

**APPENDIX C**

**PRELIMINARY COST ESTIMATES**



# TECHNICAL MEMORANDUM

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**To:** Paul Miller, Project Manager      **Date:** January 4, 2006  
**From:** Carlos Silva      **Project:** Shasta County Southern Area Study  
**Re:** Preliminary Interchange Alternatives and Cost Estimates      **Job No.:** 25-6498-03  
**File No.:** c848mem005.doc  
**CC:**

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## General Information

### Existing Information

Digital aerial photographs of the Route 5 corridor provided by the County were collected relative to the preliminary proposed improvements. Resolution of the digital aerials was sufficient to identify most surface features.

### Design Criteria and Application of Standards

The primary design standards applied for the various project locations limits were based on the latest Caltrans "Highway Design Manual (HDM) – Fifth Edition" and the 2001 "Roundabout Design Guidelines" by Ourston Roundabout Engineering. The following represents some general design criteria used to develop the alignment alternatives.

- Design Vehicle: STAA and California (HDM, Index 404.3)
- Design Speed (V): 25 mph (for existing Gas Point Road) to 35 mph on local routes/overcrossings (OC)
- Horizontal Curves: 230 feet (70 meters) minimum @ 25 mph (40 km/h) at ramp termini and 850 feet (260 meters) minimum @ 50 mph (80 km/h) at ramp exit nose. (HDM, Index 504.3)
- Typical Cross Section(s): 12-ft lanes, 8-ft shoulders (right shoulders along ramps), 4-ft shoulders (left shoulders along ramps)
- Slopes: fills @ 4:1 per HDM, Index 304.1 and cuts @ 2:1
- Lane Drops: 30:1 minimum (HDM, Index 504.3)
- Deceleration Length: assumed partial deceleration permitted on thru lanes; therefore reducing V by 15 mph (~25 km/h) and using 25 mph (~40 km/h) per Table 405.2B in HDM, Index 405.2(2)(d))

### Base Drawings

After identifying the limits of the various interchange projects, an AutoCAD drawing file was created to facilitate the layout of, on a preliminary basis, the improvements for each project location. The AutoCAD drawing file referenced information from the base drawing and therefore included the limits of each roadway project and any preliminary proposed improvements. The appropriate digital aerial photographs were also inserted into the computer drawing to aid in the layout of the proposed improvements and identify potential impacts.

Two interchange concepts/alternatives were developed for each freeway interchange. The alternatives are described below (also see attached schematic layouts). The alternatives do represent an order of magnitude of the potential cost of the project by utilizing the Caltrans Preliminary Project Cost Estimate Summary Worksheets.

Finally, quantities of the various cost estimate items were measured in the drawings.

### **Unit Costs**

For the various project locations, the 2004 Caltrans Cost Data was used to develop unit costs for various items of work.

### **Cost Estimates**

Multiple cost estimate items were considered in the development of the preliminary cost estimates (see attached preliminary cost estimates). Where possible, relationships between construction items were developed and incorporated into the cost estimate sheets to simplify the quantity take-off process and reduce the potential for errors. An example of such a relationship is the correlation between asphalt concrete, aggregate base and roadway excavation. A single measurement of new paved area is sufficient to derive a quantity for all three of these cost estimate items. Of course, many major items do not have a consistent relationship with other items and must be measured separately. Following is a partial list of items considered in the cost estimate process and the criteria for their measurement:

