5.0 Major Alternatives Analysis

5.1 Summary of Deficiencies and Future Solutions

The downtown area of the City has the largest challenges to finding mitigations that will be satisfactory to all people who live in or work within the City. The street system in downtown has been overlaid by a freeway system that has created several closely spaced intersections, and the historical nature of the City prevents any significant capacity enhancement mitigation (due to the lack of space to widen Main Street.

Because of these constraints, it is necessary to:

1. Find creative solutions.
2. Investigate alternative routes for vehicles to travel (to spread the existing load and anticipated future demand).
3. Investigate alternative modes of transportation (to reduce vehicle demand, as long as the shift in mode does not further impact congestion).

Table 5.1 reports the future levels of service at critical intersections after mitigation. The mitigations at intersections include widening, modification of lane geometry, installation of a signal, installation of a roundabout, or closure of the intersection. All locations are expected to operate at LOS D or better conditions in the Year 2020 with the proposed mitigations defined in this document, more particularly in Tables 3.09, 3.10, and 3.11 of the CIP section, and illustrated in Figures 3.18, 3.19, and 3.20.

5.1.1 Main Street Corridor

5.1.1.1 Main Street currently suffers from LOS F conditions during the am and pm peak hour time periods. There are several independent alternatives that have been identified to partially or completely address current and future traffic demand. A list of the potential alternatives that can provide relief to the Main Street corridor are listed below:

- Alternative 1. Utilize Transportation Demand Management measures to lessen school or large employer related peak traffic demands.
- Alternative 2. Evaluate/monitor any changing traffic flows/patterns and resulting safety conditions on Main Street resulting from the completed Richardson Street connector to Bennett Street for a one-year period.

Table 5.1
Mitigated* Intersection Levels of Service

		GP Existing		2020 NCTC	
Intersection	**ctrl**	**LOS**	**Delay**	**LOS**	**Delay**
Auburn/Empire	SIG	A	9.1	C	24.6
Auburn/Main	SIG	D	35.3	D	50.6
Auburn/Neal	SIG	C	25.0	C	21.5
Auburn/SR 20/49 Frontage	SIG	B	16.7	D	58.8
Bennett/SR 20/49 WB Ramp	SIG	A	0.0	D	37.9
Bennett/SR 20/49 EB Ramp	SIG	A	0.0	B	15.2
Bennett/Centennial	SS	A	0.0	C	19.2
Bennett/Ophir	SS	A	9.0	C	20.2
Brunswick/Dorsey	SIG	A	0.0	D	55.0
Brunswick/Nevada City Hwy	SIG	E	60.0	D	43.0
Brunswick/SR 20/49 EB Ramps	SIG	B	15.0	C	25.6
Brunswick/SR 20/49 WB Ramps	SIG	D	44.6	C	31.0
Brunswick/Sutton	SIG	E	55.1	D	53.0
Brunswick/Whispering Pines	SS	B	11.0	C	22.0
Colfax Hwy/Ophir	SS	A	10.0	C	16.7
Colfax Hwy/SR 20/49 Frontage	SIG	B	13.0	eliminated	
Dorsey/Sutton	SS	B	12.0	B	14.4
Empire/SR 20 NB Ramps	SIG	B	16.2	C	27.5
Empire/SR 20 SB Ramps	SIG	B	19.7	C	30.0
Freeman/McCourtney/Mill/Allison	RND	A	7.8	B	20.0
Freeman/McKnight	SS	B	10.4	C	24.4
Idaho Maryland/Centennial	SS	A	3.7	A	3.8
Idaho Maryland/SR 20/49 EB Ramps	SIG	E	38.0	D	37.0
Idaho Maryland/Sutton	SS	A	1.5	A	1.8
Main/Alta	SIG	C	16.0	D	43.2
Main/Bennett/Washington	SIG	B	11.6	B	17.9
Main/Idaho Maryland/SR 20/49 SB Rmp	SIG	E	46.0	D	53.8
McCourtney/Brighton	SIG	B	12.9	B	14.4
McCourtney/SR 20 EB Ramps	SS	A	4.8	A	4.1
McKnight/SR 49 NB Ramps	RND	B	19.6	C	20.0
McKnight/SR 49 SB Ramps	RND	C	22.6	C	20.0
Mill/Neal	SIG	A	8.7	A	5.9
Mill/SR 20 WB Ramps	RND	B	12.9	C	25.0
E. Main Street/Hughes	SIG	C	20.0	C	21.9
E. Main Street/Sierra College	SIG	C	21.5	C	31.6
Ridge/Hughes	SS	A	7.1	A	9.2
Sierra College/Morgan Ranch/Ridge	SS	A	5.5	C	24.0

