HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
ROAD EVALUATION REPORT

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

Applicant Name: Jose & Cathy Caballeroa APN: 223-022-002

Planning & Building Department Case/File No.: _____

Road Name: Bellus Rd *(complete a separate form for each road)*

From Road (Cross street): Adjoining Parcel 216-073-005 → SEE ATTACHED PUBLIC WORKS MEMO

To Road (Cross street): Subject Parcel

Length of road segment: 0.12 miles Date Inspected: 12-9-2019

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.

Signature _____ Date 12-9-2019

David Spinosa
Name Printed

RECEIVED
DEC 2 9 2019
Humboldt County Cannabis Svcs.

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.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HUMBOLDT
MAILING ADDRESS: 1106 SECOND STREET, EUREKA, CA 95501-0579
AREA CODE 707

ARCATA-EUREKA AIRPORT TERMINAL
McKINLEYVILLE
FAX 839-3596
AVIATION 839-5401

PUBLIC WORKS BUILDING
SECOND & L ST., EUREKA
FAX 445-7409

ADMINISTRATION	445-7491	NATURAL RESOURCES	445-7741
BUSINESS	445-7652	NATURAL RESOURCES PLANNING	267-9540
ENGINEERING	445-7377	PARKS	445-7651
FACILITY MAINTENANCE	445-7493	ROADS & EQUIPMENT MAINTENANCE	445-7421

CLARK COMPLEX
HARRIS & H ST., EUREKA
FAX 445-7388
LAND USE 445-7205

LAND USE DIVISION INTEROFFICE MEMORANDUM

TO: Rodney Yandell, Planner, Planning & Building Department

FROM: Kenneth M. Freed, Assistant Engineer II

DATE: 09/20/2017

RE: FORBIDDEN FRUIT FARMS, APN 216-073-005, SP16-153, APPS# 11127

The Department of Public Works has received a road evaluation report for the above project. The results of the road evaluation report are as follows:

Road Name & Limits	Maintained By:	Investigated By & Report Date:	Public Works Comments and Recommendations
Unnamed access road (Bell Springs Road to #8A010 to subject property)	☐ County ☒ Other	Applicant (7-20-2017)	The road is adequate as is; the road is equivalent to category 4 road standards. The applicant shall apply for and obtain an encroachment permit for the improvements at the intersection of Bellus Road and the County maintained road pursuant to DPW memo dated 6/19/2017.

Note: There may be other projects that have been conditioned to evaluate and/or improve the road(s). Prior to constructing any improvements or implementing any neighborhood traffic management plan, the Department recommends that the applicant determine what work has already been accomplished so that efforts are not duplicated.

// END //

HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
ROAD EVALUATION REPORT

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

Applicant Name: Forbidden Fruit Farms APN: 216-073-005

Planning & Building Department Case/File No.: 11127

Road Name: Bellus Road *(complete a separate form for each road)*

From Road (Cross street): Bell Springs Road

To Road (Cross street):

Length of road segment: 1.6 miles Date Inspected: 07/20/2017

Road is maintained by: ☐ County ☒ Other Private
(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.

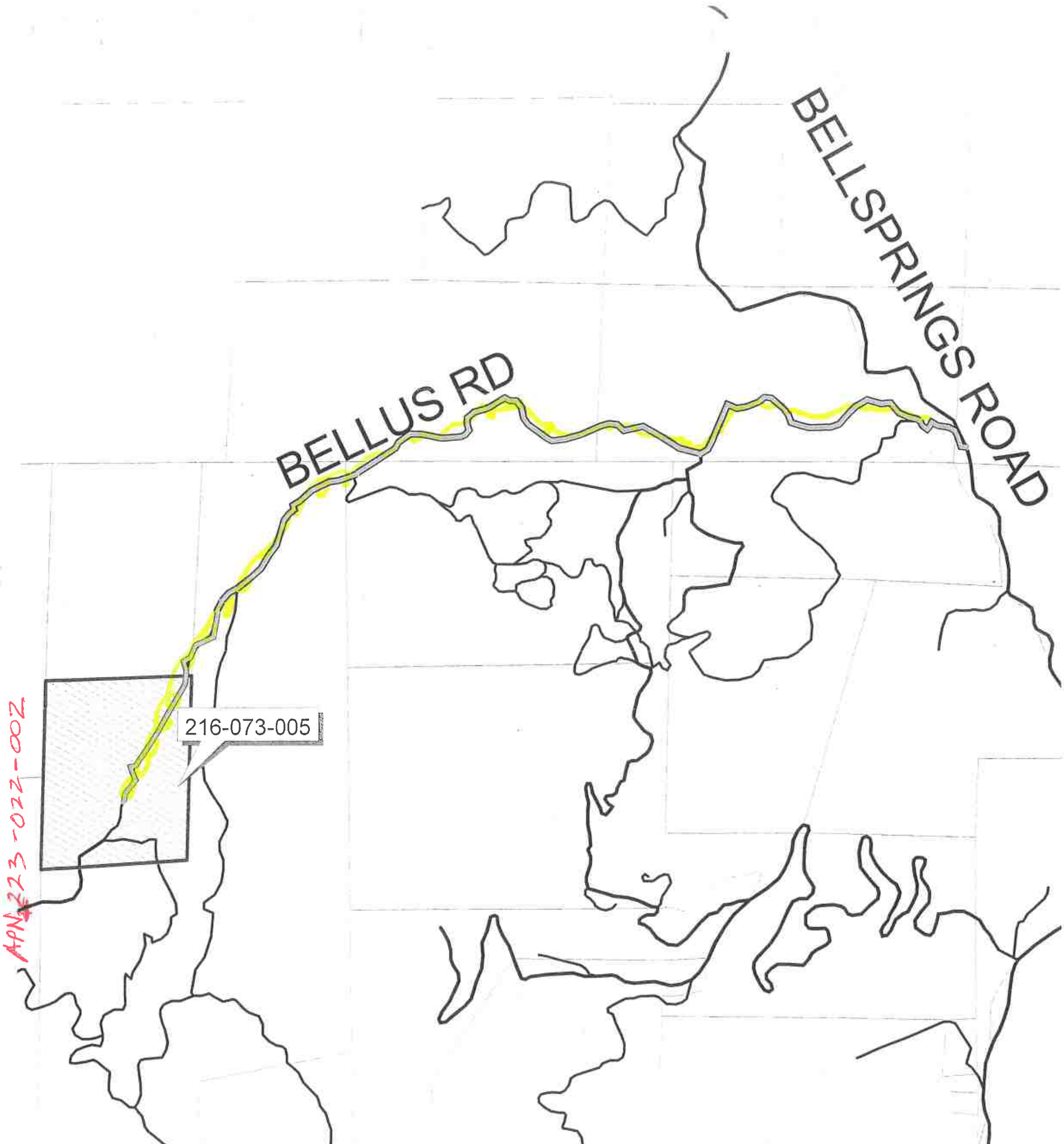
Box 3 ☐ The entire road segment is not developed to the equivalent of road category 4 or better. The road may or may not be able to accommodate the proposed use and further evaluation is necessary. Part B is to be completed by a Civil Engineer licensed by the State of California.

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

Signature Dylan Carstensen Date 07/20/17

Dylan Carstensen
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.



