EVALUATION OF THE GATEWAY MONUMENT DEMONSTRATION PROGRAM:

SAFETY, ECONOMIC AND SOCIAL IMPACT ANALYSIS

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GLOSSARY OF ABBREVIATIONS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AMF	Accident Modification Factor
APM	Accident Prediction Model
BOE	Board of Equalization
C-G	Comparison Group
CPI	Consumer Price Index
EB	Empirical Bayes
FARS	Fatality Analysis Reporting System
GLM	Generalized Linear Model
GMDP	Gateway Monument Demonstration Program
HSM	Highway Safety Manual
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NB	Negative Binomial
PDO	Property Damage Only
RTM	Regression to the Mean
SPF	Safety Performance Function
TASAS	Traffic Accident Surveillance and Analysis System
TSD	Taxable Sales Deflator

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EXECUTIVE SUMMARY

The Gateway Monument Demonstration Program (GMDP) facilitated the construction of freestanding structures or signage along roadways to communicate the name of a city, county or township to motorists. The GMDP spanned a four-year period, commencing on January 1, 2005, and concluding December 31, 2008. During the first two years of the program (concluding December 31, 2006), approval and installations were completed at five sites. Two additional monuments were constructed prior to the start of the program, bringing to seven the number of gateway monuments installed in five California communities.

While the GMDP sought to foster partnerships with local entities in the placement and construction of signage, there was a knowledge gap concerning how such signs affected highway safety, as well how they contributed to the local economy, community image and sense of place. Therefore, the research undertaken here sought to quantify the impacts that this type of signage. Such quantification would provide Caltrans with the necessary information to decide whether the gateway monuments program should continue.

Overall, in examining the crash data from each of the monument sites, no patterns stood out as being the result of a monument's construction. Most of the observed crash types were those typical for specific roadway locations (rear-end crashes at signalized intersections, run-off-road crashes on segments). In examining the crash patterns and sequence of events detailed in the crash data, it was further evident the general trends observed before and after monument construction consisted of primarily the same events. In other words, pre- and post-construction crashes generally showed the same types and locations, features struck, and contributing factors. Based on these descriptive analyses, it did not appear that gateway monuments contributed to crashes. While 28 crashes occurred at the study monument sites following construction, no clear patterns emerged on an individual site level indicating that changes in the number of crashes were anything more than the result of the regression to the mean phenomenon at work.

To evaluate the safety performance of monument sites before and after construction, the Empirical Bayes (EB) technique was employed. This approach accounted for issues such as regression to the mean, changes in traffic flow, and other factors. In applying this methodology, the objective was to estimate the number crashes that would have been expected had a monument not been constructed. This estimate would subsequently be compared to crashes observed with the monuments present at each site. To apply the EB method, reference groups and safety performance functions were adapted from existing studies that included traits similar to the monument sites. This eliminated the need to calibrate new models for the limited sample of sites available.

Results of the EB analysis indicated that, on an individual basis, no deterioration in safety was observed at any monument site. When all sites were examined collectively, reductions in the total number of crashes were observed. The calculated index of effectiveness (θ) values, depending on the scenario employed, were 0.978 and 0.680, respectively, corresponding to 2.2 percent and 32.0 percent reductions in crashes. These results should not be construed as meaning that monuments are a safety treatment; rather, they indicate that their presence was not detrimental to safety. In light of these results, Caltrans may continue to participate in the Gateway Monument Program with the knowledge that roadway safety is not impacted by monuments.

Fifteen different regression analyses were conducted in this portion of the study to assess economic impacts of the gateway monuments in the three study communities: Rocklin, Nevada County and Paso Robles. Findings from the sales tax analyses and IMPLAN models suggest that the installation of gateway monuments had combined total economic impacts of $57,468,663 in those three communities in 2008 and 2009. Four retail sectors showed significant growth after installation of the gateway monuments. Though numerous positive and negative economic events occurred in the three communities after completion of the gateway monuments, most key informants and telephone survey respondents (approximately 80 percent) did not believe the monuments were a contributing factor to those economic events. However, about two-thirds of the telephone survey respondents indicated the monuments in their communities contributed positively or somewhat positively to tourism promotion. Thus, the installation of the gateway monuments were one aspect of community enhancement for economic development, but the monuments did not directly generate economic activity for the three study communities.

Overall, responses to questions by both the key informants and the telephone survey respondents regarding community enhancement by gateway monuments were positive in all three communities. More specifically, most telephone survey respondents gave positive ratings for community enhancement and impacts on community image in all three communities, though the ratings were significantly higher in Nevada County and Paso Robles than in Rocklin. Ratings for the monuments helping to create a sense of place and community identity were also very positive across all three communities. When telephone survey respondents were asked if, in their opinions, the monuments create distraction for drivers or cause an increase in accidents, almost all said they do not.

Responses to key informant and telephone survey questions regarding the locations of the gateway monuments revealed that most residents of all three communities believe the monument in their community is effective as a geographic marker and is about the right size. Most (81.7 percent) said that gateway monuments should be installed in other communities in California.

1. INTRODUCTION

The Gateway Monument Demonstration Program (GMDP) facilitated the construction of freestanding structures or signage along roadways to communicate the name of a city, county or township to motorists. Gateway monuments provide communities with an exciting way to identify themselves and create a favorable image. The monuments typically include the official seal or slogan of the local entity and are considered non-integral and/or non-required highway features. They are planned, designed, funded, constructed and maintained by local entities. Images of each monument examined in this research are presented in Figure 1.

Figure 1: Gateway monuments examined in this research

The GMDP spanned a four-year period, commencing on January 1, 2005, and concluding December 31, 2008. The role of Caltrans was to review and approve proposals for gateway monuments that would be located within a state-controlled right-of-way. During the first two years of the program (concluding December 31, 2006), 42 proposals were submitted, with another five having been submitted prior to the start of the program. Of these proposals, four received approval, and installations were completed at five sites. Two additional monuments were constructed prior to the start of the program, bringing to seven the number of gateway monuments installed in five California communities. In addition, a number of proposals were reviewed during the course of this research.

The locations of these sites were:

- Willow Creek (one monument);
- Rocklin (two monuments);
- Nevada County (one monument);
- Paso Robles (two monuments, constructed prior to start of program);
- Tehachapi (one monument).

The locations of these sites are presented in Figure 2.

Figure 2: Location of gateway monuments employed in research

While the GMDP sought to foster partnerships with local entities in the placement and construction of signage, these kinds of highway appurtenances for which outcomes and benefits cannot be measured are becoming more difficult to justify and prioritize under increased budget pressures. Caltrans must allocate costly administrative resources to review and determine the appropriateness of the proposed monuments. Without understanding how such signs affect highway safety, or how they contribute to the local economy, community image and sense of place, it is difficult for Caltrans to justify allocating scarce resources to such a program.

The research presented here sought to address this knowledge gap by examining the safety performance of gateway monuments, how they add economic value to communities and the surrounding environment, add to the sense of place, and enhance community image. The results are expected to provide Caltrans with a clearer picture of how the GMDP is performing. In this sense, the research will have two primary impacts. First, it will provide Caltrans with the information necessary to decide whether the program should continue. Second, it will fill a distinct research void regarding the safety impacts this type of signage may have on the roadway. While the findings will solely focus on signage along state-controlled routes, it is believed that they will be of interest to any agency and/or community that is seeking to erect such signage.

1.1. Background

While the GMDP sought to foster partnerships with local entities in the placement and construction of signage, there was a knowledge gap concerning how such signs affected highway safety, as well how they contributed to the local economy, community image and sense of place. Therefore, research was needed to quantify the impacts this type of signage. Such quantification would provide Caltrans with the necessary information to decide whether the gateway monuments program should continue.

The proposal guidelines for the GMDP included requirements intended to provide for the safety of the traveling public. These included specifications that signage does not impact sight distance, that it is located outside of the "Clear Zone," and that it is within a given range of size dimensions. However, without examining the crash history of the site before and after the signs were constructed, it was unclear whether these requirements have prevented crashes from occurring. The possibility exists that, despite the best intentions of the requirements, instances where signage had a detrimental impact on safety could still arise. For example, despite the requirements for clear sight distances, it was still possible that unique site features (roadway angle, monument setbacks and terrain) combined to produce an unsafe environment.

Aside from safety concerns, it was not clear what impacts, if any, gateway monuments have on the economic vitality of a community, as well as on its sense of place and image. While one would assume that attractive, welcoming signage would have a positive impact on the image of a community, both to visitors and residents, such information must be established if it is to be taken into account when deciding the future of the program. Similarly, one could reasonably expect that such signage might have a positive effect on travelers in an economic sense by creating a welcoming atmosphere that encourages visiting merchants.

The research presented here will answer these questions. The results of this research are expected to provide Caltrans with a clearer picture of how the GMDP performed, both in terms of its impacts on highway safety in the vicinity of the monument, as well as on the community's economy and image. In this sense, it will have two primary impacts. First, the research will

provide Caltrans with the data necessary to decide whether gateway monuments should continue to be constructed on state-controlled right of way. Second, it will fill a research void regarding the impacts that this type of signage has on the roadway. While the findings will solely focus on signage along state-controlled routes, it is believed that they will be of interest to any agency and/or community that is looking to erect such signage.

The primary users of the results of this research will be Caltrans and the Federal Highway Administration (FHWA). During the course of this research, the FHWA granted the gateway monuments program permanent status. In completing the evaluation presented here, the performance of the demonstration program has been documented. The results of this demonstration period, particularly with respect to safety, are therefore of interest to FHWA.

Aside from these users, the research is expected to be of benefit to any local California entities (city, county, or township) that wish to construct such a monument in their community, either as part of the GMDP or along roadways that do not fall under the program's umbrella. Additionally, the proposed research has the potential to assist other states and localities throughout the nation in establishing criteria for placing similar signs, based on California's safety experience.

If this research were not undertaken, there could have been adverse consequences for Caltrans and the motoring public. The failure to perform this analysis would hamper Caltrans' efforts to advance Director's Policy 22 (Context Sensitive Solutions). Ultimately, this would have resulted in reduced capability to address the needs of local entities seeking to advance similar monument projects. If this research were not conducted, an opportunity would also be missed to examine the safety performance of gateway monuments early in the history of the program. Such an examination would reveal whether there are any design features of the monuments, which, in combination with other factors such as traffic speeds and volumes, lead to safety problems. Early identification of such cases would allow for design revisions to be made by communities in future monument proposals.

1.2. Research Objectives

The research presented in this document has three primary objectives. One objective was to determine the site safety performance for gateway monuments following their construction. This understanding is critical in establishing the basis by which the GMDP may continue in the future. Should the construction of monuments lead to a detrimental impact on safety, it would not be advisable for their construction to continue in other locations. Conversely, if no increases in crashes are observed, then it would be logical for Caltrans, at its discretion, to continue the program.

A second objective of the research was to determine the economic impacts of the monuments on local communities. Of interest to this research was what impacts, if any, gateway monuments have on the economic vitality of a community. It is reasonable to assume that such signage would have a positive effect on travelers in an economic sense of providing a friendly, welcoming atmosphere from the community, encouraging travelers to patronize local businesses. To determine the impacts that gateway monuments may have on communities, sales tax data were analyzed for three California locales: Rocklin, Paso Robles and Nevada County. These three communities were selected for this research as their monuments had been in place the

longest and therefore allowed for several years of post-installation data to compare with the data for pre-installation years.

The final objective of this research was to determine what the social impacts of gateway monuments were in the community. One could assume that attractive, welcoming signage would have a positive impact on the image of a community, particularly to residents. To determine how the signage is perceived, resident surveys were conducted to determine to what extent gateway monuments contributed to creating a sense of place and enhancing the image of the community.

1.3. Expected Benefits

Two primary benefits are expected to result from this research. First, an understanding of the safety performance of roadways in the proximity of gateway monuments will be established. To date, no such examination has been performed with respect to gateway monument. The analysis performed by this research will allow for an understanding of whether crashes increased following the construction of monuments. If gateway monument sites did not present safety problems, this would be a beneficial research result, as it would bolster Caltrans' effort to secure the permanent status of the program.

A second benefit of this research was documentation of the extent to which such signage is contributing to the local economy, creating a sense of place, and enhancing the image of the community. The findings will provide base evidence of the effectiveness of gateway monuments in meeting these objectives. This evidence will add another dimension of reference for Caltrans to consider when deciding the future of the Gateway Monument Program.

1.4. Report Organization

This report is organized into six chapters. Chapter 1 has introduced the work, while Chapter 2 will present a literature review related to past research conducted on gateway monuments and similar roadside features, and the economic and social impacts of gateway features. Chapter 3 presents an overview of crash trends at each monument site, the statistical analysis methodology, and the results of the statistical analysis. Chapter 4 presents the methodology and results of the economic analysis, while Chapter 5 presents the methodology and results of the social impacts analysis. Chapter 6 presents conclusions and recommendations based on the results of this work.

2. LITERATURE REVIEW

2.1. Safety Literature

Despite the prevalence of monument signage along roadways throughout the nation (and internationally) announcing to motorists that they are entering a community, no research has been performed to date specific to the potential safety impacts of such signage. Due to this lack of monument-specific safety evaluation, literature related to the safety impacts of similar roadside features such as billboards and other fixed features, as well as general landscaping is reviewed. The intention of this information is to educate the reader with respect to the impacts that signage such as gateway monuments may have on safety, either directly or indirectly. The following sections provide an overview of this literature.

2.1.1. Gateway Monuments

Hallmark et al. discuss several low-cost traffic-calming strategies that communities may employ to address speeding issues, including so-called "community gateways," (1) or gateway monuments. The researchers examined the impacts on vehicle speeds that several of the identified treatments had; unfortunately, they did not examine the impact of community gateways on speeds or crashes. Rather, the authors acknowledged that such monuments may be effective in communicating to motorists that they are making a transition from a rural roadway to a city street (having distinct safety implications), but would also be installed for reasons beyond traffic calming. This work touched upon some of the advantages and disadvantages of gateway monuments, which included:

- Advantages
    - Personalized to each community;
    - Aesthetically pleasing.
- Disadvantages
    - Require ongoing maintenance (painting, landscape renewal, etc.);
    - Infringe on the clear zone (1).

In a report published by the United Kingdom's Department of Transport, a series of traffic-calming treatments along major roads were evaluated, including community gateways. The report indicated that mean speed reductions of between 3 mph and 13 mph (with an average of 5 mph) had been observed when gateways were employed (2). These results would seem to indicate that there are tangible speed-reduction benefits provided by monument signage. Additional research from the United Kingdom found up to a 15 mph speed reduction for 85 percent of vehicles observed when using gateways in combination with other treatments (3). This would further indicate that such monuments are having an impact on driver behavior (vehicle speeds) that may translate into safety benefits.

2.1.2. Billboards

While limited research exists related to gateway monuments, extensive work has been performed over time examining the safety impacts of a similar roadside feature: billboards.[1] While the purpose of billboards is to advertise, they do share features in common with gateway monuments, namely the conveyance of a message to motorists. Gateway monuments advertise the name of a community, while billboards advertise a product or service. Of course, despite their shared objective, these types of signage do differ from one another. Billboards are located outside of the roadway right-of-way, while monuments may be located within it. Additionally, billboards are often elevated, while monuments are typically located at or near ground level. Despite these differences, it is still useful to examine the findings of studies on the safety impacts of billboards on account of the shared mission of conveying a non-traffic-control message to motorists.

Early work pertaining to billboards was conducted by McMonagle in the 1950s. A 70-mile stretch of rural road (divided into 1,000-foot sections) was examined to determine the relationship between crashes and roadway complexity. Results indicated that, while there did not appear to be a correlation between billboards on their own and crash rates, intersections with billboards located nearby did see a higher association (4). Of course, the nature of this study involved correlation and did not conclusively determine that billboards were the causative factor in the observed crashes.

Work performed in Minnesota examining 510 miles of roadway during the 1950s compared crash rates for roadway sections with billboards to those without. It was found that a significant correlation existed between the presence of billboards, intersections, and crash rates (5). Once again, the nature of this study involved correlation and did not conclusively determine that billboards were the causative factor in the observed crashes.

Rusch examined crashes in Iowa by dividing the entire state into four geographic sections and then classifying them by the number of billboards they contained. It was determined that the area that hosted 90 percent of such advertisements had the highest accident rate (6). However, the work was problematic in that it did not specify how an area was determined to contain a "high advertising level." Additionally, the presence of other factors such as retail densities was not controlled for. As a result, it is unclear whether the presence of retailer signage versus billboards versus another factor was the important determinant of crashes.

Work by the firm Madigan-Hyland in 1961 examined two years of crash data along 1,118 miles of New York State Thruway by dividing data into two categories: crashes where the driver could have seen an advertisement versus crashes where they could not. Crashes that were identified as "driver inattention" were used in the analysis. It was found that 13.1 percent of the highway had a high proportion of visible signing, with 32.6 percent of the total 1,550 "driver inattention" crashes occurring along these sections (7). Furthermore, there were 1.7 crashes per mile in high advertising areas versus 0.5 crashes in areas with low advertising (7). Caution should be taken in considering these results as the methodology employed was questionable, particularly in the fact

[1] Note that in this discussion, billboard refers to static signage as opposed to digital/video. Digital/video signage may be more eye catching or distracting, while static signage can be thought to function similar to existing gateway monuments.

that crashes at intersections were omitted from consideration. While the conclusions that may be drawn from this work are far from concrete, they do provide another data point that indicates that billboards may affect crash rates.

Blanche attempted to find correlations between crash rates and road sections along the New Jersey Garden State Parkway that had a high number of billboards. The roadway was divided into 1/10-mile segments, with all roadside features noted. In analyzing data from 1961–1963, no correlations were found between crash rates and the number of billboards present (either by billboard sections of road, or individual billboards) (8). However, it should be noted that the parkway lacked intersections, which previous work had indicated may play a role in combination with billboards in crash rates.

Ady performed a before-and-after study that selected three billboards for their potential to be distracting to drivers. Crash rates were determined for the year before and after the signs were built, with an equivalent section of road on the same highway used as control (9). Two billboards showed no effect on crash rates post-installation. However, the third billboard did show an effect (at the 5 percent significance level), although the sign itself was positioned on a curve and was brightly lit. The primary conclusion drawn by the researcher was that some billboards in specific situations may cause crashes.

Holohan examined sixty intersections in Austin, Texas, during the 1970s. Records were made of every sign visible from an approach, including billboards, with correlations determined between crash rates and sites with a large number of signs (10). One correlation was found to exist: when a larger sign was present (i.e., a billboard), it had a stronger correlation effect (10). Again however, the nature of this study involving correlation did not conclusively determine that billboards were the causative factor in crashes.

2.1.3. Landscape Features

In addition to research specific to monuments and billboards, other work has examined the safety implications of roadside landscaping. Naderi investigated the effects that various roadside landscape variables within the clear zone had on driver safety (11). While gateway monuments were not among the specific variables, sites with similar features, including raised concrete planters, sculptures and decorative noise barriers were examined. The research found that with such features in place, accidents decreased between 5 percent and 20 percent. Furthermore, the results indicated that a well-defined roadway edge had a positive effect, resulting in decreased run-off-the-road crashes with obstacles. The researcher did not indicate the extent of statistical evaluation that was performed as part of this work; it appears that the results primarily were derived from descriptive statistics.

Mok and Landphair linked safety performance to corridor landscape types for four states using Fatality Analysis Reporting System (FARS) data between 1994 and 2000 (12). The research compared safety data on parkways and freeways. In the study, parkways were considered to be routes that had higher aesthetic values (landscaped edges, grass shoulders, median vegetation, etc.), while freeways had paved shoulders, concrete medians and limited landscape. Comparisons of the safety performance of parallel sections of freeways and parkways in terms of fatal crash rates and accident costs were made, with the results indicating that parkway sections were significantly safer in terms of fatal crash rates per one hundred million vehicle miles travelled. Accident costs per one million vehicle miles traveled were also found to be

significantly lower compared to freeway sections. The researchers stressed that the study did not allow for conclusions regarding specific landscape elements that may have contributed to the observed differences in crashes along parkways (12). Rather, further study was necessary to investigate this observed phenomenon.

Mok et al. looked at the impacts of roadside landscape improvements on safety in Texas. The research employed a before-and-after study of crashes as a quantitative measure of roadside greening, with results showing a significant decrease in crash rates after landscape improvements were implemented (13). However, the researchers did not explicitly list the landscape features that were included in the improvements, aside from a mention of trees. As a result, it is impossible to determine if any of the study sites possessed gateway monuments or similar design features that may have presented a safety concern.

2.1.4. Additional Roadside Features

Additional research has been performed examining the safety performance of other fixed roadside features. While these features (e.g., light poles, trees, etc.) are not similar to monument signage, they do represent fixed objects in the vicinity of a roadway that may influence crash occurrence.

Work by Holdridge et al. investigated the hazards presented by fixed roadside objects. Models developed to estimate injury severity indicated that several roadside features had a significant impact on severity (14). Such features included sign posts, which increased the propensity toward non-injury crashes, and trees or poles, which increased the propensity toward fatal crashes/injuries. Consequently, the researchers stress that protecting traffic from fixed obstacles is essential for features that have shown a high propensity for resulting in higher injury severity.

Lee and Mannering developed statistical models of run-off-roadway crashes to isolate the factors that significantly influenced crash frequency and severity (15). The researchers note that there has traditionally been a lack of roadside data for estimating rigorous statistical models, making it difficult to predict vehicular run-off-roadway accident frequency (15). Fixed roadside elements in the research included trees, barriers, utility and light poles, wooden sign supports, boulders, and mailboxes. Results indicated that, not surprisingly, increasing the distance from the edge of the traveled way to light poles and removing isolated trees along the roadway would reduce crash frequencies. The implication for gateway monuments is that their location should be as far as possible from the edge of the roadway.

Troxel et al. used FARS data from 1980–1985 and National Accident Sampling System (NASS) data from 1982–1985 to examine side-impact collisions with roadside obstacles. The obstacles examined were classified as “Broad,” “Narrow” and “Other.” “Broad” objects were most similar to gateway monuments (although such features were not explicitly listed among the examined features), while “Narrow” objects were those such as trees and light posts. Objects classified as “Other” included ditches, culverts, and similar features. The research found that narrow-object crashes were most likely, accounting for 59 percent of identified crashes, while broad-object crashes represented 18 percent and other object crashes 23 percent (16). Of these figures, 80 percent of the crashes involving fatalities were with narrow objects. These results would seem to indicate that crashes with broad features, at least during the period of analysis, were less likely. This was probably due to the limited number of broad features in the roadway environment compared to the frequency of narrow objects, such as trees and poles.

2.1.5. Guidance Documents

The American Association of State Highway and Transportation Officials (AASHTO) offers guidance relevant to gateway monuments in two documents: the *Roadside Design Guide* and *A Policy on Geometric Design of Highways and Streets* (the "Green Book"). The *Roadside Design Guide* is the foremost document providing guidance specific to roadside obstacles (culverts, trees, etc.) and barriers (guardrails, etc.) that share similarities to gateway monuments (monuments are not specifically addressed in the guide) (17). The guide recommends that such features be located outside the "Clear Zone." This zone is a traversable and unobstructed roadside area that vehicles can pass through safely should they leave the roadway. Should an obstacle be present in the clear zone, it should be shielded by a barrier, assuming striking the barrier would result in a less severe crash than hitting the object itself (17). The guide goes on to note that most manmade objects incorporated in the roadway environment can be designed to minimize or eliminate the danger they present to motorists (17). The Green Book provides no specific guidance with respect to gateway monument features, but does stress that concerns about crashes with fixed roadside objects must be balanced against the positive factors of visual preference, noise abatement and erosion control achieved by roadside landscape development (18).

The Caltrans' *Encroachment Permits Manual* provides specific guidance pertaining to the GMDP (19). Guidelines specific to the placement of gateway monument signage state that designs shall minimize the exposure of the traveling public to potential risks. Specifically, the manual states that the monuments shall be in compliance with Section 309.1 of the Caltrans *Highway Design Manual*, which cites that, at a minimum, clear recovery zone widths of 9 meters (30 feet) for freeways and expressways and 6 meters (20 feet) for conventional highways be employed; features within these distances should be shielded (20). The *Encroachment Permits Manual* further states that the guidance of the *Roadside Design Guide,* which indicates that features such as gateway monuments be located outside of the site-specific clear zone, should be followed.

While the *Manual on Uniform Traffic Control Devices* (MUTCD) does not provide specific guidelines for gateway monuments, it does present recommendations with respect to the location of guidance signage adjacent to roadways. Such signage provides information to motorists (speed limits, stop signs, etc.), and is often mounted to fixed posts within the roadway environment. The MUTCD states that "all supports should be located as far as practical from the edge of the shoulder. Advantage should be taken to place signs behind existing roadside barriers, on over-crossing structures, or other locations that minimize the exposure of the traffic to sign supports" (21). This guidance is just as applicable to more substantial signage (e.g., monuments) as it is to smaller regulatory signage.

2.1.6. Safety Literature Summary

As the literature presented in this section has indicated, no significant work has been performed that examines the impacts that gateway monuments and similar signage have on safety performance. Rather, the existing body of work has focused on features that are somewhat similar (billboards), landscaping treatments in general, or the safety performance of other roadside fixed features (utility poles, trees, etc.). The conclusions drawn from this previous research are mixed. While billboards have a questionable impact on safety and landscaping appears to produce a positive effect, the presence of unyielding features in proximity to the

roadway environment does still present safety issues. Guidance documentation such as the *Roadside Design Guide* and Caltrans' *Highway Design Manual* recommend that unyielding features such as gateway monuments be located outside of the roadway clear zone to minimize the opportunities for collision with errant vehicles.

2.2. Economic and Social Literature

2.2.1. Gateway Communities

In order to evaluate the social and economic impact of gateway monuments, it is essential to understand the community that a gateway monument represents. Rick Kurtz (2003) completed a thorough analysis of gateway communities from an economic development standpoint (22). He defined a gateway community as a town with a year-round population of less than 10,000 residents. Gateway communities are distinguished through their rural character, proximity to public lands, as well as wild and scenic river corridors, national lakeshores and seashores. Most gateway communities have traditionally relied on a relatively few or even a single source to drive the local economy. These economic sources have often been linked to adjacent public lands consisting of resources extraction and processing, and recreational activities. Yet, the relative proximity to public lands does not guarantee that local communities will be well-positioned to take advantage of the opportunities public lands provide. Kurtz acknowledged that some gateway communities have failed, in recent decades, to develop a new economic policy vision.

Two factors are involved with economic policy in gateway communities. One is the leadership role that local government officials assume. The other is citizen unity. The hypothesis is that gateway communities that are the most successful in formulating an economic development policy vision have local officials who demonstrate higher levels of leadership attributes and have high levels of citizen unity. In order to test this hypothesis, the researchers conducted a set of interviews with local government officials—city managers, mayors, economic and/or community development directors—in fourteen gateway communities, four in Colorado and ten in Michigan. The communities were numbered from one to fourteen in order to assure participant confidentiality. Results were clearly different across the surveyed communities. However, two factors seemed particularly relevant in determining leadership capacity. First was the individual's confidence in his or her own management and leadership skills, and second was the confidence of their staff. Still, there were certain negative influences on leadership capacity. They were financial constraints, state and federal government prohibitions or mandates, and employee friction. In speaking of citizen unity, several officials acknowledged that community support was extremely important for implementation of certain projects and local economic development. An additional benefit is the link that appears to exist between community unity and volunteerism. Several local officials noted the significant contribution that volunteers made to their communities. The author concluded that local government leadership capacity and citizen unity were two factors that could inhibit or enhance economic vision-planning efforts. Effective leadership capacity, coupled with a high level of community unity, could translate into greater success in formulating an economic policy vision (22).

2.2.2. Gateway Monuments

Since ancient times, monuments and signage have been used all over the world to communicate social messages. One of the objectives of this research is to quantify the economic as well as community image (social) benefits of gateway monument signage.

Based on a review of the popular literature as well as the paucity of research publications on signage and monuments, writers and researchers have concluded that these "conveyors of messages" can communicate a community's identity, location, pride, morals and social or economic focus. Images, first impressions and perceptions of a community begin to form in the minds of individuals along the major access corridors and entrances into a city. Communities need to be aware that these corridors are "gateways" and should be designed to create a cohesive and desired image of the community they represent. Gateways can include both public and private architecturally significant buildings, bridges, public artwork, monuments, public infrastructure, signs and landscaping.

When researching signage in Jordan, Abu-Ghazzeh (1996) concluded the following:

> "Signs and the way they are displayed reveal a great deal about a community's pride and morals, its aesthetic level, vitality, diversity, originality and sense of order. They are an important indicator of what people think of themselves and their environment" (23).

Abu-Ghazzeh further stated that signage (including monuments) can evoke a number of positive as well as negative emotional responses from viewers. He contends that an effective sign should communicate a clear message, and that its "size and location contribute to its communication capability" (23).

Burk (2006) found that monuments have existed for millennia throughout many cultures, but the forms of urban monuments that are common today began to appear at the end of the Middle Ages (24). Tendencies to centralize, specify and impose explicit social messages in public places led to the making of historic and heroic monuments. This allowed a community to open up to new meanings that were different from those originally expressed.

2.2.2.1. Historical Perspective

History has shown that gateway monuments have had considerable impact on communities around the world. During the Renaissance and Baroque eras, public decorative sculptures and monuments were more gloomy, dismal and/or somber. By the late nineteenth century, "the creating of public monuments became an artistic, political and social domain in its own right" (25).

Construction of a gateway monument in a country, city, town or state evokes various interpretations of the monument's social meaning by residents and visitors. Monuments may inspire people's common memories of past events, success, war and may even suggest a type of foundation for a new local social order. Once an idea is put into motion and a decision is made to create a monument, interested parties want to discuss all their likes and dislikes. Certain interest groups may attempt to skew the will of the majority and possibly take away from the originally intended meaning of the monument. According to Burk (2006), "monuments provide insights into various social manoeuvres, as negotiations about which monuments should be created, where they should be and what rituals around their planning, installation and re-consecrating

should occur all provide opportunities of memory-making and inscriptions of power and hegemony" (24).

2.2.2.1.1. Ancient Athens

In ancient Greece, the city of Athens was like a world unto its own. It was built with many divided districts or wards known as *demes*. These *demes* were also used as subdivisions of Attica, the region of Greece that surrounded Athens. The countryside was riddled with these divisions of land, which existed in the sixth century BC and earlier, and monuments were sometimes used to mark the boundaries of these districts. For example, a shaft of Hymettian marble was set up against the wall outside Dipylum that bore the inscription "boundary of Cerameicus." Outer Cerameicus was mentioned by Thucydides as "the most beautiful suburb of the city." This added to the idea of having boundaries and monuments, and the people could see the actual land divisions as well as where they stood both physically and socially. The *demes* of the City of Athens were political subdivisions of the 10 tribes as organized by Cleisthenes. Thus, *demes* did not acquire any particular significance until after the reforms of the era of Cleisthenes in 508 BC (26).

Weller (1913) stated that the Acropolis was defended by a great fortress known as the Enneapylum or "Nine-gates" (26). He conjectured that the highest opening to this great fortress was graced by an ornamental gateway that was based on practices of contemporary cities (26). In ancient times, it was very popular to grace a city with a large gateway where people could see it from afar. Inscriptions were created on these gateways to be read and understood by all who entered these cities.

Many emperors built elaborate gateways marking their territory so that all who passed knew who owned the land and where one stood in the social makeup of their cities. Such a gateway was constructed in the southeast corner of the City of Athens by the Roman Emperor Hadrian. An inscription over the west face of the arch read, "This is the Athens of Theseus, the former city." The opposite side of the arch was inscribed with "This is the city of Hadrian, not of Theseus" (26).

Elaborate, well-inscribed gateways existed in other areas of Athens including cemeteries and sacred areas. Weller also provided an extensive discussion of the construction and use of gateways in these types of areas (26).

2.2.2.1.2. United Kingdom and Ireland

To add to the distinctiveness of towns and the countryside, the United Kingdom's monuments consisted of much more than just gateway markers. These monuments served as entrances to walled cities. Individual communities wanted to express stories of past generations of human endeavor and life, as well as help to create a sense of time and place for their people. For example, in the City of Lincoln, the Newport Arch was built long ago by the Romans as a gateway to that city. Traffic entering this city today still passes under this ancient arch (27).

For residents in the City of Dublin, a new conservation plan for that city's walls will help to recreate the actual physical cohesion of the medieval cityscape lost to development from the seventeenth century, as well as re-install its sense of place. This conservation plan includes two major provisions.

> "Because of the lack of certainty regarding the actual ownership of the dispersed remains (designated as more than 40 separate monuments) has led to serious dilapidation of the City's principal civic monument, practical measures to reverse this include enhanced streetscape presentation of the wall and traffic-calming measures at former gateway points" (27).

Urban communities within the boundaries of the United Kingdom and Ireland have always perceived walls as being an important part of their heritage as well as their present day culture. "An historic perspective is vital along with a strong local civic value of the present day walls remains clear as ever!" As Alfonso the Wise put it in the eleventh century (and as quoted in Avila's recent tourist brochure), "You need a good wall to have a proper city" (27).

Within the United Kingdom, monuments have been and continue to be far more than just gateway markers. They are cherished nationally as important archaeological sites, landscapes, prehistoric burial mounds, flint mines, causewayed enclosures and hill forts. Roman towns were included on this list as were villas, forts, medieval settlements, castles, abbeys, post medieval fortifications and industrial structures that added individual distinctiveness to each town (28).

Modern cities could add an historic perspective when constructing their walls. Walls have been used as a demarcation of where a particular city begins and ends, and it gives the impression of a strong local civic value in the hearts of the people who live in these cities.

> "They (the walls) are a unique inheritance that tell the story of many generations of human endeavour and life. They create our sense of time and place, and add greatly to the distinctiveness of our towns and countryside" (28).

