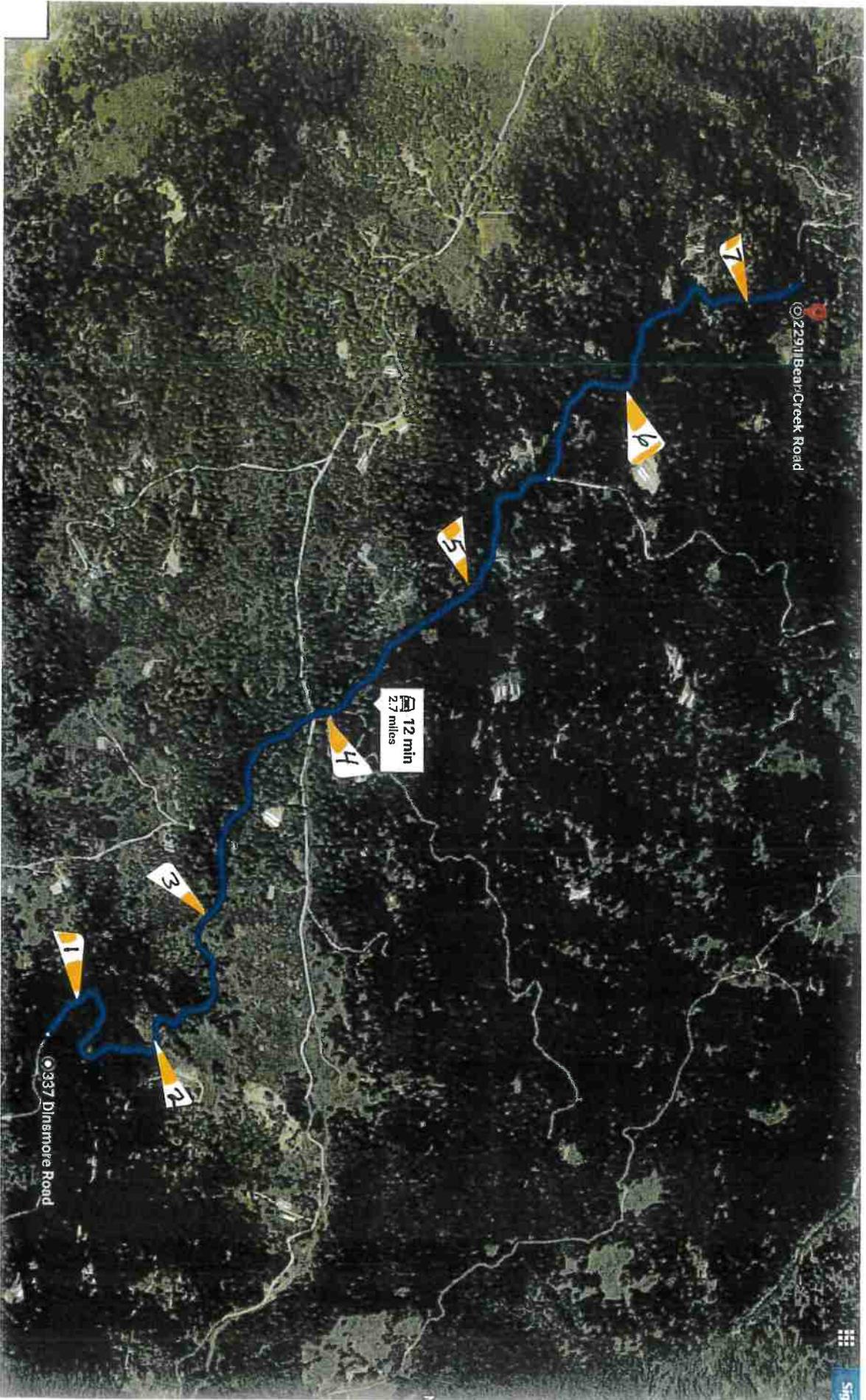
Brian Hall
Signature

12-5-18
Date

Brian Hall
Name Printed

Important: Read the instructions before using this form. If you have questions, please call the Dept. of Public Works Land Use Division at 707.445.7205.

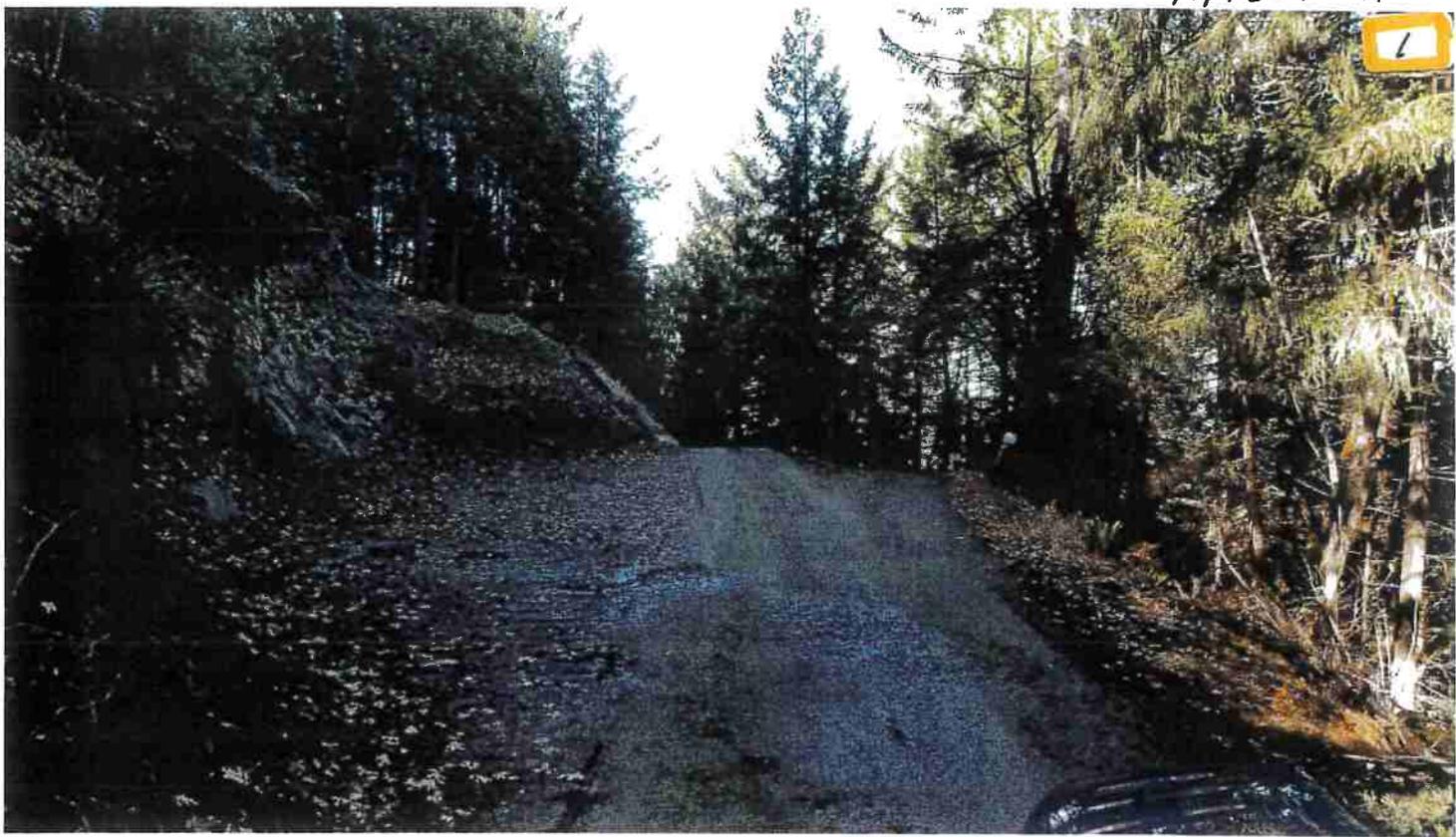




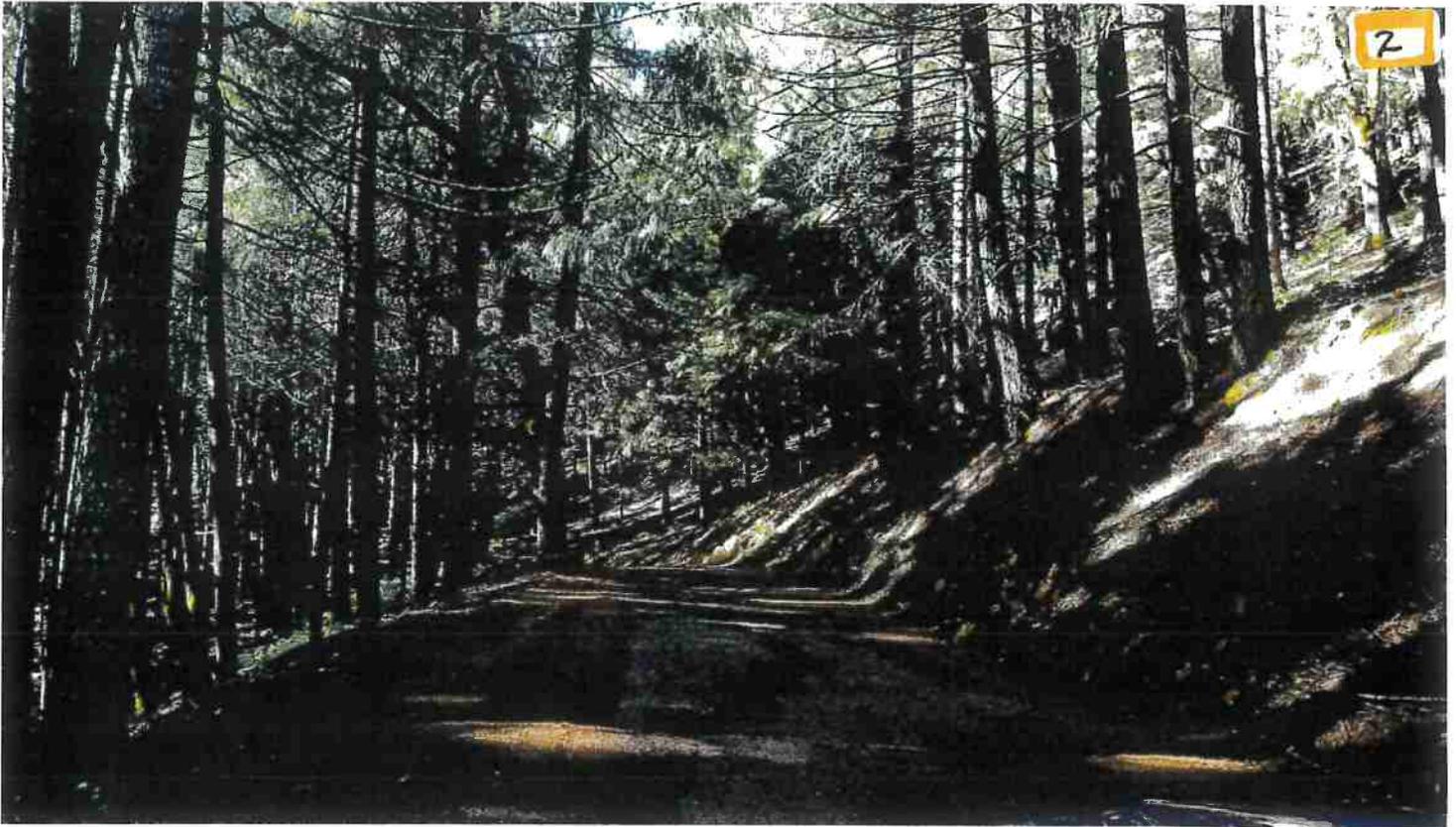
Apps: 11 2-11

APPS: 11241

1



APPS: U241



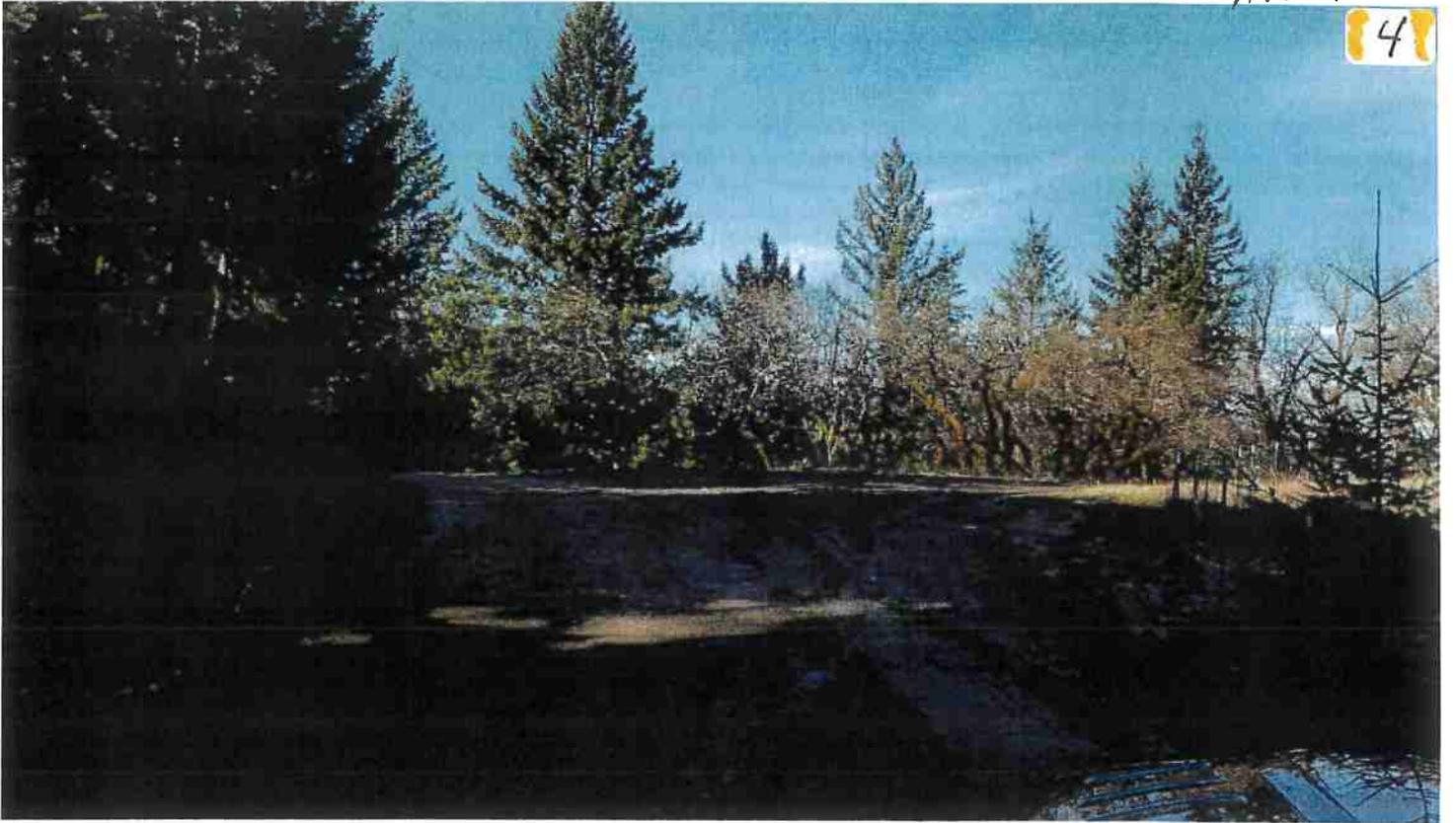
APPS: 11241

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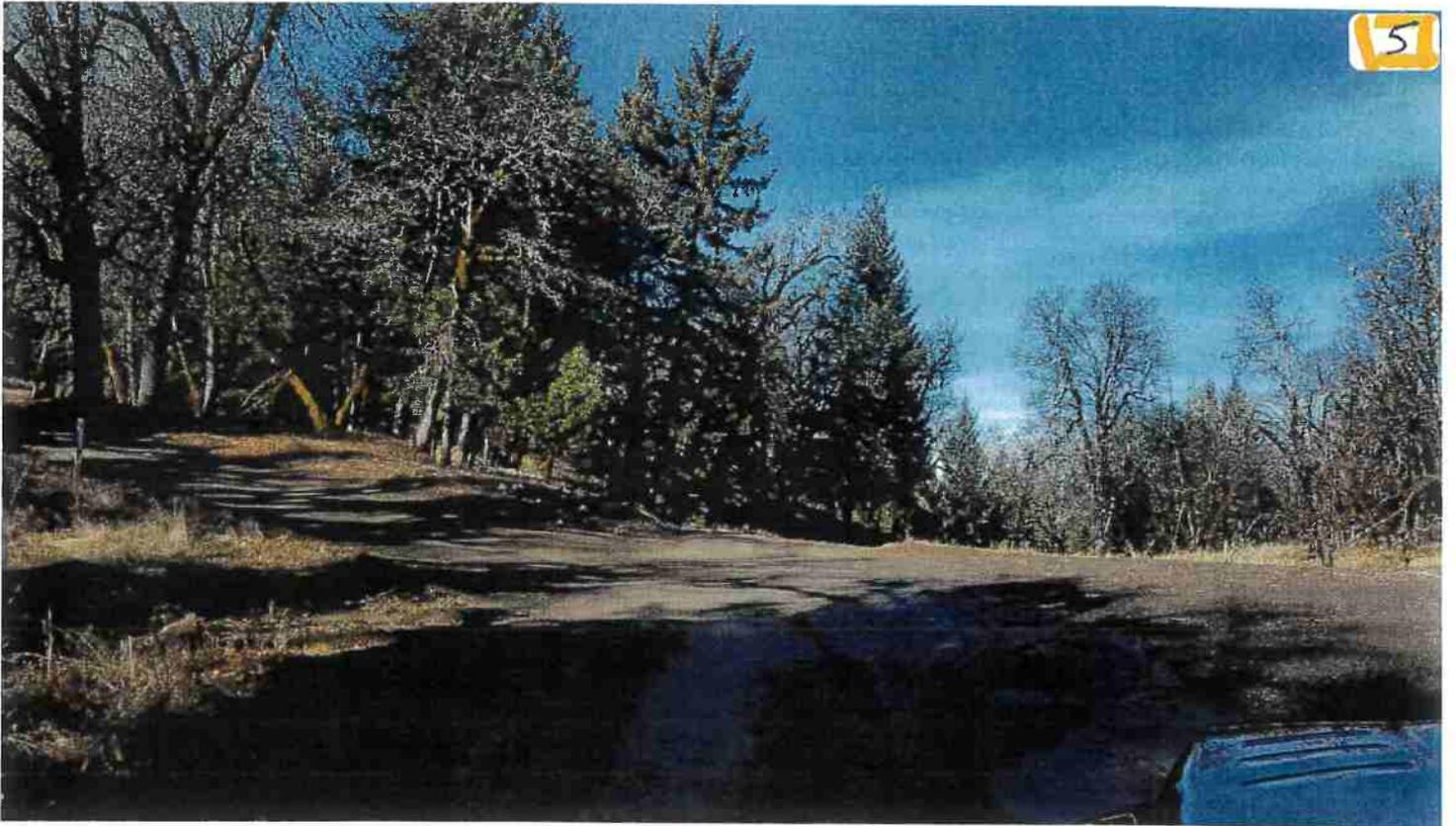


APPS: 11241

4



APPS: 11241

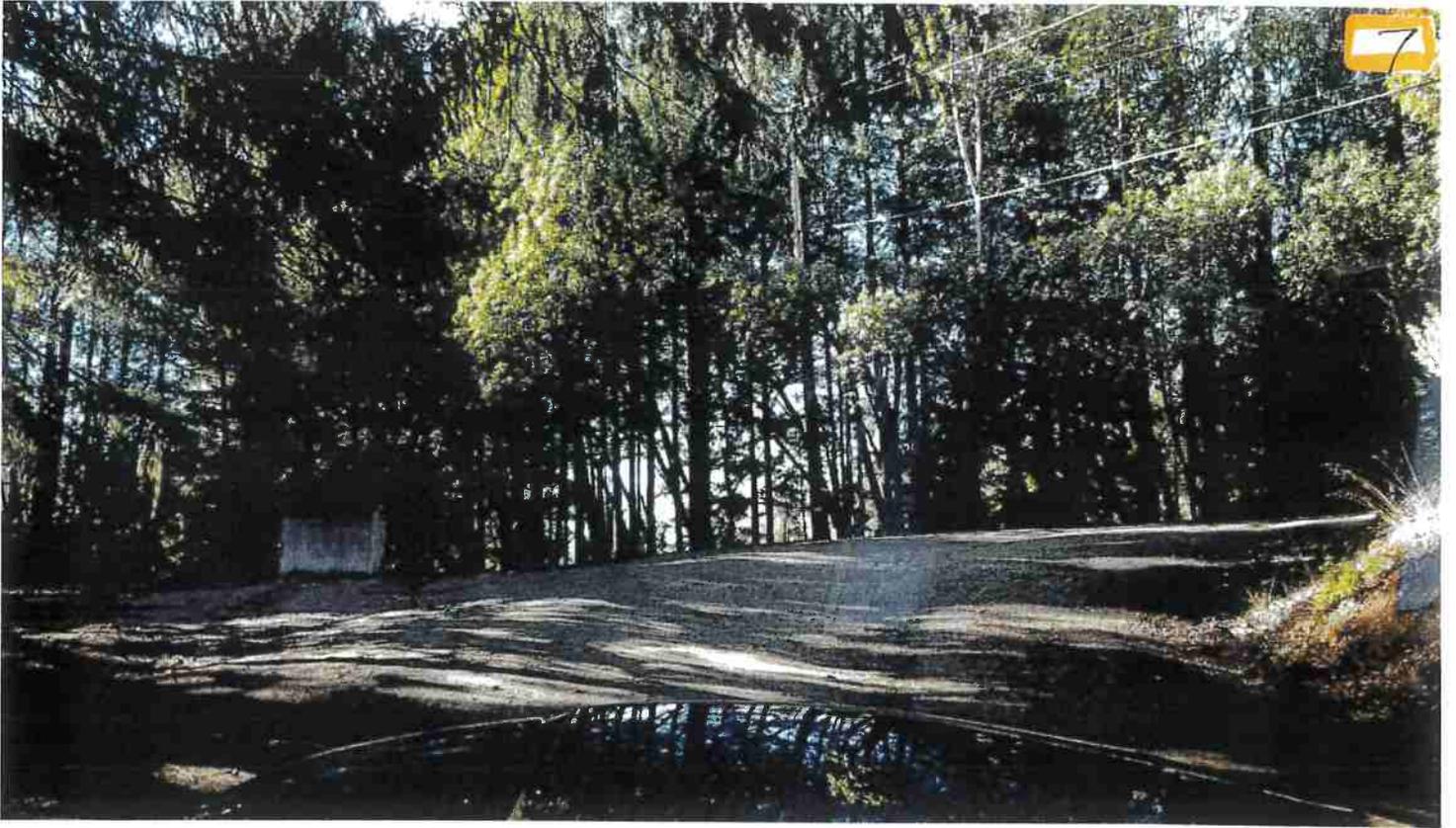


APP5:11241



AB 05-11241

7



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
REGION 1 – NORTHERN REGION
619 Second Street
Eureka, CA 95501



STREAMBED ALTERATION AGREEMENT

NOTIFICATION No. 1600-2019-0590-R1

Unnamed Tributary to Unnamed Tributary to Mad River and the Pacific Ocean

Brian Hall and Sheila Hall
Hall Water Diversion and Stream Crossings Project
7 Encroachments

This Lake or Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and Brian and Sheila Hall (Permittee).

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, the Permittee initially notified CDFW on July 12, 2019, 2019 with additional information January 30, 2020 that the Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, the Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, the Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project to be completed is located within the Mad-Redwood River watershed, approximately 2.6 miles south east of the town of Dinsmore, County of Humboldt, State of California. The project is located in Section 29 T02N, R05E, Humboldt Base and Meridian; in the Showers Mountain U.S. Geological Survey 7.5-minute quadrangle; Assessor's Parcel Number **208-201-026**; latitude 40.5187 N and longitude -123.6453 W at the point of diversion (POD).

PROJECT DESCRIPTION

The project is limited to 7 encroachments (Table 1). Two points of diversions POD-1 and POD-2 are for water diversion for domestic and irrigation uses. The first diversion is

from a spring. The second diversion is from an onstream pond. The third encroachment is to decommission an on-stream spring-fed pond, referred to as Pond A by implementing a Stream Restoration Plan. Water Right H507270 was filed September 9, 2019 for the same two encroachments for cannabis irrigation for this parcel. Work for the water diversion POD-1 spring will include use and maintenance of the water diversion infrastructure. The 4 other proposed encroachments are to upgrade failing and undersized culverts. Work for these encroachments will include excavation, removal of the failing culverts, replacement with new properly sized culverts, backfilling and compaction of fill, and rock armoring as necessary to minimize erosion.