Source: NCTC data and PRISM Engineering Reports
Note: Delay is in average seconds per vehicle at intersection
**mitigations include projects listed in CIP tables in Chapter 3*

- Alternative 3. Dedicate an item within the City's CIP that serves to obligate future funding for addressing issues within the Main Street corridor.
- Alternative 4. Signalize and coordinate the intersections of Church, Mill and South Auburn Street to better move through traffic. As an additional option or a first phase of this alternative, consider adding a single signal at Church Street at Main Street. Traffic circulation in the downtown area can benefit from an improved access to and from Church Street at Main Street. Church Street is currently one-way in the southbound direction (towards Main Street). If a signal is installed at this location, Church Street traffic can more easily cross Main Street without impacting the Main Street corridor by adding traffic to the corridor. Bus routes would need to be modified to accommodate an increase in vehicle traffic flows.
- Alternative 5. Remove the stop sign at Mill Street, and install a raised cross-walk with flashing pavement light indicators when a pedestrian is present.
- Alternative 6. Conduct a feasibility study of constructing a southwest bypass route from the East Main Street corridor to Highway 20. The study would evaluate options for extending a bypass route from W. Main Street in the area west of Carpenter Street that would serve to divert traffic to, and connect with, Highway 20. This concept was investigated as a potential solution to relieving congestion along the West Main Street corridor, it was found the LOS F conditions at Mill Street could be improved to LOS D conditions if some traffic could be diverted to a southwest bypass. It is our opinion that barring any other potentially negative neighborhood side-effects of this alternative, there is significant merit in pursuing this idea from a traffic engineering standpoint. More study is needed to determine existing travel patterns that could benefit from such a connection (such as a basic origin/destination study to know where drivers eastbound on Main Street travel to). In general there are approximately 200 vehicles per hour that currently travel east on Main Street and turn right to go south on South Auburn Street in the pm peak hour Some of this traffic could get to destinations south of downtown via Mill Street or Brighton Street. In addition, there are vehicles in the contra flow direction that could avoid Main Street's congested corridor if an alternative route were available.
- Alternative 7. Implement one-way couplet on Main Street and Richardson Street from Alta Street on the west to Bennett Street on the east. This option results in a reorientation of the circulation patterns of the downtown; however, it would more than double traffic

capacity, increase parking options and number of spaces, and create an LOS A/B condition.

- Alternative 8. Lower the LOS to "E" for the Main Street corridor within the downtown historic district. This alternative should be considered for implementation if other listed alternatives are not pursued.
- Alternative 9. Evaluate minor improvements to Main Street corridor for a short-term duration (such as raised cross-walks, stop sign removals, elimination or moving of parking spaces, etc.).

5.1.1.2 Analysis of Main Street Corridor and Preferred Recommendations

Our capacity analysis checks on reducing traffic flows along Main Street by 200 vehicles per hour (a 50% diversion of southbound oriented traffic to use the potential bypass connection), shows that level of service can improve from LOS F to LOS D. This is a significant improvement in level of service along the Main Street corridor, and makes the southwest bypass concept viable from a traffic engineering standpoint. To a lesser degree, Church Street can also provide some benefit (if it is oriented in the southbound direction), but existing bus and vehicle traffic congestion along Church Street between Neal and Main is significant. A southwest bypass is significantly more attractive for traffic to avoid the Main Street queues. Alternative routes for vehicular traffic should be investigated, since road widening possibilities in the downtown area are not feasible. Richardson Street will help in the future once the intersection with Bennett Street is finalized, and its benefits to the circulation pattern of the community should be evaluated. Currently Auburn Street is one-way north towards Richardson from Main Street. This directionality is good because it provides a way for traffic to enter Richardson Street and continue to areas in the north or to Alta Street without further impacting Main Street.

