

# TECHNICAL MEMORANDUM

## Titlow Hill General Plan Amendment, Zone Reclassification, and Subdivision Certifications Road Maintenance and Capital Improvement Cost Analysis Background

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Prepared For: County of Humboldt

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Attachments: Figures: Figure 1: Titlow Hill Road Maintenance Plan  
Appendix 1: Humboldt County Public Works Road Evaluations  
Appendix 2: Humboldt County Public Works Memorandum  
Appendix 3: Per Parcel RMA Cost Estimates

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## 1.0 OVERVIEW

This memorandum documents the raw data, agency recommendations, and assumptions used to estimate the per parcel costs of capital improvements and road maintenance that are likely to be necessary to satisfy mitigations and conditions associated with the proposed Titlow Hill General Plan Amendment, Zone Reclassification, and Subdivision Certifications (Project). The suggested Road Maintenance Association (RMA) membership are also discussed. The Project is located in the Titlow Hill area of eastern Humboldt County within the boundary of the historic B&B Ranch (Figure 1).

The capital improvement and road maintenance needs addressed in this analysis are a necessary component of the Project, as all roads within the Project area will be required to meet standards set forth in the Humboldt County Fire Safe Regulations (Humboldt County Code §3111-3116).

Humboldt County Public Works collected data and completed road evaluations on portions of the Titlow Hill road network between April 19, 2018 and June 19, 2018. The data sheets pertaining to these road evaluations have been compiled in Appendix 1.

The road evaluations contain information regarding the slope, width, condition, line of sight, pinch points, culverts, bridges, and gates present at discrete, non-regular intervals along the roadway. Data collection was performed intuitively, with intervals that capture significant changes in the roadway. Each observed change is noted and location referenced.

The Humboldt County Fire Safe Regulations, in part, require that roadways meet specific standards to allow for safe ingress/egress and access for emergency services. The most common ways that rural roads fail to meet these standards are poor line of sight, insufficient width, length of dead-end roads, turnarounds, and signage.

A plan to work towards compliance with the Fire Safe Regulations and the road standards contained in the Humboldt County Subdivision Regulations has been presented in the memo provided by Humboldt County Public Works, which was created in collaboration with the California Department of Forestry and Fire Protection (CalFire), dated June 17, 2020 (Appendix 2).

## 2.0 ROAD MAINTENANCE MEMBERSHIP

To determine which parcels would need to join which Road Maintenance Associations (RMAs), the primary consideration was which road the parcel takes access from and which roads need to be used to gain that access. Secondary access, which is crucial for fire protection purposes, is also considered. Including secondary access in the consideration for which RMAs a parcel needs to join can mean that a parcel could be included in an RMA for a road that they do not routinely use, but may need to use in the event of a fire blocking the primary access. In some cases, more than one RMA would need to be joined.

The following RMAs are proposed to be created:

- Road 1, 2, and 2A: Upper Ranch Loop Road and Portions of Saber Tooth Road
- Road 2B: Portion of Saber Tooth Road
- Road 3: Old State Highway 299
- Road 4: Angus Road
- Road 5: Jim Road
- Road 6: Lower Saber Tooth Road

## 3.0 ROAD REQUIREMENTS

The Humboldt County Fire Safe Regulations contain requirements for road widths. Generally, all roads shall be constructed to a minimum Road Category 4 road standard of two ten (10) foot traffic lanes, not including shoulders, capable of providing for two-way traffic flow to support emergency vehicle and civilian egress (§3112-3. Road Width). In mountainous terrain and/or where geologic or other natural features make infeasible full development of two ten (10) foot wide traffic lanes, the standard may be modified where an exception has been granted pursuant to Sections 3111-7 through 3111-10 of the Fire Safe Regulations, and where residential density is limited, further subdivision rights have been waived, and intervisible turnouts are created.

Roadway grades in excess of 16 percent are required to be paved.

The maximum length of a dead-end road, for parcels zoned for 40 acres, which would be the case in the Project area after Project approval, is 7,500 feet.

## 4.0 ASSUMPTIONS

The following assumptions were used to facilitate evaluation of the potential costs of capital improvement and maintenance for the RMAs needed for the Project. The Project is considered to be at the conceptual stage and, as such, highly detailed cost estimates are not possible. Rather, we use “rule of thumb” type estimates and apply a contingency to cover unexpected conditions.

