ALTERNATIVES FEASIBILITY STUDY

MT. MURPHY ROAD BRIDGE REPLACEMENT PROJECT 5925 (090) 25C0004

SEPTEMBER 2016

This document serves as a technical study of the alternatives (corridors) considered for evaluation in the environmental process of the Mt. Murphy Bridge Replacement Project (Project). The study focuses on the feasibility (viability) of the alternatives as it pertains to funding, design practices, right-of-way impacts, environmental impacts, and cultural/historical impacts. The study serves as a supporting document of the consideration of alternatives evaluated as it applies to the Environmental Document on the Project.

EXECUTIVE SUMMARY

The purpose of this document is to acknowledge the three (3) initial alternatives for the proposed Mt. Murphy Bridge Replacement Project (Project) identified by the lead agency for consideration in the Environmental Impact Report (EIR). The viability of the alternatives for further evaluation in the EIR is also addressed in this report based on assessing the effectiveness of the alternatives to meet the basic project objectives.

This project is located in the small historic community of Coloma that is home to Marshal Gold Discovery State Historic Park (MGDSHP) and therefore necessitates a limited impact design (LID). A Feasibility Study for possible retrofit of the existing bridge to meet necessary standards was completed and determined it is not feasible to retrofit the existing bridge to meet current safety standards. The preliminary alternatives and project objectives reflect input from community stakeholder advisory committee, MGDSHP, Caltrans, and the County Board of Supervisors.

These project objectives include the following features:

1. Remove and replace a structurally deficient and functionally obsolete bridge from the County bridge inventory with a solution that satisfies good design practices (to include solutions that are consistent with project funding requirements, have minimal right-of-way impacts, and are cost and schedule effective), and improves safety for users (Objective 1);
2. Protect natural resources by avoiding or minimizing impacts (Objective 2); and
3. Protect cultural and historical resources by avoiding or minimizing impacts (Objective 3).

The three (3) initial alternatives include the following:

1. Corridor 1: On existing alignment
2. Corridor 2: Approximately 1,000 ft downstream
3. Corridor 3: Approximately 2,500 ft downstream

The findings associated with this technical study conclude that Corridor 1 (on existing alignment) appears to be the preferred solution based on the following considerations:

1. The alternative most closely meets the HBP project funding requirements.
2. The alternative is the most cost and schedule effective solution.
3. The alternative contains the least required roadway expansion and minimal to no impacts to State Highway 49.
4. The alternative minimizes the most right-of-way impacts, both temporary and permanent, including impacts to lands owned by the MGDSP.
5. The alternative minimizes the most disturbances to natural habitat and sensitive areas, including waterways.
6. The alternative is consistent with the El Dorado County Transportation Commission (EDCTC) State Route (SR) 49 Realignment Study and Caltrans Transportation Concept Report (TCR) for SR 49.
7. Community identity can be preserved by replacing the bridge on alignment with a similar style structure that meets current safety standards.

By contrast, the findings of Corridor 2 (approx. 1,000 lf downstream) appear to have significant impacts that may deem the alternative infeasible based on the following considerations:

1. The alternative requires considerable roadway improvements that appear to be beyond the project funding requirements at nearly three (3) times the length of roadway improvements than Corridor 1.
2. The alternative requires considerable costs to construct (over 150% the costs of Corridor 1 which does not include additional design or preliminary engineering costs).
3. The alternative has considerable environmental impacts at nearly 3 1/2 times the permanent disturbance area in undeveloped locations as compared to Corridor 1.
4. The alternative results in the largest apparent cultural and historical resource impacts to MGDSP including improvements in the center of Gold Discovery Park.

Similarly, the findings of Corridor 3 (approx. 2,500 lf downstream) appear to have significant impacts that may deem the alternative infeasible based on the following considerations:

1. The alternative requires substantial roadway improvements that appear beyond the project funding requirements with nearly five (5) times the total length of roadway improvements typically eligible for project funding, and nearly 7 1/2 times the distance of roadway improvements proposed by Corridor 1.
2. The alternative requires significant improvements to Highway 49 which may require funding from other currently unidentified sources (approx. 1,100 lf of improvements and approx. $1.2 million).
3. The alternative requires the greatest costs and schedule to construct (over 150% the costs of Corridor 1 which does not include additional design or preliminary engineering costs).
4. The alternative requires the greatest right-of-way acquisitions to construct, including over 20 times the area of acquisition from State Parks as compared to Corridor 1.
5. The alternative has the greatest environmental impacts at approximately 8.6 times the permanent disturbance area in undeveloped locations as compared to Corridor 1, including impacts to waterways and permit complexities.
6. The alternative is considered infeasible by EDCTC in the SR 49 Realignment Study and Caltrans in the TCR for SR 49 based on inability to meet key goals and significant resource impacts.

For additional details pertaining to the above summary of findings, refer to the Corridor Relative Impacts Table located in Appendix A.

Based on the findings associated with this technical study, Corridor 1 is the likely preferred design for the proposed Project and should continue to be evaluated for consideration in California Environmental Quality Act (CEQA) and the EIR. Consistent with CEQA Guidelines Section 15126.6(d), the EIR will also include sufficient information which may be qualitative in nature, about each alternative to the proposed Project to allow meaningful evaluation, analysis, and comparison.

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General: For additional details pertaining to the alternatives and discussions of potential impacts, refer to "Mt. Murphy Road Bridge Project Alternatives Analysis Report," prepared by CH2M Hill, dated May 2015.

CONSIDERATION OF ALTERNATIVES FOR THE MT. MURPHY BRIDGE REPLACEMENT PROJECT

I. INTRODUCTION

The purpose of this document is to acknowledge the three (3) initial alternatives for the proposed Mt. Murphy Bridge Replacement Project (Project) identified by the lead agency for consideration in the Environmental Impact Report (EIR). The viability of the alternatives for further evaluation in the EIR are also addressed in this report.

II. PROJECT OBJECTIVES

CEQA Guidelines Section 15124 describes the need for a statement of objectives sought by a proposed project. The statement of objectives includes the underlying purpose of a project. This Project's purpose is described in the following objectives. These clear project objectives simplify the selection process by providing a standard against which to measure the alternatives.

Objective 1:
To replace a structurally deficient and functionally obsolete bridge and reconstruct the roadway approaches to satisfy good design practices and improve safety for users of the facility.

This objective includes the following elements:

a. Objective 1a: Effectiveness of the proposed solution to satisfy good design practices in a solution consistent with the project funding requirements [Highway Bridge Program (HBP)].
b. Objective 1b: Construction cost and schedule effectiveness of the proposed solution.
c. Objective 1c: Feasibility of the proposed solution as it pertains to right-of-way impacts.

Objective 2:
Protect natural resources, including native oak trees, and the South Fork of the American River by selecting alignments that directly avoid or minimize impacts to these features to the extent feasible while producing environmental benefits where achievable.

Objective 3:
Protect cultural and historical resources and preserve the historic community identity by selecting alignments that directly avoid or minimize impacts to these features to the extent feasible while producing benefits where achievable.

III. ALTERNATIVES CONSIDERED

Numerous initial alternatives to meet the Project objectives were considered with attention paid to the functionality of the various designs and their ability to meet the objective design elements, and the ability of the alternative to minimize or avoid significant effects on the environment and cultural/ historical resources. Focus was then given to alternatives which are capable of avoiding or substantially lessening many significant effects of the project. Nine (9) alternatives were initially evaluated and many were rejected based on the following:

- Similarly satisfying the project objectives but less feasible compared to other similar alternatives
- Failure to meet most of the basic project objectives
- Infeasible

- Significant environmental effects
- Not satisfying good design practices

Discussion of these alternatives and reasons for their rejection will be provided in the Project EIR.

The initial alternatives evaluation process resulted in three remaining alternatives listed as corridors.

- Corridor 1: Existing Alignment Alternatives 2A, 2B, 3A, 3B and 7
- Corridor 2: Alternatives 1 or 5, or hybrid of the two.
- Corridor 3: Alternative 6

Since the initial alternatives analysis, the three alternatives of the Project have been further evaluated based on site specific details and their ability to meet the basic project objectives. The findings associated with this analysis may be seen below.

IV. FURTHER CONSIDERATION OF CORRIDORS 1, 2, and 3

Below is a summary of the additional evaluation of Corridors 1, 2, and 3 to determine whether it is reasonable to include all corridors, or any portion thereof, as part of a range of alternatives in the EIR. For a detailed summary of the information discussed in this section and the relative impacts of the three corridors, refer to Appendix A.

DESCRIPTION OF CORRIDOR 1

Corridor 1 would be located approximately "on alignment" or adjacent to the current alignment of the existing Mt. Murphy Road Bridge and be constructed in two stages (See Appendix B). Stage 1 would be accomplished by constructing half of the new bridge adjacent to the existing, thereby allowing traffic to continue to utilize the existing alignment. In Stage 2, traffic would be shifted from the existing alignment to the newly constructed portion of the bridge and roadway from Stage 1. This alternative appears to encroach upon the existing driveway for the Gold Trail Grange No. 452 (Grange) building and a new driveway on the opposite side of the Grange may need to be provided (as shown in exhibits located in the Appendices). Corridor 1 would require the removal of the existing Mt. Murphy Bridge, which may potentially require mitigation[1].

As shown in the project "Screening Criteria" (See Appendix I), Corridor 1 performed the highest based on screening categories developed through public feedback.

Comparison Against Project Objectives

Corridor 1 appears to meet all the above outlined objectives by replacing a structurally deficient and functionally obsolete Mt. Murphy Road Bridge with a solution that both satisfies good design practices while also avoiding or minimizing impacts to natural and cultural/ historical resources as detailed below:

Objective 1a

i. **Corridor 1 would replace the structurally deficient and functionally obsolete Mt. Murphy Bridge with a solution that satisfies good design practices by utilizing the existing roadway alignment to minimize the required limits of work.** The improvements proposed in Corridor 1 replace the Mt. Murphy Bridge with a solution that adheres to current design standards without extensive roadway approach improvements required by utilizing the existing alignment and satisfying good design practices (See Appendix A). Additionally, the proposed solution of

Corridor 1 contains improvements above the high water mark (hydraulic required improvements), and contains minimal retaining walls or roadway structures to construct.

ii. **Corridor 1 would enhance safety for users of the facility without requiring additional improvements along the roadway approaches or tie-ins.** Since Corridor 1 optimizes use of the existing alignment, impacts to adjacent infrastructure (such as trails, adjacent roadway, residents, etc.) as a consequence of improving the bridge facility can be minimized without compromising performance or safety of the proposed alignment.

iii. **Corridor 1 provides a solution that meets the requirements of the HBP funding the project.** The HBP program funding the project focuses expenditures on bridge improvements and as such, provides standards for roadway limits funded by the program. For an off-system roadway (similar to Mt. Murphy) the program stipulates a 400' limit for roadway approach improvements on either side of the bridge (800' total), or the minimum necessary to make the facility operable and consistent with current design standards. Corridor 1 provides a solution that adheres to these requirements with roadway approach limits of less than 400' on either side of the bridge (approximately 150' approach on the South and 350' approach on the North). Additionally, the HBP program also stipulates goals on program expenses, based on Federal Highway Administration (FHWA) guidelines, towards roadway improvements (not to exceed 10% construction costs) and no improvements performed on state highways. For Corridor 1 estimated roadway expenditures are below 10% total construction costs and negligible impacts are anticipated to occur on State Highway 49 as the proposed alternative utilizes the existing roadway and Mt. Murphy Road intersection infrastructure.

iv. **Corridor 1 provides an effective and efficient solution that minimizes permanent impacts to residents that depend upon this bridge for access.** Since Corridor 1 minimizes the required improvements to replace the existing bridge by utilizing the existing alignment, the construction schedule and costs can be minimized. Furthermore, by performing two-stage construction, residents can continue to utilize the existing alignment through construction. Once complete, the final configuration will also require minimal changes to conform to the proposed bridge.

Objective 1b

v. **Corridor 1 provides a solution that minimizes cost and schedule impacts.** The improvements proposed in Corridor 1 replace the Mt. Murphy Bridge with a solution that minimizes costs and schedule (apparent lowest cost and schedule requirements to construct of the three alternatives, see Appendix A and G).

Objective 1c

vi. **Corridor 1 provides a solution that minimizes right-of-way (ROW) impacts.** The improvements proposed in Corridor 1 replace the Mt. Murphy Bridge with a solution that has a minimal impact to ROW in both temporary and permanent acquisitions (apparent lowest ROW impact areas of the three Corridors, see Appendix E). Additionally, the ROW impacts associated with Corridor 1 minimize the impact areas in Caltrans ROW and State Parks land.

Objective 2

i. **Corridor 1 appears to have minimal impact areas, especially impacts to natural habitat or sensitive areas (i.e. Waters of the United States, WOUS).** Since Corridor 1 utilizes the existing roadway alignment, most improvements will be performed in an existing developed area (roadway or adjacent shoulder), with very few features impacting natural habitat (See Appendix C). This is also further illustrated by the minimal area of improvements required to replace the bridge. In summation, Corridor 1 has the apparent lowest disturbance areas either permanent or temporary, tree and habitat removal areas, fills in WOUS, permit complexities during construction, and environmental costs (i.e. mitigation fees, tree removal, monitoring, etc.) of the three alternatives.

ii. **Corridor 1 appears have a minimal temporary or permanent impact to air quality.** Since the limits of work and project improvements are minimized by utilizing the existing alignment, construction schedules should also be minimized. Similarly, detours or extensive staging efforts would be mitigated through the use of 2-stage construction. This would result in a minimal temporary or permanent impact to air quality as final traffic configurations will remain in their existing patterns. Furthermore, temporary impacts would be mitigated by the minimal grading and large equipment operations needed to construct Corridor 1. Since post project alignment is also consistent with existing conditions, travel paths and emissions should also be unimpacted.

iii. **Corridor 1 appears to have a minimal impact area in the floodway (high water mark).** Since most of the proposed improvements in Corridor 1 appear to be located above the approximate high water mark (with the exception of one (1) Pier 2), the impacts and work areas in the approximate floodway are limited and will likely be performed without significant access or impact to these sensitive areas.

iv. **Corridor 1 appears to have a minimal impact on viewshed, traffic, bicycle, and pedestrian circulation.** Since Corridor 1 utilizes the existing alignment, the viewshed, both for bridge users and travelers along Highway 49 or Marshall Gold Discovery Park, as well as the existing traffic, bicycle, and pedestrian circulation performance, will be relatively unimpacted in the post project condition.

Objective 3

i. **Corridor 1 appears to avoid or minimize impacts to existing cultural and/or historical resources.** Since Corridor 1 utilizes the existing roadway alignment, most improvements will be performed in an existing developed area, and is aligned with the bridge in the 1857 map. These improvements appear to avoid cultural and/or historical resources to neighboring buildings and sites (See Appendix F). However, the existing Mt. Murphy Bridge will require removal and replacement[1].

ii. **Corridor 1 can be constructed without temporary or permanent disturbance to adjacent cultural and/or historical resources by implementing monitoring and vibration requirements during construction.** As shown in the "Vibration Study Documentation" (See Appendix H), construction activities can be mitigated to help ensure vibration amplitudes are maintained within acceptable ranges. As shown in the analysis and detailed in the exhibits and calculations located in the Vibration Study, most construction activities would not pose a threat to nearby cultural and/or historical resources. It is recommended in the Vibration Study Document, however, that vibratory pile driving and vibratory rollers be avoided and other means of construction evaluated. In other words, for the construction of Corridor 1 (as based upon site soil conditions assumed and proximity to the closest nearby cultural resource), vibratory pile drilling and vibratory rollers if used would be anticipated to potentially generate vibration amplitude at the threshold for damages to old masonry structures. This finding, however, can be mitigated by the structure and footing design (i.e. spread footing, drilled piles, etc.) and by requiring the contractor to perform extensive site investigation and monitoring during construction. These monitoring efforts may include placing monitoring devices nearby adjacent sensitive site locations (i.e. cultural resources) and imposing vibration amplitude requirements below damage thresholds. Alternatively, if during additional site investigations it is determined that maintaining the vibration amplitude below damaging thresholds cannot be reasonable accomplished, other design approaches with less invasive vibratory means of construction may be considered to help ensure safety of nearby cultural resources. Additionally, after construction improvements are complete, vibration considerations associated with nearby large truck traffic should not be of concern as the vibration amplitude for these trucks appears to be below the threshold that damages would occur for the site. This is based upon soil conditions and distance between the travel way and sensitive locations (See Appendix H).

iii. **Corridor 1 does not appear to impact future potential realignments of Highway 49 (i.e. "Coloma Bypass") based on ADT and traffic analysis.** The "State Route 49 Realignment Study" performed by the El Dorado County Transportation Commission discusses the "Coloma Bypass" as an alternative not selected or analyzed based upon its inability to meet key project goals and have a far greater impact on resources (including environmental impacts). The study identifies the need to replace Mt. Murphy Bridge as an opportunity to fund one of the two bridges proposed in the alignment. This alternative has also been identified by State Parks as a preferred solution for realignment of State Route 49. The findings associated with the elimination of the "Coloma Bypass" as an alternative to consider in the potential realignment of SR 49 is also consistent with the Transportation Concept Report (TCR) for SR 49 performed by Caltrans (for additional details refer to Appendix J). Based on ADT and traffic analysis, however, the traffic volumes of Mt. Murphy Road are negligible compared to State Route 49; therefore, realignments of State Route 49 should be considered separate from Mt. Murphy Road Bridge Replacement.

As shown in the "Corridor 1 Traffic Study" (See Appendix D), traffic counts performed along Highway 49 and Mt. Murphy Road indicate that the majority of travelers along Highway 49 are not users of Mt Murphy Road. These findings are based upon traffic studies for turning movements on Mt. Murphy Road (and traffic counts) performed by Caltrans and El Dorado County within the area. The results indicate that approximately 3% of the traffic along Highway 49 accesses Mt. Murphy Road during the peak weekdays based on turning movements. Additionally, based on approximate Average Daily Traffic (ADT) volumes, Mt. Murphy Road counts are approximately 5% to volume of Hwy 49 counts. These results indicate that the travelers along Mt. Murphy Road only constitute a small fraction of the traffic utilizing Highway 49. These findings also appear to be consistent when evaluating future growth (over the next 20 years) see Appendix D. As a consequence of these findings, it may be concluded that future potential realignment of Highway 49 should be regarded separately from the Mt. Murphy Bridge Project.

Corridor 1 Concluding Remarks

Based on the assessment above, Corridor 1 appears to clearly meet all project objectives, to include:

1. Supports Project Purpose and Need (project feasibility) to include:
    a. Effectiveness at satisfying good design practices and meeting the project funding requirements (Objective 1a)
    b. Construction cost and schedule effectiveness (Objective 1b)
    c. Minimize right-of-way impacts (Objective 1c)
2. Protects natural and environmental resources by avoiding or minimizing impacts (Objective 2)
3. Protects cultural and historical resources by avoiding or minimizing impacts (Objective 3). Note that the removal of the existing Mt. Murphy Bridge is likely to be required for all alternative Corridors and may require mitigation[3].

DESCRIPTION OF CORRIDOR 2

Corridor 2 would be located approximately 1,000 feet downstream, north of the existing Mt. Murphy Bridge (See Appendix B). This corridor would include a new intersection with Highway 49 downstream and adjacent to the Grange Building. After Crossing the South Fork American River, the alignment would tie into existing Mt. Murphy Road and Carvers Road near the exit for the Coloma Resort. This corridor would require realignment of the adjacent river trail to allow for construction of the new roadway along the north side of the river and parallel to Mt. Murphy Road

before connecting at the intersection of Carvers Road. The existing Mt. Murphy Bridge and Mt. Murphy Road would maintain traffic during construction. The existing bridge would be removed after construction of the new 2-lane bridge (with sidewalks) unless funding and ownership can be found to retrofit and maintain the existing bridge for pedestrian, bicycle, or other uses. It should also be noted that due to this close proximity of the new bridge downstream the existing (old) bridge, a safety risk of structure damage due to washout of the old bridge would be present. This risk of washout will likely require removal of the old bridge for Corridor 2 to be built. This risk has also been identified by Caltrans personnel.

As shown in the project "Screening Criteria" (See Appendix I), Corridor 2 performed slightly below Corridor 3 based on screening categories developed through public feedback.

Comparison Against Project Objectives

While Corridor 2 appears to meet some of Objective 1 in replacing a structurally deficient and functionally obsolete Mt. Murphy Road Bridge, it requires more approach roadway improvements, with substantial impacts to State Parks, and fails to meet most of the project objectives set forth in Objective 3 and outlined below:

Objective 1a

i. **Corridor 2 would replace the structurally deficient and functionally obsolete Mt. Murphy Bridge with a solution that requires extended roadway approach improvements to include realignment of Bayne Road intersection and a new intersection at Highway 49 and Mt. Murphy Road.** While the improvements proposed in Corridor 2 include a bridge structure of similar geometrics to Corridor 1, the extensive roadway improvements may be deemed beyond those necessary to satisfy the best practices for design and outside the funding limits of the HBP program (See Appendix A). The new alignment and intersection reconstructions (required at Bayne Road and Highway 49) are anticipated to exceed the 400' approach limits (800' total) of the HBP program funding the project. For Corridor 2, the approach roadway improvements are anticipated to amount to around 1,325' total and exceed the 10% roadway funding expenditures for the HBP program. It should also be noted that although a new intersection at Mt Murphy Road and Highway 49 is required, the solution of Corridor 2 is anticipated to need from very few to negligible improvements along Highway 49 to accommodate the proposed intersection.

ii. **Corridor 2 would improve safety for users of the bridge and intersection facilities with limited permanent impact to residents that depend upon the bridge for access.** The Corridor 2 proposed improvements include replacing the existing bridge with a new bridge facility and approaches that meet current design standards and operational needs, thereby improving the safety of the facility's users. Furthermore, since these improvements may be constructed off-alignment, very few traffic closures or detours are anticipated.

iii. **Corridor 2 provides a solution that is substantially above the high water mark and does not require extensive retaining walls or roadway structures to construct.** Corridor 2 utilizes good design practice in a solution that is substantially above the high water mark and flood plain, and an alignment that while longer than the 800' length prescribed by the HBP program does not appear to require extensive retaining wall and roadway structures to construct.

Objective 1b

iv. **Corridor 2 provides a solution that has an effective construction schedule, but considerable costs.** The improvements proposed in Corridor 2 replace the Mt. Murphy Bridge with a solution that minimizes schedule; however, requires considerable roadway and bridge costs to construct. Approximately over a $1 million more roadway construction costs, and the apparent largest bridge and overall construction costs of the three alternatives. It should be noted, however, that cost savings may be seen in reducing the bridge and roadway widths (from 46' total width, 12' travel

lanes, 5’ shoulders, 6’ sidewalks) to a geometry similar to Corridor 1 (32’ total width, 12’ travel lanes, 4’ sidewalks) (See Appendix A and G).

Objective 1c

v. **Corridor 2 provides a solution with considerable right-of-way impacts to include impacts to the State Parks (Gold Discovery Park).** The improvements proposed in Corridor 2 replace the Mt. Murphy Bridge with a new alignment solution that requires extensive ROW acquisition from State Parks to include substantial impact to Marshall Gold Discovery Park (See Appendix E).

Objective 2

i. **Corridor 2 appears to have considerable impact to natural habitat and some sensitive areas adjacent to and within floodplains or WOUS.** Since Corridor 2 utilizes a new alignment in substantially undeveloped locations, the temporary and permanent disturbance areas are considerable. Moreover, these disturbance areas also include locations of sensitive habitat within and/ or adjacent to the floodplain. As a result, it is anticipated that Corridor 2 will have considerable tree and habitat removal areas, higher costs and schedule implications associated with the work activities, and permit complexities occurring in these areas (See Appendix C).

ii. **Corridor 2 would likely have a potential temporary and permanent impact to air quality.** Since Corridor 2 involves more grading and large equipment operations, and a proposed new alignment with a longer final travel path for vehicles, it is anticipated that the temporary and permanent impacts result in higher emissions and a greater impact to air quality.

iii. **Corridor 2 appears to have a potential impact on viewshed, as well as traffic, bicycle, and pedestrian circulation.** Since Corridor 2 involves an “off-alignment” solution with an extended approach roadway, it should be anticipated that bicycle and pedestrian facilities will likely require some modification and extension to enhance circulation and continuity. It also appears the viewshed will be impacted due to new bridge alignment as it is in close proximity to the old bridge infrastructure (if the old bridge remains in place[1]). Furthermore, the viewshed will likely be impacted by the approach roadway improvements along the natural, undeveloped areas of the South Fork of the American River.

Objective 3

i. **Corridor 2 appears to have the greatest direct impacts to existing cultural and/or historical resources.** Since Corridor 2 involves a new proposed alignment in predominately undeveloped areas through the center of Marshall Gold Discovery Park, it is likely to have the largest direct impact to existing cultural and/or historical resources. There is also a likely temporary and permanent impact Corridor 2 will have on recreational resources to include the rafting community and trail users as a result of impacts to the parking area adjacent the original Sutter Mill replica and impacts to Gold Discovery Loop Trail. This can be seen in greater detail in Appendix F.

ii. **Corridor 2 does not appear to impact future potential realignments of Highway 49 as Mt. Murphy Road provides negligible contribution to traffic along Highway 49.** The “State Route 49 Realignment Study” performed by the El Dorado County Transportation Commission discusses the “Coloma Bypass” as an alternative not selected or analyzed based upon its inability to meet key project goals and have a far greater impact on resources (including environmental impacts). The study identifies the need to replace Mt. Murphy Bridge as an opportunity to fund one of the two bridges proposed in the alignment. The findings associated with the elimination of the “Coloma Bypass” as an alternative to consider in the potential realignment of SR 49 is also consistent with the Transportation Concept Report (TCR) for SR 49 performed by Caltrans (for additional details refer to Appendix J). Based on ADT and traffic analysis, however, the traffic volumes of Mt. Murphy Road are negligible compared to Highway 49; therefore, realignments of Highway 49 should be considered separate from Mt. Murphy Road.

As shown in the “Corridor 2 Traffic Study” (See Appendix D), traffic counts performed along Highway 49 and Mt. Murphy Road indicate that the majority of travelers along Highway 49 are

not users of Mt Murphy Road. These findings are based upon traffic studies for turning movements on Mt. Murphy Road (and traffic counts) performed by Caltrans and El Dorado County within the area. The results indicate that approximately 3% of the traffic along Highway 49 accesses Mt. Murphy Road during the peak weekdays based on turning movements. Additionally, based on approximate Average Daily Traffic (ADT) volumes, Mt. Murphy Road counts are approximately 5% to volume of Hwy 49 counts. These results indicate that the travelers along Mt. Murphy Road only constitute a small fraction of the traffic utilizing Highway 49. These findings also appear to be consistent when evaluating future growth (over the next 20 years) see Appendix D. As a consequence of these findings, it may be concluded that future potential realignment of Highway 49 should be regarded separately from the Mt. Murphy Bridge Project.

Corridor 2 Infeasibility

Corridor 2 is deemed infeasible due to the likely significance of the apparent cultural/ historical resource impacts. Corridor 2 not only has a considerable impact to environmental habitat, but also an apparent significant impact to cultural/ historical resources located in Marshall Gold Discovery Park. In other words, the Corridor 2 proposed alignment appears to impact park resources and natural lands in the center of Marshall Gold Discovery Park. As shown in Appendix F, there are a number of sensitive and significant cultural resources within the area of the alignment that would likely result in a direct and unacceptable impact, deeming Corridor 2 likely infeasible.

Corridor 2 Concluding Remarks

Based on the assessment above, Corridor 2 will likely result in the following significant impacts and as a result may be deemed infeasible:

1. Requires considerable roadway improvements to satisfy Project Purpose and Need/ Feasibility (Objective 1a, Objective 1b, Objective 1c)
2. Considerable environmental effects (Objective 2)
3. Greatest cultural/ historical resource impacts to State Park (Objective 3)

DESTCRIPTION OF CORRIDOR 3

Corridor 3 is located approximately 2,500 feet north of the existing bridge and outside the approximate limits of Marshall Gold Discovery Park (See Appendix B). This corridor would include a new intersection with Highway 49, and significant improvements along Highway 49 to mitigate safety considerations. A stretch of Carvers Road from where the bridge connects on the north side of the river to the intersection with Mt. Murphy Road would require significant geometric improvements. This alternative would be laid out to avoid physical impacts to the North Beach river access and picnic areas, as reasonably possible, but would require parcel takes from the State Park south of the river and multiple parcel takes on the north side of the river. The existing bridge would be removed after construction of the new bridge unless funding and ownership can be found to retrofit and maintain the existing bridge for pedestrian, bicycle, or other uses.

As shown in the project "Screening Criteria" (See Appendix I), Corridor 3 performed slightly better than Corridor 2 based on screening categories developed through public feedback.

Comparison Against Project Objectives

While Corridor 3 appears to meet most of Objective 3 in avoiding or minimizing impacts to cultural/ historical resources, while replacing a structurally deficient and functionally obsolete Mt. Murphy Road Bridge, it fails to meet most of Objective 1 and Objective 2 as outlined below:

Objective 1a

i. **Corridor 3 would replace the structurally deficient and functionally obsolete Mt. Murphy Bridge with a solution that requires extensive roadway approach improvements to include significant realignment of Carver Road and a reconstruction of Highway 49 to accommodate the Mt. Murphy Road intersection.** While the improvements proposed in Corridor 3 include a bridge structure of a lesser span than the other alternatives, the roadway improvements of the proposed alignment are substantial (See Appendix A). These improvements include extensive reconstruction of Highway 49 of over 1,100', to accommodate the new Mt. Murphy Road intersection which would require funding from other sources outside the HBP program. Similarly, the HBP program establishes approach roadway limits of 400' either side, or 800' total, for the project, which will be far exceeded with nearly a half mile (approximately 2,600') of new roadway alignment, not including the Highway 49 improvements. Moreover, these improvements also far exceed the FHWA guidelines established for roadway expenditures in the HBP program which are not to exceed 10%. Corridor 3 roadway costs (estimated at $3.4 million for construction only, with Corridor 1 at approx. $0.7 million by comparison, and not including Highway 49 improvements) are also further amplified by the retaining wall improvements, drainage improvements, and other roadway approach infrastructure required to accommodate the proposed alignment.

ii. **Corridor 3 would require extensive structure and roadway improvements within the floodway.** As shown in Appendix B, Corridor 3 lies predominately in a floodway (within the high water mark) and as a result has environmental impacts, hydraulic impacts, and requires grade correction to meet design standards. These improvements also extend to Highway 49 requiring a significant stretch of the State Highway to be raised to properly conform to the new Mt. Murphy Road intersection.

iii. **Corridor 3 appears to introduce a line of sight safety condition and that requires additional improvements along Highway 49 to properly mitigate.** Since the Corridor 3 improvements propose a new intersection of Mt. Murphy Road and Highway 49 located north and downstream of the State Park, the tie-in location appears to introduce a line of sight safety challenge for travelers along Highway 49. This apparent challenge results from an intersection with Mt. Murphy Road located along a horizontal and vertical curve of Highway 49 that is further amplified by obstructions (i.e. trees, brush, slopes, etc.) along the shoulders of the roadway. These Highway 49 improvements are anticipated to amount to approx. 1,100 lf of reconstruction and $1.2 million in costs.

iv. **Corridor 3 provides a solution with temporary and permanent impacts to residents that depend upon the bridge for access.** While Corridor 3 is an off-alignment alternative that can be constructed with very few traffic closures and detours on Mt. Murphy Road, the proposed changes along Carver Road and Highway 49 are substantial and are anticipated to greatly impact users during construction. After project completion, the new alignment will also impact residents by extending travel paths and impacting circulation.

Objective 1b

v. **Corridor 3 provides a solution with significant roadway costs and extended schedule considerations.** Corridor 3 proposes a solution with significant roadway costs (over 6 times the roadway costs of Corridor 1) to include approximately $1.2 million in Highway 49 improvements that cannot be funded by the HBP program (See Appendix G). Additionally, Corridor 3 is anticipated to have a longer construction schedule to perform the improvements. As a result, Corridor 3 contains a significant overall construction cost and schedule, with a relatively small bridge, and substantial roadway improvements.

Objective 1c

vi. **Corridor 3 provides a solution with significant right-of-way (ROW) impacts.** The improvements proposed in Corridor 3 utilize a new alignment with significant acquisition. The

highest temporary and permanent ROW impacts of the three alternatives that requires State Parks, other private property owners, and extensive work to be completed on State Highway (Caltrans) ROW (See Appendix E).

Objective 2

i. **Corridor 3 appears to have significant impact areas especially to natural habitat and sensitive locations (i.e. WOUS).** Since the alignment utilized for Corridor 3 includes an extensive length of roadway approach improvements in undeveloped areas, and is substantially along the South Fork of the American River, significant disturbance areas are anticipated (See Appendix C). Moreover, a significant amount of the alignment is also located within the floodway of the river, further impacting sensitive habitat and WOUS.

ii. **Corridor 3 appears to have the largest impact areas and activities within the floodway.** Corridor 3 requires construction of both permanent and temporary improvements located within the floodway, impacting WOUS, including permanent placements of fill. Since access (i.e. temporary roads and staging areas) must be constructed for the piers and new alignment of the approach roadway, the impact areas within the floodway include temporary and permanent impacts. Additionally, extensive improvements are required for the new alignment along Carvers Road that include construction of retaining walls and roadway alignments along the South Fork of the American River. These work areas within waterways and floodways will likely result in an extended construction schedule as work activities will not be permitted through the defined winter season (typically as detailed in project environmental permits to include RWQCB 401, USACE 404, CDFW 1600, etc.).

iii. **Corridor 3 appears to have the largest potential temporary and permanent impact to air quality.** Since Corridor 3 involves the largest alignment changes and most extensive approach roadway improvements, it will also have the longest travel distances and highest increases in vehicle emissions for motorists after construction completes. Additionally, as a result of the extensive roadway improvements, Corridor 3 will likely have the longest construction schedule and require the highest usage of large equipment for grading and excavation. As a result of these increases in construction duration, equipment utilization, and extended traffic control operations, especially for improvements along Highway 49, it is anticipated that Corridor 3 will also have the highest temporary emissions during construction of the Project.

iv. **Corridor 3 appears to have the largest potential for temporary and permanent impacts on natural and sensitive habitat.** Corridor 3 contains the largest apparent temporary and permanent impacts to natural habitat to include upland oak areas, riparian areas, and within the floodway. This is largely a consequence of a proposed new alignment through an undeveloped and predominately floodway area within the high water mark. Furthermore, Corridor 3 also has the largest overall improvement and disturbance areas.

v. **Corridor 3 appears to have the largest impact on viewshed, as well as traffic, bicycle, and pedestrian circulation.** The proposed alignment for Corridor 3 includes an extended approach roadway that parallels the South Fork of the American River and results in a substantial area of development along the river. The resulting viewshed of travelers along Highway 49 or from Marshall Gold Discovery Park will likely be impacted by the new roadway approach along the opposing river bank. This new alignment will likely also extend travel paths for residents and users of Mt. Murphy Road as well as interrupt the bicycle and pedestrian circulation that the current alignment accommodates.