- **Storm Drainage** – The determination of which type of drainage system to be used on each roadway project was beyond the scope of this estimate. Therefore, for estimate purposes, storm drainage costs were based on a percentage ranging from approximately 10% of the earthwork and structural section totals.
- **Specialty Items** –The determination of which type of specialty items to include on each roadway project was beyond the scope of this estimate. Therefore, for estimate purposes, the following items were included and based on similar projects for the region: erosion control, hazardous waste work and environmental mitigation.
- **Traffic Items** –The determination of certain traffic items to include on each roadway project was beyond the scope of this estimate. Therefore, for estimate purposes, the following items were included and based on similar projects for the region: maintain traffic, signing and striping, lighting and traffic management plan.
- **Right-of-Way Items** –The costs for preliminary right-of-way acquisitions was estimated at \$10.00 per square foot for the area, regardless of the land use designation. Title and escrow fees were estimated to be approximately 6% of the total acquisition cost. No potential damages were estimated or incorporated into the cost estimate.
- **Support Cost** – Applied to the total capital cost, this contingency addresses the project development support costs including pre-design studies, environmental studies, reports and permits, topographic design surveys, property surveys, geotechnical reports, engineering design and plan preparation, and City Administration.

## Alternatives

### *Route 5/Main Street Roundabout Option 1 (without northbound off-ramp and southbound on-ramp)*

This alternative proposes to realign the existing northbound (NB) on-ramp, the existing southbound (SB) off-ramp and introduce new intersections with Main Street using roundabouts. The alternative proposes to eliminate the existing direct connection of the SB off-ramp to southbound Main Street. The preliminary geometrics accommodated all intersecting ramps and roads within each roundabout while also providing through movements at all new intersections (see attached schematic layout). The interchange improvements would also include two realignments for Rhonda Rd north and south of Main Street (East-West Arterial). The realignment occurring to the north would introduce a new intersection with Main Street just east of Merry Wood Road and the realignment occurring to the south of Main Street would connect to the new roundabout in order to maintain north and south access along Rhonda Road. The realignment of Rhonda Road north of Main Street is necessary in order to meet the Caltrans mandatory distance of 125m (approx. 410 feet) between ramp intersections and local road intersections (section 504.3(3) of the HDM). The introduction of the roundabouts at the intersections requires no traffic signals to be installed for this alternative.

The existing undercrossing (UC) structures would remain intact.

This alternative does not require mandatory or advisory design exceptions from Caltrans standards.

Total project cost: **\$12,839,000**. (see Project Cost Summary Table below)

### *Route 5/Main Street Roundabout Option 2 (with northbound off-ramp and southbound on-ramp)*

This alternative proposes to realign the existing northbound (NB) on-ramp, the existing southbound (SB) off-ramp and introduce new intersections with Main Street using roundabouts. The alternative proposes to introduce a new NB off-ramp and a new SB on-ramp and eliminate the existing direct connection of the SB off-ramp to southbound Main Street. The preliminary geometrics accommodated all intersecting ramps and roads within each roundabout while also providing through movements at all new intersections (see attached schematic layout). The interchange improvements would also include two realignments for Rhonda Rd north and south of Main Street (East-West Arterial). The realignment occurring to the north would introduce a new intersection with Main Street just east of Merry Wood Road and the realignment occurring to the south of Main Street would connect to the new roundabout in order to maintain north and south access along Rhonda Road. The realignment of Rhonda Road north of Main Street is necessary in order to meet the Caltrans mandatory distance of 125m (approx. 410 feet) between ramp intersections and local road intersections (section 504.3(3) of the HDM). The introduction of the roundabouts at the intersections requires no traffic signals to be installed for this alternative.

The existing undercrossing (UC) structures would remain intact.

This alternative does not require mandatory or advisory design exceptions from Caltrans standards.

Total project cost: **\$14,256,000** (see Project Cost Summary Table below)

***Route 5/Gas Point Road Roundabout Option***

This alternative proposes to construct roundabouts at the NB and SB ramp intersections with Gas Point Road to improve and accommodate traffic capacity by realigning all ramp termini. The preliminary layout was able to accommodate all intersecting ramps and roads within each roundabout (see attached schematic layouts) while maintaining one thru lane in each direction along Gas Point Road. This alternative also proposes to widen Gas Point Road just west of the Route 5 SB off-ramp to allow for improved circulation. The introduction of the roundabouts at the intersections requires no traffic signals to be installed for this alternative.