5.1.1.3 Based on input from the Street System Master Plan Subcommittee, a list of recommendations was developed for implementation. Taken together, these recommendations would serve to enhance traffic conditions in the Main Street corridor.

- **Recommendation 1.** Utilize Transportation Demand Management (TDM) measures to lessen school or large employer related peak traffic demands. A list of potential TDM options that can be utilized for the City are given later in this chapter.
- **Recommendation 2.** The Richardson Street Connector from Washington to Bennett Street opens up a parallel route from Bennett Street to Alta Street. The improvement of Richardson Street and its intersection with Bennett will enhance traffic flows on the Main street

corridor, yet its actual benefit to the level of service in the downtown corridor will need to be further investigated. The City should conduct a corridor analysis over a one year period to determine the effectiveness of this improvement, the resulting LOS, and evaluate the performance of intersections relating to pedestrian and vehicle safety on Main Street.

- **Recommendation 3.** Conduct a feasibility study of constructing a southwest bypass route from the West Main Street corridor to Highway 20. The study should evaluate options for extending a bypass route from W. Main Street in the area west of Carpenter Street that would serve to divert traffic to, and connect with, Highway 20. Upon the completion of the study, the City Council should proceed with the adoption of a preferred alignment of a bypass route, and identify funding options to complete such a project.

5.1.2 SR 20/49 Frontage Road Improvements

One of the most accident prone areas in the City is at the Caltrans SR 20/49 freeway ramps with South Auburn Street in the vicinity of the Colfax Highway (also near Neal Street). Improvements are planned for this area is in the current regional CIP (NCTC regional mitigation fee has a "budget" of $500,000 for improving this location, previously conceived as a roundabout). The NCTC has recently completed their SR 20/49 Frontage Road Study (February 2004), and found that there is a workable solution for existing and future traffic projections from the Idaho Maryland onramp to the South Auburn Street onramp that can carry traffic more efficiently.

The frontage road system consists of two two-lane one-way streets that connect South Auburn Street to Bennett Street (a significant distance). In between these streets are the Colfax Highway and Bank Street. There is much available capacity in these underutilized two-lane frontage roads (four lanes total). It is possible to eliminate a portion of the Colfax Highway connecting Neal Street to the NB Frontage Road, and create parking lots in the unused street space. The two frontage roads would only be connected via a one-way westbound lane where the existing westbound lane now exists, but only between the frontage roads. There would be no connection of Colfax Highway to Neal Street. South Auburn Street would have three signalized intersections, coordinated, and operating at satisfactory levels of service long into the future. The NCTC is currently beginning the process of preparing Caltrans Project Reports to better define all alternatives and designs. Figure 5.1 illustrates the improvement concepts refined in that study.

Figure 5.2 shows a proposed transfer station at the proposed modified Caltrans Park and Ride lot location because it is a good idea to place bus transfer stations near to a park and ride lot. Commuters could park their car in the lot and then catch the Amtrak Bus to the train station, for example. Currently, there is no effective way for someone to park their car for long periods in the downtown area. The existing transfer station at City Hall is several blocks away from the park and ride lot.

The freeway weave between the intersection of the Idaho Maryland onramp and the Bennett Street offramp could benefit from the available capacity of the frontage road system. If onramp traffic is forced to enter the Bennett Street offramp and continue on to the frontage road, this traffic could enter the SR 20/49 freeway at the South Auburn Street location (the end of the frontage road) and avoid impacts to the freeway weave or to Main Street. Many drivers (about 10%) have been observed getting on the freeway ramp at Idaho Maryland Road and continue on to Bennett Street as a natural "bypass" of Main Street traffic congestion, or to avoid a conflict with the short freeway weave. If the ramp is widened, and a K-Rail installed, Idaho Maryland onramp traffic can avoid any conflict with the Bennett Street offramp (see Figure 5.1)

This particular concept for the SR 20/49 Frontage Road is being evaluated as to potential phasing and construction approaches.