Objective 3

i. **Corridor 3 appears to avoid most cultural/ historical resource impacts to Marshall Gold Discovery Park; however, it also appears to have an impact on recreational activities.** Corridor 3 appears to be located outside the limits of Marshall Gold Discovery Park; therefore avoiding most cultural/ historical resource impacts. The alignment may also impact recreational

resources (See Appendix E). In other words, the Corridor 3 alignment appears to directly impact an existing parking lot and portion of a picnic area frequently inhabited by rafters and recreational river users.

ii. **Corridor 3 appears to provide a solution consistent with the State Parks General Plan for a realignment of State Route 49 with a "Coloma Bypass.''** The "State Route 49 Realignment Study" performed by the El Dorado County Transportation Commission discusses the "Coloma Bypass" as an alternative not selected or analyzed based upon its inability to meet key project goals and have a far greater impact on resources (including environmental impacts). The study identifies the need to replace Mt. Murphy Bridge as an opportunity to fund one of the two bridges proposed in the alignment. The findings associated with the elimination of the "Coloma Bypass" as an alternative to consider in the potential realignment of SR 49 is also consistent with the Transportation Concept Report (TCR) for SR 49 performed by Caltrans (for additional details refer to Appendix J). Corridor 3 would be consistent with this "Coloma Bypass" alternative, and a likely preferred solution realignment of State Route 49 by State Parks.

Corridor 3 Infeasibility

Corridor 3 may be deemed infeasible due to the likely significance of the apparent environmental impacts and extensive roadway and Highway 49 improvements required (i.e. exceeds HBP funding limitations). Corridor 3 has significant impacts to environmental habitat, but is also located predominately in the floodway. As a result, Corridor 3 has substantial temporary and permanent impacts. Additionally, Corridor 3 includes extensive roadway improvements to include significant grading, retaining walls, and reconstruction of Highway 49 to accommodate the proposed new Mt. Murphy Road intersection. The anticipated cost impacts associated with the roadway improvements are beyond the apparent HBP and FHWA funding guidelines and requirements and Highway 49 improvements will require funding from other sources outside the HBP program. As a result of the extensive environmental and right-of-way impacts, and the significant and likely unfunded roadway infrastructure improvements required, the proposed Corridor 3 solution is likely infeasible as an engineering solution for bridge replacement.

Corridor 3 Concluding Remarks

Based on the assessment above, Corridor 3 will likely result in the following significant impacts and as a result may be deemed infeasible:

1. Requires considerable roadway improvements including substantial impacts to Highway 49, and right-of-way acquisitions (including over 20 times the area of land acquisitions from State Parks) to satisfy Project Purpose and Need (Objective 1a, Objective 1b, Objective 1c)
2. Requires extensive project improvement features attributed to an alignment in the floodway (Objective 1a)
3. Most significant environmental impacts (Objective 2)

V. CONCLUDING REMARKS

CEQA Guidelines Section 15126.6 notes that a reasonable range of alternatives should be considered which would feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any of the significant effects of the project. This reasonable range of alternatives needs to foster informed decision making and public participation. Per CEQA Guidelines Section 15121, the EIR should inform the public agency decision makers and the public of the generally significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the Project.

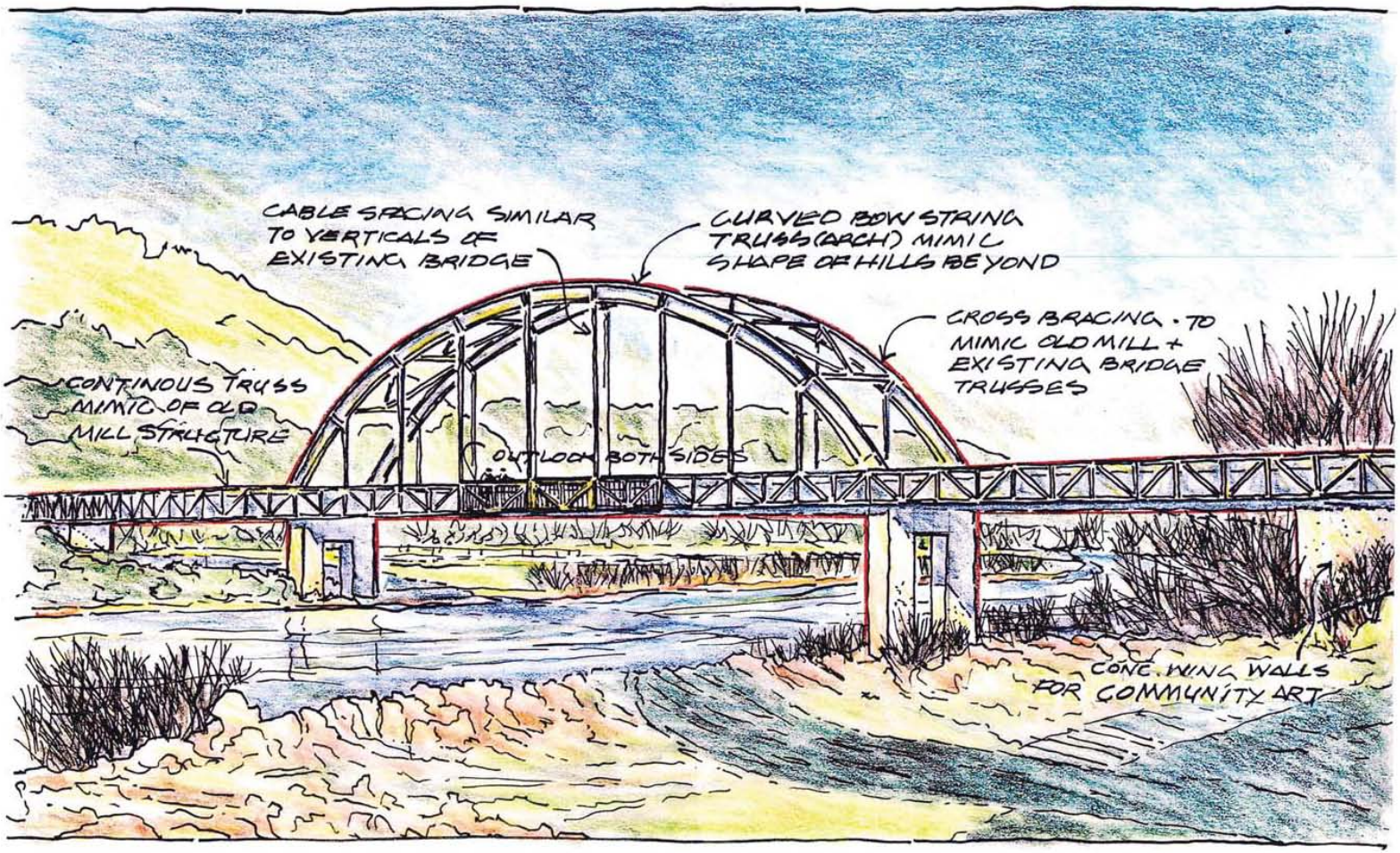
Based on the multiple corridor assessments as reviewed by CEQA Guidelines Section 15124, El Dorado County has identified Corridor 1 as the likely preferred design for the proposed project. Consistent with CEQA Guidelines Section 15126.6(d), the EIR will include sufficient information about each alternative to the proposed Project (Corridors 2 and 3) to allow meaningful evaluation, analysis, and comparison.

Reference Notes:

[1]Since the existing Mt. Murphy Bridge is eligible to be listed in the National Register of Historic Places, Corridor 1 would potentially have a direct impact, and if determined to be so, a treatment plan would be necessary to mitigate this impact. However, it should also be noted that a requirement of the HBP funding (project funding) is that the old bridge facility must be removed from the County's list of facilities to be maintained. As such, the existing bridge must be removed or if kept would require another party to take ownership for operation and maintenance. The HBP program only covers removal costs; meaning any costs needed to upgrade the bridge for bike, pedestrian, and/or vehicle use, must be derived from other sources. Additionally, if the existing bridge remains in place, hydraulic implications (i.e. washout) would need to be assessed and may likely require improvements to ensure washout does not occur impacting downstream bridge solutions (i.e. considerations for Corridor 2, Corridor 3). At this time, no parties have shown an interest or capability of providing the required funds to retain ownership of the bridge. It is likely the existing Mt. Murphy Bridge will require removal and potential mitigation regardless of the Corridor selected.

Figures

Figure 1: Mt. Murphy Bridge Conceptual Rendering



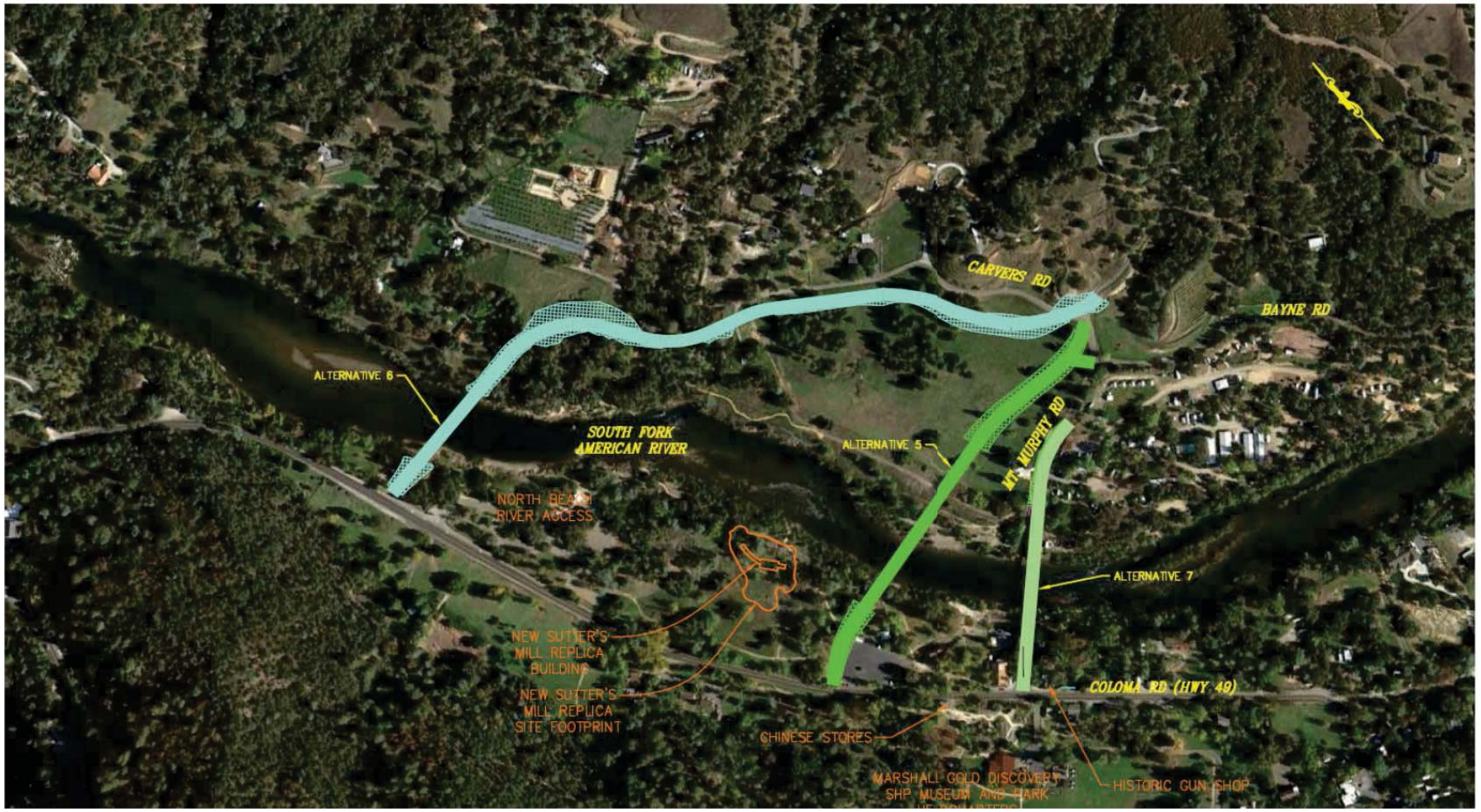
EL DORADO COUNTY - MT MURPHY BRIDGE REPLACEMENT CONCEPT "ONE"

CM/2013. NOTE: CLEAR SPAN OVER RIVER

Figure 2: 3 Alternative Corridor Alignments

Mt. Murphy

Corridor 1: On Existing Alignment (Alt 7)
Corridor 2: Downstream Existing (Alt 5)
Corridor 3: Downstream North Beach (Alt 6)



Figures 3 - 14: Corridor 1 Conceptual Renderings

Figure 3: Corridor 1 Overview – Conceptual Rendering (Overall 1, North)

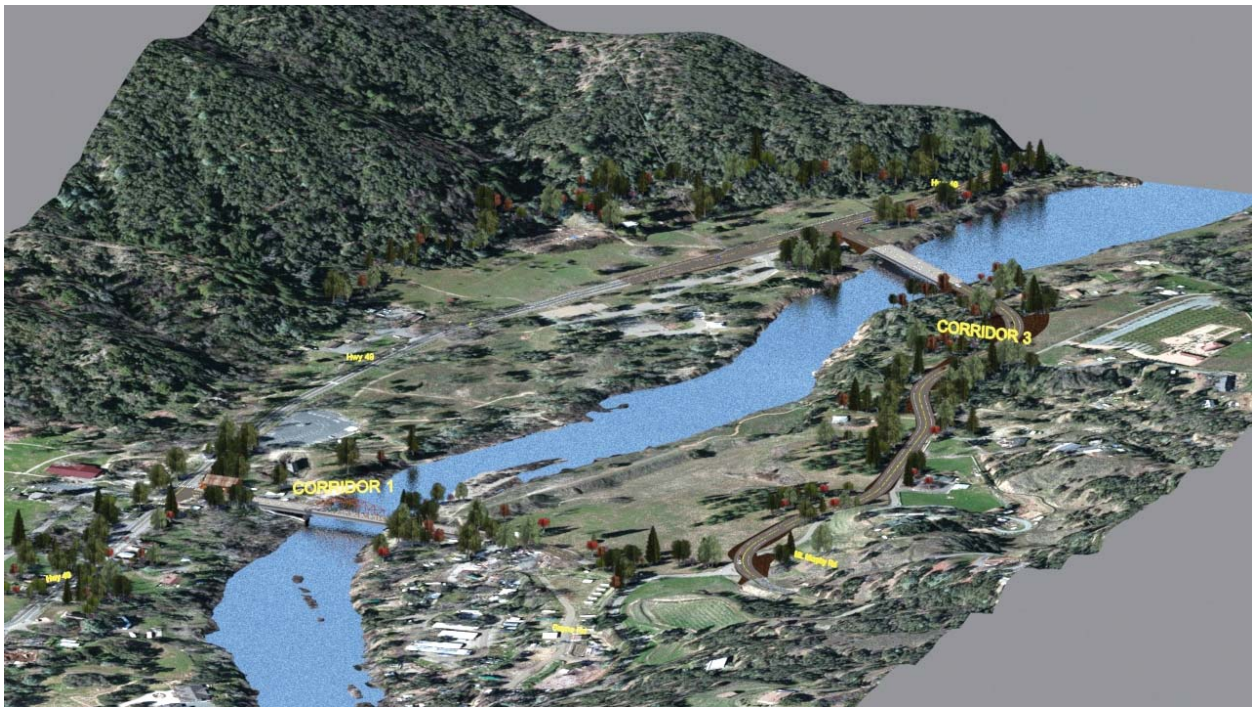


Figure 4: Corridor 1 Overview – Conceptual Rendering (Overall 2, North)

Figure 5: Corridor 1 – Conceptual Rendering (North)

Figure 6: Corridor 1 – Conceptual Rendering (West)

Figure 7: Corridor 1 – Conceptual Rendering (Southwest)

Figure 8: Corridor 1 – Conceptual Rendering (Bridge, West)

Figure 9: Corridor 1 – Conceptual Rendering (Right Turn, Highway 49 to Mt. Murphy Road)

Figure 10: Corridor 1 – Conceptual Rendering (Highway 49 – Mt. Murphy Intersection, Northeast)

Figure 11: Corridor 1 – Conceptual Rendering (Mt. Murphy Road, Bridge Approach)

Figure 12: Corridor 1 – Conceptual Rendering (Mt. Murphy Road at Bridge, North)

Figure 13: Corridor 1 – Conceptual Rendering (Mt. Murphy Bridge, Northwest)

Figure 14: Corridor 1 – Conceptual Rendering (Mt. Murphy Bridge, Northeast)

Figures 15 - 24: Corridor 3 Conceptual Renderings

Figure 15: Corridor 3 Overview – Conceptual Rendering (Overall 3, Northeast)

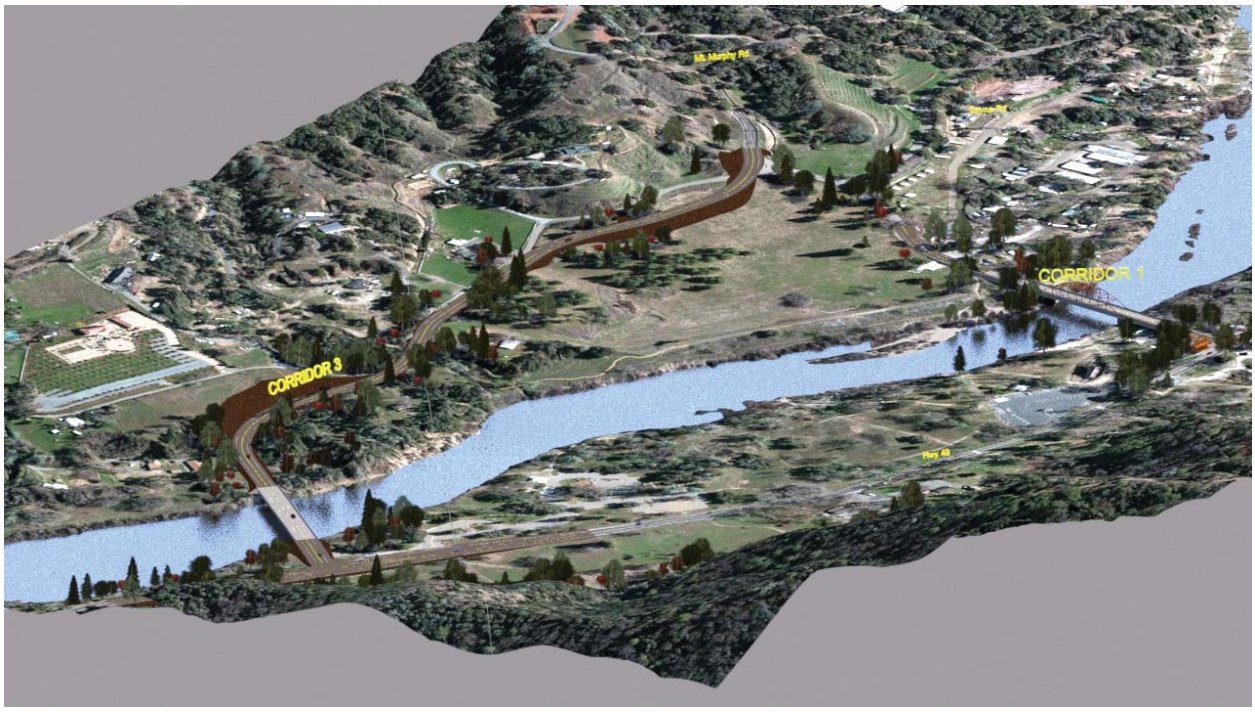


Figure 16: Corridor 3 Overview – Conceptual Rendering (Overall 4, Southeast)

Figure 17: Corridor 3 – Conceptual Rendering (Southeast)

Figure 18: Corridor 3 – Conceptual Rendering (Bridge, Southeast)

Figure 19: Corridor 3 – Conceptual Rendering (Bridge, Northwest)

Figure 20: Corridor 3 – Conceptual Rendering (New Mt. Murphy Road, East 1)

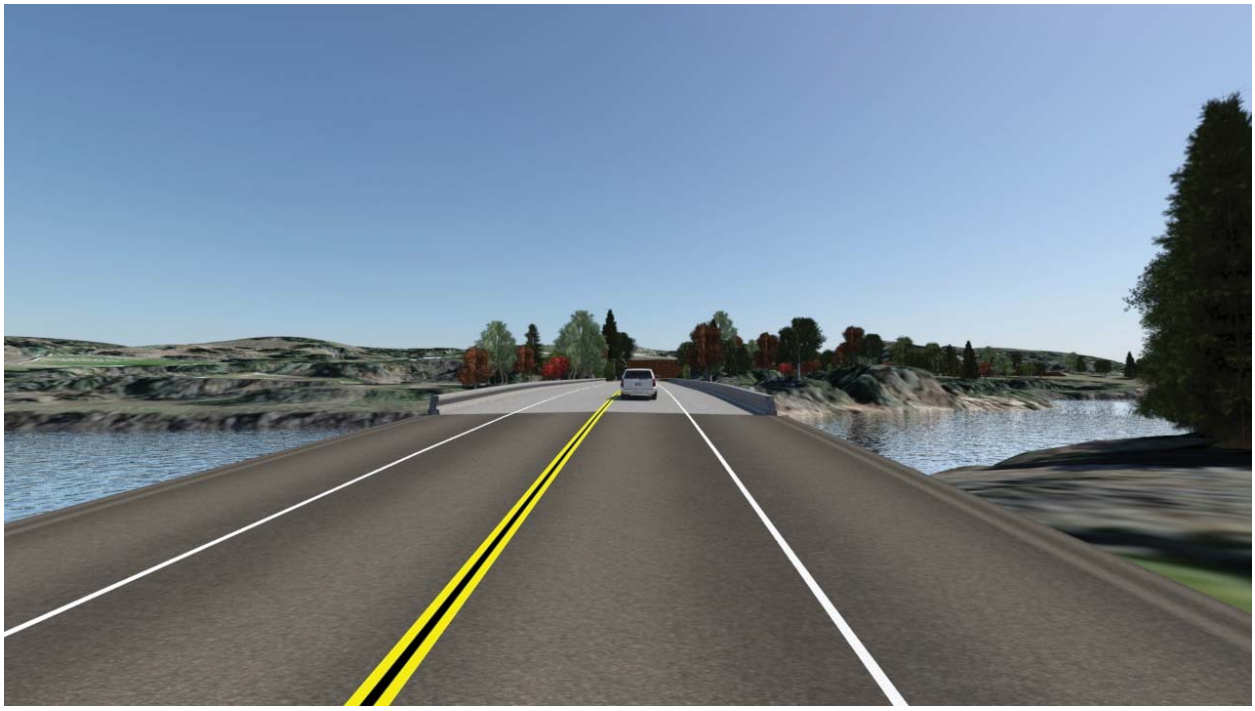


Figure 21: Corridor 3 – Conceptual Rendering (New Mt. Murphy Road, East 2)

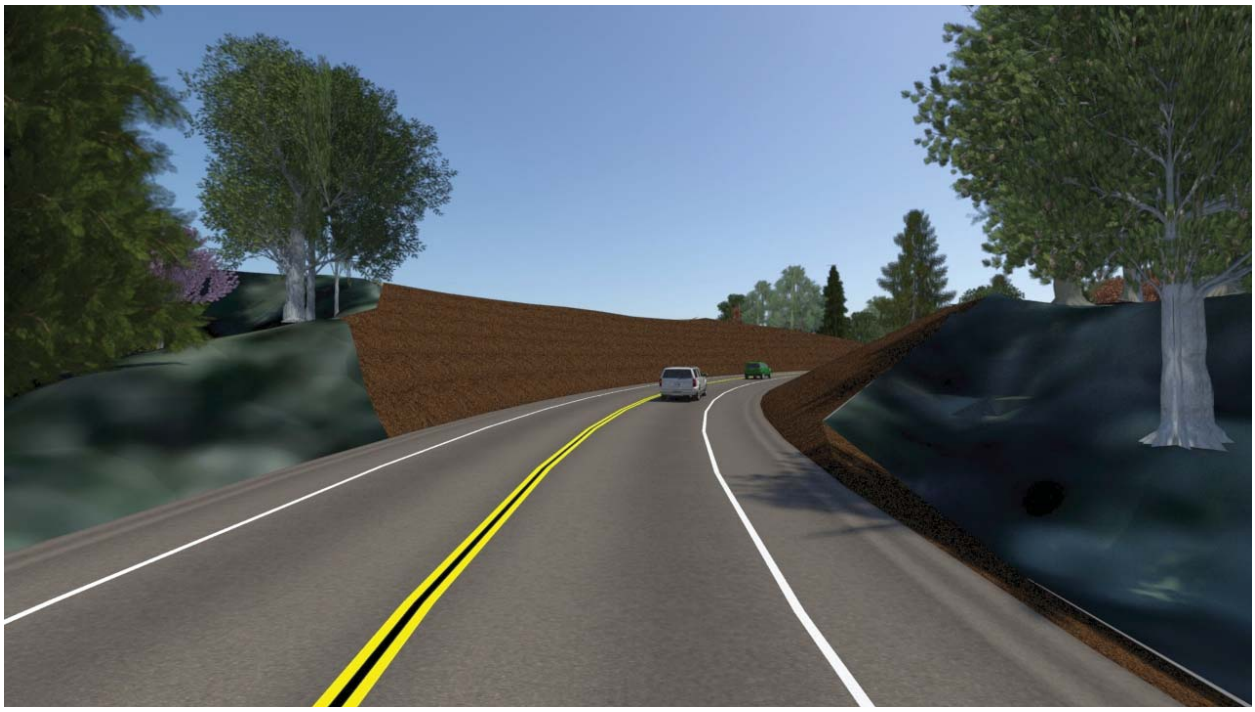


Figure 22: Corridor 3 – Conceptual Rendering (New Mt. Murphy Road, East 3)

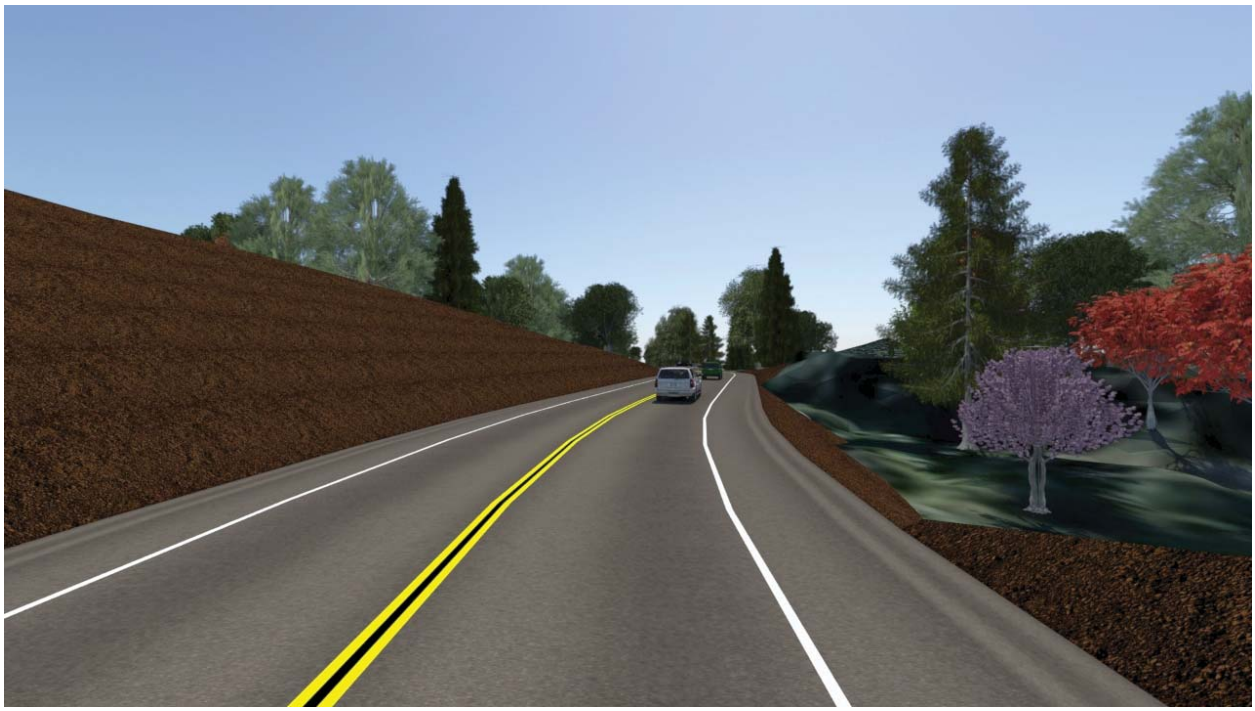


Figure 23: Corridor 3 – Conceptual Rendering (New Mt. Murphy Road, East 4)

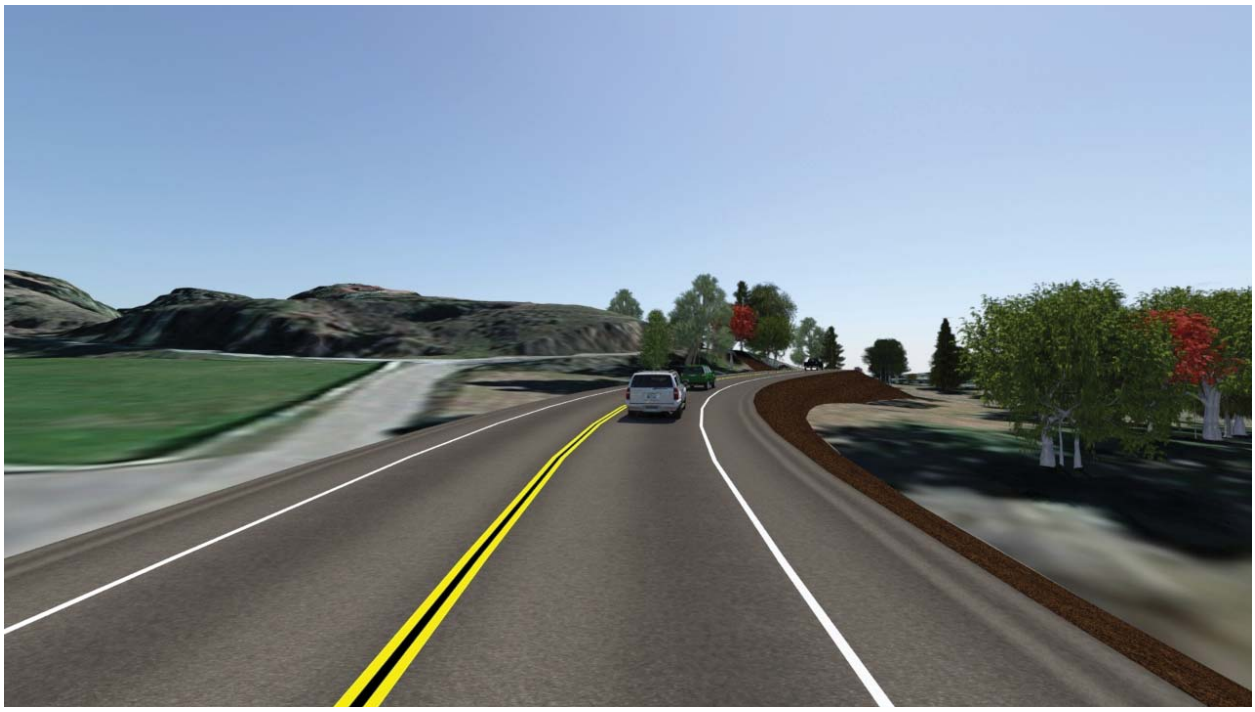


Figure 24: Corridor 3 – Conceptual Rendering (New Mt. Murphy Road, East 5)

Appendix

Appendix A: Corridor Relative Impacts Summary (Table)

Appendix B: Corridors 1, 2, 3 Overview, Plan, & Profile Sheets

Appendix C: Corridors 1, 2, 3 Environmental Impact Areas

Appendix D: Corridors 1, 2, 3 Traffic Studies

Appendix E: Corridors 1, 2, 3 Right-of-Way (ROW) Impact Areas

Appendix F: Corridors 1, 2, 3 Cultural Resource Overview Map

Appendix G: Corridors 1, 2, 3 Construction Cost Estimates

Appendix H: Vibration Study Documentation

Appendix I: Screening Criteria Scores by Category

Appendix J: EDCTC SR 49 Realignment Study and Caltrans SR 49 Transportation Concept (TCR)

Appendix A: Corridor Relative Impacts Summary (Table)

Mt. Murphy Road Bridge Replacement
Corridor Relative Impacts - Corridor Details Summary

Impact Description			Corridor 1		Corridor 2		Corridor 3	
	Description	Assessment Item	Assessment	Impact Points[1]	Assessment	Impact Points[1]	Assessment	Impact Points[1]
1a	**Objective #1a: Purpose & Need (Feasibility) - Overview[2]**			**0**		**1**		**3**
1a.1	**HBP Funding Program**	Consistentency of Proposed Improvements with HBP Funding Requirements	Consistent with HBP	0	Roadway Improvements beyond HBP Program	1	Most Extensive Roadway Improvements (beyond HBP) and Hwy 49 Improvements Required	3
1a.2	**Proposed Bridge Structure**	Overview of Bridge Improvements (Dimensions, etc.)	Approx. 540' Span, 32' Width, 2 Piers, 30' above channel floor, 2-stage construction	0	Approx. 535' Span, 46' Width, 2 Piers, 36' above channel floor, off-alignment	0	Approx. 400' Span, 46' Width, 2 Piers, 30' above channel floor, off-alignment	0
1a.3	**Proposed Roadway Improvements**	Length of Roadway Improvements (**400' max Conforms, 800' total for Off-System**)	**Approx. 500' total Roadway** Improvements (150' approach (South), 350' approach (North))	0	**Approx. 1,325' total Roadway** Improvements (325' approach (South), 850' approach (North), Reconstruct Bayne Rd Intersection (150'))	2	**Approx. 3,690' total Roadway** Improvements (175' approach (South), 2315' approach (North), Reconstruct Old Mt. Murphy Rd Intersection (100'), Hwy 49 Intersection (1,100')	3
1a.4	**Proposed Highway 49 Improvements**	Overview of required improvements along Hwy 49	Conform Improvements at Existing Mt. Murphy Road Tie-in	0	Proposes new Hwy 49 intersection improvements/ Conforms	1	Proposes new Hwy 49 Intersection, Requires Turn-Pocket (Line-of-Sight/ Blind spot at Tie-In), Approx 1,100 ' for Grade Realignment (Conforms)	3
1a.5	**Proposed Retaining Walls (Roadway Structures)**	Overview of Retaining Walls required for Roadway Improvements	Only Along Abutments; South: 2 each, 185' total; North: 1 each, 110' total	1	No Retaining Walls Required, Fill Slopes	0	Along North Approach, 3 each, 675' total	3
1a.6	**Final Configuration of Existing Mt. Murphy Bridge**	Proposed Condition of Existing Mt. Murphy Bridge	Removed, May be relocated or saved at direction and expense of new owner	0	Must be removed from DOT facilities, if remains in place must be updated for safety, washout, use at new owners expense (removal costs compensated)	2	Must be removed from DOT facilities, if remains in place must be updated for safety, washout, use at new owners expense (removal costs compensated)	2
1a.7	**Hydraulic Considerations**	Hydraulic Risks or Considerations	Above High Water Mark	0	Improvements within High Water Mark, Risk of Washout if Existing Bridge Remains	2	Extensive Improvements in High Water Mark, Risk of Washout if Existing Bridge Remains	3
1a.8	**Temporary Traffic Control/ Detours**	Traffic Impacts and management during Construction (i.e. detours, closures, etc.)	2-stage construction (on-alignment)	2	Off-alignment solution, more extensive improvements along Hwy 49 and parking lot	1	Off-alignment solution, proposes extensive improvements along Hwy 49, and realignment of Carvers Rd and Bayne Intersection, longer construction schedule	3
1b	**Objective #1b: Purpose & Need (Feasibility) - Total Construction Costs (& Schedule)[3]**			**1**		**2**		**3**
1b.1	**Esimated Duration**	Approx. Construction Schedule	24 months	1	24 months	1	30 months	2
1b.2	**Estimated Roadway Costs**	Total Estimated Roadway, Retaining Walls, Culvert Structures Construction Costs	$ 755,563	0	$ 1,772,955	2	$ 3,405,468	3
1b.3	**Estimated "Non-HBP" Funded Project Costs**	Total Estimated Construction Costs for "Non-Participating" HBP Improvements (Requiring Funding from Other Sources); includes Hwy 49 Improvements	$ -	0	$ -	0	$ 1,181,244	3
1b.4	**Estimated Bridge Costs**	Estimated Bridge Costs Based on $554/ SF (refer to Rehabilitation Feasibility Report for Project)	$ 9,573,120	1	$ 13,633,940	3	$ 10,193,600	2
1b.5	**Total Estimated Construction Costs**	Total Estimated Construction Costs	**$ 10,328,683**	1	**$ 15,406,895**	3	**$ 14,780,312**	2
1b.6	**% Roadway Costs (HBP Project Only)**	% Roadway Costs of Total HBP Project Construction Costs (FHWA guideline targets under 10%)/ Excludes Non-HBP Project Costs	**7.3%**	0	**11.5%**	0	**25.0%**	3