Humboldt County Department of Public Works - Land Use Division
Diagram of road(s) that need to be evaluated

Planning & Building Department File/Case No.: SP16-153

N
W E
S

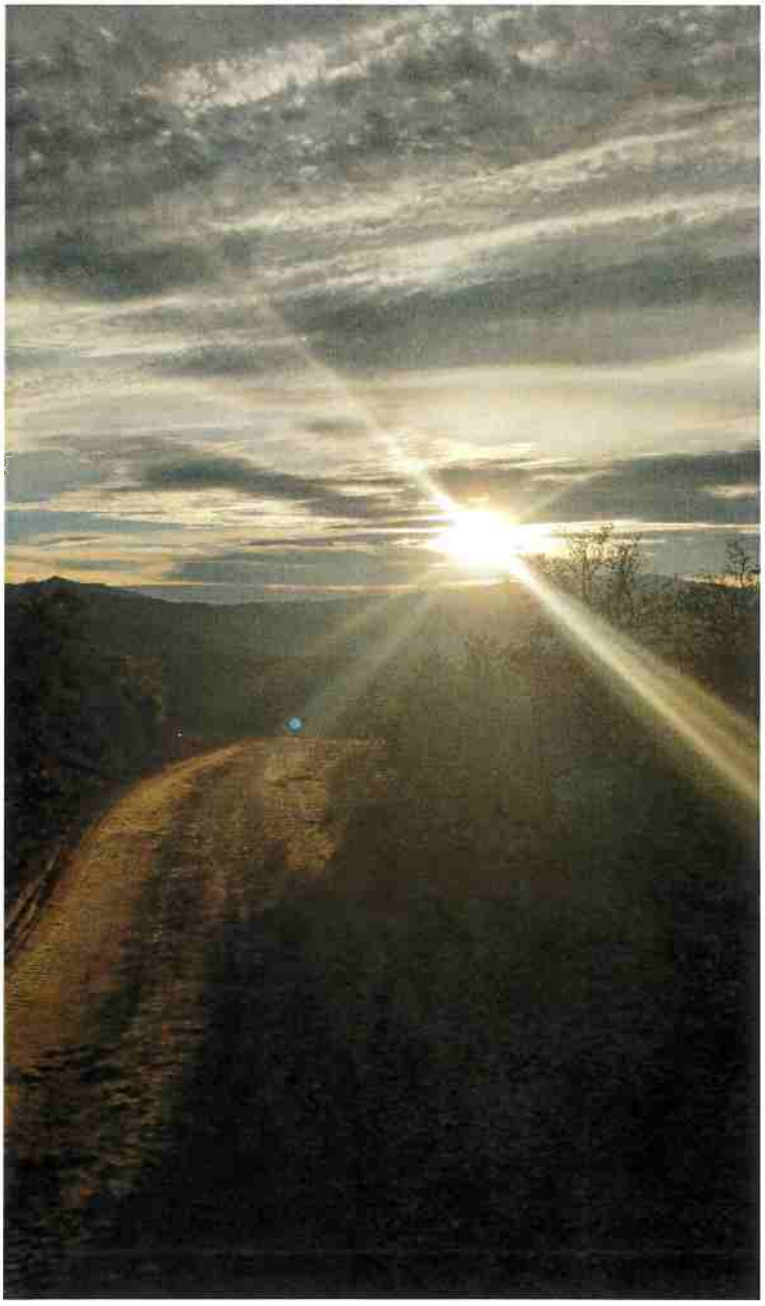
500 0 500 1000 Feet

RF -- 1:12000

Indicates the project area

Indicates the access road(s) that need to be evaluated

Map Disclaimer:
While every effort has been made to assure the accuracy of this information, it should be understood that it does not have the force and effect of law,rule, or regulation. Should any difference or error occur, the law will take precedence.



ROAD ASSESSMENT

Timberland Resource Consultants

Prepared by:

Chris Carroll

Timberland Resource Consultants

165 South Fortuna Blvd

Fortuna, CA 95540

November 27, 2019

Purpose

This road assessment has been prepared on behalf of the Applicant, Jose Caballero, for a Humboldt County Cannabis Cultivation Project, on APN 223-022-002. 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 223-022-002, which is approximately 98 acres located approximately 2 miles southwest of the community of Harris, CA. It is located in Section 1, T5S-R4E, H.B.M.

Scope

This road assessment is limited to the appurtenant road accessing the subject parcel from the nearest public road as it was observed on 11-21-2019. The "Roadshed" is defined as the segment of permanent rocked road beginning from Bell Springs County Road, and extending to the subject property, APN 223-022-002. The Roadshed is shown on the attached maps. It includes approximately 1.8 miles of private road known as Bellus Road, to access the subject parcel. 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 any stream crossings and watercourses, wet areas, and wetlands near and downslope of the road system, which could be impacted by road drainage/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 very dry conditions on 11-21-2019. Most of the road surface was approximately 16 to 18 feet wide with numerous turnouts to allow for parking or passing of oncoming vehicles. The Roadshed identified is located on approximately 6 separate, private parcels. The road receives light to moderate traffic use and it appears that landowners keep up on routine or regular maintenance in the form of surface rocking and grading. The surface appeared to contain enough rock to allow for winter time vehicle use. The majority of the road has an outsloped surface drainage pattern with numerous rolling dips and lead-out ditches. Some segments located along ridgetops or through-cuts have ditches along one or both sides of the road with lead-outs at available locations. The Roadshed does not contain any insloped roads drained by way of ditch relief culverts. The road is located on or near ridgetops and does not contain any watercourse crossings.

Where the assessment has determined that improvements within the Roadshed are required, 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 work. Given the relatively light volume of traffic and regular road maintenance along the majority of the road, recommendations are generally minor improvements to surface drainage at specific locations. No controllable sediment discharge sites were identified along the Roadshed.

Road Points

Map Point 1: Existing 18-inch diameter culvert watercourse crossing located on Bell Springs Road (county road), outside of the Roadshed. This crossing also receives drainage from approximately 600 feet of inside ditch along Bell Springs Road from the southeast, and from the inside ditch and road surface of the north entrance to Bellus Road near Map Point 5. Installation of a new ditch relief culvert along Bell Springs Road between Map Point 1 and 2 would be effective in disconnection of the ditch prior to it entering the watercourse crossing inlet. See Map Point 5 below for the description of the north entrance to Bellus Road.

Map Point 2: Existing 15-inch diameter ditch relief culvert located on Bell Springs Road, outside of the Roadshed. It is located above the head of a Class III watercourse. The area between the outlet at Map Point 2 and the head of the Class III watercourse is thick grass. Dry road sediment from the previous wet season could be seen filtering out in the grass for approximately 100 feet below the outlet. During heavy rainfall, runoff from the outlet likely connects with the head of the Class III watercourse. The ditch relief culvert receives drainage from the existing lead-out ditch at Map Point 5, and over 600 feet of the inside ditch along Bell Springs Road from the south. The area between Map Point 5 and the inlet at Map Point 2 is thick grass and no erosion was present. The lengthy inside ditch along the county road from the south picks up sediment from the south entrance to Bellus Road near Map Point 3. Installation of a new ditch relief culvert along Bell Springs Road, south of Map Point 2 would reduce the hydrologic connectivity to the Class III watercourse.