Table 1. Project Encroachments with Description

ID	Latitude/Longitude	Description
POD-1 Spring	40.5187, -123.6453	<p>POD diverts water from a spring for domestic and agricultural use. Point of diversion is a screened 1 ½ inch polyline from a spring.</p> <p><u>Maximum Diversion Rate.</u> The maximum instantaneous diversion rate from the water intake shall not exceed three (3) gallons per minute (gpm) at any time.</p> <p><u>Bypass flow.</u> Permittee shall pass 80% of the flow at all times to keep all aquatic species including fish and other aquatic life in good condition below the POD.</p> <p><u>Seasonal Diversion Rate.</u> No more than 200 gallons in any one day (cumulatively between POD-1 and POD-2) shall be diverted (intend for household domestic use) during the low flow season from May 15 to October 31 of each year. Water shall be diverted only if the Permittee can adhere to the maximum diversion rate and bypass flow conditions of this Agreement.</p>
POD-2 Onstream Pond A (Stream Restoration Plan to take pond off stream)	40.5177, -123.6430	<p>POD diverts water from a spring fed pond for domestic and agricultural use.</p> <p><u>Maximum Diversion Rate.</u> The maximum instantaneous diversion rate from the water intake shall not exceed three (3) gallons per minute (gpm) at any time.</p> <p><u>Bypass flow.</u> Permittee shall pass 80% of the flow at all times to keep all aquatic species including fish and other aquatic life in good condition below the POD.</p> <p><u>Seasonal Diversion Rate.</u> No more than 200 gallons in any one day (cumulatively between POD-1 and POD-2) shall be diverted (intend for household domestic use) during the low flow season from May 15 to October 31 of each year. Water shall be diverted only if the Permittee can adhere to the maximum diversion rate and bypass flow conditions of this Agreement.</p> <p>Permittee shall submit a Stream Restoration Plan (SRP) prepared by a licensed engineer or other qualified professional for CDFW review and approval at least 90 days before initiating work.</p>
Crossing-1	40.5196, -123.6457	Replace undersized 18" culvert with a minimum 36" diameter culvert. Hydrologically disconnect road from stream.
Crossing-2	40.5199, -123.6448	Replace failed 36" diameter culvert with minimum 36" diameter culvert. Hydrologically disconnect road from stream.

Crossing-3	40.5191, -123.6444	Replace undersized 36" culvert with a minimum 66" diameter culvert. Hydrologically disconnect road from stream.
Crossing-4	40.5188, -123.6430	Replace undersized 18" culvert with a minimum 54" diameter culvert. Hydrologically disconnect road from stream.

One additional point of diversion exists depicted as Pond B, which appears to be an onstream pond subject to FGC section 1602 in Table 2. The pond has not been evaluated in the field, but only from the desk. It appears highly likely to be hydrologically connected. This Agreement does not retroactively permit the construction of the pond or diversion for any use. This Agreement does not retroactively permit any stream crossings, water diversions or other encroachments not described in Table 1.

Table 2. Encroachment with description subject to 1600 and **not** covered under this Agreement

ID	Latitude/Longitude	Description
Pond B	40.0166, -123.8443	Appears to be an onstream pond subject to FGC section 1602. This Agreement does not retroactively permit the construction of the pond or authorize diversion for any use.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*O. kisutch*), Steelhead Trout (*O. mykiss*), Western Brook Lamprey (*Lampetra richardsoni*), Pacific Lamprey (*Entosphenus tridentatus*), Southern Torrent Salamander (*Rhyacotriton variegatus*), Pacific Giant Salamander (*Dicamptodon tenebrosus*), Foothill Yellow-legged Frog (*Rana boylei*), Coastal Tailed Frog (*Ascaphus truei*), Western Pond Turtle (*Actinemys marmorata marmorata*) amphibians, reptiles, aquatic invertebrates, mammals, birds, and other aquatic and riparian species.

The adverse effects the project could have on the fish or wildlife resources identified above include:

Impacts to water quality:

increased water temperature;
 reduced instream flow;
 temporary increase in fine sediment transport;

Impacts to bed, channel, or bank and direct effects on fish, wildlife, and their habitat:

loss or decline of riparian habitat;
 direct impacts on benthic organisms;

Impacts to natural flow and effects on habitat structure and process:

cumulative effect when other diversions on the same stream are considered;
 diversion of flow from activity site;
 direct and/or incidental take;

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, the Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605, subdivision (b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with FGC section 1605, subdivisions (b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code § 1605, subd. (f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after the Permittee signature; 2) after CDFW complies with all applicable requirements under CEQA; and 3) after payment of the applicable FGC section 711.4 filing fee listed at

<https://www.wildlife.ca.gov/Conservation/CEQA/Fees>.

TERM

This Agreement shall **expire five (5) years** from date of execution, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. The Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605, subdivision (a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
ROAD EVALUATION REPORT

PART A: *Part A may be completed by the applicant*

Applicant Name: CHRIS DAZZI APN: 208-201-011

Planning & Building Department Case/File No.: _____

Road Name: CANYON ROAD (complete a separate form for each road)

From Road (Cross street): BEAR CREEK ROAD

To Road (Cross street): SUBJECT PARCEL

Length of road segment: 1.12 miles Date Inspected: 5-2-22

Road is maintained by: County Other _____
(State, Forest Service, National Park, State Park, BLM, Private, Tribal, etc)

Check one of the following:

Box 1 The entire road segment is developed to Category 4 road standards (20 feet wide) or better. If checked, then the road is adequate for the proposed use without further review by the applicant.

Box 2 The entire road segment is developed to the equivalent of a road category 4 standard. If checked, then the road is adequate for the proposed use without further review by the applicant.

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Box 3 The entire road segment is not developed to the equivalent of road category 4 or better. The road may or may not be able to accommodate the proposed use and further evaluation is necessary. Part B is to be completed by a Civil Engineer licensed by the State of California.

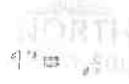
The statements in PART A are true and correct and have been made by me after personally inspecting and measuring the road. A map showing the location and limits of the road being evaluated in PART A is attached.

Chris Dazzi
Signature

5/2/22
Date

CHRIS DAZZI
Name Printed

Important: Read the instructions before using this form. If you have questions, please call the Dept. of Public Works Land Use Division at 707.445.7205.



- Parcel Information
 Post & Assessment Map
- Property Boundary (APN 208-201-011)
 - Ratched Assessment Parcel
 - Ratched
 - State Highway 99
 - Non-supermarket Road
 - Class I Watercourse
 - Class II Watercourse
 - Class III Watercourse

SUBJECT PARCEL

APN: 208-201-011 "Subject Parcel" utilizes 1.12 miles of Canyon Road (from 208-201-026 below) to access site. This segment of road essentially functions as a private driveway for the subject parcel

See attached Road Eval & LSAA

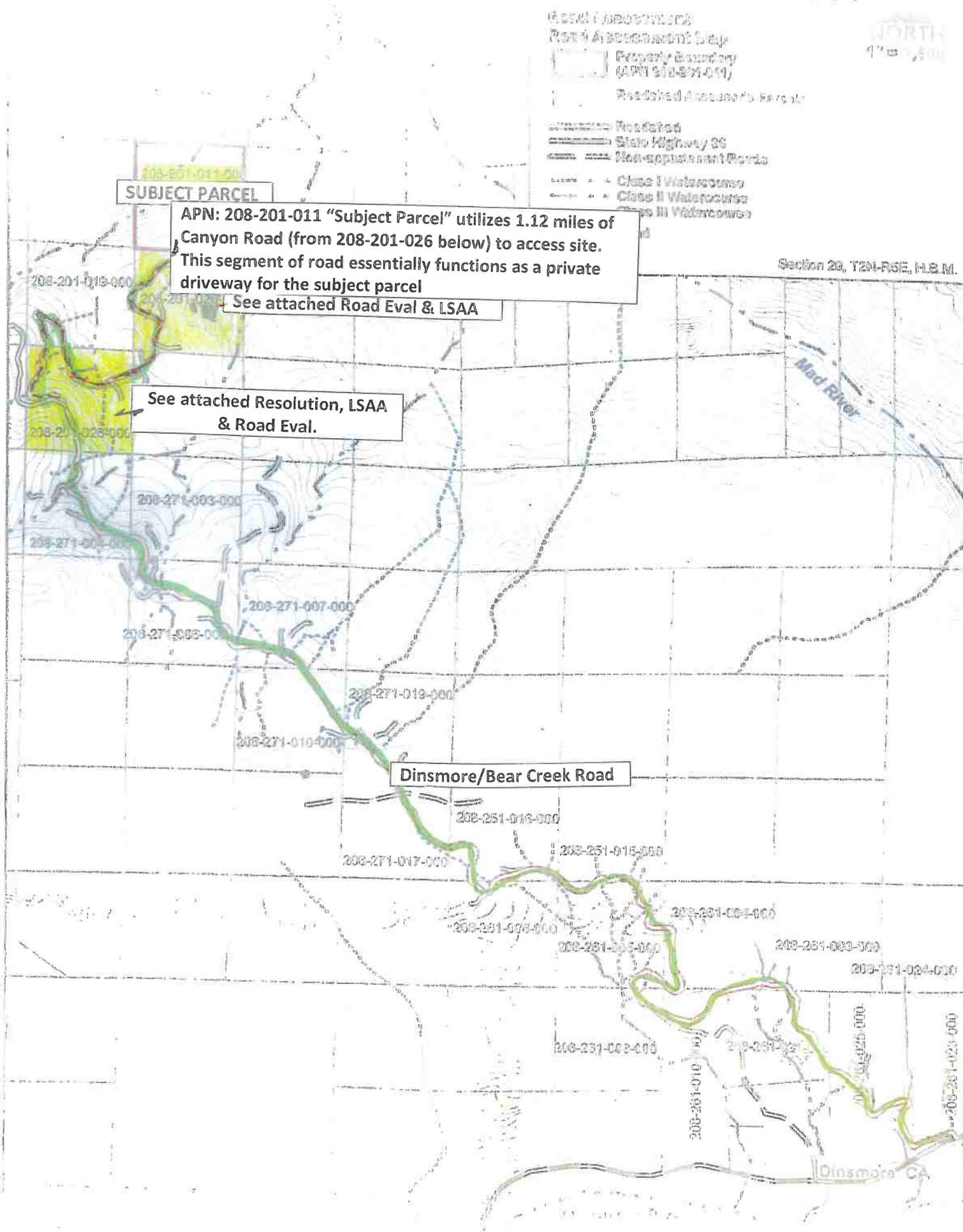
See attached Resolution, LSAA & Road Eval.

Dinsmore/Bear Creek Road

Section 29, T24N-R5E, H.R.M.

Mad River

Dinsmore CA



HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
ROAD EVALUATION REPORT

PART A: Part A may be completed by the applicant

Applicant Name: Full Moon Farms APN: 708-201-020

Planning & Building Department Case/File No.: 11219

Road Name: Bear Creek Road (complete a separate form for each road)

From Road (Cross street): Hwy 36

To Road (Cross street): Bear Creek Road

Length of road segment: 4.3 miles Date Inspected: 10/6/2017

Road is maintained by: County Other
(State, Forest Service, National Park, State Park, BLM, Private, Tribal, etc)

Check one of the following:

Box 1 The entire road segment is developed to Category 4 road standards (20 feet wide) or better. If checked, then the road is adequate for the proposed use without further review by the applicant.

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Box 3 The entire road segment is not developed to the equivalent of road category 4 or better. The road may or may not be able to accommodate the proposed use and further evaluation is necessary. Part B is to be completed by a Civil Engineer licensed by the State of California.

The statements in PART A are true and correct and have been made by me after personally inspecting and measuring the road.

Nik Erickson
Signature

10-6-17
Date

Nik Erickson
Name Printed

Important: Read the instructions before using this form. If you have questions, please call the Dept. of Public Works Land Use Division at 707.445.7205.

208-201-020

Road Eval Map

40.5217,-123.6385

Legend

- Dinsmore
- 🏠 Dinsmore Store
- 📍 Feature 1
- 📄 [Untitled]

Google earth

© 2017 Google

1 mi



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
REGION 1 – NORTHERN REGION
619 Second Street
Eureka, CA 95501



STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2019-0559-R1
Unnamed Tributaries to the Mad River and the Pacific Ocean

Mr. Nikolai Erickson
Erickson Stream Crossings Project
5 Encroachments

This Streambed Alteration Agreement (Agreement) is entered into and between the California Department of Fish and Wildlife (CDFW) and Mr. Nikolai Erickson (Permittee).

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, the Permittee initially notified CDFW on March 5, 2018, that the Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, the Permittee has reviewed the Agreement and accept its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, the Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project to be completed is located within the Mad River watershed, approximately 2.65 miles northwest of the town of Dinsmore, County of Humboldt, State of California. The project is located in Section 29, T2N, R5E, Humboldt Base and Meridian; in the Showers Mountain U.S. Geological Survey 7.5-minute quadrangle; Assessor's Parcel Number 208-201-020; latitude 40.521728 N and longitude 123.63932 W at the parcel center.

PROJECT DESCRIPTION

This Agreement is limited to five (5) projects (Table 1). The proposed work is to upgrade existing stream crossings. Work for these encroachments will include excavation, culverts removal, culvert installation, backfilling and compaction of fill, and rock armoring as necessary to minimize erosion. This Agreement does not authorize

work on four other projects proposed. Mutual agreement made to authorize work at those locations under a different agreement.

Table 1. Projects notified and authorization under this Agreement with descriptions of work.

ID	Latitude/Longitude	Description
Reservoir outlet 1	40.521187, -123.63879	No work authorized at this location under this Agreement. Mutual agreement made for new notification with revised remediation plan for the onstream ponds shall be submitted to CDFW by June 15, 2021.
Reservoir outlet 2	40.521038, -123.63819	No work authorized at this location under this Agreement. Mutual agreement made for new notification with revised remediation plan for the onstream ponds shall be submitted to CDFW by June 15, 2021.
STX1	40.52119, -123.63922	Upgrade existing rock ford with minimum 24" diameter culvert. Note this treatment is different than initially proposed.
STX2	40.52122, -123.64116	Upgrade existing undersized 12" diameter culvert with minimum 30" diameter culvert.
STX3	40.52119, -123.63922	Upgrade existing ford crossing with minimum 18" diameter culvert. Note this treatment is different than initially proposed.
STX4	40.52090, -123.63908	Upgrade existing ford crossing with minimum 18" diameter culvert. Note this treatment is different than initially proposed.
STX5	40.52085, -123.63808	No work authorized at this location under this Agreement. Mutual agreement made for new notification with revised remediation plan for the onstream ponds shall be submitted to CDFW by June 15, 2021.
STX6	40.52080, -123.63805	Upgrade existing ford crossing with minimum 30" diameter culvert.
Bypass culvert	40.52090, -123.63908	No work authorized at this location under this Agreement. Mutual agreement made for new notification with revised remediation plan for the onstream ponds shall be submitted to CDFW by June 15, 2021.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include: Steelhead Trout (*Oncorhynchus mykiss*), Foothill Yellow-legged Frog (*Rana boylei*), Western Pond Turtle (*Actinemys marmorata marmorata*), Rough-skinned Newt (*Taricha granulosa*), Pacific Tailed Frog (*Ascaphus truei*), Pacific Giant Salamander (*Dicamptodon tenebrosus*), as well as, other aquatic and riparian amphibian, reptile, aquatic invertebrate, mammal and bird species.

The adverse effects the project could have on the fish or wildlife resources identified above include:

Impacts to water quality:

temporary increase in fine sediment transport;

Impacts to bed, channel, or bank and direct effects on fish, wildlife, and their habitat:

loss or decline of riparian habitat;
direct impacts on benthic organisms;

Impacts to natural flow and effects on habitat structure and process:

direct and/or incidental take;
indirect impacts;
impediment of up- or down-stream migration;
water quality degradation; and
damage to aquatic habitat and function.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

The Permittee shall meet each administrative requirement described below.

- 1.1 **Permitted Project Activities.** Except where otherwise stipulated in this Agreement, all work shall be in accordance with the Permittee Notification received on July 3, 2019, together with all maps, BMP's, photographs, drawings, emails, and other supporting documents submitted with the Notification.
- 1.2 **Documentation at Project Site.** The Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.
- 1.3 **Providing Agreement to Persons at Project Site.** The Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of the Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.
- 1.4 **Change of Conditions and Need to Cease Operations.** If conditions arise, or change, in such a manner as to be considered deleterious by CDFW to the stream or wildlife, operations shall cease until corrective measures approved by CDFW are taken. This includes new information becoming available that indicates that the bypass flows and diversion rates provided in this agreement are not providing adequate protection to keep aquatic life downstream in good condition or to avoid "take" or "incidental take" of federal or State listed species.

- 1.5 **Notification of Conflicting Provisions.** The Permittee shall notify CDFW if the Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, CDFW shall contact the Permittee to resolve any conflict.
- 1.6 **Agreement Compliance.** The proposed work shall comply with the measures of this Agreement. Failure to comply with these measures shall result in suspension or revocation of this agreement.
- 1.7 **Project Site Entry.** Permittee agrees that CDFW personnel may enter the project site at any time to verify compliance with the Agreement.
- 1.8 **CDFW Notification of Work Initiation and Completion.** The Permittee shall contact CDFW within the seven-day period preceding the beginning of work permitted by this Agreement. Information to be disclosed shall include Agreement number, and the anticipated start date. Subsequently, the Permittee shall notify CDFW no later than seven (7) days after the project is fully completed.
- 1.9 **Work Completion.** The Permittee shall complete all authorized projects by **October 1, 2021**. A new notification for remediation of Reservoir 1, Reservoir 2 and STX-5 shall be submitted to CDFW by **June 15, 2021**.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, the Permittee shall implement each measure listed below.

- 2.1 **Permitted Project Activities.** Except where otherwise stipulated in this Agreement, all work shall be in accordance with the Permittee Notification received on July 3, 2019, together with all maps, BMP's, photographs, drawings, and other supporting documents submitted with the Notification.
- 2.2 **Work Period.** All work, not including water diversion, shall be confined to the period **June 15 through October 1** of each year. Work within the active channel of a stream shall be restricted to periods of **dry weather**. Precipitation forecasts and potential increases in stream flow shall be considered when planning construction activities. Construction activities shall cease and all necessary erosion control measures shall be implemented prior to the onset of precipitation.
- 2.3 **Extension of the Work Period.** If weather conditions permit, and the Permittee wishes to extend the work period after **October 1**, a written request shall be made to CDFW at least **5-working days** before the proposed work period variance. Written approval (letter or e-mail) for the proposed time extension must be received from CDFW prior to activities continuing past **October 1**.

- 2.4 **Incidental Take.** This Agreement does not allow for the take, or incidental take of any state or federal listed threatened or endangered listed species.

Vegetation Management

- 2.5 **Minimum Vegetation Removal.** No native riparian vegetation shall be removed from the bank of the stream, except where authorized by CDFW. Permittee shall limit the disturbance or removal of native vegetation to the minimum necessary to achieve design guidelines and standards for the Authorized Activity. Permittee shall take precautions to avoid damage to vegetation outside the work area.
- 2.6 **Vegetation Management.** Permittee shall limit vegetation management (e.g., trimming, pruning, or limbing) and removal for the purpose of stream crossing or diversion infrastructure placement/maintenance to the use of hand tools. Vegetation management shall not include treatment with herbicides.

Stream Crossings

- 2.7 **Stream Protection.** No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete washings, oil or petroleum products, or other deleterious material from project activities shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into the stream. All project materials and debris shall be removed from the project site and properly disposed of off-site upon project completion.
- 2.8 **Equipment Maintenance.** Refueling of machinery or heavy equipment, or adding or draining oil, lubricants, coolants or hydraulic fluids shall not take place within stream bed, channel and bank. All such fluids and containers shall be disposed of properly off-site. Heavy equipment used or stored within stream bed, channel and bank shall use drip pans or other devices (e.g., absorbent blankets, sheet barriers or other materials) as needed to prevent soil and water contamination.
- 2.9 **Hazardous Spills.** Any material, which could be hazardous or toxic to aquatic life and enters a stream (i.e. a piece of equipment tipping-over in a stream and dumping oil, fuel or hydraulic fluid), the Permittee shall immediately notify the California Emergency Management Agency State Warning Center at 1-800-852-7550, and immediately initiate clean-up activities. CDFW shall be notified by the Permittee within 24 hours at 707-445-6493 and consulted regarding clean-up procedures.
- 2.10 **Excavated Fill.** Excavated fill material shall be placed in locations where it cannot deliver to a watercourse. To minimize the potential for material to enter the watercourse during the winter period, all excavated and relocated fill material shall be tractor contoured (to drain water) and tractor compacted to effectively incorporate and stabilize loose material into existing road and/or landing features.

2.11 Runoff from Steep Areas. The Permittee shall make preparations so that runoff from steep, erodible surfaces will be diverted into stable areas with little erosion potential or contained behind erosion control structures. Erosion control structures such as straw bales and/or siltation control fencing shall be placed and maintained until the threat of erosion ceases. Frequent water checks shall be placed on dirt roads, cat tracks, or other work trails to control erosion.

2.12 Culvert Installation.

2.12.1 Existing fill material in the crossing shall be excavated down vertically to the approximate original channel and outwards horizontally to the approximate crossing hinge points (transition between naturally occurring soil and remnant temporary crossing fill material) to remove any potential unstable debris and voids in the older fill prism.

2.12.2 Culvert shall be installed to grade, aligned with the natural stream channel, and extend lengthwise completely beyond the toe of fill. If culvert cannot be set to grade, it shall be oriented in the lower third of the fill face, and a downspout or energy dissipator (such as boulders, rip-rap, or rocks) shall be installed above or below the outfall as needed to effectively control stream bed, channel, or bank erosion (scouring, headcutting, or downcutting).

2.12.3 Culvert bed shall be composed of either compacted rock-free soil or crushed gravel. Bedding beneath the culvert shall provide for even distribution of the load over the length of the pipe, and allow for natural settling and compaction to help the pipe settle into a straight profile. The crossing backfill materials shall be free of rocks, limbs, or other debris that could allow water to seep around the pipe, and shall be compacted.

2.12.4 Culvert inlet, outlet (including the outfall area), and fill faces shall be armored where stream flow, road runoff, or rainfall energy is likely to erode fill material and the outfall area.

2.12.5 Permanent culverts shall be sized to accommodate the estimated 100-year flood flow [i.e. ≥ 1.0 times the width of the bankfull channel width or the 100-year flood size, whichever is greater], including debris, culvert embedding, and sediment loads.

2.13 Rock Armor Placement.

2.13.1 No heavy equipment shall enter the wetted stream channel.

2.13.2 No fill material, other than clean rock, shall be placed in the stream channel.

2.13.3 Rock shall be sized to withstand washout from high stream flows, and

extend above the ordinary high water level.

2.13.4 Rock armoring shall not constrict the natural stream channel width and shall be keyed into a footing trench with a depth sufficient to prevent instability.

2.14 **Project Inspection.** The Project shall be inspected by Green Road Consulting or a licensed engineer before October 1 during the year when the project was completed to ensure that stream crossing(s) were installed as designed. A copy of the inspection report, including photographs of each site, shall be submitted to CDFW in accordance with the reporting measures described below.

3. Reporting Measures

3.1 **Project Inspection.** To comply with Measure 2.14, the Permittee shall submit the Project Inspection Report, within 90 days of completion of this project to CDFW (see contact information below).

CONTACT INFORMATION

Written communication that the Permittee or CDFW submits to the other shall be delivered to the address below unless the Permittee or CDFW specifies otherwise.

To Permittee:

Mr. Nikolai Erickson
Erickson Ventures, LLC
1065 Riverside Drive
Rio Dell, California 95562
707-672-5141
humInvestments@yahoo.com

To CDFW:

Department of Fish and Wildlife
Northern Region
619 Second Street
Eureka, California 95501
Attn: Lake and Streambed Alteration Program
Notification #1600-2019-0559-R1

LIABILITY

The Permittee shall be solely liable for any violation of the Agreement, whether committed by the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW's endorsement of, or require the Permittee to proceed with the project. The decision to proceed with the project is the Permittee's alone.

SUSPENSION AND REVOCATION

CDFW may suspend or revoke in its entirety this Agreement if it determines that the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide the Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide the Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to the Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against the Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 *et seq.* (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

The Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and the Permittee. To request an amendment, the Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by the Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, the Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), the Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, the Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with FGC 1605(b) through (e).