Figures 5.3, and 5.4 show a "before" and "after" photo comparison with these changes to South Auburn Street and Colfax Highway.

> **Recommendation 1.** Implement the frontage road mitigation concepts found in the NCTC Frontage Road Study. This includes an entire redesign of the Colfax / South Auburn / Neal intersection area to eliminate Colfax Hwy. Between S. Auburn and the SB Frontage Road. Modify Colfax Hwy. Between frontage roads to convert eastbound lane to parking, and leave northern-most westbound lane as is. The analysis for these street and intersection modifications will need to plan for, and address, the alignment of the Wolf Creek Trail. In addition to this area, it will be necessary to signalize the intersections of 1) Idaho Maryland Road at East Main Street, 2) the SR 20/49 offramp and Bennett Street, and install a K-Rail on the Idaho Maryland onramp to permanently eliminate the freeway weave with Bennett Street offramp traffic. The Idaho Maryland onramp would need to be slightly widened to accomplish this.

If this measure is implemented, the following tasks should be undertaken by the City that would serve to strengthen the economic vitality of the Colfax Avenue neighborhood, including, but not limited to:

a) Development of a City signage program that would include and directional entry signs that would tie to the downtown.
b) Implementation of the Colfax Avenue Infill Study,
c) Evaluation of entry way enhancements, and
d) Evaluation of other neighborhood improvement programs that would be developed through the City's Redevelopment Agency Program.

5.1.3 Brunswick Basin Improvements

The Brunswick Basin area can benefit from three various improvements along Brunswick Road from Nevada City Highway to Sutton Way. The first traffic problem is lack of proper lane-utilization on Nevada City Highway southbound turning left onto Brunswick Road. This is currently a dual left turn movement, but the inside left turn lane is under-utilized. In order to get the traffic to better utilize this lane (and thus increase capacity and LOS at the intersection), it is necessary to make "downstream" improvements along Brunswick Road east of Nevada City Highway. This involves creating a six lane cross-section with three westbound lanes and three eastbound lanes between NCH and Maltman. In addition, overhead signing on Nevada City Highway to guide drivers to use the correct lanes will also be needed. Finally, the SR 20/49 WB onramp would be expanded to a dual-lane onramp. This is depicted in Figure 5.5 which shows a before and after illustration.

On the east side of the freeway west of the Sutton Way intersection, the existing six-lane cross-section of Brunswick Road would be modified from its present configuration of three eastbound and three westbound lanes, to four eastbound and two westbound lanes as shown in Figure 5.6. No widening of the roadway will be necessary along Brunswick Road west of Sutton Way. In addition to these striping and signal modifications, it will be necessary to slightly widen Sutton Way (north of Brunswick Road) by four feet on the east side to be able to accommodate two turning lanes from the proposed dual-left turn pocket on Brunswick Road to Sutton Way.

5.1.4 Reduction in Downtown Traffic Impact Through Implementation of Pedestrian, Bicycle, Transit Alternatives, and Transportation Demand Management

The City's downtown street and transportation system is limited in its potential to expand vehicle transportation capacity through street widening

projects, and signals, because there are physical constraints in topography, historical buildings, etc. However, there is potential for the City to help reduce some traffic impacts throughout the City, through implementation of a pedestrian and bicycle trail system, more especially in the downtown area. This is true if some vehicle demand can be reduced by the mode shift, and if the change in mode is shifted to an adjacent street from where the demand was reduced. In other words, it would not help the City of Grass Valley's downtown congestion problem if more people got out of their cars and rode bikes along Main Street instead. This would in fact create a worse congestion problem as bikes and cars in the same lane of travel are not a good mix. The alternative mode of travel needs to take place on roads that are not impacted, such as through neighborhood streets, or even new Class 1 bike trails if possible (separate trail). Figure 5.1 shows information pertaining to these proposed trails and transit centers (see Appendix H for more discussion, as well as the City's *Parks and Recreation Master Plan, February 2001*).