Map Point 3: The south entrance to Bellus Road and an adjacent, large, unvegetated area upslope to the west. The lower 100 feet of the south entrance to Bellus Road drains to the inside ditch along Bell Springs Road. Bellus Road appeared rocked. Apply clean, compacted rock as necessary to maintain a stable operating surface and to reduce fine sediment runoff to the ditch at the intersection of Bellus Road and Bell Springs Road.

The large unvegetated area at Map Point 3 is separate from Bellus Road. It is located on a ridgetop, seasonal road immediately to the west, outside of the Roadshed. This area appears bare in all available aerial imagery from 2019 back to 2004. Over the last 15 to 20 years, it appears that this area may have been used as a motorcycle track, a staging area for powerline maintenance, a heavy equipment offloading site, and a turn-around / cell phone reception area. Logs have been placed blocking access to this area from the south entrance to Bellus Road. Sediment laden runoff from this unvegetated area drains across the surface of Bellus Road and enters the inside ditch along Bell Springs Road. During heavy rainfall sediment is transported to Map Point 2 via the inside ditch. Although outside of the Roadshed, this seasonal road surface and staging / turn-around area should be rocked as necessary to provide a stable operating surface and to reduce the amount of sediment leaving this area. As an alternative to rocking, the landowner could allow this area to revegetate naturally or by grass seeding.

Road Segment 3 to 5: The south entrance to Bellus Road. The segment is rocked with a slight outslope from the intersection, to beyond Map Point 4. Near Map Point 5 the road is located on a broad ridgetop and becomes a through-cut section that is drained by way of ditches with lead-outs. Along Road Segment 3 to 5, keep the road graded to maintain its current drainage pattern, and to eliminate berms that build up along the roadside edges. Apply clean, compacted rock as necessary to maintain a stable operating surface.

Map Point 4: Existing lead-out ditch that drains a short length of the road surface. Maintain the road surface to drain to this location and keep the lead-out ditch open.

Map Point 5: Existing lead-out ditch that drains a short length of through-cut road surface and ditch. Maintain road surface and ditch to drain to this location and keep the lead-out ditch open. The north entrance to Bellus Road from Map Point 5 to Bell Springs Road is rocked with a slight inslope. Along this segment, keep the road graded to maintain its current drainage pattern, and eliminate berms that build up along the roadside edges. Apply clean, compacted rock as necessary to maintain a stable operating surface.

Road Segment 5 to 11: Road Segment follows a broad ridgetop and is located in a shallow through-cut section. The road surface is rocked and graded to drain the road surface to ditches on both sides of the road with numerous lead-outs for ditch relief. The road appeared to be maintained and there were no signs of erosion along ditches. Near Map Point 11, the road surface drainage pattern begins to transition to ousloped. Along Road Segment 5 to 11, keep the road graded to maintain its current drainage pattern and keep the ditches open. Maintain the existing drainage facilities at Map Point 6, 7, 8, 9, and 10. Apply clean, compacted rock as necessary to maintain a stable operating surface.

Road Segment 11 to 14: Road Segment located along a ridgetop in a shallow through-cut, and transitions to a sidehill with outsloping drainage. The road surface is rocked and graded to drain the inner half of the road surface towards the inside ditch and to available lead-outs. The outer half of the road drains by way of outsloping when possible. The road appeared to be maintained and there were no signs of erosion along ditches. Along Road Segment 11 to 14, keep the road graded to maintain its current drainage pattern and keep the ditches open. Maintain the existing drainage facilities at Map Point 11 and 13. Apply clean, compacted rock as necessary to maintain a stable operating surface. As a point of reference, Map Point 12 is a rock source located along the road.

Road Segment 14 to 30: Road Segment located along a sidehill with an outsloped surface drainage pattern. It is located just below the main ridgeline. The Road Segment has an adequate number of existing rocked rolling dips and lead-out ditches. The road surface is rocked and graded to drain the road surface towards the outboard edge, and to existing rocked rolling dips and lead-outs. The road and drainage features were maintained and there were no signs of erosion. Along Road Segment 14 to 30, keep the road graded to maintain its current outsloped drainage pattern and eliminate berms and high spots that develop along the outboard edge. Keep the existing rocked rolling dips and lead-outs open. Apply clean, compacted rock as necessary to maintain a stable operating surface. Install an additional rocked rolling dip at Map Point 28.

Road Segment 30 to 40: Road Segment transitions back to a ridgetop location within some short sections of shallow through-cuts. The drainage pattern is best described as crowned and the surface appeared rocked and maintained. Runoff collects along berms on one or both sides of the road and sometimes down a tire depression for a short distance until it is drained by way of a lead-out. This causes minor gullying on the roadside edge or surface, but there are no watercourses nearby. Along Road Segment 30 to 40, maintain the existing lead-outs and install rocked rolling dips at the locations shown on the attached map. In most cases dips can be shallow with lead-outs excavated through berms to allow runoff to exit. See the attached BMPs for rolling dip and lead-out design. Apply clean, compacted rock as necessary to maintain a stable operating surface.

Road Segment 40 to 43: Road Segment leaves the ridgetop and becomes an outsloped road. From the forks in the road south of Map Point 40 to the property boundary, the road is less traveled and the surface has accumulated slough, leaves, and duff. The road has a very hard native rock surface that is resistant to erosion. Although this road was constructed as an outlsope, there is a build-up of duff and material along the shoulder, and runoff flows down tire depressions. The landowner had recently bladed a short section of built up material from the shoulder. Along Road Segment 40 to 43, grade the road shoulder and surface per the attached Road Outsloping BMPs so the road surface drains. Maintain the existing lead-outs and install a rocked rolling dip at Map Point 43.

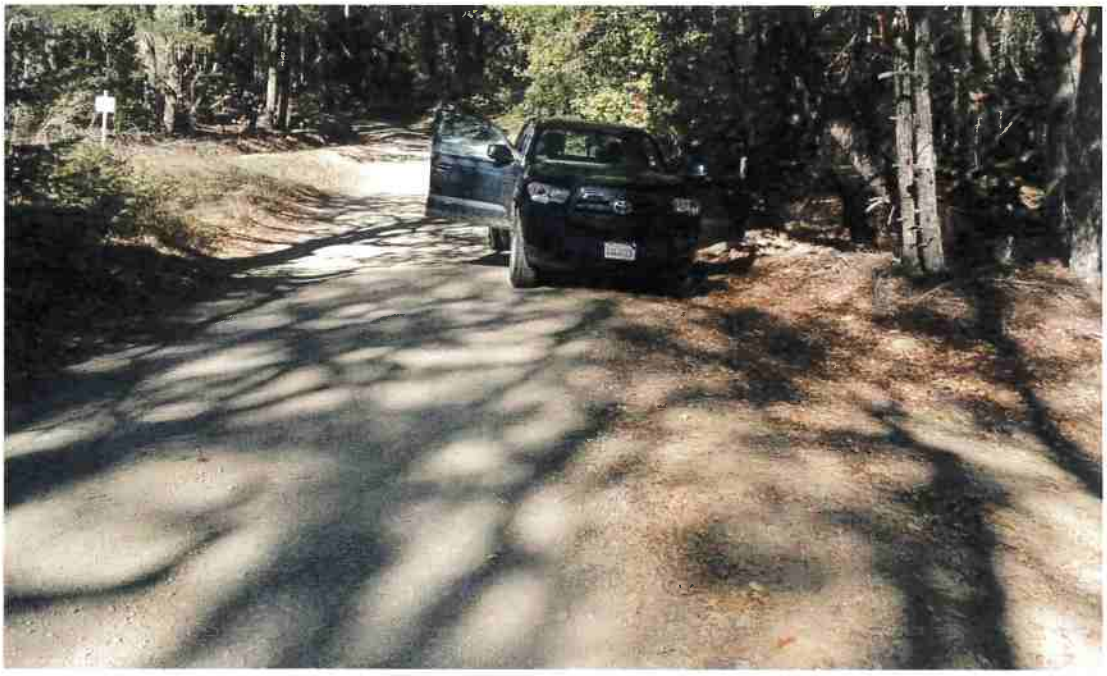
Photographs

North Entrance to Bellus Road: The existing lead-out ditch at Map Point 5 is located near the vehicle pictured, and the inlet to the ditch relief culvert at Map Point 2 is located beyond the mailboxes in the left half of the frame. Photo date 11-21-2019.