If the Permittee fails to submit a request to extend the Agreement prior to its expiration, the Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (FGC section 1605(f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after the Permittee signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at http://www.wildlife.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall **expire five years** from date of execution, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. The Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of the Permittee, the signatory hereby acknowledges that he or she is doing so on the Permittee's behalf and represents and warrants that he or she has the authority to legally bind the Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If the Permittee begins or completes a project different from the project the Agreement authorizes, the Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

FOR Mr. Nikolai Erickson


Nik Erickson (Mar 24, 2021 14:36 MDT)

Nikolai Erickson

Mar 24, 2021

Date

FOR DEPARTMENT OF FISH AND WILDLIFE

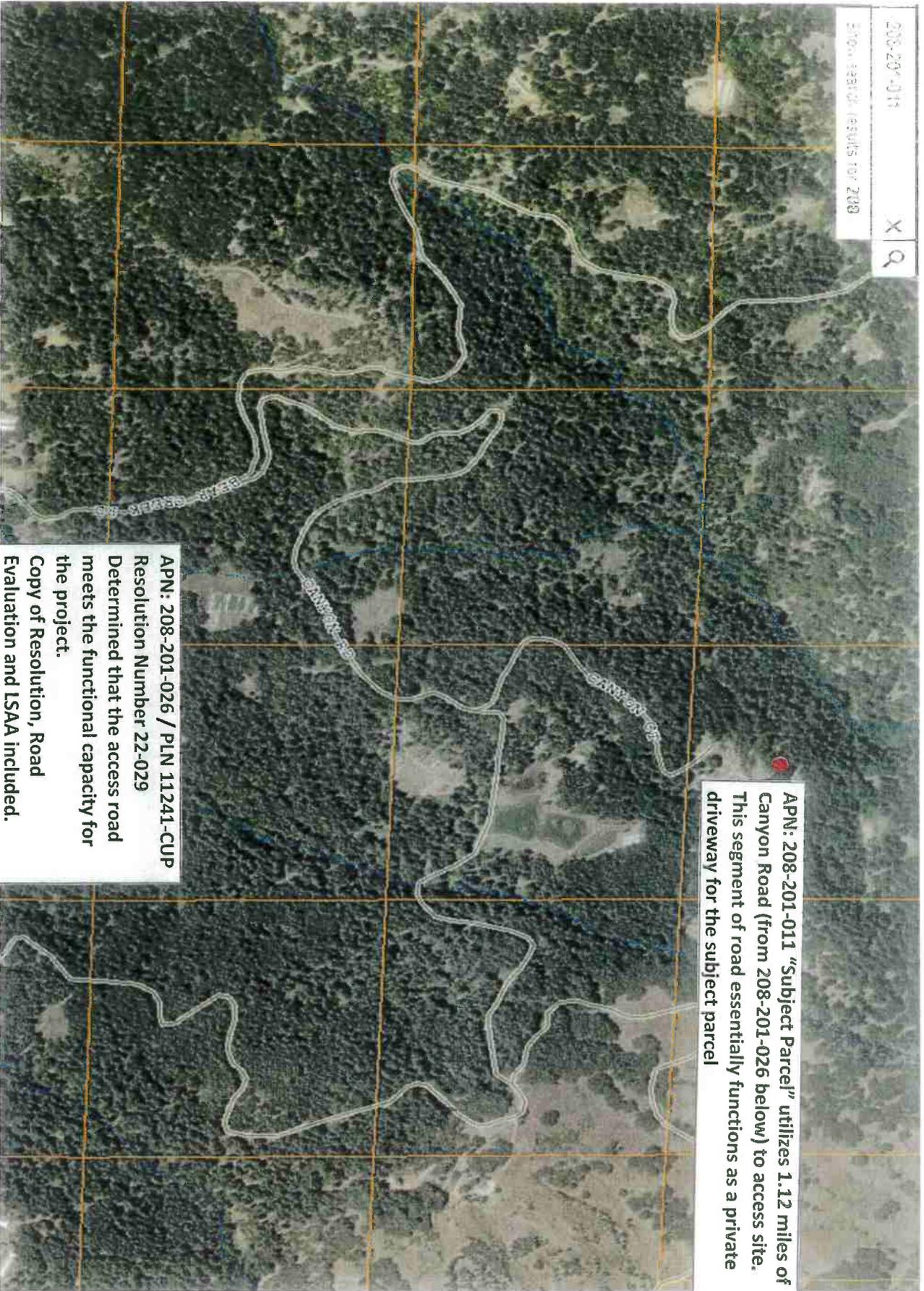

Scott Bauer
Senior Environmental Scientist Supervisor

4/7/2021
Date

208-201-011

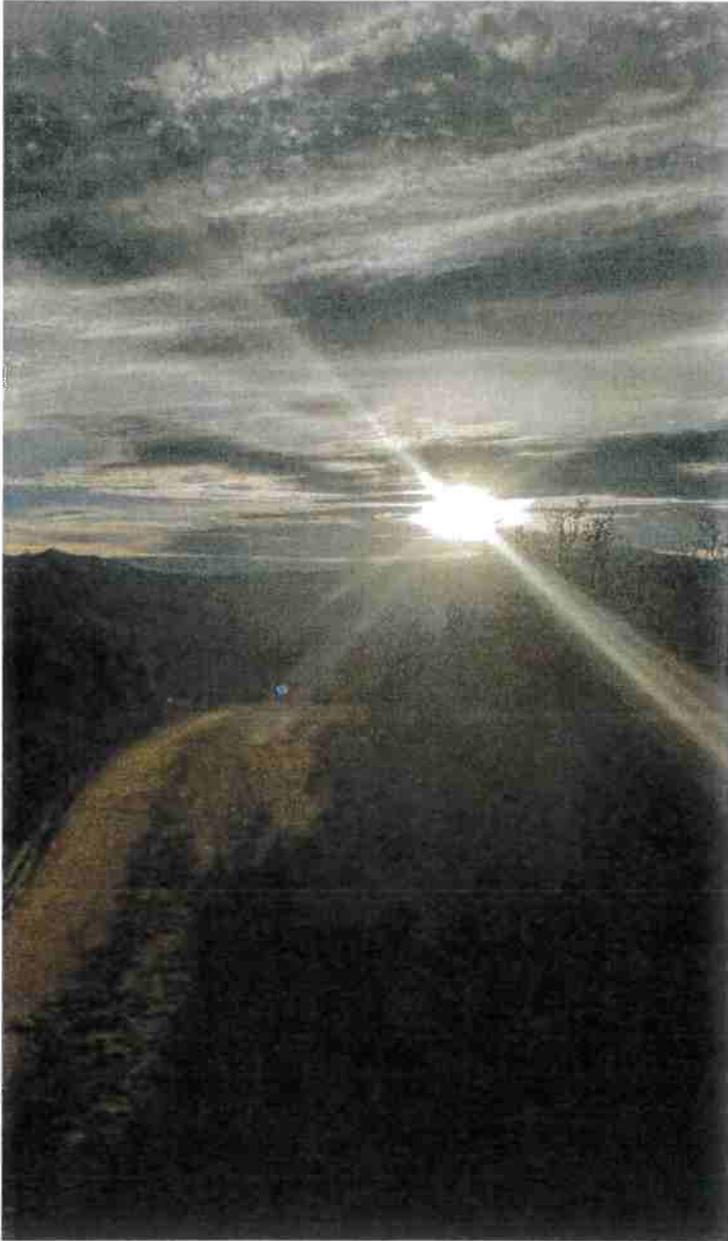
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Info: search results for 208



APN: 208-201-011 "Subject Parcel" utilizes 1.12 miles of Canyon Road (from 208-201-026 below) to access site. This segment of road essentially functions as a private driveway for the subject parcel

APN: 208-201-026 / PLN 11241-CUP
Resolution Number 22-029
Determined that the access road meets the functional capacity for the project.
Copy of Resolution, Road Evaluation and LSAA included.



ROAD ASSESSMENT



Prepared by:

Chris Carroll

Timberland Resource Consultants

165 South Fortuna Blvd

Fortuna, CA 95540

December 30, 2021

Purpose

This road assessment has been prepared on behalf of the Applicant, Chris Dazzi, for a Humboldt County Cannabis Cultivation Project, on APN 208-201-011. This road assessment is required pursuant to Commercial Cannabis Land Use Ordinance (CCLUO), Section 55.4.12.1.8(c)(2) Performance Standard–Road Systems, which states:

- 2) *Where access to a site is provided in part by private roads systems, any application to permit a Commercial Cannabis Activity shall include a report evaluating the design, condition, and performance of all private road segments within the defined Roadshed.*
 - i. *The report shall be prepared by a licensed engineer or similarly licensed professional.*
 - ii. *The report shall be prepared to the satisfaction of the County and shall include or be accompanied by exhibits and stationing information of sufficient detail to enable the location, attributes, and condition of all road drainage features to be itemized and documented. The narrative portion of the report must evaluate the current design, functionality and performance of discrete drainage systems and segments and develop conclusions concerning compliance and conformance with best management practices within the defined Roadshed. The County reserves the right to ask for additional information or choose to independently investigate and verify any and all conclusions within the report.*
 - iii. *Where an evaluation has determined, to the satisfaction of the County, that all private road segments comply with relevant best management practices, as defined herein, no further work is needed.*
 - iv. *Where an evaluation has determined that improvements within the projects' Roadshed are required, the report shall identify the location and nature of each discrete improvement. Improvements shall be tied to all provisional permit approval(s) within the defined Roadshed and identified within the Conditions of Approval of all discretionary permit applications.*

Property Description

The Roadshed accesses parcel APN 208-201-011, which is approximately 40 acres located 2.8 miles northwest of Dinsmore, CA. It is located in Section 29, T2N-R5E, H.B.M.

Scope

This road assessment is limited to the appurtenant road accessing the subject parcel from the nearest public road. The "Roadshed" is defined as the segment of permanent rocked road beginning from State Highway 36 near Dinsmore, CA, and extending to the subject property, APN 208-201-011. The Roadshed is shown on the attached maps. It includes approximately 5 miles of private access roads to the subject parcel (Bear Creek Road 3.9 mi., Canyon Road 0.8 mi., and Canyon Court 0.3 mi.). The road assessment, which focuses specifically on the condition and functionality of road drainage features, was conducted using standards and procedures found in the *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads, Mendocino County Resource Conservation District*. The road assessment will evaluate whether the Roadshed is designed and maintained in accordance with *A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds*. Where the assessment has determined that

improvements within the projects' Roadshed are required, the report will recommend upgrades consistent with best management practices contained in the report.

Methods

The methods used to develop this road assessment include both field, and office components. The office component consisted of aerial photography review and interpretation, existing USGS quad map review, GIS mapping of field reconnaissance data, review of on-site photography points, streamflow calculations, and general planning. The field component included identifying and accurately mapping stream crossings, watercourses, wet areas, and wetlands near and downslope of the road system, which could be impacted by road drainage or runoff. An accurate location of the Waters of the State is necessary to make an assessment of whether existing erosion sites have the potential to discharge waste to an area that could affect Waters of the State. Watersheds associated with streamflow calculations, when necessary, are delineated using available USGS DEM derived topography, and rainfall data for 100-year storm events is attained from NOAA's Hydrometeorological Design Studies Center Precipitation Frequency Data Server https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca.

The initial assessment was conducted under relatively dry conditions on November 18th and 22th, 2021, following a three to four week long rainy period. Most of the road surface was approximately 15 to 20 feet wide with numerous wider turnouts to allow for parking or passing of oncoming vehicles. The Roadshed identified is located across 22 separate, private parcels. It follows a road that is shown on the Dinsmore, Blake Mountain, and Showers Mountain U.S.G.S. 7.5' Quad. Maps for most of its length. The road receives light to heavy traffic use depending on the time of year, with the most traffic along the southern section closest to Dinsmore and Highway 36. It appears that landowners have performed occasional road maintenance in the form of surface grading and rocking to keep it open and drivable. The surface appeared hard and has enough rock to allow winter time property access. Numerous watercourse crossings observed along the road are mostly permanent culverts across Class II and III watercourses, with two small watercourses that lack crossing structures altogether. Most culverts appear to have been in place for many years, with the exception of several that have been upgraded within the last five years by individual landowners. All of the watercourse crossings have been assessed and are mapped and described below.

Where the assessment has determined that improvements within the Roadshed are needed, the report will recommend upgrades consistent with best management practices contained in the report. Descriptions and/or recommendations given at individual road points or road segments are stated below. Road point recommendations are based on the conditions observed on the date of the assessment, and may require modifications due to changes in the condition of the road in the future. Recommendations did not take into account private property landowners along the Roadshed, or any required permits that must be obtained prior to road improvement work.

Road Points

Road Point 1: The intersection of Bear Creek Road with State Highway 36. Minor puddles and channeling were observed on the surface where the road gradient flattens and is beginning to lose its crowned surface. The surface is heavily rocked. At the intersection and up the road, the surface should be graded to remove the minor puddles and channels on the surface and to re-establish the crowned drainage pattern per the attached Crowned Road BMPs.

Road Point 2: Existing 18-inch diameter metal culvert crossing of a Class III watercourse. The culvert inlet was covered by thick Himalaya berry and the outlet was plugged with road related sediment. It was difficult to see but appeared to be rusted but still functioning. The culvert also receives ditch runoff from up the road. Although plugged at the outlet, water was flowing through on the day of the assessment. The culvert is calculated as undersized. Approximately 50 feet below the outlet, the watercourse crosses Highway 36 via a 24-inch metal culvert. At Road Point 2, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 30-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Segment 2 to 6: Road Segment is rocked with a mostly crowned drainage pattern. It appears to be kept maintained by grading, but there was evidence of minor channeling of runoff down the surface. A lengthy inside ditch connects to the watercourse crossing at Road Point 2. Point 3 and 5 are existing turnouts that were noted. At Road Point 4 relieve the inside ditch by installing a ditch relief culvert per the attached BMPs. Grade the road surface to remove the minor channels that have developed on the surface and re-establish the crowned drainage pattern per the attached Crowned Road BMPs.

Road Point 6: Existing 36-inch diameter metal culvert crossing of a Class II watercourse. The culvert appeared to be in fair condition and functioning. The culvert also receives ditch runoff from up the road, and road surface runoff over the outboard fill above the outlet. The culvert is slightly undersized. At Road Point 6, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 48-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Segment 6 to 9: Road Segment is rocked with a mostly crowned drainage pattern. It appears to be kept maintained by grading, but there was evidence of minor channeling of runoff down the surface. An inside ditch connects to the watercourse crossing at Road Point 6, and runoff along the outer half of the road flows over the outboard edge at the culvert outlet. Points 7 and 8 are existing surface lead-out locations that no longer function properly. Along this segment, relieve the inside ditch by installing a ditch relief culvert per the attached BMPs at Point 7 and opening the surface lead-out at Point 8. Grade the road surface to remove minor channels that have developed on the surface and re-establish the crowned drainage pattern per the

attached Crowned Road BMPs. Road Point 9 is the intersection with a steep driveway that contributes to the inside ditch runoff.

Road Segment 9 to 11: Road Segment becomes narrower and more of an outsloped road. Point 10 is a natural dip in the road where water tends to collect and pond. Point 11 is a new, 18-inch ditch relief culvert that is heavily rock armored, open and functioning. At Road Point 10 install a rocked rolling dip, and grade the road surface per the attached Road Outsloping BMPs to maintain efficient surface runoff.

Road Point 12: Existing old, rusted 18-inch diameter metal culvert crossing of a Class III watercourse. The culvert is also undersized. At Road Point 12, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 42-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Segment 12 to 18: Road Segment is rocked with a mostly crowned drainage pattern, and is maintained by occasional road grading. Short segments have minor channeling along the surface. The inside ditch is connected to the watercourse crossing at Point 12. An existing ditch relief culvert showing wear is located at Point 15. At Road Point 13, install a new ditch relief culvert at the natural swale location to drain the ditch before it enters the inlet of the crossing at Point 12. At Point 14 reconstruct the rolling dip / lead-out to drain the road surface. At Point 15, replace the existing ditch relief culvert, and install a surface lead-out at Point 16. At Road Point 17, install a new ditch relief culvert at the natural swale location. Grade the road surface to remove minor channels that have developed on the surface and re-establish the crowned or outsloped drainage pattern per the attached BMPs.

Road Point 18: Existing 24-inch diameter metal culvert crossing of a Class II watercourse. The culvert appeared to be in fair condition and functioning. Its bottom is beginning to rust and it is slightly "shotgunned" at the outlet. The culvert is calculated as undersized. At Road Point 18, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 42-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Point 19: Existing 60-inch diameter metal culvert watercourse crossing. The inlet is set at the confluence of two Class II watercourses. The culvert appeared to be in good condition and functioning properly. The bottom is solid but is showing early signs of wear. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 19, monitor to make sure that the culvert is open and functioning.

Road Segment 19 to 23: Road Segment is rocked with a mostly outsloped surface that becomes more of a crowned drainage pattern along the approaches to the existing ditch relief culvert at Point 22. The road surface is maintained by occasional road grading. The ditch relief culvert at Point 22 is a functioning 15-inch diameter, with a damaged inlet that had been recently dug out. At Road Point 20 and 21, install proper, elongated rocked rolling dips that can hold up to the road's traffic. At Point 22 replace the ditch relief culvert with the inlet rock armored and situated back off the road surface far enough that it cannot get run over by traffic. Continue to maintain the current surface drainage patterns per the attached BMPs.

Road Point 23: Existing 24-inch diameter culvert crossing of a Class III watercourse. The culvert inlet was partially plugged with fine sediment that appeared to have originated from up the road during the first rainy period of mid-October and early November 2021. The outlet was partially blocked from a small amount of fill material that recently fell loose from the outboard edge of the road and over the outlet. It was difficult to see the condition of the culvert, but it appeared to be functional. The culvert length is too short to extend beyond road fills but its diameter is adequate for the 100-year peak streamflow. At Road Point 23, the ends of the culvert are in need of maintenance to remove the blockages and to assess the physical condition of the culvert. Road Points 24, 26, and 27 up the road will help to address road related sediment entering the Class III watercourse from above. If the culvert is found to be rusted and worn out, it should be replaced with a properly sized culvert installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 24-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Point 24: The northwest approach to the watercourse crossing at Road Point 23 has an inside ditch that is hydrologically connected with the culvert crossing inlet. At Road Point 24, install a new ditch relief culvert per the attached BMPs.

Road Point 25: Existing 30-inch diameter plastic culvert watercourse crossing of a Class III watercourse. The culvert appeared to be in good condition and functioning properly. It has a slightly "shotgunned" outlet that can be mitigated by the placement of a small amount of rock for energy dissipation. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 25, monitor to make sure that the culvert is open and functioning. The Class III watercourse had received road related sediment from upstream and from a connected inside ditch during the first rainy period of mid-October and early November 2021. Road Points 26 through 31 up the road will help to address road related sediment entering the Class III watercourse from above by breaking up concentrated road surface runoff.

Road Point 26: The southeast approach to the watercourse crossing at Road Point 25 has an inside ditch that is hydrologically connected with the culvert crossing inlet. At Road Point 26, install a new ditch relief culvert per the attached BMPs to hydrologically disconnect the inside ditch.

Road Segment 26 to 32: Road Segment is rocked with a mostly crowned or outsloped surface. The road surface is maintained by occasional road grading. There are several surface drainage features that are in need of maintenance or improvement to re-establish functionality. At Road Point 27 maintain the lead-ditch that drains the inside ditch at the switchback. At Road Point 28 maintain the surface lead-out, or as an alternative install a new ditch relief culvert at this location. At Road Point 29 install a new ditch relief culvert. At Road Point 30 maintain the surface lead-out at its existing location. At Road Point 31 maintain the rolling dip at the natural low spot in the road surface. This site could be improved further by the installation of a proper rocked rolling dip per the attached BMPs. Grade the road surface to remove any minor channels that have developed on the surface and re-establish the crowned or outsloped drainage pattern per the attached BMPs. Improvements along this road segment together will help to disperse concentrated road runoff that contributed sediment delivery to the Class III watercourse at Point 23 and 25.

Road Point 32: Road Point 32 is an existing 24-inch diameter plastic ditch relief culvert. Although it is situated above the head of a Class III watercourse, it didn't appear to be the source of sediment in the Class III watercourse at Point 23 and 25. It appeared to be functioning with a heavily rock armored cutbank, and the incoming ditch was grassed and didn't appear to be sediment laden. At Point 32 continue to keep the culvert open and functioning. From Point 32 to 33 continue to maintain the crowned road surface and breach the outboard berm at regular intervals to allow for runoff to disperse off the surface.

Road Point 33: Existing 18-inch diameter metal culvert watercourse crossing of a small Class III watercourse. It is located above the confluence with another Class III watercourse that the road crosses approximately 100 feet to the northeast. The culvert appeared to be in fair condition and functioning properly. The outlet is partially blocked by a build up of grass, leaves, and road material. The culvert is set at a natural low spot in the road and surface runoff flows over the outboard edge of the road towards the outlet. The culvert is sized adequately sized for the 100 year peak streamflow. At Road Point 33 clean out the small amount of material at the outlet. If feasible, breach the outboard berm and establish a surface lead-out to disperse road runoff approximately 40 feet to the north.

Road Point 34: Existing 18-inch diameter metal culvert watercourse crossing of a small Class III watercourse. The culvert also receives inside ditch runoff from the northwest, and surface runoff flows over the outboard edge of the road towards the outlet. The culvert appeared to be in fair condition and functioning properly. The culvert is calculated as slightly undersized. At Road Point 34 hydrologically disconnect the incoming road surface to the northwest. See Road Point 35 below. From Point 34 to 35 continue to maintain the crowned road surface and breach the outboard berm at regular intervals to allow for runoff to be dispersed. Upon its replacement, a properly sized culvert should be installed per the attached BMPs. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 24-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Point 35: Existing surface lead-out that is not functioning properly. Maintenance at this point will help to hydrologically disconnect the ditch and road surface from the crossing at Point 34. At Point 35 deepen and lengthen the existing lead-out so that it drains the road surface and the inside ditch. As an alternative, a new ditch relief culvert could be installed at this location along with re-establishing a crowned road surface and

inside ditch up the road towards Point 36. A remnant of a crushed ditch relief culvert was visible in the road surface at the point.

Road Point 36: Existing 24-inch diameter metal culvert watercourse crossing of a small Class III watercourse. It is located above the confluence of another Class III watercourse that the road crosses approximately 75 feet to the northeast. A very short, vegetated inside ditch with no sign of erosion connects to the inlet. The culvert appeared to be in good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 36 keep the culvert open and free of obstructions.

Road Point 37: Existing 18-inch diameter metal culvert watercourse crossing of a small Class III watercourse. The culvert also receives inside ditch runoff from the northwest from a low gradient vegetated inside ditch with no erosion. The culvert appeared to be in fair condition and functioning properly. The culvert is calculated as slightly undersized. From Point 37 to 39 continue to maintain the crowned road surface and breach the outboard berm at regular intervals where feasible to allow for runoff to be dispersed. Upon its replacement, a properly sized culvert should be installed per the attached BMPs. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 24-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Point 38: At Point 38 install a new ditch relief culvert west of the turnout. Situate the outlet back off the road surface far enough that it cannot get run over by traffic. Continue to maintain the current surface drainage patterns by grading berm material that builds up over time with traffic use. See the Road Outsloping and Crowned Road BMPs attached.

Road Point 39: Existing 18-inch diameter metal culvert watercourse crossing of a small Class III watercourse. The road approaches are mostly outsloped through the crossing and surface runoff flows over the outboard edge of the road towards the outlet. The culvert appears slightly misaligned at the inlet, and was set above the natural grade at the outlet that resulted in past erosion. The culvert is calculated as slightly undersized. At Road Point 39 a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 24-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work. Continue to maintain the current outsloped drainage pattern by grading berm material that builds up over time with traffic use. This will allow runoff to sheet off the road without becoming concentrated directly over the culvert outlet.

Road Segment 39 to 42: Road Segment is rocked with a mostly crowned or outsloped surface with an inside ditch. Along the crowned segments more runoff is directed towards the outboard edge than the inside ditch. Over time traffic use results in a build-up of berm material that impedes surface drainage. At Road Point 40 and 41 install new ditch relief culverts. Continue to maintain the road surface by grading the road to remove or breach berms at regular intervals to evenly disperse road runoff as much as possible.

Road Point 42: Existing 24-inch diameter metal culvert watercourse crossing. The crossing was upgraded in the last 5 years under a valid CDFW LSA Agreement. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 42, monitor to make sure that the culvert remains open and functioning.

Road Point 43: Existing 36-inch diameter metal culvert watercourse crossing. The crossing was upgraded in the last 5 years under a valid CDFW LSA Agreement. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 43, monitor to make sure that the culvert remains open and functioning. Maintain the existing surface lead-out approximately 40 feet east of Point 43. From Point 43 to Point 44, maintain the existing surface lead-outs and continue to maintain the road surface by grading.

Road Point 44, 45, and 46: Road Point 44 is an existing 36-inch diameter metal culvert watercourse crossing. The crossing was upgraded in the last 5 years under a valid CDFW LSA Agreement. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 44, monitor to make sure that the culvert remains open and functioning. Runoff from a portion of a through-cut section of road between Point 45 (bottom) and Point 46 (top) drains via a hydrologically connected inside ditch to the inlet of this culvert crossing. Approximately 40 feet south of Point 44 install a rocked rolling dip to cross drain the ditch and road surface. Or alternatively there may be a location approximately 80 south of Point 44 to install a ditch relief culvert. This alternative would require a culvert long enough at the outlet to extend beyond a turnout, to keep it from getting crushed vehicles.

Road Point 47: Existing 36-inch diameter metal culvert watercourse crossing. The crossing was upgraded in the last 5 years under a valid CDFW LSA Agreement. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 47, monitor to make sure that the culvert remains open and functioning. The Class III watercourse had received road related sediment from upstream and from a connected inside ditch during the first rainy period of mid-October and early November 2021. Maintenance and installation of road drainage features up the road at Road Point 48 through 54 will help to address road related sediment entering the Class III watercourse from above by dispersing road surface runoff.

Road Point 48: The northeast approach to the watercourse crossing at Road Point 47 has an inside ditch that is hydrologically connected with the culvert crossing inlet. At Road Point 48, install a new ditch relief culvert per the attached BMPs to hydrologically disconnect the inside ditch.