2.2.2.1.3. India

In some cultures, monuments are built to commemorate a visit by royalty. The Gateway of India was originally built for the visit of King George V and Queen Mary in 1911. The monument was also meant to serve as the Gateway of India. It is located in Mumbai on the waterfront in the Apollo Bunder area in South Mumbai, and is constructed of basalt and concrete in an arch 85 feet in height. "In earlier times, the Gateway was the monument that visitors arriving by boat would have first seen in the city of Bombay" (29).

2.2.2.1.4. Germany

In Germany, monuments and memorials were architecturally and structurally planned on the belief that the experiences of the present are intricately connected to the past; they are places where memories converge, condense, conflict and define relationships between past, present and future. Connerton (1989) succinctly summarized the importance of monuments in German society in the following passage:

> "Since the experience of the present is intricately connected with the memory of the past, public monuments are a means of controlling and guiding people's perception of the contemporary sociopolitical order, as well as shaping community and national identity" (30).

A well-known example of monuments in Germany is the trademark Brandenburg Gate, constructed between 1788 and 1791. The gate is located at the main entrance to the city of

Berlin, which was surrounded by the Berlin wall and gate for 30 years. This gateway monument provided a symbol for the world to show the division of the city and the world into two power blocs. "Today's international visitors to Pariser Platz come to re-experience this first gateway to the city, and to enjoy the long-denied freedom to walk through this magnificent work of art and look at it up close" (31).

The Brandenburg Gate was built by an architect who selected the Propylaea gate and the monumental entry hall of the Acropolis located in the City of Athens, Greece, to be its model. "The entire construction and ornamentation of the gate reflect the extraordinary importance it was granted by its builders. Just as the Propylaea led to a shrine of the Ancient World, this gate was to represent the access to the most important city of the Prussian kingdom" (31).

The City of Berlin enjoyed showing off its friendship and statesmanship along with symbols of arts and sciences because it made the city bloom in times of peace. Representation of their communities and their lives was important and they wanted to share that with others. The Brandenburg Gate was designed to reflect that symbolism. Reliefs with the exploits of Hercules in the passages allude to the time of the wars and the subsequent period of reconstruction, during which Friedrich II made Prussia into a European power and laid the foundation for flourishing trade and crafts (31).

For more than 200 years, the Brandenburg Gate has withstood times of political and social upheaval including two world wars. The Brandenburg Gate is not only a symbol of division and reunification, but also the site of many other events in German history, a history characterized by many peaks and troughs (31). "People's choices made and raised this great gateway monument known as the Brandenburg Gate in Berlin, Germany. Someday choices will make and raise another monument to take its place. That is why people build gateway monuments … so they can remember their home." (30)

In summary, communities in Germany use public monuments as a means to control and guide people's perceptions of their country's present-day sociopolitical order, their national identity, and their country's future identity. "Monuments and memorials are places where memories converge, condense, conflict and define relationships between past, present and future," state Feversham and Schmidt in the context of the Berlin Wall (32,33).

2.2.2.2. Gateway Monuments in Cities Around the World

Cities throughout the world reflect the general mindset of the very people who are born, live and die there. Once city residents come together to build a structure that will reflect their city's mindset, much thought must go into all their proposals before the end product is built. Decisions to build, reconstruct and/or add to a city can make long-lasting vital impressions on the minds of those who pass through. Therefore, entrances are important "statements" about the identity of a city or community and its residents.

2.2.2.2.1. Ottawa, Canada

To the residents of the City of Ottawa, Canada, lasting impressions have become a salient political and social issue. Ottawa is considering traffic improvements to make the city more attractive. One interested resident stated that, "The concept of improving intersections, improving the urban design with gateway features, whether they are flowers or monuments, is a

good thing." He further stressed that he was eager to see the detailed plan for traffic improvements. (34)

Councilor Georges Bedard, whose ward includes the key Rideau–Sussex–Colonel By intersection in Ottawa, agreed. He stated that, "What is being proposed at the intersection will not only bring a sense of community to the area, but improve traffic in the part of the city used most by dignitaries and foreign visitors." The National Capital Commission plans to remake the downtown by first transforming the Rideau-Sussex-Colonel By intersection into a "grand entrance" into the capital city (34).

2.2.2.2.2. London, England

One of London's only attempts to create an entrance was the decision in 1999 to re-designate the Scratchwood service area on the M1 as a London gateway. In contrast, Manchester has two landmarks at its main entrances—the Hulme Arch from the south, and on the east the B of the Bang, a steel sculpture of an explosion as high as Nelson's column built for the 2002 Commonwealth Games (Booth 2007).

Those who work and live in London want their visitors to know the boundaries of their city when they enter London. The city does not have any signage marking where it begins or ends. Mayor Ken Livingstone expressed a desire to erect six new landmark sculptures in the city to "proclaim" to visitors the boundaries of the city and thus end confusion as to where London begins and ends. "It's hard to know when you are actually in London," said Sir Terry Farrell, architect of the MI6 headquarters. "It might be there in the subconscious and drivers will think that a particular building or hill means they are now in London. But people do want to feel they have arrived" (35).

Because, the Olympic Games will be held in London in 2012, London communities are looking to create exciting visual imagery for their world visitors.

> "'London has no perimeter signage marking where it begins and ends. I am interested in looking at the potential for a visually imaginative and exciting way to change this,' said Nicky Gavron, Livingstone's deputy. Design concepts included a theme centered on the London 2012 Olympics as well as London as a multicultural "world city" (35).

2.2.2.2.3. Beijing, China

Beijing's new airport opened in early 2008, and other high profile projects are increasing that city's world visibility. Budding global primacy puts Beijing's unique new air terminal in an architectural category along with other new monuments that have recently been constructed. Intellectual and economic clout has made Beijing dazzling. "If Westerners feel dazed and confused upon exiting the plane at the new international airport terminal here, it is understandable. It is not just the grandeur of the space. It is the inescapable feeling that you are passing through a portal to another world, one whose fierce embrace of change has left Western nations in the dust" (36)

New projects such as the airport are giving world-wide critics the impression of a bullish attitude by China in terms of global dominance. "Yet these buildings are not simply blunt expressions of power. Like the great monuments of 16th-century Rome or 19th-century Paris, China's new

architecture exudes an aura that has as much to do with intellectual ferment as economic clout" (36).

Thus, Beijing is constructing gateways and buildings as monuments to create lasting impressions on the world community. These intended impressions appear to be focused on changing world opinion about Beijing as a city and China as a growing economic and social power.

2.2.2.3. Gateway Monuments in the United States

Visitors who pass through a state, county or city usually form an initial impression of that entity regarding its character and livability based on visual cues along major access corridors and entrances. Those cues may include natural features as well as signage, monuments and landscaping, along with the nature and character of urban development.

2.2.2.3.1. St. Cloud, Minnesota

The City of St. Cloud, Minnesota, is referred to as the "Granite City" because of the natural material so widely available throughout the community. The city is recognized as a source of this native stone that is used as a metaphor for the will and the strength of the people who live there. St. Cloud erected a gateway monument at the intersection of East St. Germain Street and what was then the Jefferson paved highway, Lincoln Avenue. The monument, constructed of granite and ornamental iron, stood 20 feet tall and 30 feet wide. This gateway monument was intended to greet visitors to the community from the north and to direct these visitors over the St. Germain Bridge.

This "Granite City" wanted to create a cohesive identity to reflect the image it desired for its community. This first gateway monument went a long way to help define the desired character, materials and location of future gateway monuments throughout the community.

Gateways can include bridges, other infrastructure improvements, monuments, signs, landscaping and architecturally significant buildings. Public and/or private realms can both help enhance all of these types of projects. The public realm may help with improvements in the form of landscaping, directional or information signs, markers and public artwork (37).

As a policy, St. Cloud wanted to incorporate the granite stone into the design of the community gateway monuments. A varied character of the gateway corridors was given by adding native plant materials and existing natural land forms. A more localized approach was taken with the location and design of the monuments by including neighborhood icons, imagery, and places of interest, views, vistas and landmarks (37).

2.2.2.3.2. Leavenworth County, Kansas

The Kansas Department of Transportation and local government entities in Leavenworth County conducted a design study as a part of the United States 24/40 Corridor Study. Based on their observations, they compiled a list of design guidelines for gateway monuments. They recommended that gateway monuments (1) have a prominent position, and (2) be used to signify an entry into a special place, like a scenic overlook or historic landmark, or change of location, like the city limits. Gateway monuments were to primarily be used on major thoroughfares and were to have clean lines, be crafted of high quality materials like stone or brick, and match or complement the architectural context of their surrounding area. Gateway monuments were to be

designed to be highly visible and incorporated into the planned landscape or streetscape, and not be placed as an afterthought (38).

2.2.2.3.3. St. Louis, Missouri

The magnificent 630-foot-high Gateway Arch, located at the Jefferson National Expansion Memorial, is one of the most visited places in St. Louis. This great arch, which is visible for miles, could also be seen as a colossal "Gateway to the West." According to the planners and designers, this monument was intended to provide a visual expression of the "spirit of the American pioneers who crossed our great nation and as the center piece for St. Louis as a tourism destination" (39). Because St. Louis was a river city, its development, especially early economic development, progressed in response to its relationship with the Mississippi River. The steamboat era began in the early 1800s and brought about significant river trade, as steam power permitted much more efficient and dependable river transportation. By the 1850s, St. Louis had become the second-largest port in the country and the largest U.S. city west of Pittsburgh (40). To this day, the Jefferson National Expansion Memorial can be seen along 91 acres of the riverbank, symbolizing the permanent connection between city and waterway.

2.2.2.3.4. Schaumburg, Illinois

A gateway monument is being designed and built to provide a community identity to visitors traveling to and through the city of Schaumburg, Illinois. Planners are proposing an approximately 12x70-foot stone gateway monument at the intersection of Higgins Road and Route 53. This multi-ton monument is part of a larger $1.02 million project to beautify Higgins Road with landscaped medians. The city already has several smaller brick and stone monuments at several gateway entrances to the community (41).

2.2.2.3.5. Carrollton, Texas

In Carrollton, Texas, the Country Villas neighborhood and homeowners' association proposed to build and maintain twin gateway monument signs at the neighborhood's outer corners at Keller Springs Road. The project was designed to promote a distinctive identity and a positive image for the neighborhood and the City of Carrollton (42).

2.2.2.3.6. Great Rivers Scenic Route National Byway, Illinois

The Great Rivers Scenic Route National Byway received official designation in 1998. Future plans are for visitors to be greeted by an 18-foot-high limestone gateway monument along this scenic byway. The sign will be constructed on the south side of the town of Eldred and will inform visitors that they are traveling a national scenic byway. Another monument will be constructed at the south gateway to this scenic byway route in Alton. "By putting something like this in the ground, it gives you an immediate sense of what you're about to enter." said Douglas Arnold, an Alton tourism official." (43)

2.2.3. Economic and Social Literature Summary

Gateway monuments are often the first message or demarcation travelers encounter when approaching or entering a city, county, or other political subdivision. They have been used throughout history to reflect a unique identity and/or to create a first impression, good, bad, or indifferent, in the minds of visitors. These impressions are often remembered long after a trip has

concluded. In addition, these monuments are often intended to contribute to the perceived distinctiveness of towns and countryside alike, and often reflect a sense of community identity and/or an economic policy vision for those who live in the area.

Further research will be conducted to identify and describe the perceived benefits of gateway monuments from the perspective of community leaders as well as community residents in three California communities. This research will explore the intended purposes and perceived benefits of gateway monuments in the three political subdivisions that are the focus of this research: Nevada County, Paso Robles and Rocklin.

3. SAFETY ANALYSIS

This chapter provides the results of descriptive and statistical analyses performed to evaluate the impact on safety of each monument site following its construction. Descriptive statistics provide an overview of general and site-specific trends, while the statistical analysis provides an indication of what the expected safety at the site (i.e., the number of crashes) would have been had a monument not been constructed versus what it was with a monument present. The crash data employed in the analyses discussed in this chapter came from Caltrans' Traffic Accident Surveillance and Analysis System (TASAS) data. Crash data were acquired at various distances before and after each monument, depending on the site type (segment, ramp, intersection). Original discussions with the project technical panel indicated that crashes 0.1 miles before and after the monument or within 500 feet of a signalized intersection should be examined. This was based on the researchers and Caltrans personnel's experience in working with crash data, as well as established analysis practice. However, based on the way that crashes are assigned to postmiles and queried in TASAS, the actual distances for each site varied. Specific site distances (cumulative) were:

- Tehachapi – 0.4 miles;
- Paso Robles U.S. 101 – Ramp (all crashes);
- Paso Robles State Route 46 – 0.6 miles;
- Nevada County – 0.4 miles;
- Willow Creek – 0.7 miles;
- Rocklin Westbound – Ramp/Intersection (all crashes); and
- Rocklin Eastbound– Ramp/Intersection (all crashes).

Based on a review of the crash records by type and contributing circumstance for all crashes at each monument site, it was concluded that no individual crashes warranted examination of police crash report narratives to establish whether monuments contributed to the crash.

3.1. Overall Trends

Before examining each specific monument site, a broad overview of crash performance was conducted. The crash history for each site before, during and after construction of each respective monument site is presented in Figure 3. Note that for all sites, the date range for crashes was January 1, 1998, through March 31, 2008.

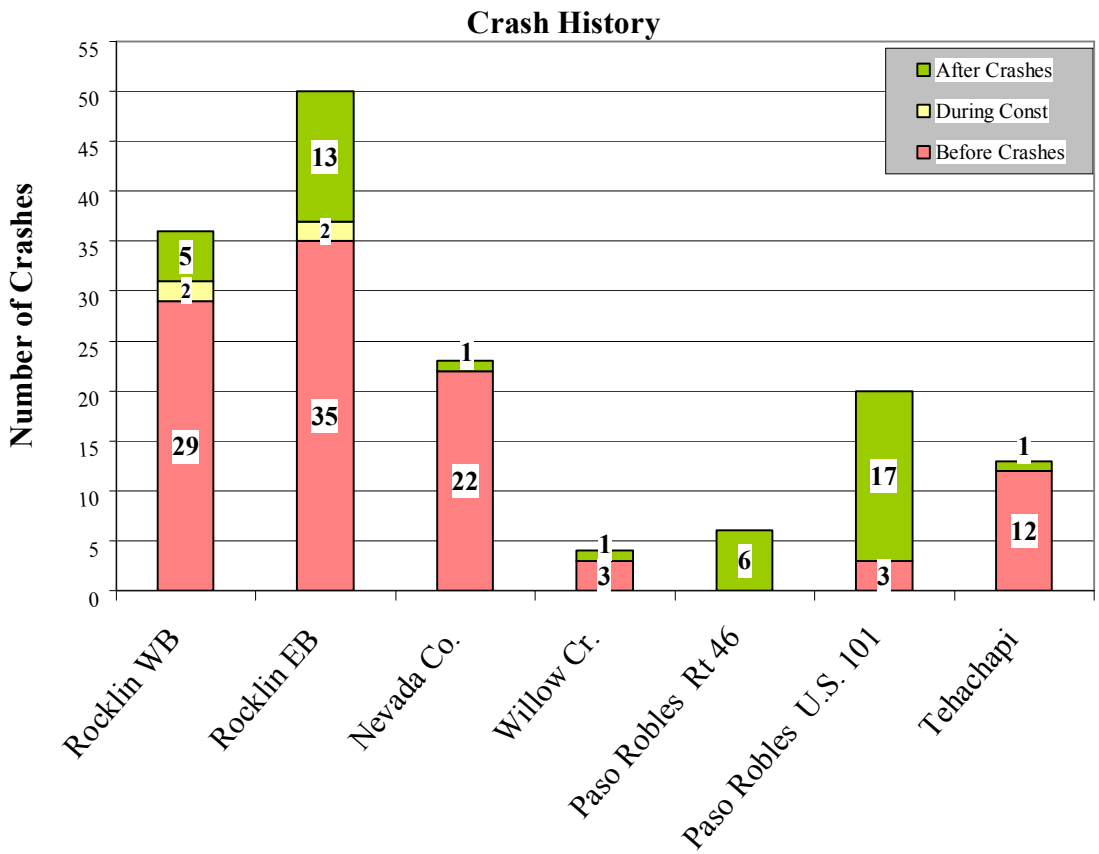

Figure 3: Crash history by monument site before, during and after construction

When examining the total number of crashes of all sites, it is evident that crash histories vary greatly. To some extent, this is due to the characteristics of the site. For example the Rocklin sites are interstate exit ramps and consequently have a higher AADT than the Willow Creek site; therefore, they have greater exposure and potential for crashes. Differences also are the result of the respective ages of the monuments (the Paso Robles sites were constructed in 2002 and those in Nevada County in 2006). Therefore, a more in-depth examination of crash patterns was conducted to yield more meaningful analysis. The results are presented in the following sections, which discuss each site in more detail. Note that the focus of the following sections will be on crashes following construction of the gateway monument, as opposed to those that occurred prior to construction.

3.1.1. Rocklin Westbound Ramp

In examining the crash history of the Rocklin Westbound exit ramp site between 1998 and 2008, a fair amount of fluctuation of crashes was observed. Crashes over time are presented in Figure 4. Over 10.3 years[2], a mean of 3.46 crashes occurred each year, with a range of zero to eight crashes occurring in individual years. Of the 36 crashes at this site, eight were Injury, while 28 were Property Damage Only (PDO).

[2] Note that 10 full years of crash data were available, plus 3 months of data from 2008 ([12 mo/4 qtr]/10ths = 0.3)

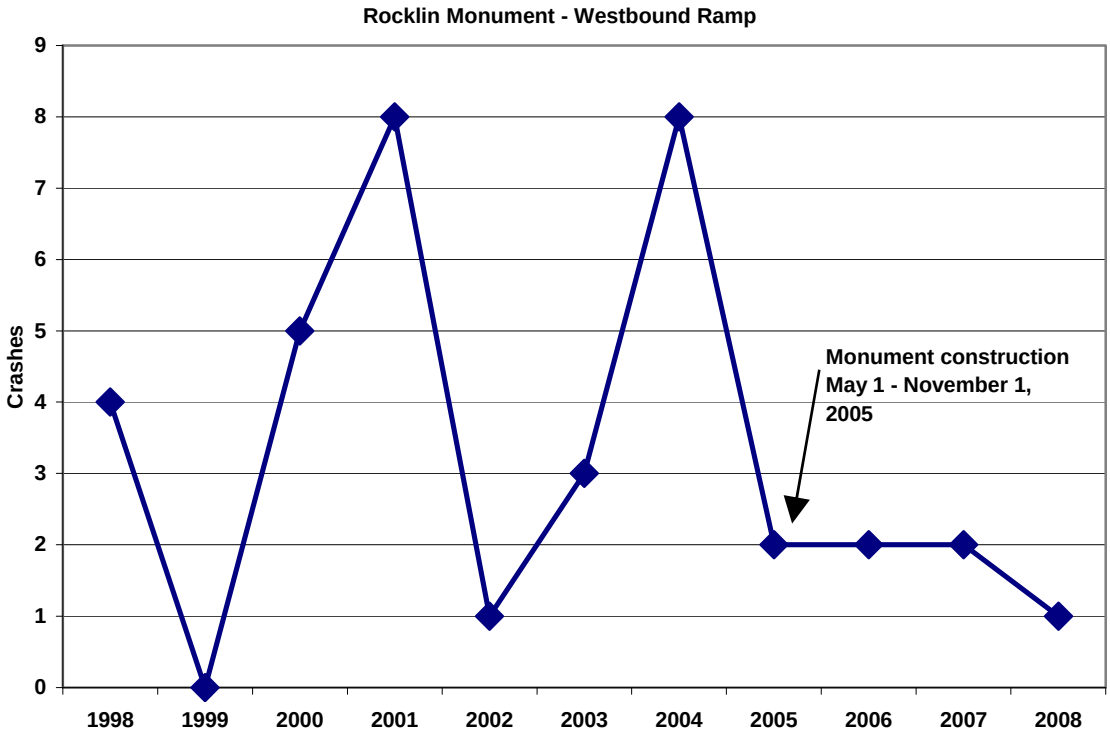

Figure 4: Crash history for Rocklin Westbound ramp site

Following the completion of the monument, a total of five crashes occurred. In examining Caltrans' crash records for this period, the predominant crash types for this site were sideswipe (1), rear end (3) and broadside (1), all types that are common for interchange ramps in combination with a signalized intersection. Further examination indicated that other violation (1), inattention (1), and enter/leave ramp (2) were associated factors related to crashes [3]. While it is possible that driver inattention and other/not stated factors could have been related to a driver being distracted, even briefly, by the monument it is more likely that factors related to the presence of a signal at the end of the ramp contributed to crashes, particularly in light of the fact that crashes before monument construction included the same factors.

Of particular interest with respect to a monument adjacent to the roadway is whether it was struck at any point. In the case of the Rocklin Westbound exit ramp, the monument being placed in an elevated position eliminated the possibility of being directly struck; however, it was still possible for the retaining wall in front of it to be hit by a vehicle. In examining the objects struck at this site, all five post-construction crashes involved vehicles striking other vehicles. Further examination of the location of the collision for each crash indicates that four crashes occurred within the right lane of the ramp, while one occurred in the left lane. The monument and associated features were not struck during the course of any crashes at this site.

[3] Note that multiple factors may be attributed to the same crash because of multiple vehicles involved, so crash totals and the total number of associated factors will not necessarily be equal.

As a result of the crash trends for this site, it was evident that no further examination of individual police crash record narratives was necessary as the monument did not reasonably appear to have played a factor in crashes.

3.1.2. Rocklin Eastbound Ramp

In examining the crash history of the Rocklin Eastbound exit ramp monument site between 1998 and 2008, a fluctuation in crashes was again observed. Crashes over time are presented in Figure 5. Over 10.3 years, a mean of 4.85 crashes occurred each year, with a range of one to eight crashes occurring in individual years[4]. Of the 50 crashes at this site, 14 were Injury, while 36 were PDO.

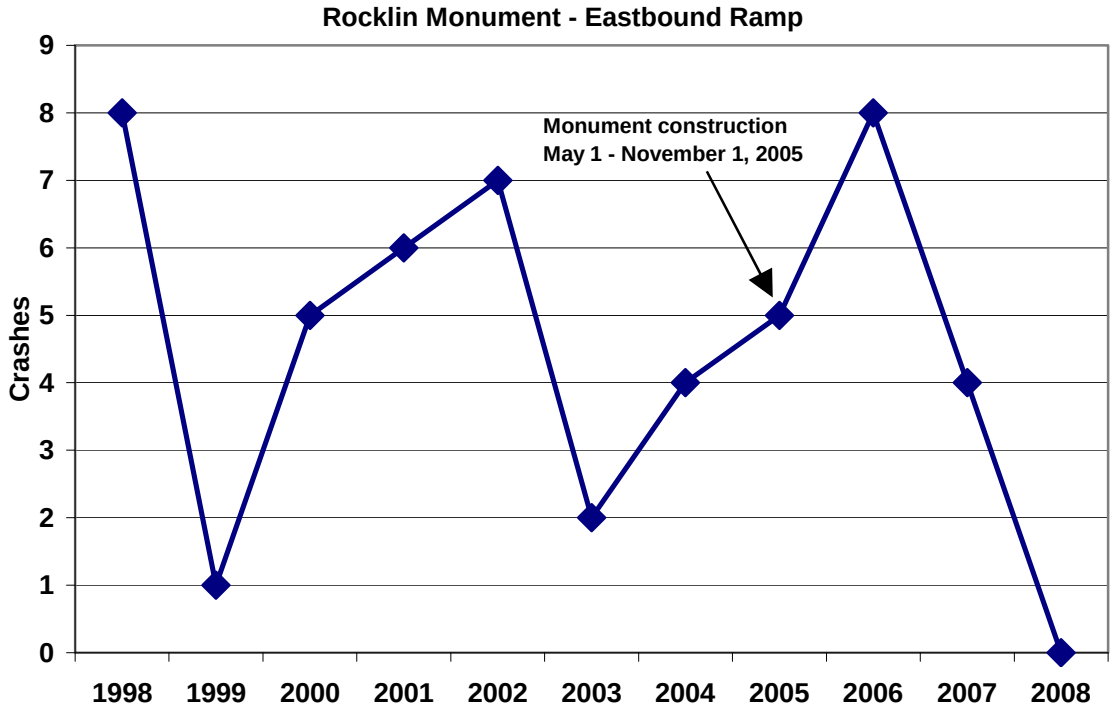

Figure 5: Crash history for Rocklin Eastbound ramp site

A total of 13 crashes occurred following construction of the monument. In examining the crash records for this period, the predominant crash types for this site were sideswipe (1), rear end (7), broadside (2), auto/pedestrian (1), other (1) and not stated (1). The majority of these types are common for interchange ramps in combination with a signalized intersection. Further examination indicated that speeding (1), enter/leave ramp (5), and other/not stated (2) were associated factors related to crashes. While it is possible that other/not stated factors could have been related to a driver being distracted, even briefly, by the monument, it is more likely that factors related to the presence of a signal at the end of the ramp contributed to crashes.

[4] 2008 is not considered to be a full year; hence the zero crashes observed during the first four months for which data were available are not included in this range.

In the case of the Rocklin Eastbound exit ramp monument, it was placed at ground level (set back from the roadway) and not shielded by a guardrail or other safety devices. Consequently, there was a potential for the monument to be directly struck by an errant vehicle. In examining the objects struck in the crashes at this site, all 13 post-construction crashes involved vehicles striking other vehicles or a pedestrian. Further examination of the location of the collision for each crash indicates that seven crashes occurred within the right lane of the ramp, four occurred in the left lane, one occurred in an interior lane (the site has a center lane from which traffic may turn right or left), and one crash was classified as "beyond shoulder, driver's left." In examining the record related to this final crash, the primary collision factor cited was speeding, and the movement being made was a left turn. A second vehicle was struck but no further objects or landscape features were struck, indicating that no contact was made with the monument itself (which would have been located on the driver's left side).

3.1.3. Nevada County Monument

The monument constructed in Nevada County was only present for a small portion of the overall crash history at the site. Over the past 10 years, approximately 23 crashes have occurred in the area where the monument now stands. Since construction, only one crash has occurred near the monument. Crash trends are displayed in Figure 6. Historically, a mean of 2.23 crashes have occurred per year, with a range of zero to five crashes occurring over that period. Six of the crashes were classified as injury and 17 were PDO.

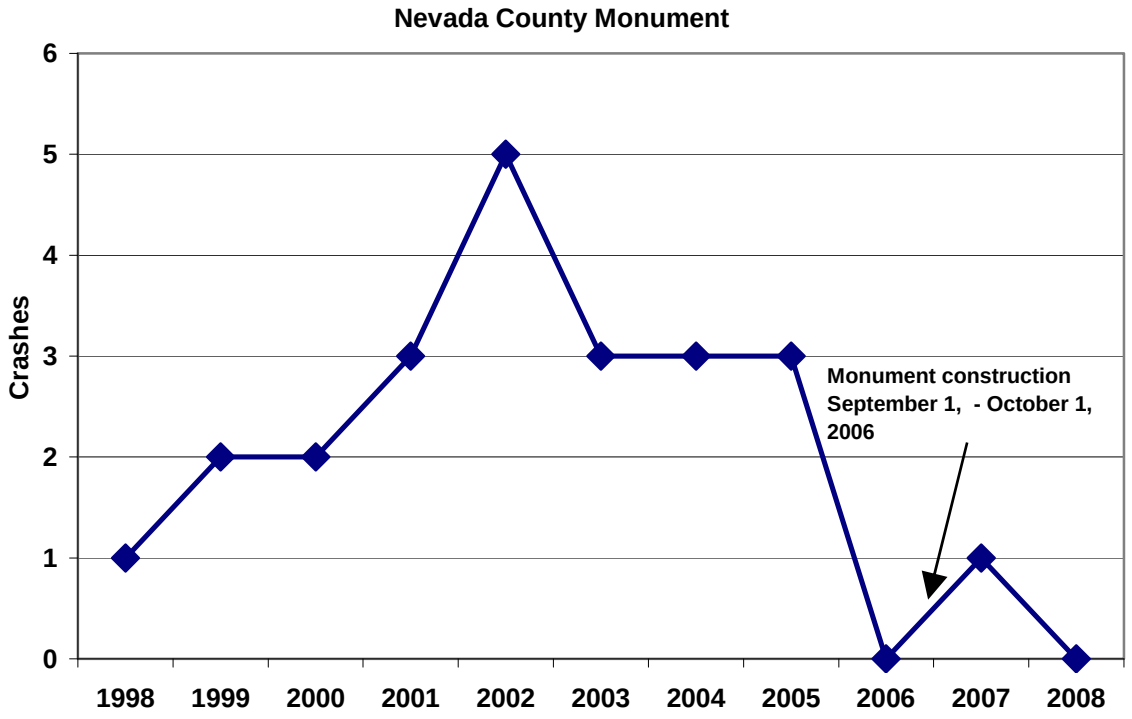

Figure 6: Crash history for the Nevada County site

As noted, in the period after the monument was constructed, only one crash occurred. Crash records indicate that this crash was a vehicle hitting an object and overturning. The object struck was classified as an embankment and the crash was the result of the vehicle running off the road.

The crash occurred at postmile 0.74, while the monument was located at postmile 0.55; consequently the vehicle, which was northbound, would have passed the monument prior to the crash. The roadway in this location curves slightly to the left when heading north, with the result likely being that this run-off-the-road crash was due to roadway geometrics.

3.1.4. Willow Creek Monument

The monument constructed in Willow Creek was only present for a brief portion of the overall crash history of the site. Over the past 10 years, only four crashes have occurred in the area where the monument now stands. Since construction, only one crash has occurred near the monument. Crash trends are displayed in Figure 7. Historically, a mean of 0.38 crashes have occurred per year, with a range of zero to one crash occurring over that period. Two of the crashes were classified as injury and two were PDO.

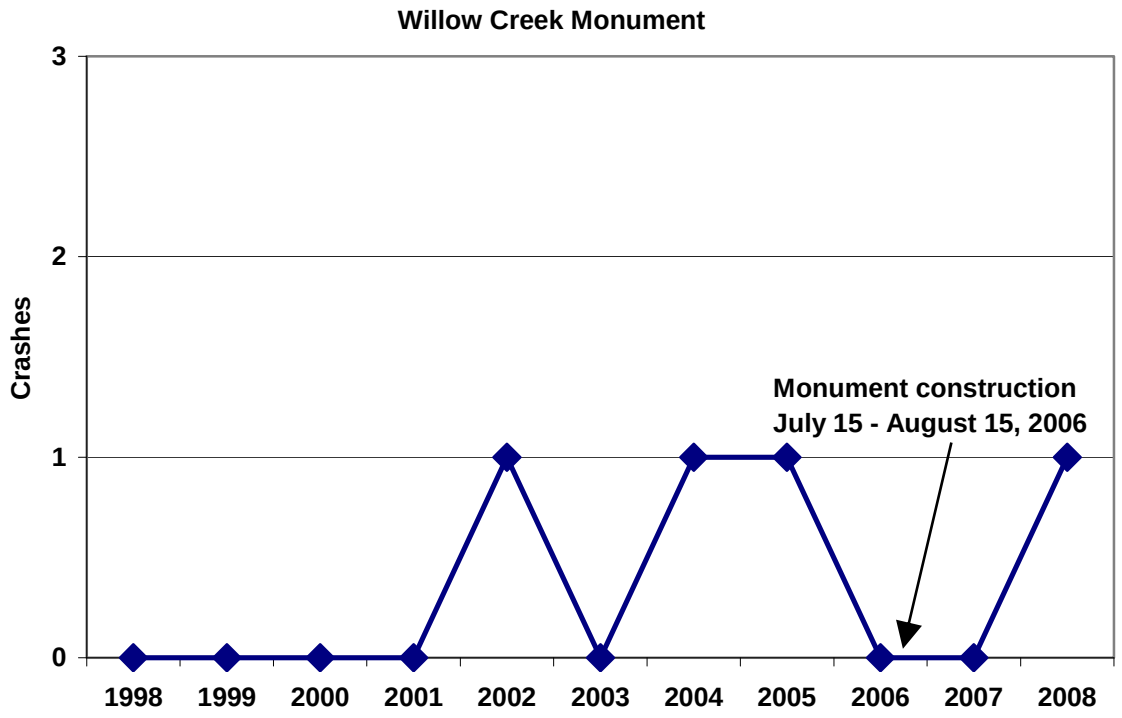

Figure 7: Crash history for the Willow Creek site

In the period after the monument was constructed, only one crash occurred. The crash record indicated that this crash was a vehicle hitting an object and overturning. The object was classified as a cut slope/embankment and the crash was the result of an improper turn. The record also indicates that alcohol did play a factor in the crash. The crash occurred at postmile 38.58, while the monument was located at postmile 38.50; consequently the eastbound vehicle would have passed the monument prior to the crash. However, as stated, the crash record indicates that the primary collision factor was alcohol, and it is unlikely that a drunk driver would have been more distracted by the monument present on the opposite side of the highway (the monument was located on the north side of the highway, welcoming eastbound traffic) compared to being intoxicated. When the vehicle did leave the roadway, it did so along the right

shoulder, while the monument was located on the opposite side of the road. The monument was not struck during the course of the crash.

3.1.5. Paso Robles State Route 46 Monument

The number of crashes experienced in the vicinity of the Paso Robles monument site on State Route 46 yields an interesting history. In the four years prior to construction of the monument, no crashes were observed at the site. Since construction, a total of six crashes have occurred. These trends are displayed in Figure 8. Note that the presence of the monument is not likely the reason for the increase in crashes; rather, this site offers a good illustration of the regression to the mean phenomenon. Historically, a mean of 0.58 crashes have occurred, with a range of zero to two crashes occurring over that period. One crash was fatal, two were injury and three were PDO.