Impact Description			Corridor 1		Corridor 2		Corridor 3	
	Description	Assessment Item	Assessment	Impact Points[1]	Assessment	Impact Points[1]	Assessment	Impact Points[1]
1c	**Objective #1c: Purpose & Need (Feasibility) - Right of Way - ROW[4]**			**1**		**2**		**3**
1c.1	**# Parcels Impacted**	Total Estimated # Parcels Impacted, Owner (Private, Parks, State, etc.)	6 (Private, Grange, State Parks), *Caltrans Hwy 49 (minor, may be avoided)*	1	7 (Private, State Parks), *Caltrans Hwy 49 (minor)*	2	16 (Private, State Parks), *Caltrans Hwy 49 (considerable)*	3
1c.2	**# State Parks Parcels Impacted**	Total Estimated # of State Parks Parcels Impacted to include: Total size (and types) of impacts	3 (TCE - 0.40 Acres, S&D - 0.05 Acres, RW - 0.15 Acres)	1	3 (TCE - 1.85 Acres, S&D - 0.67 Acres, RW - 2.06 Acres)	2	9 (TCE - 2.00 Acres, S&D - 1.35 Acres, RW - 3.06 Acres)	3
1c.3	**ROW - Temporary Construction Easement (TCE)**	TCE Requirements (Temporary Impacts, for Construction, Staging, etc.) (Assumes 20' width)	0.76 Acres (33,158 SF)	1	1.88 Acres (100,893 SF)	2	2.72 Acres (118,647 SF)	3
1c.4	**ROW - Slope and Drainage (S&D) Easement**	Slope and Drainage Easement (Assumes 10' from top of cut/ toe of fill)	0.08 Acres (3,425 SF)	1	0.67 Acres (29,116 SF)	2	1.70 Acres (74,198 SF)	3
1c.5	**ROW - Acquisition**	Permanent Acquisition Area (Assumes 60' roadway width)	0.30 Acres (13,028 SF)	1	2.26 Acres (98,567 SF)	2	3.40 Acres (148,034 SF)	3
1c.6	**Total Estimated ROW Costs[7]**	Total Estimated ROW Costs (Assumes: TCE = $0.50/SF, S&D = $1.25/SF, Acquisition = $1.50/SF)	**$ 40,402**	1	**$ 234,692**	2	**$ 374,122**	3
2	**Objective #2: Protect Natural/ Environmental Resources[5]**			**1**		**2**		**3**
2.1	**Disturbance Areas**			**1**		**2**		**3**
2.2	**Disturbance Area, DA (undeveloped)- Permanent**	Permanent Disturbance Area (DA) in undeveloped Area	0.7 Acres (52% of Total Permanent DA, 1.41 Acres)	1	2.4 Acres (82% of Total Permanent DA, 2.93 Acres)	2	6.0 Acres (78% of Total Permanent DA, 7.72 Acres)	3
2.3	**Disturbance Area, DA (undeveloped)- Temporary**	Temporary Disturbance Area (DA) in undeveloped Area	0.6 Acres (82% of Total Temporary DA, 0.71 Acres)	1	2.1 Acres (77% of Total Temporary DA,2.93 Acres)	2	3.6 Acres (97% of Total Temporary DA, 3.68 Acres)	3
2.4	**Estimated Costs**			**1**		**2**		**3**
2.5	**Fills in Waters of the United States (WOUS)**	Estimated Mitigation Cost per 0.01 acre through USACE and CVRWQB-approved In-Lieu Fee Program (Temporary: 0.5:1 = $6,000/0.01 acre; Permanent: 1:1 = $12,000/0.01 acre	$ 24,000	0	$ 108,000	1	$ 432,000	3
2.6	**Tree Removal**	Tree Removal (includes riparian trees greater than 4" diameter at 4.5 feet off ground and all upland oak tree species) Estimated Mitigation costs per acre: Site Design: $10,000/acre; Construction: $67,500-$160,000/acre; Maintenance: $13,500/acre x 5 years; Monitoring: $10,000/acre x 5 years	$ 168,075	1	$ 402,675	2	$ 950,950	3
2.7	**Monitoring**	Monitoring (cultural/ biological): Preconstruction Surveys (tree removals, bird surveys, bats, foothill yellow legged frog (FYLF), archeological sites, grading operations, etc.), estimated at $3,000/day	$ 120,000	1	$ 180,000	2	$ 300,000	3
2.8	**Total Estimated Environmental Costs**	Estimated Total = Fills in WOUS + Tree Removal + Monitoring	**$ 312,075**	**1**	**$ 690,675**	**2**	**$ 1,682,950**	**3**
2.9	**Permitting & Conceptual Environmental Impacts**			**1**		**2**		**3**
2.10.	**USACE - 404 Permit**	Permit Complexity, USACE 404 Permit	Moderate	2	Moderate	2	High	3
2.11	**RWQCB - 401 WQC**	Permit Complexity, RWQCB 401 WQC	Moderate	2	Moderate	2	High	3
2.12	**CDFW - 1600 Permit**	Permit Complexity, Fish and Wildlife Streambed Alteration Permit	Low	1	High	3	High	3
2.13	**High Water Mark/ Floodway Impacts**	Improvement Features located in the Floodway (High Water Mark)	Most improvements above high water mark	0	Most improvements above high water mark, except piers and temporary impacts during construction	1	Significant amount of improvements within and adjacent to high water mark	3
2.14	**Traffic Circulation Impacts**	Proposed permanent impacts to traffic	No changes to current traffic circulation	0	Slight/ Minor increase in travel length for most Mt Murphy users	1	Considerable increase in travel length for most Mt Murphy users	2
2.15	**Pedestrian/ Bicycle Circulation Impacts**	Proposed permanent impacts to bicycle and pedestrian access and travel	No changes to current bicycle circulation	0	Slight/ Minor increase in travel length for most bicycle and pedestrian users	1	Increases travel distances between park and bicycle/ pedestrian users; likely requires upgrades to bicycle and pedestrian facilities to maintain safe facility access/ use	3

Impact Description			Corridor 1		Corridor 2		Corridor 3	
	Description	Assessment Item	Assessment	Impact Points[1]	Assessment	Impact Points[1]	Assessment	Impact Points[1]
2.16	**Air Emissions Impacts**	Potential temporary and/ or permanent impact on air emissions	No changes to current traffic circulation (permanent); minimal temporary emissions (minimal grading and duration)	0	Minor increase in traffic circulation (travel distance) (permanent); moderate temporary emissions (grading/ large equipment and duration)	2	Increase in traffic circulation (travel distance) (permanent); increase in temporary emissions (more earthwork/ large equipment, increase duration)	3
2.17	**Noise/ Vibration Impacts**	Potential to create temporary and/ or permanent noise and vibration impacts to sensitive adjacent receptors (i.e. historical sites, etc.)	Low risk of impact, may require mitigation efforts during construction	1	Low risk of impact, may require mitigation efforts during construction	1	Low risk of impact, may require mitigation efforts during construction	0
2.18	**Viewshed Impacts**	Potential impact to viewshed for users of Mt Murphy Road and for river/ trail users	Little to no changes to current viewshed	0	Potentially 2 bridges in close proximity, moderate development of approach roadway along river edge	2	Development of approach roadway along river edge; potentially 2 bridges in close proximity	3
3	**Objective #3: Protect Cultural/ Historical Resources[6]**			**1**		**2**		**1**
3.1	**State Park - Direct Impacts**	Direct and permanent impact to State Park Cultural/ Historical Resources	Minimal Impacts to Cultural/Historical areas (utilizes existing alignment), potential minor impacts to Grange, requires removal of existing Bridge	2	New alignment directly impacts sensitive Cultural/Historical Areas (i.e. center of Gold Discovery Park)	3	Avoids impacts to most Cultural/ Historical Resources, but directly impacts recreational resources (park benches, rafting area, etc.)	1
3.2	**State Park - Indirect Impacts**	Indirect impacts to Cultural/ Historical Resources	Potential for temporary impacts to historical resources associated with construction activities (mitigated through spec requirements)	1	Potential for temporary impacts to historical resources associated with construction activities (mitigated through spec requirements)	1	Potential for temporary impacts to recreational resources associated with construction activities (mitigated through spec requirements)	1
3.3	**State Park General Plan Impacts (Realignment to Hwy 49 Considerations and Traffic Changes**	Impacts to State Park General Plan, to include potential future realignment of Hwy 49 outside Coloma State Park (i.e. "Coloma Bypass")	Mt Murphy Rd and Hwy 49 realignment are separate items based on ADT and traffic analysis	1	Mt Murphy Rd and Hwy 49 realignment are separate items based on ADT and traffic analysis	1	Realignment of Mt Murphy Road is outside the State Park (consistent with State Park General Plan)	0
	Total "Relative Impacts"		***Meets all Objectives***	**4**	***Potential Failure to Meet (3)***	**8**	***Potential Failure to Meet (1, 2)***	**11**
	Total Estimated Project Costs	Includes: Construction Costs + ROW Costs + Environmental Costs (does not include Design Costs or Utility Relocation Costs)	**$ 10,681,160**		**$ 16,332,262**		**$ 16,837,384**	

Notes:

1 **Relative Impacts Scale:**

GENERAL:	Scale used as a relative assessment of the three (3) Corridors to the Objective(s) identified
NC =	No Change (0 points)
I =	Minimum/ Negligible Impacts (1 point)
II =	Moderate/ Non-Significant Impacts (2 points)
III =	Significant Impacts (3 points) - *Potential Unacceptable Impact*

2 Objective 1a: Purpose and Need (Feasibility) - Overview; details items that measure the effectiveness of the proposed alternative to satisify good design practices and to meet the project funding requirements (HBP requirements)

3 Objective 1b: Purpose and Need (Feasibility) - Total Construction Costs and Schedule; details items that measure the cost and schedule effectiveness of the proposed alternative (to include cost breakdown considerations of the HBP funding). Refer to Appendix G for additional Construction Cost Estimate details.

4 Objective 1c: Purpose and Need (Feasibility) - Right-of-Way (ROW); details items that assess the effectiveness of the proposed alternative to minimize ROW impacts (both temporary, permanent, and owner considerations). Refer to Appendix E for ROW impact area maps and details.

5 Objective 2: Protect Natural/ Environmental Resources; details items that measure the effectiveness of the proposed alternative to protect, avoid, and minimize impacts to natural and environmental resources (this includes qualitative assessments, cost evaluations, and permit complexity considerations). Refer to Appendix C for Environmental impact area maps and details.

6 Objective 3: Protect Cultural/ Historical Resources; details items that measure the effectiveness of the proposed alternative to protect, avoid, and minimize impacts to cultural and historical resources (this includes qualitative assessments of the potential for impacts based on improvement features and alignments). Refer to Appendix F for cultural/ historical resources map and details.

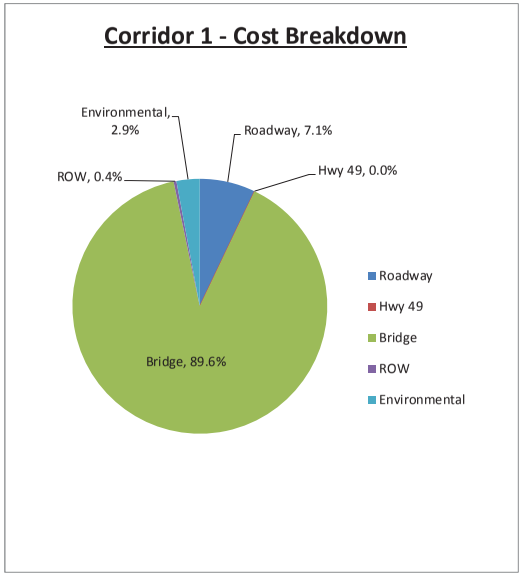
7 ROW costs include only TCE, S&D, and Acquisition Costs but do not include engineering or staff costs

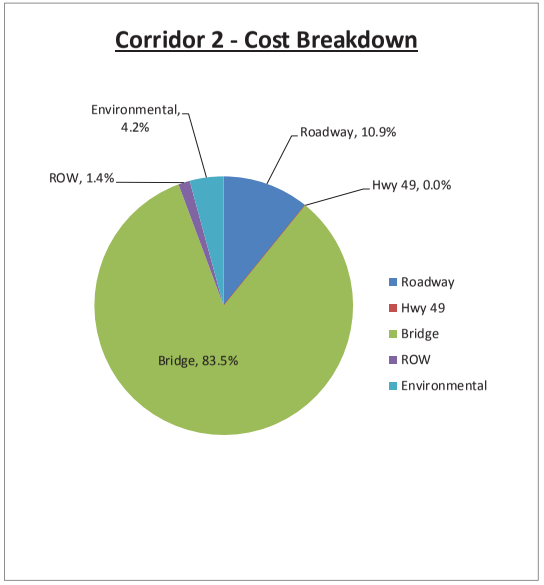
8 For additional details pertaining to the information included in the above table, refer to the "Alternatives Feasibility Study" Appendix.

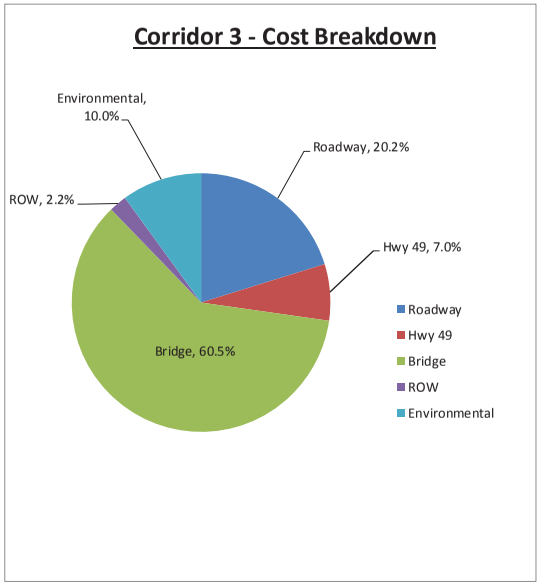
Impact Description			Corridor 1		Corridor 2		Corridor 3	
	Description	Assessment Item	Assessment	Impact Points[1]	Assessment	Impact Points[1]	Assessment	Impact Points[1]

Corridor Cost Breakdowns

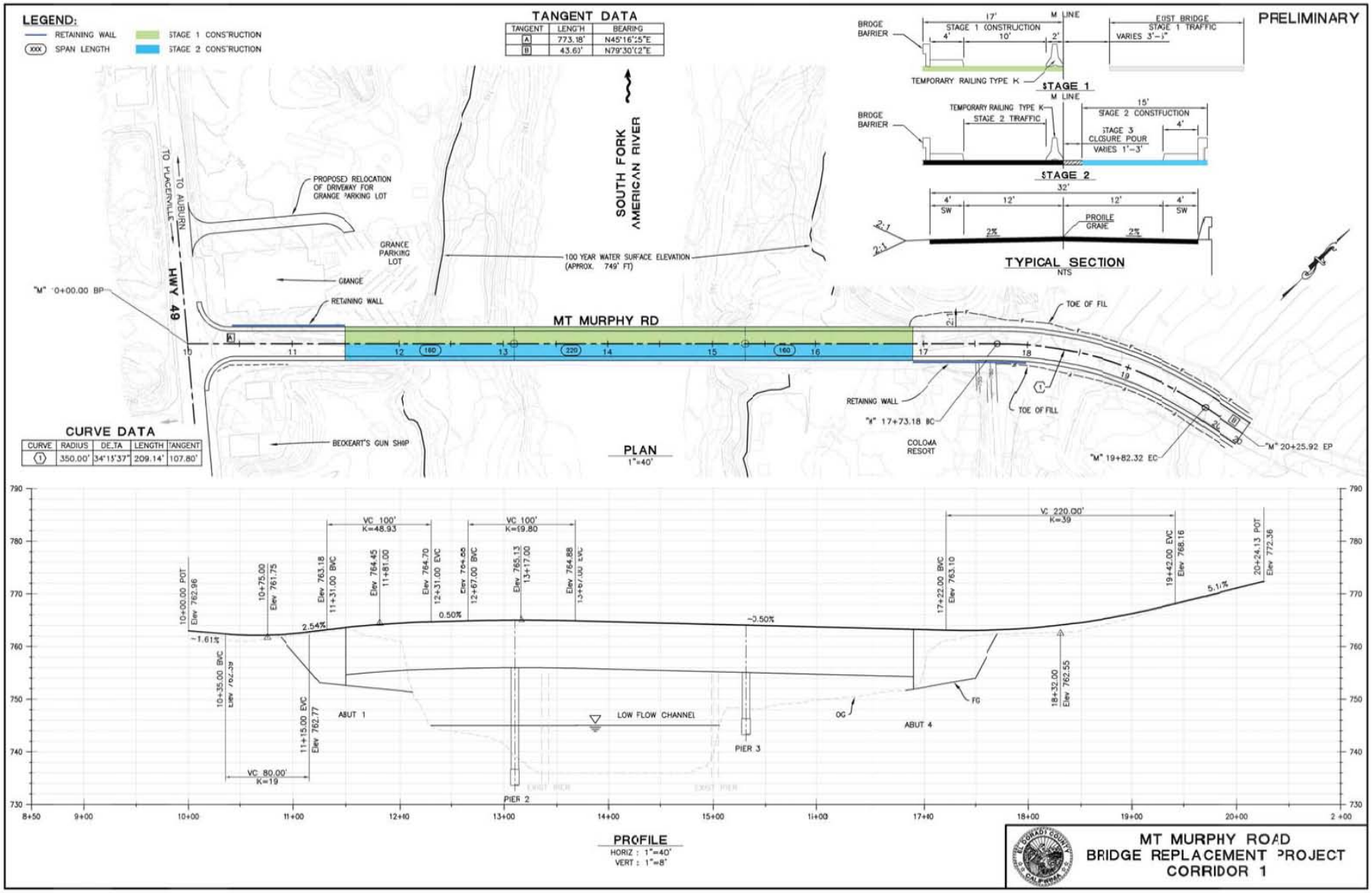
	Corridor 1		Corridor 2		Corridor 3	
Construction Costs						
Roadway	$ 755,563	7.1%	$ 1,772,955	10.9%	$ 3,405,468	20.2%
Hwy 49	$ -	0.0%	$ -	0.0%	$ 1,181,244	7.0%
Bridge	$ 9,573,120	89.6%	$ 13,633,940	83.5%	$ 10,193,600	60.5%
ROW	$ 40,402	0.4%	$ 234,692	1.4%	$ 374,122	2.2%
Environmental	$ 312,075	2.9%	$ 690,675	4.2%	$ 1,682,950	10.0%
Total	**$ 10,681,160**	**100.0%**	**$ 16,332,262**	**100.0%**	**$ 16,837,384**	**100.0%**

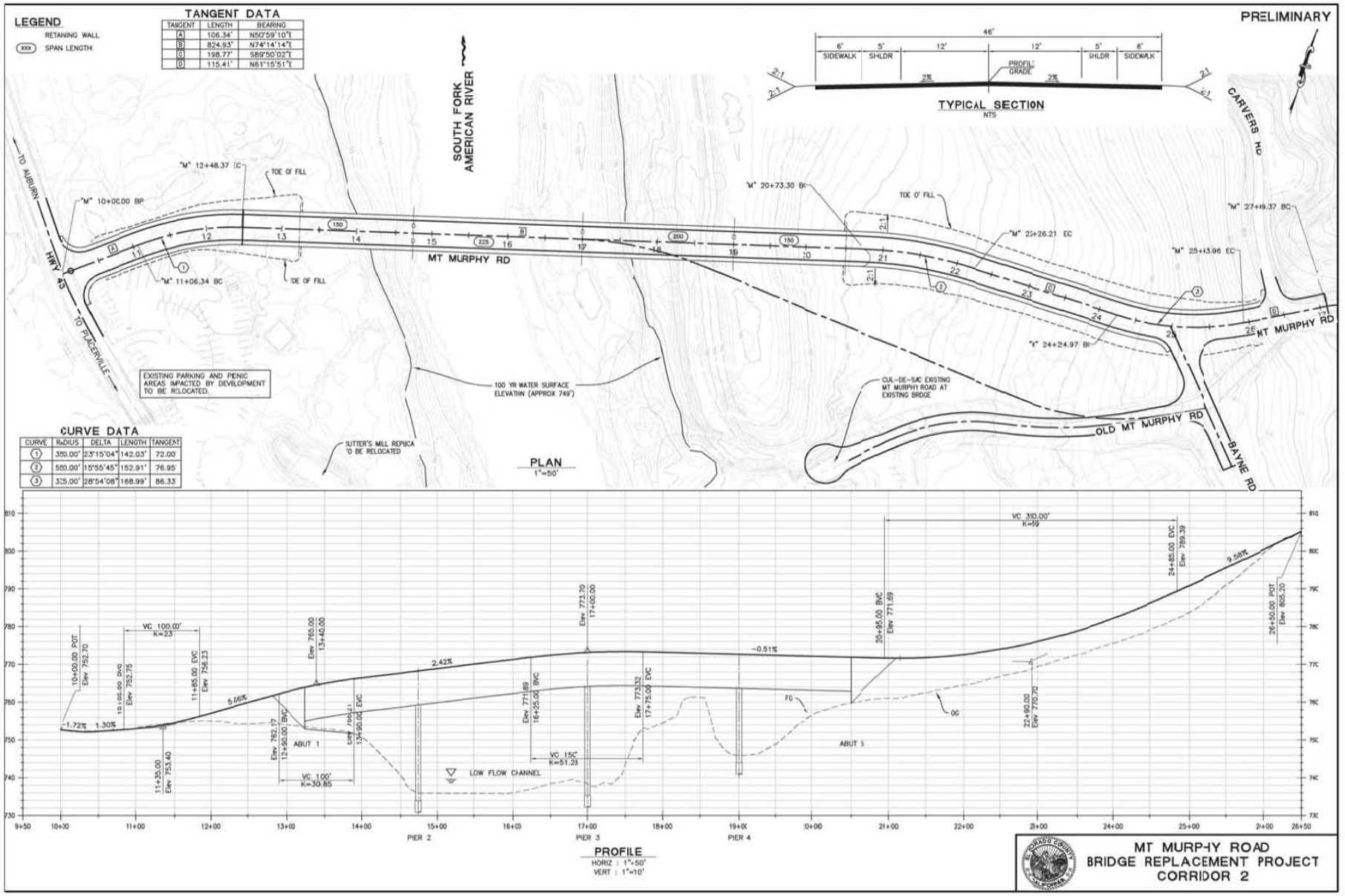


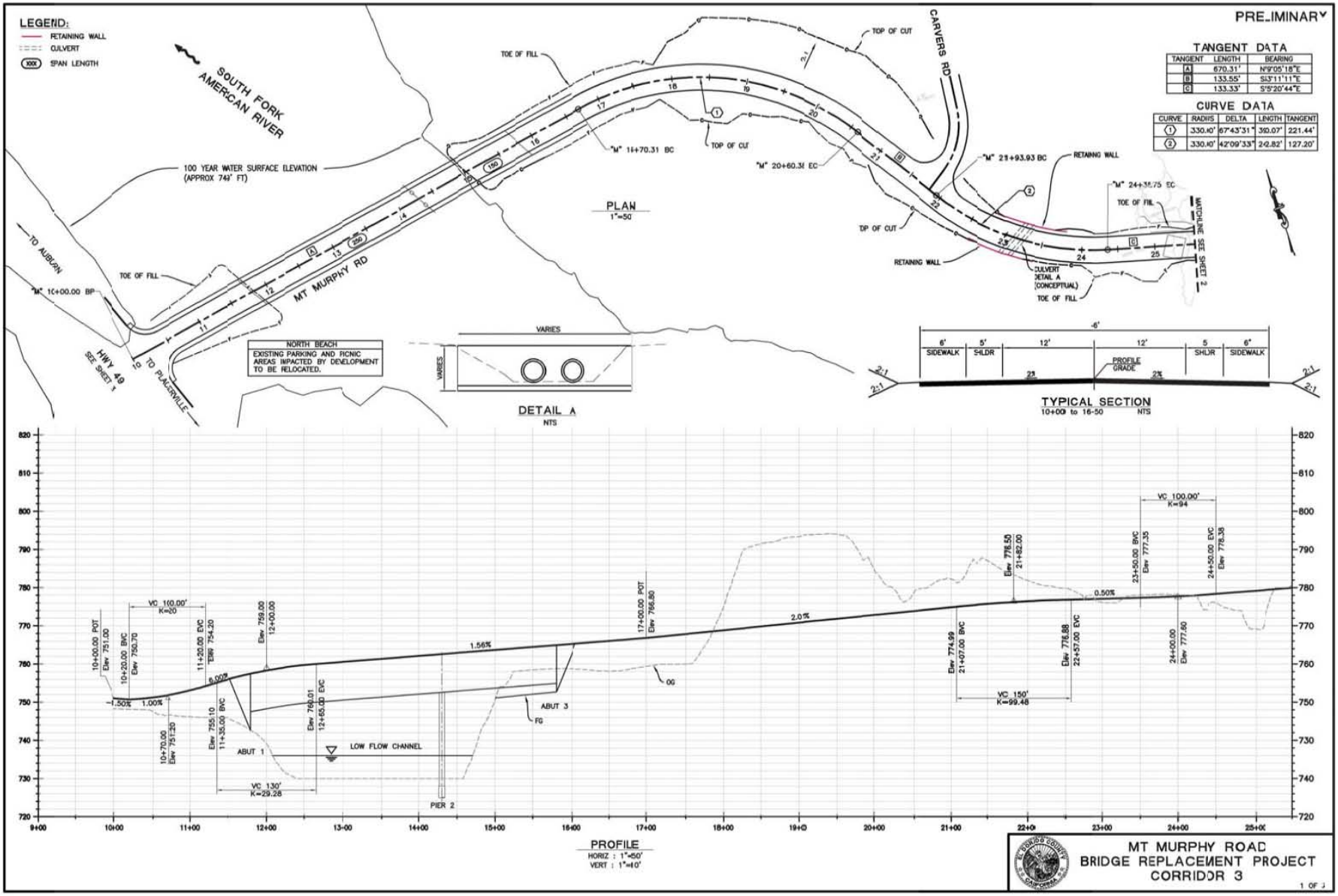


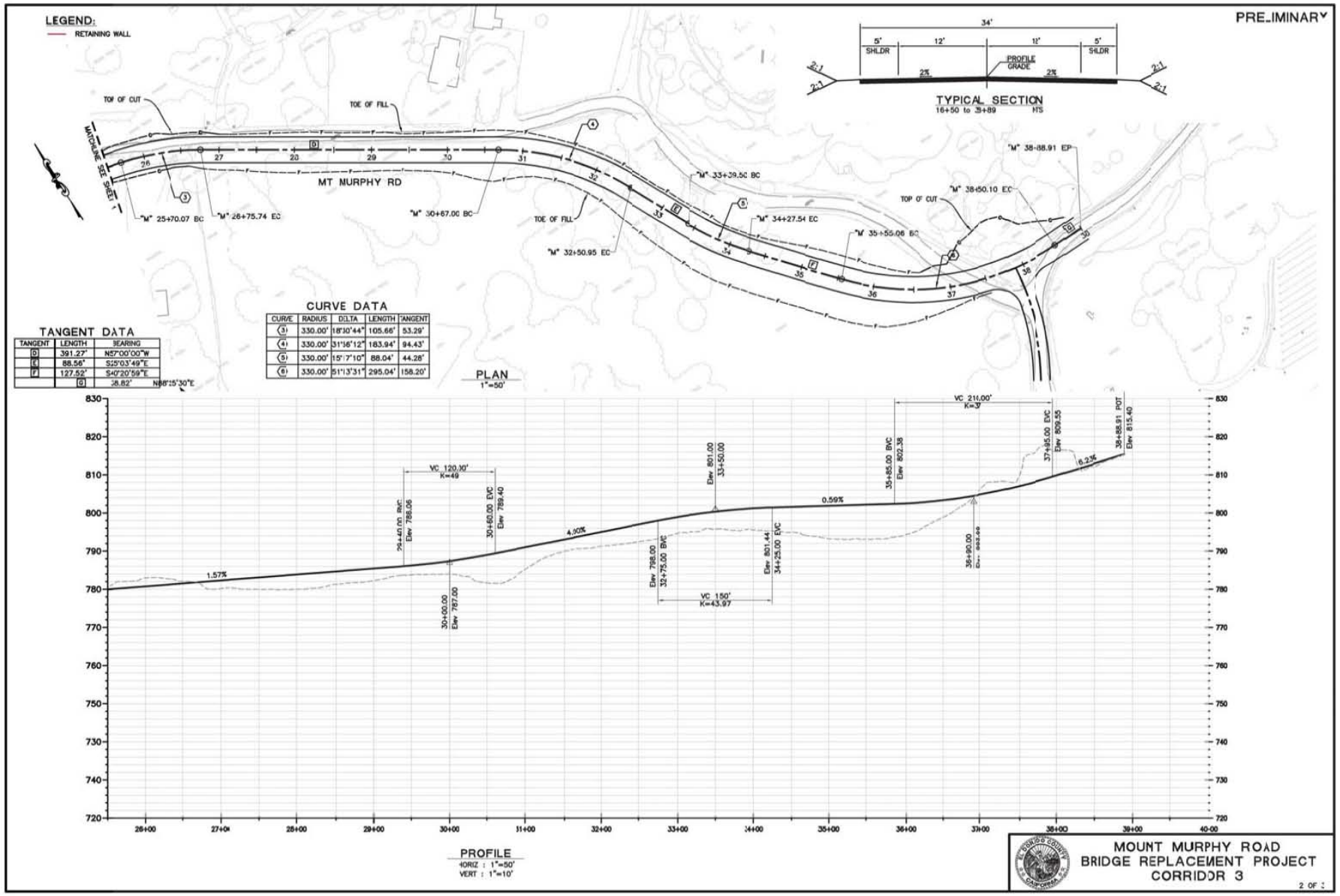


Appendix B: Corridors 1, 2, 3 Overview, Plan, & Profile Sheets


LEGEND:
RETAINING WALL
SPAN LENGTH
STAGE 1 CONSTRUCTION
STAGE 2 CONSTRUCTION
TANGENT DATA
TANGENT | LENGTH | BEARING
A | 773.18' | N45°16'25"E
B | 43.63' | N79°30'12"E
PRELIMINARY
BRIDGE BARRIER
STAGE 1 CONSTRUCTION
EXIST BRIDGE
STAGE 1 TRAFFIC
TEMPORARY RAILING TYPE K
STAGE 1
STAGE 2 TRAFFIC
STAGE 2 CONSTFUCTION
STAGE 3 CLOSURE POUR
STAGE 2
PROFILE GRADE
TYPICAL SECTION
NTS
SOUTH FORK AMERICAN RIVER
TO AUBURN
TO PLACERVILLE
HWY 49
PROPOSED RELOCATION OF DRIVEWAY FOR GRANGE PARKING LOT
GRANGE PARKING LOT
GRANGE
100 YEAR WATER SURFACE ELEVATION (APPROX. 749' FT)
"M" 0+00.00 BP
RETAINING WALL
MT MURPHY RD
TOE OF FILL
RETAINING WALL
"M" 17+73.18 BC
COLOMA RESORT
"M" 19+82.32 EC
"M" 20+25.92 EP
BECKEART'S GUN SHOP
CURVE DATA
CURVE | RADIUS | DELTA | LENGTH | TANGENT
1 | 350.00' | 34°15'37" | 209.14' | 107.80'
PLAN
1"=40'
VC 100' K=48.93
VC 100' K=19.80
VC 220.00' K=39
VC 80.00' K=19
10+00.00 POT Elev 762.96
10+75.00 Elev 761.75
11+31.00 BVC Elev 763.18
11+81.00 Elev 764.45
12+31.00 EVC Elev 764.70
12+67.00 BVC Elev 764.65
13+17.00 Elev 765.13
13+67.00 EVC Elev 764.88
17+22.00 BVC Elev 763.10
19+42.00 EVC Elev 768.16
20+24.13 POT Elev 772.36
10+35.00 BVC
11+15.00 EVC Elev 762.77
18+32.00 Elev 762.55
2.54%
0.50%
-0.50%
5.1%
ABUT 1
ABUT 4
PIER 2
PIER 3
LOW FLOW CHANNEL
EXIST PIER
FG
OG
790
780
770
760
750
740
730
8+50
9+00
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
PROFILE
HORIZ : 1"=40'
VERT : 1"=8'
EL DORADO COUNTY CALIFORNIA
MT MURPHY ROAD
BRIDGE REPLACEMENT PROJECT
CORRIDOR 1


PRELIMINARY
LEGEND
RETAINING WALL
(XXX) SPAN LENGTH
TANGENT DATA
TANGENT | LENGTH | BEARING
A | 106.34' | N50°59'10"E
B | 824.93' | N74°14'14"E
C | 198.77' | S89°50'02"E
D | 115.41' | N61°15'51"E
TYPICAL SECTION
NTS
SOUTH FORK AMERICAN RIVER
TO AUBURN
HWY 49
TO PLACERVILLE
MT MURPHY RD
CARVERS RD
"M" 10+00.00 BP
"M" 11+06.34 BC
"M" 12+48.37 EC
"M" 20+73.30 BC
"M" 22+26.21 EC
"M" 24+24.97 BC
"M" 25+13.96 EC
"M" 27+19.37 EC
TOE OF FILL
EXISTING PARKING AND PICNIC AREAS IMPACTED BY DEVELOPMENT TO BE RELOCATED.
100 YR WATER SURFACE ELEVATION (APPROX 749')
CUL-DE-SAC EXISTING MT MURPHY ROAD AT EXISTING BRIDGE
OLD MT MURPHY RD
BAYNE RD
SUTTER'S MILL REPLICA TO BE RELOCATED
PLAN
1"=50'
CURVE DATA
CURVE | RADIUS | DELTA | LENGTH | TANGENT
1 | 350.00' | 23°15'04" | 142.03' | 72.00
2 | 550.00' | 15°55'45" | 152.91' | 76.95
3 | 325.00' | 28°54'08" | 168.99' | 86.33
VC 100.00' K=23
VC 100' K=30.85
VC 150' K=51.23
VC 300.00' K=59
ABUT 1
ABUT 3
PIER 2
PIER 3
PIER 4
LOW FLOW CHANNEL
FG
OG
PROFILE
HORIZ : 1"=50'
VERT : 1"=10'
MT MURPHY ROAD
BRIDGE REPLACEMENT PROJECT
CORRIDOR 2