Road Segment 48 to 54: Road Segment is rocked with a mostly crowned or outsloped surface. The road surface is maintained by occasional road grading. There are several surface drainage features that are in need of maintenance or improvement to re-establish functionality. At Road Point 49 maintain the lead-ditch that drains the inside ditch at the switchback location. At Road Point 50 install a new ditch relief culvert at this location. At Road Point 51, maintain or reconstruct the existing lead-out. Road Point 52 is an existing functioning ditch relief culvert. The outlet is approximately 50 feet above the Class III watercourse that parallels the road. At Road Point 53 and 54 maintain the existing surface lead-outs. Grade the road surface

to remove built-up berm material or other minor impediments to surface drainage that develop over time and re-establish the crowned or outsloped drainage pattern per the attached BMPs. Improvements along this road segment together will help to disperse concentrated road runoff capable of reaching the nearby Class III watercourse.

Road Point 55: Road Point is shown as a point of reference at the top of the road grade, at the summit of the dividing ridge between the Van Duzen River Drainage and the Mad River Drainage. The road beyond this point continues as a rocked road with a functioning crowned drainage pattern.

Road Segment 55 to 58: Road Segment is rocked with a mostly crowned or outsloped surface with an inside ditch. At Road Point 56 install a new ditch relief culvert. Or, alternatively at this location, an elongated rocked rolling dip at the natural low spot in the road could be installed. Road Point 57 is an existing 18-inch diameter ditch relief culvert. The inlet was open and the outlet was buried by recent road grading that looked to have been conducted to push open a surface lead-out. At Point 57, clean out the buried outlet and maintain the road surface lead-out. If the ditch relief culvert is damaged, it should be replaced. Point 58 is located at the top of a short through-cut road section. As close as feasible, install a road surface lead-out to drain the road surface above this section.

Road Point 59 and 60: Points 59 and 60 are two small Class III watercourse crossings in close proximity, both in need of crossing upgrades. At Point 59 a very small Class III watercourse hits the road at an angle with no crossing structure in place. Point 60 is a badly damaged, worn out 15-inch diameter culvert crossing of a small Class III watercourse. Flow from the watercourse at Point 59 diverts along the road surface and combines with road surface runoff from above. Some of these flows exit the road at Road Point 60 and some divert down the road for approximately 30 feet northwest of the culvert at Point 60. At both Road Point 59 and 60, properly sized culverts should be installed per the attached BMPs. This requires installation of new culverts set to the grade and alignment with the watercourses and rock armor at the inlets and outlets. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 18-inch diameter culvert at both points. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work. Following installation, apply clean compacted rock as necessary to maintain a stable operating surface suitable for winter time use from Point 60 and extending southeast through the through-cut section at Point 58.

Road Segment 60 to 65: Road Segment is rocked with a mostly crowned surface with an inside ditch. This segment is in generally good condition. Road Point 61 and 63 are existing ditch relief culverts that are in good condition and functioning properly. Between these, at Road Point 62 install a new ditch relief culvert to reduce the amount of concentrated road and inside ditch flow entering the culvert at Point 63. Road Point 64 is an existing ditch relief culvert that is in good condition. It needs minor maintenance to clean out the inside ditch for approximately 60 feet to the northwest. Also, approximately 30 feet to the northwest is a worn, partially filled in rolling dip that could be cleaned out during road grading as an added surface drainage feature. Continue to grade the road surface to maintain the current crowned drainage pattern per the attached BMPs.

Road Point 65: Existing 30-inch diameter metal culvert crossing of a Class III watercourse. The crossing was upgraded in the last 5 years under a valid CDFW LSA Agreement. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 65, monitor to make sure that the culvert remains open and functioning.

Road Point 66: Existing ditch relief culvert that is in good condition and functioning properly. Continue to grade the road surface to maintain the current crowned drainage pattern per the attached BMPs.

Road Point 67: Existing 48-inch diameter metal culvert crossing of a Class II watercourse. The crossing was upgraded in the last 5 years under a valid CDFW LSA Agreement. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 67, monitor to make sure that the culvert remains open and functioning. Maintain the existing surface lead-out approximately 50 feet to the northwest.

Road Segment 67 to 72: Road Segment is rocked with a light crown and low gradient. This segment is in generally good condition. Road Point 68, 69, 70, and 71 are natural low spots in the road where the road and ditch drain. At Point 68, 69, and 70 install rocked rolling dips. At Point 71 maintain the existing surface lead-out. Continue to grade the road surface to maintain the current crowned drainage pattern per the attached BMPs and to eliminate berms that develop over time due to traffic use.

Road Point 72: Existing old, rusted 48-inch diameter metal culvert crossing of a Class II watercourse. The culvert when installed many years ago was too short and not set to grade at the outlet resulting in erosion of the fills in the past. It appears that old truck tires and metal were dumped below the outlet many years ago as a means of protecting the fills. Later boulders were added below the outlet. The culvert is worn and has a partially rusted bottom, but its sizing is adequate. There is a partially plugged, 8 or 10-inch diameter plastic ditch relief culvert approximately 40 feet to the west that is not functioning properly. At Road Point 72, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 48-inch diameter culvert. Along with culvert replacement, tires and other debris below the outlet should be removed. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work. Also, the ditch relief culvert should be repaired or replaced, and maintain the existing surface lead-out 50 feet to the east.

Road Point 73 and 74: Points 73 and 74 are two small Class III watercourse crossings approximately 125 feet apart, both in need of crossing upgrades. At Point 73 a small Class III watercourse hits the road with no crossing structure in place, and diverts down the road and the inside ditch towards Point 74. Point 74 is a damaged, worn out 12-inch diameter culvert crossing of a small Class III watercourse. Flow from the watercourse at Point 73 diverts along the road and inside ditch towards the culvert crossing at Point 74. These flows eventually drain at a surface lead-out between the crossings, down the ditch to the inlet at Point 74, or over the outboard edge at the outlet of Point 74. At both Road Point 73 and 74, properly sized culverts should be installed per the attached BMPs. This requires installation of new culverts set to the grade and alignment with the watercourses and rock armor at the inlets and outlets. The new culvert size as calculated

for the 100 year peak streamflow requires a minimum 24-inch diameter culvert at both points. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work. Following installation, grade and rock the road surface between the crossings as necessary and maintain the existing lead-out between the crossings and another that is approximately 25 feet north of Point 74.

Road Segment 74 to 78: Road Segment is rocked with a slight crown to outslope, and has a low gradient. This segment is in generally good condition. Road Point 75, 76, and 77 are natural low spots in the road where the road and ditch drain. At Point 75, 76, and 77 maintain or reconstruct surface lead-outs or rolling dips as necessary. Continue to grade the road surface to maintain the current drainage patterns and to eliminate berms that develop over time due to traffic use.

Road Point 78: Existing 24-inch diameter metal culvert crossing of a Class III watercourse. The crossing was upgraded in the last 5 years. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow, given its active channel width. At Road Point 78, monitor to make sure that the culvert remains open and functioning.

Road Point 79: Point 79 is a natural dip in the road where runoff tends to collect and drain. At Road Point 79 re-establish proper road and ditch drainage by installing a rocked rolling dip per the attached BMPs.

Road Point 80: Existing 48-inch diameter metal culvert crossing of a Class II watercourse. The crossing was upgraded in the last 5 years. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 80, monitor to make sure that the culvert remains open and functioning. Maintain the existing surface lead-out approximately 50 feet to the northwest.

Road Point 81: Point 81 is a natural dip in the road where runoff tends to collect and drain. At Road Point 81 install a rocked rolling dip to drain the road surface and the inside ditch area per the attached BMPs. As an alternative, the ditch line could be cleaned out and install a new ditch relief culvert at this point.

Road Point 82: Existing 18-inch diameter metal culvert crossing of a Class III watercourse. The crossing was upgraded in the last 5 years. The culvert inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 82, monitor to make sure that the culvert remains open and functioning.

Road Segment 82 to 89: Road Segment is rocked and has a mostly outsloped drainage pattern and a low gradient. This segment is in generally good condition. Road Point 83, 84, 85, and 87 are natural low spots in the road where the road surface drains. Road Point 88 is an existing surface lead-out. Road Point 86 is shown as a point of reference where the Roadshed turns onto Canyon Road and leaves Bear Creek Road. At Point 83, 84, 85 and 87 install rocked rolling dips with rock armored outfalls. At Point 88 maintain the existing lead-out. Continue to grade the road surface to maintain the current outsloped drainage pattern per the attached BMPs and to eliminate berms that develop over time due to traffic use.

Road Point 89: Existing old, rusted 24-inch diameter metal culvert crossing of a Class II watercourse. The culvert when installed many years ago was too short and not set to grade at the outlet and has a "shotgun" outlet. There are old truck tires and boulders below the outlet from many years ago as a means of protecting the fills. The culvert is worn and has a partially rusted bottom, and is undersized. At Road Point 89, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 48-inch diameter culvert. Along with culvert installation, tires below the outlet should be removed. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Segment 89 to 91: Road Segment and inside ditch is in need of maintenance and is located very close to a Class II watercourse. The road surface is very rocky and not well drained, and has an interrupted inside ditch line. Runoff currently conveys down the road surface and drains to the nearby Class II watercourse at natural breeches in the outboard berm. Along this segment, establish a properly crowned road surface per the attached BMPs and re-construct and open up the inside ditch. The new inside ditch should be connected to a new ditch relief culvert at Point 90. Approximately 60 feet south of Point 90, install a rocked rolling dip. The newly crowned road surface should be rocked with clean, compacted rock as necessary to maintain a stable operating surface suitable for winter time use and establish numerous surface lead-outs and breeches in the berm to avoid concentrating runoff to the nearby watercourse. Although the segment is located near the watercourse, the area between is very rocky and covered with shrubs, grass, and forest litter as a filter strip. Because of its close proximity to the watercourse, this segment may require extra maintenance to ensure the crowned surface, lead-outs, and surface rock remain intact and do not become degraded due to traffic use.

Road Point 91: Existing 18-inch diameter plastic culvert crossing of a small Class III watercourse. The culvert also receives runoff from the partially hydrologically connected road and inside ditch to the south. The culvert appeared to be in fair condition and functioning properly. The culvert is calculated as adequately sized, but should be increased in size upon its replacement. Installation of a new ditch relief culvert and rocked rolling dip at Road Point 90, along with the grading described above for Road Segment 89 to 91 will hydrologically disconnect the road surface to the south. Upon its replacement, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 24-inch diameter culvert. Along with culvert installation, an old piece of metal culvert spanning the watercourse below the crossing should be removed. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Point 92: Natural dip in the road where runoff tends to collect and drain. At Road Point 92 install a rocked rolling dip to drain the road surface and the inside ditch area per the attached BMPs. As an alternative, the ditch line could be cleaned out and install a new ditch relief culvert.

Road Point 93: Existing 18-inch diameter ditch relief culvert located near the top of a Class III watercourse. The culvert and the short incoming inside ditch and road surface to the south are in need of maintenance. The ditch relief culvert at Point 93 has thick grass and vegetation blocking the inlet and the outlet. It should be maintained by cleaning out vegetation and debris at the inlet and the outlet, and upon better inspection, it should be replaced if found to be damaged. The incoming road surface is not drained well and conveys runoff towards the outlet of the culvert. There is a built-up berm that is vegetated with grass that prevents road surface runoff from draining towards the ditch. The road from Point 92 to 93 should be graded to a crowned surface and berms that impede proper road surface drainage should be removed.

Road Point 94: Natural dip in the road where runoff tends to collect and drain. At Road Point 94 install a rocked rolling dip to drain the road surface and the inside ditch area per the attached BMPs. As an alternative, the ditch line could be cleaned out and install a new ditch relief culvert.

Road Point 95: Existing lead-out that drains in the inside ditch line at a switchback in the road. At Road Point 95 maintain the lead-out ditch that drains the inside ditch at the switchback.

Road Point 96: Natural dip in the road where runoff tends to collect and drain. At Road Point 96 install a new ditch relief culvert. Clean out the incoming ditch and grade the road surface. As an alternative, install a rocked rolling dip per the attached BMPs, long enough to drain the road surface and the inside ditch line. This road work will also result in hydrologically disconnecting the road from the watercourse crossing at Point 97.

Road Point 97: Existing 18-inch diameter rusted out metal culvert crossing of a small Class III watercourse. The culvert was not installed in line with the natural watercourse channel. The watercourse is diverted down the inside ditch for approximately 25 feet to the inlet of the culvert. The culvert is calculated as adequately sized. At Road Point 97 a properly sized culvert should be installed at the natural watercourse channel location per the attached BMPs. This location is approximately 25 feet northwest of the existing culvert. The culvert should be set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 18-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Point 98: Natural dip in the road where runoff tends to collect and drain. At Road Point 98 install a rocked rolling dip to drain the road surface and the inside ditch area per the attached BMPs.

Road Point 99: Existing 30-inch diameter metal culvert crossing of a Class II watercourse. The culvert when installed many years ago was too short and not set to grade at the outlet resulting in erosion of the fills in the past. The culvert is worn and has a partially rusted bottom, but its sizing is adequate for the 100 year peak streamflow. At Road Point 99, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 30-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement

work. Also, maintain the existing rolling dips at each approach. The rolling dip to the north could be deepened or a new ditch relief culvert installed to hydrologically disconnect the incoming ditch.

Road Point 100: Natural dip in the road where runoff tends to collect and drain at the top of a short through-cut. At Road Point 100 install a rocked rolling dip to drain the road surface and the inside ditch area per the attached BMPs.

Road Point 101: Existing 36-inch diameter metal culvert crossing of a Class II watercourse. The culvert when installed many years ago was too short and not set to grade at the outlet and has a "shotgun" outlet. The culvert is solid and in good condition, but is undersized. At Road Point 101, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 54-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work. At this point, maintain the existing road surface dips located 35 to 40 feet each side of the crossing.

Road Segment 101 to 104: Road Segment is rocked and has a mostly outsloped drainage pattern and a low gradient. This segment is rocked and in generally good condition. Road Point 102 and 103 are existing rocked rolling dips. At Point 102 and 103 maintain the rocked rolling dips. Continue to grade the road surface to maintain the current outsloped drainage pattern per the attached BMPs and to eliminate berms that develop over time due to traffic use.

Road Point 104: Existing 18-inch diameter metal culvert crossing of a Class III watercourse. The culvert when installed many years ago was not set to the grade of the watercourse and has a badly "shotgunned" outlet. The culvert is rusted, in poor condition and is undersized. At Road Point 104, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 42-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work.

Road Segment 104 to 108: Road Segment is rocked and alternates between crowned and outsloped surface drainage. This segment is in generally good condition. Road Point 105 is a rolling dip in need of minor reconstruction. Points 106 and 107 are existing surface lead-outs in need of minor maintenance. Road Point 108 is a location in need of a surface drainage feature to prevent runoff from conveying down the road. Road Point 108 is also a point of reference for the location where the Roadshed turns onto Canyon Court and leaves Canyon Road. At Point 105 reconstruct the rocked rolling dip long enough to drain the inside ditch line. At Points 106 and 107 maintain the existing lead-outs. At Point 108 construct a rocked rolling dip per the attached BMPs. Continue to grade the road surface to maintain the current drainage patterns and to eliminate berms that develop over time due to traffic use.

Road Point 109: Existing 12-inch diameter plastic culvert crossing of a very small Class III watercourse. The culvert is in fair condition, but is broken off at the outlet and it is slightly undersized. At Road Point 109, a properly sized culvert should be installed per the attached BMPs. This requires installation of the new culvert set to the grade and alignment with the watercourse and rock armor at the inlet and outlet. The new culvert size as calculated for the 100 year peak streamflow requires a minimum 18-inch diameter culvert. Prior to crossing replacement, permits from the State of California such as a signed CDFW LSAA must be obtained. This process includes environmental review in which projects are subject to revisions. The final culvert diameter will be stated in approved state permits prior to crossing replacement work. From the crossing back to Point 108, maintain the existing surface lead-outs as necessary for proper road drainage.

Road Segment 109 to 117: Road Segment is located along a ridgetop with numerous existing surface lead-outs and rolling dips that are in need of minor maintenance. The road surface is adequately rocked, but some short sections are in need of "spot" rocking. At Point 110 to 117 maintain the existing surface lead-outs and rolling dips so they drain the surface properly and don't pond runoff on the surface. At Point 112 a short section of the road surface should get re-rocked. Continue to grade the road surface to maintain the current drainage patterns and to eliminate berms and wheel ruts that develop over time due to traffic use. Point 117 is the end of the Roadshed.

Watercourse Crossing Culvert Sizing

The watercourse crossings were evaluated using methods recommended in "Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood, and Sediment (Updated 2017)". Peter Cafferata, Thomas Spittler, Michael Wopat, Greg Bundros, and Sam Flanagan. This report recommends the rational method be limited to watersheds less than 100 acres. Calculations to determine the 100 year peak streamflow at each watercourse crossing along the Roadshed are shown below. Of 33 existing watercourse crossings, 17 were determined to be sized appropriately for the estimated 100 year peak streamflow with a headwall to depth (HD/W) ratio of 1.0. Culverts planned for replacement are typically sized using a HW/D ratio of 0.67, from the Culvert Capacity Chart below. This results in oversized culverts to account for wood and debris. Culverts sized with a HD/W ratio of less than 1.0, sometimes needs to be increased by two sizes to have a HW/D ratio of 0.67 or less. The 100-year Return-Period precipitation data is from:

http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca

Rational Method for 100-year flood flow (A < 100 acres) Dazzi - 208-201-011

$T_c = 60((11.9 \times L^3)/H)^{0.385}$				$Q_{100} = CIA$			
Road Point No. (existing culvert dia)	Channel length (to top of basin) (mi) L	Elevation difference (ft) H	Concentration time (min) T_c	Runoff coefficient C	100-year Return-Period Precipitation (in/hr) I ^{**}	Area (acres) A	100-yr flood flow (cfs) Q100
2 (existing 18")			#DIV/0!	0.35	3.1	15	16.3
6 (existing 36")		#REF!	#REF!	0.35	3.1	32	34.7
12 (existing 18")		#REF!	#REF!	0.35	3.1	25	27.1
18 (existing 24")		#REF!	#REF!	0.35	3.1	27	29.3
19 (existing 60")				0.35	3.1	50	54.3
23 (existing 24")		#REF!	#REF!	0.35	3.1	8	8.7
25 (existing 30")		#REF!	#REF!	0.35	3.1	6	6.5
33 (existing 18")		#REF!	#REF!	0.35	3.1	2	2.2
34 (existing 18")		#REF!	#REF!	0.35	3.1	4	4.3
36 (existing 24")		#REF!	#REF!	0.35	3.1	4	4.3
37 (existing 18")		#REF!	#REF!	0.35	3.1	4	4.3
39 (existing 18")		#REF!	#REF!	0.35	3.1	6	6.5
42 (existing 24")		#REF!	#REF!	0.35	3.1	5	5.4
43 (existing 36")		#REF!	#REF!	0.35	3.1	12	13.0
44 (existing 36")		#REF!	#REF!	0.35	3.1	15	16.3
47 (existing 36")		#REF!	#REF!	0.35	3.1	13	14.1
59 (No culvert)		#REF!	#REF!	0.35	3.1	1	1.1
60 (existing 15")		#REF!	#REF!	0.35	3.1	3	3.3
65 (existing 30")		#REF!	#REF!	0.35	3.1	9	9.8
67 (existing 48")		#REF!	#REF!	0.35	3.1	23	25.0
72 (existing 48")		#REF!	#REF!	0.35	3.1	40	43.4
73 (No culvert)		#REF!	#REF!	0.35	3.1	4	4.3
74 (existing 12")		#REF!	#REF!	0.35	3.1	3	3.3
78 (existing 24")		#REF!	#REF!	0.35	3.1	16	17.4
80 (existing 48")		#REF!	#REF!	0.35	3.1	60	65.1
82 (existing 18")		#REF!	#REF!	0.35	3.1	3	3.3
89 (existing 24")		#REF!	#REF!	0.35	3.1	39	42.3
91 (existing 16")		#REF!	#REF!	0.35	3.1	5	5.4
97 (existing 18")		#REF!	#REF!	0.35	3.1	3	3.3
99 (existing 30")		#REF!	#REF!	0.35	3.1	6	6.5
101 (existing 36")		#REF!	#REF!	0.35	3.1	45	48.8
104 (existing 18")		#REF!	#REF!	0.35	3.1	21	22.8
109 (existing 12")		#REF!	#REF!	0.35	3.1	2	2.2

**Use 100-yr precipitation of duration similar to T_c or for 10 min, whichever is larger. convert to in/hr for input as "I"

Culvert Capacity Chart

HW/D	CU18	CU24	CU30	CU36	CU42	CU48	CU54	CU60	CU72
0.67	3.5	7.1	12.3	19.5	29.8	42	54	69	109
1.0	5.6	11.6	20	32	47	66	89	115	180
1.1	6.4	13	23	35	53	75	99	128	200
1.2	7	14.5	25	40	59	83	109	141	230
1.3	7.9	16.5	28	44	64	90	120	158	250
1.4	8.2	16.7	30	46	68	96	125	165	260
1.5	8.9	18	32	50	72	101	135	178	290

Photographs



Road Point 1: At the intersection of Bear Creek Road with Highway 36, and up the road, the surface should be graded to remove the minor puddles and channels on the surface and to re-establish the crowned drainage pattern per the attached Crowned Road BMPs. Photo date 11-18-2021.

Photographs



Road Point 2: Existing 18-inch diameter metal culvert crossing of a Class III watercourse. The picture on the left shows the inlet area and the picture on the right shows the outlet that is plugged with road related sediment. The culvert is undersized and should be replaced with a properly sized culvert per the attached BMPs. Photo date 11-18-2021.

Photographs



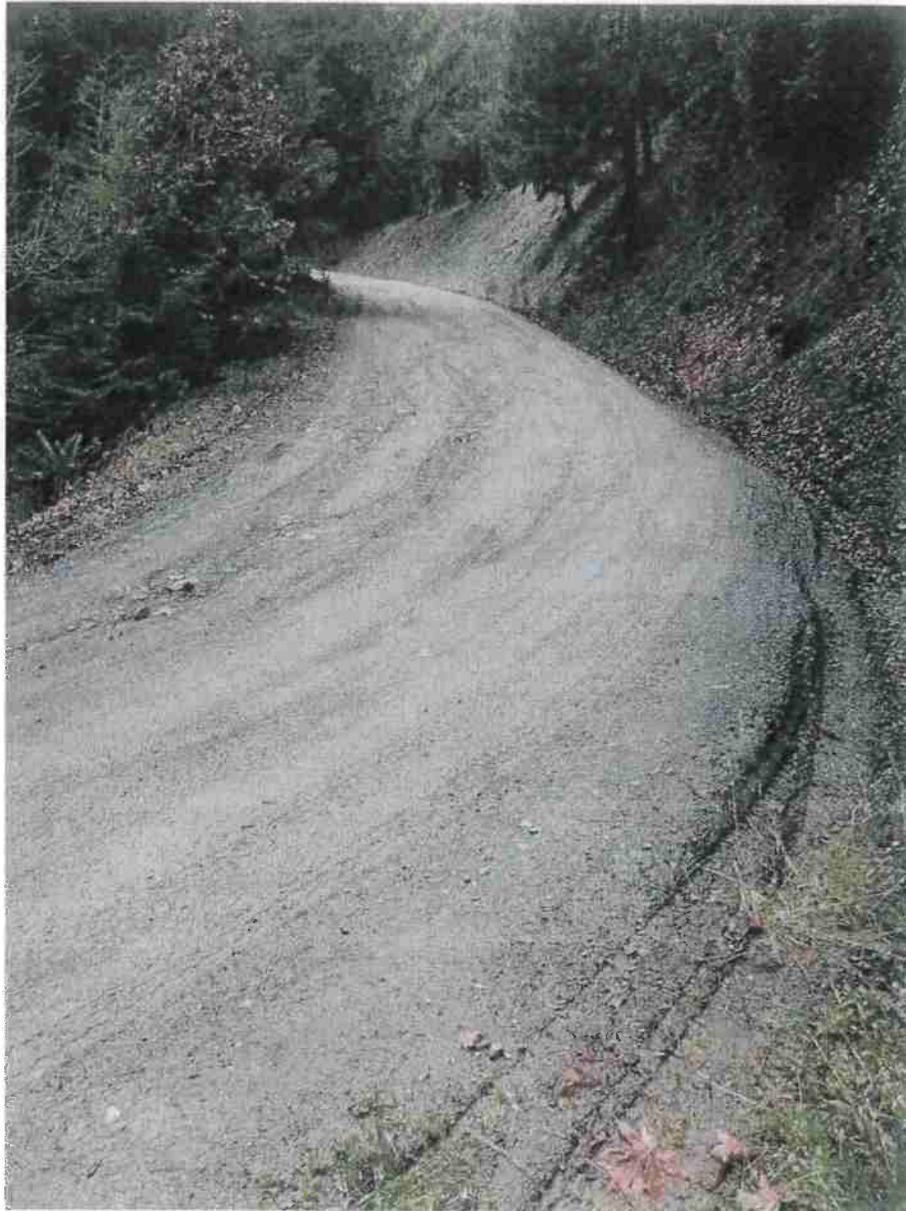
Road Segment 2 to 6: Road Segment is rocked with a mostly crowned drainage pattern. The picture on the right is taken near Road Point 4 on the map. The road surface should be graded to remove the minor channels that have developed on the surface and to re-establish or maintain the crowned drainage pattern per the attached Crowned Road BMPs. Photo date 11-18-2021.