The existing overcrossing (OC) structure would remain intact.

This alternative may require a design exception for the Caltrans mandatory standard distance of 125m (approx. 410 feet) between ramp intersections and local road intersections (HDM section 504.3(3)) for the spacing between the SB ramps and Rhonda Road and for the spacing between the NB ramps and Parkway Street.

Total project cost: **\$7,533,000**. (see Project Cost Summary Table below)

***Route 5/Main Street Signalized Intersection Alternative***

This alternative proposes to realign the existing partial interchange into a spread diamond (Type L-2) interchange while introducing a new NB off-ramp and a new SB on-ramp to improve and accommodate traffic capacity (see attached schematic layouts). The alternative proposes signalized intersections at the NB and SB ramp termini. The realignment of Rhonda Road is also necessary in this alternative to meet Caltrans mandatory distance of 125m (approx. 410 feet) between ramp intersections and local road intersections (section 504.3(3) of the HDM).

The existing undercrossing (UC) structures would remain intact.

This alternative does not require mandatory or advisory design exceptions from Caltrans standards.

Total project cost: **\$17,037,000**. (see Project Cost Summary Table below)

***Route 5/Gas Point Road Signalized Intersection Alternative – Interim Improvements***

This alternative proposes to improve the existing Type L-1 interchange by adding traffic signals at the ramp termini. The alternative also proposes to widen Gas Point Road west of the SB ramps to improve traffic circulation and capacity.

The existing overcrossing (OC) structure would remain intact.

This alternative may require a design exception for the Caltrans mandatory standard distance of 125m (approx. 410 feet) between ramp intersections and local road intersections (HDM section 504.3(3)) for the spacing between the SB ramps and Rhonda Road and for the spacing between the NB ramps and Parkway Street.

Additionally, a design exception would be required for the advisory standard of 75 degrees or more for the angle of intersection between alignments as noted in section 403.3 of the Caltrans HDM for the existing ramp alignments and the Gas Point Road alignment.

Total project cost: **\$4,239,000**. (see Project Cost Summary Table below)

***Route 5/Gas Point Road Signalized Intersection Alternative – Ultimate Improvements***

This alternative proposes to improve the existing Type L-1 interchange by adding traffic signals at the ramp termini. The alternative also proposes to widen Gas Point Road west of the SB ramps to improve traffic circulation and capacity.

This alternative assumes complete replacement of the existing two-lane OC structure with a new structure.

This alternative may require a design exception for the Caltrans mandatory standard distance of 125m (approx. 410 feet) between ramp intersections and local road intersections (HDM section 504.3(3)) for the spacing between the SB ramps and Rhonda Road and for the spacing between the NB ramps and Parkway Street.

Additionally, a design exception would be required for the advisory standard of 75 degrees or more for the angle of intersection between alignments as noted in section 403.3 of the Caltrans HDM for the NB ramp intersections with the Gas Point Road alignment.

Total project cost: **\$14,000,000**. (see Project Cost Summary Table below)

**PROJECT COST SUMMARY TABLE**

Location	Cost to Construct	Right-of-Way Cost	Support Cost	Total Project Cost
Route 5/Main Street – Roundabout Option 1 (without NB Off-ramp and SB On-ramp)	\$7,000,000	\$2,510,000	\$3,329,000	<b>\$12,839,000</b>
Route 5/Main Street – Roundabout Option 2 (with NB Off-ramp and SB On-ramp)	\$8,050,000	\$2,510,000	\$3,696,000	<b>\$14,256,000</b>
Route 5/Gas Point Road – Roundabout Option	\$5,450,000	\$130,000	\$1,953,000	<b>\$7,533,000</b>
Route 5/Main Street – Signalized Intersection Alternative	\$7,560,000	\$5,060,000	\$4,417,000	<b>\$17,037,000</b>
Route 5/Gas Point Road – Signalized Intersection Alternative – Interim Improvements	\$3,140,000	\$0	\$1,099,000	<b>\$4,239,000</b>
Route 5/Gas Point Road – Signalized Intersection Alternative – Ultimate Improvements	\$10,370,000	\$0	\$3,630,000	<b>\$14,000,000</b>