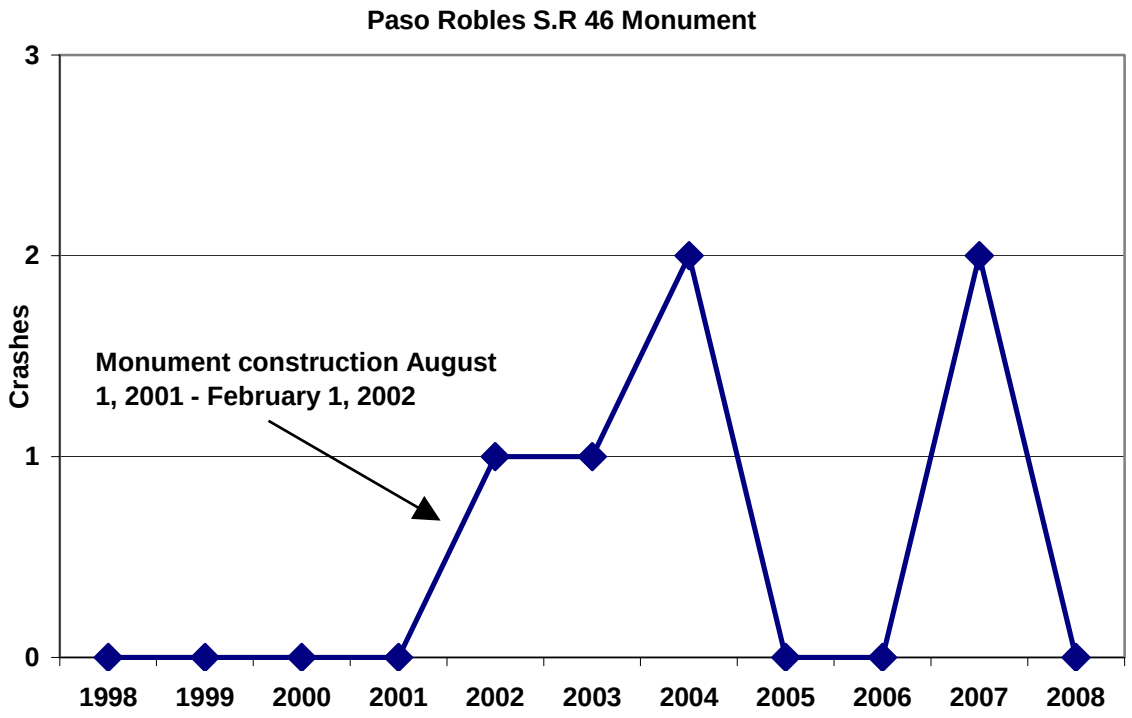

Figure 8: Crash history for the Paso Robles S.R. 46 site

As noted previously, in the period after the monument was constructed, a total of six crashes occurred. Crash records indicate that the predominant crash types for this site were head on (1), rear end (4), and hit object (1). For the crash specified as "hit object," the crash record indicated that an object was struck on the roadway, and that the vehicle never departed the road itself. In general, crash types at this location were typical of those found along a highway segment. Associated factors for crashes included stop and go traffic (2), other violations (1), vision obscured (1), and previous crash (1). In the case of a previous crash, this secondary crash contributed to the two crashes observed for 2004 (in other words, both crashes for that year occurred within minutes of one another). In examining these crash patterns, it is evident that the monument present at the site is not likely to have directly contributed to crashes, although it is possible that its presence created a momentary distraction for drivers.

Of particular interest with respect to a monument adjacent to the roadway is whether it was struck at any point. In the case of the Paso Robles S.R. 46 monument, it was placed on a hillside (set back from the roadway) with fencing surrounding the monument itself (note that the fencing was not intended to stop an errant vehicle). Consequently, there was limited potential for the monument to be directly struck. In examining the objects struck during crashes, five crashes involved vehicles striking another vehicle, while one single-vehicle crash involved a vehicle striking an object in the roadway. Further examination of the location of the crashes indicates that all occurred within the roadway itself. In none of these instances was the monument struck.

Three crashes involved eastbound vehicles as the primary contributor, and three crashes involved a westbound contributor. Westbound crashes are of interest, as this is the direction of travel that the monument signage is directed towards. One crash involved two westbound vehicles. In this case, the first vehicle was classified as stopped and another was speeding behind it, resulting in a rear end collision. This crash occurred approximately at postmile 33.99, while the monument is located at postmile 33.85. Thus, the crash occurred at a location approaching the monument, although it is unlikely that the monument contributed to it (being more than 700 feet away from the crash location). If the monument had contributed to the crash, the first vehicle would have been stopped in close proximity (in terms of postmile) to the monument. A second, head-on crash (resulting in a fatality) involved a westbound vehicle hitting an eastbound vehicle and was the result of drunk driving. According to crash records, it appears that the monument and associated features did not influence the crashes nor was it struck during the course of any crashes at this site.

3.1.6. Paso Robles U.S. 101 Monument

The crash history between 1998 and 2008 reveals a fair amount of variation in terms of the number of crashes observed per year. This trend is presented in Figure 9. Over the 10-year study period, a mean of 1.94 crashes occurred each year, with a range of zero to five crashes occurring in individual years. Of the 20 crashes at this site, one was Injury, while 19 were PDO.

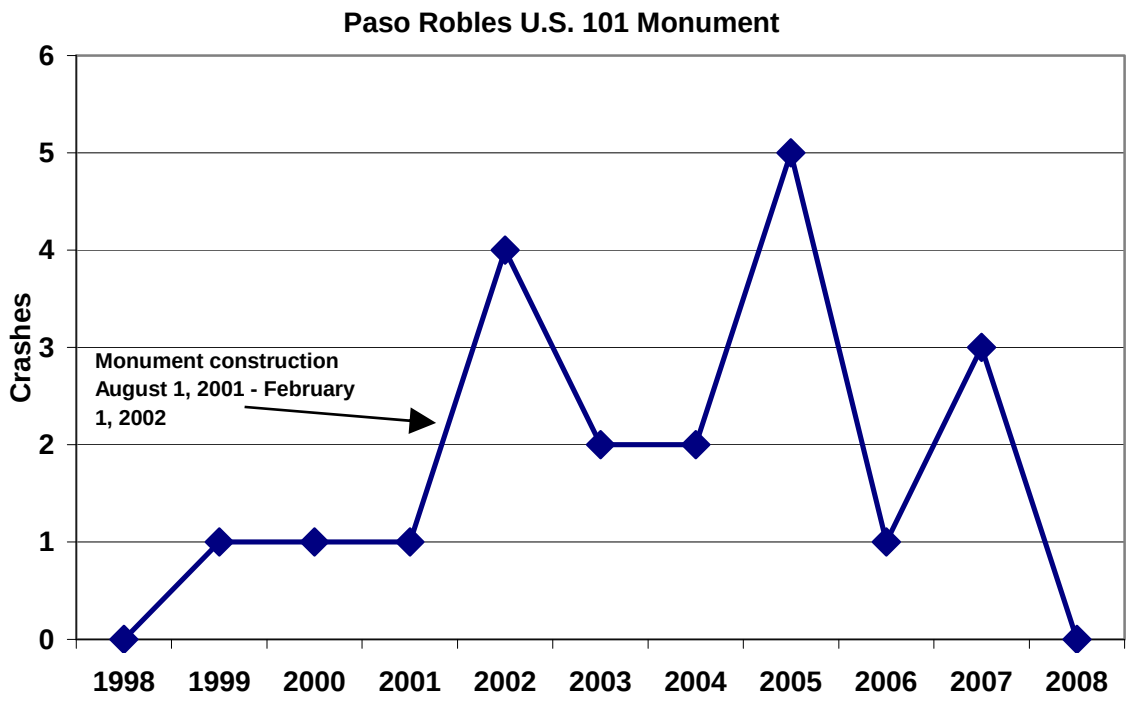

Figure 9: Crash history for the Paso Robles U.S. 101 site

In the period following construction, a total of 17 crashes occurred. Crash records indicate that the predominant crash types for this site during this period were sideswipe (7), rear end (5), broadside (3), hit object (1), and overturn (1). These patterns, particularly the sideswipes and broadside crashes, are interesting considering the location of the monument being an exit ramp from U.S. 101. It is likely that these definitions of crash type reflect the subjectivity of the officer filling out the crash report. They also may be the result of vehicles making last minute or sudden departures from the mainline onto the interchange ramp.

For the crash specified as "hit object," the object struck was a second vehicle, not a roadside feature. Further examination indicated that speeding (2), enter/leave ramp (7), failure to yield (1), unfamiliar with road (2), uninvolved vehicle (1), and other/not stated (2) were associated factors related to crashes. While it is possible that other/not stated could have been related to a driver being distracted, even briefly, by the monument, it is more likely that factors related to vehicle behaviors on a ramp such as decelerating, played a more significant role.

The Paso Robles U.S. 101 monument was placed on a hillside (set back from the roadway) on a high-traffic interchange ramp and not shielded by a guardrail or other safety devices. As such, there was the potential for the monument to be directly struck. In examining the objects struck in the crashes at this site, 16 post-construction crashes involved vehicles striking other vehicles, while one single-vehicle crash involved a vehicle going over an embankment. As the vehicle was listed as traveling over the embankment, it did not strike the monument.

In looking at this site in general, it is clear that for a period following the construction of the monument, crashes increased. To an extent, this is likely due to the regression to the mean phenomenon in action. In addition, looking back at the AADT records for the site for each year (1998-2008), there was a significant growth in traffic on US 101 (and the ramp) beginning in

2001 and continuing through 2006. This corresponds to the period of time where crashes increased. As a result, the increase in crashes may also been the result of additional exposure for motorists to crashes as the result of increased traffic.

3.1.7. Tehachapi Monument

The monument site in Tehachapi experienced a fluctuation in the number of crashes over time. Over ten years, 13 crashes have occurred in the area where the monument has been constructed. Since construction, only one crash has occurred near the monument. Crash trends are displayed in Figure 10. Historically, a mean of 1.26 crashes have occurred per year, with a range of zero to four crashes occurring over that period. One crash was fatal, six were classified as injury and six were PDO. Note that all crashes prior to 2003 occurred on a previous alignment of the roadway. Therefore, these crashes did not occur at the monument's future location.

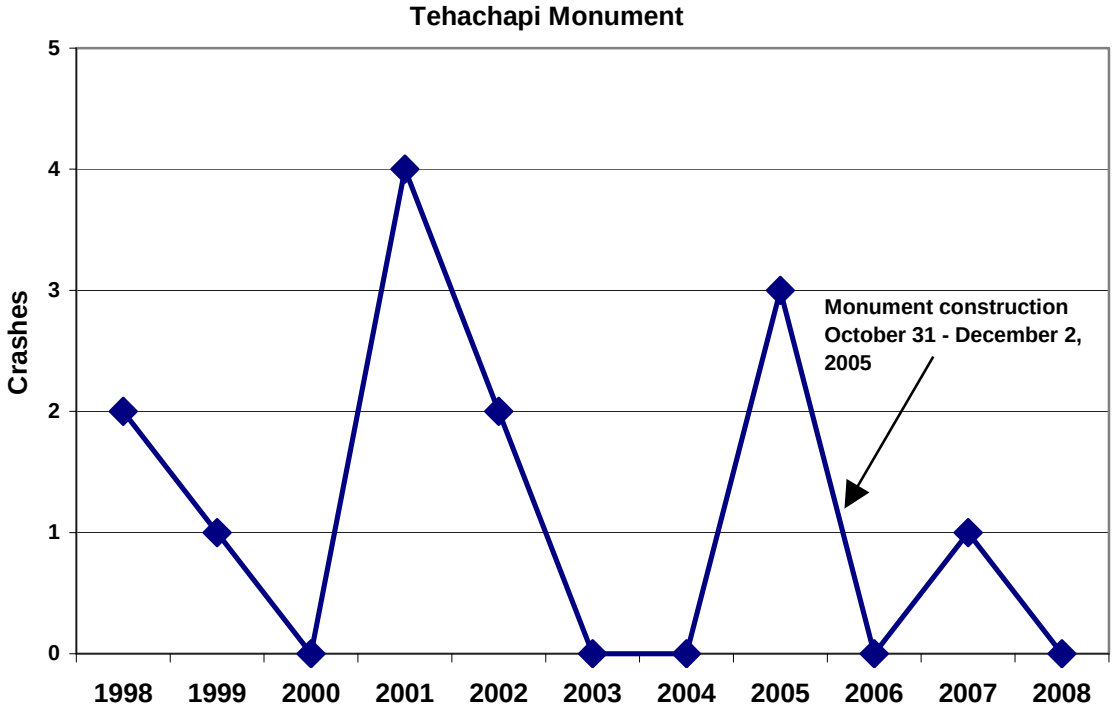

Figure 10: Crash history for the Tehachapi site

As the figure shows, only one crash has occurred since the construction of the monument at this site. This was the one fatal crash that occurred over the ten-year period. This crash involved a motorcycle (the fatality) and emergency vehicle, as well as a third vehicle that was struck by the emergency vehicle following the primary crash. The crash type was a broadside, with improper driving listed as the contributing factor. An associated factor in the crash was attributed to the motorcycle having defective equipment. From the information provided in the crash record, it appears that this crash was the result of a mechanical problem on the motorcycle leading to its collision with an emergency vehicle traveling in the opposite direction in an adjacent lane.

This crash occurred at approximately the same postmile as the monument (9.38), on the west side of the highway, the same side that the monument is located on. The monument is placed on a hill and set back from the roadway, with a curbed shoulder present. Vehicles involved in this

crash remained on the roadway, so the monument itself was not struck. Based on the information provided in the crash record, it remains unclear what, if any, role the monument may have played in this crash.

3.1.8. Summary of Site Trends

Overall, in examining the crash data from each of the monument sites, no patterns stood out as resulting from construction of a monument. Indeed, most of the observed crash types were those typical for specific roadway locations (rear-end crashes at signalized intersections, run-off-road crashes on segments). In this respect, it does not appear that the monuments are contributing towards crashes, at least from the standpoint of crash information. While a collective 28 crashes have occurred at all monument sites following construction, no clear patterns emerged on an individual site level that would indicate that changes in the number of crashes were anything more than the result of the regression to the mean phenomenon at work.

Similarly, in no way does an increase or decrease in the number of crashes following the construction of a gateway monument suggest that the monument was responsible for safety improvement or deterioration. It is possible that the monument played a subliminal role in a decrease in some way (for example, delineating the boundary between rural, higher speed driving and lower speed developed area driving), but this contribution is part of a larger number of contributing factors and is difficult to isolate. Similarly, it is possible that the monument distracted drivers and resulted in an increase in crashes, but simple descriptive statistics and site summaries should not be viewed as providing such definitive information.

In examining the crash patterns and sequence of events detailed in the TASAS crash data, it became evident that no further examination of police crash forms was necessary. This was because the general trends identified by TASAS records in terms of crashes observed before and after monument construction consisted of primarily the same events. In other words, crashes generally were of the same types and locations of collisions, features struck, and contributing factors.

To further evaluate whether the presence of monuments impacted safety, a statistical evaluation of the expected number of crashes after monument construction was performed. The rationale behind this evaluation was that it was possible crash increases may have occurred during the after-construction period that were influenced in some manner (but unrecorded in crash records) by the presence of the monuments. The following section presents the results of this research activity.

3.2. Statistical Evaluation

This section details the statistical evaluation conducted of crashes at the monument sites. This evaluation employs Safety Performance Functions (SPFs) and the Empirical Bayes methodology to determine what the expected number of crashes at each monument site would have been had the monuments not been constructed. These figures are compared to the actual crash history at the site following the construction of monuments to determine whether the number of crashes was higher, lower or remained equal to what would be expected. For the purposes of this evaluation, the desired outcome would be a drop or no change in crashes following monument construction.

3.2.1. Site Histories

Aside from the construction of gateway monuments, other activities occurring at a site over the course of the analysis period may have contributed to crashes. Most notably, road construction and improvement activities (repaving, roadway expansion, restriping, etc.) may have contributed to or reduced crashes, leading to a misperception that changes in crashes at the site were primarily due to the presence of a monument. To address this concern, the researchers examined Caltrans records of construction on each route from 1998 through 2008 to determine when such activities occurred, as well as what they consisted of.

To an extent, some activities cannot be accounted for by the statistical models discussed in later sections of this chapter. For example, restriping or repainting activities initially represent a safety improvement (freshly painted lines are more visible/retro-reflective, producing safety benefits). However, over time, pavement markings deteriorate. This deterioration is variable and would represent a moving target to capture for inclusion in models. Similarly, construction activities themselves are not typically included in such models; rather, their end results are accounted for by variables (ex. addition of rumble strips, lane additions) in the models.

Unless dictated by the duration of the "after" period, the crash data employed in the statistical analysis covered three years before monument construction and three years after construction.[5] Ideally, no road construction activities would have occurred during this period, negating the potential for these activities to impact crashes. The following paragraphs present the construction history of each site, as well the dates employed for the before and after crash analysis periods at the specific site. Construction activities consisted of those in which the postmile of the monument fell at or within.

The before period for both the Rocklin Westbound and Eastbound interchange ramps (Pla 80, postmile 6.06) were May 2002 to April 2005, while the after period ran from May 2005 to April 2008.[6] Construction activities for these sites consisted of the following:

- Replace structural sections: 10-26-98 (awarded) through 9-29-00 (completed); and
- Asphalt concrete overlay: 8-25-04 (awarded) through 11-15-04 (completed).

As indicated, the only construction activity that occurred during the course of the analysis period was repaving work. This work did not result in any changes to roadway alignment, layout, etc.; rather, it renewed the pavement surface. As subsequent sections of this chapter will indicate, none of the models available for analysis that incorporated other features present at the site included a variable to address the impacts of repaving work. However, given the brief period during which this work occurred, its immediate and residual impacts were likely to be minimal. What long-term impacts it did have were likely to result in an improvement in safety. This improvement would be captured by the Empirical Bayes approach employed and its capabilities of accounting for the regression to the mean phenomenon.

[5] Three year periods were selected because they were adequate in capturing crash trends over time.

[6] Note that the after period does not always consist of a full three years. This was because of the lag between when a crash occurred and when its record became available in TASAS (typically 6 to 9 months). At the time of the acquisition of crash data from Caltrans (January 2009), crashes through April 2008 were the latest available.

For Nevada County, (Nev 49 postmile 0.55), the before period ran from September 2003 to August 2006, while the after period ran from September 2006 to April 2008. No construction activities occurred at this site during the entire ten year period for which crash data were available.

The Willow Creek (Hum 299, postmile 38.5) site's before period ran from August 2003 to July 2006, while the after period ran from August 2006 to April 2008. Construction activities for this site consisted of the following:

- Resurface asphalt concrete: 4-19-99 (awarded) through 10-12-99 (completed); and
- Asphalt concrete surfacing: 6-13-01 (awarded) through 11-2-01 (completed).

As the dates of completion for each project indicate, none of the construction activities occurred during the before or after analysis periods for the site, so construction activities are not of concern when modeling this location.

Paso Robles State Route 46 (SLO 46, postmile 33.85) had a before period that ran from May 2002 through April 2005, while the after period ran between May 2005 and August 2008. Construction activities for this site consisted of the following:

- Install median barrier: 8-13-99 (awarded) through 5-25-00 (completed);
- Asphalt concrete overlay: 2-14-01 (awarded) through 12-13-01 (completed); and
- Highway planting and irrigation: 8-2-01 (awarded) through 6-11-03 (completed).

As indicated, only planting and irrigation activities occurred during the analysis period. These activities took place off the roadway and cannot be accounted for in any of the models discussed in subsequent sections.

The Paso Robles (SLO 101, postmile 55.6) site's before period ran from May 2002 to April 2005, while the after period ran from May 2005 to April 2008. Construction activities for this site consisted of the following:

- Rehabilitate roadway and barrier: 9-28-99 (awarded) through 5-23-01 (completed);
- Extend on-ramp (note, the monument is located on the off ramp): 4-20-01 (awarded) through 5-30-02 (completed); and
- Seal coat: 5-31-05 (awarded) through 9-29-05 (completed).

As these activities indicate, the only work ongoing during the crash analysis period was the ramp extension (which was not being done to the ramp the monument was located on) and seal coating. In the case of seal coating, no known model accounts for this activity.

Finally, for Tehachapi, (Ker 202 postmile 9.4) the before period ran from August 2003 to July 2006, while the after period ran from August 2006 to April 2008. Construction activities for this site consisted of the following:

- Asphalt concrete overlay: 6-1-98 (awarded) through 1-5-99 (completed); and
- Replace bridge and realign roadway: 6-22-01 (awarded) through 12-31-02 (completed).

The realignment created the roadway on which the monument was ultimately constructed. However, as the dates of completion for each project indicate, none of the construction activities

occurred during the before or after analysis periods for the site, so construction activities are not of concern when modeling this location.

As the overview of monument site construction histories has indicated, in only a limited number of cases did any construction activity occur during the before and after statistical analysis periods. The construction that did occur was of a nature that was unobtrusive (ex. roadside planting) and/or could not be accounted for by any known models (ex. seal coating). As a result, in the absence of any major construction activities (two to four lane conversions, interchange reconstruction, etc.), it is reasonable to conclude that the outside factor of construction/improvements that could potentially impact crash occurrence is minimal or non-existent at each site. Consequently, the analysis approach discussed throughout the remainder of this chapter is not impacted by the inability to include such information in the models ultimately employed.

3.2.2. Study Data

To analyze the safety impact of gateway monuments, traffic flow, crashes, and other data (geometrics) were collected for the before and after monument construction periods. These data are summarized in Table 1. Five of the seven monuments were constructed along roadway segments and two were constructed at signalized intersections. The segments at Nevada County and Tehachapi were rural four-lane two-way undivided roadways and the Paso Robles Route 46 and Willow Creek sites were along rural two-lane two-way undivided roadways. The signalized intersections at the Rocklin sites were four-legged and located in urban areas. The Paso Robles U.S. 101 site was on an interchange ramp located on the periphery of town.

The construction periods for monuments varied from one to six months. Since their construction may affect motorists, crashes from the construction period were included in the after period. The construction of monuments was somewhat different from traffic safety countermeasures that require relatively short time periods for implementation (e.g., installation of red light cameras) or long time periods with an absence of traffic (e.g., conversion of signalized intersections to roundabouts). The construction of monuments typically did not affect normal traffic operations, which is reasonable since they are not treated as safety remedies. In this study, only two crashes occurred during the construction of all monuments, one at the Rocklin Westbound site, and one at the Rocklin Eastbound site.

The crash counts in the table include all accidents (injury and Property Damage Only—PDO, no fatal crashes occurred during the study period). The total before and after crashes were 13 and 13 for segments and 23 and 22 for signalized intersections. The measured Average Annual Daily Traffic (AADT) data during “after” periods was generally higher than “before” periods except at the Willow Creek site, which saw a slight decrease. The Paso Robles U.S. 101 ramp segment experienced a moderate increase of AADT over the course of three years.

Table 1: Summary of Site Data

Segments										
					Before Period			After Period		
Location	Length (mi)	No. of Lanes	Lane Width (ft)	Shoulder Width* (ft)	AADT **	Years of Data	Total Crashes	AADT **	Years of Data	Total Crashes
Willow Creek	0.7	2	12	11	3400	Aug 03 – Jul 06	2	3300	Aug 06 – Apr 08	1
Paso Robles Rt 46	0.6	2	12	8	17000	Aug 98- Jul 01	0	20000	Aug 01 – Jul 04	4
Nevada County	0.4	4	12	10	27500	Sep 03 – Aug 06	5	34000	Sep 06 – Apr 08	1
Tehachapi	0.4	4	12	8	10100	Nov 02 – Oct 05	3	10900	Nov 05 – Apr 08	1
Paso Robles US 101	0.05	1	12	9	9600	Aug 98 - Jul 01	3	12900	Aug 01 -Jul 04	6

	Before Period				After Period			
Location	Minor AADT	Major AADT	Years of Data	Total Crashes	Minor AADT	Major AADT	Years of Data	Total Crashes
Rocklin WB	2770	25000	May 02 – Apr 05	12	3400	29500	May 05 – Apr 08	7
Rocklin EB	11050	24000	May 02 – Apr 05	11	11350	28200	May 05 – Apr 08	15

* Average width for two sides of roadway

** AADT was obtained for the middle year of each before and after period

3.2.3. Analysis Methodology

The purpose of this research was to investigate crash history before and after the construction of monuments and determine whether their presence negatively or positively affected traffic safety. Based on the available data, the effect of gateway monuments on traffic safety can be evaluated through an observational before-after study (44). To do this, it was important to know about the change in safety in terms of crash counts. This change may be determined through the equations:

$$\delta = \pi - \lambda \text{ or } \theta = \lambda / \pi \quad (1)$$

Where:

δ = crash reduction (or increase);

θ = index of safety effectiveness (45);

π = the predicted number of crashes in the after period without the presence of gateway monuments; and

λ = the number of reported crashes in the after period (with a monument present).

Before–after studies can be grouped into three types: the simple (naïve) before–after study, the before–after study with control groups, and the before–after study using the Empirical Bayes (EB) technique. The selection of the study type is usually governed by the availability of the data, such as crashes and traffic flow, and whether the transportation safety analyst has access to entities that are part of the reference group. The selection can also be influenced by the amount of available data (or sample size). It is worth noting that in observational studies, the term "comparison group" is used instead of "control group" since the entities (sites for treatment) are not selected at random (44).

In this study, it was easy to estimate λ, as crash counts during the after period are known. Thus, it was essential to estimate π by using an appropriate technique to achieve maximum accuracy. The problem with the naïve approach is that it cannot distinguish the effects of causal factors. For example, this method does not account for changes in traffic, which are known to affect safety. In addition, there are causal factors that cannot be measured or are unknown but may affect safety. The Comparison-Group (C-G) method can be used to improve upon the naïve approach. However, as noted by Hauer (44), this method usually requires hundreds (or thousands) of crashes in the comparison group, which were not available for this study. For these reasons, the EB method was employed as it has been shown to have better performance than both the naïve and the C-G methods (44) in addressing problems associated with those methods (e.g., regression-to-mean (RTM), appropriate selection of a before period). This technique has been effectively used in numerous traffic safety evaluations (45, 46, 47, 48, 49, 50, 51, 52, 53, 54).

3.2.3.1. Empirical Bayes Approach

Like the naïve and the C-G study, the EB before–after procedure includes four steps for estimating safety effects of a treatment (*44*). Among the steps, an important task is to estimate the number of crashes in the after period without the safety treatment (π), or in this case, had a monument not been built. This section mainly introduces the EB method for the estimation of π. For more information about the other steps, please refer to Hauer (44).

Two pieces of information are essential to the EB approach: the accident history of an entity and knowledge about the safety of a group of untreated entities with similar traits. The group of entities with similar traits is referred to as the "reference group." The purpose of a reference group is to capture the relationship between safety, traffic volume, and site characteristics (e.g., lane width, shoulder width). The model that depicts this relationship can then be applied to the entity of interest to estimate the associated expected crash rate.

In traffic safety analysis, it is often assumed that the distribution of crash counts at a given entity follows a Poisson distribution, which has been shown to be reasonable in modeling crashes (55). However, crashes over a group of entities often display overdispersion (variance is greater than the mean) (56). For this reason, the negative binomial (NB) distribution, also known as the Poisson-Gamma distribution, has been the most commonly used probabilistic distribution for analyzing crashes (57, 58, 59, 60). The NB distribution has two parameters; the mean u and the inverse dispersion parameter k. The relationship between traffic crashes and explanatory variables (e.g., traffic volume) can be developed by means of the Generalized Linear Model (GLM) framework. The use of NB distribution for GLM is referred to as NB regression.

An important characteristic of NB regression is the choice of the functional form that links crashes to the explanatory variables. Such a relationship is called a Safety Performance Function (SPF) or Accident Prediction Model (APM). SPFs vary with different types of entities (e.g., highway segment, intersection) and may have different forms for a certain type of entity. The following equations present some commonly used SPFs for intersections (equations 2 and 3) and roadway segments (equation 4). In the equations, Average Annual Daily Traffic (AADT) data are typically employed for F_1, F_2, and F.

$$u = \beta_0 F_1^{\beta_1} F_2^{\beta_2} \tag{2}$$

$$u = \beta_0 (F_1 + F_2)^{\beta_1} \tag{3}$$

$$u = \beta_0 L F^{\beta_1} e^{\sum_{i=2}^{n} x_i \beta_i} \tag{4}$$

Where:

u = the estimated number of crashes per year for a given entity;

F_1 = traffic flow on the major road of an intersection;

F_2 = traffic flow on the minor road of the intersection;

F = traffic flow for a roadway segment;

L = segment length;

x_i = a series of explanatory variables (e.g., lane width, shoulder width); and

$\beta_0, ..., \beta_n$ = coefficients to be estimated through regression analysis.

To evaluate safety before and after the treatment for n entities with similar traits, the expected number of crashes per year for those entities ($\{u | u_{B1}, ..., u_{Bn}\}$) must be calculated using an SPF. These expected numbers are further combined with observed crash counts ($\{y | y_1, ..., y_n\}$) in the

before period to obtain the expected number of crashes per year ($\{z|z_1,...,z_n\}$) before the treatment (gateway monuments in this case). In this study, the observed crashes for each entity and each year were available. However, AADT information was only available for the middle year of the before period. Thus, the observed crashes during the before period for each entity (y_i) were used and the AADT was assumed to be the same for each year. With this information, z_i could be estimated by the following equation using the EB technique (44):

$$z_i = w_1 * \bar{y}_i + (1 - w_1) * u_{Bi}, i = 1,...,n \quad (5)$$

Where:

$w_1 = u_{Bi} / (u_{Bi} + k)$; and

$\bar{y}_i$ = the average number of crashes per year during the before period.

In this case, $\bar{y}_i = y_i / m_{Bi}$, where m_{Bi} is the number of years during the before period. w_1 and $(1 - w_1)$ determine the weights for observed crash data ($\bar{y}_i$) and the expected crash rate (u_{Bi}). This equation can be further denoted by:

$$z_i = \frac{\bar{y}_i + k}{k / u_{Bi} + 1} = \frac{y_i / m_{Bi} + k}{k / u_{Bi} + 1}, i = 1,...,n \quad (6)$$

To calculate the expected number of crashes during the after period for a group of entities ($\{\pi|\pi_1,...,\pi_n\}$), a series of factors ($\{r|r_1,...,r_n\}$) are used to account for the differences in traffic volumes and other explanatory variables between the before and after periods. Factors are estimated by:

$$r_i = \frac{u_{Bi}}{u_{Ai}}, \qquad i = 1,...,n \quad (7)$$

Where:

u_{Ai} = The expected number of crashes during the after period for entity i.

The SPF is used to calculate u_{Ai} using data collected during the after period. With these, π_i is computed by:

$$\pi_i = r_i * m_{Ai} * z_i, \; i = 1,...,n \quad (8)$$

Where:

m_{Ai} = the number of years in the after period.

The variance of π_i is calculated by:

$$Var(\pi_i) = r_i^2 * m_{Ai}^2 * (k + y_i / m_{Bi}^2) / (k / u_{Bi} + 1)^2 \quad (9)$$

Once $\pi_1,...,\pi_n$ are obtained, π in Equation 1 can be estimated ($\pi = \sum_{i=1}^{n} \pi_i$) to evaluate safety before and after the treatment.

3.2.3.2. Selection of Reference Groups and SPFs

As mentioned above, a reference group of entities with similar traits are required to use the EB technique for an entity (or a group of entities). In the case of this study, such reference groups were not available. Given that numerous studies have been carried out to develop SPFs for road segments and intersections, existing reference groups were chosen from the literature, with associated SPFs applied to this research. Based on the features present at gateway monument sites, SPFs for rural two-lane undivided highway segments, rural four-lane undivided highway segments, rural one-lane ramp segments, and urban four-legged signalized intersections were selected. A literature review was conducted with a focus on those four types of roadway configurations. Over ten previous studies conducted in North America were identified for urban four-legged signalized intersections SPFs (61, 62, 63, 64, 65, 66) and rural two-lane and multiple-lane undivided road segment SPFs (67, 68, 69, 70), and ramp segments SPF (71) as summarized in Table 2 and Table 3.

In choosing appropriate reference groups and SPFs, several factors need to be considered. First, a study must provide SPFs and dispersion parameters to apply the methodology previously discussed. Second, given the study locations of this research, reference groups in California were preferred. Applying SPFs to geographical areas other than those used in developing the models requires Accident Modification Factors (AMFs) to convert predicted accident frequency to local conditions. Third, studies using more recent years of data are preferred because the expected accident rate may be changed over a longer period due to improvements in traffic signal timing, presence of new signs and markings, and other unobserved factors. As a result, SPFs from the following studies were selected for this study:

- For two rural two-lane undivided highway segments, the study by Persaud et al. (69) was chosen. Persaud's study used data collected from 29 two-lane road segments in California and other states from 2003. The SPF developed from that work for total accidents is presented in Table 3.
- The model from the National Cooperative Highway Research Program (NCHRP) study (70) was applied to the two four-lane road segments in Nevada County and Tehachapi. This model is presented in Table 3, with data collected from 356 rural multiple-lane highway segments in California. As some of the results from this study will be incorporated into Chapter 11 of the forthcoming *Highway Safety Manual* (HSM), it is an ideal candidate for application to this research on account of the HSM's intention to be applied across multiple jurisdictions nationally (70, 72).
- For the ramp segment, the SPF developed by the FHWA study was utilized (71). As shown in Table 3, the data were collected from 737 ramps for 3 years in the State of Washington. Given the large sample size and the number of variables (e.g., ramp type, number of lanes, ramp configuration) incorporated into the model, applying it model to this study was considered reasonable.
- For the three urban four-legged signalized intersections (the Paso Robles U.S. 101 and Rocklin sites), two SPFs were selected from the studies of Persaud et al. (64) and Harwood et al. (65). The first study used data from three cities in California to develop models. The SPF that was developed by using the San Francisco data set was chosen for this study, as San Francisco is closer to study locations than the other two cities. The authors stated that the data collected from the three cities in California did not have full reporting of PDO crashes. For this reason, the NCHRP study by Harwood et al. (65) was

also selected. This study used data collected from 111 sites in Minnesota and North Carolina to develop base models, which were used to predict the safety performance of an intersection with base values of variables (e.g., 12-foot lanes, 6-foot shoulders). This study also provided AMFs for geometric design and traffic control variables to convert safety performance to local conditions. The AMFs for traffic control include left-turn lanes, left-turn signal phasing, right-turn lanes, right turn on red, and lighting. The results from this NCHRP study will be incorporated into Chapter 12 of the forthcoming HSM (72). The SPFs from both studies were applied to this research and results are compared as described in the next section.