Photographs



Road Point 6: Existing 36-inch diameter metal culvert crossing of a Class II watercourse. The photo on the top shows the inlet and the photo on the bottom shows the crossing approach. The culvert appeared to be in fair condition and functioning, but is undersized. A properly sized culvert should be installed per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Segment 6 to 9: Photo shows the western approach to the watercourse crossing at Point 6. Road Segment is rocked with a mostly crowned drainage pattern, but an inside ditch connects to the watercourse crossing at Road Point 6, and runoff along the outer half of the road flows over the outboard edge at the culvert outlet. Along this segment, relieve the inside ditch by installing a ditch relief culvert per the attached BMPs at Point 7 and opening the surface lead-out at Point 8. Grade the road surface to remove minor channels that have developed on the surface and re-establish the crowned drainage pattern per the attached Crowned Road BMPs. Photo date 11-18-2021.

Photographs



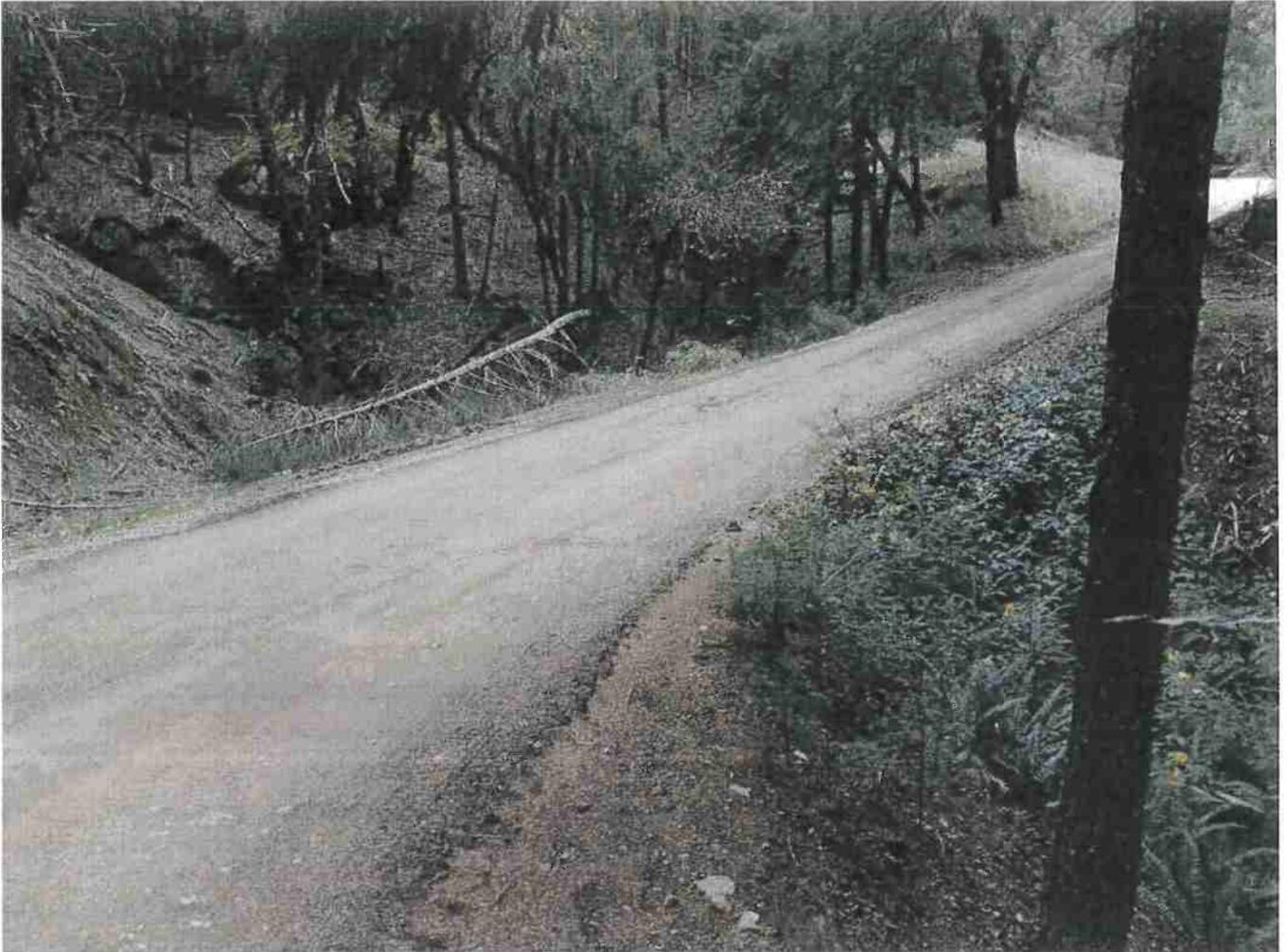
Road Segment 12 to 18: Photos taken at Road Point 13. Road Segment is rocked with a mostly crowned drainage pattern, and is maintained by occasional road grading. Short segments have minor channeling along the surface. The inside ditch in the photo is connected to the watercourse crossing at Point 12. At Road Point 13, install a new ditch relief culvert at the natural swale location to drain the ditch before it enters the inlet of the crossing at Point 12. Grade the road surface to remove minor channels that have developed on the surface and re-establish the crowned or outsloped drainage pattern per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Point 18: Existing 24-inch diameter metal culvert crossing of a Class II watercourse. Photo on the left shows the outlet and the photo on the right shows the incoming watercourse. The culvert appeared to be in fair condition and functioning. Its bottom is beginning to rust, it is slightly "shotgunned" at the outlet, and it is calculated as undersized. It should be replaced with a properly sized culvert installed per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Point 19: Photo shows the road approaches through the existing 60-inch diameter metal culvert watercourse crossing. The inlet is set at the confluence of two Class II watercourses. The culvert appeared to be in good condition, functioning properly, but is showing beginning signs of wear. The culvert is sized adequately for the 100 year peak streamflow. At Road Point 19, monitor to make sure that the culvert remains open and functioning. Photo date 11-18-2021.

Photographs



Road Segment 19 to 23: Photo on the left is taken near Road Point 20 and the photo on the right is taken near Road Point 21. Road Segment is rocked with a mostly outsloped surface that becomes more of a crowned drainage pattern along the approaches to the existing ditch relief culvert at Point 22. At Road Point 20 and 21 proper rocked rolling dips that can hold up to the road's traffic should be installed. Photo date 11-18-2021.

Photographs



Road Point 23: Existing 24-inch diameter culvert crossing of a Class III watercourse. The photo on the left shows the inlet plugged with fine, road related sediment. The photo on the right shows the outlet partially blocked by a small amount of fill material that recently fell loose from the outboard edge of the road. The culvert length is too short to extend beyond road fills but its diameter is adequate for the 100-year peak streamflow. At Road Point 23, the ends of the culvert are in need of maintenance to remove the blockages and to assess the physical condition of the culvert. Road Points 24, 26, and 27 up the road will help to address road related sediment entering the Class III watercourse from above. If the culvert is found to be rusted and worn out, it should be replaced with a properly sized culvert installed per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Point 25: Existing 30-inch diameter plastic culvert watercourse crossing of a Class III watercourse. The photo on the left shows the inlet and the photo on the right is looking down at the outlet. The culvert appeared to be in good condition, functioning properly, and is adequately sized. It has a slightly "shotgunned" outlet that can be mitigated by the placement of a small amount of rock for energy dissipation. The Class III watercourse had received road related sediment from upstream and from a connected inside ditch during the first rainy period of mid-October and early November 2021. Road Points 26 through 31 up the road will help to address road related sediment entering the Class III watercourse from above by breaking up concentrated road surface runoff. Photo date 11-18-2021.

Photographs



Road Point 32: Photos are taken looking each direction at the properly functioning ditch relief culvert at Road Point 32. It is situated above the head of a Class III watercourse, but didn't appear to be the source of sediment in the Class III watercourse downstream at Point 23 and 25. Between Road Point 32 and Point 25, there are several surface drainage features described above that are in need of maintenance or improvement to disperse concentrated road runoff. Photo date 11-18-2021.

Photographs



Road Point 33: Photo shows the road looking each direction at the existing 18-inch diameter metal culvert, Class III watercourse crossing. The culvert appeared to be in fair condition, functioning properly, and adequately sized for the 100 year peak streamflow. The culvert is set at a natural low spot in the road and surface runoff flows over the outboard edge of the road towards the outlet. At Road Point 33 keep the culvert open and maintained, and if feasible, breach the outboard berm and establish a surface lead-out to disperse road runoff approximately 40 feet to the north. Photo date 11-18-2021.

Photographs



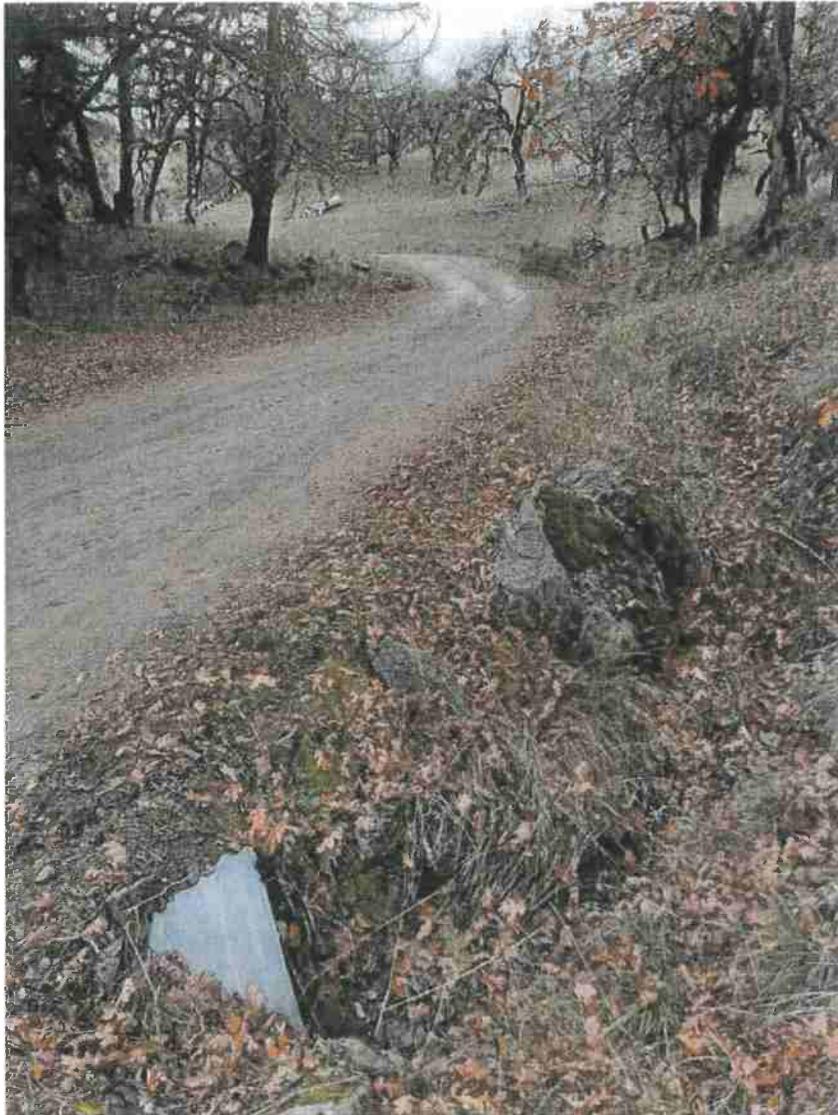
Road Point 34: Existing 18-inch diameter metal culvert crossing of a small Class III watercourse. The photo on the left shows the view looking down at the outlet and the photo on the right shows the incoming hydrologically connected inside ditch. The culvert appeared to be in fair condition, functioning properly, and calculated as slightly undersized. At Road Point 34 hydrologically disconnect the incoming road surface to the northwest per the maintenance described for Road Point 35 of this report. Upon its replacement, a properly sized culvert should be installed per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Point 35: Existing surface lead-out that is not functioning properly. Photos show that currently runoff is able to bypass the surface lead-out / berm breach, and crosses to the inside ditch in front of the pickup in the distance, and continues to the inlet at Point 34. At Point 35 deepen and lengthen the existing lead-out so that it drains the road surface and the inside ditch. As an alternative, a new ditch relief culvert could be installed at this location along with re-establishing a crowned road surface and inside ditch up the road towards Point 36. Photo date 11-18-2021.

Photographs



Road Point 36: Existing 24-inch diameter metal culvert watercourse crossing of a small Class III watercourse. A very short, vegetated inside ditch with no sign of erosion connects to the inlet. The culvert appeared to be in good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 36 keep the culvert open and free of obstructions. Photo date 11-18-2021.

Photographs



Road Point 37: Existing 18-inch diameter metal culvert watercourse crossing of a small Class III watercourse. The photo on the left shows the view up the road northwesterly and the photo on the right shows the view looking up the watercourse. The culvert also receives inside ditch runoff from the northwest from a low gradient vegetated inside ditch with no erosion. The culvert appeared to be in fair condition, functioning, and it is calculated as slightly undersized. Upon its replacement, a properly sized culvert should be installed per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Point 39: Existing 18-inch diameter metal culvert watercourse crossing of a small Class III watercourse. The photo on the left shows the inlet and the photo on the right shows the outlet. The culvert is slightly misaligned at the inlet, and was set above the natural grade at the outlet that resulted in past erosion. It is calculated as slightly undersized. The road approaches are mostly outsloped through the crossing and surface runoff flows over the outboard edge of the road towards the outlet. At Road Point 39 a properly sized culvert should be installed per the attached BMPs. Continue to maintain the current outsloped drainage pattern by grading berm material that builds up over time with traffic use. This will allow runoff to sheet off the road without becoming concentrated directly over the culvert outlet. Photo date 11-18-2021.

Photographs



Road Point 42: Existing 24-inch diameter metal culvert watercourse crossing. The photo on the left shows the outlet and the photo on the right shows the inlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 42, monitor to make sure that the culvert remains open and functioning. Photo date 11-18-2021.

Photographs



Road Point 43: Existing 36-inch diameter metal culvert watercourse crossing. The photo on the left shows the outlet and the photo on the right shows the inlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 43, monitor to make sure that the culvert remains open and functioning. Photo date 11-18-2021.

Photographs



Road Point 44, 45, and 46: The photo on the left is taken at Road Point 45 and is looking up the through-cut section towards Point 46. The photo on the right is taken at Road Point 45 and is looking towards the crossing at Road Point 44 at the turn behind the pickup. The crossing is a 36-inch diameter culvert that was upgraded in the last 5 years. It is heavily rock armored at the inlet and the outlet, in very good condition, and is sized adequately for the 100 year peak streamflow. Runoff from a portion of a through-cut section of road between Point 45 and Point 46 drains via a hydrologically connected inside ditch to the inlet of this culvert. Approximately 40 feet south of the crossing at Point 44, a rocked rolling dip should be installed to cross drain the ditch and road surface. Alternatively, there may be a location approximately 80 south of Point 44 to install a ditch relief culvert. Photo date 11-18-2021.

Photographs



Road Point 47: Existing 36-inch diameter metal culvert watercourse crossing. The photo on the left shows the outlet and the photo on the right shows the inlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 47, monitor to make sure that the culvert remains open and functioning. The Class III watercourse had received road related sediment from upstream and from a connected inside ditch during the first rainy period of mid-October and early November 2021. Maintenance and installation of road drainage features up the road at Road Point 48 through 54 will help to address road related sediment entering the Class III watercourse from above by dispersing road surface runoff. Photo date 11-18-2021.

Photographs



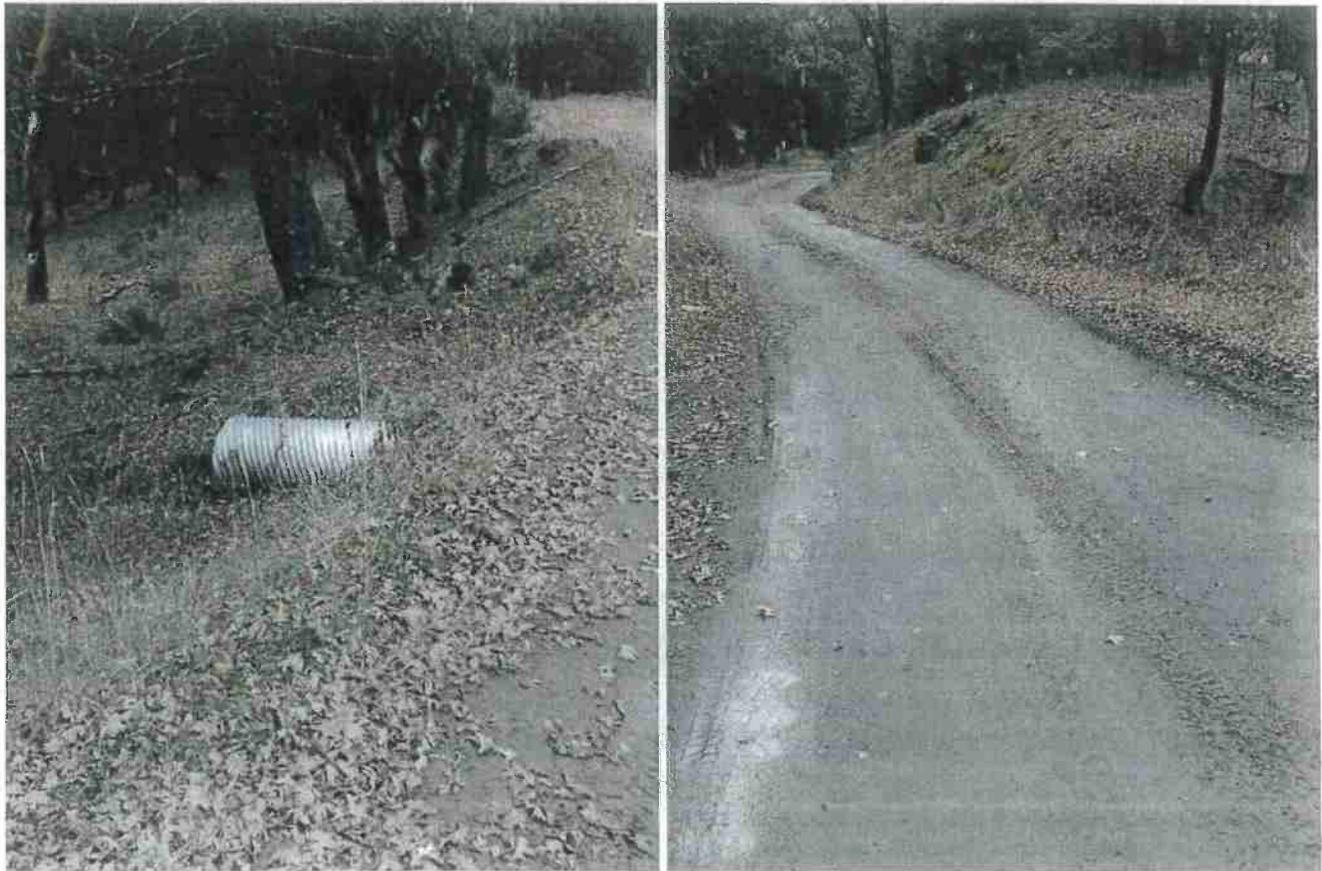
Road Point 57: Road Point 57 is an existing 18-inch diameter ditch relief culvert. The inlet area is pictured on the left and the outlet area is pictured on the right. The inlet was open and the outlet was buried by recent road grading that looked to have been conducted to push open a surface lead-out. At Point 57, clean out the buried outlet and maintain the road surface lead-out. If the ditch relief culvert is damaged, it should be replaced. Photo date 11-18-2021.

Photographs



Road Point 59 and 60: Points 59 and 60 are two small Class III watercourse crossings in close proximity, both in need of crossing upgrades. At Point 59 a very small Class III watercourse hits the road at an angle with no crossing structure in place and is diverted down the road towards Point 60. Point 60 is a badly damaged, worn out 15-inch diameter culvert crossing of a small Class III watercourse (pictured). At both Road Point 59 and 60, properly sized culverts should be installed per the attached BMPs. Photo date 11-18-2021.

Photographs



Road Point 61: Road Point 61 is an existing 18-inch diameter ditch relief culvert. Photos show the outboard edge and the road surface at the properly functioning ditch relief culvert. It is situated above the head of a Class III watercourse, but didn't appear to be a source of sediment to the Class III watercourse. Photo date 11-18-2021.

Photographs



Road Point 63: Road Point 63 is an existing 24-inch diameter ditch relief culvert. The photo on the left shows the outlet and the photo on the right shows the incoming inside ditch and inlet. Approximately 250 feet to the southeast at Road Point 62, a new ditch relief culvert should be installed to reduce the amount of concentrated flows entering this culvert. Photo date 11-18-2021.

Photographs



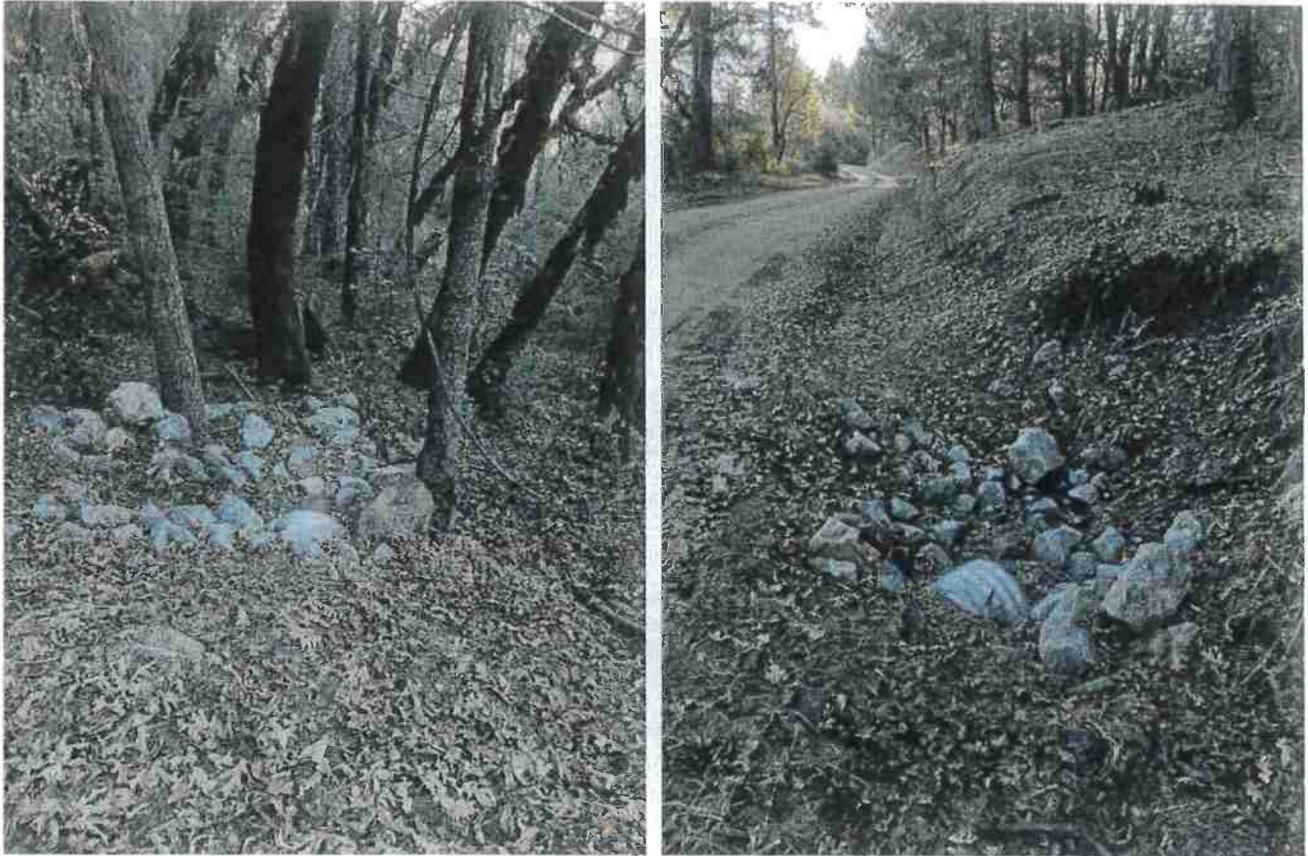
Road Point 64: Road Point 64 is an existing 18-inch ditch relief culvert that is in good condition. It needs minor maintenance to clean out the inside ditch for approximately 60 feet to the northwest. Also, approximately 30 feet to the northwest is a worn, partially filled in rolling dip that could be cleaned out during road grading as an added surface drainage feature. Continue to grade the road surface to maintain the current crowned drainage pattern per the attached BMPs. Photo date 11-22-2021.

Photographs



Road Point 65: Existing 30-inch diameter metal culvert watercourse crossing. The photo on the left shows the outlet and the photo on the right shows the inlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 65, monitor to make sure that the culvert remains open and functioning. Photo date 11-22-2021.