Photographs

Map Point 5: The left edge of the picture on top shows the incoming ditch that drains to the existing lead-out at Map Point 5. The picture on the bottom shows the grass area between Map Point 5 and the inlet to the ditch relief culvert at Map Point 2. Photo date 11-21-2019.

Photographs

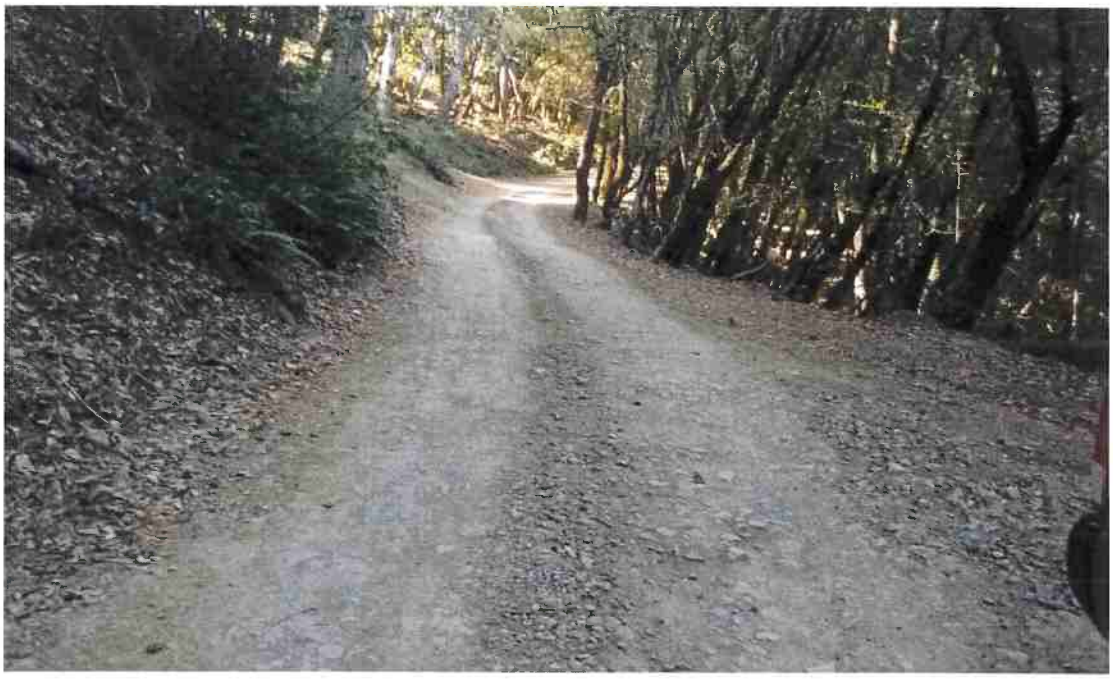


Map Point 7 and 10: The picture on top is looking westerly with the existing lead-out ditch at Map Point 7 in the distance. The picture on the bottom shows the two existing lead-out ditches that drain each side of the road at Map Point 10. One begins near the front of the pick-up and drains towards the right, the other can be seen in the distance, behind the pick-up and drains to the left. Photo date 11-21-2019.

Photographs

Map Point 12: The pictures show the condition of the road near the rock source at Map Point 12. The picture on top is looking upslope southwesterly, and the picture on the bottom is looking northeasterly. The road has a heavily rocked surface with no sign of erosion. Photo date 11-21-2019.

Photographs

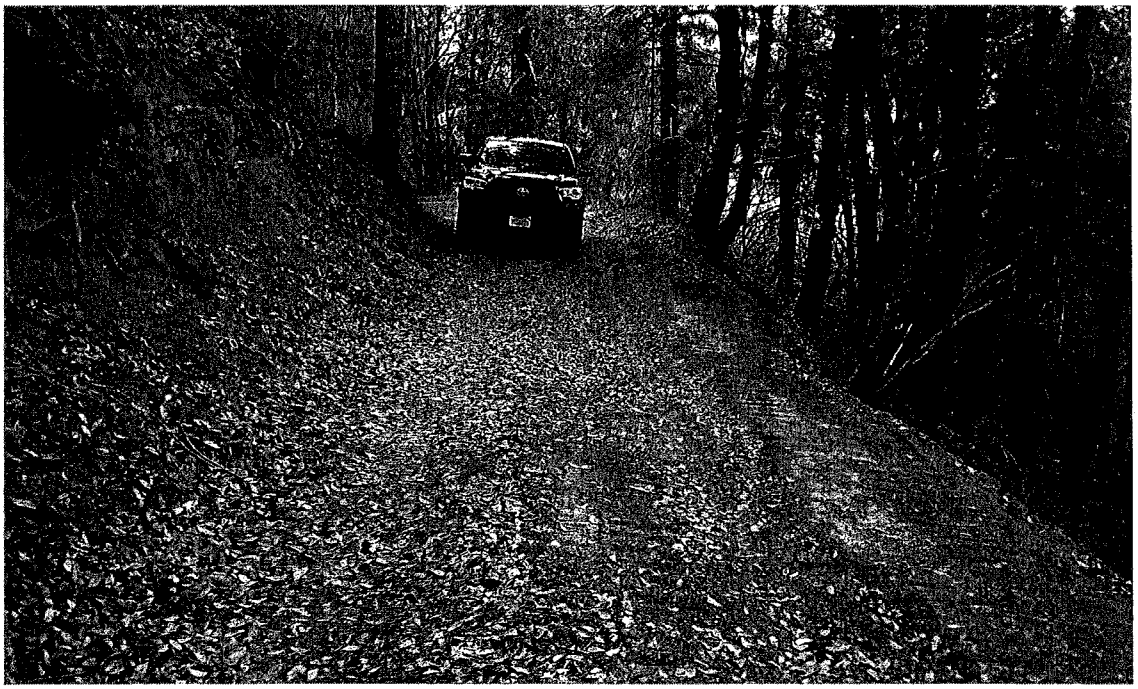


Road Segment 14 to 30: The pictures show the rocked, outsloped road near Map Point 20 and 21. An adequate number of existing rocked rolling dips are located along this segment. The road has a heavily rocked surface with no sign of erosion. Photo date 11-21-2019.