Table 2 Reference Groups and SPFs for Urban Four-Legged Signalized Intersections

Authors	Geographical Areas	Period or Duration of Data	Reference Group Size	Crash Severity	Regression Model	SPF	Inverse Disp. Para.
Bauer and Harwood (2000) (61)	California (CA)	1990-92	1,306	Total; fatal and injury (F+I)	Lognormal Regression	Including nine variables in the total accident model	N/A
Lord (2000) (62)	Toronto, Ontario	1990-95	288	Total; injury; PDO	Generalized Estimating Equations	$e^{-4.707}(F1+F2)^{0.617}$	4.83
Lyon et al. (2005) (63)	Toronto, Ontario	5 years	1,410	PDO; F+I	Negative Binomial regression	PDO: $e^{-8.347}(F_1)^{0.484}(F_2)^{0.595}e^{(0.00000734F_2)}$ F+I: $e^{-9.409}(F_1)^{0.57}(F_2)^{0.545}e^{(0.00000604F_2)}$	4.545 (PDO) 4.545 (F+I)
Persaud et al. (2005) (64)	El Cajon, CA	786 site-months	53	Total***	Negative Binomial regression	El Cajon: $e^{-3.95}(F_1+F_2)^{0.53}e^{(0.279*\min lane)}$ *	5.263
	San Diego, CA	1,896 site-months	54			San Diego: $e^{-4.624}(F_1+F_2)^{0.53}e^{(0.279*\min lane)}$	4.167
	San Francisco, CA	2,298 site-months	52			San Francisco $e^{-4.477}(F_1+F_2)^{0.53}e^{(0.279*\min lane)}$	4.167

Harwood et al. (2007) (65)	Minnesota (MN) and North Carolina (NC)	1998-2002 (MN) 1997-2003 (NC)	111	Total; F+I; PDO	Negative Binomial regression	Total single-vehicle**: $e^{-9.85}(F_1)^{0.68}(F_2)^{0.27}$ Total multiple-vehicle**: $e^{-10.63}(F_1)^{1.07}(F_2)^{0.23}$	2.778
Sayed and Leur (2008) (66)	British Columbia (BC)	2001-05	N/A	Severe; PDO	Negative Binomial regression	PDO: $e^{-5.139}(F_1)^{0.4820}(F_2)^{0.2852}$ Severe: $e^{-7.022}(F_1)^{0.729}(F_2)^{0.2082}$	2.706 (PDO) 3.198 (Severe)

* *Minlane* represents the number of left-turn lanes on the minor road.

** Base models for total accidents. Accident Modification Factors (AMFs) are also provided in this study to convert predicted accident frequency to local conditions.

***PDO crashes underreported in the study data; may result in underestimation of total crashes.

Table 3: Reference Groups and SPFs for Rural Undivided Road Segments

No. of Lanes	Authors	Geographical Areas	Period of Data Collection	Reference Group Size	Crash Severity	Regression Model	SPF	Dispersion Parameter
Two lanes	Vogt and Bared (1998) (67)	MN and WA	1985-89 (MN) 1993-95 (WA)	N/A	Injury	Negative Binomial regression	Including 8 variables in the injury prediction model	3.226
	Council and Stewart (1999) (68)	CA, MN, NC, and Washington (WA)	1993-95	4,823	Total	Overdispersed Poisson regression	CA data model: $e^{-3.0188} LF^{0.9048} e^{-0.3419 shldwid} e^{-0.4167 sfwid}$ *	N/A
	Persaud et al. (2004) (69)	CA**	2003	29	Total; injury	Negative Binomial regression	Total accidents: $e^{-7.432} L^{0.834} F^{0.933} e^{(-0.036 shldwid + terrain*a)}$ ***	2.702
Multiple lanes	Lord et al. (2008) (70)	CA**	N/A	356	Total; injury	Negative Binomial regression	Total accidents: $e^{-6.7469} LF^{1.1298} e^{(-0.1905 LW - 0.037 shldwid + 0.1005 INT)}$ *	2.107
One lane (ramp)	Bauer and Harwood (1997) (71)	Washington	1993-95	737	Total	Negative Binomial regression	$e^{-9.81} (F)^{0.93} e^{(0.78*L + 0.78(off_ramp))}$	1.47

* shldwid = average shoulder width; sfwid = surface width; *LW* = lane width; *INT* = number of intersections located on the segment

** Data also collected from other states.

*** $a = 0$ for flat terrain; $a = 0.354$ for rolling terrain; $a = 0.269$ for mountainous terrain

3.2.4. Analysis and Results

The EB before–after approach was applied to this research with those selected SPFs. To illustrate the calculation of π_i, the following takes the rural four-lane undivided highway segment at Nevada County (assumed entity no. 1) as an example. Using the SPF from the NCHRP study (70), the estimated numbers of crashes each year during the before and after periods were:

$$\begin{aligned} u_{B1} &= e^{-6.7469} L(F_{B1})^{1.1298} e^{(-0.1905LW - 0.037shldwid + 0.1005INT)} \\ &= 0.001175 * 0.4 * (27500)^{1.1298} * e^{(-0.1905*12 - 0.037*12 + 0)} \\ &= 2.36(crashes / year) \end{aligned}$$

$$\begin{aligned} u_{A1} &= e^{-6.7469} L(F_{A1})^{1.1298} e^{(-0.1905LW - 0.037shldwid + 0.1005INT)} \\ &= 0.001175 * 0.4 * (34000)^{1.1298} * e^{(-0.1905*12 - 0.037*12 + 0)} \\ &= 3.00(crashes / year) \end{aligned}$$

Using the EB approach, the expected number of crashes per year during the before period was:

$$z_1 = \frac{\bar{y}_1 + k}{k / u_{B1} + 1} = \frac{(5/3) + 2.107}{2.107 / 2.36 + 1} = 1.99(crashes / year)$$

The expected total number of crashes that would occur during the after period had the gateway monument not been constructed was:

$$\pi_1 = r_1 * m_{A1} * z_1 = (3/2.36) * 1.67 * 1.99 = 4.23(crashes)$$

The variance of π is calculated by:

$$Var(\pi_1) = r_1^2 * m_{A1}^2 * (k + y_i / m_{Bi}^2) / (k / u_{Bi} + 1)^2 = 3.35(crashes^2)$$

The same approach was applied to other entities using the appropriate SPFs. The results of that analysis are presented in Table 4. EB estimates for intersections using the NCHRP equations (65) included two SPFs, one for single-vehicle collisions and the other for multiple-vehicle collisions. Correspondingly, the estimated crashes during the after period had the gateway monuments not been constructed were the sum of single- and multiple-vehicle collisions. Four AMFs (left-turn lanes, right-turn lanes, right turn on red, and lighting) were used to convert predicted crashes to local conditions (65). Unfortunately, information about left-turn signal phasing was not available from any study site. Instead, a conservative minimum AMF for left-turn signal phasing (0.937) was employed.

For the three intersections, the results from using the two different reference groups show that the EB estimated crashes (π) are significantly different, with 23.1 crashes (reference group from San Francisco, California) and 45.5 crashes (reference group from Minnesota and North Carolina) respectively. This is due in part to the fact that the San Francisco study did not fully include all PDO crashes, which affected the calibrated SPF and further impacted the estimates of μ and k. With fewer crashes used for the negative binomial regression, μ could have been underestimated, which could further underestimate z given a fixed k. Consequently, in

examining the results, estimated crashes produced using the SPF of Harwood et al. should be viewed as more accurate.

In examining estimated and observed crashes following monument construction, it is evident that no deterioration in safety occurred at any site (with the exception of Rocklin eastbound using Persaud, et al.'s SPF and Paso Robles U.S. 101). For rural two-lane sites, Willow Creek experienced roughly the number of crashes that could be expected, as did the Paso Robles Route 46 monument site. For rural four-lane sites, Nevada County and Tehachapi experienced fewer crashes than expected, with differences of 3.23 and 2.0 crashes respectively. The Paso Robles U.S. 101 experienced slightly more crashes than the SPF predicted.

Examining the crashes at signalized intersections, the lack of inclusion of PDO crashes by Persaud et al.'s SPF becomes evident in the Rocklin eastbound results. Here, 15 crashes occurred, while the SPF estimated 8.67. Since the site is an exit ramp from I-80 with a high AADT (11,050), the majority of crashes are PDO (rear-end) and unaccounted for by that SPF.

The results generated by the comprehensive Harwood et al. model are considered more accurate. This SPF estimated 16.63 crashes compared to seven observed at the Rocklin westbound site. For the Rocklin eastbound site, 16.29 crashes were estimated, while 15 were observed. Based on these results, the observed crash history at the signalized sites following monument construction was lower than what would be expected at comparable sites.

With the estimates of π, the before–after study using the EB technique was conducted by following the steps presented in Hauer (44). Two scenarios were used in the before–after analysis. Each used the same EB estimated crashes for the rural two-lane and rural four-lane undivided highway segments, but used different results for the urban four-legged signalized intersections, with one using the SPF from Persaud et al. (64) and the other from Harwood et al. (65). These results are shown in Table 5, where π and λ are the summed crashes for all seven sites. Instead of calculating the index of effectiveness (θ) presented in Equation 1, an approximate, unbiased estimate of θ was determined by (44):

$$\theta = (\lambda / \pi) / (1 + Var(\pi) / \pi^2) \tag{10}$$

The variance of θ was calculated by:

$$Var(\theta) = \frac{\theta^2 [(Var(\lambda) / \lambda^2) + (Var(\pi) / \pi^2)]}{[1 + (Var(\pi) / \pi^2)]^2} \tag{11}$$

From the table, neither scenario shows an increase in crashes following the construction of gateway monuments. On the contrary, reductions in the number of crashes were identified. The θ values were 0.978 and 0.680, respectively, which correspond to 2.2 percent and 32.0 percent reductions in traffic crashes. Overall, the before–after study with the EB technique showed that the gateway monument sites did not deteriorate traffic safety.

Table 4: Empirical Bayes Analysis Results

Type of Entity	Location	Resource of SPF	Observed Crashes during the Before Period (y)	EB Estimated Crash Rate during the Before Period (z)	Observed Crashes during the After Period (λ)	EB Estimated Crashes during the After Period (π)	Variance of π
Rural two-lane undivided segment	Willow Creek	Persaud et al. (2004)	2	0.74	1	1.26	0.600
	Paso Robles Rt 46		0	1.55	4	5.42	13.257
Rural four-lane undivided segment	Nevada County	Lord et al. (2008)	5	1.99	1	4.23	3.350
	Tehachapi		3	0.92	1	3.00	2.276
One-lane off-ramp segment	Paso Robles US 101	Bauer and Harwood (1997)	3	0.85	6	3.36	3.64
Urban four-legged signalized intersection	Rocklin WB	Persaud et al. (2005)*	12	2.60	7	8.53	10.379
	Rocklin EB		11	2.71	15	8.67	11.106
	Rocklin WB	Harwood et al. (2007)	12	6.94	7	16.63	20.337
	Rocklin EB		11	7.13	15	16.29	20.697

Table 5: Before–After Study Results

Statistics	Scenario 1*	Scenario 2**
EB estimated crashes π	34.5	50.20
$Variance(\pi)$ of estimated crashes	44.605	64.154
Observed crashes λ	35	35
$Variance\{\lambda\}$ of observed crashes	35	35
Crash Reduction δ	5.5	15.20
$Variance(\delta)$ of crash reduction	79.605	99.154
Index of Safety Effectiveness θ	0.978	0.680
$Variance(\theta)$ of Index of Safety Effectiveness	0.059	0.024

*: The SPF from the study by Persaud et al. (2005) was used for intersections.

**: The SPFs from the study by Harwood et al. (2007) were used for intersections.

3.2.5. Discussion

This research investigated the before–after safety performance of gateway monument sites using the EB technique to account for RTM, changes in traffic flow, and other factors. To apply the EB method, reference groups and SPFs were adapted from existing studies, which included similar traits to the monument sites. As reference groups from the same jurisdiction are preferred since they are more representative of the study area, this study used two reference groups from California and recent data to estimate safety for segments, eliminating the need to calibrate SPFs. In the case that a reference group is not available from the same jurisdiction, the HSM methodology is recommended through the use of AMFs to convert predicted safety to local conditions (72). The upcoming HSM will provide base models and AMFs for various types of entities (e.g., rural two-lane highway, rural multiple-lane highway, urban and suburban arterials), allowing adjustment to local conditions.

In the calculation of variance of observed crashes, it was assumed that crash counts for an entity over several years and crash counts over different entities were Poisson-distributed (44). Hence, the variance of observed crashes was equal to its mean ($Var(\lambda) = E(\lambda) = \lambda$). In reality, observational data often display over-dispersion (variance greater than mean) (73,74). Thus, mixed distributions, such as the Poisson-Gamma (otherwise known as NB distribution), are used as an approximate distribution for analyzing crashes. Given small sample sizes, the Poisson distribution assumption was used in this study for simplicity.

3.2.6. Conclusion

This chapter has presented the results of research that investigated whether the presence of gateway monuments had a detrimental impact on safety following their construction. These features are free-standing roadside structures or signage that communicate the name of a city, county or township to motorists. To date, no specific research has examined the impact (if any) such features have on crashes.

Overall, in examining the crash data from each of the monument sites, no patterns stood out as being the result of the construction of a monument. Indeed, most of the observed crash types were those typical for specific roadway locations (rear-end crashes at signalized intersections, run-off-road crashes on segments). In this respect, it does not appear that the monuments are contributing towards crashes, at least from the standpoint of crash information. While a collective 44 crashes have occurred at all monument sites following construction, no clear patterns emerged on an individual site level that would indicate that these changes were anything more than the result of the regression to the mean phenomenon at work.

To statistically determine whether these features impacted safety, the before–after study method with Empirical Bayes technique was used, with reference groups and SPFs adapted from existing studies eliminating the need to calibrate new models for the limited sample available. Results indicated that, on an individual basis (using Harwood et al.'s comprehensive intersection SPF), no deterioration in safety was observed at any monument site, with the exception of the Paso Robles U.S. 101 ramp. When all sites were examined collectively (using either signalized intersection SPF), reductions in the total number of crashes were observed. The calculated index of effectiveness (θ) values for either scenario were 0.978 and 0.680 respectively, corresponding to 2.2 percent and 32.0 percent reductions in crashes. These results should not be interpreted to

mean that monuments are a safety treatment; rather, they indicate that their presence was not detrimental to safety.

In light of these results, Caltrans may continue to participate in the Gateway Monument Program with the knowledge that, for the sites examined in this analysis, roadway safety was not impacted. While this research focused on monuments present along state-controlled routes, similar sites are located along local roads. The criteria by which these sites were constructed may not be as rigorous as those employed by Caltrans, and so their safety performance may differ. In light of this, it is suggested that further research be undertaken to examine the safety performance of these sites in the future both in California and in other states.

4. ECONOMIC ANALYSIS

This portion of the research uses a method of statistical analysis called regression to examine the trends in reported taxable transactions at the local level in the three study areas. Regression analysis is a powerful statistical technique providing information on the relationship between a dependent variable of interest, taxable transactions, and variables that are thought to be important for explaining behavior of the dependent variable. This report relies on time trend analysis along with a categorical variable, referred to as a dummy variable, to help explain the patterns of taxable transactions. Regression analysis is defined as "methods of explaining or predicting the variability of a dependent variable using information about one or more independent variables" (75). Data files on the three communities from the California Board of Equalization Taxable Transactions records beginning in the first quarter of 1995 were used throughout this report. The data is complete through the third quarter of 2007. The data on trends after that time period are not available from the California Board of Equalization (BOE).[7] These records show the political jurisdictions' economic behavior with regard to retail sales that are taxable under state law. Thus, it is possible to estimate the economic performance of a city or a county over time, and before and after a significant event theoretically having an impact on the study area.

All the reports on retail sales' taxable transactions for the three study areas over the period of this report were used with a statistical package called STATA.[8] Regression analyses are used to find those retail sectors that showed an increase in taxable transactions after the installation of the monument related to the community being studied. There are typically nine categories reported in the California State Board of Equalization documents on taxable transactions. The following sectors were selected from those nine and were analyzed using regression statistical techniques:

- service stations
- eating and drinking places
- auto dealers and auto supply stores
- food stores
- total transactions for the specific political unit

These retail sectors are the most closely associated with highway traffic, and for that reason they became the focus of analysis here. Total transactions provide information on the study area's overall retail performance.

Although there are a considerable number of tables in which there is more than one decimal place, interpretation in the text relies on one decimal place.

4.1. Variables

The regression analyses used the measure of time, in quarters, and a dummy variable as independent variables, on the dependent variables of service stations' taxable transactions, auto and supplies' taxable transactions, food and drinking establishments' taxable transactions, food

[7] California State Board of Equalization, Taxable Sales in California (Sales and Use Taxes), Quarterly Reports from 1995 through third quarter 2007. These reports are also available on the Web at http://www.boe.ca.gov/news/tsalescont00.htm from the first quarter of 2000 to the third quarter of 2007. Data obtained prior to the first quarter of 2000 is from the BOE archive.

[8] STATA is available as a demonstration software package for one month by using the Web to find STATA.com.

stores' taxable transactions, and total retail taxable transactions. All the measures of taxable transactions have been altered to represent per capita transactions by using population data in each year, and the data on transactions has been deflated by relying on the BOE's deflator entitled TSDI. This is the measure BOE uses to adjust its data for inflation. Hence, all results here are real in terms of adjusted-for-inflation changes and are representative of per capita expenditures in the study area. As the reader will see, only a handful of these taxable transactions indicated a potential impact on the study area's economy in terms of real per capita sales.

Dummy variables, which have a value of 0 or 1, can be used as independent variables in regression analysis. The researchers created a dummy variable by identifying the point in time when the gateway monument installation occurred. It has a value of 0 for the pre-monument period and value of 1 for the post-monument period. The time trend measure represents each quarter period starting in January 1995, and ending in the third quarter of 2007. These quarters are coded 1 through 51 to represent the quarters over the time span of interest. The quarters are named "timequarters" in this analysis. The dummy variable is labeled "dummy111." Because the installation of the gateway monument for the three study areas had a different time period, the dummy111 variable represents the time when the installation is started.

The purpose of these regression analyses is to find out if there is a relationship between changes in taxable transactions and the installation of a monument over time. Thus, an attempt is made to find out if there is a shift in the time trend measure before and after the installation of the monuments. If the shift increases after the installation point in time, one might infer that the monument had something to do with that shift.

The five sectors for each study area are examined using a time trend measure, the quarters of each year and a dummy variable. The results of the statistical tests and a graphic portrayal of the same results are used to illustrate the behaviors in taxable transactions. The general hypotheses are that there will be an increase in taxable transactions after the installation of a monument because passing motorists are more likely to notice the community and stop for gas, food, etc. The gateway monument may also be accompanied by other changes, such as a new industry, which may be even more influential than the gateway monument. These other factors are investigated through a telephone survey of residents in each of the study areas.

If there is sufficient evidence to support a statistically significant change or a visual change in taxable transactions, then further analyses will be carried out to measure the impact of that increased demand on the community using IMPLAN. This will provide more detailed information on the economic impact of the monument being studied. There is a useful test of regression results when there is a dummy variable in the set of independent variables: The Chow Test. Each table has the regression results followed by the Chow Test, which shows if the coefficients in the two regressions are the same.

4.2. Criteria for Inclusion of an Estimated Equation

The same procedures for all the study areas and for all the categories of retail sales in the communities under study are presented here. The criteria used to include the results of an estimated equation are the following:

1. The adjusted R^2 must show enough explained variance to suggest that the relationship between the trend variable and the dummy variable is strong. The researchers use the

F statistic to make this determination. Hence, if there is a significant R^2, the F value must show p=<.05. The R^2 ranges from zero (no association) and 1 (complete association). Thus, higher values of R^2 indicate stronger associations between the independent variables and the dependent variables.

2. The "t" values for each of the coefficients of the independent variables must be significant p=<.05 and they must be positive.
3. The Chow Test must show that there is a significant difference between the pre-period slope of the regression estimate and the post-period slope of the regression estimate, respectively, before and after the installation of a monument. Here is a description of the Chow Test, "[which] is most commonly used in time series analysis to test for the presence of a structural break (an unexpected shift in a macroeconomic time series)." In the case of the data here, if a significant structural break is found and the coefficient is positive, then we might conclude that there is an increase in the taxable transactions after the monument installation.[9]

Results of tests are presented in the form of tables of regression results and graphs of those results. All the statistical tests for the period before and after completion of the gateway monument are examined and used to determine if the results meet the criteria of selection. In this manner, one can examine the likelihood of a change in the slope of the regression equation on the time trend data. If there is no change in the period before compared to the period after, then one can conclude the monument had no effect. If there is a negative change, then one can conclude that other factors are involved and there is no impact on the study area.

4.3. City of Rocklin

Rocklin installed a gateway monument in November 2005. The following is a discussion of the findings for Rocklin when the researchers examined the economic impact before and after monument installation.

In all of the analyses in this report, real per capita taxable transactions for the geographic area of interest are used. Taxable transactions are divided by the best estimate of population in the community to obtain per capita transactions. Then, the taxable transactions are deflated with an index that more closely matches the actual sales of taxable items than the consumer price index (CPI).[10]

A dummy variable is created by using 0 for the monument period before and 1 for the monument period after the installation. The taxable transactions for service stations, eating and drinking places, food stores, auto dealers and auto supply stores, and the total for all outlets are then examined.

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[9] http://en.wikipedia.org/wiki/Chow_test; see also "Testing for a shift in structure." Kane, Edward J. Economic Statistics & Econometrics, New York: N.Y.: Harper & Row, Publishers, 1968, p. 341. This statistic follows the F distribution.

[10] "The California State Board of Equalization's taxable sales deflator (TSD) adjusts taxable sales amounts for inflation. In 2004 the BOE took the position that TSD is more accurate than the Consumer Price Index when adjusting for inflations in taxable sales."
Http://www.ciwmb.ca.gov/LGeneral/DivMeasure/AdjustMethod/TSDI.htm

As noted earlier in the section on Criteria for Inclusion, the statistical criteria chosen consist of those that are normally required for social science research. The significance levels are those set at a likelihood of the event occurring by random chance alone at 5 percent. In those cases where there is consistency in the results, such as a positive and significant coefficient for both the time trend variable and the dummy variable after the installation, one can more confidently conclude the gateway monument was a factor in the change in economic activity.

4.3.1. Eating and Drinking Taxable Transactions

The first analysis for Rocklin indicates there is a significant relationship between eating and drinking taxable transactions in Rocklin in time periods from the first quarter 1995 to the third quarter 2007. The results presented in Figure 11 indicate that the dummy variable is significant, with a "t" value of 4.3. The overall results of the estimated equation have a high adjusted R^2 = .90, suggesting that the equation explains 90 percent of the pattern of taxable transactions in the time period examined.

The trend independent variable "timequarters" has a "t" value of 13.8 suggesting that the likelihood of this occurring by chance is less than 0.000. The Chow Test further confirms the structural break in the slope of the equation. Thus one can conclude that the trend function after the installation of the monument at Rocklin is significantly different from the long-term trend. The value for the Chow Test is 18.9 with a probability of occurrence by random chance of 1 out of 10,000 repeated trials.

These results suggest that demand for eating and drinking increased after the installation of the monument, but does not explain why this increase occurred. Interviews of key informants at the community level will provide more information about these results. To measure the full impact, the researchers will have to rely on analysis using input/output from IMPLAN. The increase might be explained by factors beyond the local circumstances in Rocklin, but the data to examine these other factors is not available in the BOE databases.

```
. reg realpceatdrinktrans timequarters dummy111

Source        SS          df        MS          Number of obs =      51
                                                F(  2,    48) =  235.18
Model     55904.833       2    27952.4165       Prob > F      =  0.0000
Residual   5705.17716    48      118.857858     R-squared     =  0.9074
                                                Adj R-squared =  0.9035
Total   61610.0101    50   1232.2002            Root MSE      =  10.902


realpceatd~s       Coef.    Std. Err.      t    P>t    [95% Conf.    Interval]

timequarters   1.838206   .1335508    13.76    0.000   1.569684      2.106728
dummy111      23.48085   5.40547       4.34    0.000  12.61243      34.34928
_cons        100.8966    3.375895     29.89    0.000  94.10887      107.6843

Chow Test
. test dummy111

( 1)  dummy111 = 0

F(  1,    48) =   18.87
Prob > F =    0.0001
```

Figure 11: Rocklin regression analysis of eating and drinking taxable transactions

The equations from these regression estimates are the following:

$$\text{Realpcaeatanddrinktrans} = 100.9 + 1.8 * \text{timequarters} + 23.5 * \text{dummy} \quad (12)$$

where

dummy = 0

And

$$\text{Realpcaeatanddrinktrans} = 100.9 + 1.8 * \text{timequarters} + 23.5 * \text{dummy} \quad (13)$$

where

dummy = 1

Assume that the period of interest is the 44th quarter in the data series, which is equivalent to the period at the time of the gateway monument installation. The equations allow one to calculate the real per capita value of expenditures on taxable transactions of eating and drinking establishments in a quarter using the first equation; it is $180.10 taxable transactions in the Rocklin city limits per capita in that quarter. The value for the period after the installation is $203.60. All these estimates are calculated to take into consideration inflation over time. Thus, the values here are real per capita expenditures in the city limits of Rocklin during the period before the installation and during the period after the installation of the gateway monument. These results suggest that the monument is associated with an average overall increase in real per capita taxable transactions at local eating and drinking places.[11]

Figure 12 indicates that the trend lines before and after the installation are quite different, and the statistical analysis points that out. The F value for the Chow Test was statistically significant. This graph illustrates that pattern.

[11] The reader should recall that we calculated the real taxable transactions using the measure TSDI. It is the taxable sales deflator index produced by the Board of Equalization. It measures changes in prices of goods and services subjected to the California Sales and Use Tax. It is useful for adjusting trends of taxable sales for inflation impacts. See this web site: http://www.ciwmb.ca.gov/lgcentral/DivMeasure/AdjustMethod/TSDI.htm

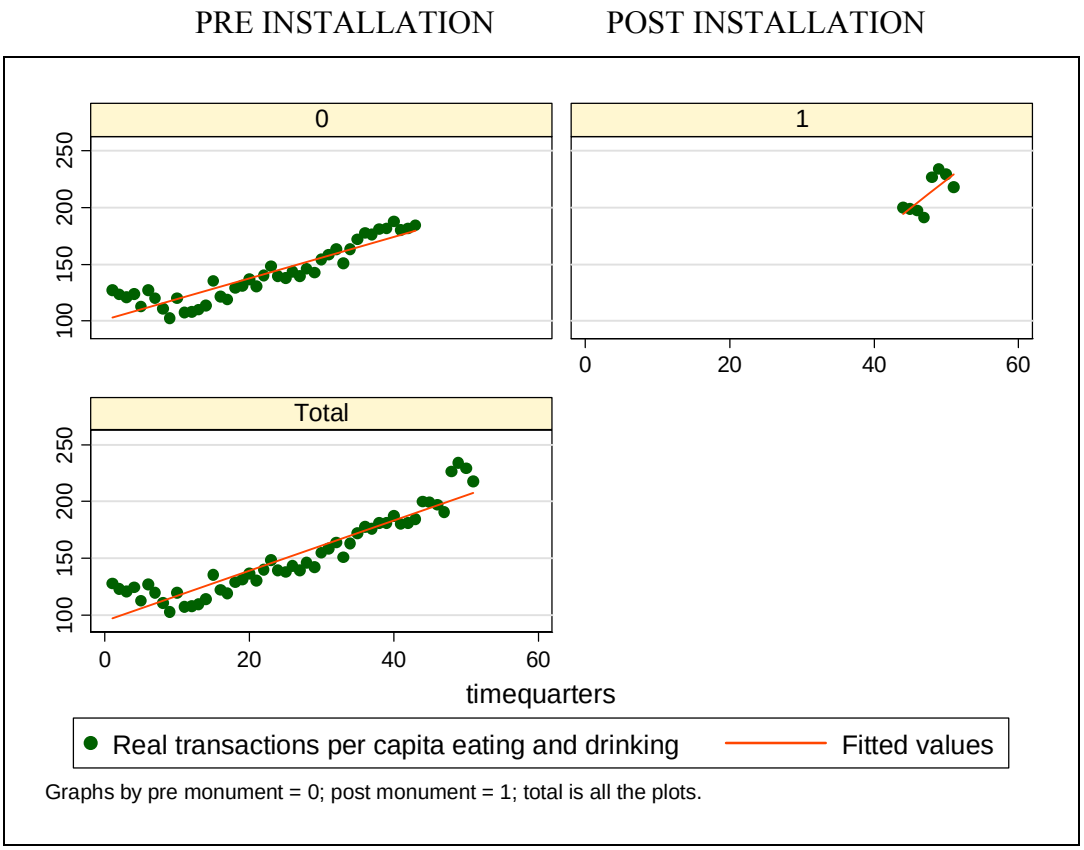

Figure 12: Rocklin relationships between real taxable transactions for food and drinking before and after installation of monument

4.3.2. Auto Dealers and Suppliers Taxable Transactions

This retail sector shows an increase in taxable transactions after the installation of the monument. Figure 13 shows that both of the independent variables are statistically significant. The adjusted R^2 is .79 for "timequarters." This suggests that almost 80 percent of the variance in "autopoptsdi" is explained by the time trend and the dummy variable. The "t" value for this measure is 5.6 and significance is less than 1 out of 10,000 repeated trials. The dummy variable is also significant at "t" = 6.2. Both the independent variables are significant contributors to the dependent variable defined as taxable retail sales patterns among auto dealers and suppliers.

The Chow Test reveals that the slopes are significantly different from each other, and this suggests that since the slopes are both positive, the gateway monument is associated with an increase in taxable transactions in Rocklin. The likelihood that the difference between the two slopes is by random chance alone is less than 1 out 10,000 repeated trials. The F value for the Chow Test is 38.3 with 1 and 47 degrees of freedom.

```
reg autopoptsdinew timequarters dummy111

Source        SS       df       MS              Number of obs =      51
                                                F(  2,    48) =   93.94
Model     473940.543     2  236970.272          Prob > F      =  0.0000
Residual  121084.566    48  2522.59512          R-squared     =  0.7965
                                                Adj R-squared =  0.7880
Total   595025.109    50  11900.5022            Root MSE      =  50.225


autopoptsd~w       Coef.   Std. Err.      t    P>t    [95% Conf.   Interval]

timequarters    3.444033   .6152566     5.60   0.000    2.206977   4.68109
dummy111        154.1393   24.90252     6.19   0.000  104.0694     204.2092
_cons          -14.54285   15.55245    -0.94   0.354  -45.81315    16.72745


. test dummy111

( 1)  dummy111 = 0

F(  1,    48) =   38.31
Prob > F =    0.0000
```

Figure 13: Rocklin regression of auto and auto suppliers taxable transactions

The equations from these regression estimates are the following:

autopoptsdinew = -14.5 + 3.4 * timequarters + 154.1 * dummy (14)
where
dummy = 0

And

autopoptsdinew = -14.5 + 3.4 * timequarters + 154.1 * dummy (15)
where
dummy = 1

For example, assume that the period of interest is the 44th quarter in the data series, which is equivalent to the time of installation at the site. The real per capita taxable transaction is $135.10 prior to the installation of the gateway monument, the 44th quarter. The value for the period after the installation is $289.20. These results suggest that the monument is associated with an average overall increase in taxable transactions from the auto and auto supplies sector of the local economy after the installation of the monument.

The quarterly periods and the dummy variable both indicate that they are correlated with taxable transactions in these categories and with the installation of the monument. Figure 14 indicates a best fit plot of the data as it shows a much more rapid increase in taxable sales after the installation of the monument. Again it may be that the increased retail sales in this category are due to some other factors, and that issue will be explored with the key informants' interviews in Rocklin. The researchers will also examine economic activity in this community using IMPLAN.