Photographs



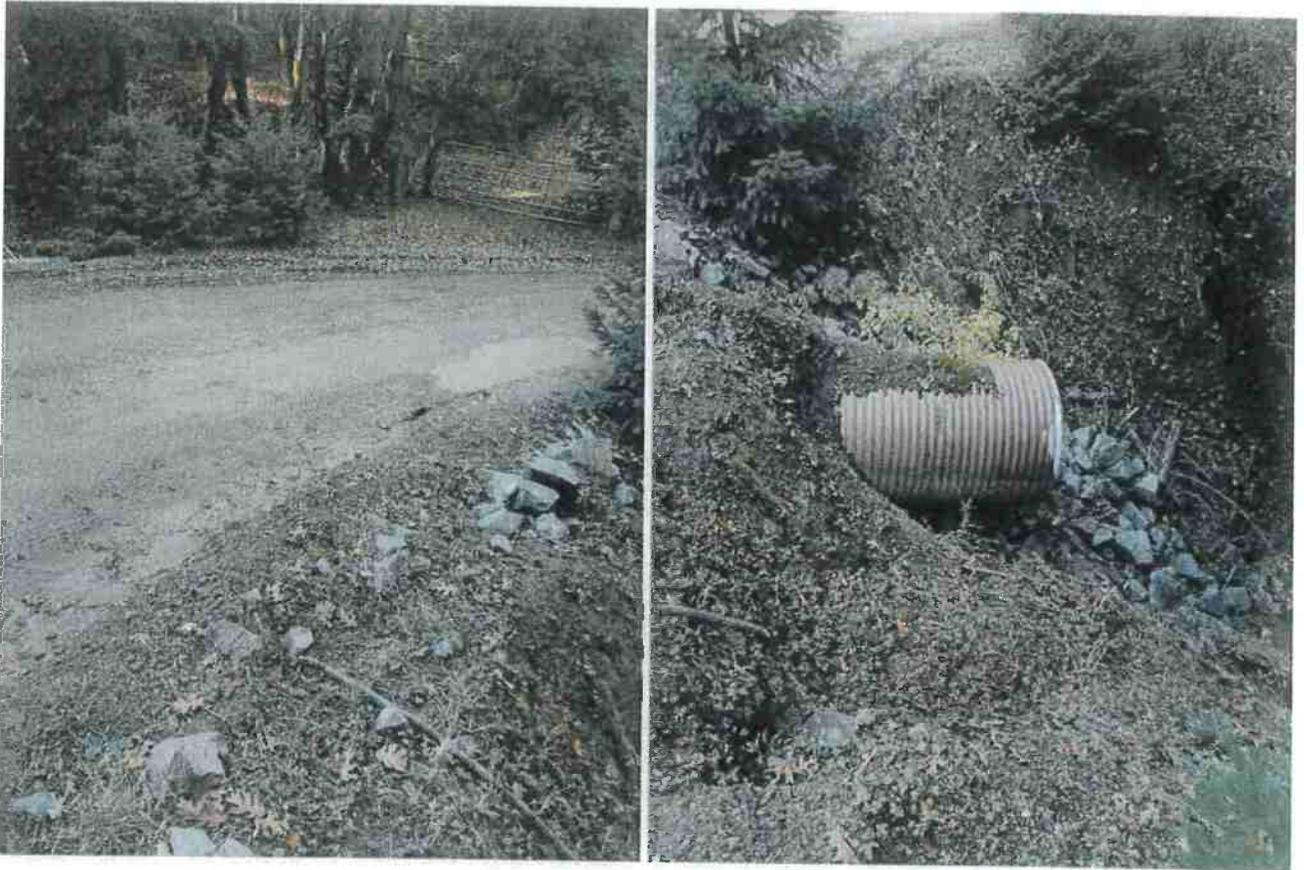
Road Point 66: Road Point 66 is an existing 18-inch diameter ditch relief culvert. The photo on the left shows the outlet and the photo on the right shows the incoming inside ditch and inlet. Photo date 11-22-2021.

Photographs



Road Point 67: Existing 48-inch diameter metal culvert watercourse crossing. The photo on the left shows the outlet and the photo on the right shows the inlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 67, monitor to make sure that the culvert remains open and functioning. Photo date 11-22-2021.

Photographs



Road Point 72: Existing old, rusted 48-inch diameter metal culvert crossing of a Class II watercourse. The culvert when installed many years ago was too short and not set to grade at the outlet resulting in erosion of the fills in the past. The culvert is worn and has a partially rusted bottom, but its sizing is adequate. At Road Point 72, a properly sized culvert should be installed per the attached BMPs. Photo date 11-22-21.

Photographs



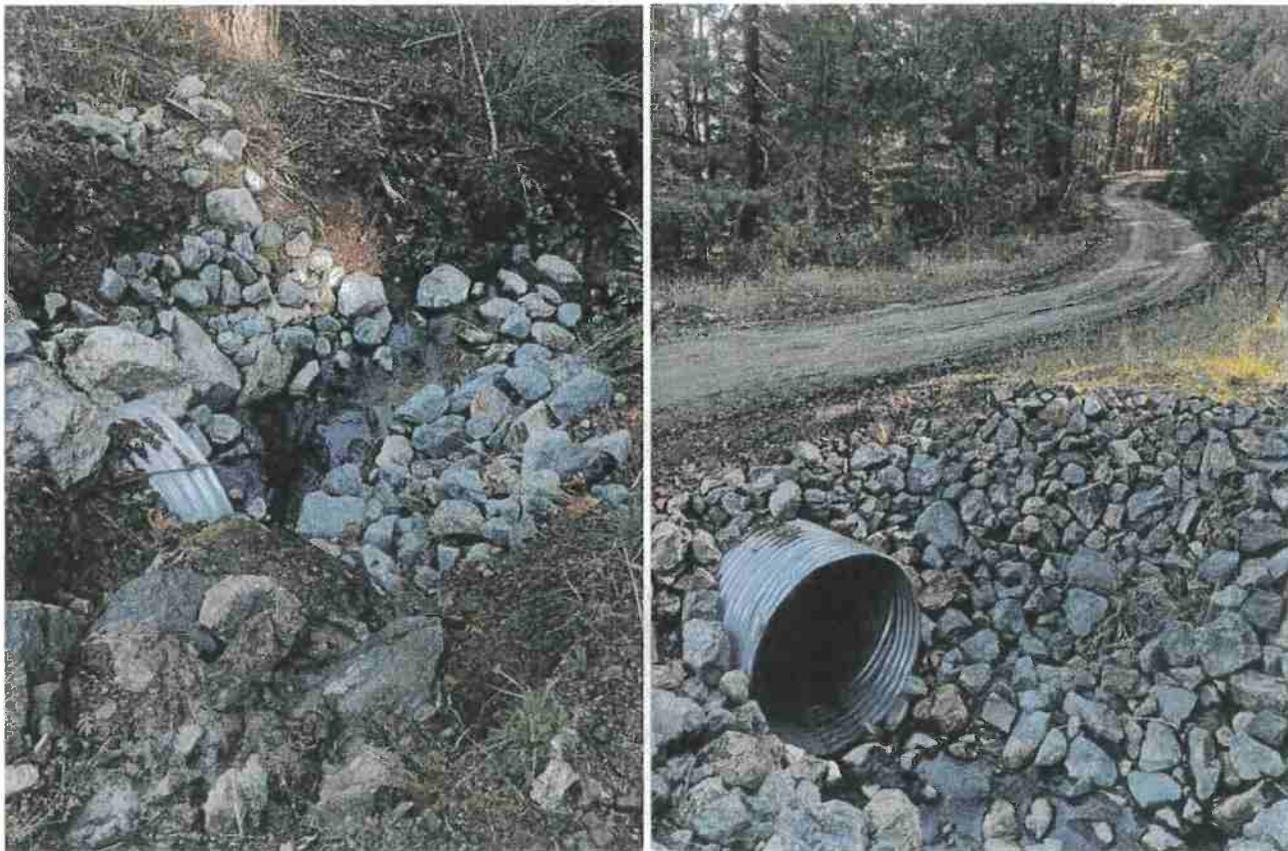
Road Point 73 and 74: Points 73 and 74 are two small Class III watercourse crossings in close proximity, both in need of crossing upgrades. At Point 73 a very small Class III watercourse hits the road at an angle with no crossing structure in place and is diverted down the ditch and road surface towards Point 74. Point 74 is a worn out 12-inch diameter culvert crossing of a small Class III watercourse. The picture on the right shows the inlet at Point 74 and the incoming inside ditch looking southwest. The picture on the left shows the outlet at Point 74. At both Road Point 73 and 74, properly sized culverts should be installed per the attached BMPs. Photo date 11-22-2021.

Photographs



Map Point 78: Existing 24-inch diameter metal culvert watercourse crossing. The photo on the left shows the inlet and the photo on the right shows the outlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. At Road Point 78, monitor to make sure that the culvert remains open and functioning. Photo date 11-22-2021.

Photographs



Map Point 80: Existing 48-inch diameter metal culvert watercourse crossing. The photo on the left shows the outlet and the photo on the right shows the inlet and the view looking southwesterly. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition and functioning properly. At Road Point 80, monitor to make sure that the culvert remains open and functioning. Photo date 11-22-2021.

Photographs



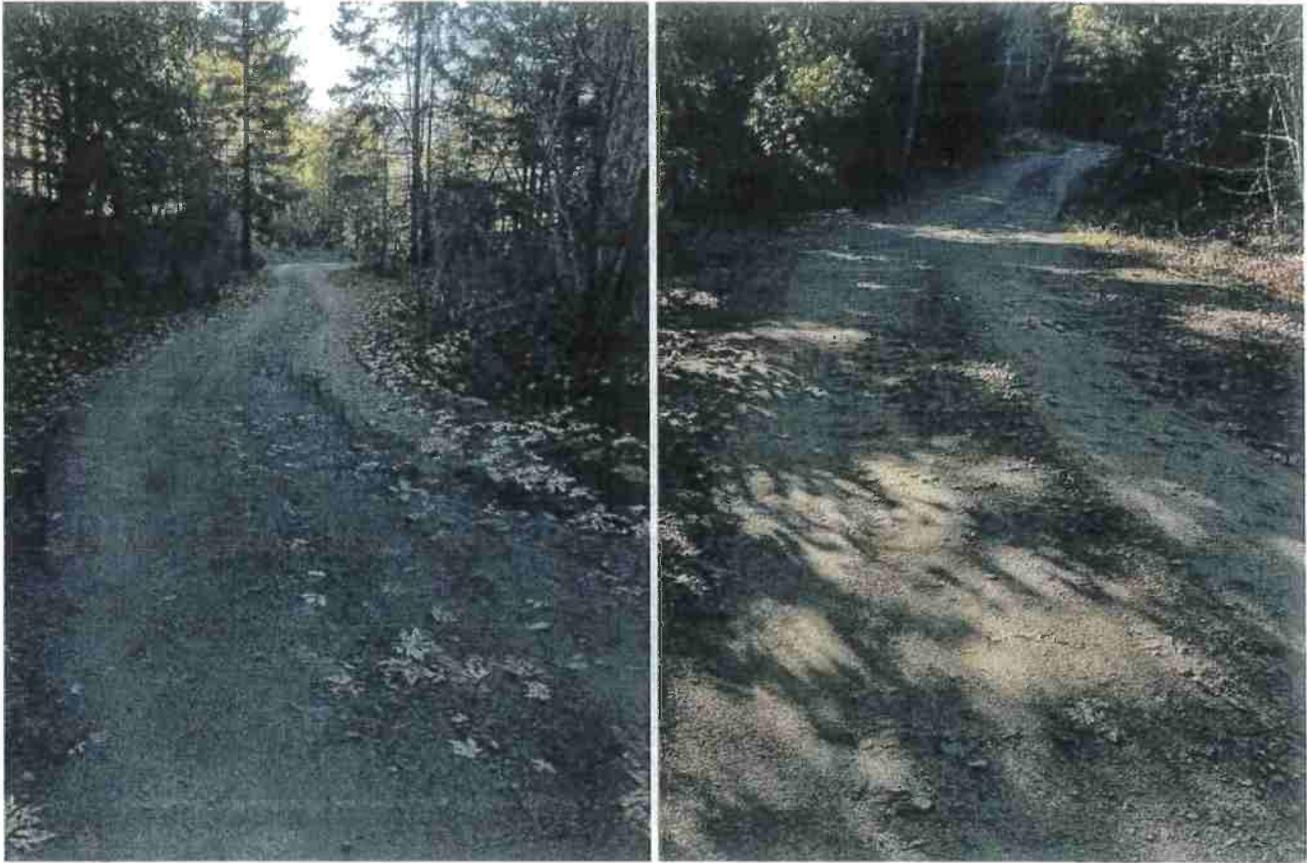
Map Point 82: Existing 18-inch diameter metal culvert watercourse crossing. The photo on the left shows the inlet and the photo on the right shows the outlet. The crossing was upgraded within the last 5 years. The inlet and outlet are heavily rock armored and the culvert appeared to be in very good condition, functioning properly, and it is sized adequately for the 100 year peak streamflow. At Road Point 82, monitor to make sure that the culvert remains open and functioning. Photo date 11-22-2021.

Photographs



Road Point 89: Existing old, rusted 24-inch diameter metal culvert crossing of a Class II watercourse. The culvert when installed many years ago was too short and not set to grade at the outlet resulting in erosion of the fills in the past. The culvert is worn and has a partially rusted bottom, and is undersized. At Road Point 89, a properly sized culvert should be installed per the attached BMPs. Photo date 11-22-21.

Photographs



Road Segment 89 to 91: Photo on the left shows the view facing northeasterly from Point 89 and the photo on the right shows the southwesterly view from Point 90. The road surface is very rocky but not well drained, and has an interrupted inside ditch line. Runoff currently conveys down the road surface and drains to the nearby Class II watercourse at natural breaches in the outboard berm. Along this segment, a properly crowned road surface should be established per the attached BMPs, and the inside ditch should be opened up and reconstructed. The new inside ditch should be connected to a new ditch relief culvert at Point 90. Approximately 60 feet south of Point 90, a rocked rolling dip should be installed. The surface should be rocked with clean, compacted rock with numerous surface lead-outs. Photo date 11-22-21.

Photographs



Road Point 91: Existing 18-inch diameter plastic culvert crossing of a Class III watercourse. The culvert also receives runoff from the hydrologically connected road and inside ditch to the south. The photo on the left shows the outlet and a small gully above the outlet, and the photo on the right shows the inlet and the incoming inside ditch. The culvert appeared to be in fair condition and functioning properly. The culvert is calculated as adequately sized, but should be increased in size upon its replacement. Installation of a new ditch relief culvert and rocked rolling dip at Road Point 90, along with the grading described above for Road Segment 89 to 91 will hydrologically disconnect the road surface to the south. Photo date 11-22-21.

Photographs



Road Point 93: Existing 18-inch diameter ditch relief culvert located near the top of a Class III watercourse. The ditch relief culvert has thick grass and vegetation blocking the inlet and the outlet. It should be maintained by cleaning out vegetation and debris at the inlet and the outlet, and upon better inspection, it should be replaced if found to be damaged. The incoming road surface is not drained well and conveys runoff towards the culvert outlet. There is a built-up berm that is vegetated with grass that prevents road surface runoff from draining towards the ditch. The road from Point 92 to 93 should be graded to a crowned surface and berms that impede proper road surface drainage should be removed. Photo date 11-22-21.

Photographs



Road Point 97: Existing worn, rusted 18-inch diameter metal culvert crossing of a Class III watercourse. The culvert was not installed in line with the natural watercourse channel. The photos on the left shows the inlet area of the culvert and the photo on the right shows a portion of the inside ditch that diverts the Class III watercourse. The watercourse is diverted down the inside ditch for approximately 25 feet to the inlet of the culvert. The culvert is calculated as adequately sized. At Road Point 97 a properly sized culvert should be installed at the natural watercourse channel location, per the attached BMPs. This location is approximately 25 feet northwest of the existing culvert. Photo date 11-22-21.

Photographs



Road Point 99: Existing 30-inch diameter metal culvert crossing of a Class II watercourse that is showing signs of wear. The culvert installed was too short and not set to the grade of the natural watercourse. The photo on the left shows the outlet and the photo on the right shows the inlet. At Road Point 99, a properly sized culvert should be installed per the attached BMPs. Also, maintain the existing rolling dips at each approach. Photo date 11-22-21.

Photographs



Road Point 101: Existing 36-inch diameter metal culvert crossing of a Class II watercourse. The photo on the left shows the outlet and the photo on the right shows the inlet. The culvert when installed many years ago was too short and not set to grade at the outlet and has a "shotgun" outlet. The culvert is solid and in good condition, but is undersized. At Road Point 101, a properly sized culvert should be installed per the attached BMPs. Photo date 11-22-21.

Photographs



Road Point 104: Existing 18-inch diameter metal culvert crossing of a Class III watercourse. The culvert installed is too short, not set to the grade of the watercourse, and is badly "shotgunned". It is rusted, in poor condition, and is undersized. The photo on the left shows the inlet and the photo on the right shows the outlet. At Road Point 104, a properly sized culvert should be installed per the attached BMPs. Photo date 11-22-21.

Photographs



Road Point 109: Existing 12-inch diameter plastic culvert crossing of a very small Class III watercourse. The culvert is in fair condition, but is broken off at the outlet and it is slightly undersized. The photo on the left shows the inlet and the photo on the right shows the outlet. At Road Point 109, a properly sized culvert should be installed per the attached BMPs. Photo date 11-22-21.

BMPS

BMP: Rolling Dip Design and Placement

- Rolling dips are drainage structures designed to force surface water to be drained from the road surface.
- The road shall dip into, and rise out of, the rolling dip to eliminate the potential of road surface runoff to run further down road way.
- The rolling dip shall be constructed with clean native materials or rock surfaced where specified.
- The rolling dips outlet may be armored to resist down-cutting and erosion of the outboard road fill.
- Do not discharge rolling dips into any areas that show signs of instability or active landsliding.
- If the rolling dip is designed to divert both road surface and ditch runoff, block the down-road ditch with compacted fill in order to force all ditch flows through the trough (low point) of the rolling dip.

BMP: Rocked Rolling Dip Design and Placement

- Rocked rolling dips are drainage structures designed to carry known sources of surface water across road ways or from known persistently wet segments of road such as swales without defined watercourses or road segments with heavy bank/road seepage.
- The road shall dip into, and rise out of, the rocked rolling dip to minimize diversion potential.
- The rocked rolling dip shall be constructed with clean rock that is large enough to remain in place during peak flows. Rock size shall vary relative to the anticipated flow through the dip with larger rock used in location where greater flow is anticipated.
- The rocked rolling dips inlet and outlet shall be armored to resist down-cutting and erosion.
- The entire width of the rocked rolling dip shall be rock armored to a minimum of 5-feet from the centerline of the dipped portion of the rolling dip.
- If a keyway is necessary, the rocked rolling dip keyway at the base of the dip shall be of sufficient size, depth and length to support materials used in the rocked rolling dip construction back up to the road crossing interface.
- Do not discharge rolling dips into any areas that show signs of instability or active landsliding.
- If the rolling dip is designed to divert both road surface and ditch runoff, block the down-road ditch with compacted fill.
- The rolling dip should be designed as a broad feature ranging from 10-100 feet long so that it is drivable by most types of vehicular traffic and not significantly inhibit traffic and road use.

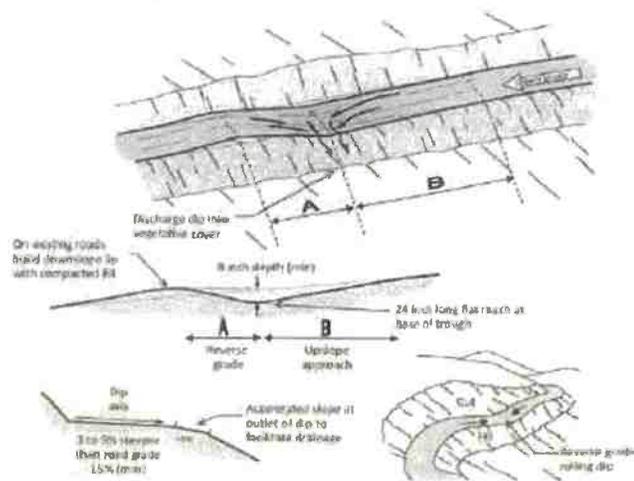
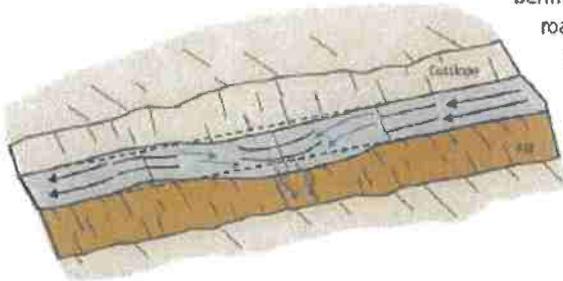


FIGURE 34. A classic Type 1 rolling dip, where the excavated up-road approach (B) to the rolling dip is several percent steeper than the approaching road and extends for 60 to 80 feet to the dip axis. The lower side of the structure reverses grade (A) over approximately 16 feet or more, and then falls down to rejoin the original road grade. The dip must be deep enough that it is not obliterated by normal grading, but not so deep that it is difficult to negotiate or a hazard to normal traffic. The outward cross-slope of the dip axis should be 3% to 5% greater than the up-road grade (B) so it will drain properly. The dip axis should be out-sloped sufficiently to be self-cleaning, without triggering excessive downcutting or sediment deposition in the dip axis (Modified from: Best, 2013).

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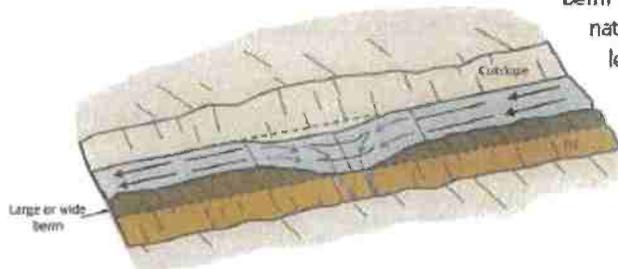
BMP: Rolling Dip Design and Placement (Types)

**Type 1 Rolling Dip
(Standard)**



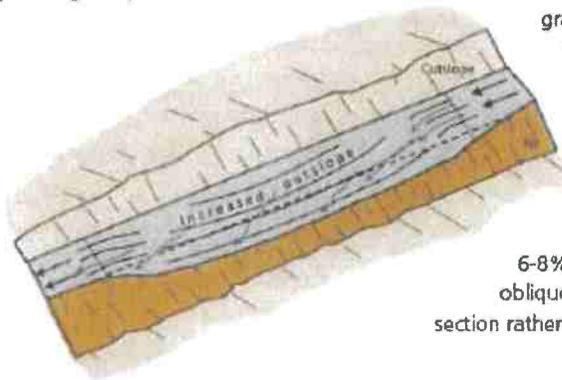
Type 1 rolling dips are used where road grades are less than about 12-14% and road runoff is not confined by a large through cut or berm. The axis of the dip should be perpendicular to the road alignment and sloped at 3-4% across the road tread. Steep roads will have longer and more abrupt dip dimensions to develop reverse grade through the dip axis. The road tread and/or the dip outlet can be rocked to protect against erosion, if needed.

**Type 2 Rolling Dip
(Through-cut or thick berm road reaches)**



Type 2 rolling dips are constructed on roads up to 12-14% grade where there is a through cut up to 3 feet tall, or a wide or tall berm that otherwise blocks road drainage. The berm or native through cut material should be removed for the length of the dip, or at least through the axis of the dip, to the extent needed to provide for uninterrupted drainage onto the adjacent slope. The berm and slope material can be excavated and endhailed, or the material can be sidecast onto native slopes up to 45%, provided it will not enter a stream.

**Type 3 Rolling Dip
(Steep road grade)**



Type 3 rolling dips are utilized where road grades are steeper than about 12% and it is not feasible to develop a reverse grade that will also allow passage of the design vehicle (steep road grades require more abrupt grade reversals that some vehicles may not be able to traverse without bottoming out).

Instead of relying on the dip's grade reversal to turn runoff off the roadbed, the road is built with an exaggerated outslope of 6-8% across the dip axis. Road runoff is deflected obliquely across the dip axis and is shed off the outsloped section rather than continuing down the steep road grade.

FIGURE 36. Rolling dip types

BMP: Rolling Dip Design and Placement

FIGURE 33A.
Rolling dip constructed on a rock surfaced rural road. The rolling dip represents a change-in-grade along the road alignment and acts to discharge water that has collected on, or is flowing down, the road surface. This road was recently converted from a high maintenance, insloped, ditched road to a low maintenance, outsloped road with rolling dips.