Figure 5.1 shows several schools in the downtown area, and in the vicinity surrounding the downtown area. It can be seen that there is potential for several trails to feed from outer areas of the City into the downtown area (shown in green on Figure 5.1), and can lead by schools. It can also be seen that there is an existing bus loop serving these areas (Gold Country Stage, Grass Valley loop). The bus route currently enters Main Street, as do the school bus routes. This should be changed, as it is possible to program bus routes, whereas it is not possible to program the route a passenger car driver will take. The buses aggravate traffic congestion, as do parents who are driving children to school during the school peak hours. This impact can be reduced through changing some bus routes to avoid congested areas, and to encourage use of buses and bikes to families that could have their children utilize a bike trail once implemented.

5.1.5 Transportation Demand Management.

Vehicle reduction during the peak hour time periods can be accomplished through a transportation demand management (TDM) program where schools and possibly employers work with the City to shift their traffic impact to other times, or to spread out the demand over a longer period of time. Since school traffic is the major contributor to congestion during AM and afternoon PM peak hours, an adjustment to school traffic demand could provide significant benefit to reducing congestion. If school arrival schedules are staggered by grade, the 20-30 minute peak could be spread over a much longer time period. Many employers already practice a form of TDM, allowing employees to arrive early or late, and leave early or late, to avoid peak hour traffic congestion. Schools, on the other hand, have not addressed the problem of

peak hour impacts by adjusting arrival and departure schedules. College campuses have staggered schedules of classes and curriculum throughout the day and evening. High Schools and Elementary Schools can also benefit from reducing ingress and egress demands, improving safety and reducing congestion on the local street system.

Recommendation 1. Reroute Bus Traffic. Existing buses should avoid impacting existing traffic congestion along the arterial street system where possible. Once the Richardson Street connector to Bennett Street is complete this year, it will be possible to reroute school bus traffic to use Richardson Street in the future as an alternative to Main Street. It is also possible to reroute the Gold Country Stage to avoid/minimize impacts to Main Street and other arterials, by merely "crossing" Main Street at key points. Each large bus is equivalent to the impact of many vehicles, depending on number of bus stops, as well as the gaps (or lack of gaps) in traffic. When traffic gaps are low, buses have greater difficulty than a small vehicle has to actually accelerate and move into a traffic stream. This creates significant delays to vehicles behind a bus.