### 4.1 Cost Assumptions

The following cost assumptions were used in this analysis. The costs related to road widening, culvert replacement, and contingency funds were provided by LACO’s engineering department. The Consumer Price Index (CPI) was taken from the U.S. Bureau of Labor Statistics website for June 2020 (<https://www.bls.gov/cpi/>). The data assumptions used in the analysis were developed by LACO based on industry experience and the limited information available at this conceptual stage, and include the following:

- Where road widening of up to 4 feet would be needed, cost was assumed to be \$100,000 per mile.
- Where road widening of greater than 4 feet would be needed, cost was assumed to be \$150,000 per mile.
- The cost of replacing a culvert for width or 100-year flow requirements was assumed to be \$20,000 per culvert.
- A Consumer Price Index (CPI) of 0.6 percent.
- An additional 50 percent contingency was added to the calculated costs.
- Certain areas of the road where there is a 16 percent slope or greater would need to be paved. Applying the contingency allows for these costs to be captured in the assumptions above.
- No retaining walls are included in the cost estimation. Due to the lack of data on their necessity and variability of costs associated with designing and constructing retaining walls, they are not included in the cost assumptions.

Costs may be reduced if labor, equipment, and/or materials can be provided in-kind by those within the Project area.

### 4.2 Data Assumptions

The following assumptions were made to create the map exhibit (Figure 1) and estimate costs:

- The roadway width provided in the Humboldt County road evaluations is valid until the next reported post mile. For example, if the road evaluation states a width of 12 feet at mile post 1.0 and the next reported value is at post mile 1.2 with a width of 16 feet, the entire reach from mile post 1.0 to 1.2 is assumed to be 12 feet in width.
- The slope percent provided in the Humboldt County road evaluations is valid until the next reported post mile. For example, if the road evaluation states a grade of 17 percent at post mile 1.0 and the next reported value is at post mile 1.2, the entire reach from post mile 1.0 to 1.2 is assumed to be a 17 percent grade.
- The road evaluations provided by Humboldt County report the condition of the roadway at non-regular intervals, with various “segment lengths.” For example, there could be data provided for post miles 1.0, 1.1, 1.14, 1.18, and 2.0. These non-regular intervals have been approximated to regular intervals based on the total length of the road evaluated and the number of data points provided by Humboldt County. For example, if a given road is 2.5 miles in length, and 18 data points were provided at non-regular intervals, the regular intervals would be set at 0.139 miles each (2.5/18).

There is variability in the length of each road and number of data points recorded and regular intervals vary in length for each road. The range of length of the determined regular intervals is approximately 0.9 to 1.15 miles.

- Although regulations allow for exemptions to road category requirements for a variety of reasons (impassable terrain, difficult site conditions, etc.), it is assumed that all roads evaluated can and will be upgraded to meet the category requirements for their entire reach. Any of these possible exemptions will need to be identified and evaluated on a case-by-case basis through additional study.

## 5.0 SOURCES OF ERROR

The following sources of potential error have been identified in the analysis.

- Road 6/Lower Sabertooth Road. There is no current road evaluation for Road 6/Lower Sabertooth Road. This does not imply that road improvements and an RMA would not be necessary. Public Works is in the process of collecting data for this road.
- Continuity of Data. The road evaluations provided by Humboldt County use discrete mile posts to report the condition of a continuous roadway. These discrete points have been assumed to quantify the roadway conditions from the reported post mile to the next reported post mile. Further evaluation/survey work would be necessary to determine the length of roadway surface requiring improvement to a greater extent than is currently possible with existing data. The error produced by this assumption is various and can involve over or under estimation of costs. Further evaluation/surveying would be necessary to document the roadway conditions more precisely to determine the length of roadway improvements needed.
- Non-Regular Intervals. As mentioned above, the road evaluations provided by Humboldt County report the condition of the roadway at non-regular intervals, with various "segment lengths." For example, there could be data provided for post miles 1.0, 1.1, 1.14, 1.18, and 2.0. To allow these non-regular intervals to be manageable for the scale of the map, they have been approximated to regular intervals based on the total length of the road evaluated and the number of data points provided by Humboldt County. The error produced by this assumption is various and can involve over or under estimation of the length of improvements needed. The direction of error is dependent on whether a discrete post mile is part of a roadway increment that has been expanded or contracted to become a "regular interval."