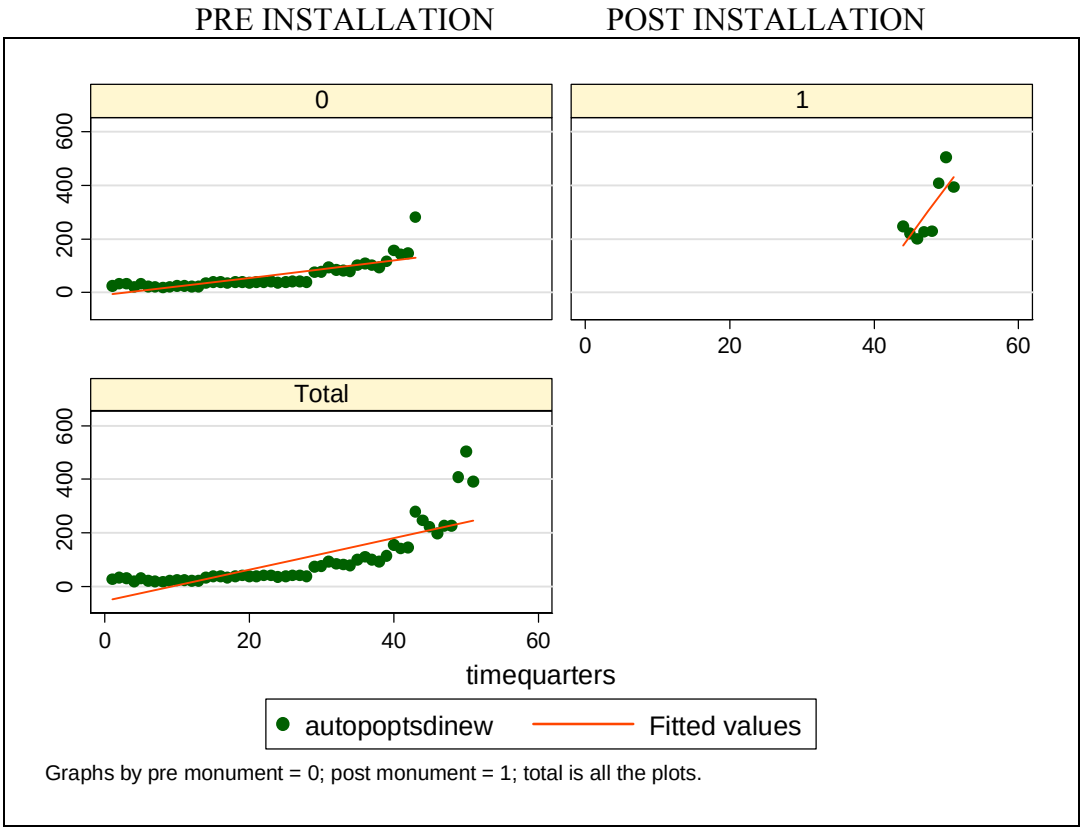

Figure 14: Rocklin auto dealers and supply stores taxable transactions over time

4.3.3. Food Taxable Transactions

The adjusted R^2 for taxable transactions for food is .30 which means that 70 percent of the variance in taxable transactions by time periods is not explained by these variables. The two variables are significant, but the overall equation does not seem to explain much of the behavior of the dependent variable. Since they meet the minimum criteria for inclusion, however, they continued to be examined. The results from the regression analyses and the graphing indicate that the monument is associated with a negative slope after installation. The coefficient for the dummy111 is -53.3. This is a negative slope, contrary to the hypotheses established. While the slopes are quite different, the post installation period for the monument does not fit with the logic of the arguments here. The researchers conclude that this retail sector should be excluded from further analyses.

4.3.4. Service Station Taxable Transactions

In this retail sector, the regression estimate is quite high at .85, but the dummy variable is negative, thus indicating a downward slope after the installation of the gateway monument.

Moreover, while the "timequarters" measure is significant with a "t" of 13.6, the Chow Test indicates that the slope is not different from the long run trend. Hence, the researchers conclude that the results cannot be included in the data presented here. The Chow Test results indicate F=1.1 with 1 and 48 degrees of freedom. The significance of these results suggests that it is likely to occur by chance 33 times out of one hundred repeated trials. Thus, service station taxable transactions did not change significantly after installation of the gateway monument in Rocklin.

4.3.5. Total Taxable Transactions

For the total transactions before and after the installation in Rocklin, there is no basis for further analysis as there is not a significant difference in the slopes of the regression equation. The explained variance is high, but the main problem is the negative "dummy111" coefficient. This suggests that the post monument period produced a decline in total taxable transactions in the community. Those results are not included in this report because they do not meet the criteria for inclusion as we have stated earlier. Moreover, the "dummy111" coefficient is not significant. Thus, there are two reasons for excluding these taxable transactions for the City of Rocklin.

4.3.6. Rocklin Conclusions

There are changes in two sectors of the Rocklin economy that seem to be correlated with the gateway monument installation: (1) auto sales and supplies and (2) eating and drinking establishments. Both showed significant increases in real per capita taxable transactions and Table 6 indicates the forecasted values for these retail sectors into the 2008 through 2009 years. Further examination of these two retail sectors was completed using IMPLAN to estimate the economic impact of the changes in the local community. IMPLAN estimates of economic impact are presented in Table 6.

Table 6 shows the forecasted total taxable transactions for the two years, 2008 and 2009, due to the changes in the installation of the gateway monument. The final row of Table 6 shows the net increase in value with the monument and without the monument based on the IMPLAN analysis.

Table 6: IMPLAN Analysis for Rocklin

Forecasted Taxable Transactions at Eating & Drinking Places & Auto Dealers & Suppliers in Rocklin		
	2008	2009
Per Capita Without Monument	$ 1,496.94	$ 1,581.46
Per Capita With Monument	$ 2,207.42	$ 2,291.94
Estimated Population	50,131	50,131
Total Taxable Transactions Without Monument	$75,043,255	$79,280,117
Total Taxable Transactions With Monument	$110,660,358	$114,897,220
Change in Total Taxable Transactions With Monument	$35,617,103	$35,617,103

Population (2006) from:
http://quickfacts.census.gov/qfd/states/06/0662364.html

4.4. City of Paso Robles

The gateway monument for Paso Robles, California was installed June 11, 2003. A dummy variable was installed in the database by using 0 for the period before the monument and 1 for the period after the monument. Analysis of taxable transactions for service stations, eating and

drinking places, food stores, auto dealers and auto supplies, and the total for all outlets, was conducted following the same procedures as for the City of Rocklin. The same criteria for inclusion relying on significant statistical results were used for this study area as well.

4.4.1. Service Station Taxable Transactions

Figure 15 suggests there is a relationship between the gateway monument's completion and the dummy variable, which represents the expected shift in taxable transactions in Paso Robles as a result of the installation. The adjusted R^2 = .59 for the estimated equation, and "dummy111" is significant at "t" = 2.7. The "t" value is = 2.4 for the time trend variable and is significant at p=.02. This estimated equation explains 59 percent of the taxable transactions data using the "dummy111" and the time in quarters since 1995, first quarter. This is a moderate influence because it is known that only slightly more than half of the total variance in the dependent variable is explained by these two independent variables. When rounded, the R^2 leaves 41 percent of the variance unexplained.

```
reg servicepoptsdinew timequarters dummy111

Source        SS       df       MS            Number of obs=      51
                                              F(  2,    48)=   37.13
Model   247991.543     2 23995.772            Prob > F      =  0.0000
Residual 60298.129    48  3339.54434          R-squared     =  0.6074
                                              Adj R-squared=  0.5910
Total   408289.672    50  8165.79343          Root MSE      =  57.789


servicepop~w       Coef.   Std. Err.      t    P>t    [95% Conf.   Interval]

timequarters     2.349995    .9801047     2.40 0.020  .379362      4.320627
dummy111         80.23153   30.18878      2.66 0.011  19.53293     140.9301
_cons           253.7946    19.46313     13.04 0.000  214.6613     292.9278

Chow Test
. test dummy111

( 1)  dummy111 = 0

F(  1,    48) =    7.06
Prob > F =    0.0107
```

Figure 15: Paso Robles regression of service station taxable transactions

The Chow Test indicates the slopes of the two independent variables are significantly different from each other. Thus, it seems that the regression results allow the researchers to include this analysis for the measurement of economic impact on the study area. The Chow Test indicates

that the slopes are significantly different with a value of F = 7.1, and 1 and 48 degrees of freedom. The probability of this occurring by chance is p=.01 (Figure 16).

The equations from these regression estimates are the following:

servicepoptsdinew = 253.8 + 2.3 * timequarters + 80.2 * dummy (16)

where

dummy = 0.

And

servicepoptsdinew = 253.8 + 2.3* timequarters + 80.2 * dummy (17)

where

dummy = 1.

As an example of how this regression functions, assume that the period of study is the 34th quarter in the data series, which is equivalent to the time of monument installation at the site. One can calculate that the real per capita expenditure value using the first equation is $332.00. The value for the period after the installation is $412.20. These results suggest that the monument is associated with an average overall increase in taxable transactions from the service station sector of the local economy after the monument installation.

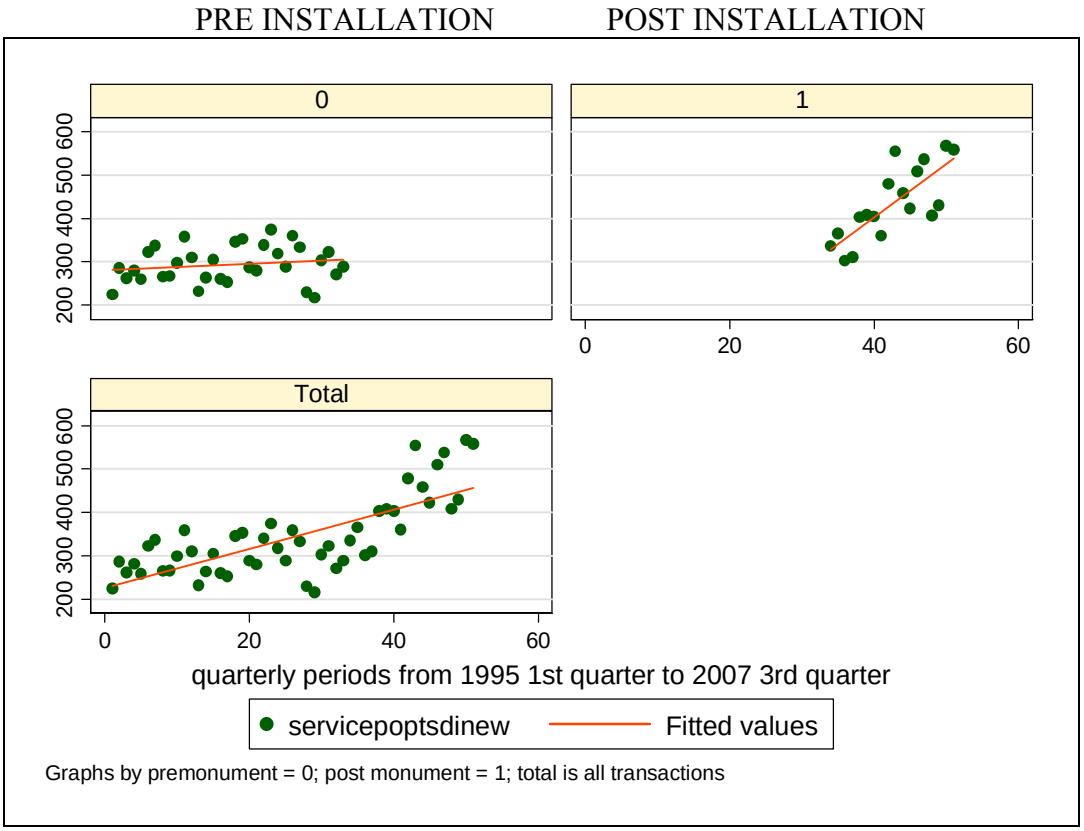

Figure 16: Paso Robles service station taxable transactions over time

The monument may have had the effect of increasing the taxable transactions for service stations in the city, or there may be other factors that caused the increase at the same time the monument

was completed. The survey of community residents and key informants will help to explain these changes. IMPLAN analysis provided broader economic information about the impact of these changes on the study area because it produced primary, secondary and tertiary changes in employment, income and total output.

4.4.2. Eating and Drinking Taxable Transactions

The relationship between eating and drinking taxable transactions and the time trend periods in the data set were examined next. The results do not support the view that the period after the monument installation differed significantly from the period before on the trends of these taxable transactions. While the overall equation was significant with an R^2 of .91 and an F value of 264.7, the Chow Test revealed that the slopes of regression are not different from each other. The Chow Test showed an F value of 0.65. By chance alone that would occur 42 times out of 100 repeated trials, (p=.42). In the graph, the slopes are almost perfectly parallel. The trends continue from the period before as well as through the period after the installation. There is no evidence that installation of the monument affected taxable transactions at eating and drinking establishments.

4.4.3. Food Taxable Transactions

The data for food taxable transactions in Paso Robles indicate that there is no significant relationship in the regression estimate and the Chow Test reveals that the slopes do not show a change between the pre-period and post-period for the monument installation. The adjusted R^2 = .09. None of the "t" values are significant and the Chow Test shows no significant difference before or after the installation with F = 1.18 at 1 and 48 degrees of freedom. The probability of that occurring by chance is p=.28. The researchers concluded that the regression estimates from this retail sector could not be included as the Chow Test did not show a significant difference, and the overall estimate was not significant for either the time trend or the dummy variable. Hence, there is no indication of economic impact on food taxable transactions associated with installation of the gateway monument in Paso Robles.

4.4.4. Auto and Auto Supplies Taxable Transactions

The next analysis consists of examining the relationship between taxable transactions in auto sales and auto supplies in Paso Robles. While the regression estimate suggests there is a large amount of explained variance with an adjusted R^2 of .87, and the overall equation is significant, the slopes do not differ across the pre- and post-installation of the monument. The Chow Test indicates F = 0.44, with 1 and 48 degrees of freedom. The probability of this occurring by chance is 51 times out of 100. Hence, the researchers cannot include auto and auto supplies transactions since the analysis results do not meet the criteria of significance as established at the beginning of this report.

4.4.5. Total Transactions

The R^2 for the equation indicates a high value at 0.88 or 88 percent explained variance, but the dummy variable does not contribute to the significant separation of the two slopes in the equation. The "t" values for the time trend data are 10.2, and for the dummy variable it is 0.77. That outcome is likely to appear by chance p=.44. These results suggest that changes in taxable transactions in the study area did not occur in relationship to the installation of the monument.

Total transactions for the City of Paso Robles have a significant equation estimate, but the slopes of the regression equations before and after the installation do not significantly differ. Since the Chow Test shows no significant difference between the period before the installation and the period after the installation, total transactions are not included in any further analysis. The Chow Test reveals that the slopes are not significantly different from each other with F = 0.60

Graphic illustrations suggest an almost perfect continuation of the trend in transactions prior to the installation of the monument as well as after the installation of the monument. Therefore, the conclusion is drawn based on the graphs that the installation of the gateway monument had no effect except in service station taxable transactions in Paso Robles.

4.4.6. Paso Robles Conclusions

The only retail sector in Paso Robles that should be analyzed using IMPLAN (input-output analysis) is the service station sector. Eating and drinking retailers, food suppliers, auto and auto supply retailers, and total taxable transactions showed no statistically significant differences in total transactions between the pre-installation and the post-installation of the gateway monument. Table 7 for Paso Robles shows the forecasted total taxable transactions for service station retailers before and after the monument installation.

Table 7 shows the forecasted total taxable transactions for the two years, 2008 and 2009, due to the installation of the gateway monument. The final row of Table 7 shows the net increase in the value of taxable transactions with the monument and without the monument.

Table 7: IMPLAN Analysis for Paso Robles

Forecasted Taxable Transactions at Service Stations		
	2008	2009
Per Capita Without Monument	$1,405	$1,443
Per Capital With Monument	$1,726	$1,764
Estimated Population	28,639	28,639
Total Taxable Transactions Without Monument	$40,245,744	$41,322.57
Total Taxable Transactions With Monument	$49,436,747	$50,513,572
Change in Total Taxable Transaction With Monument	**$9,191,003**	**$9,191,003**

Population (2007) from:
http://www.city-data.com/city/El-Paso-de-Robles-(Paso-Robles)-California.html

4.5. Nevada County

The gateway monument for Nevada County was installed October 1, 2006. For purposes of analysis, a dummy variable was created using 0 for the pre-monument period and 1 for the post-monument period. After analysis of service station transactions, the trends indicate a statistically significant set of data. It is the only sector showing a significant increase in taxable transactions for the period after the installation of the gateway monument. The eating and drinking places, food stores, auto dealers and auto supply stores, and the total for all retail outlets did not indicate a significant change in the trend line for taxable transactions, nor was there a significant impact after the installation of the monument. Those results are not in this summary because they did not meet the statistical criteria for inclusion.

4.5.1. Service Station Taxable Transactions

Figure 17 suggests that the taxable transactions for service stations did increase after installation of the monument. The adjusted R^2 = .72 for the estimated equation, and the dummy is significant at "t" = 3.4. The "t" value for the trend line is 7.4 and is significant at p < .0000.

```
reg realservicestatrans timequarters dummy111

Source        SS        df        MS            Number of obs =      50
                                                F(  2,    47) =   63.29
Model     37800.2146     2  18900.1073          Prob > F      =  0.0000
Residual  14034.7209    47  298.611082          R-squared     =  0.7292
                                                Adj R-squared =  0.7177
Total     51834.9355    49  1057.85583          Root MSE      = 17.28

realservic~s    Coef.    Std. Err.      t       P>t    [95% Conf.    Interval]

timequarters 1.432057   .1928963     7.42      0.000  1.043999      1.820114
dummy111     32.0475    9.537055     3.36      0.002  12.86142      51.23358
_cons       105.1515    5.178505    20.31      0.000  94.73365      115.5693

CHOW TEST
. test dummy111

( 1)  dummy111 = 0

F(  1,    47) =   11.36
Prob > F =    0.0016
```

Figure 17: Nevada County regression of service station taxable transactions

The Chow Test shows an F value of 11.4 with 1 and 47 degrees of freedom. This is likely to occur by chance p=.002. This indicates that the dummy variable is statistically significant and Figure 17 illustrates this.

There is evidence that the monument may be associated with increased demand for service station sales in Nevada County. Using the estimated regression equation, the real per capita taxable transactions before and after the installation of the monument are indicated here.

realservicestationpercapitataxabletransactions = 105.2 + 1.4 * timequarters + 32.0 * dummy (18)

where

dummy = 0

and

realservicestationpercapitataxabletransactions = 105.2 + 1.4 * timequarters + 32.0 * dummy (19)

where

dummy = 1

For example, assume that the period of interest is the 47th quarter in the data series, which is equivalent to the time of installation of the gateway monument at the site. The real per capita expenditure using the first equation is $171.00 of per capita taxable transactions in the County of Nevada before the installation of the monument. The value for the period after the installation is $203.00. These results suggest that the gateway monument is associated with an average overall increase in taxable transactions from the service station retail taxable transactions in the local economy.

The Chow Test indicates that the slopes in Figure 18 are significantly different. More specifically, F = 11.36 and these results are statistically significant with p=.0016.

Figure 18 further illustrates the pattern of the two slopes. Note that the post-linear function indicates a steep rise in the taxable transactions for service stations after monument installation. This result suggests that the monument in Nevada County might have had the effect of increasing the visitations of drivers to service stations. Of course, one must realize that there are economic factors at a level beyond this locality that might affect the economic impacts identified here. Further examination of this sector of the Nevada County economy will be conducted using IMPLAN.

PRE INSTALLATION POST INSTALLATION

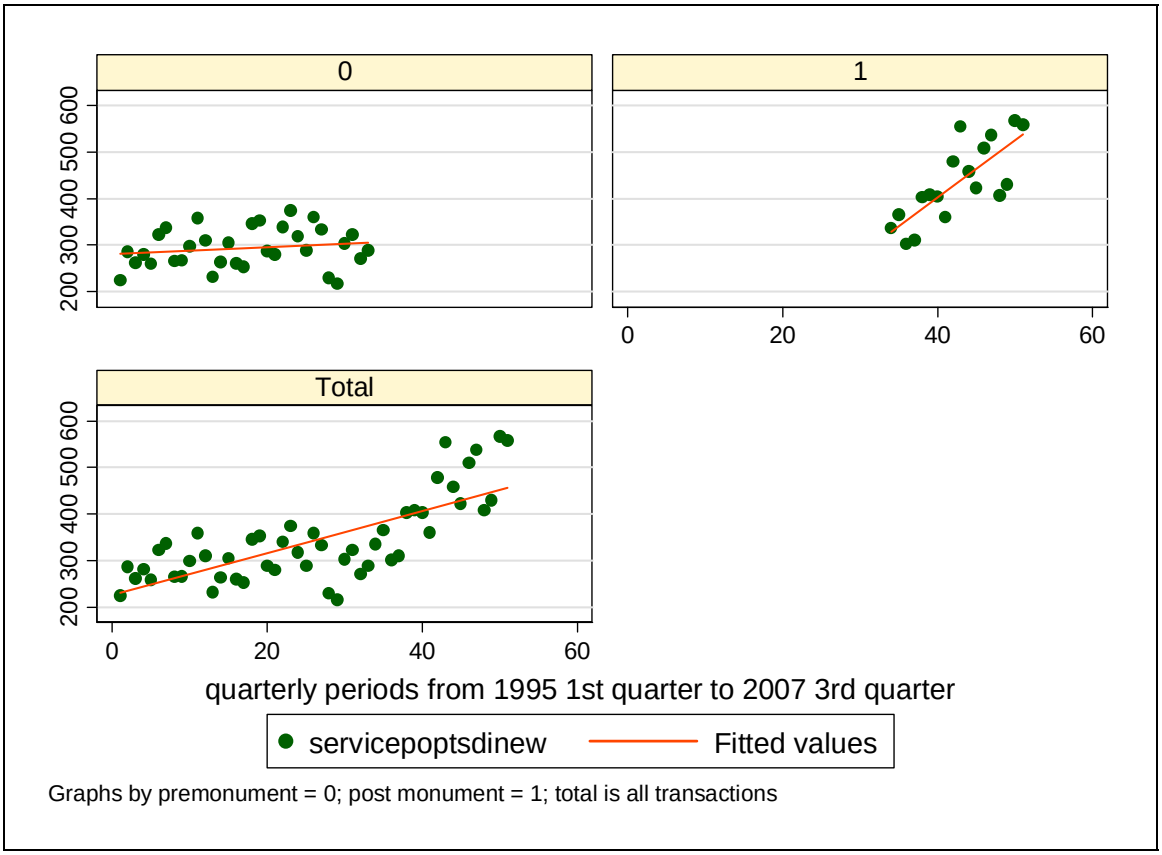

Figure 18: Nevada County service station taxable transactions over time

4.5.2. Eating and Drinking Taxable Transactions

Examination of the data for eating and drinking establishments finds that this retail sector does not meet the criteria established for inclusion and further analysis using IMPLAN. The adjusted R^2 is .58, the "t" value for the time trend measure is 6.8, with p=.0000. The dummy variable, however, is not significant in its comparison with the long-term trend. The F value in the Chow Test is 0.19 with p=.19. The conclusion is that the installation of the gateway monument in Nevada County did not have an impact on eating and drinking taxable transactions in the county.

4.5.3. Food Taxable Transactions

The taxable transactions for purchases of food in Nevada County indicate that while the time trend measures are significant at a "t" value of 8.5 and p<.0000, the dummy variable moves in the negative direction after the installation of the monument. It has a "t" value of -1.4. The Chow Test illustrates that it is neither significant at F = 2.0, nor is the slope in the right direction to conclude that the gateway monument had a positive effect on taxable food transactions in Nevada County.

4.5.4. Auto and Auto Supplies Taxable Transactions

The transactions in this retail sector show that the overall estimated equation is significant at an adjusted R^2 = .58. The dummy variable is in the negative direction after the installation of the gateway monument. The "t" value for the time trend measure is 8.0, which makes it significant at p<.0000, but the dummy variable is negative. The "t" value of -6.4 indicates that while it is significant, it is negative in slope.

4.5.5. Total Taxable Transactions

The adjusted R^2 in this estimate is .79, and the "t" value of 11.7 for "timequarters" suggests that it is statistically significant. The probability of this occurring by chance is p<.0000. The main problem with this estimate, however, is that the dummy variable indicates a negative slope and has a negative "t" value at -0.3. The "t" value is not statistically significant. IMPLAN will not be used to further examine the county's total taxable transactions.

4.5.6. Nevada County Conclusions

Only taxable transactions at service stations in Nevada County appear to have increased after installation of the gateway monument. Again, this may be due to other simultaneous economic changes that will be further examined in the survey of residents. Increases in service station taxable transactions were further examined using IMPLAN.

Table 8 shows the forecasted total transactions at service stations in Nevada County for the two years, 2008 and 2009, due to the installation of the gateway monument. The final row of Table 8 shows the net increase in value with the monument and without the monument.

Table 8: IMPLAN Analysis for Nevada County

Forecasted Taxable Transactions at Service Stations in Nevada County		
	2008	2009
Per Capita Without Monument	$733	$756
Per Capita With Monument	$861	$884
Estimated Population	98,764	98,764
Total Taxable Transactions Without Monument	$72,373,709	$74,636,680
Total Taxable Transactions With Monument	$85,034,266	$87,297,237
Change in Taxable Transactions With Monument	$12,660,557	$12,660,557

Population (2006) from:
http://quickfacts.census.gov/qfd/states/06/06057.html

4.6. Conclusion

A summary of the impact of gateway monument installations on the three study areas suggests that the installation of gateway monuments in these three study areas had combined economic impacts of $57,468,663 in 2008 and 2009 (Table 9).

Table 9: Summary of net total impacts on the three study areas

Forecasted Taxable Transactions at Eating & Drinking Places & Auto Dealers & Suppliers in Rocklin & Service Stations in Nevada County & Paso Robles		
	2008	2009
Per Capita Without Monuments	$3,635	$3,780
Per Capita With Monuments	$4,795	$4,940
Estimated Population	177,534	177,534
Total Taxable Transactions Without Monuments	$187,662,708	$195,239,365
Total Taxable Transactions With Monuments	$245,131,371	$252,708,029
Change in Total Taxable Transactions With Monuments	$57,468,663	$57,468,663

Population (2006) from:
http://quickfacts.census.gov/qfd/states/06/0662364.html

Table 10 illustrates the results across all the retail sectors and the three study areas. This is a summary of all the regression analyses conducted for this study. As seen in this report, only four retail sectors showed significant growth after the installation of the gateway monuments. Fifteen different regression analyses were conducted in this study. The term “DNA” means there was no change in the slope of the regression equation after the gateway monument installation. “Some” means there was an increase, but it did not meet the statistical significance required in this study. “Increase” means there was an increase in the slope after the gateway monument installation and it was statistically significant. Finally, “decrease” means the slope after the installation was in the opposite direction of the hypothesized direction and produced a negative coefficient.

Table 10: Matrix for further analysis

Summary of Evidence for Economic Impact of Monuments in Rocklin, Paso Robles, & Nevada County						
	Monument Locales & Date of Installation					
	Rocklin, 11/2005		Paso Robles, 6/11/2003		Nevada County, 10/1/2006	
Taxable Transactions	Impact	Direction	Impact	Direction	Impact	Direction
Service Stations	No	DNA	Yes	Increase	Yes	Increase
Eating & Drinking	Yes	Increase	No	DNA	No	DNA
Auto Dealers & Suppliers	Yes	Increase	Some	Flat	No	Decrease
Food	Some	Decrease	Some	Decrease	Some	Decrease
Total	No	DNA	No	DNA	Some	Drops & Surges

Further research for this project will include interviewing the key persons involved in economic development in the three study areas and a general population survey in each study area. These key informant interviews and general population surveys will focus on finding plausible explanations for changes in economic activity in each study area.

5. SOCIAL IMPACTS: SUMMARY OF THE KEY INFORMANTS STUDY

5.1. Introduction

Applied Research and Evaluation (ARAE) at California State University, Chico, conducted telephone interviews of key informants in Nevada County, Paso Robles, and Rocklin between July 16 and August 5, 2009. ARAE attempted to obtain 10 completed interviews from each community, but due to some refusals, only nine were completed in Paso Robles and Rocklin. Before conducting the telephone interviews, ARAE sent the key informants photographs of the gateway monuments in their community in order to insure that they were responding to questions about the gateway monuments installed under permits from Caltrans. Key informants answered questions about their perceptions of the monuments and their impacts on the local economy and tourism. The interviews took about 5 to 10 minutes to complete and all key informants seemed to be very familiar with the gateway monuments.

The following table summarizes the location and completion date for the gateway monuments and each of the locations designated by Caltrans for this study.

City/County	Location	Completed
Nevada Co	Route 49 at Gautier Rd (outside Auburn north of county line)	***Oct-06***
Paso Robles	Route 46 at Jardine Rd & on 101 at the S. Spring St. off ramp	***Jun-03***
Rocklin	Rocklin Road at I 80 interchange	***Nov-05***

Overall, key informants were generally positive in their opinions about the gateway monuments. When asked if they think the gateway monuments benefit the community at large, nine out of ten in Nevada County said yes and eight out of nine said yes in both Paso Robles and Rocklin. Generally, key informants said that the monuments benefited the community because they welcomed people entering the communities as well as showed community pride. When asked if they thought the monuments fulfilled their purpose of communicating the name of the city or county, eight out of ten (80 percent) answered yes in Nevada County, six out of nine (67 percent) said yes in Paso Robles, and nine out of nine (100 percent) said yes in Rocklin. In each area, a majority said that the monuments benefited the local economy, but only in Paso Robles did a majority say that the monuments helped to promote tourism.

Ten of the 28 key informants said that they recalled the application and design/review process for the permit approval through Caltrans. Although some said that it was a long process, they were generally positive about the outcomes and about Caltrans' role. One key informant who was negative about the process said it was closed to competition.

When asked about economic events since the gateway monuments were completed, all of the key informants cited negative and/or positive events. They reported more negative than positive events in Nevada County where most cited the loss of three car dealerships and other businesses due to the recession. In Rocklin, many key informants recalled large businesses, such as Mervyns, Albertsons, and the Shoe Pavilion, that closed, but they also cited two upscale auto dealers and a boat dealer that opened since the monuments were installed. The Paso Robles key informants reported more positive than negative economic events. One key informant said that the earthquake hit about the same time that the monument was built and that since that time, businesses had rebuilt the downtown area.[12] Another said that Paso Robles recently attracted international events and more tourism.

The key informants' comments about economic events after the gateway monuments were installed sheds some light on the changes in taxable transactions following the installation of the monuments. The following table summarizes the impacts that ARAE found in our statistical analysis of taxable transactions before and after the installations.

Table 11: Summary of findings from economic impact analysis

Summary of Evidence for Economic Impact of Monuments in Rocklin, Paso Robles, & Nevada County						
Source of Evidence	Monument Locales & Date of Installation					
Taxable Transactions	Rocklin 11/2005		Paso Robles 6/11/2003		Nevada County 10/1/2006	
Sector	Impact	Direction	Impact	Direction	Impact	Direction
Service Stations	No	DNA	Yes	Inc	Yes	Inc
Eating & Drinking	Yes	Inc	No	DNA	No	DNA
Auto Dealers & Supp	Yes	Inc	Some	Flat	Yes	Dec
Food	Some	Dec	Some	Dec	Some	Dec
Total	No	DNA	No	DNA	Some	Drops & Surges

The red font indicates that responses from key informants provided some reasons for these changes.

Key informants reported that two high-end car dealerships opened in Rocklin after the monuments were installed and that could explain why ARAE found statistical evidence of an increase in taxable transactions at auto dealers and suppliers in Rocklin after the installation. An increase in tourism, noted by Paso Robles' key informants, could explain why there was an increase in taxable transactions in that community after installation of the monuments. Key informants in Nevada County said that they lost their three auto dealerships after the monument was installed, and that could explain why ARAE found statistical evidence for a decrease in taxable transactions at auto dealers and suppliers in Nevada County after the monument was installed. All key informants noted some

[12] Note that the monument was completed in June 2003 and the earthquake struck Paso Robles in December 2003.

impacts of the recession, and this could explain why there were decreases in taxable transactions at food stores in all locales. Although groceries are not taxed, non-food items are subject to the sales tax, and the recession may be causing consumers to reduce their purchases of non-food items.

Overall, the most positive responses were from the key informants in Paso Robles who did not report hearing a single negative comment about the gateway monuments. Key informants in Nevada County were generally positive, but the monuments became a political controversy in Rocklin where a candidate for the County Board of Supervisors criticized the amount spent on the monuments and some citizens criticized the use of artificial rather than actual granite rocks in the construction of the monument.

5.2. Key Informant Interview Questions and Summary: Nevada County

Figure 19: The Nevada County gateway monument on Highway 49

The Nevada County interviews were conducted by telephone between July 16 and August 5, 2009. Overall, only one of the ten key informants was generally negative about the gateway monument in Nevada County. The other nine key informants were generally positive about the monument, although a few expressed negative views on answers to some questions.

Question 1: In your opinion, what message/messages are conveyed to local residents and visitors through the gateway monument?

Eight of the ten key informants said that the message is "welcome to Nevada County" or "you are entering Nevada County." Two said that it conveyed something about the rustic history of Nevada County. One said that it showed the people of Nevada County have

pride. Only one of the ten key informants expressed a negative view. He said that "not many people notice the sign because it is very recessive."

Question 2: How well does the gateway monument(s) project a positive image or identity for your city/county?

Nine of the key informants said that the monument did "very well" or a "good job" of projecting a positive image of Nevada County. One said that it did "not at all" project a positive image because it is too small.

Question 3: If your community adds another gateway monument, what theme would you prefer?

All 10 key informants agreed that they would prefer a historical theme and one added that he would like it to also have a tourism theme.

Question 3a: Why would you prefer this theme for a new monument?

Key informants said that history is very important to residents and tourists in Nevada County. Several said it is our "identity," it is our "core," it is "who we are." One key informant said that he would like to see "the historical and artistic themes combined with the use of the right materials in more of a sculptural way for a better monument."

Question 4: In your opinion, does the gateway monument help to promote the local economy?

O Yes	**6**
O No	**3**
O Don't know	**1**

Question 4a: (If YES) Please explain how?

One key informant said, "People come for business and tourism; it sets a positive atmosphere and lets them know they have arrived." Several commented that people come to Nevada for tourism, and the monument gives them a positive image of the county. One said, "I think that it is a reminder for our citizens to shop locally."

Question 4b: (If NO) Please explain why not?

One key informant who answered no added that "I don't know if I would stop because I zipped by this rock at 60 mph." Another with a "no" response explained that it was not designed to promote tourism.