Photographs

Road Segment 30 to 40: The picture on top is from near Map Point 33 looking northeast. The picture on the bottom is from near Map Point 38 looking northerly. Along this segment, maintain the existing lead-outs and install rocked rolling dips at the locations shown on the attached map. In most cases dips can be shallow with lead-outs excavated through berms to allow runoff to exit. Photo date 11-21-2019.

Photographs



Road Segment 40 to 43: The picture on top is from near Map Point 41 looking northerly, and the picture on the bottom is looking southerly. Along Road Segment 40 to 43, grade the road shoulder and surface per the attached Road Outsloping BMPs. Maintain the existing lead-outs and install a rocked rolling dip at Map Point 43. Photo date 11-21-2019.

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.

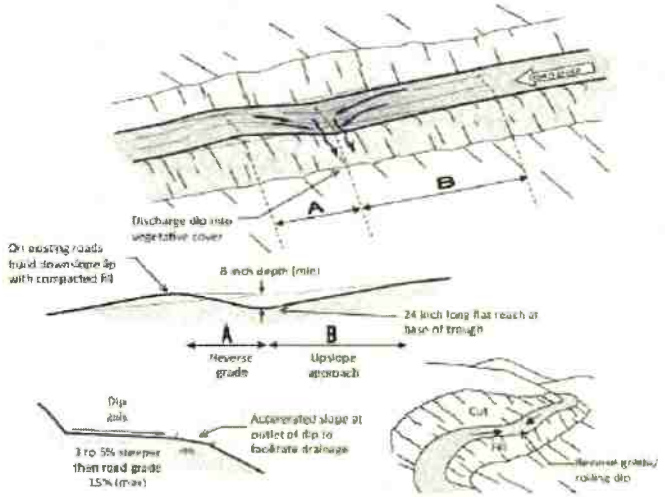


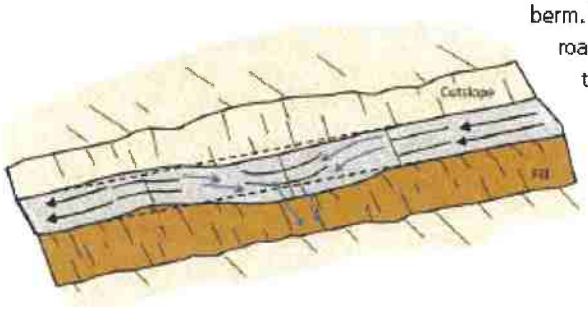
FIGURE 34. *A classic Type I rolling dip, where the excavated up-road approach (B) to the rolling dip is several percent steeper than the approaching road and extends for 60 to 80 feet to the dip axis. The lower side of the structure reverses grade (A) over approximately 15 feet or more, and then falls 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).*

HANDBOOK FOR FOREST, RANCH AND RURAL ROADS

BMP: Rolling Dip Design and Placement (Types)

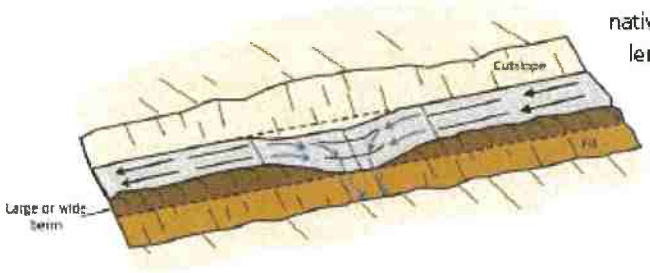
Type 1 Rolling Dip
(Standard)

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 endhauled, 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.

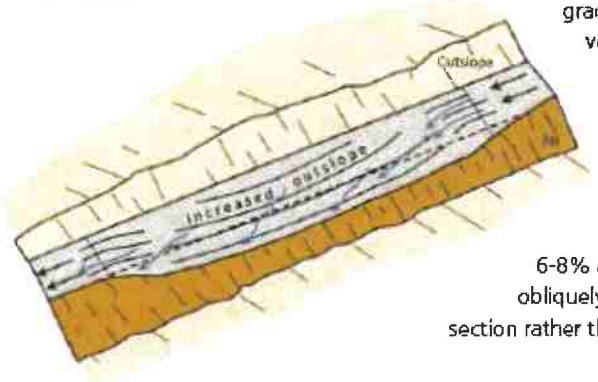


FIGURE 36. *Rolling dip types*

HANDBOOK FOR FOREST, RANCH AND RURAL ROADS

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.*

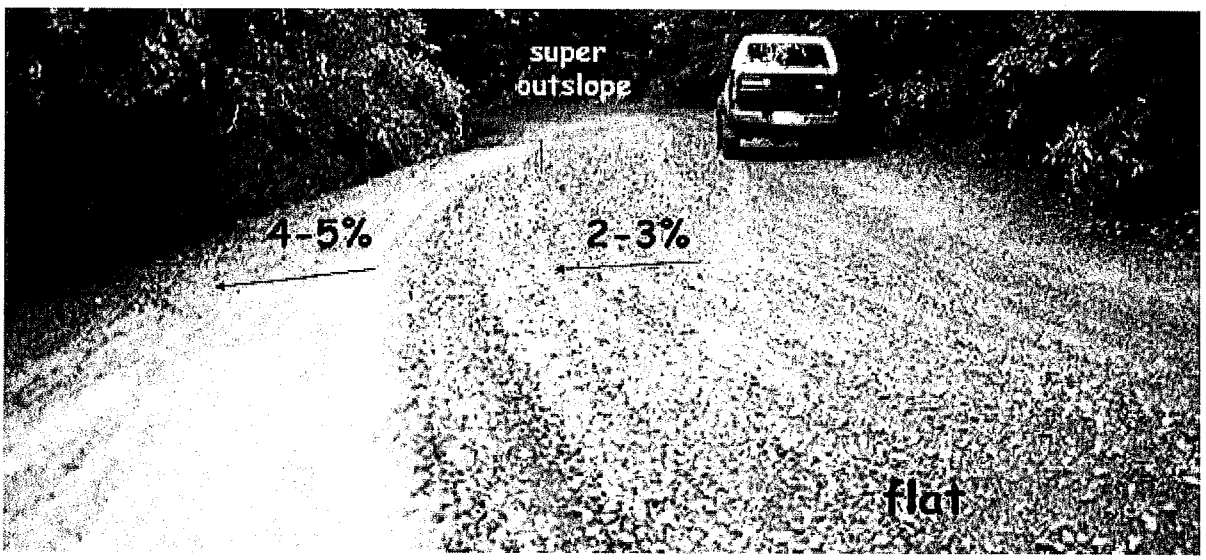
FIGURE 33B. *This side view of an outsloped road shows that the rolling dip does not have to be deep or abrupt to reverse road grade and effectively drain the road surface. This outsloped forest road has rolling dips that allow all traffic types to travel the route without changing speed.*