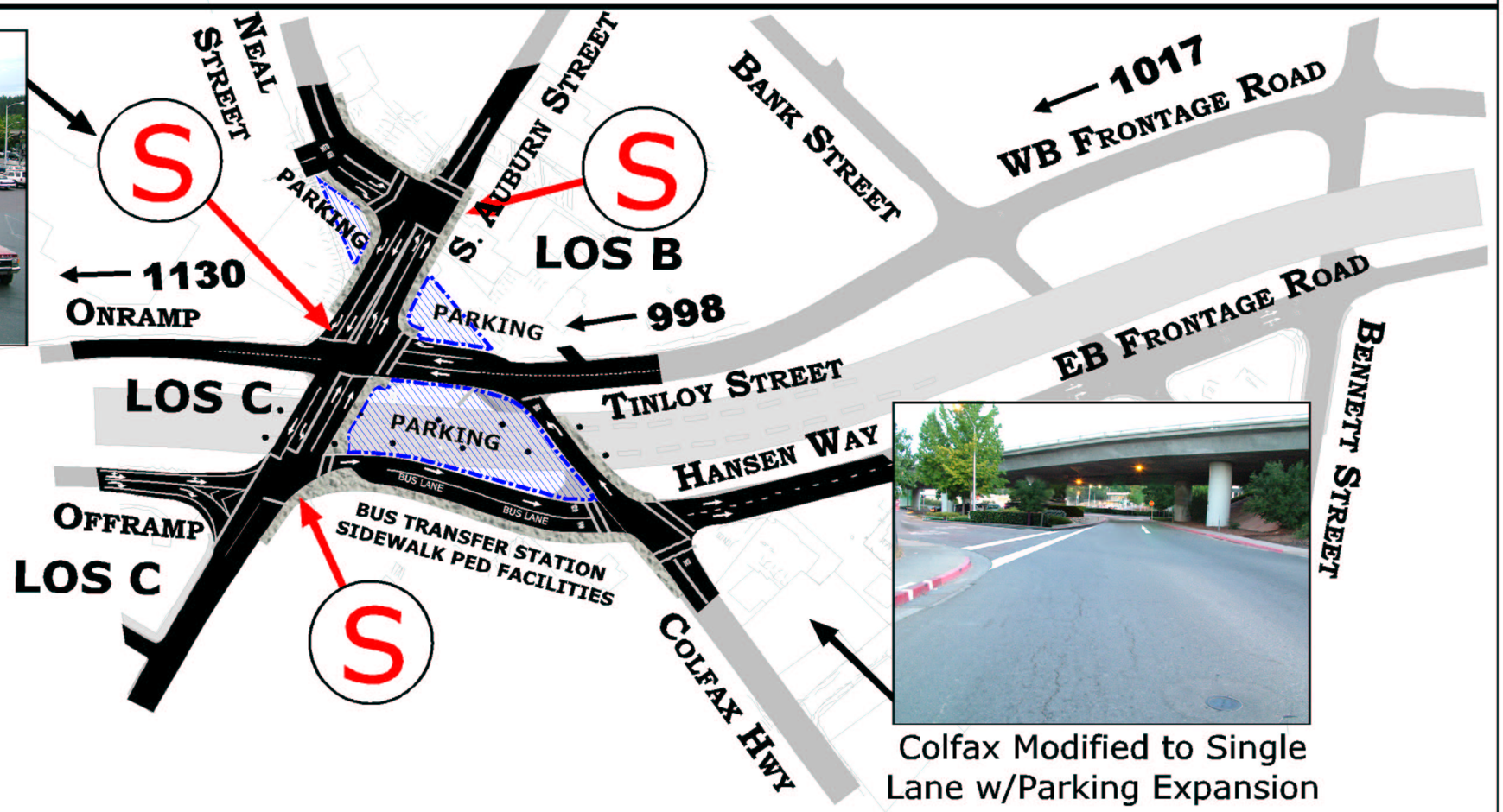
Recommendation 2. Stagger School Arrival/Departure Schedules. School-related vehicle traffic (parents taking children to school) should be spread out slightly to reduce demand impacts. The City should present local schools with a suggestion to implement a TDM program to stagger arrival times of students by grade. Class schedules for different grades would start at different times, and as a result students would be brought at the appropriate times. The end result would be spreading of the traffic load to a time period longer than 15 or 20 minutes. For example, Grades 7-12 student classes could begin at 7:45 am, and Grades 4-6 student classes could begin at 8:00 am, and the Grades 1-3 student classes begin at 8:15 am. Slightly staggering the start times of student classes will result in different parents dropping off their children at different times, where possible. The result will be a reduction in school related impacts by adding one half hour to the 20 minute rush, essentially creating a 50 minute "non-rush" period in which children arrive to school. This spread in the school traffic load will significantly improve levels of service at critical intersections, and is a mitigation of traffic.

Recommendation 3. Stagger Business Park and Hospital Traffic. Large employers can slightly stagger work force shifts of their employees, resulting in some employees arriving sooner, others at the regular time, and the third group at a later time. Accordingly,

employees would leave work in the evening at staggered times. The end result is a significant reduction in traffic during the am and pm peak hour time periods, as these hourly loads of traffic are spread out to multiple hours. The City should open dialog and discussion with major employers of large traffic generators, such as the Sierra Nevada Memorial Hospital and various Business Parks in the City to determine if these businesses can contribute to a reduction in traffic congestion in the City. Where new business parks go in, or where the hospital is expanded, etc., these can be conditioned to implement a measurable program. Program effectiveness can be verified by surveying parking lots at different times of day to determine if staggered arrival/departure is taking place. Financial incentives to mitigation fees can be received by businesses that show success in measured TDM.

Colfax / Auburn Street Modifications

Neal Street Realignment looking east to Freeway



Colfax Modified to Single Lane w/Parking Expansion

Figure 5.1A Grass Valley Corridor Improvement Project