Question 5: Do you consider the gateway monument to be a piece of public art in your community?

O Yes	**8**
O No	**2**
O Don't know	**0**

Question 5a: (If YES) Please explain why?

Several of the eight who consider the monument to be public art commented about the pleasing design, the historical perspective, and the landscaping. One said, "It is not a traditional sign on a four by four."

Question 5b: (If NO) Please explain why you think it is not public art?

One of the two who answered "no" said, "It has the county name, date, and logo; it is not really artistic." The other key informant who answered "no" said that "I don't think it has any artistic element. It has no repetition, assertiveness, composition, tension. Anything that you would consider art is lacking. It has no design."

Question 6: Have you heard residents or visitors comment about the aesthetics of the gateway monument?

O Yes	**5**
O No	**5**
O Don't know	**0**

Question 6a: (If YES) What comments about the aesthetics of the monument have you heard?

Generally, the key informants said that they heard only positive comments. One key informant added that he heard very positive comments except from an artist whose work was not chosen. "It's very welcoming." One said that she heard "a lot of comments about how cool it is." One said that "they like the way light hits it at night when headlights shine on the monument." One said that he heard one person say that a tree shadowed part of the sign at times. Another key informant added that "They say, 'oh, isn't that a nice new welcome sign.' It needs landscaping, but there's not enough money." One key informant said that the monument was too small to be noticed.

Question 7: In your opinion, is the gateway monument an effective boundary marker for the community? For example, does it mark the beginning boundary for your community?

O Yes	**7**
O No	**3**
O Don't know	**0**

Question 7a: (If YES) Please explain how?

Although seven of the key informants agreed that the gateway monument in Nevada County is an effective boundary marker, some pointed out that it was not exactly at the border, which is the Bear River. One said that "it is not exactly at the border, but it's close."

Question 7b: (If NO) Why do you think that it is not an effective boundary marker?

The two key informants who answered "no" thought that the monument needed to be at the Bear River in order to be an effective boundary marker.

Question 8: Does the gateway monument help promote local tourism?

O Yes	**5**

O No **5**

O Don't know **0**

Question 8a: (If YES) How does it help to promote tourism?

Generally, the five key informants who agreed thought that the monument with the pictures of the miners has a positive image because the miners remind people of the history of the county. One added that "a big billboard would be garish and not in keeping with the temperament of the community."

Question 8b: (If NO) Why do you think it does not help to promote tourism?

One said that "people are already here before they see the sign." Another said that "it is a big rock, not a flashing neon sign." One key informant commented, "I doubt that people come for the sign. It's just a rock." One key informant said that the monument was too small to attract tourists.

Question 9: How long have you lived in Nevada County?

The answers were 1.5, 2, 17, 17, 20, 28, 35, 59, and 60 years. The average length of time among the key informants is 26.6 years in Nevada County.

Question 10: The monument in Nevada County was installed in 10/2006. Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

O Yes **10**

O No **0**

O Don't know **0**

Question 10a: (If YES), Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

Most of the key informants mentioned that three auto dealers closed, leaving the county without any dealers, and that some other businesses also closed due to the recession. One key informant said that a couple of manufacturers moved out. One mentioned that the Holiday Inn Express opened, and that several retail stores opened. For the most part, key informants thought that the economic events were negative. One key informant said that "we lost a number of stores, e.g., a furniture store in Nevada City. A few small businesses opened, but mostly Nevada County has been in a downward [economic] spiral due to recession."

Question 11: In general, do you think the presence of the gateway monument benefits the community at large?

O Yes **9**

O No **1**

O Don't know **0**

Question 11a: (If YES) Please explain how?

Generally, key informants said that the community benefits because the monument presents a "welcome mat" with a positive image. One key informant stated that "we all want to know that we belong someplace; when we see the sign we know we have come home."

Question 11b: (If NO) Why does the monument not benefit the community?

One key informant replied, "no, not monumentally."

Question 12: Do you think there has been an increase in the number of traffic accidents in the vicinity of the gateway monument since its construction?

O Yes	**0**
O No	**9**
O Don't know	**1**

One key informant added that "I checked the accident data; there were none since the monument was installed."

Question 13: Do you recall the application and design/review process with Caltrans that was required prior to the approval and installation of the gateway monument? You may recall that we sent you a summary of the Gateway Monument application process.

O Yes	**3**
O No	**7**
O Don't know	**0**

One of the three key informants familiar with the process said that "we had Caltrans people present at the meeting to discuss the monument and they told us about the rules for monuments, which was very informative. They know their business."

Another said that "it was a long process, but everyone's desires were met. I give a lot of kudos to the Nevada County Chamber of Commerce that came up with additional funding."

The key informant who was generally negative about the monument said that **"**we applied for one in Grass Valley but it was not approved. The process was closed. The supervisor knew what he wanted for Nevada County. That person knew the process and raised community donations. The process was closed to artists and architects who knew how to design monuments."

Question 14: In your opinion, has the gateway monument in Nevada County fulfilled the purpose(s) as identified in the application for approval submitted to Caltrans? In general the purpose is to communicate the name of the city, county or township.

O Yes	**8**
O No	**2**

O Don't know 0

Questions 14a: (If YES) Please explain why?

Generally, the eight who said that it did fulfill the original purpose in the application, commented that it identified the county boundary and it welcomed people to the county.

Questions 14b: (If NO) Why not?

The two key informants who answered "no" said that the monument should be at the county border on the Bear River. One added that it was too small to serve the original intent.

That concludes the questions we have. Do you have additional information or comments that you would like to share with us?

Three key informants commented as follows:

- "What is Chico State's involvement? Is this a good use of taxpayer dollars?"
- "Go and ask for an rfp from artists with professional organizations, such as planning organizations and artists' collaboratives. It would be nice to have a committee with an open process."
- "I wish we could have welcome monuments at all entrances."

5.3. Key Informant Interview Questions and Summary: Paso Robles

Figure 20: The monuments in Paso Robles are located on U.S. Highway 101 at the South Spring Street off ramp (top) and on State Route 46 at Jardine Road (bottom). The monuments were completed in June 2003.

The interviews for Paso Robles were conducted by telephone between July 16 and August 5, 2009. All key informants were generally positive about the monuments and none reported negative comments from residents as was the case for the other two monument sites, Nevada County and especially for Rocklin. Unlike the other two sites, key informants reported a preponderance of positive economic events. One key informant pointed out that an earthquake hit Paso Robles about the same time as the monuments were constructed. The downtown area was rebuilt following the earthquake, attracting more businesses and tourists. Key informants reported increased tourism with international events and the growth of wineries. Although some businesses did fail due to the recession, one key informant reported an increase in building permits.

Question 1: In your opinion, what message/messages are conveyed to local residents and visitors through the gateway monument?

Generally, key informants said that the gateway monuments let people know that they are entering Paso Robles where the residents take pride in their community. One key informant said that "it says that we are proud of our name and our city." Another said that "it marks the point where you go from semi-urban to urban area."

Question 2: How well does the gateway monument(s) project a positive image or identity for your city/county?

Generally, key informants said that the monuments project a very positive image of Paso Robles. One key informant said that, "It is a very positive image, clean, not overly contemporary, classic design, more of a historic feel with a good first impression." Another said that, "the traditional design in masonry is simple, but dignified. The monument says that this is a culturally adept place. It is on a reasonable scale, but it could be a little larger." Another pointed out that "it matches the downtown motif with bricks and color."

Question 3: If your community adds another gateway monument, what theme would you prefer?

O Historical	**3**
O Patriotic	**0**
O Tourism	**1**
O Products of the area	**1**
O Art	**1**
Same as others	**2**
No theme - simply identification	**1**

Unlike the key informants from Nevada County and Rocklin who almost all preferred a historical theme, the Paso Robles key informants split on the choice of theme, with only three of the nine preferring a historical theme. Two key informants wanted the same theme as the existing gateway monuments, and one wanted simply identification without a theme. One each wanted tourism, art and products of the area as a theme.

Question 3a: Why would you prefer this theme for a new monument?

Although she preferred any new gateway monument to be similar to the existing ones, one key informant said, "Maybe we should add something that ties in with the wine industry." Another key informant who also preferred consistency with the current monuments said he would "like to incorporate Paso Robles logo."

Question 4: In your opinion, does the gateway monument help to promote the local economy?

O Yes	**6**
O No	**2**
O Don't know.	**0**

Question 4a: (If YES) Please explain how?

One key informant who said he thought that the gateway monuments promote the local economy explained that, "If they see the sign, maybe they will pull off and get lunch and gas." Another pointed out that the monuments "tie in with historic downtown businesses." One key informant said that, "Tourists will remember gateway monument and it reinforces identify."

Question 4b: (If NO) Please explain why not?

When asked why she did not think the monuments promote the local economy, one key informant replied that, "it doesn't say what is available in Paso Robles, the lakes and wine. We need to say what is available to attract tourists." Another said, "That is not its purpose."

Question 5: Do you consider the gateway monument to be a piece of public art in your community?

O Yes	**4**
O No	**5**
O Don't know	**0**

Question 5a: (If YES) Please explain why?

One key informant said that, "we have an art fund set aside that includes landscaping and monuments and we used this fund to pay for the gateways." Another said that, "It has a very attractive design and architecture, and that is art."

Question 5b: (If NO) Please explain why you think it is not public art?

One key informant said that "it's an entry sign, not designed to be art." Another who responded "no" said that "it's a geographical locator."

Question 6: Have you heard residents or visitors comment about the aesthetics of the gateway monument?

O Yes	**4**
O No	**5**
O Don't know	**0**

Question 6a: (If YES) What comments about the aesthetics of the monument have you heard?

Unlike the Rocklin key informants, the Paso Robles key informants said they had not heard any negative comments about the monuments. **"**When it was first constructed, I

heard comments about how nice it was. They like it because the designs and materials matched other structures it town, such as bridges." Another said, "by and large they compliment the aesthetics, but the service clubs want to add their logos to the monument or they want another sign for them in the right away."

Question 7: In your opinion, is the gateway monument an effective boundary marker for the community? For example, does it mark the beginning boundary for your community?

O Yes	**8**
O No	**1**
O Don't know	**0**

Question 7a: (If YES) Please explain how?

All except one of the key informants thought that the gateway monuments are effective boundary markers. One key informant who thought the monuments are effective markers said, "the city extends beyond the monument, but it marks the historic core of the city." Another said, "it's at the point of transition from rural to urban development."

Question 7b: (If NO) Why do you think that it is not an effective boundary marker?

The one key informant who did not think the monuments are effective boundary markers said "the locations are not at the true city limits."

Question 8: Does the gateway monument help promote local tourism?

O Yes	**7**
O No	**1**
O Don't know	**1**

Question 8a: (If YES) How does it help to promote tourism?

One key informant said "It promotes tourism in the same way that having a nice, clean person at the counter of your store rather than a person with orange hair and body piercings does." Another key informant said, "To a certain degree, it promotes tourism to downtown, but not to wineries." One key informant said that it promotes tourism "by reminding tourists where they were when they had a good time."

Question 8b: (If NO) Why do you think it does not help to promote tourism?

The only key informant who said that he doesn't think the monuments promote tourism explained that "it just tells them where they are."

Question 9: How long have you lived in Paso Robles?

Two key informants worked in Paso Robles, but lived in nearby cities; one who lived in Atascadero, had worked in Paso Robles for five years and the other who lived in Templeton had worked in Paso Robles for eight years. For the other seven key informants, the answers were in years: 6, 24, 32, 40, 41, 50, and 55. The average length of time living in the community of those who responded and lived there is 35.4 years.

Question 10: The monument in Paso Robles was installed in 6/2003. Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

O Yes	**8**
O No	**1**
O Don't know	**0**

Question 10a: (If YES), Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

The Paso Robles key informants reported more positive economic events than did those in Rocklin and Nevada County. One key informant pointed out that, "The monuments were constructed about the same time as the earthquake hit Paso Robles. We rebuilt beautiful new buildings in the downtown area. Several new hotels opened." However, he said that not all was positive. "Some manufacturers closed recently. One made exercise equipment."

Another key informant also pointed out positive events. "We have attracted world-class events, such as the AMGEN tour and the Futurity." He added that, "Some businesses closed due to recession, but our commercial permits are up." Several other key informants also mentioned the increase in the downtown retail and the addition of Wal-Mart and Target.

Question 11: In general, do you think the presence of the gateway monument benefits the community at large?

O Yes	**8**
O No	**1**
O Don't know	**0**

Question 11a: (If YES) Please explain how?

Eight out of nine agreed that it does benefit the community, and one commented, "Yes, it is a good visual symbol of the city. People could drive through town without realizing they are in Paso Robles before the monument was installed." Another said, **"**Yes, our goal is to be known as a tourist destination. The monuments on Highways 46 or 101 say they have arrived." One said, "Yes because it presents a great image of Paso Robles with a welcoming identifier. It has low maintenance cost. With billboards, would we would have to pay every month."

Question 12: Do you think there has been an increase in the number of traffic accidents in the vicinity of the gateway monument since its construction?

O Yes	**0**
O No	**9**
O Don't know	**0**

All key informants agreed that there has not been an increase in accidents at the monument sites. One added, "I checked with the city. Absolutely not!"

Question 13: Do you recall the application and design/review process with Caltrans that was required prior to the approval and installation of the gateway monument? You may recall that we sent you a summary of the Gateway Monument application process.

O Yes	**2**
O No	**7**
O Don't know	**0**

Question 13a: (If YES) How would you describe that process?

One key informant said, "I was not involved directly, but the east boundary sign is on family property. We leased to city for $1 for 25 or 50 years. The process must have been smooth because I don't remember any disagreements. My family basically donated land because it is a good addition for Paso Robles."

Another said, "I don't recall a big struggle although I was not directly involved in process."

Question 14: In your opinion, has the gateway monument in Paso Robles fulfilled the purpose(s), as identified in the application for approval submitted to Caltrans? In general the purpose is to communicate the name of the city, county or township.

O Yes	**6**
O No	**0**
O Don't know	**3**

Questions 14a: (If YES) Please explain why?

Those who answered "yes" to the above question generally agreed that the gateway monuments identify the city's core. One key informant said, "One monument marks the beginning of the city boundary between rural and urban. The south monument marks the beginning of downtown."

That concludes the questions we have. Do you have additional information or comments that you would like to share with us?

Responses were as follows:

- "It's a nicely designed monument and the city takes pride in it."
- "I don't think that I would want additional signs at monuments or additional monuments. It would detract from the ones we have."
- "Why is Caltrans asking about the monument six years after it was built?"
- "I would love to see one on the northern boundary and on the western boundary. The current ones have solar lights which are spotty and don't always work too well. My family donated land because it adds a lot to the city."

- "We have billboards that may be more potent in attracting visitors, but the monument is more dignified. I think other cities would appreciate monuments."

5.4. Key Informant Interview Questions and Summary: Rocklin

Figure 21: The main gateway monument in Rocklin (top) is located at the Rocklin Road exit off of Interstate 80. A smaller monument is shown below on the opposite side of Interstate 80 at the same exit. The monuments were completed in November 2005

These interviews were conducted by telephone between July 16 and August 5, 2009. Although key informants said that the monument in Rocklin was very controversial, eight of the nine key informants were generally positive about both the gateway monuments.

The Rocklin monuments appear to be more controversial than those in Paso Robles or Nevada County as a result of (1) the cost, which became a political campaign issue, and (2) the use of artificial granite instead of real granite.

Question 1: In your opinion, what message/messages are conveyed to local residents and visitors through the gateway monument?

Generally, key informants said that the monuments welcomed people to Rocklin and provided a pictorial history of the city with the use of granite. One key informant said that "the signs give the impression of a community that has been around for a long time because of the antique look, and they welcome people to Rocklin." Another key informant said, **"**The signs say that Rocklin has a history based on granite, that Rocklin cares about its image, and that Rocklin is a quality place to live."

Question 2: How well does the gateway monument(s) project a positive image or identity for your city/county?

All key informants agreed that the monuments do a good or very good job projecting a positive image of Rocklin. One key informant said that, "There was controversy, but I think it does a very good job. It shows granite rocks in a natural state, then quarried, and then a polished sign." Another said, "It's definitely positive in the sense that it looks good and it's landscaped."

Question 3: If your community adds another gateway monument, what theme would you prefer?

O Historical	**9**
O Patriotic	**0**
O Tourism	**0**
O Products of the area	**1**
O Art	**1**

All nine key informants said they preferred a historical theme. One key informant wanted to combine a historical theme with art, and another wanted to combine historical with products of the area.

Question 3a: Why would you prefer this theme for a new monument?

Generally, key informants preferred historical because they want to use the same theme that the existing monuments portray and they think that it is important to maintain Rocklin's identity.

Question 4: In your opinion, does the gateway monument help to promote the local economy?

O Yes	**5**
O No	**3**
O Don't know	**1**

Question 4a: (If YES) Please explain how?

Generally, the five key informants who said yes indicated that citizens care about the community and they have a commitment to quality, which attracts businesses. One key informant said that, "In a way, it helps promote the local economy because it increases interest and it shows that we care about Rocklin's image and therefore we care about businesses and our citizens."

Question 4b: (If NO) Please explain why not?

Generally, the three key informants who said that the monuments do not promote the local economy indicated that the monuments were not designed for that purpose. One key informant said, "that is not what they are designed to do. It's a welcome sign. People need to know they have crossed into a different city." Another said, "It's simply a sign that identifies you are entering Rocklin."

Question 5: Do you consider the gateway monument to be a piece of public art in your community?

O Yes	**8**
O No	**1**
O Don't know	**0**

Question 5a: (If YES) Please explain why?

Generally, the eight key informants who said that they considered the monuments to be public art referred to the use of granite and its historical role in development of the City of Rocklin. One key informant said that, "It's an artistic representation of our granite quarry history." Another said, "It's a real monument with several pieces and it shows granite evolving from its natural state to a polished sign." Another key informant said that, "they look like a big pile of rocks, but they are not real rocks. They were created."

Question 5b: (If NO) Please explain why you think it is not public art?

The one key informant who said it is not public art explained that, "It's not art in the sense of having an artist design it; it's just a gateway."

Question 6: Have you heard residents or visitors comment about the aesthetics of the gateway monument?

O Yes	**8**
O No	**1**
O Don't know	**0**

Question 6a: (If YES) What comments about the aesthetics of the monument have you heard?

Generally, the eight key informants who had heard comments about the monuments said that overall comments were positive, but some people thought that the monument was too costly and that it should be constructed with real granite, not artificial. One key informant said, "Comments were generally positive, but some commented about artificial rock. There was a lot of criticism because it was artificial stone, but Rocklin couldn't use

natural stone. The natural stones are so large that they weighed too much to ship. Because of size and scale, we had to manufacture on site. It cost $1.5 million, but we also landscaped the interchange. The monument cost $700,000 and the landscaping $800,000. Some said we should have spent it on police, but they don't understand city finance; it was redevelopment money." Another key informant said, "Most people think it is wonderful, but others don't. In their local campaign, some argued that the money should not have been spent on monuments. Everyone else likes it."

Question 7: In your opinion, is the gateway monument an effective boundary marker for the community? For example, does it mark the beginning boundary for your community?

O Yes	**8**
O No	**1**
O Don't know	**0**

Question 7a: (If YES) Please explain how?

Generally, the eight said that the monuments clearly mark the entrances to the city of Rocklin. Some indicated that it was important to separate Rocklin from other cities in the suburban fringe. "It's located on one of the main entrances to the city; you can see it as soon as you get off freeway and it clearly identifies it as separate from nearby cities."

Question 7b: (If NO) Why do you think that it is not an effective boundary marker?

One key informant said that, "It's not at the entrance to city."

Question 8: Does the gateway monument help promote local tourism?

O Yes	**2**
O No	**6**
O Don't know	**0**

Question 8a: (If YES) How does it help to promote tourism?

One key informant said that the main monument promotes tourism. "Because of its location, it is a draw to the historical downtown." The other key informant said, "Because they know they are in Rocklin."

Question 8b: (If NO) Why do you think it does not help to promote tourism?

Generally, the six key informants who said they did not think the monuments promoted tourism explained that was not the intended purpose and that people do not see the signs until they get off the freeway. One said that, "I don't think it draws tourists to Rocklin because they have to get off the freeway to see it." Another said, "It's just a sign."

Question 9: How long have you lived in Rocklin?

The answers were in years: 4.5, 10, 25, 28, 30, and 33, years. One did not live in Rocklin, but had lived in the region for 10 years. Another who lived in Orangevale has worked in Rocklin for 19 years. The average length of time living in Rocklin was 21.8 years.

Question 10: The monument in Rocklin was installed on 11/2005. Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

O Yes	**9**
O No	**0**
O Don't know	**0**

Question 10a: (If YES), Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

Most key informants recalled negative events, mainly due to the recession, that affected Rocklin since the monuments were installed, but they also pointed out businesses that opened after the monument was installed. The businesses that key informants said closed were Mervyn's, Albertsons, the Shoe Pavilion, and some smaller businesses. Key informants also pointed out that a Mercedes and a Porsche dealership opened in the time since the monument was installed. One said that a boat dealership also opened. One key informant said that Granite Drive, "which used to be Toy Row because it had so many toy stores, runs parallel to Interstate 80. It now has two new high-end auto dealers."

Question 11: In general, do you think the presence of the gateway monument benefits the community at large?

O Yes	**8**
O No	**0**
O Don't know	**1**

Question 11a: (If YES) Please explain how?

Generally, key informants said they thought the monuments benefit the community by identifying it as separate from nearby cities and by projecting a positive image of Rocklin. One key informant said, **"**Yes, because it defines Rocklin; it separates it from Roseville and Loomis." Another said, **"**Anytime you show interest in the community, it brings cohesiveness, and that brings out better planning. We encourage use of granite in buildings, parks, etc."

Question 12: Do you think there has been an increase in the number of traffic accidents in the vicinity of the gateway monument since its construction?

O Yes	**0**
O No	**8**
O Don't know	**1**

One key informant said, "No. I checked with the police."

Question 13: Do you recall the application and design/review process with Caltrans that was required prior to the approval and installation of the gateway monument?

You may recall that we sent you a summary of the Gateway Monument application process.

O Yes	**5**
O No	**4**
O Don't know	**0**

Four of the five key informants who said that they recalled the application process with Caltrans were generally positive. One said that, "It was pretty smooth. It was bureaucracy, but we have a good relationship with Caltrans." The one key informant who was critical said that "it was slow. They had to create policy since they did not have one. We lost the better part of two years going through the process."

Question 14: In your opinion, has the gateway monument in Rocklin fulfilled the purpose(s) as identified in the application for approval submitted to Caltrans? In general the purpose is to communicate the name of the city, county or township.

O Yes	**9**
O No	**0**
O Don't know	**0**

Questions 14a: (If YES) Please explain why?

All nine key informants agreed that the monuments fulfilled their purpose. One key informant said that, **"**It covers a large area at the freeway interchange, which would have otherwise been unused. Now people see the monument as they come off freeway and stop for the traffic light." Another said that, "It's enhanced awareness that you are entering Rocklin, a quality community with strong roots."

Do you have additional information or comments that you would like to share with us?

Two key informants made the following comments:

- "I think these programs in interchanges look so much better than weeds that often grow there. It's good to take advantage of unused land and let people know where they are and give them a flavor of the community. I hope we can do another one at Sierra College, but it's expensive."
- "It clearly shows that you are coming into Rocklin."

6. SUMMARY OF FINDINGS FROM TELEPHONE INTERVIEWS WITH RESIDENTS OF ROCKLIN, PASO ROBLES AND NEVADA COUNTY

6.1. Introduction

This report examines the similarities and differences among telephone survey responses in three California communities—Rocklin, Paso Robles, and Nevada County—to questions regarding gateway monuments installed in the Caltrans rights-of-way in those communities pursuant to permits issued by the California Department of Transportation. The survey questions were based on a review and summary of the literature written about gateway monuments as well as a survey of key informants who were interviewed regarding the gateway monuments in each of the three study communities. The survey included modules of questions on each of the following topics:

- **Community Image**—how well does the gateway monument project a positive image or a negative image for the community where it is located?
- **Community Enhancement**—does the monument enhance or detract from the community?
- **Economic Impact**—does the monument enhance the local economy and/or promote tourism?
- **Safety**—does the monument create any kinds of distractions or safety hazards for drivers?
- **Location**—is the size and location of the monument appropriate?
- **Demographics** of the survey respondents.

A copy of the telephone survey questionnaire is included in Appendix A.

A total of 1,224 telephone interviews were completed for the survey (**Table 12**). Another section of this report presents the tabulations from the questions and the summaries of the text responses to the open-ended questions.

Table 12: Number of telephone interviews completed, by community

Community	Number
Rocklin	402
Paso Robles	403
Nevada County	419
Total	**1224**

The methods used for analyses of the survey data include analysis of variance, some logit analysis, and cross tabulations of the data as necessary to illustrate meaning. The criterion for decisions regarding statistical differences in the data is based on a probability of </=.05, which means the difference is likely to be due to random chance five times out of 100 repeated times and therefore is likely to be due to actual differences in the data 95 times out of 100.

The Scheffe post-hoc test is used to adjust for the fact that multiple comparisons are made in most of these tests. This allows the researcher to take into consideration the fact that there are several comparisons and it adjusts for the frequencies of those comparisons in order to establish a more conservative decision profile regarding statistical differences in the data.

The Levene test is used to test whether there is equality of variances in the several groups being compared using ANOVA (analysis of variance). If the test is significant, then one might conclude that the test is not robust. One might then consider a less strong interpretation of the

significance of the differences across the groups. In some instances, the SPSS (Statistical Package for the Social Sciences) tables show counts without taking out the missing values even though the missing values have been assigned in the program. This will explain some of the anomalies in the tables.

6.2. Community Enhancement

In general, the responses to the questions on community enhancement indicate that there are positive feelings about the presence of the monuments in each of the three communities. However, there are some differences among the residents of the three communities sampled in this survey. Survey respondents were asked, "In your opinion, how well does/do the gateway monument(s) project a positive image or a negative image for your city/county?" A Likert-type scale was used to record responses with 1 as very positive to 5 as very negative. As shown in Table 13, residents surveyed in Paso Robles and Nevada County gave more positive ratings for their monuments than did residents of Rocklin. This difference in image ratings is statistically significant (Table 14).

Table 13: Mean ratings among respondents for the question of positive or negative impacts on community image (Q5)

Community	**Sample size**	**Mean ratings**
Rocklin	391	2.2
Paso Robles	396	1.8
Nevada County	407	1.8
Total / Average	**1194**	**1.9**

Table 14: Analysis of variance results regarding the monuments' impacts on community image (Q5)

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	32.294	2	16.147	19.002	**.000**
Within Groups	1012.072	1191	.850		
Total	1044.366	1193			

The mean scores on the question of impacts on community image suggest that the two communities with the most positive views are Paso Robles and Nevada County. Their mean scores on a scale of 1 to 5 with 1 as very positive and 5 as very negative indicate that there is a significant difference in perceptions of the residents of the three communities. Table 13 presents the mean values for the three communities. Note that the Rocklin monuments have a less positive perception among that community's residents than do of the monuments in the other two communities (Table 15).

Table 15: Multiple comparisons for community image ratings (Q5)—Scheffe Test

(I) Community	Community Comparison	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Rocklin	Paso Robles	.353(*)	.066	.000	.19	.51
	Nevada County	.348(*)	.065	.000	.19	.51
Paso Robles	Rocklin	-.353(*)	.066	.000	-.51	-.19
	Nevada County	-.005	.065	.997	-.16	.15
Nevada County	Rocklin	-.348(*)	.065	.000	-.51	-.19
	Paso Robles	.005	.065	.997	-.15	.16

* The mean difference is significant at the .05 level.

The results of the Scheffe tests suggest that the greatest differences of opinion on Question 5 "impact on the community" are between Rocklin and Nevada County and the smallest differences are between Nevada County and Paso Robles**.** The Levene test of homogeneity of variance indicates that the variances are not significantly different among the three sites (Table 16). The standard assumptions for use of ANOVA are that the variances are homogeneous, and this test indicates that they are.

Table 16: Levene homogeneity of variance test for community image ratings (Q5)

Levene Statistic	df1	df2	Sig.
1.368	2	1191	.255

The next question in the series on Community Enhancement asked if the monuments appear to make the host communities more positive or negative places in which to live (Question 6). Table 17 indicates there are differences in this measure of perceptions of the monuments by residents of each of the three communities. ANOVA was used to examine these differences in responses across the three communities, and as shown in Table 18, these differences are statistically significant.

Table 17: Mean ratings among respondents regarding monuments' impacts on the communities as positive or negative places to live (Q6)

Community	Sample size	Mean ratings
Rocklin	397	2.11
Paso Robles	401	1.74
Nevada County	418	1.78
Total / average	**1216**	**1.87**

Table 18: Analysis of variance results for mean ratings among respondents on the question of positive or negative impacts on communities as places to live (Q6)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	33.277	2	16.638	20.290	**.000**
Within Groups	994.710	1213	.820		
Total	1027.987	1215			

Table 19 shows the significance of the differences based on a paired comparison of the communities using the Scheffe test. The main differences are between Rocklin and the other two communities, Paso Robles and Nevada County. In the latter communities, the monuments are perceived as enhancing or making each community a more positive place to live than monuments in Rocklin. Note there is little difference between the opinions of residents in Paso Robles and Nevada County regarding the impacts of their monuments. In order to have more reliability on these results, the Levene test of homogeneity of variance found that differences in homogeneity were not significant (Table 20).

Table 19: Multiple comparisons for ratings of impacts on the communities as places to live (Q6)—Scheffe Test

(I) Community	(J) Community	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Rocklin	Paso Robles	.370(*)	.064	.000	.21	.53
	Nevada County	.333(*)	.063	.000	.18	.49
Paso Robles	Rocklin	-.370(*)	.064	.000	-.53	-.21
	Nevada County	-.037	.063	.843	-.19	.12
Nevada County	Rocklin	-.333(*)	.063	.000	-.49	-.18
	Paso Robles	.037	.063	.843	-.12	.19

* The mean difference is significant at the .05 level.

Table 20: Levene test of homogeneity of variance for impact ratings on communities as places to live (Q6)

Levene Statistic	df1	df2	Sig.
.210	2	1213	.810

The third question in the Community Enhancement module focused on sense of place, defined as a place having characteristics that make it special or unique. Again, a Likert-type scale with 1 as very positive to 5 as very negative was used to measure perceived contributions of the monuments to each community's sense of place. As shown in Table 21, there were differences in perceptions across the three communities. Residents in both Paso Robles and Nevada County

gave significantly more positive ratings for their monuments than residents in Rocklin (Table 22).

Table 21: Mean ratings among respondents regarding contributions of monuments to each community's sense of place (Q7)

Community	Sample size	Mean ratings
Rocklin	391	2.14
Paso Robles	397	1.89
Nevada County	409	1.87
Total / average	**1197**	**1.97**

Table 22: Analysis of variance results regarding contributions of the monuments to a community's sense of place (Q7)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.328	2	9.164	9.990	**.000**
Within Groups	1095.268	1194	.917		
Total	1113.596	1196			

The mean values of the scores on contributions to sense of place (Question 7) indicate there is a similar pattern of perceptions regarding the monuments as found in the two ANOVAs presented above. Residents of Rocklin rated their monuments less positively on all three questions than residents in Paso Robles and Nevada County.

Table 23 presents multiple paired comparisons that show the community of Rocklin is less positive about its monuments than are residents in Paso Robles and Nevada County. More specifically, the Scheffe test indicates that there is a significant difference between the perceptions of Rocklin residents compared to the other two communities, and that the difference is statistically significant. However, there is no difference in the perceptions of residents in Paso Robles compared with those of Nevada County. In order to ensure that there is robust interpretation of this ANOVA, the Levene test was used. It indicates that the variances are homogeneous (Table 24).

Table 23: Multiple comparisons for ratings of impacts on a community's sense of place (Q7)—Scheffe Test

(I) Community	(J) Community	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Rocklin	Paso Robles	.257(*)	.068	.001	.09	.42
	Nevada County	.270(*)	.068	.000	.10	.44
Paso Robles	Rocklin	-.257(*)	.068	.001	-.42	-.09
	Nevada County	.014	.067	.979	-.15	.18
Nevada County	Rocklin	-.270(*)	.068	.000	-.44	-.10
	Paso Robles	-.014	.067	.979	-.18	.15

* The mean difference is significant at the .05 level.

Table 24: Levene test of homogeneity of variance for ratings of impacts on a community's sense of place (Q7)

Levene Statistic	df1	df2	Sig.
1.433	2	1194	.239

The final question in this series on enhancement uses a Likert-type scale to measure perceptions regarding the effectiveness of the monuments as boundary markers for the communities (Question 8). The scale ranges from 1 as very effective to 5 as very ineffective. Table 25 shows the mean values or ratings for each of the three study communities. The results of the ANOVA presented in Table 26 indicate that these differences in mean effectiveness ratings are statistically significant.

Table 25: Mean values among respondents for the effectiveness of monuments as boundary markers for the communities (Q8)

Community	Sample size	Mean
Rocklin	383	2.44
Paso Robles	386	1.93
Nevada County	411	1.93
Total / average	**1180**	**2.10**

Table 26: Analysis of variance results on whether the monuments are effective as boundary markers for the communities (Q8)

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	68.713	2	34.357	24.049	**.000**
Within Groups	1681.466	1177	1.429		
Total	1750.179	1179			

As shown in Table 27, the paired comparisons between communities using the Scheffe Test show that residents of Nevada County and Paso Robles gave significantly higher effectiveness ratings for their monuments as boundary markers than did residents of Rocklin. However, there were no significant differences between ratings given by Nevada County residents and those of Paso Robles residents.