PRELIMINARY
LEGEND:
RETAINING WALL
CULVERT
(XXX) SPAN LENGTH
SOUTH FORK AMERICAN RIVER
100 YEAR WATER SURFACE ELEVATION (APPROX 749' FT)
TOE OF FILL
TOP OF CUT
CARVERS RD
"M" 11+70.31 BC
"M" 20+60.31 EC
"M" 21+93.93 BC
"M" 24+35.75 EC
RETAINING WALL
MATCHLINE SEE SHEET 2
TOE OF FILL
TOP OF CUT
RETAINING WALL
CULVERT DETAIL A (CONCEPTUAL)
TOE OF FILL
TO AUBURN
"M" 10+00.00 BP
MT MURPHY RD
HWY 49 SEE SHEET 1
TO PLACERVILLE
PLAN
1"=50'
TANGENT DATA
TANGENT | LENGTH | BEARING
A | 670.31' | N9°05'18"E
B | 133.55' | S13°11'11"E
C | 133.33' | S5°20'44"E
CURVE DATA
CURVE | RADIUS | DELTA | LENGTH | TANGENT
1 | 330.10' | 67°43'31" | 390.07' | 221.44'
2 | 330.10' | 42°09'33" | 242.82' | 127.20'
NORTH BEACH
EXISTING PARKING AND PICNIC AREAS IMPACTED BY DEVELOPMENT TO BE RELOCATED.
VARIES
DETAIL A
NTS
6' SIDEWALK
5' SHLDR
12'
12'
5 SHLDR
6' SIDEWALK
PROFILE GRADE
2%
2:1
TYPICAL SECTION
10+00 to 16-50 NTS
VC 100.00' K=20
VC 100.00' K=94
VC 150' K=99.48
VC 130' K=29.28
10+00.00 POT Elev 751.00
10+20.00 BVC Elev 750.70
11+20.00 EVC Elev 754.20
10+70.00 Elev 751.20
11+35.00 BVC Elev 755.10
12+00.00 Elev 759.00
12+65.00 EVC Elev 760.01
17+00.00 POT Elev 766.80
21+07.00 BVC Elev 774.99
21+82.00 Elev 778.50
22+57.00 EVC Elev 776.88
23+50.00 BVC Elev 777.35
24+00.00 Elev 777.60
24+50.00 EVC Elev 778.38
-1.50%
1.00%
1.56%
2.0%
0.50%
ABUT 1
ABUT 3
PIER 2
LOW FLOW CHANNEL
FG
OG
PROFILE
HORIZ : 1"=50'
VERT : 1"=10'
MT MURPHY ROAD
BRIDGE REPLACEMENT PROJECT
CORRIDOR 3
1 OF 3



TANGENT	LENGTH	BEARING
D	391.27'	N57°00'00"W
E	88.56'	S25°03'49"E
F	127.52'	S40°20'59"E
G	38.82'	N86°25'30"E

CURVE	RADIUS	DELTA	LENGTH	TANGENT
3	330.00'	18°30'44"	106.66'	53.29'
4	330.00'	31°36'12"	183.94'	94.43'
5	330.00'	15°17'10"	88.04'	44.28'
6	330.00'	51°13'31"	295.04'	158.20'

PRELIMINARY

SR49 ROAD GENERAL DATA

12' TRAVEL LANES, 5' PAVED SHOULDERS (ROADWAY) CONCRETE CURB AND 6' SIDEWALK

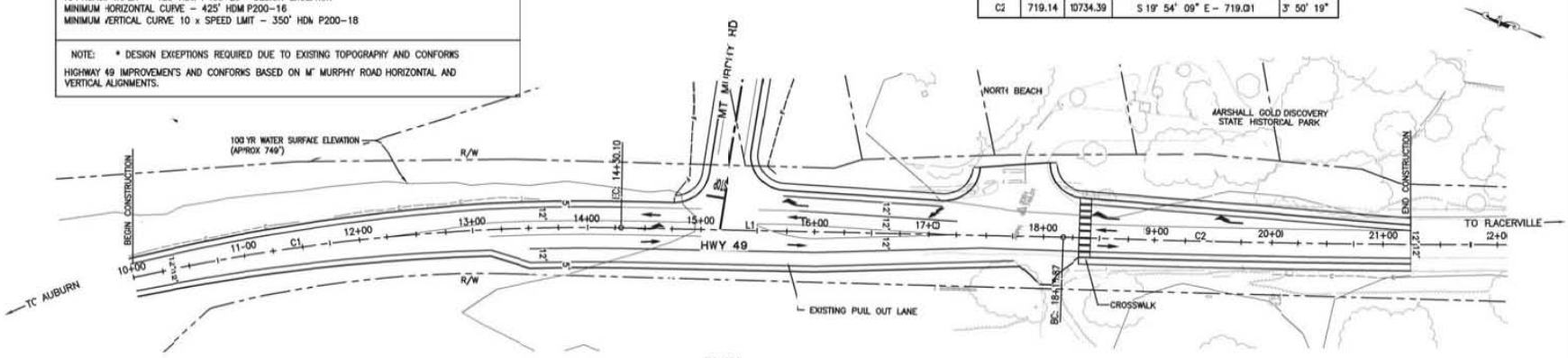
DESIGN SPEED – 35 MPH

CORNER SIGHT AT INTERSECTION (7.5 SECOND RULE) – 385' HDM P400-22
STOPPING SIGHT DISTANCE – 250' HDM P200-1 DECISION SIGHT DISTANCE – 525' HDM P200-3
MEDIAN DECELERATION LANE PLUS STORAGE – 275' (35 MPH) *DESIGN EXCEPTION
BAY TAPER – 90' HDM P400-22
APPROACH TAPER – 125' HDM P400-26 *DESIGN EXCEPTION
MINIMUM HORIZONTAL CURVE – 425' HDM P200-16
MINIMUM VERTICAL CURVE 10 x SPEED LIMIT – 350' HDM P200-18

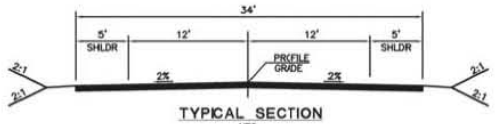
NOTE: * DESIGN EXCEPTIONS REQUIRED DUE TO EXISTING TOPOGRAPHY AND CONFORMS HIGHWAY 49 IMPROVEMENTS AND CONFORMS BASED ON MT MURPHY ROAD HORIZONTAL AND VERTICAL ALIGNMENTS.

CL SR49

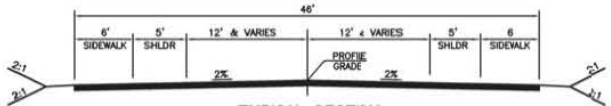
NUMBER	LENGTH	RADIUS	LINE / CHORD DIRECTION & LENGTH	DELTA
C1	430.10	818.46	S 25° 47' 52" E – 429.10	13° 33' 05"
L1	386.77		S 18° 46' 41" E	
C2	719.14	10734.39	S 19° 54' 09" E – 719.01	3° 50' 19"



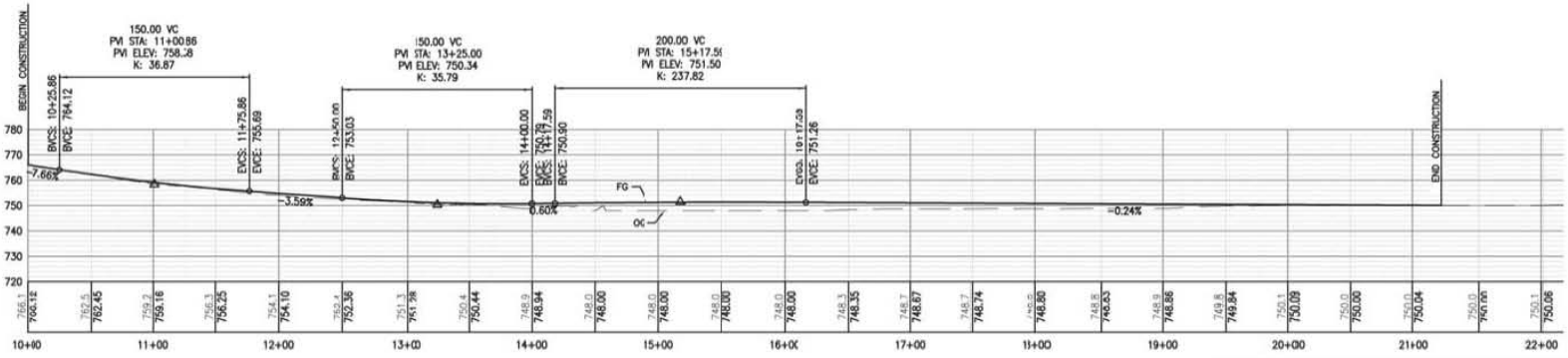
PLAN
1"=40'



TYPICAL SECTION
NTS



TYPICAL SECTION
NTS



PROFILE
SCALE: 1"=40'H,V

MOUNT MURPHY ROAD
BRIDGE REPLACEMENT PROJECT
CORRIDOR 3

3 OF 3

MT. MURPHY ROAD BRIDGE PRELIMINARY ENGINEERING
FATAL FLAW TECHINCAL DESIGN CRITERIA

Prepared by CH2M HILL May, 2014

Design Element	Design Criteria	Design Criteria Source
ROADWAY WORK		
Lane Width (ft)	10 min. (10 min.)	El Dorado County DOT (AASHTO Table 5-5 Page 5-6)
Sidewalk (ft)	6 min. on both sides (4 to 8 ft; 6 to 10 ft if adjacent to the curb)	El Dorado County Std Plan RS-20 (AASHTO Page 4-56)
Bike Lane (ft)	Class 2: Uncurbed=4, Curbed/Barrier=5	AASHTO Guide for Development of Bicycle Facilities Sec. 4.5
BRIDGE WORK		
Design Live Load	HL-93 Loading	AASHTO
Freeboard for 100 yr flood	Must Pass Flow	Caltrans/FHWA
Freeboard for 50 year flood	2' min	Caltrans/FHWA
Sidewalk Width for Bridge	4'-8'	ASHSTO Geometric Guidelines, p4-56 (4'-8'), Caltrans HDM Index 208.4 (6'min, 8' preferred)
Lane Width on Bridge	12'	12' is typical lane in AASHTO and HDM, width is restricted to what is available
Bike Lane on Bridge	Class 2: Uncurbed=4, Curbed/Barrier=5	AASHTO Guide for Development of Bicycle Facilities Sec. 4.5

All references to AASHTO are intended to refer to "A Policy on Geometric Design of Highways and Streets", AASHTO 2011
All references to El Dorado County DOT are intended to refer to "Design and Improvement Standards Manual", County of El Dorado Department of Transportation, 1990 All references to El Dorado County Plan are intended to refer to "El Dorado County Standard Plans", County of El Dorado Department of Transportation, 2011

TABLE 1 - MT. MURPHY ROAD BRIDGE PRELIMINARY ENGINEERING
PROPOSED DESIGN CRITERIA

Prepared by CH2M HILL September 26, 2013

Design Element	Proposed Design Criteria	What is Achievable Scott Rd. Extension Scott Road	What is Achievable Rehabilitation Alternative Mt. Murphy Road	Design Criteria Source
Design Classification	Local Rural	Local Rural	Local Rural	AASHTO Page 5-2
Posted Speed (mph)	25		5	
Design Speed (mph)	30	15	5	AASHTO Table 5-1 Page 5-2, need veh/day to confirm
Design Year	2035		N/A	TBD, based on traffic
Design Vehicle	SU/Motorhome	Car/Travel Trailer	SU/Motorhome	
Terrain	Rolling		Rolling	
HORIZONTAL ALIGNMENT				
Lane Transition (ft)	$L = WS^2/60$			AASHTO Eq. 3-38 Page 3-134
Maximum Superelevation (emax)	8% (if desired)			AASHTO Page 5-3
Minimum Centerline Radius (ft)	100 (214)	To be filled out when preliminary roadway layout is complete	To be filled out when preliminary roadway layout is complete	El Dorado County DOT (AASHTO Table 3-7 Page 3-32)
Length of Horizontal Curve (ft)	N/A			
Curb Return Radius (ft)	Match existing radius at curb return			Turn movements will be checked using AutoTurn
Stopping Sight Distance (ft)	200			AASHTO Table 5-3 Page 5-4
Intersection Sight Distance (ft)	200 (290)			El Dorado County DOT (AASHTO Table 9-8 Page 9-41)
Decision Sight Distance (ft)	450			AASHTO Table 3-3 Page 3-7
Horizontal Clearance to Roadside Objects (ft)	7 to 10 ft from the edge of the traveled way			AASHTO Page 5-8
VERTICAL ALIGNMENT				
Maximum Grade (%)	10 (10)			El Dorado County DOT (AASHTO Table 5-2 Page 5-3)
Minimum Grade (%)	0.5 (0.3)			El Dorado County DOT (AASHTO Page 3-119)
Critical Length of Grade (ft)	N/A			
Length of Vertical Curve (ft)	100 (90)			El Dorado County Std Plan RD-03 (AASHTO Page 3-153)
K_{sag} (minimum-desirable %)	37 (37)			El Dorado County Std Plan RD-03 (AASHTO Table 5-3 Page 5-4)
K_{crest} (minimum-desirable %)	19 (19)			El Dorado County Std Plan RD-03 (AASHTO Table 5-3 Page 5-4)
Freeboard (ft)	TBD			
Minimum Overhead Clearance (ft)	14			AASHTO Page 5-8
CROSS SECTION				
Lane Width (ft)	10 min. (10 min.)	10 min.		El Dorado County DOT (AASHTO Table 5-5 Page 5-6)
Structural Section (in)	4" AC/7" AB			El Dorado County Std Plan 101C
Cross Slope (%)	2% min. (1.5 to 2% normal crown)			El Dorado County Std Plan 101C (AASHTO Page 5-3)
Curb and Gutter Type	Type 2 (4 to 6 in high curb)			El Dorado County DOT (AASHTO Page 5-14)
Sidewalk (ft)	6 min. on both sides (4 to 8 ft; 6 to 10 ft if adjacent to the curb)			El Dorado County Std Plan RS-20 (AASHTO Page 4-56)
Bike Lane (ft)	Class 2: Uncurbed=4, Curbed/Barrier=5			AASHTO Guide for Development of Bicycle Facilities Sec. 4.5
Median (ft)	N/A			
DRAINAGE				
Design Storm Event	10-year			El Dorado County DOT
Maximum Flow	N/A			Only required if trapping
Maximum Spread	N/A			Only required if trapping
Maximum Depth	N/A			Only required if trapping
Minimum Flow Velocity (ft/s)	3			El Dorado County DOT, depends on type of lining
Maximum Flow Velocity (ft/s)	15			El Dorado County DOT, depends on type of lining
Materials	TBD			
Minimum Size (in)	12			El Dorado County DOT
Manhole Spacing (ft)	300 max.			El Dorado County DOT
Utility Clearance	TBD			

TABLE 1 - MT. MURPHY ROAD BRIDGE PRELIMINARY ENGINEERING
PROPOSED DESIGN CRITERIA

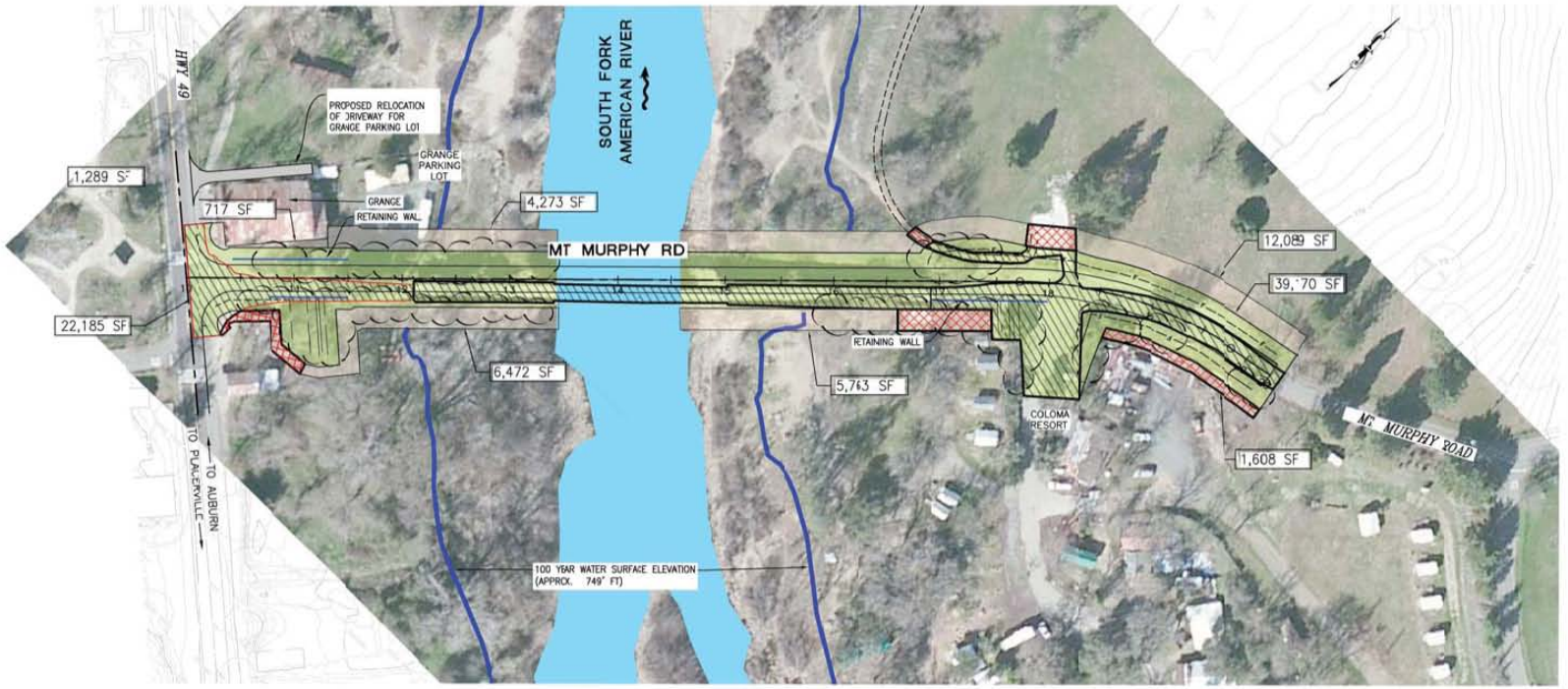
Prepared by CH2M HILL September 26, 2013

Design Element	Proposed Design Criteria	What is Achievable Scott Rd. Extension Scott Road	What is Achievable Rehabilitation Alternative Mt. Murphy Road	Design Criteria Source
BRIDGE WORK	**Standard Bridge Criteria**		**Targeted Mt. Murphy Bridge Criteria**	
Bridge Design Specification	Caltrans BDS (AASHSTO LRFD 4th Edition)		Caltrans BDS (AASHSTO LRFD 4th Edition)	Caltrans (Note Caltrans suggest they are adopting 6th edition in October, might consider using 6th Edition)
Seismic Design Code	Caltrans SDC 1.7		Caltrans SDC 1.7	Caltrans Requirement unless unachievable or unreasonable to achieve
Design Live Load	HL-93 Loading		HL-93 Loading	AASHTO
Future Wearing Surface	Optional, typically 35 psf		Assume no overlay	AASHTO
Stay-in-place Deck Form Allowance (lbs/sqft)	5		5	Caltrans BDS (ASSHSTO LRFD 4th Edtion) (Section 3.5.1)
Freeboard for 100 yr flood	Must Pass Flow		Must Pass flow	Caltrans/FHWA
Freeboard for 50 year flood	2' min		3'	Caltrans/FHWA
Sidewalk Width for Bridge	4'-8'		Propose 4' each side	preferred)
Lane Width on Bridge	12'		9'-6"	12' is typical lane in AASHTO and HDM, width is restricted to what is available
Bike Lane on Bridge	Class 2: Uncurbed=4, Curbed/Barrier=5		Propose none	AASHTO Guide for Development of Bicycle Facilities Sec. 4.5
Vertical Clearance	15'-0"		13'-6"	Caltrans Minimum Vertical for Non-Freeway
Temperature Range for Site	70 degrees		70 degrees	Caltrans BDS (ASSHSTO LRFD 4th Edtion) (Section 3.5.1)
Assummed Steel Strength (ksi)	30		30	Manual for Bridge Evaluation 1st Edition, 2008 (Section 6A.6.2)
Replacement Steel Strength (ksi)	50		50	Normal practice to use 50 ksi for new work, will specify ASTM A709, Grade 50F with Zone 2 for FCT members
Concrete Deck Strength (psi)	4000		5000	Caltrans BDS (ASSHSTO LRFD 4th Edtion) (Section 5.4.2.1)
Concrete Deck Unit Weight (lbs/cuft)	145		145	Caltrans BDS (ASSHSTO LRFD 4th Edtion) (Section 3.5.1)
Concrete Deck Composite with Stringers?	Not required		Yes, to increase capacity	
Corrosion Protection System for Steel	2 coats Zinc-rich Primer		2 coats of Zinc primer with Top Color Coat	Assume color coat will be required for aesthetics
Emergency Vehicle Loading	Any Cal Fire or other Permit Loads?		County to provide	
Expansion Joints	N/A		Yes	
Approach Slabs	Not required		No	
Steel Design Code	Caltrans BDS (AASHSTO LRFD 4th Edition)		Caltrans BDS (AASHSTO LRFD 4th Edition)	Caltrans BDS (ASSHSTO LRFD 4th Edtion)
Vehicular Railing Type and Unit Weight/ft	Crash Tested Barrier		Caltrans ST-40 Modified	
Pedestrain Railing Type and Unit Weight/ft	54" height since bikes might also use walks		Prefabricated with vertical pickets	
Maintain appearance (if historic)	If historic, can't change appearance		TBD	
Traffic Handling During Construction			Must provide temporary bridge during repairs	
Utility Allowance	6" dia EID water pipeline		6" dia EID pipeline	Assume match existing
HYDRAULICS AND HYDROLOGY				
Design Storm Event	Pass Flood		100-yr Flood	Caltrans/FHWA
	Pass with Freeboard		50-yr Flood	Caltrans/FHWA
Scour	Must Not Collapse		Must Not Collapse	Caltrans/FHWA
Debris Loading to Piers	Required		Required	Caltrans BDS (ASSHSTO LRFD 4th Edtion), AASHTO 3.7.3
Bridge Deck Drainage	Varies		Scuppers to River	RWQCB

All references to AASHTO are intended to refer to "A Policy on Geometric Design of Highways and Streets", AASHTO 2011
All references to El Dorado County DOT are intended to refer to "Design and Improvement Standards Manual", County of El Dorado Department of Transportation, 1990 All references to El Dorado County Plan are intended to refer to "El Dorado County Standard Plans", County of El Dorado Departmanet of Transportation, 2011

** Items listed as N/A were investigated, but are not applicable to this project.

Appendix C: Corridors 1, 2, 3 Environmental Impact Areas



PLAN
1"=50'

LEGEND	IMPACT TO DEVELOPED AREA	UNDEVELOPED AREA
TEMPORARY CONSTRUCTION DISTURBANCE AREA, 10,922 SF, 0.11 Ac.	5,507 SF 18%	25,414 SF 82%
PERMANENT CONSTRUCTION DISTURBANCE AREA, 31,355 SF, 1.11 Ac.	29,792 SF 48%	31,563 SF 52%
100 YEAR WATER SURFACE ELEVATION (APPROX 749' FT)		
PROPERTY LINE		
PROJECT STUDY LIMITS		
FILLS IN WATERS OF THE UNITED STATES (WOUS) 0.00 SF., 0.0 Ac.		
TREE REMOVAL AREAS APPROX. 36,439 SF., 0.83 Ac.		

CORRIDOR 1
CONCEPTUAL DISTURBANCE AREAS
SCALE : 1" = 50'

PRELIMINARY-SUBJECT TO REVISION

REVISION NUMBER	DATE	DESCRIPTION	BY

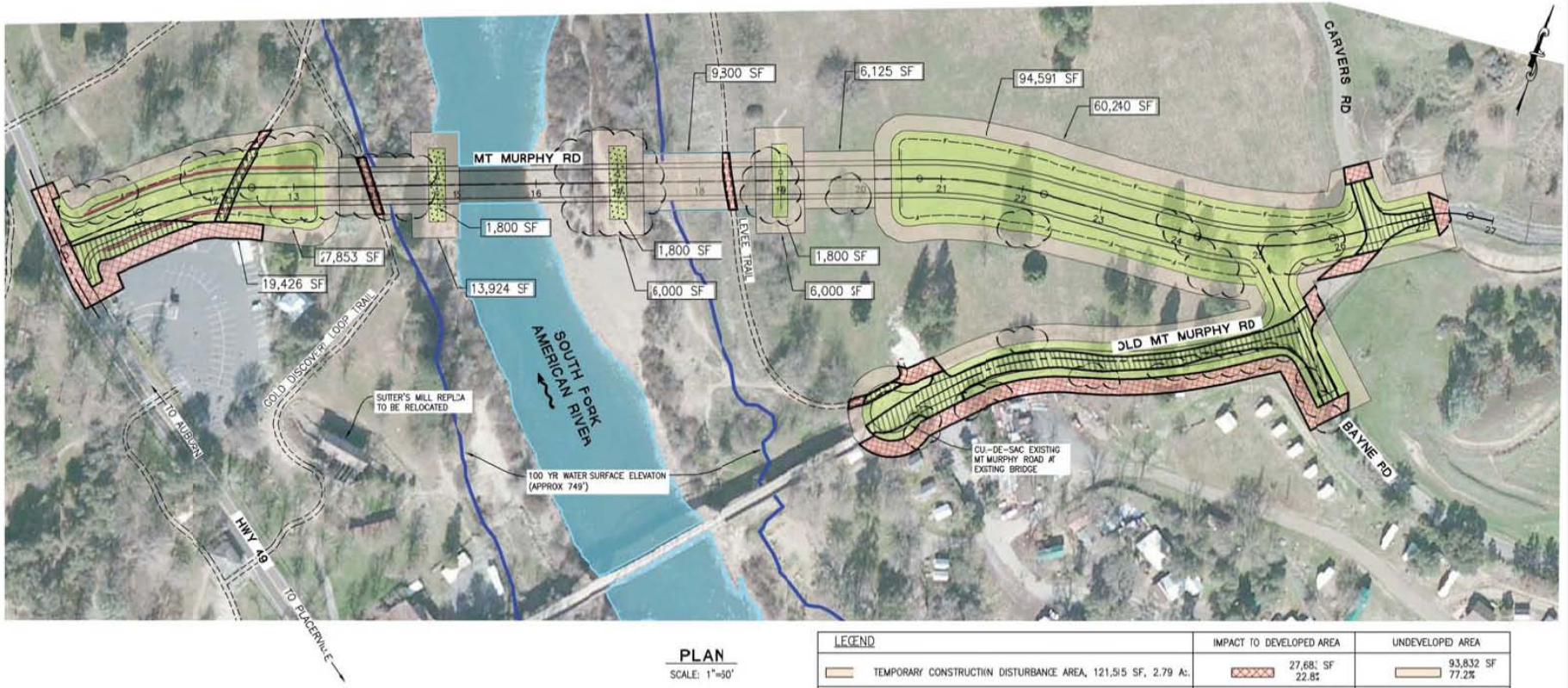
PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8/03/16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 1
W.O. No.
77129

FOR REDUCED PLANS 0 1 2 ORIGINAL SCALE IS IN INCHES
Drawing name: C:\Civil 3D Projects\77129 Mt Murphy Bridge Replacement\CADD Files\Exhibits\CORRIDOR 1.dwg Layout Tab: CORRIDOR 1 Aug 03,2016 - 9:26am BRichards



PLAN
SCALE: 1"=50'

LEGEND	IMPACT TO DEVELOPED AREA	UNDEVELOPED AREA
TEMPORARY CONSTRUCTION DISTURBANCE AREA, 121,515 SF, 2.79 Ac.	27,681 SF 22.8%	93,832 SF 77.2%
PERMANENT CONSTRUCTION DISTURBANCE AREA, 127,814 SF, 2.93 Ac.	22,779 SF 17.8%	105,065 SF 82.2%
100 YEAR WATER SURFACE ELEVATION (APPROX 749' MT)		
PROPERTY LINE		
PROJECT STUDY LIMITS		
FILLS IN WATERS OF THE UNITED STATES (WOUS) APPROX. 3,600 SF., 0.08 Ac.		
TREE REMOVAL AREAS APPROX. 76,996 SF., 1.77 Ac.		

CORRIDOR 2
CONCEPTUAL DISTURBANCE AREAS
SCALE : 1" = 60'

PRELIMINARY-SUBJECT TO REVISION

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8-03-16
ROAD NUMBER:

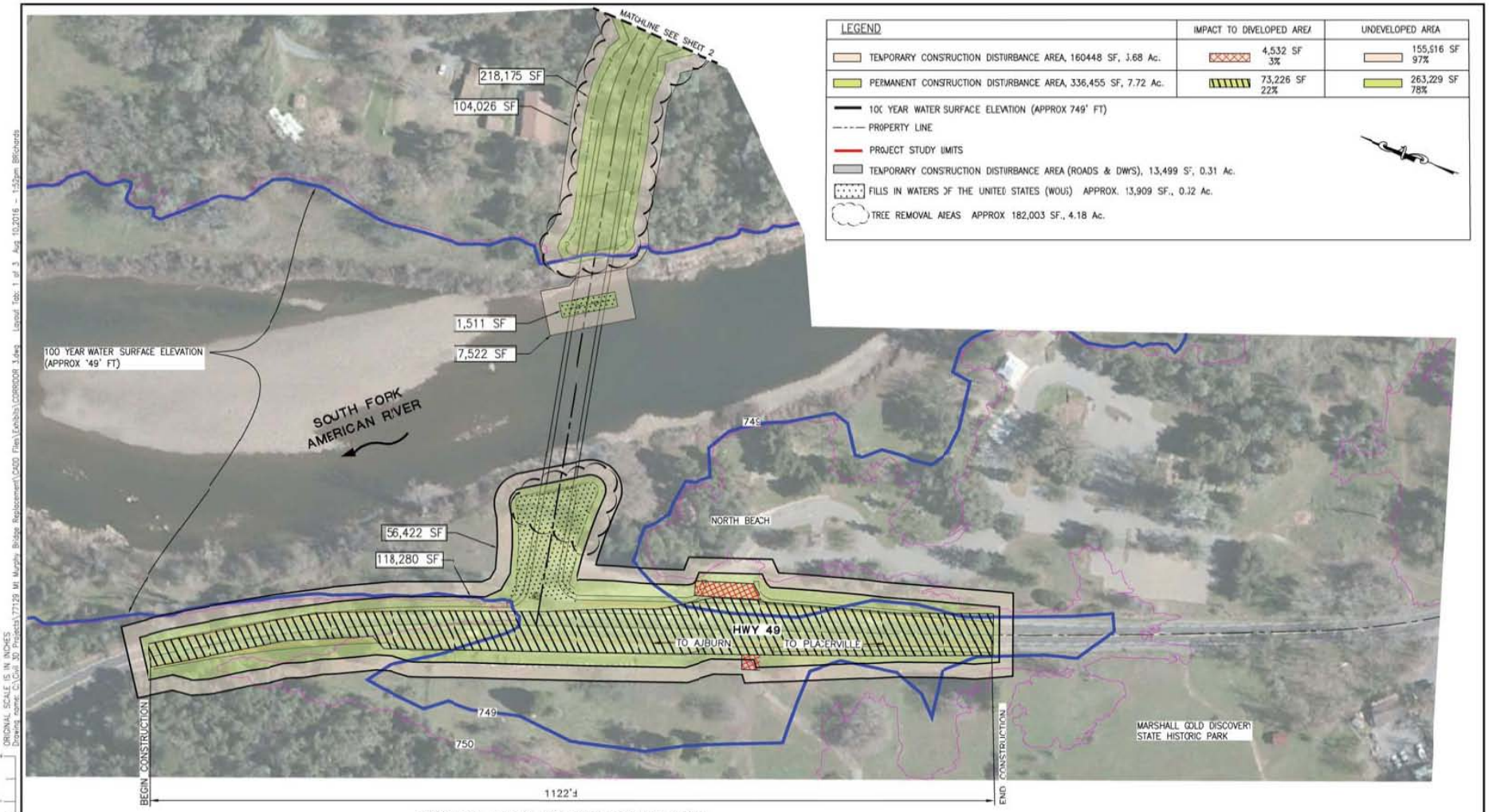
COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 1
W.O. No. 77129

FOR REDUCED PLANS 0 1 2 ORIGINAL SCALE IS IN INCHES
Drawing name: C:\Civil 3D Projects\77129 Mt Murphy Bridge Replacement\CADD Files\Exhibits\CORRIDOR 2.dwg Layout Tab: CORRIDOR 2 Aug 03,2016 - 8:29am BRichards

13-0217 7B 53 of 111



PLAN
1"=60'