BMP: 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.*

HANDBOOK FOR FOREST, RANCH AND RURAL ROADS

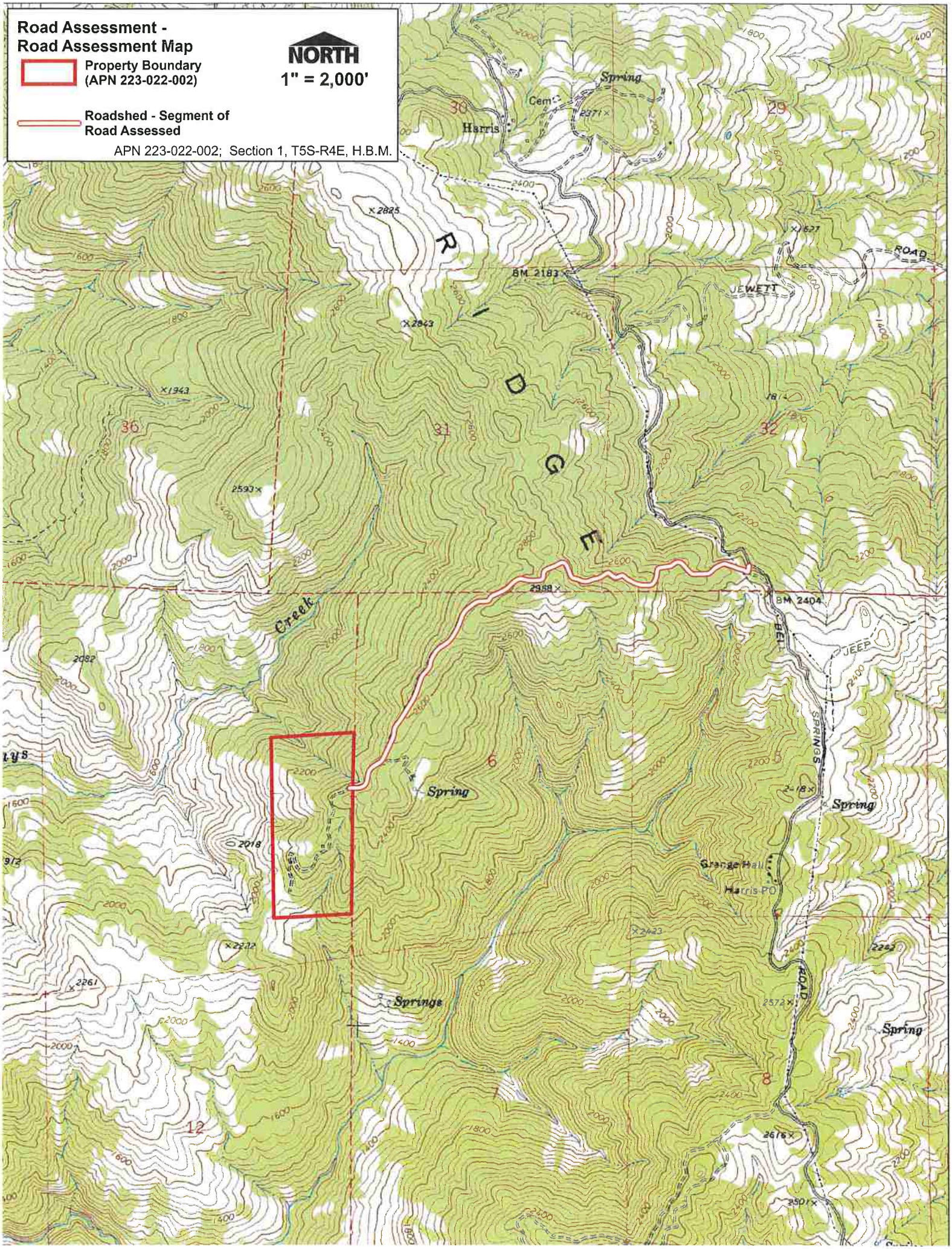
BMP: Road Outsloping

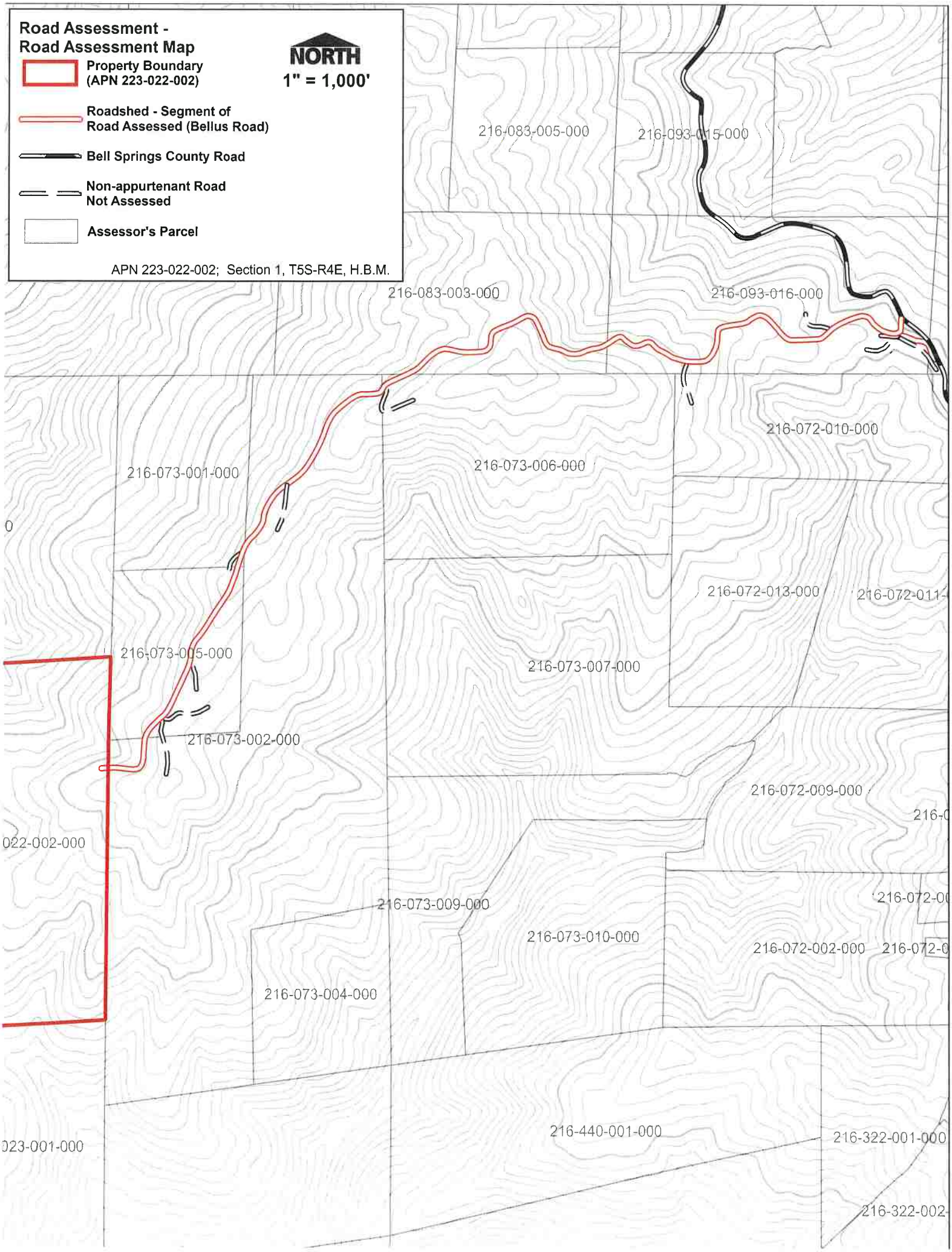


HANDBOOK FOR FOREST, RANCH, AND RURAL ROADS

FIGURE 29. *Road shape changes as the road travels through the landscape. For example, an outsloped 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.*