Table 28 presents the results of the Levene Test of homogeneity of variance, which indicates that there is a significant difference in the variances among the three communities. The interpretation of this finding is that the ANOVA of the effectiveness scores is less robust, meaning that the finding of significant differences are not as certain as some of the prior ANOVAs where the Levene Tests found there was homogeneity of variance among respondents from the three communities.

Table 27: Multiple comparisons for effectiveness ratings of monuments as boundary markers for the communities (Q8)—Scheffe Test

(I) Community	**(J) Community**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
		Lower Bound	**Upper Bound**	**Lower Bound**	**Upper Bound**	**Lower Bound**
Rocklin	Paso Robles	.516(*)	.086	.000	.31	.73
	Nevada County	.514(*)	.085	.000	.31	.72
Paso Robles	Rocklin	-.516(*)	.086	.000	-.73	-.31
	Nevada County	-.002	.085	1.000	-.21	.21
Nevada County	Rocklin	-.514(*)	.085	.000	-.72	-.31
	Paso Robles	.002	.085	1.000	-.21	.21

* The mean difference is significant at the .05 level.

Table 28: Levene test of homogeneity of variance for ratings for effectiveness of monuments as boundary markers (Q8)

Levene Statistic	**df1**	**df2**	**Sig.**
9.958	2	1177	.000

6.3. Economic Impacts

The next module of questions in the telephone survey focused on the extent to which the communities' gateway monuments provide some types of economic impacts. Question 9 in the survey asked, "…how positively or negatively does the monument [in your community] help to promote tourism?" Overall, most survey respondents feel the monuments help to promote tourism or have no impact (92.7%) (Table 29). When analyzed by community, it was found there were differences in perceptions of residents among the three communities. Both Paso Robles and Nevada County residents gave more positive ratings for the impacts of their monuments on tourism than did residents of Rocklin (Table 30).

The results of the ANOVA, presented in Table 31, indicate that the differences among the three communities are statistically significant. However, the Levene Test for homogeneity of variance among the responses of residents in the three communities suggests that there are significant differences in the variances of the three groups (Table 32). The interpretation of this finding is that the ANOVA of the ratings is less robust, meaning that the finding of significant differences is not highly certain.

Table 29: How positively or negatively do the monuments help to promote tourism (Q9)?

Effect		**Number**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Very positive (1)	223	18.2	19.5	19.5
	Somewhat positive (2)	305	24.9	26.6	46.1
	Neither positive nor negative (3)	533	43.5	46.6	92.7
	Somewhat negative (4)	41	3.3	3.6	96.2
	Very negative (5)	43	3.5	3.8	100.0
	Total	1145	93.5	100.0	
Missing	Don't know	79	6.5		
Total		**1224**	**100.0**		

Table 30: Mean values among respondents for the question of how positively or negatively the monuments help to promote tourism (Q9)

Community	**Sample size**	**Mean**
Rocklin	373	2.9
Paso Robles	382	2.2
Nevada County	390	2.3
Total / average	**1145**	**2.5**

Table 31: Analysis of variance for ratings on whether the monuments positively or negatively promote tourism for the communities (Q9)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	96.397	2	48.198	56.539	.000
Within Groups	973.537	1142	.852		
Total	1069.934	1144			

Table 32: Levene test of homogeneity of variance for ratings on whether the monuments positively or negatively promote tourism for the communities (Q9)

Levene Statistic	df1	df2	Sig.
23.370	2	1142	.000

Table 33 shows the results of comparing the mean scores from each of the three communities. These error margins cannot be relied upon based on the findings from the Levene Test (Table 32). However, the mean rating scores for Rocklin still show that, in the opinions of Rocklin residents, their monuments do not seem to be as effective in promoting tourism as the monuments in the other two communities.

Table 33: Multiple comparisons for effectiveness ratings of monuments in promoting tourism for the communities (Q9)—Scheffe Test

(I) Community	(J) Community	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Rocklin	Paso Robles	.672(*)	.067	.000	.51	.84
	Nevada County	.548(*)	.067	.000	.38	.71
Paso Robles	Rocklin	-.672(*)	.067	.000	-.84	-.51
	Nevada County	-.124	.066	.175	-.29	.04
Nevada County	Rocklin	-.548(*)	.067	.000	-.71	-.38
	Paso Robles	.124	.066	.175	-.04	.29

* The mean difference is significant at the .05 level.

Question 10 in the survey asked if there are "…ways the monument benefits the local economy." Table 34 presents the relationship between responses to this question and the three study communities. There is a significant difference among the communities on this question (significance = .000). Though about 20 percent or less of respondents in each of the three communities said that the monuments benefitted the local economies, a significantly higher percentage of survey respondents in both Paso Robles and Nevada County said their monuments contributed to the local economy than did respondents from Rocklin.

Table 34: Cross tabulation of perceived local economic benefits of gateway monuments by community (Q10)

Community	Economic Benefits?				Table Total	
	1. Yes		2. No			
	Row %	Count	Row %	Count	Row %	Count
Rocklin	14.0%	51	86.0%	314	100.0%	402
Paso Robles	20.7%	78	79.3%	298	100.0%	403
Nevada County	18.2%	65	81.8%	292	100.0%	419
Total	**17.7%**	**194**	**82.3%**	**904**	**100.0%**	**1224**

Significance = .000

Question 11 asked if the monument has had a positive or negative economic effect on the community recently. The Likert-type scale for responses to this question consisted of five points ranging from 1 as very positive to 5 as very negative. The ANOVA of Question 11 by community indicates that that there are significant differences among the communities on the respondents' attitudes about the positive or negative effects on economic issues in their communities. However, the unequal sample sizes and the significance of the robust test of variance equality shows that the data must be interpreted in a weak manner. As shown in Table 35, 37.7 percent of Paso Robles residents and 30.4 percent of Nevada County residents said the monuments in their communities had a very or somewhat positive economic effect on the community. In contrast, 18.9 percent of Rocklin residents said their monuments had very or somewhat positive effects. The multiple comparisons across the three communities show that the differences between Rocklin and the other two communities were statistically significant (Table 36).

Table 35: Cross tabulation of perceived positive or negative economic effects of monuments by community (Q11)

Effects of the Monument	Community						Total	
	Rocklin		Paso Robles		Nevada County			
	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Very positive	16	4.8%	64	18.7%	30	9.1%	110	11.0%
Somewhat positive	47	14.1%	65	19.0%	70	21.3%	182	18.1%
Neither positive nor negative	233	70.0%	184	53.6%	216	65.9%	633	63.0%
Somewhat negative	12	3.6%	12	3.5%	6	1.8%	30	3.0%
Very negative	25	7.5%	18	5.2%	6	1.8%	49	4.9%
Total	**402**	**100.0%**	**403**	**100.0%**	**419**	**100.0%**	**1224**	**100.0%**

Significance = .000

Table 36: Multiple comparisons for positive or negative economic effects of monuments in each community (Q11)

(I) Community	(J) Community	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound
Rocklin	Paso Robles	.372(*)	.066	.000	.21	.53
	Nevada County	.290(*)	.067	.000	.13	.46
Paso Robles	Rocklin	-.372(*)	.066	.000	-.53	-.21
	Nevada County	-.081	.067	.477	-.24	.08
Nevada County	Rocklin	-.290(*)	.067	.000	-.46	-.13
	Paso Robles	.081	.067	.477	-.08	.24

* The mean difference is significant at the .05 level.

Question 12 in the telephone survey asked about an economic event, such as a store opening or closing, since the monument was installed. The number of persons responding that they did recall an economic event of this type since the installation of the monument in their community varied across the three communities, with Paso Robles the highest (53.7 percent), Nevada County the second highest (46.0 percent), and Rocklin with the smallest percentage (40.1 percent) (Table 37).

Table 37: Cross tabulation of survey respondents' recall of an economic event since the installation of the monuments in each of the communities (Q12)

Recall a major economic event?	Community						Total	
	Rocklin		Paso Robles		Nevada County			
	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Yes	155	40.1%	205	53.7%	180	46.0%	540	46.6%
No	232	59.9%	177	46.3%	211	54.0%	620	53.4%
Total	**402**	**100.0%**	**403**	**100.0%**	**419**	**100.0%**	**1224**	**100.0%**

Significance = .000

Table 38 shows the strength of the relationships regarding the recall of a major economic event by telephone survey respondents across the three communities. The strongest, using the Cramer's V statistic, is in Paso Robles at .26. Cramer's V is a way of calculating correlation in tables that have more than two rows and two columns. It is used as a post-test to determine strengths of association after chi-square has determined significance. Chi-square says that there is a significant relationship between variables, but it does not measure just how significant and important this is. Cramer's V is a post-test to provide this additional information expressed between 0 and 1. A Cramer's V of close to 0 shows little association between variables, which can be translated into an approximation of a correlation coefficient for classified data. Since the three tables all have significant Chi Squares, it is possible to use Cramer's V to examine and compare the association between the responses to an economic event and a positive or negative view of the impact.

Table 38: Analysis of responses for all three communities on the relationship between a major economic event (Q12) and positive or negative economic effects of the monument (Q11)

Major Economic Event? (Q12)	**Q11 Very positive**	**Somewhat positive**	**Neither positive nor negative**	**Somewhat negative**	**Very negative**	**Total**
Yes	68/15.5	97/22.1	231/52.5	14/3.2	30/6.8	440/100.0
No	37/7.0	67/12.7	390/74.0	14/2.7	19/3.6	527/100.0
Total	**105/10.9**	**164/17.0**	**621/64.2**	**28/2.9**	**49/5.1**	**967/100.0**

Pearson chi2(4) = 50.4004 Pr = 0.000
Cramér's V = 0.2283[13]

Findings in Table 38 suggest there is a moderate to weak relationship among the telephone survey respondents' opinions regarding the economic impact of the gateway monuments and major economic events in their communities since installation of the monuments. This suggests that some respondents feel there has been an important economic contribution of the monument in their community. The relationship is statistically significant and Cramer's V indicates that about 23 percent of the variance in the two sets of data is shared. About 38 percent of the survey respondents who said they recall a recent economic event felt their monument made a very positive or somewhat positive impact on their local economy.

Table 39, Table 40 and Table 41 present a three-way analysis of the relationships found in Table 38. This third measure is the location of the monument by community (Rocklin, Paso Robles or Nevada County). This method of cross tabulation provides a deeper insight into the significant relationships presented in Table 38. All the relationships are statistically significant, but some are stronger than others. The weakest relationship is in the community of Rocklin, where Cramer's V is 0.18. The strongest is in Paso Robles with a Cramer's V of 0.26.

Table 39: Cross tabs comparing responses to a major economic event and perceptions of whether there has been a positive economic impact since the monuments was installed—Rocklin

Has there been a major economic event?	**Very positive**	**Somewhat positive**	**Neither positive nor negative**	**Somewhat negative**	**Very negative**	**Total**
Yes	7/5.6	20/15.9	80/63.5	3/2.4	16/12.7	126/100.0
No	8/3.9	23/11.4	152/75.6	9/4.5	9/4.5	201/99.9[#]
Total	**15/4.6**	**43/13.2**	**232/71.0**	**12/3.7**	**25/7.7**	**327/100.0**

Pearson chi2(4) = 10.9553 Pr = 0.027
Cramér's V = 0.1830
[#]**Does not total 100.0% due to rounding error.**

[13] For more detail: http://changingminds.org/explanations/research/analysis/cramers_v.htm and Cramér, H. (1999). *Mathematical Methods of Statistics*, Princeton University Press

Table 40: Cross tabs comparing responses to a major economic event and perceptions of whether there has been a positive economic impact since the monuments was installed—Paso Robles

Has there been a major economic event?	**Very positive**	**Somewhat positive**	**Neither positive nor negative**	**Somewhat negative**	**Very negative**	**Total**
Yes	43/24.9	39/22.5	73/42.2	7/4.1	11/6.4	173/100.0
No	19/12.0	22/13.8	108/67.9	3/1.9	7/4.4	159/100.0
Total	**62/18.7**	**61/18.4**	**181/54.5**	**10/3.0**	**18/5.4**	**332/100.0**

Pearson chi2(4) = 22.7349 Pr = 0.000
Cramér's V = 0.261

Table 41: Cross tabs comparing responses to a major economic event and perceptions of whether there has been a positive economic impact since the monuments was installed—Nevada County

Has there been a major economic event?	**Very positive**	**Somewhat positive**	**Neither positive nor negative**	**Somewhat negative**	**Very negative**	**Total**
Yes	18/12.8	38/27.0	78/55.3	4/2.8	3/2.1	141/100.0
No	10/5.9	22/13.2	130/77.8	1/1.2	3/1.8	159/99.9[#]
Total	**28/9.1**	**60/19.5**	**208/68.0**	**6/2.0**	**6/2.0**	**308/100.0**

Pearson chi2(4) = 18.1536 Pr = 0.001
Cramér's V = 0.2428
[#]**Does not total 100.0% due to rounding error.**

6.4. Safety

The next module of questions in the telephone survey addressed safety. It is quite clear from the responses to Question 14, the people surveyed in each of the three study communities did not feel the monuments are a distraction to drivers. Only 4.2 percent of the respondents, or 52 out of the 1,224 respondents, indicated they felt the gateway monument in their community was a distraction.

Question 15 asked, "Do you think the monument is a safety hazard for drivers?" The responses showed a very strong consensus that the gateway monuments do not present driving problems with 97.6 percent of all survey respondents having indicated that they did not think the monument in their community was a problem for them. The final safety question asked survey respondents, "To the best of your knowledge, has there been any increase in the number of traffic accidents in the vicinity of the gateway monument since its construction?" Only 1.7 percent said there had been an increase, while 83.3 percent said there had been no increase. Another 15 percent indicated they did not know.

Based on the findings from the three safety questions included in the survey, almost all of the respondents in all three communities do not feel the gateway monuments distract drivers nor

pose a safety hazard. They also believe that the number of accidents has not increased in the vicinity of the monument in their community since the completion of construction.

6.5. Gateway Monument Location

Three questions related to location of gateway monuments were included in the telephone survey. First, survey respondents were asked, "In your opinion, does the location of the monument appear to you to be close enough to the city or county boundary to be a very effective, somewhat effective, neither effective nor ineffective, somewhat ineffective or very ineffective geographic boundary marker for your city/county?" Table 42 shows that 76.4 percent of the total survey respondents feel that the monuments are somewhat or very effective as geographic boundary markers.

Next, survey respondents were asked, "In your opinion, should the monument(s) be larger, smaller, or is it about the right size to be considered a gateway to your community?" As shown in Table 43, 85 percent of the respondents said the size of the monument in their community was about right. The effectiveness of the monument as a boundary marker and its relationship to the size of the monument is analyzed in Table 44. Almost half (47.5 percent) of the respondents said the gateway monument in their community is about right in size and that it is very effective as a geographic boundary market. Cramer's V indicates that it has a moderate to low level of correlation between the two measures.

Table 42: Perceived effectiveness of gateway monuments as geographic boundary markers (Q17)

Effectiveness		**Number**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Very effective	519	42.4	44.9	44.9
	Somewhat effective	365	29.8	31.5	76.4
	Neither effective nor ineffective	118	9.6	10.2	86.6
	Somewhat ineffective	86	7.0	7.4	94.0
	Very ineffective	69	5.6	6.0	100.0
	Total	1157	94.5	100.0	
Missing	Don't know	67	5.5		
Total		**1224**	**100.0**		

Table 43: Preferences regarding the size of gateway monuments (Q17a)

Monument Size		Number	Percent	Valid Percent	Cumulative Percent
Valid	Larger	138	11.3	11.8	11.8
	Smaller	38	3.1	3.2	15.0
	About the right size	994	81.2	85.0	100.0
	Total	1170	95.6	100.0	
Missing	Don't know	50	4.1		
	Refused to answer	4	.3		
	Total	54	4.4		
Total		**1224**	**100.0**		

Table 44: Relationship between size of the monument (Q17a) and the utility of the monument as a boundary marker (Q17)

Effectiveness as a Boundary Marker	Monument Size			Total
	Larger	Smaller	Right Size	
Very effective	57/44.2	5/13.5	447/47.5	509/46.0
Somewhat Effective	34/26.4	14/37.8	305/32.4	353/31.9
Neither effective nor ineffective	16/12.4	4/10.8	86/9.1	106/9.6
Somewhat ineffective	13/10.1	6/16.2	64/6.8	83/7.5
Very ineffective	9/7.0	8/21.6	39/4.1	56/5.1
Total	**129/100.0**	**37/100.0**	**941/100.0**	**1,107/100.0**

Pearson chi2(8) = 40.1620 Pr = 0.000
Cramér's V = 0.1347

The last question in the monument location module asked, "In your opinion, should similar monuments be constructed in other communities throughout the state?" An overwhelming percentage of the respondents (81.7 percent) said that other monuments should be constructed in other communities in California.

6.6. Conclusions

1. Overall, responses to questions regarding community enhancement by gateway monuments were positive. However, residents of Rocklin were less positive in their opinions regarding community enhancement by their gateway monument than were residents of the other two study communities.
2. In the economic impacts module, residents of Rocklin gave less positive ratings for the perceived economic impacts of their monument than did residents of Nevada County and Paso Robles.
3. In the safety module of the survey, responses clearly indicate that the gateway monuments do not pose a distraction to drivers nor a safety hazard.
4. Responses to questions included in the gateway monument location module revealed that most of the residents of all three communities believe the monument in their community

is effective as a geographic marker and is about the right size. Most (81.7 percent) indicated that gateway monuments should be installed in other communities throughout California.

7. CONCLUSIONS

Based on the research presented in this report, several conclusions and recommendations have been drawn. These are presented in the following sections.

7.1. Conclusions

7.1.1. Safety Analysis

The primary motivation of this research was to determine what, if any, impact gateway monuments had on site safety following their construction. To this end, the analyses performed researched several conclusions. These are discussed in the following paragraphs.

Overall, in examining the crash data from each of the monument sites, no patterns stood out as being the result of a monument's construction. Most of the observed crash types were those typical for specific roadway locations (rear-end crashes at signalized intersections, run-off-road crashes on segments). In examining the crash patterns and sequence of events detailed in the TASAS crash data, it was further evident the general trends observed before and after monument construction consisted of primarily the same events. In other words, pre- and post-construction crashes generally showed the same types and locations, features struck, and contributing factors. Based on these descriptive analyses, it did not appear that gateway monuments contributed to crashes. While 28 crashes occurred at the study monument sites following construction, no clear patterns emerged on an individual site level indicating that changes in the number of crashes were anything more than the result of the regression to the mean phenomenon at work.

To evaluate the safety performance of monument sites before and after construction, the Empirical Bayes technique was employed. This approach accounted for issues such as RTM, changes in traffic flow, and other factors. In applying this methodology, the objective was to estimate the number crashes that would have been expected had a monument not been constructed. This estimate would subsequently be compared to crashes observed with the monuments present at each site. To apply the EB method, reference groups and safety performance functions were adapted from existing studies that included traits similar to the monument sites. This eliminated the need to calibrate new models for the limited sample of sites available.

Results of the EB analysis indicated that, on an individual basis, no deterioration in safety was observed at any monument site. When all sites were examined collectively (using either signalized intersection SPF), reductions in the total number of crashes were observed. The calculated index of effectiveness (θ) values, depending on the scenario employed, were 0.978 and 0.680, respectively, corresponding to 2.2 percent and 32.0 percent reductions in crashes. These results should not be construed as meaning that monuments are a safety treatment; rather, they indicate that their presence was not detrimental to safety.

Similarly, in no way does an aggregate increase or decrease in the number of crashes following the construction of a gateway monument suggest that the monument was responsible for a safety improvement or deterioration. It is possible that the monument played a subliminal role in a decrease in some way (for example, delineating the boundary between rural, higher speed driving and lower speed developed area driving), but this contribution is part of a larger number of contributing factors and is difficult to isolate.

In light of these results, Caltrans may continue to participate in the Gateway Monument Program with the knowledge that, for the sites examined in this analysis, roadway safety was not impacted. Consequently, future applications and construction that maintain the design and permitting standards established by the GMDP should not present a detrimental site safety impact.

7.1.2. Economic Analysis

Fifteen different regression analyses were conducted in this portion of the study to assess economic impacts of the gateway monuments in the three study communities. Findings from the sales tax analyses and IMPLAN models suggest that the installation of gateway monuments had combined total economic impacts of $57,468,663 in those three communities in 2008 and 2009. Four retail sectors showed significant growth after installation of the gateway monuments. Though numerous positive and negative economic events occurred in the three communities after completion of the gateway monuments, most key informants and telephone survey respondents (approximately 80 percent) did not believe the monuments were a contributing factor to those economic events. However, about two-thirds of the telephone survey respondents indicated the monuments in their communities contributed positively or somewhat positively to tourism promotion. Thus, the installation of the gateway monuments were one aspect of community enhancement for economic development, but the monuments did not directly generate economic activity for the three study communities.

7.1.3. Social Impact Analysis

Overall, responses to questions by both the key informants and the telephone survey respondents regarding community enhancement by gateway monuments were positive in all three communities. More specifically, most telephone survey respondents gave positive ratings for community enhancement and impacts on community image in all three communities, though the ratings were significantly higher in Nevada County and Paso Robles than in Rocklin. Ratings for the monuments helping to create a sense of place and community identity were also very positive across all three communities. When telephone survey respondents were asked if, in their opinions, the monuments create distraction for drivers or cause an increase in accidents, almost all said they do not.

Responses to key informant and telephone survey questions regarding the locations of the gateway monuments revealed that most residents of all three communities believe the monument in their community is effective as a geographic marker and is about the right size. Most (81.7 percent) said that gateway monuments should be installed in other communities in California.

7.2. Recommendations

Based on the safety performance of gateway monument sites following construction, Caltrans, at its discretion, can continue to permit monument construction along Federal-aid routes. As the statistical analysis indicated, no detrimental impacts to safety occurred at any monument location. The stringent design and permitting standards employed during the GMDP trial period in terms of clear zone placement and monument dimensions appear to have prevented an increase in crashes directly attributable to gateway monuments.

In no way do the results presented here represent an absolute expectation of what the safety performance at other existing or future monument sites will be. Similarly, the results do not intend to suggest that the monument was responsible for a safety improvement or deterioration. It is possible that the monument played a subliminal role in a decrease in some way, but this contribution is part of a larger number of contributing factors and is difficult to isolate.

Results from the key informant interviews and the telephone survey support the conclusion that the gateway monuments do not pose a safety hazard for drivers, but do enhance community identity and image as well as positively promote tourism. Most residents of the three study communities are supportive of the installation of gateway monuments in other communities in California.

7.3. Future Research

This research focused on gateway monuments that were constructed along Federal-aid highways using stringent design and permitting standards. However, both in California as well as nationally, numerous similar features have been constructed along local roadways to varying standards. In light of this, further studies are encouraged to determine whether such installations have a detrimental impact on safety. Such evaluations will provide a better understanding of whether specific designs and/or features of other monuments have led to an increase in crashes. Conversely, there may be aspects of gateway monument signage in other locales that have a positive impact on safety. Examining larger samples of such sites will allow for such identifications to occur.

Further research into a process that communities might utilize to develop their theme, and guidelines for placement and size of gateway monuments for the purposes of enhancing community image and identity as well as effectively promoting tourism, would be useful to communities considering gateway monuments. This process should focus on building consensus on these issues as well as funding for design and construction, which was a contentious issue in one of the three communities included in this study.

8. APPENDIX A: SURVEY MATERIALS

FINAL QUESTIONNAIRE FOR THE

CALTRANS GATEWAY MONUMENT PROJECT SURVEY

Password: Enter interviewer **user name** and **password.**

LOCATE. Code calls to :

1. Rocklin
2. Paso Robles
3. Nevada County ***[continue***]

CaseID. Enter phone number including area code in the following format: 517-443-1111. _____

Introduction module

Intro. This is _____ calling from CSU-Chico to conduct research on behalf of the California Department of Transportation, Caltrans. Can you hear me ok? We are conducting a 10 minute opinion survey regarding the impact of gateway monuments positioned near the main roads in your area. May I speak with the person age18 or older who had the most recent birthday?

1. Yes (go to **Respondent**)
2. Respondent is not available (go to **Callback**)
3. Refused (go to **Terminate**)
4. Language barrier (go to **Callback3**)

If the respondent is a Hispanic who doesn't speak English, ask if he or she is willing to be interviewed by a person fluent in Spanish. If he/she is willing to be interviewed, ask when you can call back for this person. Write down the day of the week, weekend and the time and the name of the person's first name.

Respondent

(*If different than the person who answered the telephone*) This is _____ calling from CSU-Chico on behalf of the California Department of Transportation, Caltrans. Can you hear me ok? We are conducting a 10-minute opinion survey regarding gateway monuments. Are you familiar with the gateway momument(s) in your city (Paso Robles, Rocklin)/county (Nevada County)?

☐**1.** Yes (go to Q2)

2. No (go to **DESCRIPTION**)

☐**3.** Now is not a good time for an interview (go to **Callback2**)

☐**4.** Refused (go to **Terminate**)

Callback. When is a good time for me to call back and talk with _____?

Enter date _____; time _____

Callback2. When is a good time for me to call you back for a short interview?

Enter date _____; time _____

Callback3. If the respondent is a Hispanic who doesn't speak English, ask if he or she is willing to be interviewed by a person fluent in Spanish. If he/she is willing to be interviewed, ask when you can call back for this person. Write down the day of the week/weekend, the time, and the name of the person's first name.

date _____; time _____; first name _____

DESCRIPTION OF A GATEWAY MONUMENT.

Description. A gateway monument identifies the name of a city or county and its important characteristics. For example, some may have granite rocks that display a major product and some may include images of gold miners that depict an important historical era. They are usually located on major highways near an entrance to a city or county.

KNOWLEDGE MODULE

We are going to ask you some questions about the gateway monument in your area which is located at:

City/County	Location	Completed
Nevada Co	Rte 49 at Gautier Rd exit (outside Auburn north of county line)	***Oct-06***
Paso Robles	Rte 46 at Jardine Rd & on 101 at the S. Spring St. off ramp	***Jun-03***
Rocklin	Rocklin Road at I 80 interchange	***Nov-05***

1. Are you familiar with the monument?
    1. Yes
    2. No [if the response is still no, then try to get the respondent to say "yes" by describing some of the features of the monument using the photographs of the monuments.] (*Each interviewer will need photos of the monuments.*)
    3. Don't know ***[use this only after a second probe]***
    4. Refused (go to Terminate)

Terminate. Thank you for your time. Have a nice day/evening.

COMMUNITY IMAGE MODULE

2. In your opinion, how well does/do the gateway monument(s) project a positive image or a negative image for your city/county? I will use a five point scale using 1 to mean very positive; 2 to mean somewhat positive; 3 to mean neither positive nor negative; 4 to mean somewhat negative; and 5 to mean very negative. Would you say the gateway monument(s) in your community project a very positive image, a somewhat positive image, neither a positive nor negative image, a somewhat negative image, or a very negative image?
    1. very positive
    2. somewhat positive
    3. neither positive nor negative
    4. somewhat negative
    5. very negative
    6. Don't know ***[use this only after a second probe]***

7. Refused to answer

3. What is the main theme of the gateway monument in your community? (Check only one.)

1. A Patriotic theme
2. Local economy theme
3. Human relations; a good community to live in
4. A historical theme such as when the Spanish were in control of California
5. Other? Write in_____
6. Don't know [use this only after you have asked a second time]
7. Refused to answer

4. How positively or negatively do you feel about the monument(s) in your community? Would you say that you feel very positively, somewhat positively, neither positively nor negatively, somewhat negatively, or very negatively about the monument(s) in your area?

1. very positively
2. somewhat positively
3. neither positive nor negative
4. somewhat negatively
5. very negatively
6. Don't know ***[use this only after a second probe]***
7. Refused to answer

COMMUNITY ENHANCEMENT MODULE

5. In your opinion, does the monument impact the community in a positive or negative manner? I will use a five point scale using 1 to mean very positive; 2 to mean somewhat positive; 3 to mean neither positive nor negative; 4 to mean somewhat negative; and five to mean very negative. So, would you say that the community impact is very positive, somewhat positive, neither positive nor negative, somewhat negative, or very negative?

1. very positive
2. somewhat positive
3. neither positive nor negative
4. somewhat negative
5. very negative
6. Don't know ***[use this only after a second probe]***

7. Refused to answer

6. In your opinion, does the monument make the community appear to be a more positive place or more negative place in which to live? **I will use a five point scale using 1 to mean very positive; 2 to mean somewhat positive; 3 to mean neither positive nor negative; 4 to mean somewhat negative; and five to mean very negative.**

1. very positive
2. somewhat positive
3. neither positive nor negative
4. somewhat negative
5. very negative
6. Don't know ***[use this only after a second probe]***
7. Refused to answer

7. Do you think the monument has contributed in a positive or negative way to the community's sense of place? For example, a "sense of place is often used to descirbe those characteristics that make a place special or unique, as well as to those that foster a sense of authentic human attachment and belonging." Would you say that the gateway monument in your community has contributed very positively, somewhat positively, neither positively nor negatively, somewhat negatively, or very negatively to your community's sense of place?

1. very positive
2. somewhat positive
3. neither positive nor negative
4. somewhat negative
5. very negative
6. Don't know ***[use this only after a second probe]***
7. Refused to answer

8. In your opinion, how effective is the gateway monument as a boundary marker for the community? For example, does it effectively mark the beginning boundary for your community? Woud you say that the monument is very effective, somewhat effective, neither effective nor ineffective, somewhat ineffective, or very ineffective as a boundary marker?

1. very effective
2. somewhat effective
3. neither effective nor ineffective
4. somewhat ineffective

5. very ineffective

6. Don't know ***[use this only after a second probe]***

7. Refused to answer

Economic Impact Module

9. In your opinion, how positively or negatively does the gateway monument help to promote tourism? Would you say that it is very positive, somewhat positive, neither positive nor negative, somewhat negative, or very negative in promoting tourism?

1. very positive
2. somewhat positive
3. neither positive nor negative
4. somewhat negative
5. very negative

6. Don't know ***[use this only after a second probe]***

7. Refused to answer

10. Are there ways the monument benefits the local economy, other than by attracting outside visitors?

1. Yes (go to Q10a)
2. No (skip to Q11)
3. Don't know ***[use this only after a second probe]*** (skip to Q11)
4. Refused to answer (skip to Q11)

10a. (If yes) Please describe how the gateway monument benefits the local economy?

text _____

11. In your opinion, has the presence of the monument had a positive or negative economic impact on the community in recent years? Would you say that it has had a very positive, somewhat positive, neither positive nor negative, somewhat negative, or very negative economic impact on the community?

1. very positive
2. somewhat positive

3. neither positive nor negative
4. somewhat negative
5. very negative
6. Don't know ***[use this only after a second probe]***
7. Refused to answer

12. The monument in _____ (*Nevada County, Paso Robles, Rocklin)* was installed in _____ (*Nevada County on 10/2006, Paso Robles on 6/2003, Rocklin on 11/2005*). Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

1. Yes (go to Q12a)
2. No (skip to Q13)
3. Don't know ***[use this only after a second probe]***
   (skip to Q13)
4. Refused to answer (skip to Q13)

12a. (If YES), Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

Enter Text _____

13. Can you tell me of a recent economic event such as an auto dealer or a new retailer in the community that may have caused the positive or negative growth of the community's economic activity?

1. Yes (go to Q13a)
2. No (skip to Q14)
3. Don't know ***[use this only after a second probe]*** (skip to Q14)
4. Refused to answer (skip to Q14)

13a. If yes, can you briefly describe an example of what that is?

_____

13b. If yes, do you recall the approximate date when that event occurred?

Text _____

SAFETY MODULE

14. Does the monument seem to be a distraction to you when you drive past it?

1. Yes (go to Q14a)
2. No (skip to Q15)
3. Don't know ***[use this only after a second probe]*** (skip to Q15)
4. Refused to answer (skip to Q15)

14a. Please explain why it is a distraction?

_____

15. Do you think the monument is a safety hazard for drivers?

1. Yes (go to Q15a)
2. No (skip to Q16)
3. Don't know ***[use this only after a second probe]*** (skip to Q16)
4. Refused answer (skip to Q16)

15a. Please describe that safety hazard? _____

16. To the best of your knowledge there has been any increase in the number of traffic accidents in the vicinity of the gateway monument since its construction?

1. Yes (go to Q16a)
2. No (skip to Q17)
3. Don't know ***[use this only after a second probe]*** (skip to Q17)
4. Refused to answer (skip to Q17)

16a. In your opinion, what has contributed to this increase in traffic accidents in the vicinity of the monument?

_____--

MONUMENT LOCATION MODULE

17. Now, I'd like to ask you about the effectiveness of the gateway monument as a boundary marker. In your opinion, does the location of the monument appear to you to be close enough to the city or county boundary to be a very effective, somewhat effective, neither effective nor ineffective, somewhat ineffective or very ineffective geographic boundary marker for your city/county?

1. very effective
2. somewhat effective
3. neither effective nor ineffective
4. somewhat ineffective
5. very ineffective
6. Don't know ***[use this only after a second probe]***
7. Refused to answer

18. Does the location of the monument appear to you to be far enough from the highway right of way?

1. Yes (go to 18a)
2. No (skip to Q19)
3. Don't know ***[use this only after a second probe]*** (skip to Q19)
4. Refused to answer (skip to Q19)

18a. If no, please explain why not?

Text _____

19. In your opinion should similar monuments be constructed in other communities throughout the state?

1. Yes (go to Q19a)
2. No (skip to Q20)
3. Don't know ***[use this only after a second probe]*** (skip to Q20)
4. Refused to answer (skip to Q20)

19a. Please explain why/why not? _____

DEMOGRAPHIC SECTION

These last few questions are for classification purposes only. Your responses will be combined with those of others who respond to the survey and reported as averages. All of your individual responses will remain strictly confidential.