PRELIMINARY-SUBJECT TO REVISION

CORRIDOR 3
CONCEPTUAL DISTURBANCE AREAS
SCALE : 1" = 50'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

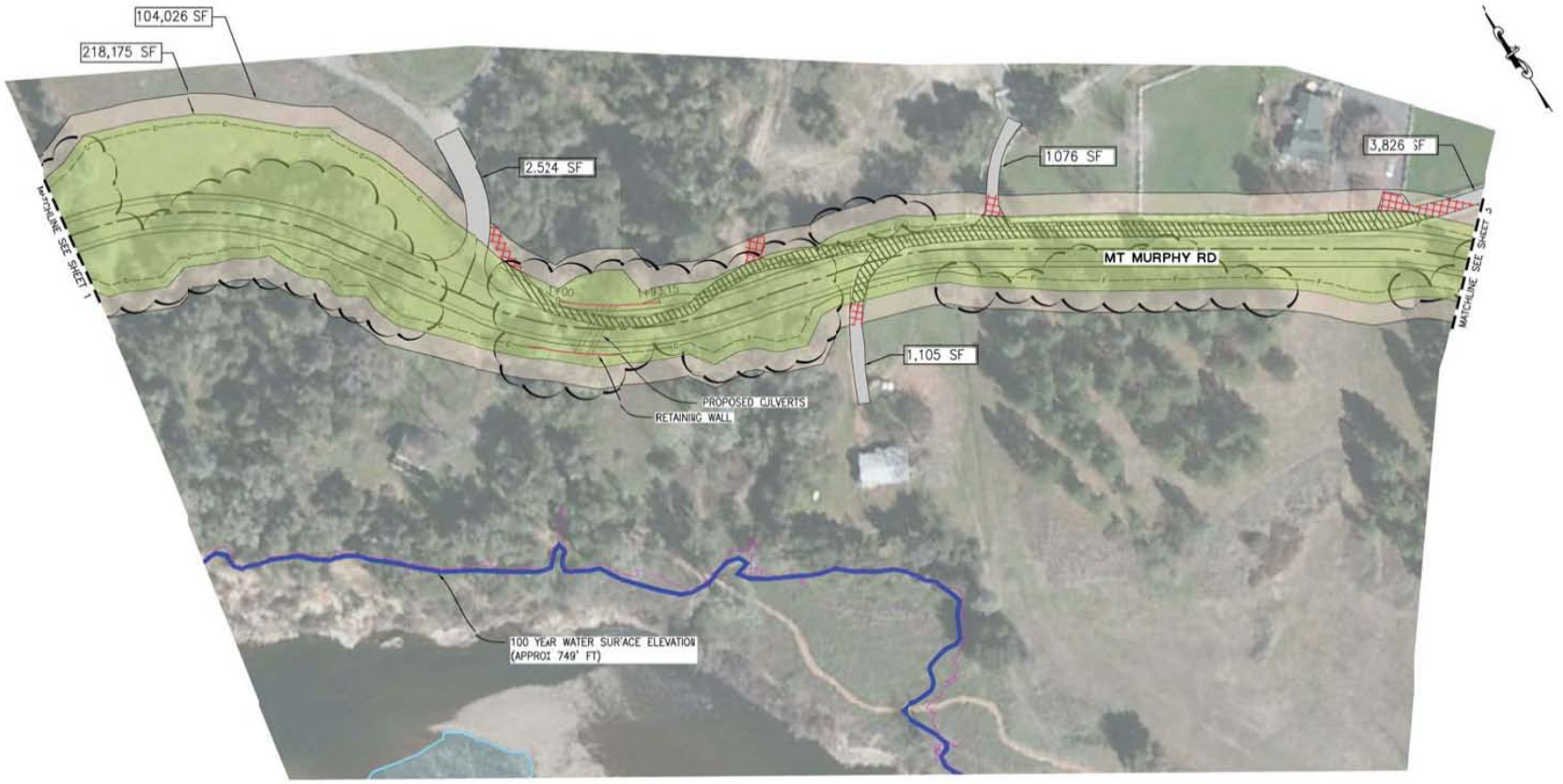
PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8-09-16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 3
W.O. No. 77129

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES
Drawing name: C:\Civil 3D Projects\77129 Mt Murphy Bridge Replacement\CAD Files\Exhibits\CORRIDOR 3.dwg Layout Tab: 1 of 3 Aug 10,2016 - 1:42pm BRichards



PLAN
1"=50'

PRELIMINARY-SUBJECT TO REVISION

CORRIDOR 3
CONCEPTUAL DISTURBANCE AREAS
SCALE : 1" = 50'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:

DESIGNED: DRAWN:
CHECKED: DATE: 8-09-16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
2 of 3
W.O. No.
77129

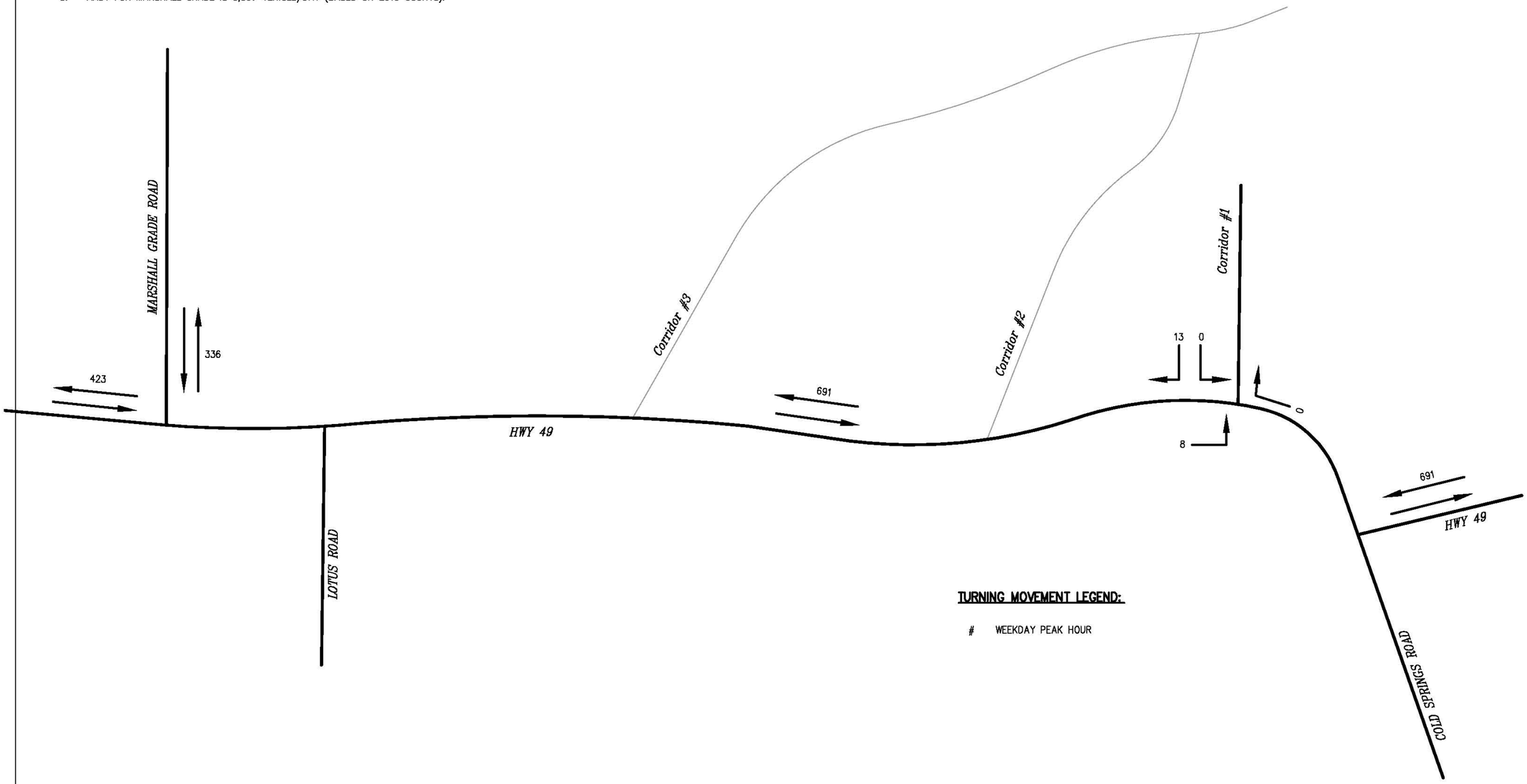
FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES
Drawing name: C:\Civil 3D Projects\77129 Mt Murphy Bridge Replacement\CADD Files\Exhibits\CORRIDOR 3.dwg Layout Tab: 2 of 3 Aug 10,2016 - 1:09pm BRichards

CONCEPTUAL DISTURBANCE AREAS
SCALE : 1" = 50'
CORRIDOR 3
PLAN
1"=60'
PRELIMINARY-SUBJECT TO REVISION
COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION
MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT
EXHIBIT
3 OF 3
77129
CARYERS RD
BAYNE RD
OLD MT MURPHY RD
2,898 SF
3,826 SF
MATCHLINE SEE SHEET 2
REVISION
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

Appendix D: Corridors 1, 2, 3 Traffic Studies

NOTES:

1. TRAFFIC VOLUMES SHOWN FOR TURNING MOVEMENTS ARE BASED UPON TRAFFIC COUNTS ON 9/2/2015 (WEEKDAY) AND 9/5/2015 (WEEKEND).
2. TRAFFIC VOLUMES SHOWN FOR HIGHWAY 49 ARE BASED UPON CALTRANS COUNT DATA AT HIGHWAY 49 AND MARSHALL GRADE (BASED ON 2016 COUNTS FOR 7-DAYS AVERAGE).
3. AADT FOR HIGHWAY 49 IS 6,914 VEHICLE/DAY EAST OF MARSHALL GRADE. VOLUMES SHOWN ARE FOR PEAK HOUR (ESTIMATED AT 10% OF THE AADT).
4. AADT FOR MOUNT MURPHY IS 360 VEHICLE/DAY (BASED ON 2015 COUNTS).
5. AADT FOR MARSHALL GRADE IS 3,367 VEHICLE/DAY (BASED ON 2015 COUNTS).



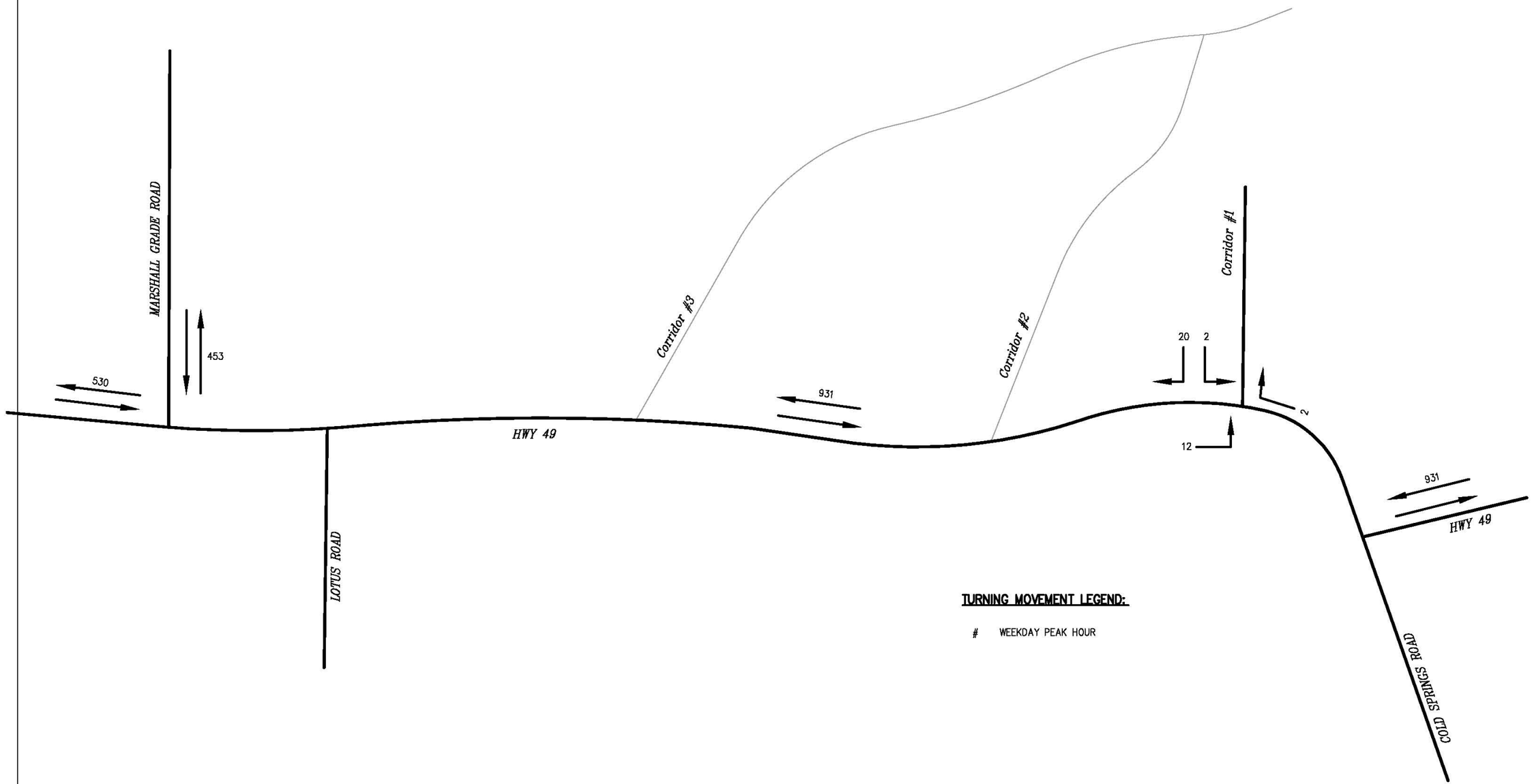
TURNING MOVEMENT LEGEND:

\# WEEKDAY PEAK HOUR

MT. MURPHY ROAD BRIDGE
CORRIDOR #1 - YEAR 2015

NOTES:

1. TRAFFIC VOLUMES SHOWN FOR FUTURE ARE BASED UPON A GROWTH RATE OF 1.5% (PER COUNTY TRAFFIC MODELS).
2. AADT FOR HIGHWAY 49 IS 9,312 VEHICLE/DAY EAST OF MARSHALL GRADE. VOLUMES SHOWN ARE FOR PEAK HOUR (ESTIMATED AT 10% OF THE AADT).
3. AADT FOR MOUNT MURPHY IS 485 VEHICLE/DAY (BASED ON 2015 COUNTS).
4. AADT FOR MARSHALL GRADE IS 4,534 VEHICLE/DAY (BASED ON 2015 COUNTS).



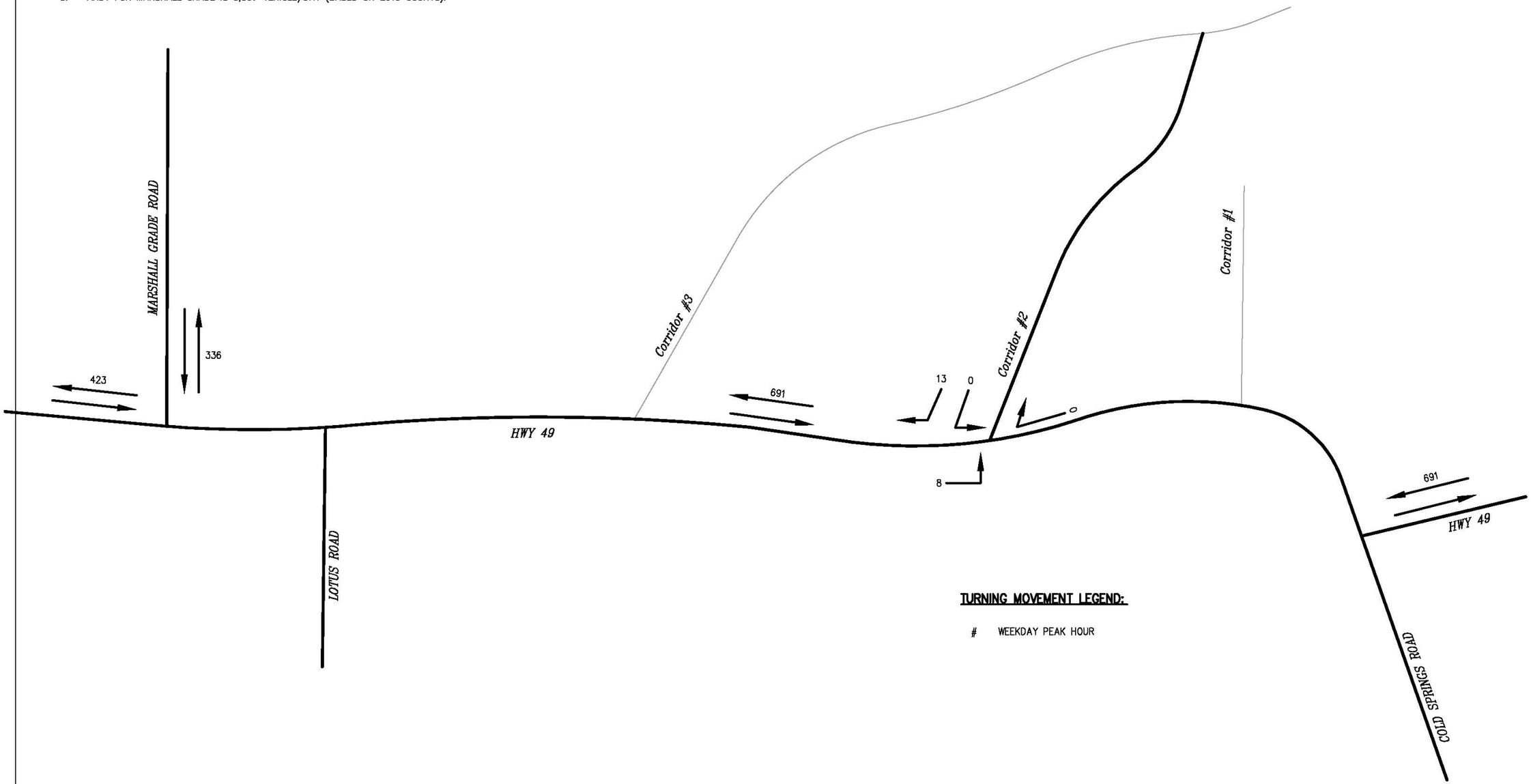
TURNING MOVEMENT LEGEND:

\# WEEKDAY PEAK HOUR

MT. MURPHY ROAD BRIDGE
CORRIDOR #1 - YEAR 2035

NOTES:

1. TRAFFIC VOLUMES SHOWN FOR TURNING MOVEMENTS ARE BASED UPON TRAFFIC COUNTS ON 9/2/2015 (WEEKDAY) AND 9/5/2015 (WEEKEND).
2. TRAFFIC VOLUMES SHOWN FOR HIGHWAY 49 ARE BASED UPON CALTRANS COUNT DATA AT HIGHWAY 49 AND MARSHALL GRADE (BASED ON 2016 COUNTS FOR 7-DAYS AVERAGE).
3. AADT FOR HIGHWAY 49 IS 6,914 VEHICLE/DAY EAST OF MARSHALL GRADE. VOLUMES SHOWN ARE FOR PEAK HOUR (ESTIMATED AT 10% OF THE AADT).
4. AADT FOR MOUNT MURPHY IS 360 VEHICLE/DAY (BASED ON 2015 COUNTS).
5. AADT FOR MARSHALL GRADE IS 3,367 VEHICLE/DAY (BASED ON 2015 COUNTS).



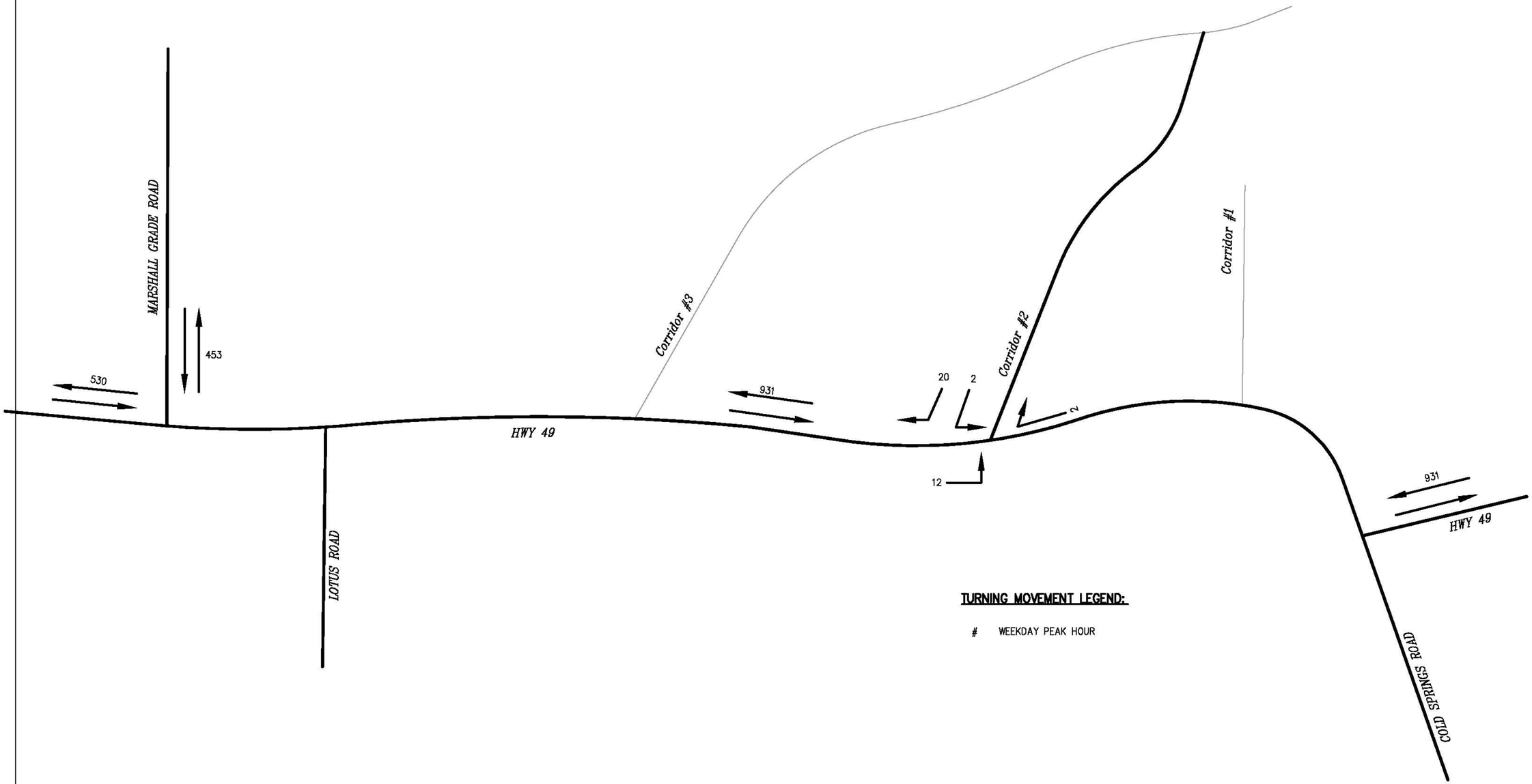
TURNING MOVEMENT LEGEND:

\# WEEKDAY PEAK HOUR

MT. MURPHY ROAD BRIDGE
CORRIDOR #2 - YEAR 2015

NOTES:

1. TRAFFIC VOLUMES SHOWN FOR FUTURE ARE BASED UPON A GROWTH RATE OF 1.5% (PER COUNTY TRAFFIC MODELS).
2. AADT FOR HIGHWAY 49 IS 9,312 VEHICLE/DAY EAST OF MARSHALL GRADE. VOLUMES SHOWN ARE FOR PEAK HOUR (ESTIMATED AT 10% OF THE AADT).
3. AADT FOR MOUNT MURPHY IS 485 VEHICLE/DAY (BASED ON 2015 COUNTS).
4. AADT FOR MARSHALL GRADE IS 4,534 VEHICLE/DAY (BASED ON 2015 COUNTS).



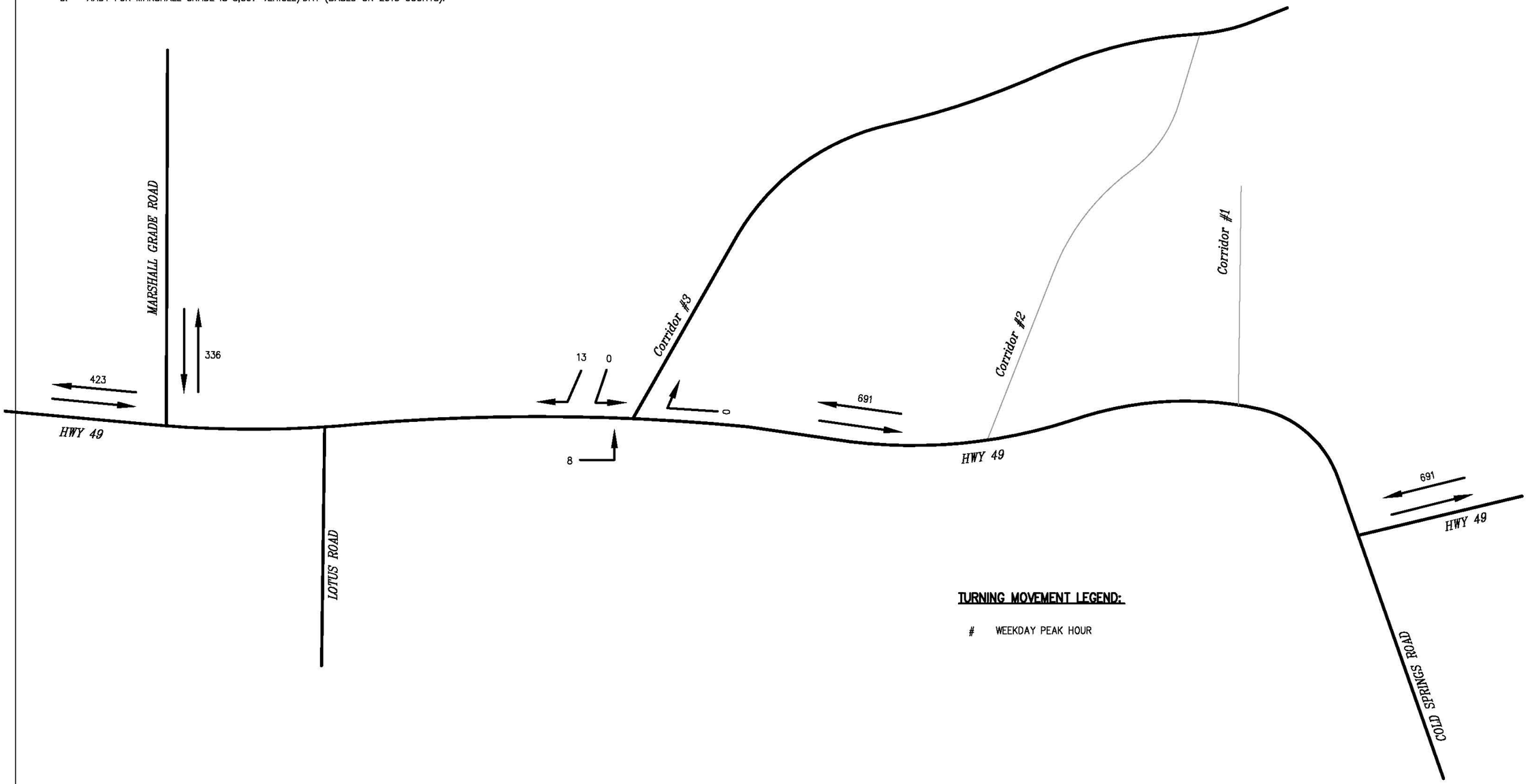
TURNING MOVEMENT LEGEND:

\# WEEKDAY PEAK HOUR

MT. MURPHY ROAD BRIDGE
CORRIDOR #2 - YEAR 2035

NOTES:

1. TRAFFIC VOLUMES SHOWN FOR TURNING MOVEMENTS ARE BASED UPON TRAFFIC COUNTS ON 9/2/2015 (WEEKDAY) AND 9/5/2015 (WEEKEND).
2. TRAFFIC VOLUMES SHOWN FOR HIGHWAY 49 ARE BASED UPON CALTRANS COUNT DATA AT HIGHWAY 49 AND MARSHALL GRADE (BASED ON 2016 COUNTS FOR 7-DAYS AVERAGE).
3. AADT FOR HIGHWAY 49 IS 6,914 VEHICLE/DAY EAST OF MARSHALL GRADE. VOLUMES SHOWN ARE FOR PEAK HOUR (ESTIMATED AT 10% OF THE AADT).
4. AADT FOR MOUNT MURPHY IS 360 VEHICLE/DAY (BASED ON 2015 COUNTS).
5. AADT FOR MARSHALL GRADE IS 3,367 VEHICLE/DAY (BASED ON 2015 COUNTS).



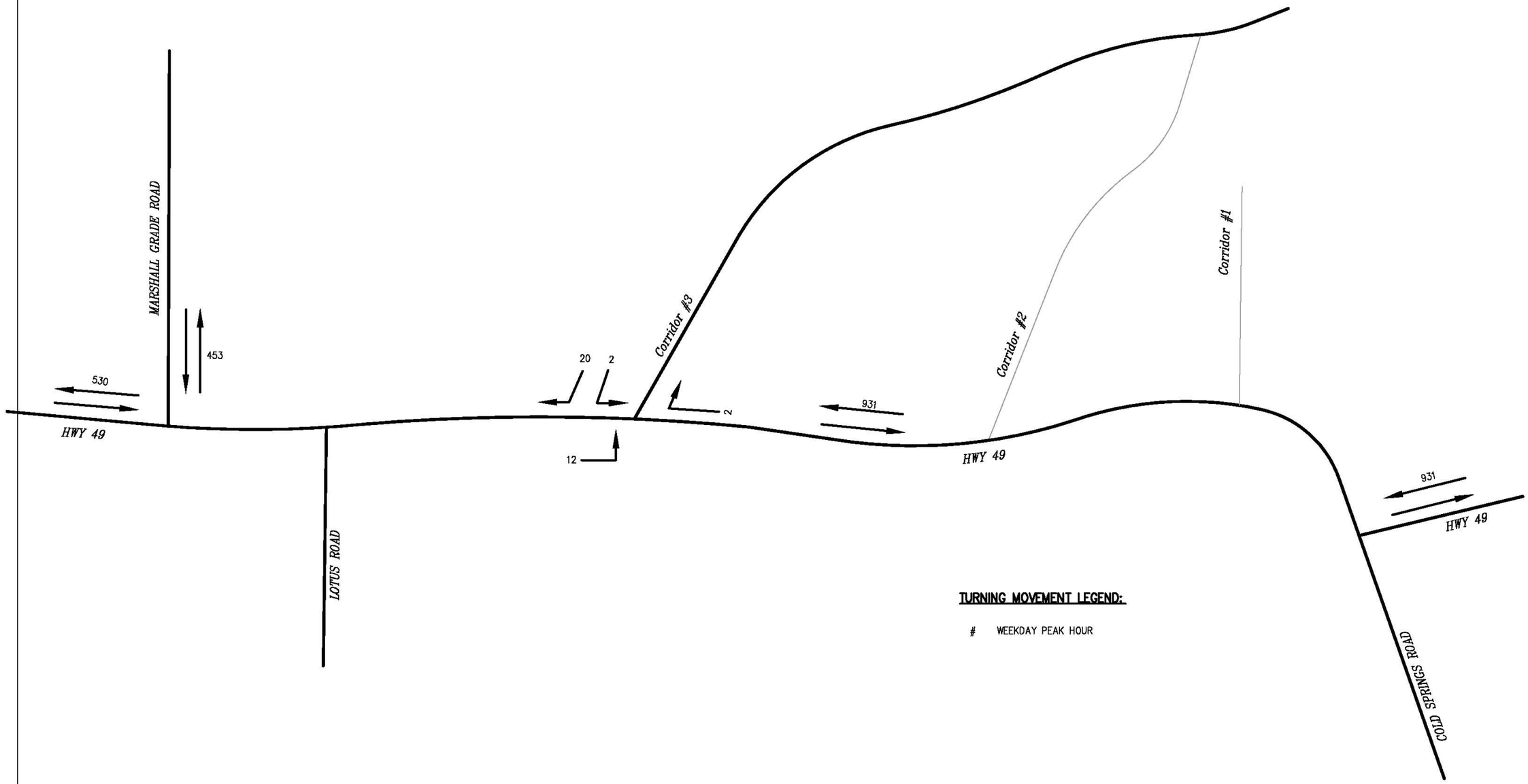
TURNING MOVEMENT LEGEND:

\# WEEKDAY PEAK HOUR

MT. MURPHY ROAD BRIDGE
CORRIDOR #3 - YEAR 2015

NOTES:

1. TRAFFIC VOLUMES SHOWN FOR FUTURE ARE BASED UPON A GROWTH RATE OF 1.5% (PER COUNTY TRAFFIC MODELS).
2. AADT FOR HIGHWAY 49 IS 9,312 VEHICLE/DAY EAST OF MARSHALL GRADE. VOLUMES SHOWN ARE FOR PEAK HOUR (ESTIMATED AT 10% OF THE AADT).
3. AADT FOR MOUNT MURPHY IS 485 VEHICLE/DAY (BASED ON 2015 COUNTS).
4. AADT FOR MARSHALL GRADE IS 4,534 VEHICLE/DAY (BASED ON 2015 COUNTS).



MT. MURPHY ROAD BRIDGE
CORRIDOR #3 - YEAR 2035

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY

Turning Movement Count
Mt. Murphy Rd at State Route 49

Start Date: 09/02/2015
Start Time: 07:15

	From S.R. 49 Southbound			From Mt. Murphy Rd Southbound			From S.R. 49 Northbound			From State Park Museum		
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
Movement #	2	3	4	6	7	8	10	11	12	14	15	16
7:15 AM	N.C.	N.C.	**1**	**1**	**0**	**1**	**1**	N.C	N.C	N.A.	N.A.	N.A.
7:30 AM	N.C.	N.C.	**1**	**1**	**0**	**2**	**0**	N.C	N.C	N.A.	N.A.	N.A.
7:45 AM	N.C.	N.C.	**1**	**3**	**0**	**3**	**1**	N.C	N.C	N.A.	N.A.	N.A.
8:00 AM	N.C.	N.C.	**0**	**4**	**0**	**0**	**2**	N.C	N.C	N.A.	N.A.	N.A.
8:15 AM	N.C.	N.C.	**2**	**4**	**0**	**1**	**3**	N.C	N.C	N.A.	N.A.	N.A.
8:30 AM	N.C.	N.C.	**2**	**2**	**0**	**2**	**1**	N.C	N.C	N.A.	N.A.	N.A.
8:45 AM	N.C.	N.C.	**4**	**3**	**0**	**4**	**1**	N.C	N.C	N.A.	N.A.	N.A.
9:00 AM	N.C.	N.C.	**1**	**3**	**0**	**0**	**0**	N.C	N.C	N.A.	N.A.	N.A.
9:15 AM	N.C.	N.C.	**3**	**3**	**0**	**1**	**2**	N.C	N.C	N.A.	N.A.	N.A.
9:30 AM	N.C.	N.C.	**1**	**2**	**1**	**1**	**0**	N.C	N.C	N.A.	N.A.	N.A.
3:15 PM	N.C.	N.C.	**4**	**3**	**0**	**1**	**0**	N.C	N.C	N.A.	N.A.	N.A.
3:30 PM	N.C.	N.C.	**2**	**2**	**0**	**0**	**1**	N.C	N.C	N.A.	N.A.	N.A.
3:45 PM	N.C.	N.C.	**1**	**1**	**0**	**2**	**0**	N.C	N.C	N.A.	N.A.	N.A.
4:00 PM	N.C.	N.C.	**5**	**2**	**0**	**2**	**3**	N.C	N.C	N.A.	N.A.	N.A.
4:15 PM	N.C.	N.C.	**1**	**2**	**0**	**0**	**4**	N.C	N.C	N.A.	N.A.	N.A.
4:30 PM	N.C.	N.C.	**3**	**2**	**0**	**2**	**0**	N.C	N.C	N.A.	N.A.	N.A.
4:45 PM	N.C.	N.C.	**3**	**2**	**0**	**0**	**3**	N.C	N.C	N.A.	N.A.	N.A.
5:00 PM	N.C.	N.C.	**2**	**2**	**0**	**0**	**1**	N.C	N.C	N.A.	N.A.	N.A.
5:15 PM	N.C.	N.C.	**2**	**2**	**0**	**2**	**2**	N.C	N.C	N.A.	N.A.	N.A.
5:30 PM	N.C.	N.C.	**3**	**2**	**0**	**2**	**0**	N.C	N.C	N.A.	N.A.	N.A.
5:45 PM	N.C.	N.C.	**2**	**1**	**0**	**1**	**1**	N.C	N.C	N.A.	N.A.	N.A.