MAPS


Road Assessment -
Road Assessment Map
Property Boundary
(APN 223-022-002)
Roadshed - Segment of
Road Assessed
APN 223-022-002; Section 1, T5S-R4E, H.B.M.
NORTH
1" = 2,000'
RIDGE
Harris
Spring
Cem
BM 2183
JEWETT
ROAD
BM 2404
JEEP
Creek
Springs
Grange Hall
Harris PO
Spring
Springs


Road Assessment -
Road Assessment Map
Property Boundary
(APN 223-022-002)
NORTH
1" = 1,000'
Roadshed - Segment of
Road Assessed (Bellus Road)
Bell Springs County Road
Non-appurtenant Road
Not Assessed
Assessor's Parcel
APN 223-022-002; Section 1, T5S-R4E, H.B.M.
216-083-005-000
216-093-015-000
216-083-003-000
216-093-016-000
216-072-010-000
216-073-001-000
216-073-006-000
216-072-013-000
216-073-005-000
216-073-007-000
216-073-002-000
216-072-009-000
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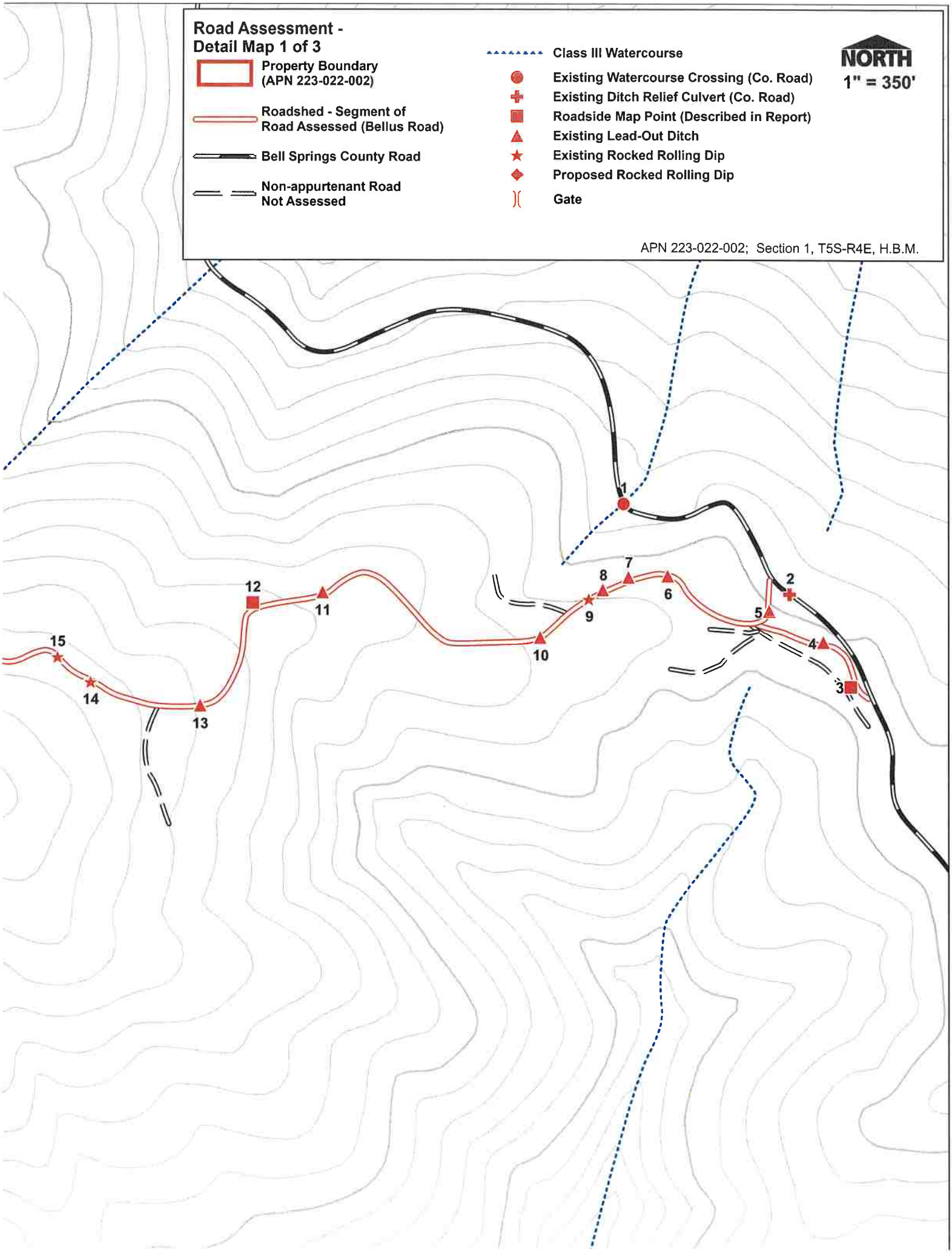
216-073-004-000
216-440-001-000
216-322-001-000