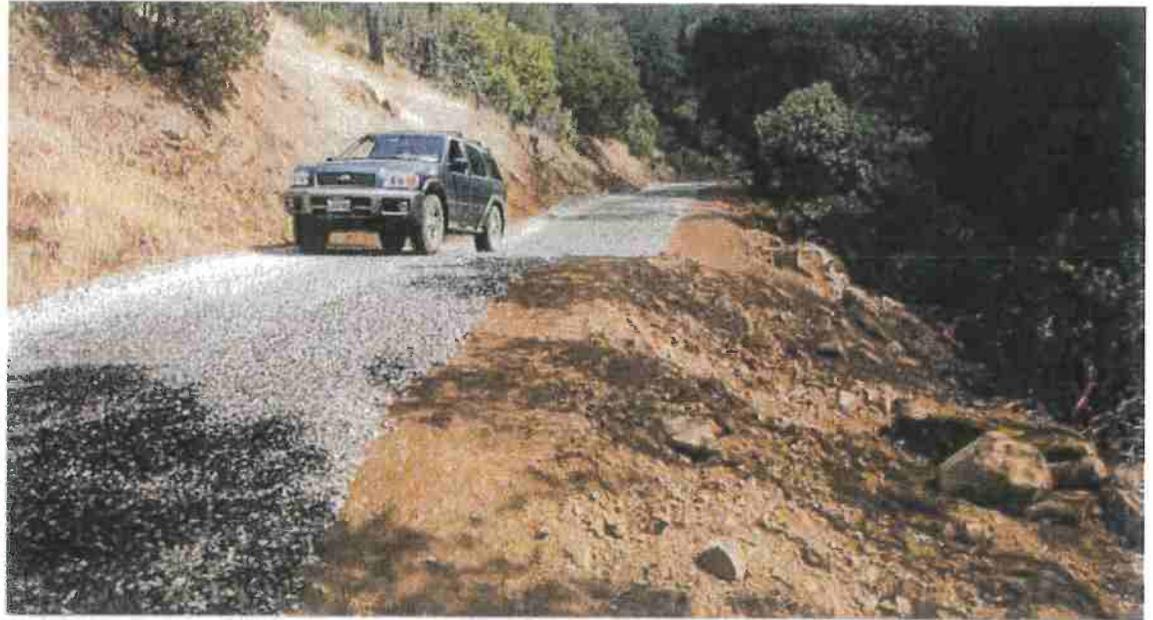
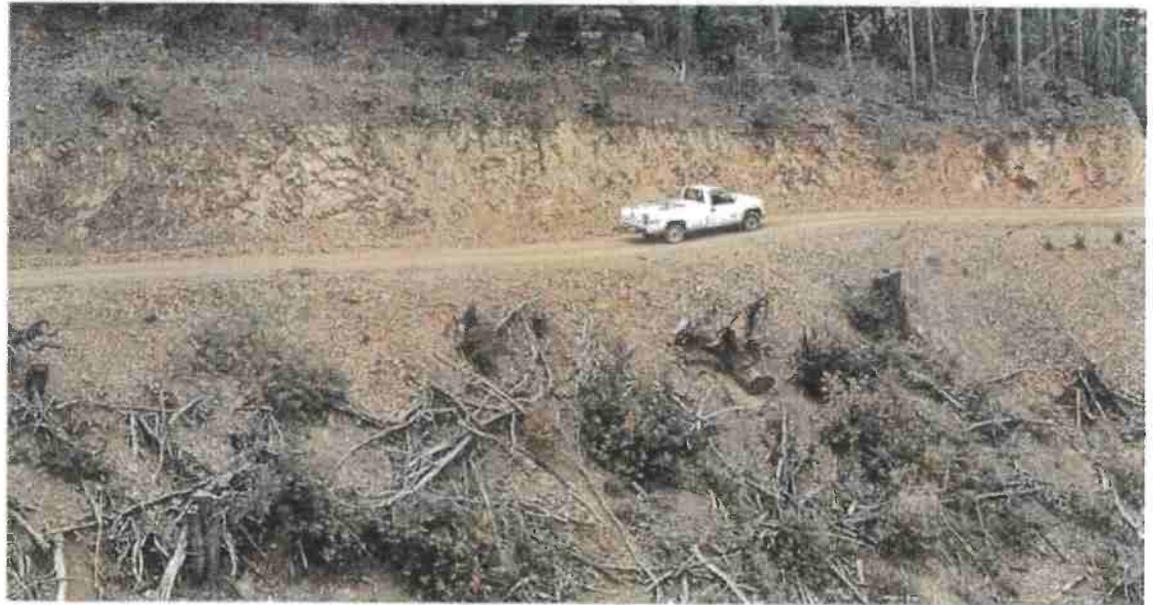


FIGURE 33B.
This side view of an outsloped road shows that the rolling dip does not have to be deep or abrupt to reverse road grade and effectively drain the road surface. This outsloped forest road has rolling dips that allow all traffic types to travel the route without changing speed.



BMP: Road Outsloping



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FIGURE 29. Road shape changes as the road travels through the landscape. For example, an out-sloped road will have a steep or "banked" outslope through inside curves, a consistent outslope through straight reaches and a flat or slightly insloped shape as it goes through an outside curve. The road may have an outslope of 2-3% across the travel surface while the shoulder is more steeply outsloped to ensure runoff and sediment will leave the roadbed.

BMP: Crowned Road

FIGURE 30. Crowned roads are peaked near the center of the roadbed and each side of the road surface drains to a ditch. This stable, crowned road reach is through cut into the hill and the ditches are drained frequently to prevent ditch erosion.

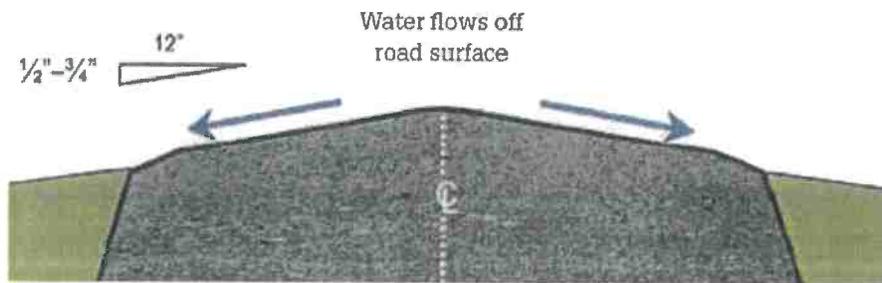


FIGURE 31A. Centerline crown with proper cross-slope for an unpaved road. Road drainage flows without obstruction off the road surface into surrounding vegetation. Note the slight grade increase at the road shoulder to encourage off-road drainage (Center for Dirt and Gravel Road Studies, 2005).

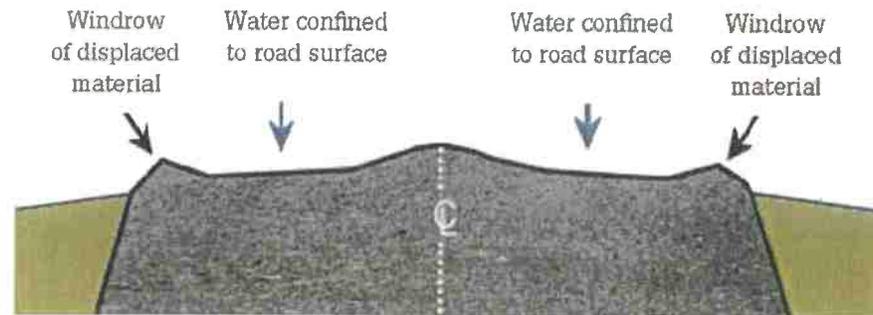


FIGURE 31B. Centerline crown has become misshapen over time. Road surface drainage is trapped on the road by gravel movement, grader berms or by road rutting under heavy traffic. Road drainage travels down the rutted road surface causing erosion, loss of road material, and increased maintenance. The road can be reshaped to restore cross drainage, but rolling dips are needed for effective, permanent surface drainage (Center for Dirt and Gravel Road Studies, 2005)

BMP: Steep Road Drainage Structures



FIGURE 55. Steep roads that go straight up or down a hillside are very difficult to drain. This steep, fall line road developed a through cut cross section that was drained using lead out ditches to direct runoff off the road and onto the adjacent, vegetated hillside. The road was "outsloped" to drain runoff to the right side, and the lead out ditch was built slightly steeper than the road grade, to be self-cleaning. Four lead out ditches have been constructed at 100-foot intervals to the bottom of the hillside.

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BMP: Ditch Relief Culvert

- Install ditch relief culverts at an oblique (typically 30 degree) angle to the road so that ditch flow does not have to make a sharp angle turn to enter the pipe. On low gradient roads (<5%), where ditch flow is slow, ditch relief culverts can be installed at right angles to the road.
- Install ditch relief culverts (DRC) to outlet at, and drain to, the base of the fill
- If it cannot be installed at the base of the fill, install the DRC with a grade steeper than the inboard ditch draining to the culvert inlet, and then install a downspout on the outlet to carry the culverted flow to the base of the fillslope or energy dissipater material at outlet to prevent erosion or the outboard road fill.
- Downspouts longer than 20 feet should be secured to the hillslope for stability.
- Ditch relief culverts should not carry excessive flow such that gulying occurs below the culvert outlet or such that erosion and down-cutting of the inboard ditch is occurring.
- Do not discharge flows from ditch relief culverts onto unstable areas or highly erodible hillslopes.
- If the ditch is on an insloped or crowned road, consider reshaping road outsloping to drain the road surface. The ditch and the ditch relief culvert would then convey only spring flow from the cutbank and hillslope runoff, and not turbid runoff from the road surface.

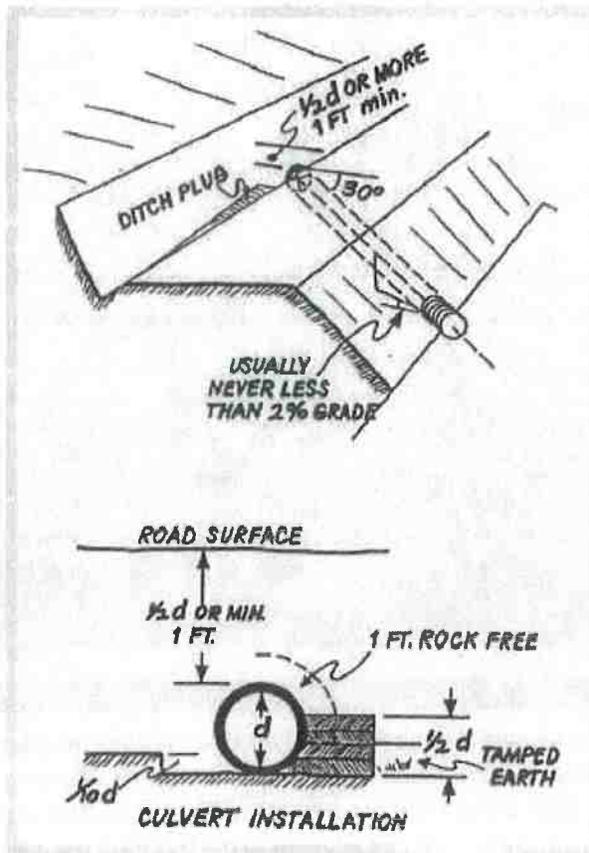


FIGURE 48. The elements of a properly installed ditch relief culvert. The culvert is angled at about 30 degrees to the road alignment to help capture flow and prevent culvert plugging or erosion of the inlet area. It is set at the base of the fill (ideally) or with a grade slightly steeper than the grade of the contributing ditch (but never with a grade less than 2 percent) (USDA-SCS, 1983). At a minimum, the grade of the ditch relief culvert should be sufficient to prevent sediment accumulation at the inlet or deposition within the culvert itself (it should be self-cleaning) (USDA-SCS, 1983).

BMP: Permanent Culvert Crossing

- New culvert installations shall be sized to accommodate flows associated with a 100-year storm event.
- If the new culvert is replacing a poorly installed old culvert, the crossing may need to be abandoned to the following standard:
 - When fills are removed they shall be excavated to form a channel that is as close as feasible to natural watercourse grade and orientation, and that is wider than the natural channel.
 - Excavated banks shall be laid back to a 2:1 (50%) or natural slope.
- New culverts shall be placed at stream gradient, or have downspouts, or have energy dissipaters at outfall.
 - Align culverts with the natural stream channel orientation to ensure proper function, prevent bank erosion, and minimize debris plugging. See Figure 97 below.
 - Place culverts at the base of the fill and at the grade of the original streambed or install a downspout past the base of the fill. Downspouts should only be installed if there are no other options.
 - Culverts should be set slightly below the original stream grade so that the water drops several inches as it enters the pipe.
 - Culvert beds should be composed of rock-free soil or gravel, evenly distributed under the length of the pipe.
 - Compact the base and sidewall material before placing the pipe in its bed.
 - Lay the pipe on a well-compacted base. Poor basal compaction will cause settling or deflection in the pipe and can result in separation at a coupling or rupture in the pipe wall.
 - Backfill material should be free of rocks, limbs, or other debris that could dent or puncture the pipe or allow water to seep around the pipe.
 - Cover one end of the culvert pipe, then the other end. Once the ends are secure, cover the center.
 - Tamp and compact backfill material throughout the entire process, using water as necessary for compaction.
 - Backfill compacting will be done in 0.5 – 1.0 foot lifts until 1/3 of the diameter of the culvert has been covered.
 - Push layers of fill over the crossing to achieve the final design road grade, road fill above the culvert should be no less than one-third to one-half the culvert diameter at any point on the drivable surface.
- Critical dips shall be installed on culvert crossings to eliminate diversion potential. Refer to Figure 84 below.
- Road approaches to crossings shall be treated out to the first drainage structure (i.e. waterbar, rolling dip, or hydrologic divide) to prevent transport of sediment.
- Road surfaces and ditches shall be disconnected from streams and stream crossings to the greatest extent feasible. Ditches and road surfaces that cannot be feasibly disconnected from streams or stream crossings shall be treated to reduce sediment transport to streams.
- If downspouts are used, they shall be secured to the culvert outlet and shall be secure on fill slopes.
- Culverts shall be long enough so that road fill does not extend or slough past the culvert ends.
- Inlet of culverts, and associate fill, shall be protected with appropriate measures that extend at least as high as the top of the culvert.
- Outlet of culverts shall be armored with rock if road fill sloughing into channel can occur.
- Armor inlets and outlets with rock, or mulch and seed with grass as needed (not all stream crossings need to be armored).
- Where debris loads could endanger the crossing, a debris catchment structure shall be constructed upstream of the culvert inlet.
- Bank and channel armoring may occur, when appropriate, to provide channel and bank stabilization.

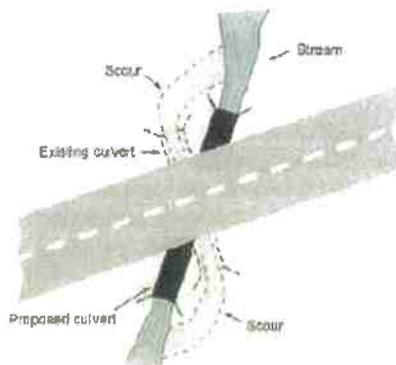


FIGURE 97. Culvert alignment should be in relation to the stream and not the road. It is important that the stream enters and leaves the culvert in a relatively straight horizontal alignment so streamflow does not have to turn to enter the inlet or discharge into a bank as it exits. This figure shows a redesigned culvert installation that replaces the bending alignment that previously existed. Channel turns at the inlet increase plugging potential because wood going through the turn will not align with the inlet. Similarly, channel turns at the inlet and outlet are often accompanied by scour against the channel banks (Wisconsin Transportation Information Center, 2004).

BMP: Permanent Culvert Crossing Design (Critical Dip and Hydrologic Disconnect Placement)

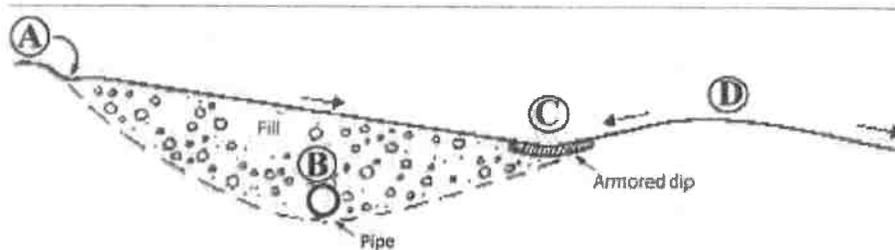
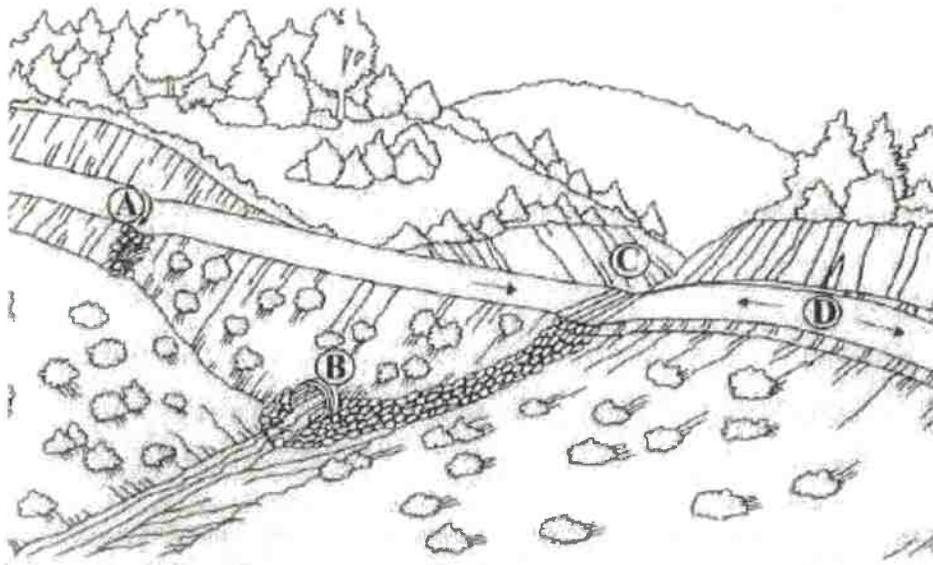
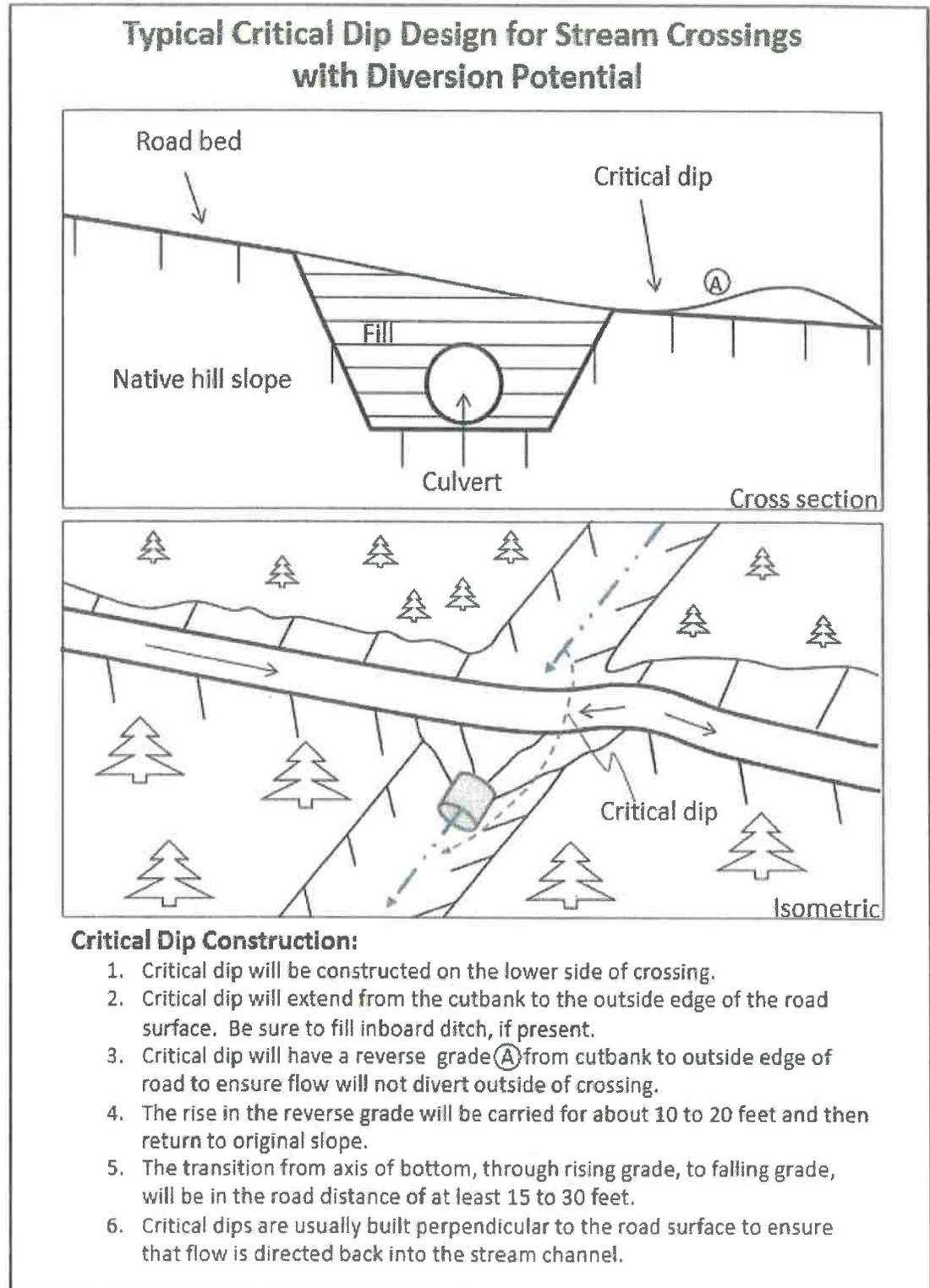


FIGURE 84. Critical dips or dipped crossing fills should be centered near a stream crossing's down-road hinge line, not over the centerline of the crossing where overtopping could cause washout or severe erosion of the fill. If the stream crossing culvert (B) plugs, water will pond behind the fill until reaching the critical dip or low point in the crossing (C) and flowing back down into the natural stream channel. The down-road ditch must be plugged to prevent streamflow from diverting down the ditch line. For extra protection in this sketch, riprap armor has been placed at the critical dip outfall and extending downslope to the stream channel. This is only required or suggested on stream crossings where the culvert is highly likely to plug and the crossing fill overtopped. The dip at the hinge line is usually sufficient to limit erosional damage during an overtopping event. Road surface and ditch runoff is disconnected from the stream crossing by installing a rolling dip and ditch relief culvert just up-road from the crossing (A) (Keller and Sharar, 2003).