N.C. = Not Counted
N/A = Does Not Apply (One Way Road)

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY

Turning Movement Count
Mt. Murphy Rd at State Route 49

Start Date: 09/05/2015
Start Time: 09:30

	From S.R. 49 Southbound			From Mt. Murphy Rd Southbound			From S.R. 49 Northbound			From State Park Museum		
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
Movement #	2	3	4	6	7	8	10	11	12	14	15	16
9:30 AM	N.C.	N.C.	**6**	**15**		**1**	**3**	N.C	N.C	N.A.	N.A.	N.A.
9:45 AM	N.C.	N.C.	**9**	**5**		**3**	**5**	N.C	N.C	N.A.	N.A.	N.A.
10:00 AM	N.C.	N.C.	**6**	**3**	**1**	**4**	**1**	N.C	N.C	N.A.	N.A.	N.A.
10:15 AM	N.C.	N.C.	**10**	**6**		**3**	**3**	N.C	N.C	N.A.	N.A.	N.A.
10:30 AM	N.C.	N.C.	**10**	**1**		**2**	**4**	N.C	N.C	N.A.	N.A.	N.A.
10:45 AM	N.C.	N.C.	**5**	**5**		**2**	**2**	N.C	N.C	N.A.	N.A.	N.A.
11:00 AM	N.C.	N.C.	**4**	**3**		**4**	**2**	N.C	N.C	N.A.	N.A.	N.A.
11:15 AM	N.C.	N.C.	**3**	**6**		**3**	**6**	N.C	N.C	N.A.	N.A.	N.A.
11:30 AM	N.C.	N.C.	**3**	**2**		**5**	**3**	N.C	N.C	N.A.	N.A.	N.A.
11:45 AM	N.C.	N.C.	**10**	**7**		**3**	**4**	N.C	N.C	N.A.	N.A.	N.A.
12:00 PM	N.C.	N.C.	**6**	**7**		**8**	**9**	N.C	N.C	N.A.	N.A.	N.A.
12:15 PM	N.C.	N.C.	**10**	**8**		**5**	**6**	N.C	N.C	N.A.	N.A.	N.A.
12:30 PM	N.C.	N.C.	**13**	**10**		**5**	**5**	N.C	N.C	N.A.	N.A.	N.A.
12:45 PM	N.C.	N.C.	**10**	**7**		**1**	**6**	N.C	N.C	N.A.	N.A.	N.A.
1:00 PM	N.C.	N.C.	**5**	**3**	**1**	**7**	**4**	N.C	N.C	N.A.	N.A.	N.A.
1:15 PM	N.C.	N.C.	**13**	**3**		**7**	**10**	N.C	N.C	N.A.	N.A.	N.A.
1:30 PM	N.C.	N.C.	**7**	**6**		**7**	**7**	N.C	N.C	N.A.	N.A.	N.A.
1:45 PM	N.C.	N.C.	**4**	**1**		**3**	**2**	N.C	N.C	N.A.	N.A.	N.A.
2:00 PM	N.C.	N.C.	**8**	**11**	**1**	**1**	**6**	N.C	N.C	N.A.	N.A.	N.A.
2:15 PM	N.C.	N.C.	**7**	**7**	**1**	**2**	**5**	N.C	N.C	N.A.	N.A.	N.A.
2:30 PM	N.C.	N.C.	**9**	**6**		**4**	**1**	N.C	N.C	N.A.	N.A.	N.A.
2:45 PM	N.C.	N.C.	**10**	**10**		**7**	**1**	N.C	N.C	N.A.	N.A.	N.A.
3:00 PM	N.C.	N.C.	**12**	**7**	**1**	**0**	**4**	N.C	N.C	N.A.	N.A.	N.A.
3:15 PM	N.C.	N.C.	**10**	**4**		**7**	**3**	N.C	N.C	N.A.	N.A.	N.A.
3:30 PM	N.C.	N.C.	**13**	**10**		**2**	**1**	N.C	N.C	N.A.	N.A.	N.A.
3:45 PM	N.C.	N.C.	**10**	**2**	**1**	**3**	**4**	N.C	N.C	N.A.	N.A.	N.A.
4:00 PM	N.C.	N.C.	**12**	**4**		**5**	**10**	N.C	N.C	N.A.	N.A.	N.A.
4:15 PM	N.C.	N.C.	**8**	**8**		**2**	**3**	N.C	N.C	N.A.	N.A.	N.A.
4:30 PM	N.C.	N.C.	**11**	**7**		**2**	**2**	N.C	N.C	N.A.	N.A.	N.A.
4:45 PM	N.C.	N.C.	**13**	**5**		**1**	**1**	N.C	N.C	N.A.	N.A.	N.A.
5:00 PM	N.C.	N.C.	**6**	**4**		**2**	**8**	N.C	N.C	N.A.	N.A.	N.A.
5:15 PM	N.C.	N.C.	**6**	**8**		**2**	**3**	N.C	N.C	N.A.	N.A.	N.A.

N.C. = Not Counted
N/A = Does Not Apply (One Way Road)

EL DORADO COUNTY
COMMUNITY DEVELOPMENT AGENCY: TRANSPORTATION DIVISION

Count Summary Beginning: August 22, 2015

Count Station:	1200075	Counter ID:	56
City/Town:	Coloma	Mile Post:	**0.11**
Road Name:	**Mt Murphy Road**	Location:	**600 Ft. N. of S.R. 49**
Lanes:	2	Direction:	NORTHBOUND

Date	23	24	25	26	27	28	22	Weekly	Wk Day
Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Average	Avg.
Time									
100	0	0	0	1	0	1	3	1	0
200	1	1	0	0	0	5	1	1	1
300	0	2	2	1	1	0	4	1	1
400	0	0	0	0	0	0	0	0	0
500	1	0	0	1	1	1	1	1	1
600	2	1	1	1	1	0	0	1	1
700	0	1	0	1	1	1	3	1	1
800	6	7	6	5	5	2	1	5	5
900	4	9	9	6	6	4	5	6	7
1000	12	6	11	9	9	6	14	10	8
1100	7	10	7	11	7	11	14	10	9
1200	6	11	13	6	7	7	12	9	9
1300	10	12	10	4	8	21	18	12	11
1400	12	17	6	6	20	20	14	14	14
1500	7	10	12	15	18	18	16	14	15
1600	15	11	12	19	15	23	19	16	16
1700	14	24	17	23	16	25	17	19	21
1800	20	14	12	16	23	8	13	15	15
1900	8	14	15	16	16	8	17	13	14
2000	12	13	9	7	15	5	15	11	10
2100	11	13	5	14	10	7	5	9	10
2200	5	3	8	6	6	9	7	6	6
2300	2	2	5	6	1	5	2	3	4
2400	1	1	2	6	8	2	4	3	4
Totals	156	182	162	180	194	189	205	181	181
AM Peak Hr	10:00	12:00	12:00	11:00	10:00	11:00	10:00	10:00	11:00
AM Count	12	11	13	11	9	11	14	10	9
PM Peak Hr	6:00	5:00	5:00	5:00	6:00	5:00	4:00	5:00	5:00
PM Count	20	24	17	23	23	25	19	19	21

TOTAL ADT: 360

EL DORADO COUNTY
COMMUNITY DEVELOPMENT AGENCY: TRANSPORTATION DIVISION

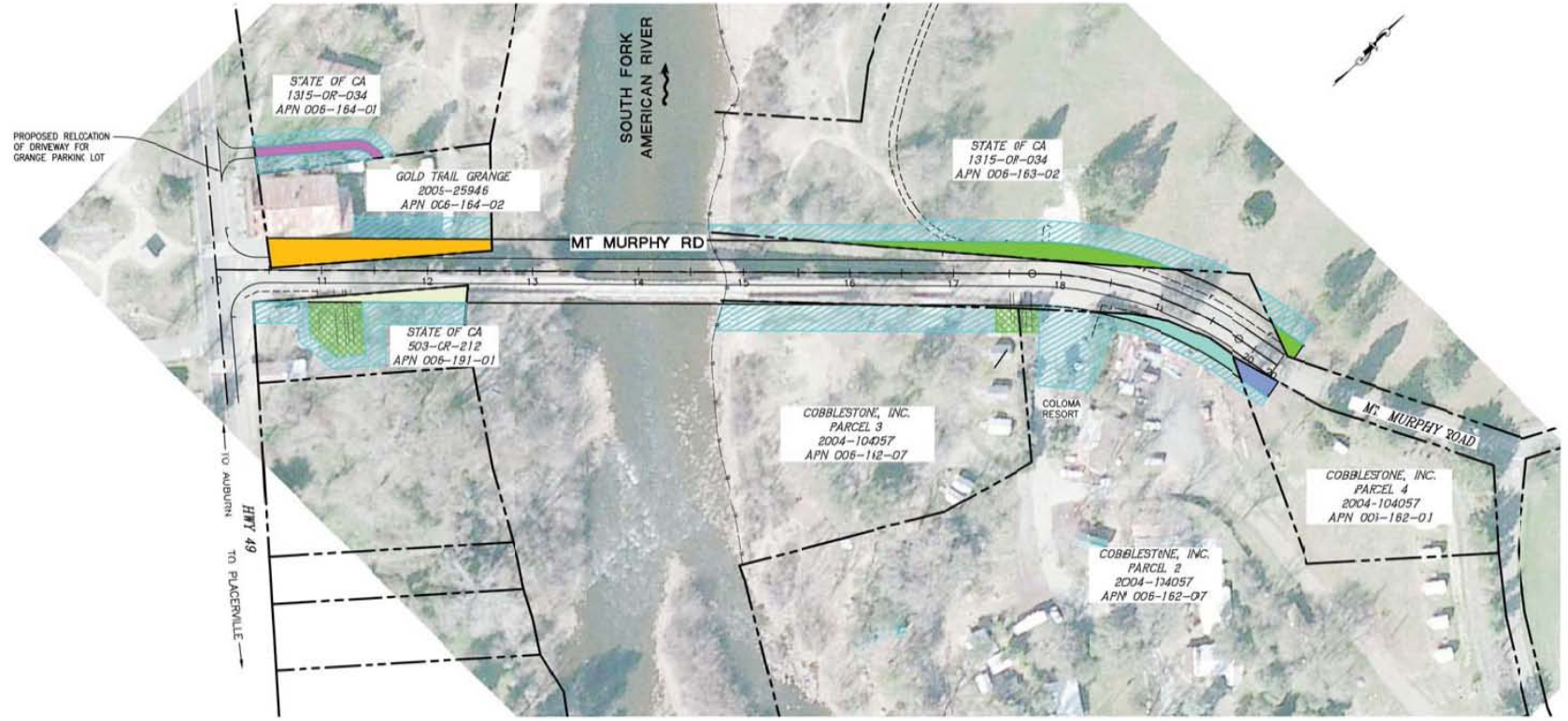
Count Summary Beginning: August 22, 2015

Count Station:	1200075	Counter ID:	56
City/Town:	Coloma	Mile Post:	**0.11**
Road Name:	**Mt Murphy Road**	Location:	**600 Ft. N. of S.R. 49**
Lanes:	2	Direction:	SOUTHBOUND

Date	23	24	25	26	27	28	22	Weekly	Wk Day
Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Average	Avg.
Time									
100	0	0	1	0	0	0	1	0	0
200	1	0	0	0	0	0	0	0	0
300	0	3	0	0	1	0	0	1	1
400	1	0	0	0	0	0	4	1	0
500	1	1	1	1	2	1	0	1	1
600	5	4	5	5	3	4	4	4	4
700	9	11	8	8	8	5	8	8	8
800	20	14	17	15	18	7	8	14	14
900	12	16	23	17	19	14	10	16	18
1000	16	16	20	21	16	12	13	16	17
1100	9	8	11	13	9	17	15	12	12
1200	10	14	9	11	9	8	10	10	10
1300	12	7	5	7	5	12	12	9	7
1400	8	14	10	4	17	16	17	12	12
1500	12	14	10	10	17	24	16	15	15
1600	12	13	13	16	12	9	14	13	13
1700	5	4	2	11	12	12	11	8	8
1800	2	8	6	13	14	15	11	10	11
1900	8	10	6	6	10	18	6	9	10
2000	8	5	5	5	15	8	7	8	8
2100	3	6	4	4	7	6	3	5	5
2200	1	2	2	5	4	3	2	3	3
2300	0	0	0	2	1	1	0	1	1
2400	0	1	0	0	0	0	0	0	0
Totals	155	171	158	174	199	192	172	174	179
AM Peak Hr	8:00	9:00	9:00	10:00	9:00	11:00	11:00	10:00	9:00
AM Count	20	16	23	21	19	17	15	16	18
PM Peak Hr	1:00	2:00	4:00	4:00	2:00	3:00	2:00	3:00	3:00
PM Count	12	14	13	16	17	24	17	15	15

TOTAL ADT: 360

Appendix E: Corridors 1, 2, 3 Right-of-Way (ROW) Impact Areas



PLAN

SCALE: 1"=50'

LEGEND

CA APN 006-164-01 RW – 1,210.92± S.F. TCE – 2,700.56± S.F.	CA APN 001-163-02 RW – 3,751.36± S.F. TCE – 10,294.12± S.F.
GRANGE APN 006-164-02 RW – 4,124.91± S.F. TCE – 2,621.98± S.F.	COBBLESTONE APN 006-162-07 RW – 1,701.32± S.F. TCE – 12,7 1.69± S.F. S&D – 1,058.05± S.F.
CA APN 006-131-01 RW – 1,596.63± S.F. TCE – 4,595.82± S.F. S&D – 2,367.02± S.F.	COBBLESTONE APN 006-162-01 RW – 636.14± S.F. TCE – 234.80± S.F.

SLOPE & DRAINAGE EASEMENT
3,425± S.F. (TOTAL)

TEMPORARY CONSTRUCTION EASEMENT
30,458± S.F. (TOTAL)

RIGHT O' WAY (PERMANENT ACQUISITION)
11,817± S.F. (TOTAL)

CORRIDOR 1
CONCEPTUAL EASEMENTS AND RIGHT OF WAY
SCALE : 1' = 50'

PRELIMINARY-SUBJECT TO REVISION

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:

DESIGNED: DRAWN:
CHECKED: DATE: 8/17/16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 1
W.O. No. 77129

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES
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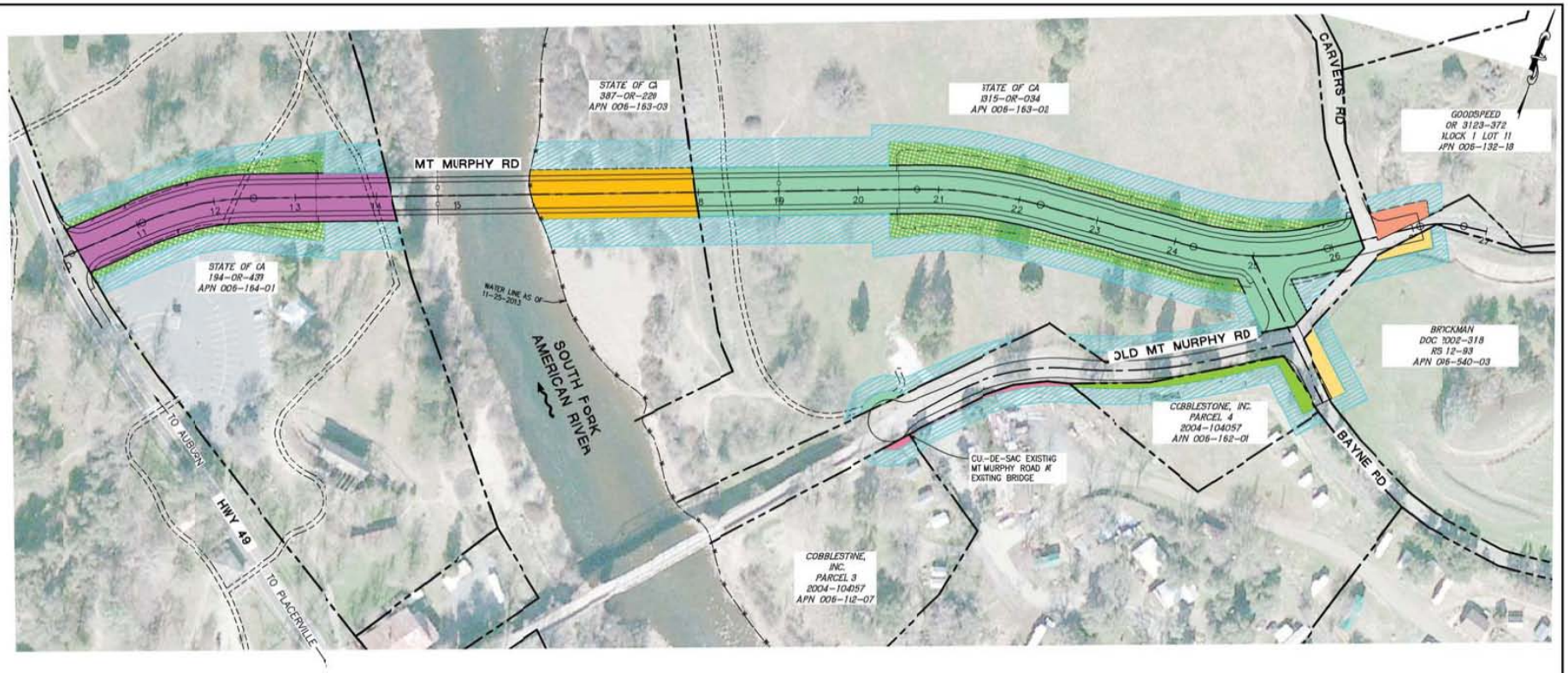

PLAN
SCALE: 1"=60'

LEGEND

CA APN 006-164-01	
RW – 23,948.58± S.F.	
TCE – 19,472.99± S.F.	
S&D – 8,223.29± S.F.	
CA APN 006-163-03	
RW – 4,124.91± S.F.	
TCE – 2,611.98± S.F.	
CA APN 006-163-02	
RW – 53,114.90± S.F.	
TCE – 48,144.54± S.F.	
S&D – 20,192.58± S.F.	

GOODSPEED APN 006-132-18	
RW – 1,596.63± S.F.	
TCE – 4,595.83± S.F.	
BROCKMAN APN 006-540-03	
RW – 1701.32± S.F.	
TCE – 12,711.69± S.F.	

COBBLESTONE APN 006-162-07	
RW – 1,701.32± S.F.	
TCE – 6,046.49± S.F.	
COBBLESTONE APN 006-162-01	
RW – 3,106.61± S.F.	
TCE – 6,408.84± S.F.	

SLOPE & DRAINAGE EASEMENT
29,155.87± S.F (TOTAL)

TEMPORARY CONSTRUCTION EASEMENT
100,893.78± S.F. (TOTAL)

RIGHT OF WAY (PERMANENT ACQUISITION)
98,565.79± S.F (TOTAL)

CORRIDOR 2
CONCEPTUAL DISTURBANCE AREAS
SCALE : 1" = 60'

PRELIMINARY-SUBJECT TO REVISION

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8-18-16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 1
W.O. No. 77129

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0 1 2
FOR REDUCED PLANS
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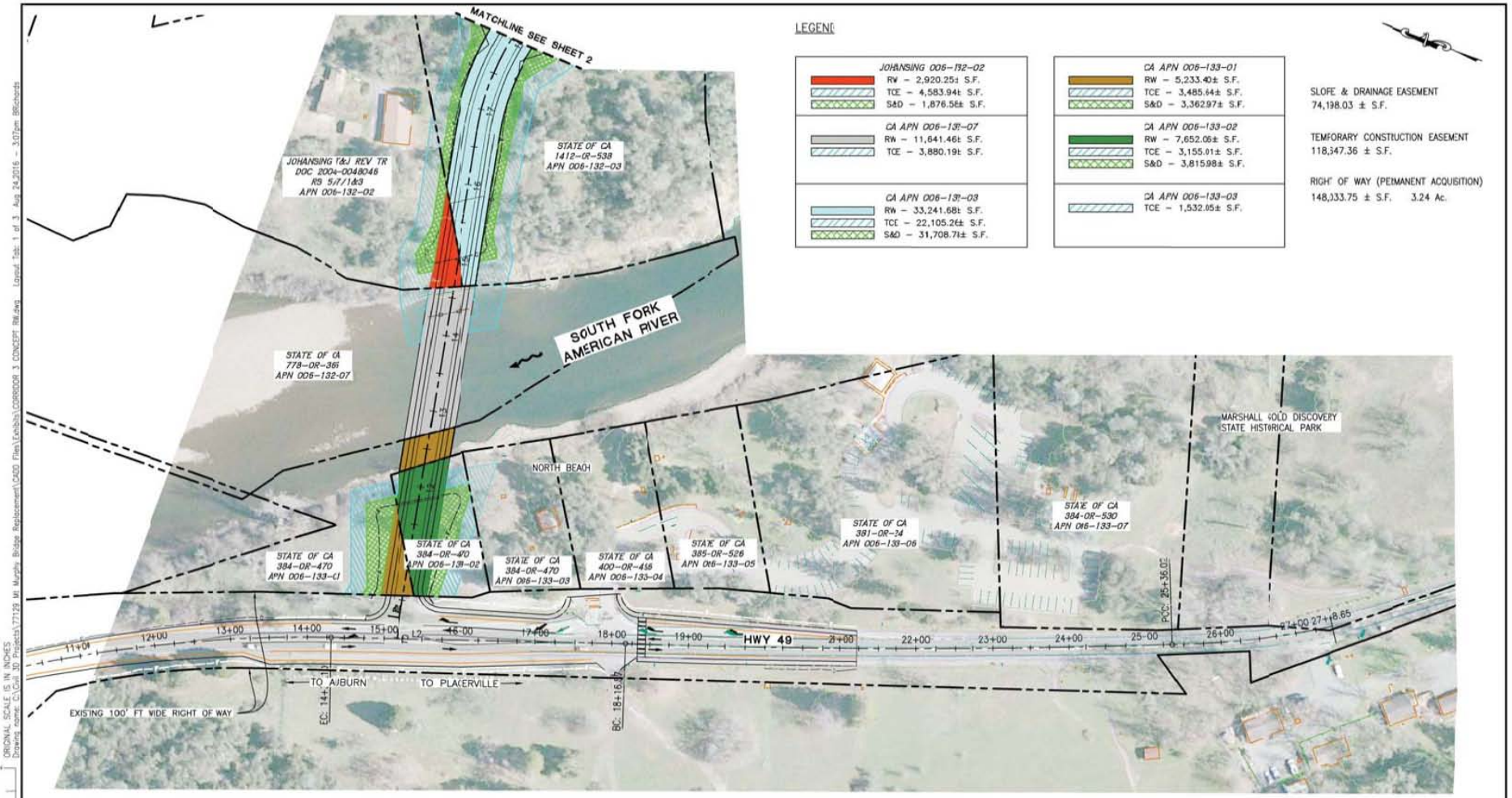

PLAN
SCALE 1"=60'

PRELIMINARY-SUBJECT TO REVISION

CORRIDOR 3
CONCEPTUAL EASEMENTS AND RIGHT OF WAY
SCALE : 1' = 50'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8-24-16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 3
W.O. No. 77129

ORIGINAL SCALE IS IN INCHES
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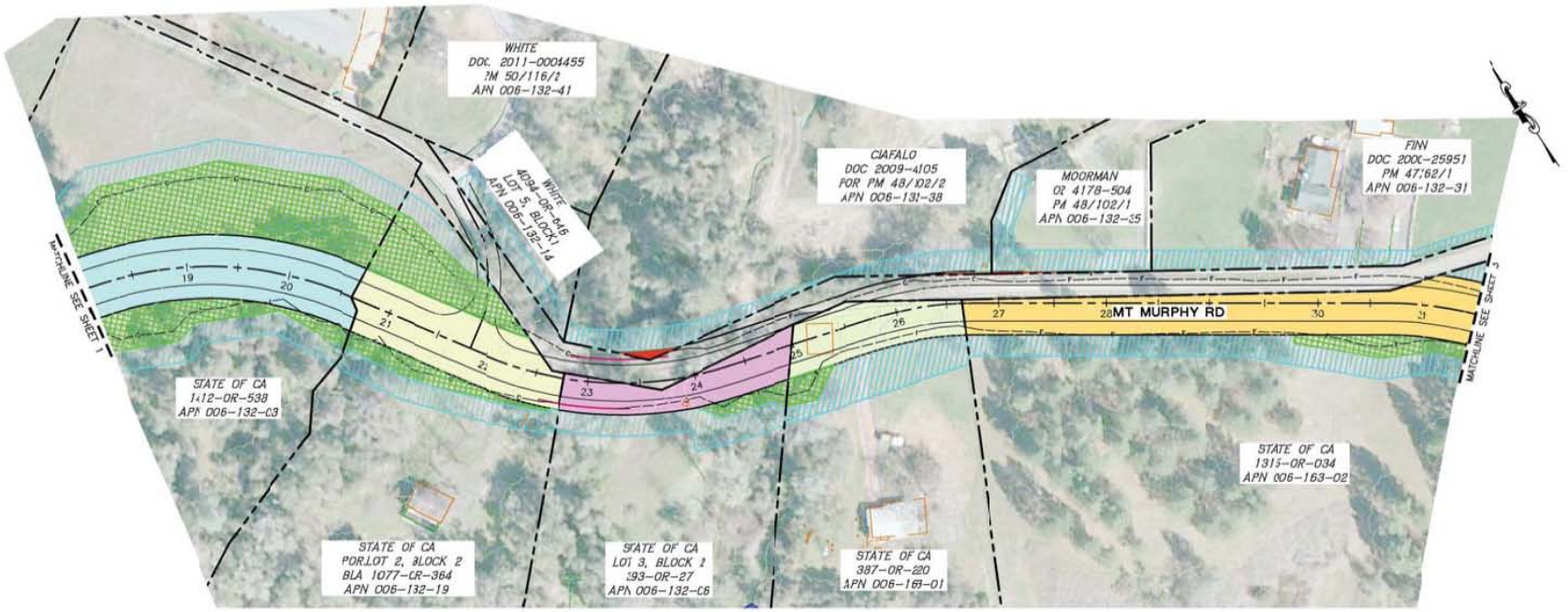
FOR REDUCED PLANS



PLAN
1"=50'

LEGEND

CIAFALO APN 006-132-38 RW – 464.10± S.F. TCE – 6,028.17± S.F.	WHITE APN 006-132-14 TCE – 3,185.94± S.F.
MOORMAN APN 006-132-35 RW – 184.80± S.F. TCE – 4,465.37± S.F.	CA APN 006-132-19 RW – 7,308.99± S.F. TCE – 5,848.47± S.F. S&D – 913.96± S.F.
FINN APN 006-132-31 TCE – 5,599.45± S.F.	CA APN 006-132-06 RW – 7,308.99± S.F. TCE – 5,848.47± S.F. S&D – 913.96± S.F.
CA APN 006-163-01 RW – 7,308.99± S.F. TCE – 5,848.47± S.F. S&D – 913.96± S.F.	

PRELIMINARY-SUBJECT TO REVISION

CORRIDOR 3
CONCEPTUAL EASEMENTS AND RIGHT OF WAY
SCALE : 1" = 50'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8-24-16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
2 of 3
W.O. No. 77129

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES
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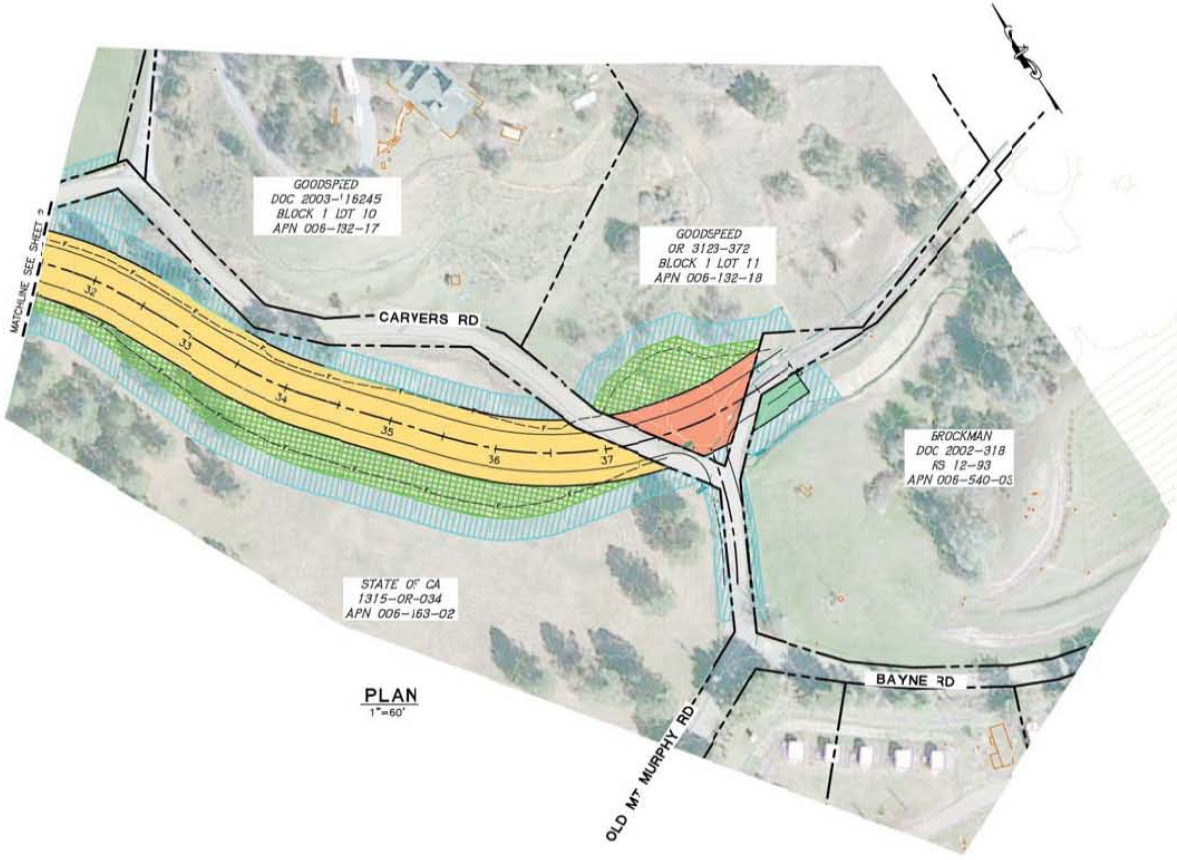

PLAN
1"=60'

LEGEND

BROCKMAN APN 006-540-03	
RW	1,184.39± S.F.
TCE	3370.35± S.F.
GOODSPEED APN 006-132-18	
RW	5,293.15± S.F.
TCE	4,572.23± S.F.
S&D	5,430.32± S.F.
CA APN 006-163-02	
RW	53,329.09± S.F.
TCE	35,469.48± S.F.
S&D	17,182.96± S.F.