Road Assessment -
Detail Map 1 of 3
Property Boundary
(APN 223-022-002)
Roadshed - Segment of
Road Assessed (Bellus Road)
Bell Springs County Road
Non-appurtenant Road
Not Assessed
Class III Watercourse
Existing Watercourse Crossing (Co. Road)
Existing Ditch Relief Culvert (Co. Road)
Roadside Map Point (Described in Report)
Existing Lead-Out Ditch
Existing Rocked Rolling Dip
Proposed Rocked Rolling Dip
Gate
NORTH
1" = 350'
APN 223-022-002; Section 1, T5S-R4E, H.B.M.
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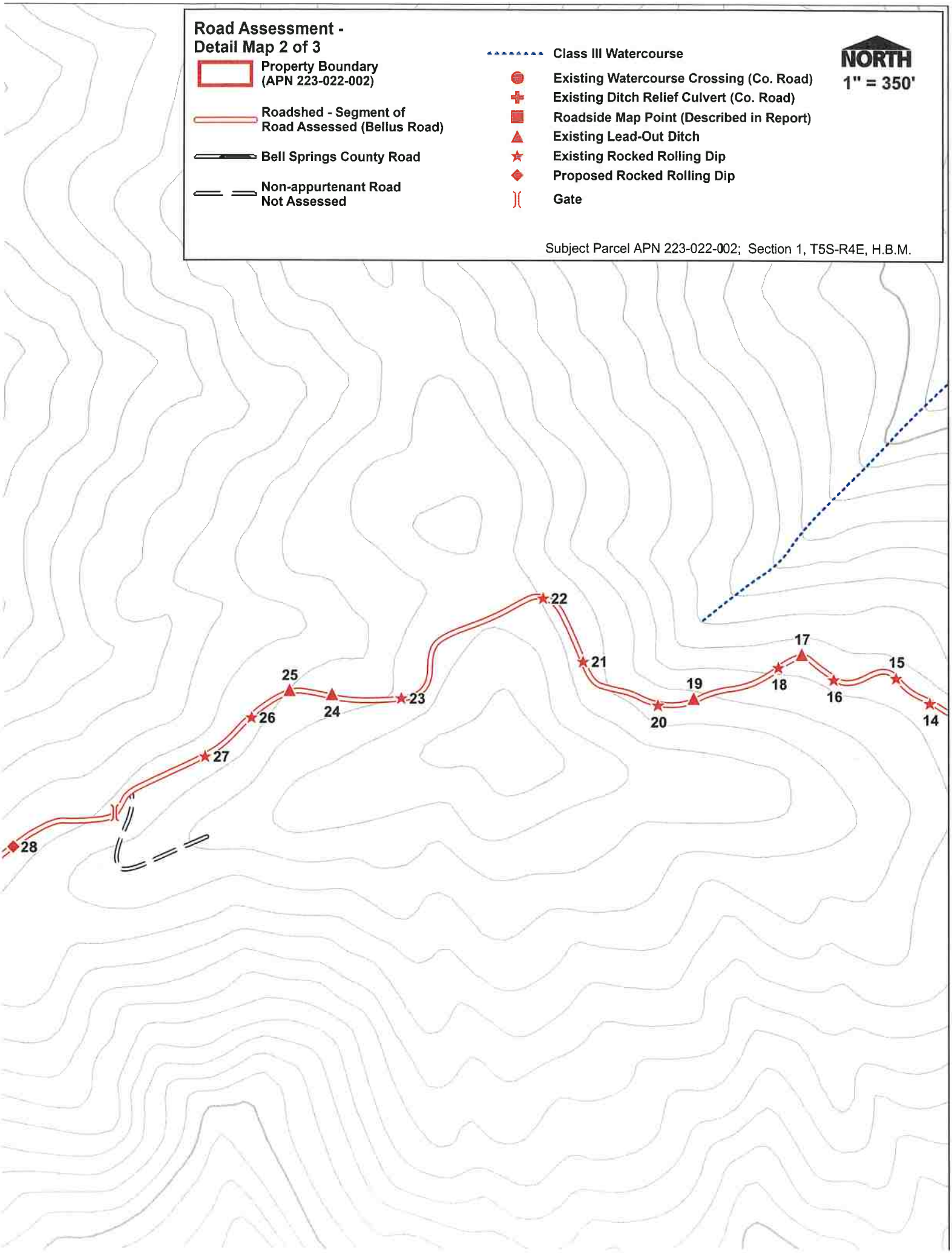
Road Assessment -
Detail Map 2 of 3
Property Boundary
(APN 223-022-002)
Roadshed - Segment of
Road Assessed (Bellus Road)
Bell Springs County Road
Non-appurtenant Road
Not Assessed
Class III Watercourse
Existing Watercourse Crossing (Co. Road)
Existing Ditch Relief Culvert (Co. Road)
Roadside Map Point (Described in Report)
Existing Lead-Out Ditch
Existing Rocked Rolling Dip
Proposed Rocked Rolling Dip
Gate
NORTH
1" = 350'
Subject Parcel APN 223-022-002; Section 1, T5S-R4E, H.B.M.
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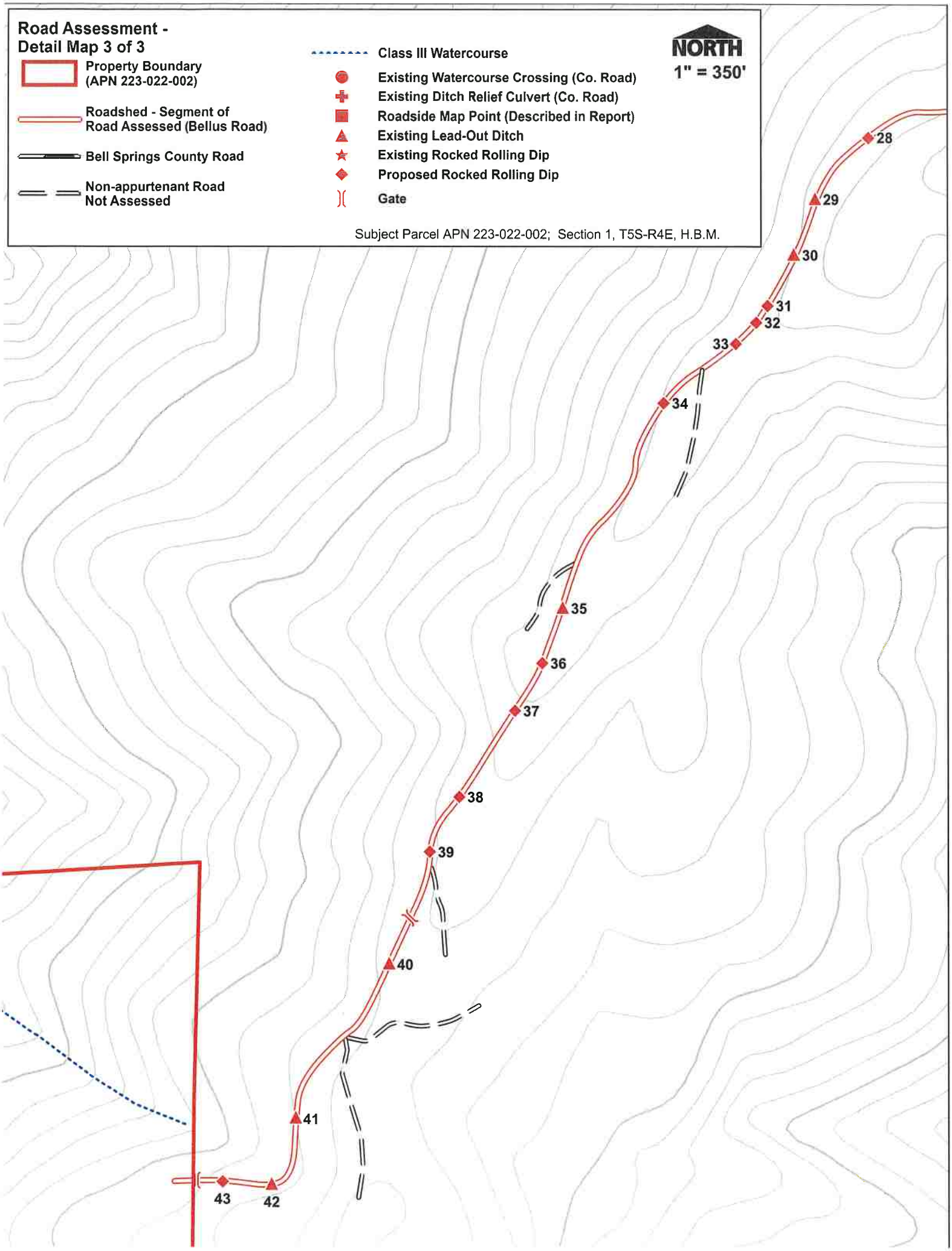
Road Assessment -
Detail Map 3 of 3
Property Boundary
(APN 223-022-002)
Roadshed - Segment of
Road Assessed (Bellus Road)
Bell Springs County Road
Non-appurtenant Road
Not Assessed
Class III Watercourse
Existing Watercourse Crossing (Co. Road)
Existing Ditch Relief Culvert (Co. Road)
Roadside Map Point (Described in Report)
Existing Lead-Out Ditch
Existing Rocked Rolling Dip
Proposed Rocked Rolling Dip
Gate
NORTH
1" = 350'
Subject Parcel APN 223-022-002; Section 1, T5S-R4E, H.B.M.
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