## 6.0 COSTS NOT INCLUDED

Several sources of potential additional cost have not been included in the cost estimates. The following potential sources of additional costs are not included in this analysis:

- Design and permitting costs.
- Required signage improvements.
- Gate modifications, if necessary.
- Bridge improvements, if necessary
- Retaining walls, if necessary.
- Vegetation management.

## 7.0 CULVERT EVALUATION

On July 20, 2020, LACO staff visited the Project area and took measurements of the 44 culverts on Upper Ranch Loop Road (Road 1). LACO is in the process of evaluating the existing culvert sizing to determine if

individual culverts are sized appropriately for the 100-year storm event. Once the analysis is complete, the number of culverts that need to be replaced may be reduced. The information will also aid in determining which culverts are most severely undersized and priority can be given to replacing those culverts. Culverts on roads other than Upper Ranch Loop Road have not yet been evaluated. Due to locked gates on many of these roads, further evaluation will require coordination with residents of those roads.

## 8.0 ESTIMATED COST

The costs associated with the road improvements including culvert replacements for each RMA are broken down on a per parcel basis in Appendix 3. There are approximately 4.7 miles of road that will need to be widened 4 feet or less. There are approximately 13.5 miles of road that will need to be widened 4 feet or more. There are approximately 68 culverts that potentially need to be replaced. The total anticipated cost for these improvements is \$5,093,000. (Note all estimates are rounded to the nearest \$1,000.)

The estimated costs associated with road widening capital improvements per RMA were calculated as follows:

Road 1, 2, and 2A:	\$2,693,000
Road 2B:	\$211,000
Road 3:	\$236,000
Road 4:	\$280,000
Road 5:	\$313,000
Road 6:	\$TBD

The estimated costs associated with culvert replacement capital improvements per RMA were calculated as follows (Note: Culverts are assumed to need replacement until proven otherwise, analysis pending):

Road 1, 2, and 2A:	\$1,020,000
Road 2B:	\$80,000
Road 3:	\$200,000
Road 4:	\$40,000
Road 5:	\$20,000
Road 6:	\$TBD

The total estimated costs associated with roadway capital improvements (roadway widening and culverts) per RMA were calculated as follows (see also Figure 2):

Road 1, 2, and 2A:	\$3,713,000
Road 2B:	\$291,000
Road 3:	\$436,000
Road 4:	\$320,000
Road 5:	\$333,000
Road 6:	\$TBD

## 8.1 Capital Improvements Annual Dues

Based on Public Works and CalFire recommendations, the capital improvements should be completed within 5 years, allowing the total estimated cost of capital improvements to be collected over a 5-year period.

Based on these initial estimates, annual RMA dues for capital improvements would be calculated as follows:

Road 1, 2, and 2A:	\$12,500
Road 2B:	\$11,500
Road 3:	\$22,000
Road 4:	\$16,000

Road 5:	\$9,500
Road 6:	\$TBD

In some cases, such as Road 3, a 5-year timeframe may be unrealistic and require a longer time horizon to make the improvements financially feasible.

## **8.2 Maintenance Dues Annual Fees**

In addition to the capital improvements, there will be annual costs associated with ongoing road maintenance. These costs will be a fraction of the capital improvement cost. Road maintenance cost can be highly variable and are dependent on how well designed and constructed the road is in the first place. According to the Handbook for Forest Ranch and Rural Roads (Pacific Watershed Associates, 2015), road maintenance should address the road surface, cutbanks, and fill slopes, as well as drainage structures and erosion control measures. Each RMA will need to establish a road maintenance plan and establish annual dues to be collected.

## 9.0 REFERENCES

County of Humboldt. 2019. Humboldt County Code §3111-3116. *Humboldt County Community Wildfire Protection Plan, 2019. Appendix J: Humboldt County SRA Fire Safe Regulations*. Accessed July 2020. Available at: <https://humboldt.gov/DocumentCenter/View/70572/Appendix-J-County-SRA-Fire-Safe-Regulations-Humboldt-County-CWPP-FINAL?bidId=>.

United States Bureau of Labor Statistics. Last modified June 2020. *Consumer Price Index*. Accessed July 2020. Available at: <https://www.bls.gov/cpi/>.

## FIGURES

### **Figure 1**

### **Titlow Hill Road Maintenance Plan**

## APPENDIX 1

### **Humboldt County Public Works Road Evaluations**

## APPENDIX 2

### **Humboldt County Public Works Memorandum**

## APPENDIX 3

### **Per Parcel RMA Cost Estimates**