PRELIMINARY-SUBJECT TO REVISION

CORRIDOR 3
CONCEPTUAL EASEMENTS AND RIGHT OF WAY
SCALE : 1" = 50'

REVISION NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8-24-16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
3 OF 3
W.O. No.
77129

FOR REDUCED PLANS 0 1 2 ORIGINAL SCALE IS IN INCHES
Drawing name: C:\Civil 3D Projects\77129 Mt Murphy Bridge Replacement\CADD Files\Exhibits\CORRIDOR 3 CONCEPT RW.dwg Layout Tab: 3 of 3 Aug 24,2016 - 3:13pm BRichards

Appendix F: Corridors 1, 2, 3 Cultural Resource Overview Map

CONCEPTUAL ALTERNATIVE CORRIDORS
SCALE : 1" = 200'

SHEET EXHIBIT 1 OF 1
W.O. No. 77129

MT MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

PRELIMINARY

DESIGNED:
DRAWN: CAD
CHECKED:
DATE: 7/29/16
ROAD NUMBER: SR 49

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER DATE:

REVISION | NUMBER | DATE | DESCRIPTION | BY

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES
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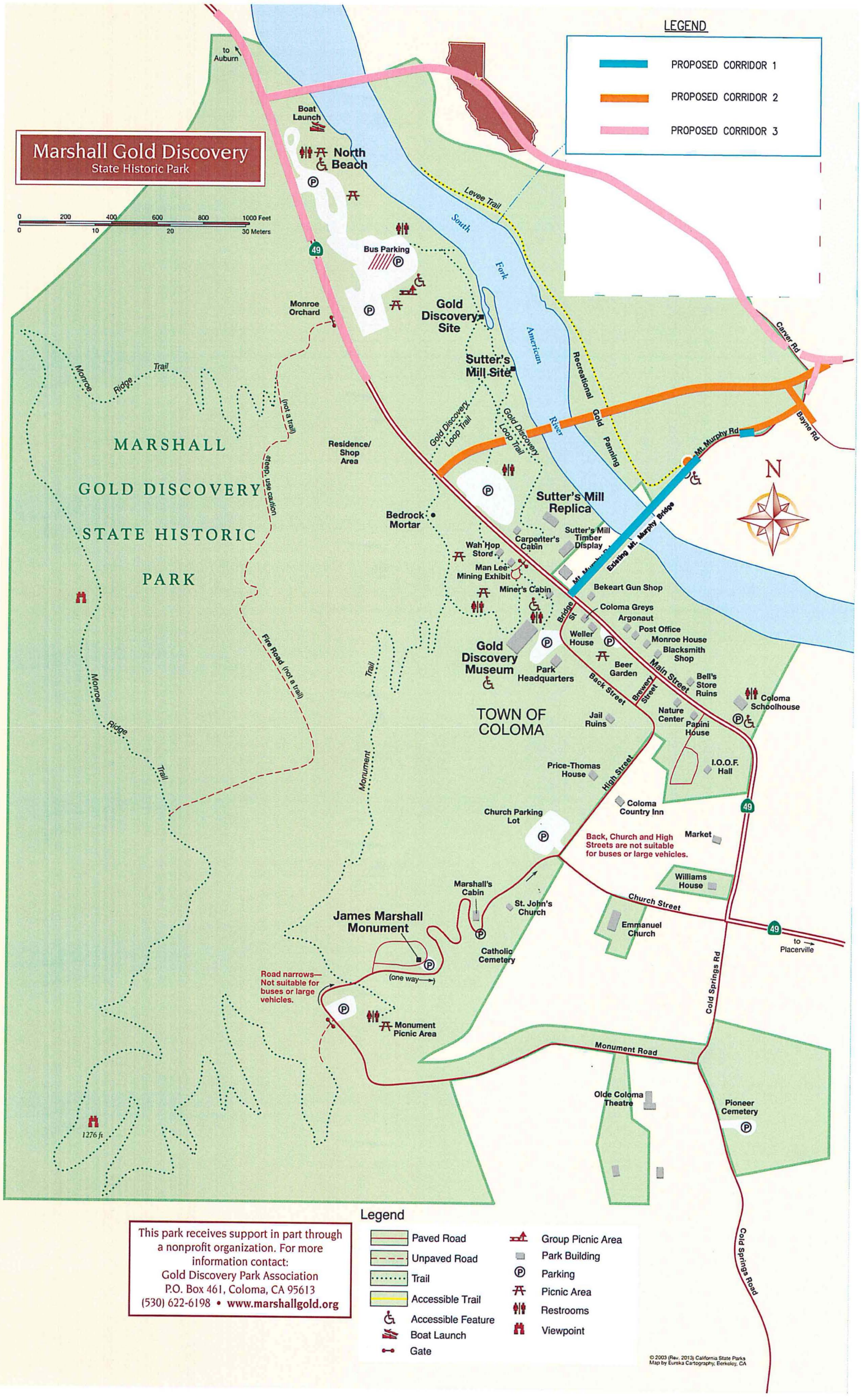


Appendix G: Corridors 1, 2, 3 Construction Cost Estimates

El Dorado County

Community Development Agency - Transportation Division

Mt Murphy Bridge - Corridor #1

Engineers Estimate- Conceptual Budget

Estimate Date: 8/10/2016

Created By: Anh Nguyen

Construction Cost Estimate				**Conceptual ESTIMATE**			
Item No.	**Item Description**	**Unit of Measure**	**Estimated Quantity**	**Unit Price**	**Item Total**	**Quantity Notes**	**Estimate Notes**
Roadway Improvements							
	Roadway Items						
1	Roadway Excavation	CY	396	55.00	$ 21,780	Per AutoCAD Earthwork 396 cy for cut and 828 cy for fill. Reused 90% of 396 cy of cut for fill.	Francisco Rt Turn - $50/CY, No blasting anticipated
2	Import Borrow	CY	472	80.00	$ 37,760	Per AutoCAD Earthwork 396 cy for cut and 828 cy for fill. Reused 90% of 396 cy of cut for fill.	2015 Caltrans Contract Cost Data
3	Hot Mix Apshalt (Type A)	TON	490	115.00	$ 56,350	Assumes 6" HMA / 12" AB, Areas from CADD 13,056 sf	Francisco Rt Turn - $113/TN
4	Class 2 Aggregate Base	CY	484	75.00	$ 36,300	Assumes 6" HMA / 12" AB, Areas from CADD 13,056 sf	Francisco - $60/CY, Salmon Falls - $135/CY
5	Minor Concrete Sidewalk	CY	153	650.00	$ 99,450	Assumes PPC, 4' x 0.5' thick, 2,061 lf.	Pleasant Valley Patterson - $650/CY
			Subtotal for Roadway Items		**$ 251,640**		
	Retaining Wall & Roadway Structure Items						
6	Retaining Wall	LF	190	150.00	$ 28,500	Construct x' to x' height Retaining Wall (Rock)	Plug
			Subtotal for Roadway Structure Items		**$ 28,500**		
	Supplemental Items						
7	Striping - Stripe	LF	4,092	2.00	$ 8,184	CL Line - 1026 lf x 2, Edge Line - 1,968 lf	Francisco Rt Turn - Stripe - $1.11/LF
8	Markings	SF	44	4.00	$ 176	20 sf limit line and 22 sf for 'STOP' pavement marking.	Francisco Rt Turn - Markings - $4/SF
9	Roadside Sign (Permanent)	EA	2	500.00	$ 1,000		Plug
10	Staging Items	LS	1	50,000.00	$ 50,000	Temporary Work Items, K-Rail, temporary paving configurations, associated with 2-stage construction	Plug
11	PCMS Boards	EA	4	20,000.00	$ 80,000	Includes temporary message boards (figures 4 each, 2 at Hwy 49, 1 at Coloma Resort, 1 at Mt Murphy	Plug
12	Construction Area Signs (CAS)	LS	1	20,000.00	$ 20,000	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug
13	Traffic Control	LS	1	50,000.00	$ 50,000	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug

El Dorado County

Community Development Agency - Transportation Division

Mt Murphy Bridge - Corridor #1

Engineers Estimate- Conceptual Budget

Estimate Date: 8/10/2016

Created By: Anh Nguyen

Construction Cost Estimate				**Conceptual ESTIMATE**			
Item No.	**Item Description**	**Unit of Measure**	**Estimated Quantity**	**Unit Price**	**Item Total**	**Quantity Notes**	**Estimate Notes**
14	SWPPP items	LS	1	50,000.00	$ 50,000	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc. (assumes 2 years of construction)	Plug
15	Final Stabilization/ Erosion Control	Acre	1	10,000.00	$ 10,000	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc.	Plug
				Subtotal for Supplemental Items	**$ 269,360**		
16	**Jobsite Management/ Mobilization - 10%**	LS	1	54,950.00	**$ 54,950**	Mobilization, oversight, jobsite management (incidental./ supplemental items) associated with roadway improvements	Plug at 10%
17	**Contingency (and Risk Items) - 25%**	LS	1	151,112.50	**$ 151,113**	Contingency and Risk Items (Conceptual Design)	Plug
				Total for Roadway Improvements	**$ 755,563**		
Hwy 49 Improvements							
	Hwy 49 Items						
1	Roadway Excavation	CY	0	55.00	$ -	Per AutoCAD Earthwork xx cy for cut and xx cy for fill.	Francisco Rt Turn - $50/CY, No blasting anticipated
2	Import Borrow	CY	0	40.00	$ -	Per AutoCAD Earthwork xx cy for cut and xx cy for fill. Reused 90% of xx cy of cut for fill.	2015 Caltrans Contract Cost Data
2	Hot Mix Apshalt (Type A)	TON	0	115.00	$ -	Assumes 6" HMA / 12" AB, Areas from CADD xx sf.	Francisco Rt Turn - $113/TN
3	Class 2 Aggregate Base	CY	0	75.00	$ -	Assumes 6" HMA / 12" AB, Areas from CADD xx sf.	Francisco - $60/CY, Salmon Falls - $135/CY
6	Curb	LF	0	35.00	$ -	Assumes xx lf.	
6	Minor Concrete Sidewalk	CY	0	650.00	$ -	Assumes PPC, 6' x 0.5' thick, xx lf.	Pleasant Valley Patterson - $650/CY
				Subtotal for Hwy 49 Items	**$ -**		
	Hwy 49 Supplemental Items						

El Dorado County

Community Development Agency - Transportation Division

Mt Murphy Bridge - Corridor #1

Engineers Estimate- Conceptual Budget

Estimate Date: 8/10/2016

Created By: Anh Nguyen

Construction Cost Estimate				**Conceptual ESTIMATE**			
Item No.	**Item Description**	**Unit of Measure**	**Estimated Quantity**	**Unit Price**	**Item Total**	**Quantity Notes**	**Estimate Notes**
10	Striping - Stripe	LF	0	2.00	$ -	CL Line - xx lf * 2, Edge Line - xx lf	Francisco Rt Turn - Stripe - $1.11/LF
11	Markings	SF	0	4.00	$ -	xx sf for Type I arrow and xx sf for Type III (L) arrow pavement markings.	Francisco Rt Turn - Markings - $4/SF
10	Roadside Sign (Permanent)	EA	0	500.00	$ -		Plug
10	Staging Items	LS	0	10,000.00	$ -	Temporary Work Items, K-Rail, temporary paving configurations, associated with 2-stage construction	Plug
11	PCMS Boards	EA	0	20,000.00	$ -	Includes temporary message boards (figures 3 each, 2 at Hwy 49, 1 at Mt Murphy	Plug
12	Construction Area Signs (CAS)	LS	0	5,000.00	$ -	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug
11	Traffic Control	LS	0	10,000.00	$ -	Additional flagging closures and traffic control shifts	Plug
8	SWPPP	LS	0	10,000.00	$ -	Additional SWPPP needs	Plug
15	Final Stabilization/ Erosion Control	Acre	0	10,000.00	$ -	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc.	Plug
				Subtotal for Supplemental Items	**$ -**		
	Jobsite Management/ Mobilization - 10%	LS	1	0.00	**$ -**		
	Contingency (and Risk Items) - 25%	LS	1	0.00	**$ -**		
PE	**PE Costs (Design, Environmental) - 25%**	LS	1	0.00	**$ -**	Includes PE Costs for Hwy 49 to include: Planning, Design, and Environmental (ROW assumed to remain within State/ Caltrans ROW)	
				Total for Hwy 49 Improvements	**$ -**		
Bridge Improvements							

El Dorado County

Community Development Agency - Transportation Division

Mt Murphy Bridge - Corridor #1

Engineers Estimate- Conceptual Budget

Estimate Date: 8/10/2016

Created By: Anh Nguyen

Construction Cost Estimate				**Conceptual ESTIMATE**			
Item No.	**Item Description**	**Unit of Measure**	**Estimated Quantity**	**Unit Price**	**Item Total**	**Quantity Notes**	**Estimate Notes**
	Bridge Items						
18	Proposed Bridge (and supplemental items)	LS	1	9,573,120.00	$ 9,573,120	Based on $554/ SF, refer to Rehabilitation Feasibility Report completed during Phase 1A of Project (includes: bridge removal/temp bridge (if needed) at $1 million, time related overhead, mobilization (10%), contingencies (25%))	Plug based on CH2m, refer to sheet "A.4 Bridge Replacement, Case C Estimate" from the Rehabilitation Feasibility Report completed during Phase 1A for the Project
				Subtotal for Bridge Items	**$ 9,573,120**		
				Total for Bridge Improvements	**$ 9,573,120**		
				TOTAL	**$ 10,328,683**		

CONSTRUCTION TOTAL	**$ 10,328,683**
% Roadway Improvements (of HBP Project)	**7.3%**
% Bridge Improvements (of HBP Project)	**92.7%**
% Hwy 49 Improvements (of Total Project)	**0.0%**

Note: Above Estimate does not include environmental costs (such as tree removals, monitoring, etc.) or ROW costs

El Dorado County

Community Development Agency - Transportation Division

Mt Murphy Bridge- Corridor #2

Engineers Estimate- Conceptual Budget

Estimate Date: 8/10/2016

Created By: Anh Nguyen

Construction Cost Estimate

				Conceptual ESTIMATE			
Item No.	**Item Description**	**Unit of Measure**	**Estimated Quantity**	**Unit Price**	**Item Total**	**Quantity Notes**	**Estimate Notes**
Roadway Items							
	Roadway Improvements						
1	Roadway Excavation	CY	309	55.00	$ 16,995	Per AutoCAD Earthwork 309 cy for cut and 10,063 cy for fill. Reused 90% of 309 cy of cut for fill.	Francisco Rt Turn - $50/CY, No blasting anticipated
2	Import Borrow	CY	9,785	40.00	$ 391,400	Per AutoCAD Earthwork 309 cy for cut and 10,063 cy for fill. Reused 90% of 309 cy of cut for fill.	2015 Caltrans Contract Cost Data
3	Hot Mix Apshalt (Type A)	TON	1,997	115.00	$ 229,655	Assumes 6" HMA / 12" AB, Areas from CADD 53,244 sf	Francisco Rt Turn - $113/TN
4	Class 2 Aggregate Base	CY	1,972	75.00	$ 147,900	Assumes 6" HMA / 12" AB, Areas from CADD 53,244 sf	Francisco - $60/CY, Salmon Falls - $135/CY
7	Minor Concrete Sidewalk	CY	347	650.00	$ 225,550	Assumes PPC, 6' x 0.5' thick, 3,121 lf.	Pleasant Valley Patterson - $650/CY
6	Shoulder Backing	CY	6	75.00	$ 450	Assumes AB, 3' x 0.2' thick, 244 LF, total for both sides	Plug at CL 2 AB Price
			Subtotal for Roadway Items		**$ 1,011,950**		
	Retaining Wall & Roadway Structure Items						
6	Retaining Wall	LF	0	150.00	$ -	Construct x' to x' height Retaining Wall (Rock)	Plug
			Subtotal for Roadway Structure Items		**$ -**		
	Supplemental Items						
8	Striping - Stripe	LF	7,938	2.00	$ 15,876	CL Line -2,345 lf * 2, Edge Line - 3,248 lf	Francisco Rt Turn - Stripe - $1.11/LF
9	Markings	SF	149	4.00	$ 596	83 sf limit line and 66 sf for 3 'STOP' pavement markings.	Francisco Rt Turn - Markings - $4/SF
10	Roadside Sign (Permanent)	EA	2	500.00	$ 1,000		Plug
10	Staging Items	LS	1	50,000.00	$ 50,000	Temporary Work Items, K-Rail, temporary paving configurations, associated with 2-stage construction	Plug
11	PCMS Boards	EA	4	20,000.00	$ 80,000	Includes temporary message boards (figures 4 each, 2 at Hwy 49, 1 at Coloma Resort, 1 at Mt Murphy	Plug
12	Construction Area Signs (CAS)	LS	1	20,000.00	$ 20,000	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug
11	Traffic Control	LS	1	50,000.00	$ 50,000	Additional flagging closures and traffic control shifts	Plug
12	SWPPP	LS	1	50,000.00	$ 50,000	Additional SWPPP needs	Plug

15	Final Stabilization/ Erosion Control	Acre	1	10,000.00	$ 10,000	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc.	Plug
				Subtotal for Supplemental Items	**$ 277,472**		
16	**Jobsite Management/ Mobilization - 10%**	LS	1	128,942.20	**$ 128,942**	Mobilization, oversight, jobsite management (incidental./ supplemental items) associated with roadway improvements	Plug at 10%
17	**Contingency (and Risk Items) - 25%**	LS	1	354,591.05	**$ 354,591**	Contingency and Risk Items (Conceptual Design)	Plug
				Total for Roadway Improvements	**$ 1,772,955**		
Hwy 49 Improvements							
	Hwy 49 Items						
1	Roadway Excavation	CY	0	55.00	$ -	Per AutoCAD Earthwork xx cy for cut and xx cy for fill.	Francisco Rt Turn - $50/CY, No blasting anticipated
2	Import Borrow	CY	0	40.00	$ -	Per AutoCAD Earthwork xx cy for cut and xx cy for fill. Reused 90% of xx cy of cut for fill.	2015 Caltrans Contract Cost Data
2	Hot Mix Apshalt (Type A)	TON	0	115.00	$ -	Assumes 6" HMA / 12" AB, Areas from CADD xx sf.	Francisco Rt Turn - $113/TN
3	Class 2 Aggregate Base	CY	0	75.00	$ -	Assumes 6" HMA / 12" AB, Areas from CADD xx sf.	Francisco - $60/CY, Salmon Falls - $135/CY
6	Curb	LF	0	35.00	$ -	Assumes xx lf.	
6	Minor Concrete Sidewalk	CY	0	650.00	$ -	Assumes PPC, 6' x 0.5' thick, xx lf.	Pleasant Valley Patterson - $650/CY
				Subtotal for Hwy 49 Items	**$ -**		
	Hwy 49 Supplemental Items						
10	Striping - Stripe	LF	0	2.00	$ -	CL Line -xx lf * 2, Edge Line - xx lf	Francisco Rt Turn - Stripe - $1.11/LF
11	Markings	SF	0	4.00	$ -	xx sf for Type I arrow and xx sf for Type III (L) arrow pavement markings.	Francisco Rt Turn - Markings - $4/SF
10	Roadside Sign (Permanent)	EA	0	500.00	$ -		Plug
10	Staging Items	LS	0	10,000.00	$ -	Temporary Work Items, K-Rail, temporary paving configurations, associated with 2-stage construction	Plug
11	PCMS Boards	EA	0	20,000.00	$ -	Includes temporary message boards (figures 3 each, 2 at Hwy 49, 1 at Mt Murphy	Plug
12	Construction Area Signs (CAS)	LS	0	5,000.00	$ -	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug
11	Traffic Control	LS	0	10,000.00	$ -	Additional flagging closures and traffic control shifts	Plug
8	SWPPP	LS	0	10,000.00	$ -	Additional SWPPP needs	Plug
15	Final Stabilization/ Erosion Control	Acre	0	10,000.00	$ -	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc.	Plug

				Subtotal for Supplemental Items	**$** -		
	Jobsite Management/ Mobilization - 10%	LS	1	0.00	**$** -		
	Contingency (and Risk Items) - 25%	LS	1	0.00	**$** -		
PE	**PE Costs (Design, Environmental) - 25%**	LS	1	0.00	**$** -	Includes PE Costs for Hwy 49 to include: Planning, Design, and Environmental (ROW assumed to remain within State/ Caltrans ROW)	
				Total for Hwy 49 Improvements	**$** -		
Bridge Improvements							
	Bridge Items						
18	Proposed Bridge (and supplemental items)	LS	1	13,633,940.00	$ 13,633,940	Based on $554/ SF, refer to Rehabilitation Feasibility Report completed during Phase 1A of Project (includes: bridge removal/temp bridge (if needed) at $1 million, time related overhead, mobilization (10%), contingencies (25%))	Plug based on CH2m, refer to sheet "A.4 Bridge Replacement, Case C Estimate" from the Rehabilitation Feasibility Report completed during Phase 1A for the Project
				Subtotal for Bridge Items	**$ 13,633,940**		
				Total for Bridge Improvements	**$ 13,633,940**		
				TOTAL	**$ 15,406,895**		

CONSTRUCTION TOTAL	**$ 15,406,895**
% Roadway Improvements (of HBP Project)	**11.5%**
% Bridge Improvements (of HBP Project)	**88.5%**
% Hwy 49 Improvements (of Total Project)	**0.0%**

Note: Above Estimate does not include environmental costs (such as tree removals, monitoring, etc.) or ROW costs

El Dorado County

Community Development Agency - Transportation Division

Mt Murphy Bridge- Corridor #3

Engineers Estimate- Conceptual Budget

Estimate Date: 8/10/2016

By: Anh Nguyen

Construction Cost Estimate				**Conceptual ESTIMATE**			
Item No.	**Item Description**	**Unit of Measure**	**Estimated Quantity**	**Unit Price**	**Item Total**	**Quantity Notes**	**Estimate Notes**
Roadway Items							
	Roadway Improvements						
1	Roadway Excavation	CY	23,577	55.00	$ 1,296,735	Per AutoCAD Earthwork 23,577 cy for cut and 16,119 cy for fill.	Francisco Rt Turn - $50/CY, No blasting anticipated
2	Hot Mix Apshalt (Type A)	TON	3,604	115.00	$ 414,460	Assumes 6" HMA / 12" AB, Areas from CADD 85,823 sf + 7331 sf (driveways) + 7345 sf (0.2' overlay for driveways).	Francisco Rt Turn - $113/TN
3	Class 2 Aggregate Base	CY	3,451	75.00	$ 258,825	Assumes 6" HMA / 12" AB, Areas from CADD 85,823 sf + 7331 sf (driveways)	Francisco - $60/CY, Salmon Falls - $135/CY
6	Shoulder Backing	CY	128	75.00	$ 9,600	Assumes AB, 3' x 0.2' thick, 5,757 lf, total for both sides	Plug at CL 2 AB Price
6	Minor Concrete Sidewalk	CY	140	650.00	$ 91,000	Assumes PPC, 6' x 0.5' thick,1,256 lf.	Pleasant Valley Patterson - $650/CY
			Subtotal for Roadway Items		**$ 2,070,620**		
	Head Wall & Roadway Structure Items						
	30" Reinforced Concrete Pipe (Class III, Rubber Gasket Joint)	LF	104	200.00	$ 20,800		Alder Bridge - $215 or $150 per lf.
4	Miscelaneous Items for Headwall	LS	1	90,000.00	$ 90,000	Length of 70-feet and 50-feet, 14.3-feet height. The lump sum is for Structrue Excavation (Headwall), Structure Excavation (Culvert), Structure Concrete (Headwall) & Bar Reinforcing Steel. The calculation is based on the ratio of the wall between Alder and Murphy, which is 5.8.	Alder Bridge
			Subtotal for Roadway Structure Items		**$ 110,800**		
	Drainage Items						
5	Roadside Ditch	LF	1030	10.00	$ 10,300	From Sta. 17+75 to 22+75 both sides and 130' from the driveway at station 21+75	Green Valley Bridges - $10/LF
			Subtotal for Drainage Items		**$ 10,300**		
	Supplemental Items						
10	Striping - Stripe	LF	11,726	2.00	$ 23,452	CL Line -3,118 lf * 2, Edge Line - 5,507 lf	Francisco Rt Turn - Stripe - $1.11/LF
11	Markings	SF	133	4.00	$ 532	67 sf limit line and 66 sf for 3 'STOP' pavement markings.	Francisco Rt Turn - Markings - $4/SF
10	Roadside Sign (Permanent)	EA	2	500.00	$ 1,000		Plug

10	Staging Items	LS	1	50,000.00	$ 50,000	Temporary Work Items, K-Rail, temporary paving configurations, associated with 2-stage construction	Plug
11	PCMS Boards	EA	4	20,000.00	$ 80,000	Includes temporary message boards (figures 4 each, 2 at Hwy 49, 1 at Coloma Resort, 1 at Mt Murphy	Plug
12	Construction Area Signs (CAS)	LS	1	20,000.00	$ 20,000	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug
11	Traffic Control	LS	1	50,000.00	$ 50,000	Additional flagging closures and traffic control shifts	Plug
8	SWPPP	LS	1	50,000.00	$ 50,000	Additional SWPPP needs	Plug
15	Final Stabilization/ Erosion Control	Acre	1	10,000.00	$ 10,000	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc.	Plug
				Subtotal for Supplemental Items	**$ 284,984**		
16	**Jobsite Management/ Mobilization - 10%**	LS	1	247,670.40	**$ 247,670**	Mobilization, oversight, jobsite management (incidental./ supplemental items) associated with roadway improvements	Plug at 10%
17	**Contingency (and Risk Items) - 25%**	LS	1	681,093.60	**$ 681,094**	Contingency and Risk Items (Conceptual Design)	Plug
				Total for Roadway Improvements	**$ 3,405,468**		
Hwy 49 Improvements							
	Hwy 49 Items						
1	Roadway Excavation	CY	1,244	55.00	$ 68,420	Per AutoCAD Earthwork 1,244 cy for cut and 1,713 cy for fill.	Francisco Rt Turn - $50/CY, No blasting anticipated
2	Import Borrow	CY	600	40.00	$ 24,000	Per AutoCAD Earthwork 1,244 cy for cut and 1,713 cy for fill. Reused 90% of 1,244 cy of cut for fill.	2015 Caltrans Contract Cost Data
2	Hot Mix Apshalt (Type A)	TON	2,165	115.00	$ 248,975	Assumes 6" HMA / 12" AB, quantity from CADD.	Francisco Rt Turn - $113/TN
3	Class 2 Aggregate Base	CY	2,126	75.00	$ 159,450	Assumes 6" HMA / 12" AB, quantity from CADD.	Francisco - $60/CY, Salmon Falls - $135/CY
6	Shoulder Backing	CY	30	75.00	$ 2,250	Assumes AB, 3' x 0.2' thick, 1,314 lf, total for both sides	Plug at CL 2 AB Price
6	Curb	LF	794	35.00	$ 27,790	Assumes 794 lf.	
6	Minor Concrete Sidewalk	CY	54	650.00	$ 35,100	Assumes PPC, 6' x 0.5' thick, quantity form CADD	Pleasant Valley Patterson - $650/CY
				Subtotal for Hwy 49 Items	**$ 565,985**		
	Hwy 49 Supplemental Items						
10	Striping - Stripe	LF	6,766	2.00	$ 13,532	Detail 22 -1,770 lf * 2, Detail 27 - 2,159 lf, Detail 38 - 893 lf, Detail 37B - 174	Francisco Rt Turn - Stripe - $1.11/LF
11	Markings	SF	438	4.00	$ 1,752	186 sf for (6) Type I arrow, 168 sf for (4) Type III (L) & (R) arrow, 84 sf for (2) Type VI arrow pavement markings.	Francisco Rt Turn - Markings - $4/SF
10	Roadside Sign (Permanent)	EA	2	500.00	$ 1,000		Plug

10	Staging Items	LS	1	10,000.00	$ 10,000	Temporary Work Items, K-Rail, temporary paving configurations, associated with 2-stage construction	Plug
11	PCMS Boards	EA	3	20,000.00	$ 60,000	Includes temporary message boards (figures 3 each, 2 at Hwy 49, 1 at Mt Murphy	Plug
12	Construction Area Signs (CAS)	LS	1	5,000.00	$ 5,000	Includes flagging, closures, temporary striping, temporary signage, etc.	Plug
11	Traffic Control	LS	1	10,000.00	$ 10,000	Additional flagging closures and traffic control shifts	Plug
8	SWPPP	LS	1	10,000.00	$ 10,000	Additional SWPPP needs	Plug
15	Final Stabilization/ Erosion Control	Acre	1	10,000.00	$ 10,000	SWPPP items to include: Prepare SWPPP, inspections, sampling, amendments, close-out (NOT), oversight items, installation, maintenance, removals, etc.	Plug
				Subtotal for Supplemental Items	**$ 121,284**		
	Jobsite Management/ Mobilization - 10%	LS	1	68,726.90	**$ 68,727**		
	Contingency (and Risk Items) - 25%	LS	1	188,998.98	**$ 188,999**		
PE	**PE Costs (Design, Environmental) - 25%**	LS	1	236,248.72	**$ 236,249**	Includes PE Costs for Hwy 49 to include: Planning, Design, and Environmental (ROW assumed to remain within State/ Caltrans ROW)	
				Total for Hwy 49 Improvements	**$ 1,181,244**		
Bridge Improvements							
	Bridge Items						
18	Proposed Bridge (and supplemental items)	LS	1	10,193,600.00	$ 10,193,600	Based on $554/ SF, refer to Rehabilitation Feasibility Report completed during Phase 1A of Project (includes: bridge removal/temp bridge (if needed) at $1 million, time related overhead, mobilization (10%), contingencies (25%))	Plug based on CH2m, refer to sheet "A.4 Bridge Replacement, Case C Estimate" from the Rehabilitation Feasibility Report completed during Phase 1A for the Project
				Subtotal for Bridge Items	**$ 10,193,600**		
				Total for Bridge Improvements	**$ 10,193,600**		
				TOTAL	**$ 14,780,312**		

CONSTRUCTION TOTAL	**$ 14,780,312**
% Roadway Improvements (of HBP Project)	**25.0%**
% Bridge Improvements (of HBP Project)	**75.0%**
% Hwy 49 Improvements (of Total Project)	**8.0%**

Note: Above Estimate does not include environmental costs (such as tree removals, monitoring, etc.) or ROW costs for HBP Project

A.4 Bridge Replacement (Case C Estimate)

[ ] GENERAL PLAN ESTIMATE [X] ADVANCE PLANNING ESTIMATE

RCVD BY: IN EST: OUT EST:

BRIDGE: Mt Murphy Road Bridge (Bridge Replacement) BR. No.: 25C-0004 DISTRICT:
TYPE: RTE: Mt Murphy Road
CU: CO: El Dorado
EA: PM:
LENGTH (FT): 550.00 WIDTH (FT): 45.50 AREA (SF)= 25,025

DESIGN SECTION:
OF STRUCTURES IN PROJECT: 01 EST. NO. 1
PRICES BY: Hans Larsen COST INDEX: 2012
PRICES CHECKED BY: Hans Strandgaard DATE: 12/18/2013
QUANTITIES BY: Hans Larsen DATE: 12/18/2013

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	PC BULB-T GIRDER (APPROACHES)		SF	13,650	$180.00	$2,457,000.00
2	CUSTOM TIED-ARCH (SPAN = 250')		SF	11,375	$450.00	$5,118,750.00
3	TEMPORARY BRIDGE		LS	1	$1,000,000.00	$1,000,000.00
4	ROADWAY APPROACH CONSTRUCTION (WALLS + FILL)		LS	1	$500,000.00	$500,000.00

SUBTOTAL	$9,075,750
TIME RELATED OVERHEAD	$907,575
MOBILIZATION (@ 10 %)	$1,109,258
SUBTOTAL BRIDGE ITEMS	$11,092,583
CONTINGENCIES (@ 25%)	$2,773,146
BRIDGE TOTAL COST	$13,865,729
COST PER SQ. FOOT	$554.08
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
AESTHETIC IMPROVEMENTS (@10%)	$1,386,573
GRAND TOTAL	$15,252,302
BUDGET ESTIMATE AS OF	$15,300,000

ROUTING
1. DES SECTION
2. OFFICE OF BRIDGE DESIGN - NORTH
3. OFFICE OF BRIDGE DESIGN - CENTRAL
4. OFFICE OF BRIDGE DESIGN - SOUTH
5. OFFICE OF BRIDGE DESIGN - WEST
6. OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: 1) Bridge width = 6.75'+4'+12'+12'+4'+6.75'
2) Assumes replacement on existing Mt Murphy Road alignment
3) Average per square foot cost of Bulb-T and Tied Arch = $300/SF
4) Environmental, ROW and engineering costs not included

Escalated Budget Estimate to Midpoint of Construction *

Escalation Rate per Year 5.0%

Years Beyond Midpoint	Escalated Budget Est.
1	$16,065,000
2	$16,868,000
3	$17,711,000
4	$18,597,000
5	$19,527,000

* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

Appendix H: Vibration Study Documentation

Vibration Impact on Historical Structures

1. Introduction

County of El Dorado Capital Improvements Program (CIP) proposes a "bridge replacement project" in the Coloma area of El Dorado County, California, near Highway 49 corridor. This bridge is going to replace the current Mt. Murphy Road Single Lane Bridge that is crossing the South Fork American River in Coloma. Actual placement location of the proposed bridge is still under review.

The area of the Mt Murphy Bridge is surrounded by the "Marshall Gold Discovery State Historic Park" and populated with many classic structures dating back to the late 1800's. Some of these buildings are classified as Historic Buildings, while others have historical relevance and considerable public interest.

As shown in Attachment A, some of the structures and their distances from the south and southwest side of the bridge abutment proposed in Corridor 1 (assumed to be a significant location of excavation activities) include the following: Gold Trail Grange 452 (approx. 28ft), Bekearts Guns and Ammo (approx. 108ft), Sutter's Mill Replica at 236ft, Sutter's Mill Timbers at 11ft, Gold Discovery Museum at 359ft and other Stone structures such as, Wah Hop and Man Lee Stores about 283ft from the bridge.

2. Vibration and Consolidation

Wilson, Ihrig & Associates, Inc., ICF International, and Simpson, Gumpertz & Heger *Operation of heavy construction equipment, particularly pile drivers and other impact devices such as rock saws, creates seismic waves that travel along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures.*

******The native soil conditions in the Coloma area typically consist of "river run" or rounded shaped Sands, Aggregates and Cobbles with very little fine contents (which consist of clays and silts). Using ASTM D2488 visual classification, a description for this material would be a Well Graded Gravel with Sands, Cobbles and Boulders (GW) with 50% or more coarse material retained on a #4 Sieves and the rest of the material being sand. As depicted in Exhibit 1, The USDA Soil Survey Website, through the Natural Resource Conservation Service, has classified the material surrounding the Mt. Murphy Road Bridge as Placer Diggings (PrD) 64.9% and water (H_2O) 35.1%. The Description of Placer Diggings include: **Setting-** Parent material: Alluvium derived from mixed sources, **Type Profile-** H1 - 0 to 60 inches: fine sandy loam, cobbles. Placer Diggings consist of stony, cobbly and gravelly material, commonly in beds of creeks and streams, or of areas that have been placer mined and contain enough fine sands, silts and clays to

support vegetative growth. The material that makes up this land type is derived from a mixture of rocks and commonly is stratified or poorly sorted.

Exhibit 1

Because of this soil matrix, the sub surface materials under Historical structures could consolidate under construction caused vibration or seismic events. Since the Coloma area is near or on the South Fork of the American River, it is assumed that ground water is present at a shallow depth. Based on this soil matrix, the material could be designated as “Competent Soil”. However, if these soils have cemented through mineralization then the soil may be categorized as “Hard Soil”.
For future calculations, the “Competent Soil” designation will be used.

3. Damage

Wilson, Ihrig & Associates, Inc., ICF International, and Simpson, Gumpertz & Heger *The manner in which a building will respond to strong ground vibration depends on many*

factors, among which are the soil on which the building is founded, the building's foundation, the building's mass, and the stiffness of the building's main structural elements.

*******Since the majority of the buildings in the park area were erected before consideration of liquefaction potential or soil movement, it can be assumed that construction improvements would have consisted of leveling with minimal compaction effort. The structures themselves were constructed "on grade" or on mine tailing with native building materials such as wood, bricks, and stones. Wooden structures, as in the case of the Gold Trail Grange Building, have weathered over the years and the structure itself has become susceptible to movement. Brick and Stone structures were built without much lateral reinforcements, and tacked together with brittle mortars and concrete. Based on the age and weathering of these wood, stone, and brick structures, damage can potentially be caused from construction type vibrations.

Wilson, Ihrig & Associates, Inc., ICF International, and Simpson, Gumpertz & Heger *A modern categorization of damage, which is contained in BS Standard 7385: Part 1: 1990 (BSI,1990) and ISO 4866-2010 (ISO, 2010), follows. Note that dusting of cracks may occur even when no cosmetic damage has been observed.*

- *Cosmetic: The formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces; formation of hairline cracks in mortar joints of brick/concrete blocks.*
- *Minor: The formation of large cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major: Damage to structural elements of the building, cracks in support columns, loosening of joints, splaying of masonry cracks, etc.*

4. NHPA and ACHP Section 106

Wilson, Ihrig & Associates, Inc., ICF International, and Simpson, Gumpertz & Heger *The process to minimize potential harm and damage to historic properties outlined in the NHPA is commonly referred to as the Section 106 process. Section 106 mandates that each responsible federal agency "take into account the effect" of its project on historic properties. An "historic property" is any property that is listed in or qualifies for listing in the National Register of Historic Places (NRHP). Most commonly, these properties are buildings or archaeological sites.*

The NHPA also creates the Advisory Council on Historic Preservation (ACHP) and empowers it to administer the Section 106 process. The ACHP published detailed regulations in 36 Code of Federal Regulation (CFR) Part 800, which lays out the Section 106 process.

The ACHP regulations lay out a four-step process for "taking into account" impacts on historic properties:

***A) Initiating the process:** The first step is the simplest of the four. The agency must decide whether its project, or "undertaking," is subject to Section 106. Certain types of activities, such as planning efforts, are not subject to Section 106 because they have no*

potential to cause harm to an historic property. It can be assumed, however, that any construction-related activity that is federally permitted or funded is subject to Section 106.