BMP: Permanent Culvert Crossing Design (Critical Dip)



BMP: Permanent Culvert Crossing Design (Culvert Orientation)

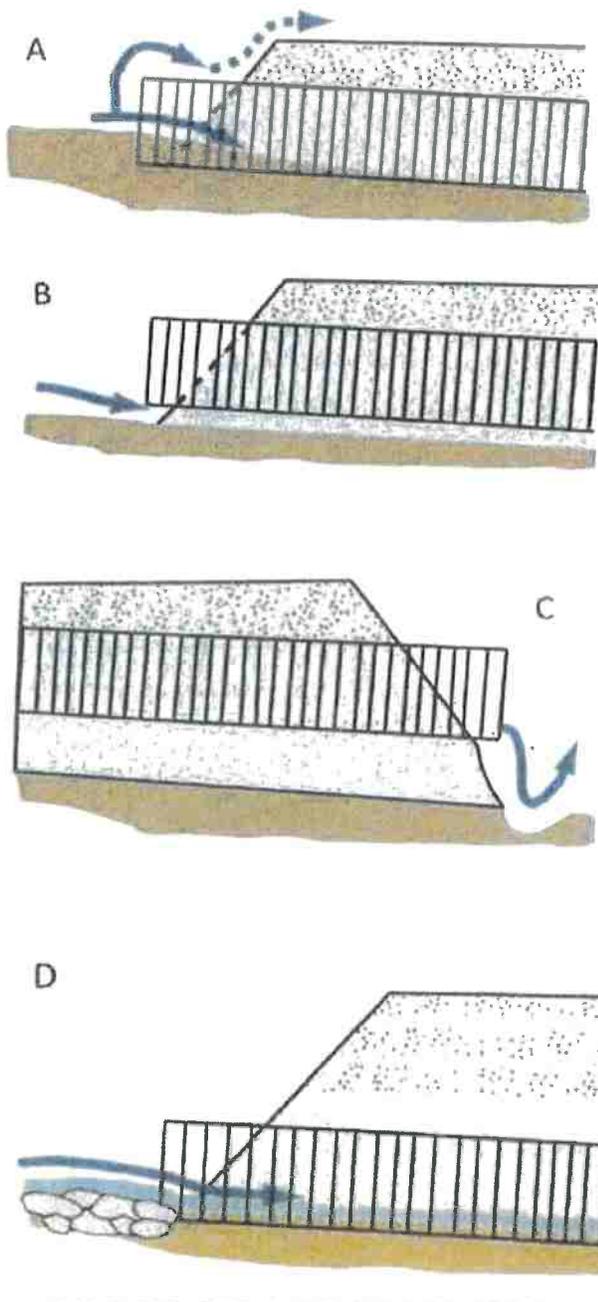
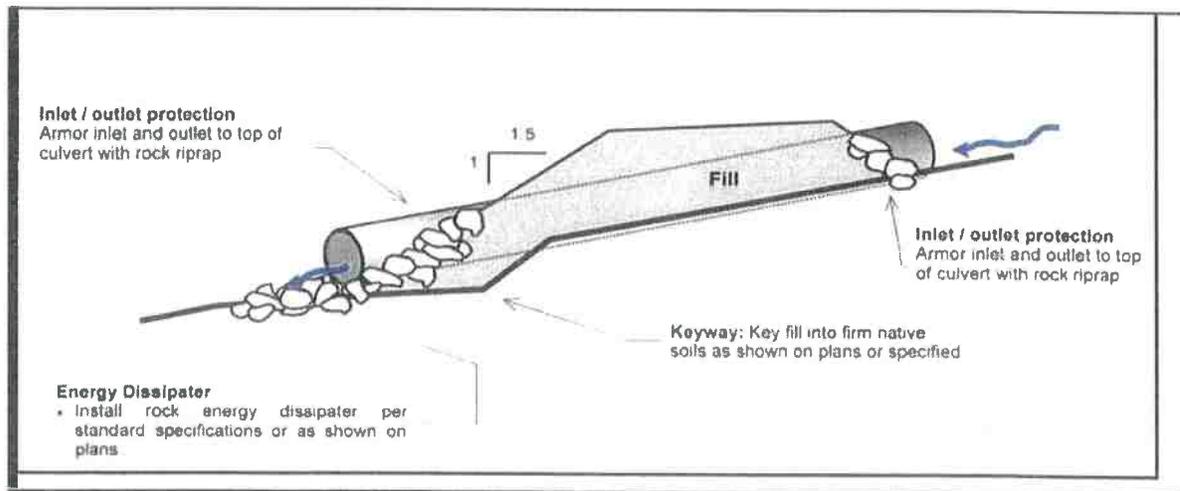
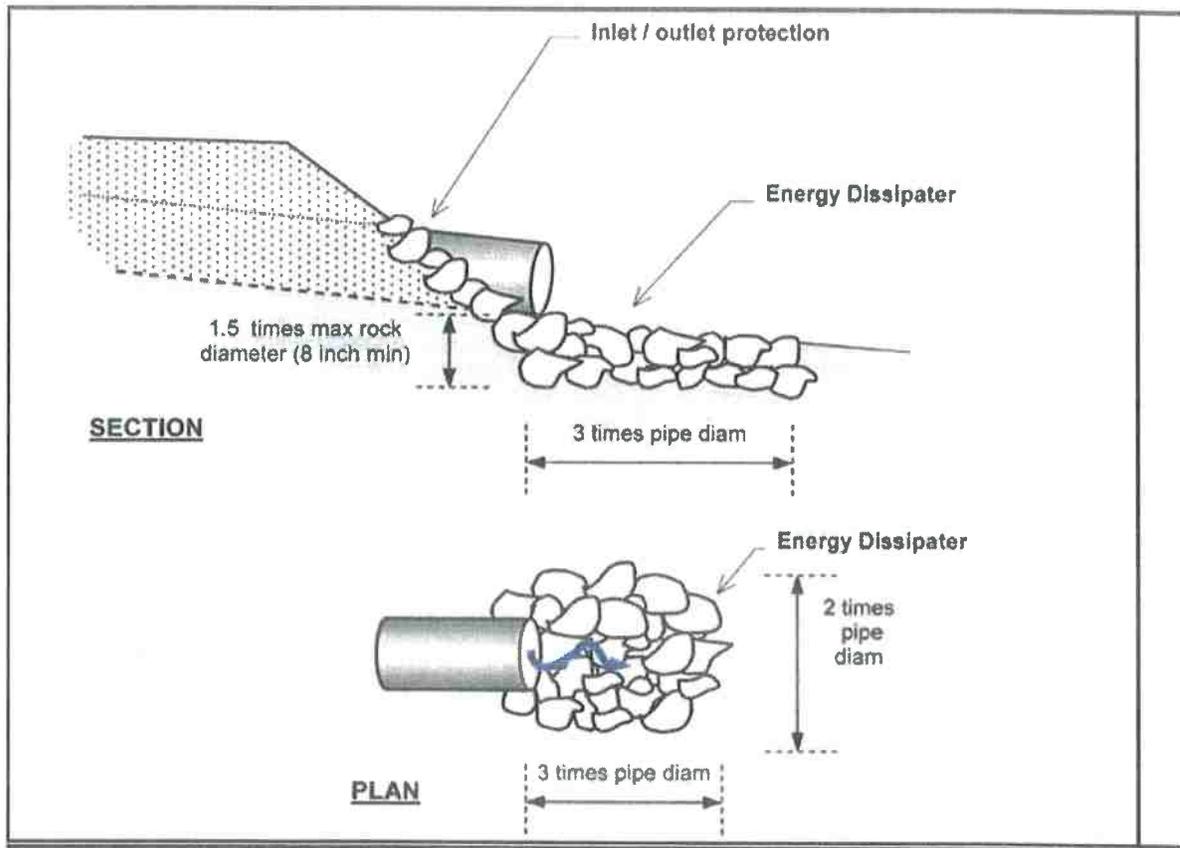


FIGURE 155. Proper culvert installation involves correct culvert orientation, setting the pipe slightly below the bed of the original stream, and backfilling and compacting the fill as it is placed over the culvert. Installing the inlet too low in the stream (A) can lead to culvert plugging, yet if set too high (B) flow can undercut the inlet. If the culvert is placed too high in the fill (C), flow at the outfall will erode the fill. Placed correctly (D), the culvert is set slightly below the original stream grade and protected with armor at the inlet and outlet. Culverts installed in fish-bearing stream channels must be inset into the streambed sufficiently (>25% embedded) to have a natural gravel bottom throughout the culvert (Modified from: MDSL, 1991).

BMP: Permanent Culvert Crossing Design (Inlet and Outlet Armoring)



Riprap installed to protect the inlet and outlet of a stream crossing culvert from erosion or for energy dissipation should be keyed into the natural channel bed and banks to an approximate depth of about 1.5x the maximum rock thickness. Riprap should be placed at least up to the top of the culvert at both the inlet and outlet to protect them from splash erosion and to trap any sediment eroded from the newly constructed fill slope above.

BMP: Permanent Culvert Crossing Design (Inlet and Outlet Armoring) Cont.

- Inlets of culverts and associate fills shall be protected with rock armoring that extends at least as high as the top of the culvert.
- Outlets of culverts shall be provided a rock energy dissipater at the outfall of the culvert.
- Outlets of culverts and associate fills shall be protected with rock armoring that extends at least as high as the top of the culvert if road fill sloughing into channel can occur.
- Prior to inlet and outlet rocking, the inlet and outlets shall be prepared. Preparation will include removal of vegetation and stored materials from the inlet and outlet.
- Inlets may require construction of an inlet basin.
- Slopes at the outlet should be shaped to a 2:1 or natural slope prior to placing rock armor.
- Rock used at culvert inlets and outlets should be a matrix of various sized rocks and rip-rap that range from a 3" dia. to a 2' dia.
- The largest rocks should be places at the base of the culvert or fill. Incrementally smaller rocks shall be placed over the larger rocks at the armoring extend up the slope. Voids and spaces shall be back filled with smaller gravels and rocks.

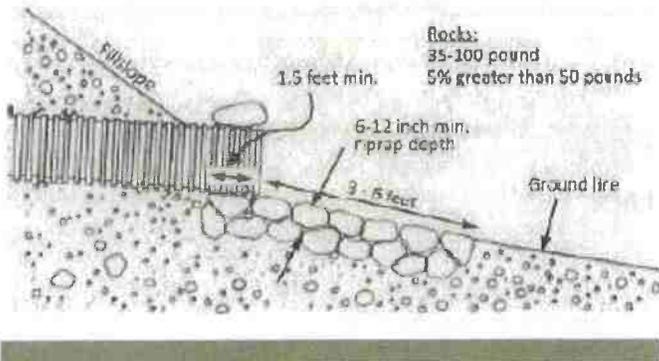


FIGURE 107A. Riprap armor at culvert outlet (Modified from: Keller et al., 2011).

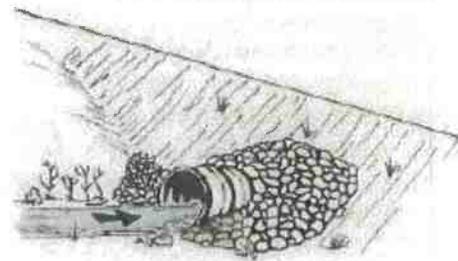


FIGURE 107B. Riprap armor at culvert inlet (Keller and Sherar, 2003).

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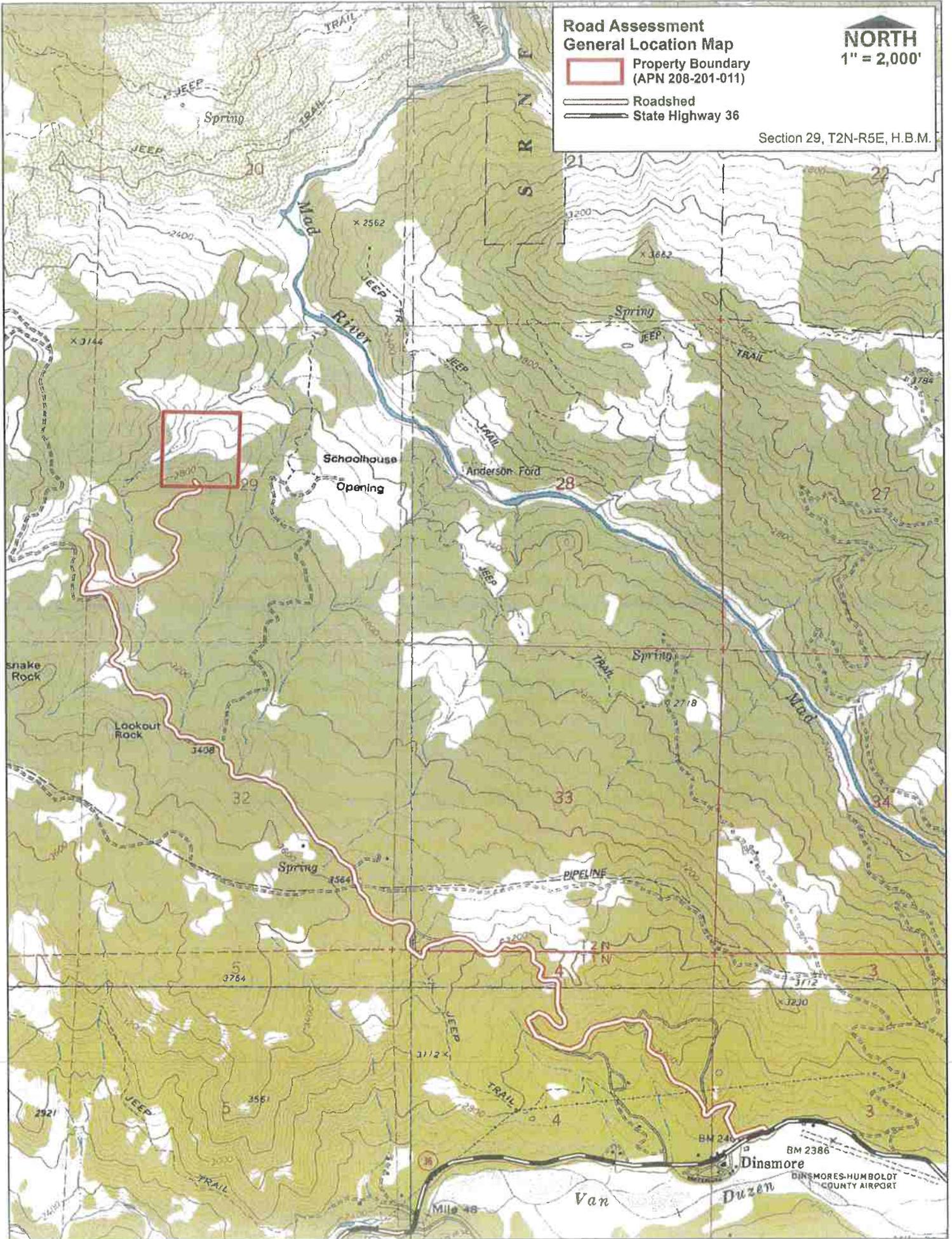
MAPS

Road Assessment
General Location Map


NORTH
1" = 2,000'

-  Property Boundary (APN 208-201-011)
-  Roadshed
-  State Highway 36

Section 29, T2N-R5E, H.B.M.

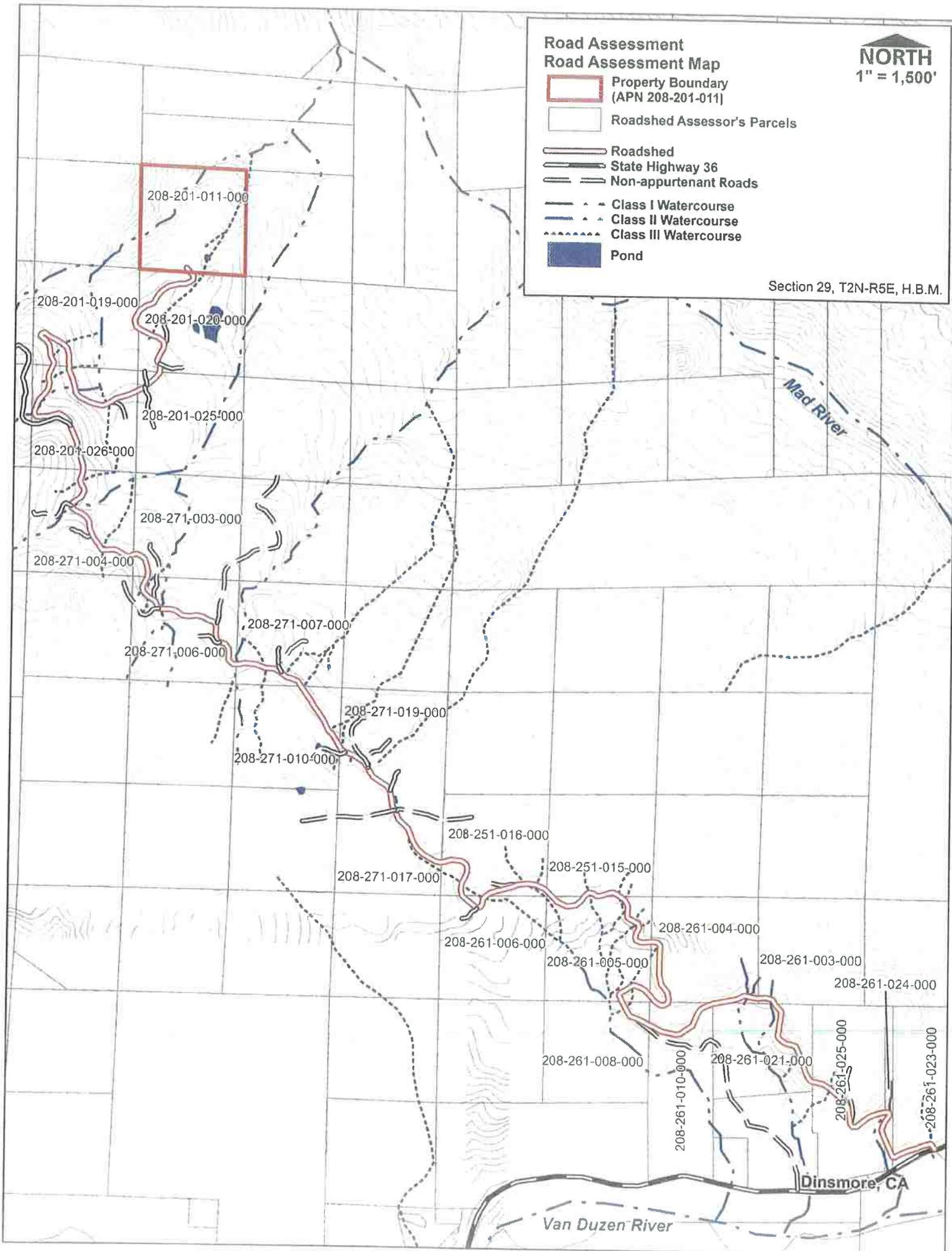


Road Assessment
Road Assessment Map

NORTH
1" = 1,500'

-  Property Boundary (APN 208-201-011)
-  Roadshed Assessor's Parcels
-  Roadshed
-  State Highway 36
-  Non-appurtenant Roads
-  Class I Watercourse
-  Class II Watercourse
-  Class III Watercourse
-  Pond

Section 29, T2N-R5E, H.B.M.



Mad River

Van Duzen River

Dinsmore, CA

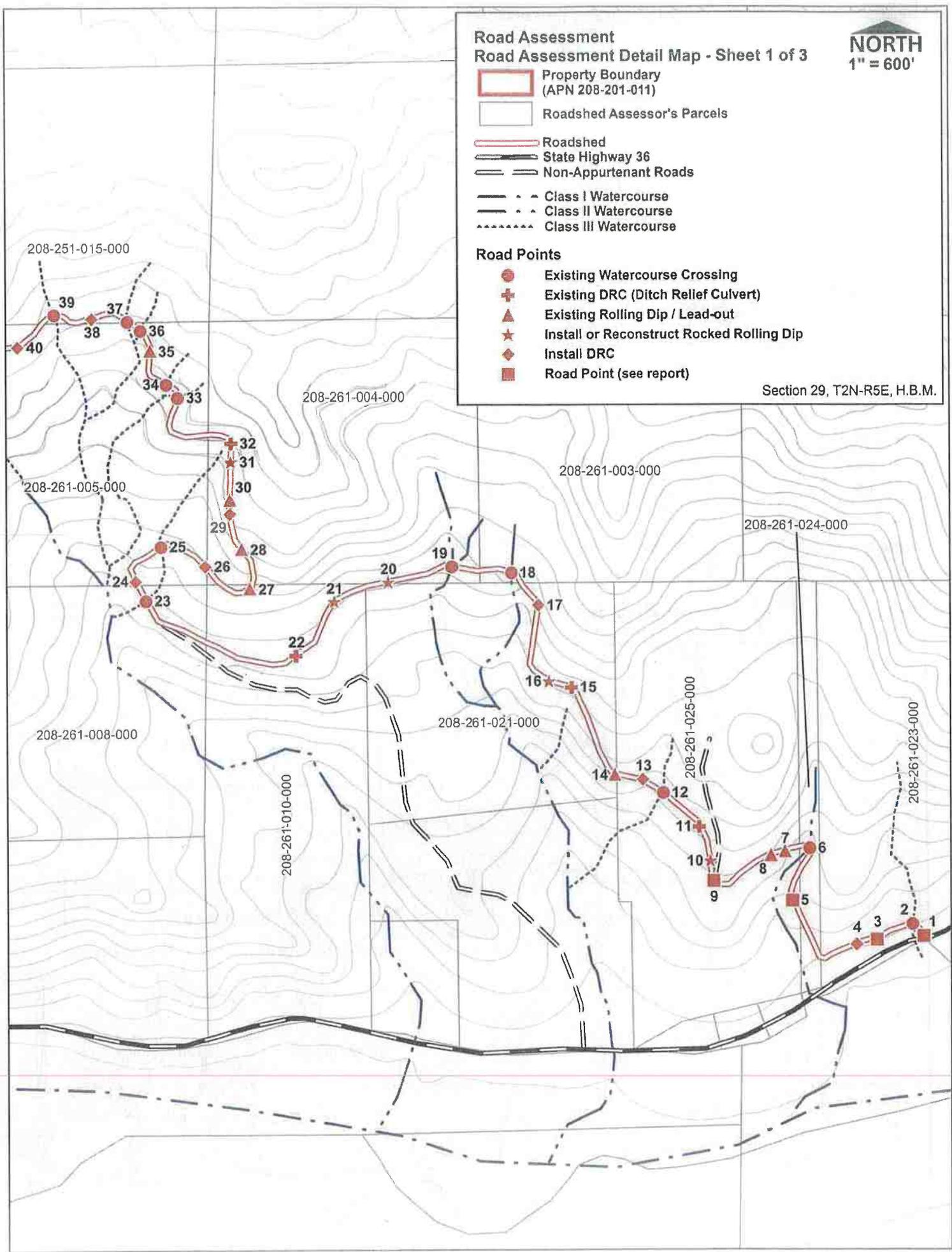
**Road Assessment
Road Assessment Detail Map - Sheet 1 of 3**

NORTH
1" = 600'

-  Property Boundary (APN 208-201-011)
-  Roadshed Assessor's Parcels
-  Roadshed
-  State Highway 36
-  Non-Appurtenant Roads
-  Class I Watercourse
-  Class II Watercourse
-  Class III Watercourse

- Road Points**
-  Existing Watercourse Crossing
 -  Existing DRC (Ditch Relief Culvert)
 -  Existing Rolling Dip / Lead-out
 -  Install or Reconstruct Rocked Rolling Dip
 -  Install DRC
 -  Road Point (see report)

Section 29, T2N-R5E, H.B.M.



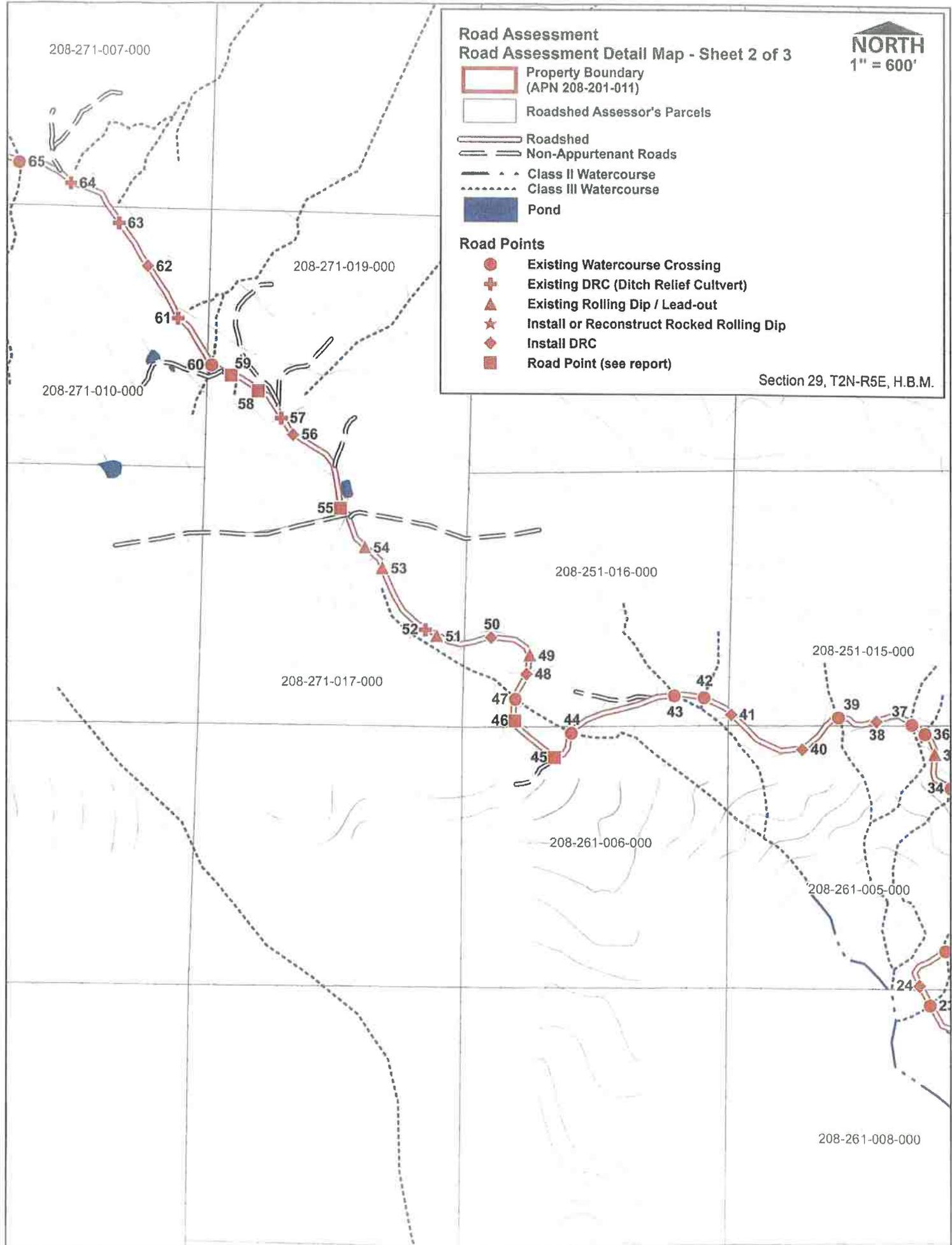


Road Assessment Road Assessment Detail Map - Sheet 2 of 3

-  Property Boundary (APN 208-201-011)
-  Roadshed Assessor's Parcels
-  Roadshed
-  Non-Appurtenant Roads
-  Class II Watercourse
-  Class III Watercourse
-  Pond

- #### Road Points
-  Existing Watercourse Crossing
 -  Existing DRC (Ditch Relief Culvert)
 -  Existing Rolling Dip / Lead-out
 -  Install or Reconstruct Rocked Rolling Dip
 -  Install DRC
 -  Road Point (see report)

Section 29, T2N-R5E, H.B.M.



Road Assessment
Road Assessment Detail Map - Sheet 3 of 3

NORTH
1" = 600'

-  Property Boundary (APN 208-201-011)
-  Roadshed Assessor's Parcels
-  Roadshed
-  Bear Creek Road (Non-Appurtenant Section)
-  Non-Appurtenant Roads
-  Class II Watercourse
-  Class III Watercourse
-  Pond

- Road Points**
-  Existing Watercourse Crossing
 -  Existing DRC (Ditch Relief Culvert)
 -  Existing Rolling Dip / Leadout
 -  Install or Reconstruct Rocked Rolling Dip
 -  Install DRC
 -  Road Point (see report)

Section 29, T2N-R5E, H.B.M.