20. How long have you lived in or near Nevada County/ City of Rocklin/ the City of Paso Robles?

_____ code 9999 if refused; 8888 if don't know

21. In what year were you born?

_____ **(code 9999 if refused; 8888 if don't know)**

22. Do you do most of the driving for your household?

1. Yes
2. No
3. Don't know ***[use this only after a second probe]***
4. Refused to answer

23. About how many miles per year do you drive?

_____

24. What type of driver's license do you have? **[don't read these unless the respondent asks for clarification]**

1. Class A [this is a license for truck drivers; if you have an A, you can also exercise the privileges of a B & C too]
2. Class B [this is a license for driving passenger vehicles, such as busses and vans with 15 passengers or more]
3. Class C [this is for regular drivers of vehicles – autos, pickups, motor homes]
4. Class M1 or M2 [this is for motorcycles]
5. Don't know ***[use this only after a second probe]***
6. I do not currently have a license to drive.
7. Refused to answer

25. What is your home zip code?

_____ **(code 99999 if refused; 88888 if don't know)**

26. Do you or your family rent or own the place where you live?

1. Rent
2. Own
3. Don't know ***[use this only after a second probe]***
4. Refused to answer

27. What is your current employment status? (Check only one)

1. Employed full time
2. Employed part time
3. Temporarily unemployed
4. Full time student; not working
5. Disabled
6. Retired
7. Homemaker, not working outside the home
8. Don't know
9. Refused to answer

28. Which of the following best describes the highest level of formal education you have completed? (Choose only one.)

1. Less than a high school education
2. High school graduate or GED
3. Some college, trade school or business school, but no degree
4. Community college graduate
5. 4 year college graduate
6. Graduate or professional degree
7. Refused to answer

29. Finally, I'd like an approximate idea of the total amount of annual income in your household--that is the total income of all related persons age 15 and older living there before taxes are paid. Is it less than $30,000 or $30,000 or more?

1. Less than $30,000 (go to Q29a)
2. If $30,000 or more (go to Q29b)
3. Don't know (go to Thanks)
4. Refused to answer (go to Thanks)

29a. Is it less than $15,000 or is it between $15,000 to $29,999?

1. Less than $15,000 (go to Thanks)
2. $15,000 to $29,999 (go to Thanks)
3. Don't know (go to Thanks)
4. Refused to answer (go to Thanks)

29b. Is it $30,000 to $59,999, or is it $60,000 or more?

1. Is it $30,000 to $59,999 (go to Thanks)
2. $60,000 or more (go to Thanks)
3. Don't know (go to Thanks)
4. Refused to answer (go to Thanks)

Thanks. Thank you for completing the survey. This is important information for Caltrans to guide improved highway decision making. Have a nice day/evening.

Sex**. INTERVIEWER:** code gender

1. male
2. female

Caltrans Gateway Monument Program

Key Informant Interview Questions

Hello. This is _____ calling from California State University, Chico, about the interview regarding the gateway monument in _____ (Nevada County, Paso Robles, Rocklin*). Did you receive the photograph(s) of the monument(s) that we mailed to you? *We'd like to ask you some questions about the monument that was installed in your community with the approval of Caltrans.

Question 1: In your opinion, what message/messages are conveyed to local residents and visitors through the gateway monument?

Enter Text **_where are you? Level of pride**

_____

Question 2: How well does the gateway monument(s) project a positive image or identity for your city/county?

Enter Text. **___fairly well_____**

Question 3: If your community adds another gateway monument, what theme would you prefer?

O Historical

O Patriotic

O Tourism

O Products of the area

O Art

Question 3a: Why would you prefer this theme for a new monument?

Enter Text **__products of the area_____**

Question 4: In your opinion, does the gateway monument help to promote the local economy?

O Yes more so than not

O No

O Don't know .

Question 4a: (If YES) Please explain how?

Enter Text **_it tells persons where you are**

_____

Question 4b: (If NO) Please explain why not?

Enter Text **_____**

Question 5: Do you consider the gateway monument to be a piece of public art in your community?

O Yes it is public description; it is nice looking

O No

O Don't know

Question 5a: (If YES) Please explain why?

Enter Text **_____**

Question 5b: (If NO) Please explain why you think it is not public art?

Enter Text **_____**

Question 6: Have you heard residents or visitors comment about the aesthetics of the gateway monument?

O Yes

O No

O Don't know

Question 6a: (If YES) What comments about the aesthetics of the monument have you heard?

Enter Text **_____they have described it and wehre the town is_____**

Question 7: In your opinion, is the gateway monument an effective boundary marker for the community? For example, does it mark the beginning boundary for your community?

O Yes

O No

O Don't know

Question 7a: (If YES) Please explain how?

Enter Text. **___the one on fourty six is pretty effective; the one on 101 does not show up until you get off the exit_____**

Question 7b: (If NO) Why do you think that it is not an effective boundary marker?

Enter Text **_____**

Question 8: Does the gateway monument help promote local tourism?

O Yes

O No

O Don't know

Question 8a: (If YES) How does it help to promote tourism?

Enter Text **_____yes; for those who don't' it indicates wehre they are_____**

Question 8b: (If NO) Why do you think it does not help to promote tourism?

Enter Text **_____**

Question 9: How long have you lived in ____six years_____(*Nevada County, Paso Robles, Rocklin*) ? (*If the respondent recently moved into the area, skip to Question 12.*)

Question 10: The monument in _____ (*Nevada County, Paso Robles, Rocklin)* was installed in _____ (*Nevada County on 10/2006, Paso Robles on 6/2003, Rocklin on 11/2005*). Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

O Yes yes

O No

O Don't know

(If NO or DON't KNOW, skip to Q11.)

Question 10a: (If YES), Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

Enter Text **_____they are unrelated events with the monument._____**

Question 11: In general, do you think the presence of the gateway monument benefits the community at large?

Question 11a: (If YES) Please explain how?

Enter Text **_____yes; sense of place _____**

Question 11b: (If NO) Why does the monument not benefit the community?

Enter Text **_____**

Now I'd like to ask you a question about the safety of the monument.

Question 12: Do you think there has been an increase in the number of traffic accidents in the vicinity of the gateway monument since its construction?

O Yes

O No not there has not been any

O Don't know

Question 13: Do you recall the application and design/review process with Caltrans that was required prior to the approval and installation of the gateway monument? You may recall that we sent you a summary of the Gateway Monument application process.

O Yes

O No no he does not know

O Don't know

Question 13a: (If YES) How would you describe that process?

Enter Text _____

Question 14: In your opinion, has the gateway monument in _____ (*Nevada County, Paso Robles, Rocklin*) fulfilled the purpose(s) _____, as identified in the application for approval submitted to Caltrans? In general the purpose is to communicate the name of the city, county or township.

O Yes

O No

O Don't know don't know

Questions 14a: (If YES) Please explain why?

Enter Text _____

Questions 14b: (If NO) Why not?

Enter Text_____

That concludes the questions we have. Do you have additional information or comments that you would like to share with us?

Enter Text _____

Thank you very much for taking time to answer our questions.

9. APPENDIX B: CALTRANS GATEWAY MONUMENT SURVEY—SUMMARY OF OPEN-ENDED QUESTIONS FROM THE TELEPHONE SURVEY

9.1. Summary of Open-Ended Questions from the Telephone Survey For Nevada County

3. What is the main theme of the gateway monument in your community?

(Check only one.)

1. A Patriotic theme
2. Local economy theme
3. Human relations; a good community to live in
4. A historical theme such as when the Spanish were in control of California
5. Other? Write in_____
6. Don't know [use this only after you have asked a second time]
7. Refused to answer

Q3_5_Other

Of those who answered "Other" to Question 3, the largest number, 25 said that the theme was gold mining. The second most frequent response was "No Theme, Boundary Marker, Welcome or Advertisement for the City." A typical respondent of the latter group said "It's just a welcome sign," or "It just let's you know that you are in Nevada County."

Seven respondents each opted for a "Nature, Natural Resources or Environmental" theme. Another seven said that it was a "Historical" theme.

The remaining eight respondents who answered "Other" to Question 3 had miscellaneous responses. For example, one said that the theme was "beautiful" and another said it was a "waste of money."

10. Are there ways the monument benefits the local economy, other than by attracting outside visitors?

10a. (If yes) Please describe how the gateway monument benefits the local economy?

Community Pride (14)

The most frequent responses were related to "community pride." One respondent said that the monument benefits the local economy "by projecting a positive image that locals care about their

community." Another stated that "local folks appreciate the monument and it builds community spirit."

Tourism Attraction (9)

Nine respondents said that the monument was a tourism attraction. Commenting on the monument's value as a tourism attraction, one respondent said that, "it draws people in, and maybe they will stop." Another added that, "It's a friendly welcome to visitors."

Promotes History (8)

Eight respondents said that they think the monument promotes history. One said that, "The monument draws people to the area who are interested in the mining history." Another added that, "People are drawn to the area to hear more about its history."

Makes Area More Attractive/ Real Estate Values Increase (6)

Six respondents said that the monument makes the area more attractive and half of them added that it has a positive impact on real estate values. One respondent stated that, "The monument makes the area look nicer and house prices go up."

Promotes Local Businesses (5)

Six respondents said that the monuments promote local businesses. One stated that, "Whenever I see it, I'm happy to be home. So I think that it promotes good attitudes for buying and thinking locally." Another added that the monument "helps keep the locals local." One respondent said that,"the monument provides an attraction for people who might think about relocating."

Identification, Boundary (5)

Five respondents said that the monument serves as a source of identification and a boundary. One said that, "It gives residents a sense of place."

Created Jobs for Builders & Maintainers (4)

Four respondents said that the monument helps the local economy by creating jobs for the people who built it and those who will maintain it. One said that the monument "created jobs for the local people who were paid to construct it." Another said that it would create jobs "when you have to replace the flowers."

12. The monument in Nevada County was installed on 10/2006. Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

12a: Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

Auto Dealers Closed (68)

The most frequently mentioned economic event was the closing of auto dealerships with 6eight respondents citing this negative outcome. Some said that, "all of the auto dealers closed," and others stated that two dealers closed or that three dealers closed.

Small & Large Businesses Closed (60)

Sixty respondents cited other small and large businesses that closed, frequently attributing their failures to the economy. One respondent said, "Blame it on the economy. A lot of stores have closed." Another said, "Businesses and houses are empty." Several respondents said that the furniture store closed and "a lot of restaurants closed."

Small & Large Businesses Opened (31)

About half as many respondents (31) cited positive changes in businesses as cited negative changes (60) noted in the previous paragraph. Twelve of the 31 respondents cited the new Walgreens as a positive economic event. A couple of respondents said that there was a new Safeway and another couple of respondents mentioned a new Home Depot.

Businesses Opened and Closed (10)

Ten respondents indicated that businesses opened while other businesses closed. One said, "Mom and Pop stores come and go." Another respondent said, "Many businesses opened and closed because of economy, but the monument didn't have to do with it."

Community Events (14)

Fourteen respondents cited community events that had a positive effect on the economy. Eight of them mentioned the bicycle race with some adding that Lance Armstrong's appearance increased attendance.

Hotel Opened (6)

Six respondents cited a new hotel in Grass Valley, the Holiday Inn Express, as a positive economic event.

Miscellaneous (4)

In the miscellaneous category, one respondent said that the area is "transitioning from a rural area to an emerging wine industry." Another said that they were "trying to reopen the mines, but there is not enough money."

14. Does the monument seem to be a distraction to you when you drive past it?

1. Yes (go to Q14a)

2. No (skip to Q15)

3. Don't know *[use this only after a second probe]* (skip to Q15)

4. Refused to answer (skip to Q15)

14a. Please explain why it is a distraction?

Only 12 survey respondents said that the monument is a distraction when they drive by and explained why. In general, the 12 respondents said that it was a distraction because for a variety of reasons, it drew their attention. One respondent said that the monument was "no more a distraction than anything else on the side of the road, but it still takes your attention away." One woman said "I always notice it. I look at the plants." Another said, "I checked the vegetation. Where is the water coming from?" One respondent explained that ,"Someone who is new to the area would maybe slow down to look at it and could cause an accident."

19. In your opinion should similar monuments be constructed in other communities throughout the state?

Yes (315)

19a. Please explain why/why not?

Attractive / Nice / I like them (57)

About 70% of respondents in all three communities answered "yes" to question 19, and in Nevada County 315 of those gave an explanation without attaching restrictions to their choices. Fifty-seven of the 315 said that they thought other communities should build similar monuments because they like monuments and they think monuments are nice or attractive. One respondent said that "monuments are aesthetically more pleasing than just a sign when entering the county." When speaking about the Nevada County monument, one respondent said that, "I notice it every time, and I think it's a nice feature for counties to have. It adds a sense of class and definition to the county." Another said that, "I just like driving into a town and seeing gateway signs."

Identification/ Boundary/ Sense of Place (55)

Fifty-five of the respondents said that they would like for other communities to have gateway monuments because they identify the community or its boundaries or offer a "sense of place." One respondent said that "It helps to know where you are when travelling through the county." Another said that "It seems like everyone drives and with rural locations it gives a sense of the whole county instead of just a single city."

Tells Something about the Community (28)

Twenty-eight respondents said that similar monuments should be constructed in other communities because the monuments tell them something about the community. One respondent said that, "It makes people more aware of where they are and what the place is about." One stated that, "It shows the uniqueness of the community." Another respondent said that, "Our great state offers so much that should be recognized."

Informs About Historical Background (25)

Twenty-five respondents said that similar monuments should be constructed in other communities because the monuments tell them about the historical background of the community. One respondent said that, "Monuments improve the community's image and remind them of the historical importance of the area." Another added that he liked monuments "because people travel out of the country and we have enough historical places here in California."

Welcome (16)

Sixteen respondents said that similar monuments should be constructed in other communities because the monuments welcome people to their communities. One respondent said that, "It's a welcome to the community. It makes you feel welcome and you want to spend time and money in the community." Another said, "It's a nice welcome to your town. It shows that you care and you want people to come visit."

Shows Community Pride (12)

Twelve respondents said that similar monuments should be constructed in other communities because the monuments show community pride. One respondent said that, "It brings a sense of home to the community and pride to the county." Another said that, "It shows the community has a lot of class."

Positive Effects (12)

Twelve respondents said that similar monuments should be constructed in other communities because the monuments have positive effects. One respondent said that, "A monument looks good and people might stop to check out the town." Another said that, "Monuments are good promotions for the county."

Yes for Miscellaneous Reasons (11)

Eleven respondents said that similar monuments should be constructed in other communities for various reasons. One said that, "A monument is better than a road sign. You can see it better." Another said that, "It gives the residents a common rallying point. It is something to remind them of why they live there."

Yes, Depending Upon Economy / Cost (29)

Twenty-nine respondents said that similar monuments should be constructed in other communities, depending upon the cost and the state of the economy. One respondent said, "If the communities want to pay for them then sure, but the state shouldn't be responsible for paying for them." One said that other communities should have monuments "if they have the money and have no other ways to spend it." Another added that, "The economy doesn't call for monuments right now! In the long haul, yes. It's nice."

Yes, Depending Upon Other Factors (24)

Twenty respondents said that similar monuments should be constructed in other communities, depending upon factors other than cost and the economy. Mostly, respondents said that communities needed to promote. One respondent said, "If they have something to be proud of, they should show it." Another said, "If they have something specific to display, yes, but not just to put something up for the heck of it."

Up to Community (16)

Sixteen respondents said that it should be up to the communities if similar monuments are to be constructed. One respondent said, "It should be up to the community to decide, not Caltrans." Another said that, "It is a local issue mainly."

No; State of the Economy / Cost (20)

Twenty respondents said that similar monuments should not be constructed in other communities due to cost or the state of the economy. One respondent said no, "Just because of the cost, especially due to the recession now." Another respondent said, "Money should be spent on fixing roads and not on the monuments." Another added, "Monuments are not necessary. It would be a good way to cut budgets."

Seventeen respondents said that similar monuments should not be constructed in other communities due to reasons other than the economy or cost. Several respondents were critical of the monument in Nevada County. One respondent said, "This monument is not noticeable enough to be worth the effort, especially where it is located. It blends in." Another said, "I think nobody pays attention to the monument and it's a waste of money." A couple of respondents viewed monuments in other areas as competition to the one in Nevada County. One said that, "It would destroy the uniqueness of the monument" in Nevada County. Another said that, "People driving have a destination in mind and they don't need a sign to tell them and the money could be better spent on other things."

9.2. Summary of Open-Ended Questions from the Telephone Survey For Paso Robles

3. What is the main theme of the gateway monument in your community?

(Check only one.)

1. A Patriotic theme
2. Local economy theme
3. Human relations; a good community to live in
4. A historical theme such as when the Spanish were in control of California
5. Other? Write in_____
6. Don't know [use this only after you have asked a second time]
7. Refused to answer

Q3_5_Other

Of those who answered "Other" to Question 3, the largest number, 33, were in the category, "No Theme, Boundary Marker, Welcome or Advertisement for the City." A typical response in this group was, "It's just a sign to tell you where you are." "It's a boundary marker and a welcome for the tourists."

Fourteen respondents said that the theme was nature or an oak tree. Two said it is "pass of the oaks" theme. Four respondents said that the theme was history, or the economy, or some combination of the two. Two thought that the theme was wine, but another said that, "It does not seem to be about wine." One thought that it was an agricultural theme. In the miscellaneous category, seven had positive comments, such as "beautiful" or "classy look," while four had negative comments, such as "pain and suffering" and "a waste of money."

10. Are there ways the monument benefits the local economy, other than by attracting outside visitors?

10a. (If yes) Please describe how the gateway monument benefits the local economy?

Community Pride (14)

The most frequent responses were related to "community pride." One respondent said that the monument benefits the local economy because, "It just gives a positive image for the community." Another said that, "The monuments have a sense of pride of place for the people who live here and see them."

Makes Area More Attractive (12)

Twelve of the respondents indicated in their remarks that the monument benefits the local economy because it makes the area more attractive. One said that, "The monuments dress the area up and make people want to come here." Another respondent noted that, "They boosted home improvements near the monuments."

Created Jobs for Builders & Maintainers (7)

Seven of the respondents said that the monument benefits the local economy because it created jobs for those who built it and it continues to create jobs for those who maintain it. One respondent said that, "It gave the construction crews jobs and it gives someone a job to maintain it." Another respondent said that he "wanted to help build the next one."

Encourages People to Use Downtown (7)

Seven respondents indicated in their remarks that the monument benefits the local economy because it encourages people to use the downtown. One respondent said that, "They make it look like the 'big city' in the area so everyone wants to shop/dine/play there instead of in their own town." Another said that, "It makes people want to stay there once they've arrived."

Attracts New Businesses & Residents (6)

Six respondents indicated in their remarks that the monument benefits the local economy because it attracts new businesses and residents. One noted that there is "new growth with new folks moving in." Another said that it is "good for attracting new stores."

Miscellaneous (7)

There were seven miscellaneous responses. One respondent said that, "Everyone knows this town." Another said that, "It makes people feel secure."

12. The monument in Paso Robles was installed on 6/2003. Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

12a: Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

New Businesses (61)

The most frequently mentioned economic events concerned the growth of large businesses in Paso Robles. Respondents said that new shopping centers with retailers such as Lowe's, Kohl's, Wal-Mart, Bed, Bath, and Beyond, Target, Osh, and Starbucks opened since the monuments were built. Kohl's was the most frequently mentioned new business with 14 respondents citing this large retailer. One respondent said that, "The hotel industry, big name stores, and the wine industry are all growing here."

Positive General Growth (42)

Forty-two respondents indicated in their remarks that there was positive general growth in Paso Robles since the monument was built. Typical remarks included "constant growth" and "general economic growth." Many pointed out that there are new housing developments and new retail. All the respondents in this group were very positive about the growth of the economy in Paso Robles.

Community Events – Positive (21)

Twenty-one respondents mentioned community events when asked about economic events since the monuments were built. Seven of the respondents mentioned bicycle races and another seven mentioned the Mid-State Fair as positive economic events occurring since the monument was built. One respondent said that, "We are always having festivals in town." Another said, "All the wine festivals have started."

Wineries (15)

Fifteen respondents cited the wineries as sources of positive economic events since the monuments were built. One respondents said, "Wine, wine, wine!" when asked about economic events. Another said that, "Growth has nothing to do with the monuments. It all has to do with the wine industry. Many big wineries have opened and that led to four major hotels in the area."

Downtown/ Earthquake (14)

Fourteen respondents mentioned either the renovation of downtown or the earthquake or both when asked about economic events. (There was a large earthquake in Paso Robles during December 2003, which was about six months after the monuments were built.) One respondent said that, "The earthquake has caused the town to be retrofitted." Respondents generally remarked about the improvements in downtown following the destruction of the earthquake and the subsequent increase in tourism.

Positive & Negative (7)

Seven respondents cited both positive and negative events since the monument was built. "We have had a lot of businesses come in and go out in recent years," according to one respondent. One respondent said that, "Small businesses and building trade struggling. Other industry is increasing."

Negative (19)

Although positive economic remarks far outweighed negative remarks, 19 respondents did cite negative events since the monument was constructed. In a typical remark, one respondent said that, "Many businesses are closing." Another said that, "Lots of small businesses have closed." Several cited the recession as the cause.

There were three miscellaneous remarks. One said that agriculture has been affected negatively because, "They are attacked financially by legislation imposing restriction on farmers." Another said that, "The leadership of the city is positive." A third cited a "shortage of water" as a negative economic event.

19. In your opinion should similar monuments be constructed in other communities throughout the state?

1. Yes (go to Q19a)

2. No (skip to Q20)

3. Don't know *[use this only after a second probe]* (skip to Q20)

4. Refused to answer (skip to Q20)

Yes (195)

19a. Please explain why/why not?

Attractive / Nice / I like them (67)

About 70% of respondents in all three study communities answered "yes" to question 19, and in Paso Robles 195 of those gave an explanation without attaching restrictions to their choices. Sixty-seven respondents indicated in their responses that they thought similar monuments should be constructed in other communities because monuments are "nice," attractive and/or they "like them." "They are nice, and I like them," was a typical response. One respondent said that, "It's nice to see a gateway monument when you enter a town." Another said that, "It instantly boosts the image of a city upon approaching it."

Identification, Boundary, Sense of Place (54)

Fifty-four respondents said that identification of the area, its boundary, and/or a sense of place were the reasons for constructing similar monuments in other communities. Several respondents cited the need to distinguish cities that are close together. One respondent said that "California cities get jumbled up. Monuments are nice to let you know when you leave a city." Another said that, "A monument lets you know where you are at. It gives a sense of the community. No graffiti on it!"

Shows Community Pride (22)

Twenty-two respondents indicated in their remarks that they think similar monuments should be constructed in other communities because the monuments show community pride. One respondent said, "It's an attractive addition to show that you are coming into a city that is proud

of itself." Another said, "I think they give the community a sense of pride. This is where we live. This is where we welcome others."

Welcome (14)

Fourteen respondents indicated in their remarks that they think similar monuments should be constructed in other communities because they welcome visitors to the community. One respondent stated that, "They are just as good as a welcome mat for the community." Another stated, "Every town should have one for a feeling of welcome or an icebreaker."

Community Benefits (13)

Thirteen respondents said that they thought other communities should have similar monuments because the community benefits. One respondent stated that, "Monuments bring in tourism and tell people where they are." Another said, "It might boost the economy."

Tells Something about the Community (6)

Six respondents think that other communities should have monuments because they tell the viewer something about the community. One respondent said that, "Monuments give an idea of what a place is about." Another said that, "A monument sets them apart and gives them a sense of individuality and explanation."

Yes for Miscellaneous Reasons (13)

Thirteen respondents said they thought other communities should have monuments for various miscellaneous reasons. One said that, "It's better than a sign." Another said, "Why not?"

Yes, Depending Upon Economy / Cost (12)

Twelve respondents said that they thought other communities should have monuments, depending upon the economy or the cost. One respondent said, "I think they're nice, but communities should consider their priorities before investing in something like that." Another said, "They need to wait until money is more available. People need jobs right now, not more government spending."

Yes, Depending Upon Other Factors (17)

Seventeen respondents said that they thought other communities should have monuments, depending upon factors other than the economy and cost. One said, "I think they're nice, but funding shouldn't come from taxpayers' money. It should be funded through private donations." Another said, "it depends on the community size. For example, in LA it wouldn't be useful." Another said, "If the community has a historical factor and will help promote tourism, yes."

No; Economic Crisis/Cost (29)

Twenty-nine respondents said that they thought other communities should not have monuments due to cost and/ or the current economic crisis. One respondent stated, "They are too expensive. We cannot even pay to fix roads and we have state workers on furlough." Another said, "They are too expensive and they don't serve much of a purpose."

No; Other Reasons (4)

Four respondents said that they thought other communities should not have monuments due to factors other than cost and/ or the current economic crisis. One respondent said, "No, because I want ours to be unique."

Up to Community (15)

Fifteen respondents said that it is up to the community to decide if they get similar monuments. One respondent stated that, "It should be up to the individual communities, and only if they have the money for it."

Six respondents gave various miscellaneous answers. One respondent stated, "Other communities shouldn't have monuments because they have nothing to offer." Another said, "It is not mandatory."

9.3. Summary of Open-Ended Questions from the Telephone Survey For Rocklin

3. What is the main theme of the gateway monument in your community?

(Check only one.)

1. A Patriotic theme
2. Local economy theme
3. Human relations; a good community to live in
4. A historical theme such as when the Spanish were in control of California
5. Other? Write in_____
6. Don't know [use this only after you have asked a second time]
7. Refused to answer

Q3_5_Other

Granite, Rocks, Quarry, Mining (30)

Of those who answered "Other" to Question 3, the largest number (30) said the theme was granite, rocks or quarry mining. One respondent said that, "It means nothing to most people, but the theme is granite mining." Another said, "It is rock to reflect the Rocklin name." Three respondents stated that the rocks were artificial granite.

No Theme, Boundary Marker, Welcome (15)

Fifteen respondents said that there was no theme, or that it was a boundary marker or a welcome sign. One respondent said, "It just looks nice. No theme."

Historical (14)

Fourteen respondents said that the theme was historical or a combination of historical and some other theme such as the economy.

Miscellaneous (10)

Ten correspondents said that it had various miscellaneous themes. One said it was a "peace loving" theme, and another said that, "It has a Zen feeling."

10. Are there ways the monument benefits the local economy, other than by attracting outside visitors?

10a. (If yes) Please describe how the gateway monument benefits the local economy?

Makes the Area More Attractive (12)

The most frequent responses were related to making the area more attractive. One respondent said that the monument benefits the local economy. One said that, "It's attractive and brings beauty to the town." Another said, "It just shows how well the town is developing."

Identification, Boundary (7)

Seven respondents said that the monument benefits the community by providing identification of the community or its boundary. One respondent said that, "It tells people where they are located."

Attracts Tourists (7)

Seven respondents said that the monument benefits the community by attracting tourists. One respondent said, "Maybe people will come to see it." Another said that, "It promotes the local festivals and gives more recognition to Rocklin."

Created Jobs for Builders & Maintainers (5)

Five respondents said that the monument benefits the community by providing jobs for those who built it and those who maintain it. One respondent said that, "Whoever built it, benefited from it."

Community Pride (4)

Four respondents said that the monument benefits the community by providing a source of community pride. One respondent said that, "It creates a sense of pride for people who live there."

Attracts New Businesses & Shoppers (4)

Four respondents said that the monument benefits the community by attracting new businesses and shoppers. One respondent said that, "It draws more businesses here because it is on Million Dollar Mile." Another said that, "It affects shopping decisions."

Portrays History (2)

Two respondents said that the monument benefits the community by portraying the historical background. One said, "It gives the history of Rocklin."

12. The monument in Nevada County was installed *on* 10/2006. Thinking about the years since the monument was installed, do you recall a major economic event, such as a new retail store opening or closing, a new industrial plant opening or closing, or an auto dealer opening or closing, that has occurred since the monument was installed?

12a: Please describe that economic event and when it occurred (what year)? In your opinion, did it have a positive or negative effect on the local economy?

Recession, Businesses, Auto Dealers Closing, (52)

The most frequently cited economic events (52 respondents) related to the recession and local businesses closing. One respondent said, "After 2005 we had a booming economy, but then it crashed recently." Another respondent pointed out that, "the businesses failures are consistent with the rest of the nation." Some said that they were losing their chain stores, such as Mervyns and Wal-Mart. Many respondents said that restaurants and other retailers were going out of business. One respondent said, "A lot of businesses have closed down, but it doesn't have to do with the monument." Another added, "Boat dealerships, RV dealerships, Mercedes Dealerships, and Land Rover dealerships have closed."

Community Events (8)

Adding to the negative comments, six respondents pointed out that community events, such as the Rocklin Jubilee, had been cancelled. Only two respondents commented on the positive impact of festivals.

Positive & Negative (11)

Eleven respondents mentioned both negative and positive changes in businesses. One respondent said, "Lots of little things come and go in Rocklin." Another said that it was "just general coming and going." Another pointed out that, "There is lots of turnover of small businesses in strip malls."

Positive Comments

Although the negative comments outnumbered the positive comments in Rocklin, 15 respondents commented on positive general economic growth in Rocklin and 43 respondents commented on new businesses.

Positive General Economic Growth (15)

Respondents commented about general growth in businesses and housing. One respondent said that Rocklin had "an increase in housing and businesses until this past year." Another said that there had been "continuous positive growth."

New Businesses, Auto Dealers (43)

Forty-three respondents commented about positive growth of businesses including auto dealers. Thirteen of the forty three specifically mentioned the new auto dealerships, with most pointing out that they were "high end" Mercedes and Porsche dealers. One respondent said, "Since the monument went in, there have been several new shopping centers and also housing developments." Several said that there are new retail businesses on Granite Drive and that the community has new malls. They also commented about growth near Sierra College.

Six respondents had various miscellaneous comments. One said that, "Growth in nearby towns has reduced local economy somewhat." Another said that the college expanded.

19. In your opinion should similar monuments be constructed in other communities throughout the state?

Yes (165)

19a. Please explain why/why not?

Attractive, Nice, I like them (49)

About 70% of respondents in all three study communities answered "yes" to question 19, and in Rocklin 165 of those gave an explanation without attaching restrictions to their choices. Forty-nine of the 165 said that they thought other communities should build similar monuments because they like monuments and they think monuments are nice or attractive. One respondent said, "They are attractive even though this one isn't even real granite." Another said, "I like aesthetic effect, adds to the image of the city." Another added, "Many of them are loud and big, casino type, but this one isn't like that."

Identification, Boundary, Sense of Place (48)

Forty-eight respondents said that they thought other communities should have similar monuments because they identify the community, mark boundaries, or provide a sense of place. One respondent said, "Small communities could use them as an indicator of what community you're about to enter." Another respondent said, "They help locate the towns as you rive along the freeway." Another added that, "It's good for dividing towns that are close together."

Tells Something About Community (18)

Eighteen respondents said that they thought other communities should have similar monuments because they tell something about the community. One respondent said, "It adds something to the city. It tells you what the community is about." Another said, "It makes the town more interesting."

Shows Community Pride (13)

Thirteen respondents said that they thought other communities should have similar monuments because they show community pride. One respondent said, "It's nice to have something that shows the city cares about its appearance." Another said, "It promotes a positive influence on people and It gives them a sense of pride for their community."

History (12)

Twelve respondents said that they thought other communities should have similar monuments because they reveal something about the community's history. One respondent said, "They show the character and history of the town."

Community Benefits (8)

Eight respondents said that they thought other communities should have similar monuments because they yield benefits to the community, such as increasing tourism. One respondents said, "When people drive by and they see something that interest them, they may stop in and visit." Another respondent said, "It's good for bringing name recognition to town."

Welcome (2)

Two respondents said that they thought other communities should have similar monuments because they are welcome signs.

Yes for Miscellaneous Reasons (13)

Thirteen respondents said that they thought other communities should have similar monuments for various miscellaneous reasons. One respondent said, “I like to take pictures of them when travelling.” Another said, "It’s better than a sign.”

Yes, Depending Upon Economy / Cost (17)

Seventeen respondents said that they thought other communities should have similar monuments, depending upon the economy and/or the cost. One respondent said, “Yes, when the economy gets better.” Another respondent said, “If there is money, but not at the risk of cutting needed services.” Another added, “Yes, for the future, but our state is in a deficit.”

Yes, Depending Upon Other Factors (26)

Twenty-six respondents said that they thought other communities should have similar monuments, depending upon factors other than the economy or the cost. One respondent said, “As long as they are not a pile of rocks, greenery and a placard.” Another respondent said, “Yes, if it has meaning.” Another stated that, “Yes, but they need more community involvement.”

No; State in Budget Crisis/Cost (52)

Fifty-two respondents said that they thought other communities should not have similar monuments because of the cost or the state budget crisis. Several respondents pointed out that monuments are wasteful expenditures when other public services are not funded adequately, and they explicitly mentioned road maintenance as a higher priority. One respondent said, “They are a waste of money. They should be fixing the roads.” Another respondent said, “They are too expensive. It is too much money for too little results.” Another said, “This gateway monument cost too much, was made of fake rocks, and turned into a big fiasco.”

No; Reasons Other than Crisis/Cost (17)

Seventeen respondents said that they thought other communities should not have similar monuments because of factors other than cost or the state budget crisis. One respondent said, “I don't like it. I think it's ugly, a waste of money and it doesn't represent anything.” Another said, “If it's a poor location, like Rocklin, there is no benefit.”

Up to Community (8)

Eight respondents said that they thought it should be up to the community. One respondent said that, “[Representatives] of each city will have to figure that out themselves.”

Miscellaneous (1)

There was one miscellaneous response from a respondent who asked, “Who is paying for it?”

9.4. Summary

Overall, most of the open-ended comments given by the survey respondents in all three communities were positive about the gateway monuments, but some did express concern about the costs of monuments during the current recession. Though numerous positive as well as negative economic events occurred after the construction of the gateway monuments, most did not believe the monuments were a contributing factor in those changes.

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