B) Identifying the area of potential effect and historic resources therein: *The second step involves determining whether there is an historic property within the area that might be affected by the project. The Part 800 regulations use the term "area of potential effects," commonly called the Area of Potential Effect (APE), to refer to the impact zone.*

C) Assessing effects: *In this step, the responsible agency must make a finding as to whether the project will have an effect on an historic property. Effect is defined as "alteration to the characteristics of an historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16 (i)). The regulations allow for three types of findings: no historic properties affected; adverse effect; and no adverse effect.*

D) Resolving adverse effects: *This step is taken only when there is a finding of adverse effect. In this step, the responsible agency consults with the State Historic Preservation Office (SHPO), the ACHP (if the ACHP chooses to participate), and with other consulting parties to arrive at steps that would reduce the adverse effect to an acceptable level or would mitigate for the adverse effect. Following this consultation, the various parties will memorialize the terms of their agreement in a Memorandum of Agreement (MOA).*

5. Procedures and Practices

Information derived from the National Cooperative Highway Research Program (NCHRP) has elaborated on some procedures and practices that should be considered before construction phases. The State of California is the only DOT which has produced a set of detailed procedures for controlling general construction vibration associated with transportation projects. Some of these activities include:

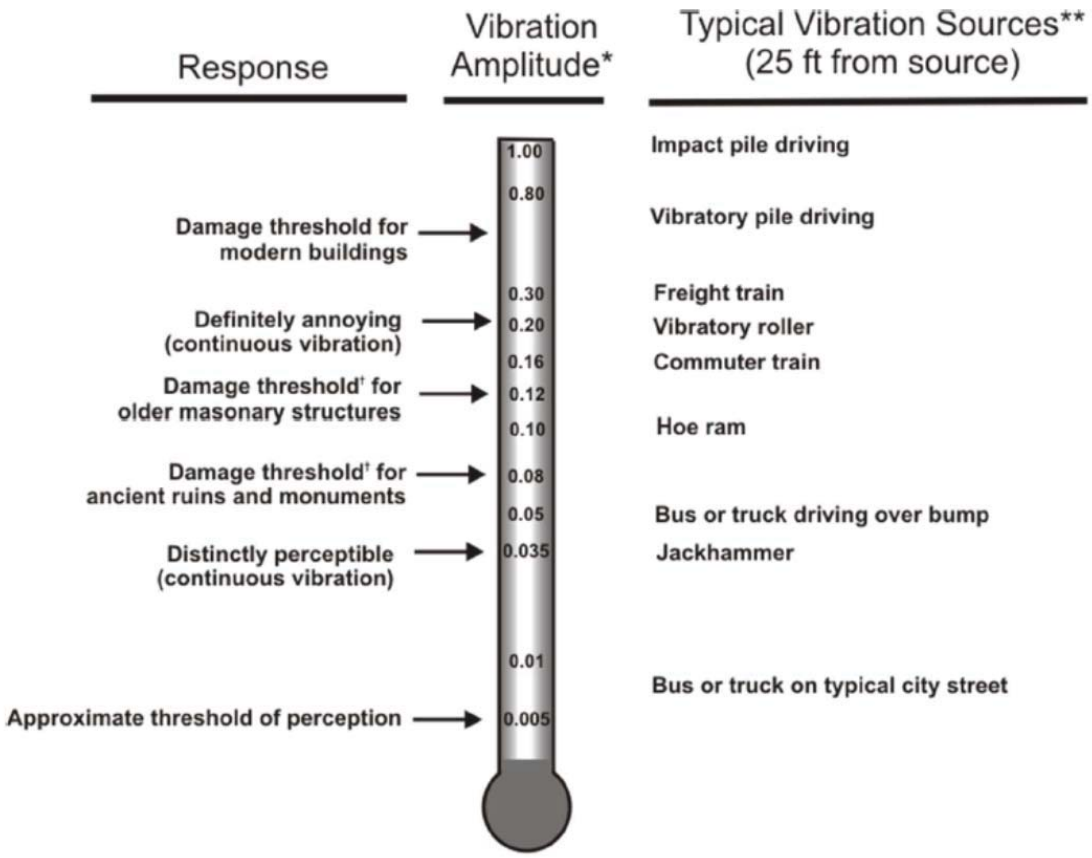
- ✓ Pre-construction review of construction plans and activities.
- ✓ A professional trained in building inspection should perform an evaluation of the current state of the structures within the construction area and post-construction condition assessment surveys of buildings.
- ✓ Site Monitoring, recording and evaluation of vibrations prior to and during construction works.
- ✓ Pre-construction review of construction plans and activities.
- ✓ Monitoring with geotechnical and structural instruments and equipment, including: manometers, tiltmeters, slope inclinometers, strain gauges, piezometers, and extensiometers.
- ✓ Determination of the types and extent of damage to structures from vibrations
- ✓ Damage assessment at adjacent properties.
- ✓ Analysis of ambient ground vibrations.
- ✓ Analysis of measured vibrations induced by construction activities.
- ✓ Analysis of level survey data and geotechnical and structural instrumentation.

6. Vibration Graphs and Tables

Wilson, Ihrig & Associates, Inc., ICF International, and Simpson, Gumpertz & Heger *There is a wide range of opinion on appropriate vibration limits for historic buildings and structures. A conservative vibration limit of 0.10 inches/sec in Historic areas except in the case of ancient ruins where 0.08 inches/sec is considered appropriate. At the other end of the range, some would consider 0.50 inches/sec or even 2.0 inches/sec to be appropriate. Table 1 summarizes the range of vibration limits recommended by researchers, practitioners, and government standards for avoiding damage to historic buildings as obtained from the generally available literature. Only those limits that are unique and originated with the reference document are indicated.*

Below is a graph of equipment use and their measured vibration within a 25 foot radius from the source.

Graph 1



* Peak particle velocity (inches/sec)
** Actual vibration levels are dependent on many factors
† Approximate threshold for cosmetic damage

Table 1: Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet
Pile driver (impact)	0.644 to 1.518
Pile drive (sonic/vibratory)	0.170 to 0.734
Vibratory roller	0.210
Hoe ram	0.089
Large bulldozer	0.089
Caisson drilling	0.089
Loaded trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003

Source: Federal Transit Administration 2006.

Table 2: Summary of Vibration Limits

Reference Source	Remarks on Vibration Source	Remarks on Building or Structure	Remarks on Type of Damage	Vibration Limit - PPV (inches/sec)
British Standards Institute (1993)	All (including blasting)	Unreinforced or light framed structures	Cosmetic	0.6 to 2.0† (historic buildings may require special consideration)
Sedovic (1984)	All	Historic buildings in good state of maintenance	--	0.5
City of New York City (1988); Esrig and Ciancia (1981)	Blasting, pile driving and vehicular traffic	Structures which are designated NYC landmarks, or located within an historic district or listed on the NHRP	--	0.5
Whiffin and Leonard (1971)	Traffic	Buildings with plastered walls and ceilings	Architectural damage and risk of structural damage	0.4 to 0.6
Rudder (1978)	Traffic	All	Structural damage possible	0.4
City of Toronto (2008)	All (blasting not mentioned)	All buildings	--	0.3 to 1.0† (lower limits may be identified by professional engineer)
Konon and Schuring (1985)	Transient	Historic buildings	Cosmetic	0.25 to 0.5†
Swiss Standards Association (1992)	All (blasting, construction equipment, and road traffic)	Historic and protected buildings	--	0.2 to 0.5†
Federal Transit Administration (2006)	All	Non-engineered timber and masonry buildings	--	0.2
Sedovic (1984)	All	Historic or architecturally important buildings in deteriorated state of maintenance	--	0.2
Whiffin and Leonard (1971)	Traffic	Buildings with plastered walls and ceilings	Threshold of risk of architectural damage	0.2
Feilden (2003)	All	All buildings	Threshold for structural damage	0.2
Rudder (1978)	Traffic	All	Minor damage possible	0.2
Konon and Schuring (1985)	Steady state	Historic buildings	Cosmetic	0.13 to 0.25†
Deutsches Institut für Normung DIN 4150-3 (1999)	All	Buildings of great intrinsic value	Any permanent effect that reduces serviceability	0.12 to 0.4†
Federal Transit Administration (2006)	All	Buildings extremely susceptible to vibration	--	0.12
American Association of State Highway and Transportation Officials (2004)	All	Historic sites and other critical locations	Threshold for cracks (cosmetic)	0.12
Esteves (1978)	Blasting	Special care, historical	--	0.1 to 0.4††
Rudder (1978)	Traffic	All	Threshold of structural damage	0.1
Whiffin and Leonard (1971)	Traffic	Buildings with plastered walls and ceilings	Virtually no risk of architectural damage	0.1
Feilden (2003)	All	All buildings	Threshold for plaster cracking	0.08
Whiffin and Leonard (1971)	Traffic	Ruins and ancient monuments	--	0.08

† frequency-dependent criteria
†† depending on soil type and frequency

7. Vibration Calculations and Assessment

(Federal Transit Administration 2006) and Caltrans' Transportation- and Construction-Induced Vibration Guidance Manual (California Department of Transportation 2004) have devised a guidance chart listed in the NCHRP 25-25 (task 72) as "Appendix C", that provides a suggested guideline approach for addressing construction vibration effects on historic buildings and measures to avoid damage. This approach is a compilation of approaches based on information gathered from their literature review. Assuming that the soils have no Liquefiable potential, a calculation can be used to assess Peak Particle Velocity from Construction Equipment to receiver (Structures).

See Table 1 for Construction Equipment PPV Values.

PPV*equip* = PPV*ref* x (25/D)^n

where: PPV (equip) is the peak particle velocity in in/sec of the equipment adjusted for distance.
PPV (ref) is the reference vibration level in in/sec at 25 feet.
D is the distance in feet from the equipment to the receiver.
n is the attenuation exponent.
n = 1.5 for *competent soils:* most sands, sandy clays, silty clays, gravel, silts, weathered rock (can dig with a shovel).
n = 1.1 for *hard soils:* dense compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock (cannot dig with a shovel, need a pick to break up).

As discussed in Section 2, Vibration and Consolidation, the n-value for Competent Soil will be used in the following calculations at a distance of 25 feet that represents the distance from the approximate equipment use (Corridor 1, south side bridge abutment), to the closest structure of concern (Gold Trail Grange 452).

Gold Trail Grange Building:

- ✓ Distance from source (south abutment) = 25ft
- ✓ Damage Threshold for older masonry structures = 0.12 in/sec (at 25ft from source)

Pile Driver (Impact) Max: $1.518((25/25)^{1.5})$ =	**1.518 in/sec**	**>0.12 in/sec**
Min: $0.664((25/25)^{1.5})$ =	**0.664 in/sec**	**>0.12 in/sec**
Pile Driver (Vibratory) Max: $0.734((25/25)^{1.5})$ =	**0.734 in/sec**	**>0.12 in/sec**
Min: $0.170((25/25)^{1.5})$ =	**0.17 in/sec**	**>0.12 in/sec**
Vibratory Roller: $0.21((25/25)^{1.5})$ =	**0.21 in/sec**	**>0.12 in/sec**
Large Bulldozer: $0.089((25/25)^{1.5})$ =	0.089 in/sec	
Caisson Drilling: $0.089((25/25)^{1.5})$ =	0.089 in/sec	
Loaded Truck: $0.076((25/25)^{1.5})$ =	0.076 in/sec	
Bus or Truck: $0.01((25/25)^{1.5})$ =	0.001 in/sec	

As discussed in Section 2, Vibration and Consolidation, the n-value for Competent Soil will be used in the following calculations at a distance of 100 feet that represents the distance from the approximate equipment use (Corridor 1, south side bridge abutment), to the closest structure of concern (Beckeart's Gun Shop).

Beckeart's Gun Shop:

- ✓ Distance from source (south abutment) = 100ft
- ✓ Damage Threshold for older masonry structures = 0.12 in/sec (at 25ft from source)

Pile Driver (Impact) Max: $1.518((25/100)^{1.5})$ =	**0.19 in/sec**	**>0.12 in/sec**
Min: $0.664((25/100)^{1.5})$ =	0.083 in/sec	
Pile Driver (Vibratory) Max: $0.734((25/100)^{1.5})$ =	0.092 in/sec	
Min: $0.170((25/100)^{1.5})$ =	0.021 in/sec	
Vibratory Roller: $0.21((25/100)^{1.5})$ =	0.0263 in/sec	
Large Bulldozer: $0.089((25/100)^{1.5})$ =	0.011 in/sec	
Caisson Drilling: $0.089((25/100)^{1.5})$ =	0.011 in/sec	
Loaded Truck: $0.076((25/100)^{1.5})$ =	0.010 in/sec	
Bus or Truck: $0.01((25/100)^{1.5})$ =	0.0013 in/sec	

8. Conclusion

The Recommendation by Federal Transit Administration (FTA) for maximum PPV, at the receiving Historic structure, should not exceed 0.12 in/sec. Based upon preliminary analysis of the site soil conditions and distance from the surrounding structures, it is recommended that pile driving (impact and vibratory), and use of vibratory rollers be avoided in the project improvements associated with Corridor 1. It should also be noted, however, that with additional site analysis and monitoring, these recommendations may be refined. Use of these construction methods (and equipment) may also be avoided through design details to include utilizing spread footings and drilled CIDH piles in lieu of driven piles.

As detailed in DIN 4150 [1986]: Some case studies suggest that it is possible to set conservative vibration limits and still allow for some flexibility in modifying those limits based on detailed engineering investigation and analysis done on a case-by-case basis prior to award of the construction contract. Alternatively, the transportation funding agency could adopt conservative criteria and allow for flexibility after the award of contract based on detailed investigations to be conducted by the contractor, who would need to demonstrate, based on an engineering analysis, the appropriateness of higher limits.

9. References

Wilson, Ihrig & Associates, Inc.,ICF International, and Simpson, Gumpertz & Heger, Inc. September 2016.

Publication for National Cooperative Highway Research Program (NCHRP) Project 25-25, Task 72 National Cooperative.

Federal Transit Administration (FTA). 2006. Transit noise and vibration impact assessment.
Washington, D.C.

California Department of Transportation (Caltrans). 2004. Transportation- and construction-induced vibration guidance manual. Sacramento, CA.

American Association of State Highway and Transportation Officials (2004)

DIN 4150 [1986]. *Deutsche Normen: Erschütterungen im Bauwesen - Einwirkungen auf bauliche Anlagen*, Germany (in German).

ASTM International

United States Department of Agriculture: *Natural Resource Conservation Service*

** All visual investigations have been performed via google maps and on-site inspection. Soil type profiling and depth of ground water was based off of those viewings. There have been no Geotechnical studies or Sub surface borings to validate this visual assessment as to date.5/3/2016

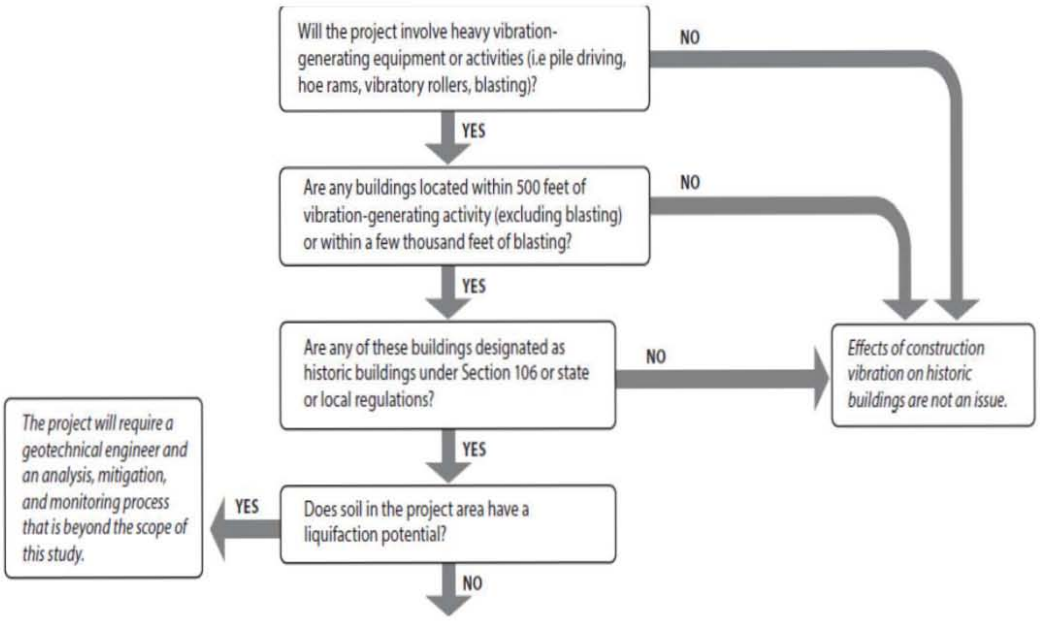
*** Assumptions on the building practices of the late 1800's are based off of History channel. :)

Mt. Murphy Bridge Replacement Project

VIBRATION STUDY (Conceptual)

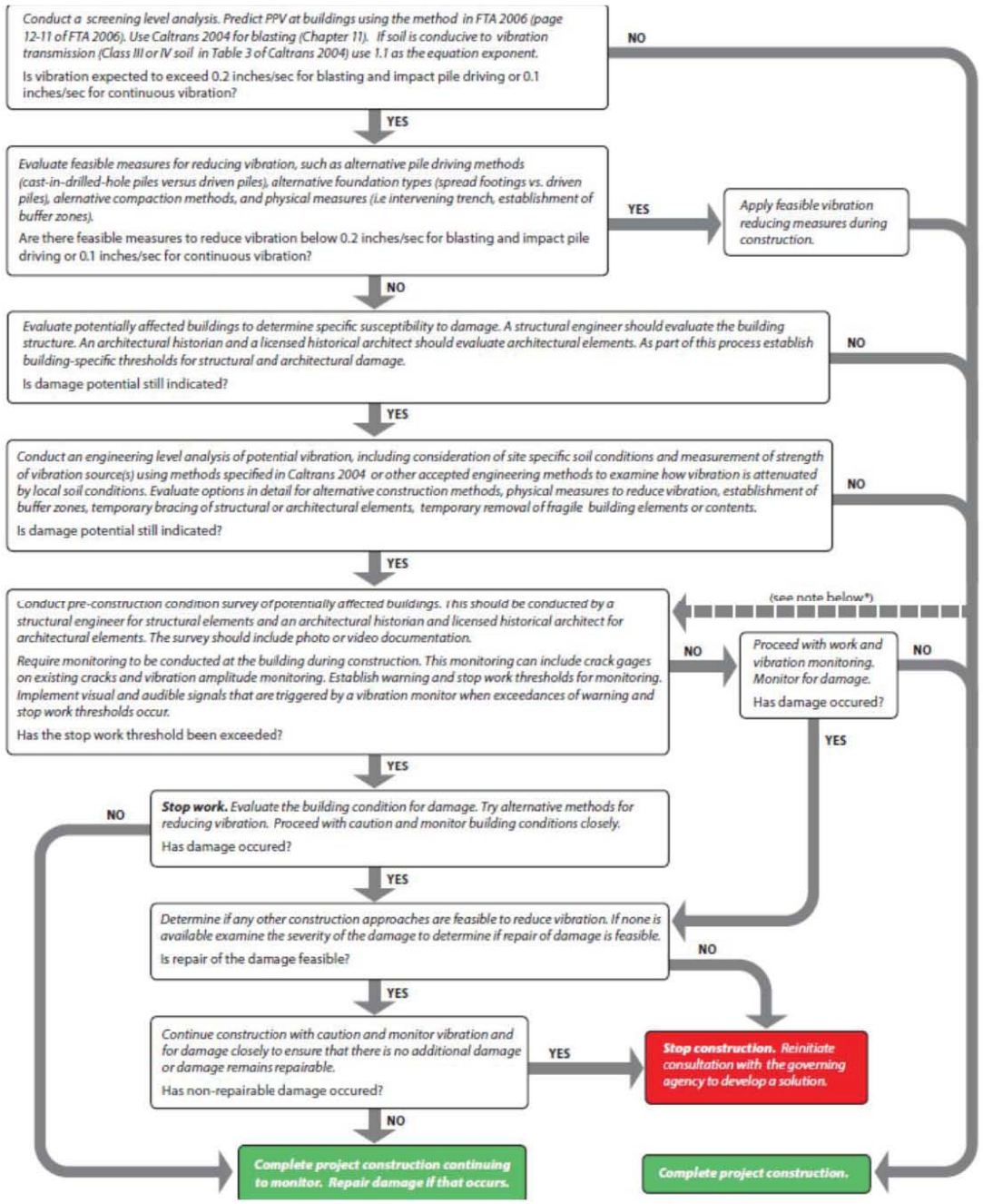
Attachment A: Vibration Study Exhibit (Corridor 1)

Appendix C


Will the project involve heavy vibration-generating equipment or activities (i.e pile driving, hoe rams, vibratory rollers, blasting)?
NO
YES
Are any buildings located within 500 feet of vibration-generating activity (excluding blasting) or within a few thousand feet of blasting?
NO
YES
Are any of these buildings designated as historic buildings under Section 106 or state or local regulations?
NO
Effects of construction vibration on historic buildings are not an issue.
YES
Does soil in the project area have a liquifaction potential?
YES
The project will require a geotechnical engineer and an analysis, mitigation, and monitoring process that is beyond the scope of this study.
NO

Mt. Murphy Bridge Replacement Project

VIBRATION STUDY (Conceptual)



PLAN
1"=40'

DETAIL
1"=20'

SIGNIFICANT LOCATION OF CONSIDERATION

STRUCTURE	RADIUS/DISTANCE FROM SOUTH ABUTMENT
GOLD TRAIL GRANGE	28'±
BECKEART'S GUN SHOP	108'±
SUTTER'S MILL REPLICA	236'±
SUTTER'S MILL TIMBERS	161'±
GOLD DISCOVERY MUSEUM	359'±
WAH HOP STORE & MAN LEE EXHIBIT	283'±

PRELIMINARY-SUBJECT TO REVISION

CORRIDOR 1
VIBRATION STUDY EXHIBIT
SCALE : AS NOTED

REVISION NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF:
REGISTERED CIVIL ENGINEER
DATE:
DESIGNED:
DRAWN:
CHECKED:
DATE: 8/26/16
ROAD NUMBER:

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT AGENCY
TRANSPORTATION DIVISION

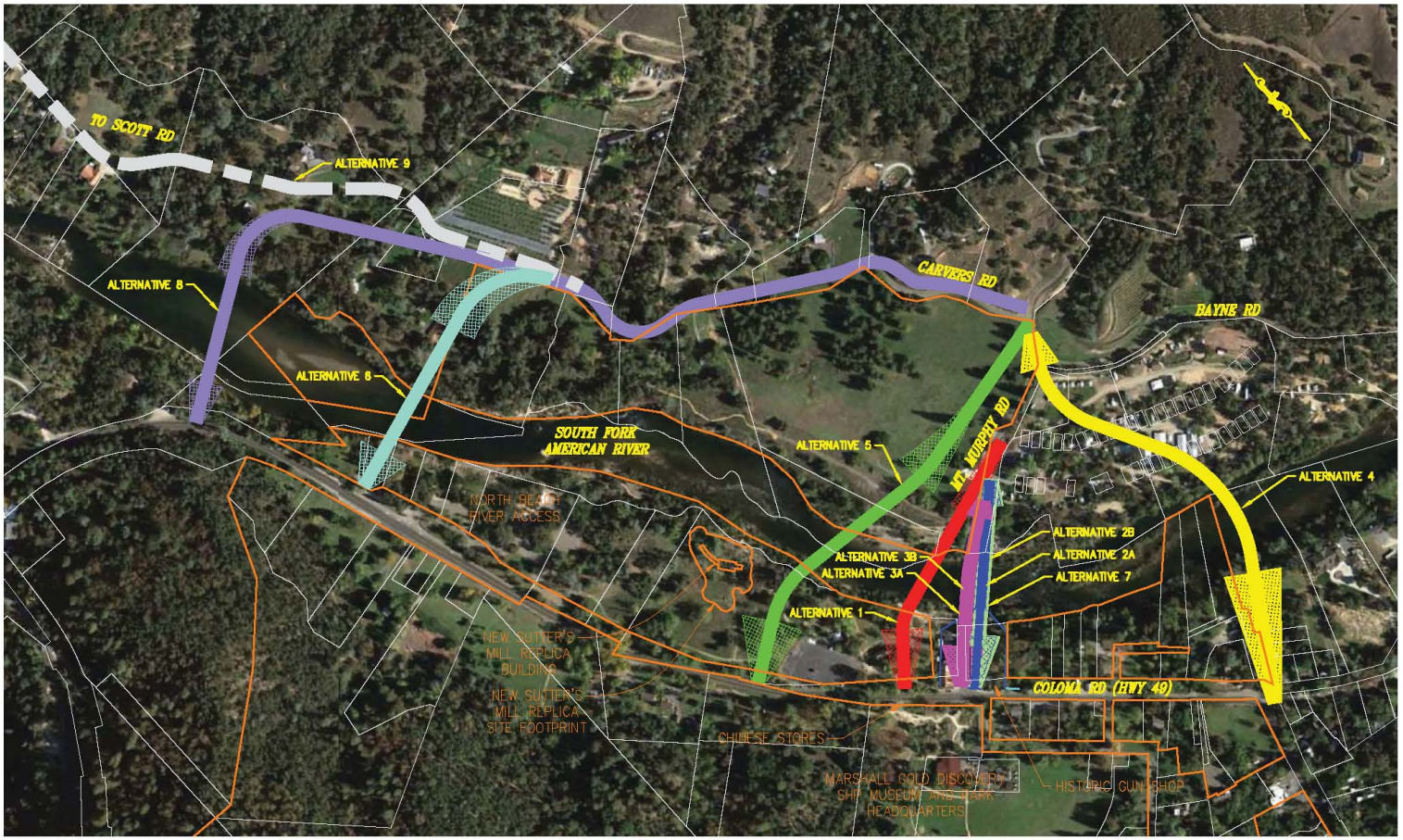
MT. MURPHY ROAD
BRIDGE REPLACEMENT PROJECT

SHEET
EXHIBIT
1 OF 1
W.O. No. 77129

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES
Drawing name: C:\Civil 3D Projects\77129 Mt Murphy Bridge Replacement\CADD Files\Exhibits\CORRIDOR 1.dwg Layout: Tab: VIBRATIONSTUDY 40scale Aug 30,2016 - 1:17pm BRichards

REFER TO THE NCHRP 25-25/TASK 72 "CURRENT PRACTICES TO ADDRESS CONSTRUCTION VIBRATION AND POTENTIAL EFFECTS TO HISTORIC BUILDINGS ADJACENT TRANSPORTATION PROJECTS" REPORT PREPARED BY WILSON, IHRIG & ASSOCIATES, ICF INTERNATIONAL, AND SIMPSON, GUMPERTZ & HEGER, INC. DATED SEPTEMBER 2012 FOR ADDITIONAL DETAILS.

Appendix I: Screening Criteria Scores by Category



LEGEND

- ALTERNATIVE 1
- ALTERNATIVE 2A
- ALTERNATIVE 2B
- ALTERNATIVE 3A
- ALTERNATIVE 3B
- ALTERNATIVE 4
- ALTERNATIVE 5
- ALTERNATIVE 6
- ALTERNATIVE 7
- ALTERNATIVE 8
- ALTERNATIVE 9
- INDICATES EMBANKMENT FILL (TYP.)
- INDICATES SHP BOUNDARY

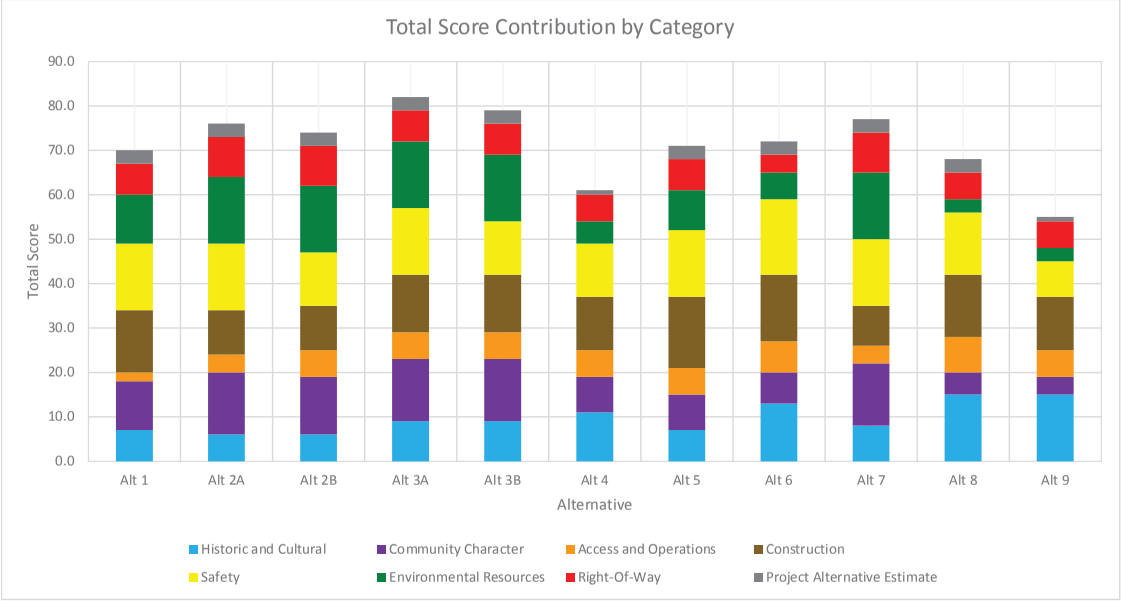
FOR REDUCED PLANS 0 200 400 ORIGINAL SCALE IS IN INCHES

MT. MURPHY ROAD BRIDGE ALTERNATIVES EXHIBIT

CH2MHILL.

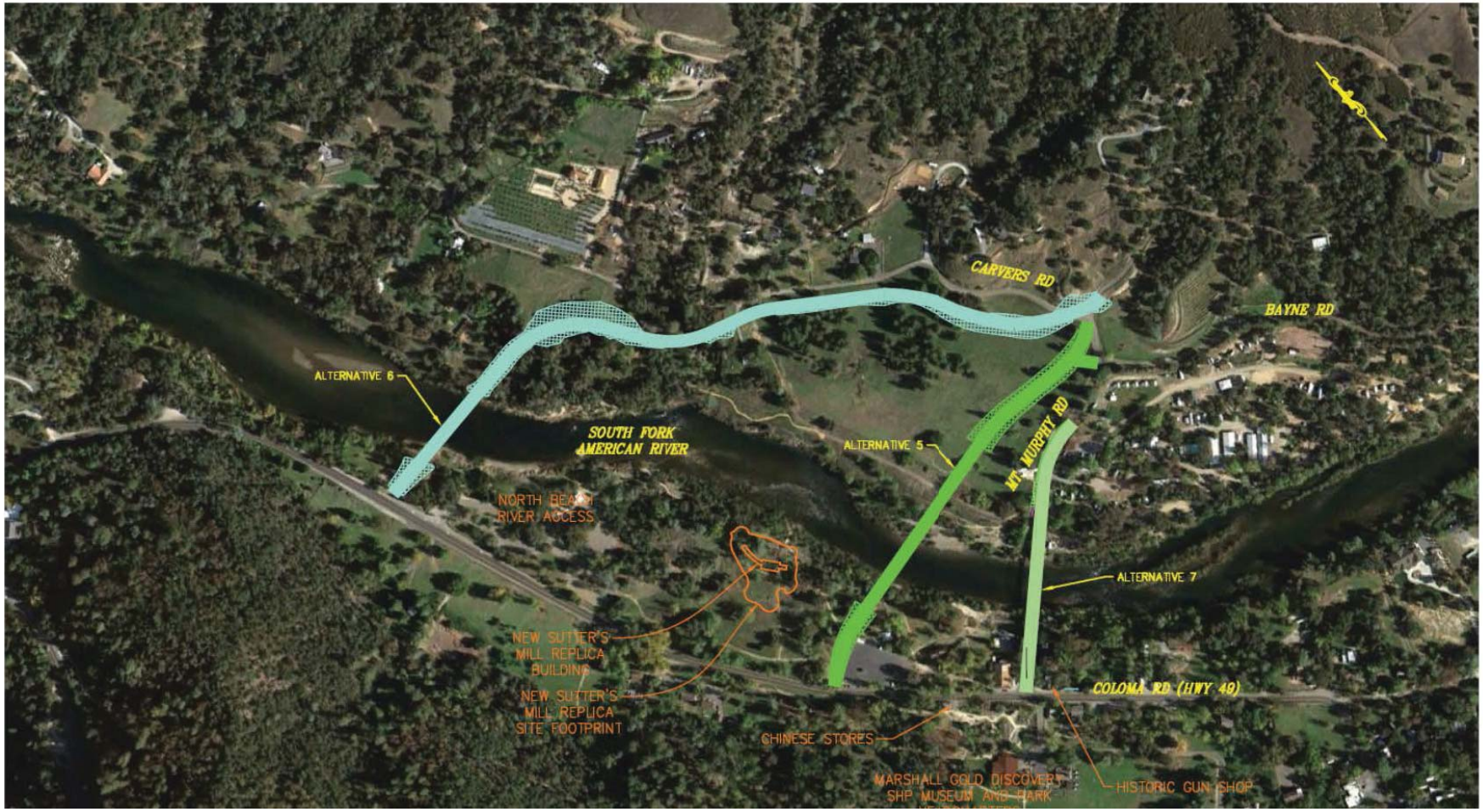
Mt. Murphy Road Screening Criteria - Scores by Category

Criteria	Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9
Historic and Cultural	7.0	6.0	6.0	9.0	9.0	11.0	7.0	13.0	8.0	15.0	15.0
Community Character	11.0	14.0	13.0	14.0	14.0	8.0	8.0	7.0	14.0	5.0	4.0
Access and Operations	2.0	4.0	6.0	6.0	6.0	6.0	6.0	7.0	4.0	8.0	6.0
Construction	14.0	10.0	10.0	13.0	13.0	12.0	16.0	15.0	9.0	14.0	12.0
Safety	15.0	15.0	12.0	15.0	12.0	12.0	15.0	17.0	15.0	14.0	8.0
Environmental Resources	11.0	15.0	15.0	15.0	15.0	5.0	9.0	6.0	15.0	3.0	3.0
Right-Of-Way	7.0	9.0	9.0	7.0	7.0	6.0	7.0	4.0	9.0	6.0	6.0
Project Alternative Estimate	3.0	3.0	3.0	3.0	3.0	1.0	3.0	3.0	3.0	3.0	1.0
TOTAL SCORE (Perfect Score = 110)	70.0	76.0	74.0	82.0	79.0	61.0	71.0	72.0	77.0	68.0	55.0



Mt. Murphy

Corridor 1: On Exising Alginment (Alt 7)
Corridor 2: Downstream Existing (Alt 5)
Corridor 3: Downstream North Beach (Alt 6)



Appendix J: EDCTC SR 49 Realignment Study and Caltrans SR 49 Transportation Concept Report (TCR)

APPENDIX J

STATE ROUTE (SR) 49 REALIGNMENT STUDY
(EL DORADO TRANSPORTATION COMMISSION (EDCTC))

The *SR 49 Realignment Study* performed by the EDCTC discusses alternatives for alignments of SR between Coloma and El Dorado that will improve the conditions of the transportation system by improving traffic operations. One of the alternatives discussed in the study is the "Coloma Bypass" which is recognized as a preferred alternative by State Parks – Gold Fields District that would eliminate vehicle traffic along a portion of Main Street in Coloma and through Marshall Gold Discovery State Historic Park (MGDSHP).

The study discusses two options for the "Coloma Bypass" with both options shifting traffic to the north side of the South Fork of the American River utilizing either two bridges to conform back to existing SR 49 or one bridge and upgrades to Carvers Road. In both cases the "Coloma Bypass" alternative were eliminated during preliminary screenings as the options require far greater resources and have much larger environmental impacts. For additional details pertaining to the *SR 49 Realignment Study* and the "Coloma Bypass" refer to the link below:

http://www.edctc.org/3/SR49Realignment.html

TRANPORTATION CONCEPT REPORT (TCR), STATE ROUTE (SR) 49
(CALTRANS)

The *Transportation Concept Report* (*TCR) for SR 49* performed by the Caltrans is a long-term planning document that evaluates the conditions of a given State highway (or corridor) and establishes a long-term vision (twenty-years or greater) for the corridor. Additionally, the document also forecasts the corridors needs and long-term planning plans identified by the Regional Transportation Planning Agencies and Metropolitan Planning Organizations within a given State highway corridor.

Consistent with the findings associated with the *SR 49 Realignment Study*, the *TCR for SR 49* performed by Caltrans does not suggest or indicate plans of a "Coloma Bypass" or realignment of SR 49 around MGDSHP. For additional details pertaining to the *TCR for SR 49* refer to the link below:

http://www.dot.ca.gov/dist3/departments/planning/tcr/tcr49.pdf