**PRELIMINARY PROJECT COST ESTIMATE SUMMARY**



Type of Estimate (Pre-PSR, PSR, PR, etc.) Pre-PSR  
 Program Code \_\_\_\_\_

DIST-CO-RTE  
02-Sha-5  
 KP(PM) 6.6 (2.0)  
 EA \_\_\_\_\_  
 PP No. \_\_\_\_\_

**12/5/05 DRAFT**

**Project Description:**

Limits: Route 5/Main Street Interchange Modification

Proposed Improvements (Scope): \_\_\_\_\_

Alternative: Roundabout Option 1  
 (does not include northbound off-ramp and southbound on-ramp)

**SUMMARY OF PROJECT COST ESTIMATE:**

ROADWAY ITEMS	\$ 7,000,000
STRUCTURAL ITEMS	\$ -
SUBTOTAL CONSTRUCTION	\$ 7,000,000
RIGHT OF WAY (Current Value)	\$ 2,510,000
TOTAL CAPITAL COST	\$ 9,510,000
SUPPORT COST (35% of Total Capital Cost)	\$ 3,329,000
TOTAL PROJECT COST	\$ 12,839,000

Reviewed By \_\_\_\_\_  
 Program Manager Signature

Date \_\_\_\_\_

Approved By \_\_\_\_\_  
 Project Manager Signature Phone No. \_\_\_\_\_

Date \_\_\_\_\_



**PRELIMINARY PROJECT COST ESTIMATE SUMMARY**

	DIST-CO-RTE
	02-Sha-5
KP(PM)	6.6 (2.0)
EA	
PP No.	-

Section 4 Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Walls	0	M2	\$ -	\$ -	
Ramp Gore Paving	0	LS	\$ -	\$ -	
Minor Concrete/Textured Paving	0	M2	\$ -	\$ -	
Sidewalk Ramps	0	EA	\$ -	\$ -	
Landscaping/Irrigation	1	LS	\$ -	\$ -	
Erosion Control	1	LS	\$ 150 000	\$ 150 000	
Curb, Gutter & Sidewalk	415	M3	\$ 20	\$ 8 305	
Barriers and Guardrails	1	LS	\$ -	\$ -	
Hazardous Waste Work	1	LS	\$ 200 000	\$ 200 000	
Environmental Mitigation	1	LS	\$ 40 000	\$ 40 000	
Chainlink Fence (1.8M)	0	M	\$ 55	\$ -	
Route 5 Widening	0	LS		\$ -	
			Total Specialty Items	\$	398 305

Section 5 Traffic Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Maintain Traffic	1	LS	\$ 100 000	\$ 100 000	
Portable CMS	4	EA	\$ 10 000	\$ 40 000	
Signing and Stripping	1	LS	\$ 100 000	\$ 100 000	
Ramp Metering	0	EA	\$ -	\$ -	
Lighting	1	LS	\$ 100 000	\$ 100 000	
Temp Traffic Signals	0	LS	\$ -	\$ -	
Permanent Signals	0	EA	\$ 160 000	\$ -	
Traffic Management Plan	1	LS	\$ 200 000	\$ 200 000	
COZEEP	0	LS	\$ -	\$ -	
Temporary Pavement	0	LS	\$ -	\$ -	
Temporary K-Rail	0	LS	\$ -	\$ -	
			Total Traffic Items	\$	540 000
			SUBTOTAL SECTIONS 1 - 5	\$	4 101 581

**PRELIMINARY PROJECT COST ESTIMATE SUMMARY**

	DIST-CO-RTE
	<u>02-Sha-5</u>
KP(PM)	<u>6.6 (2.0)</u>
EA	<u>                    </u>
PP No.	<u>                    -</u>

<b>Section 6 Minor Items</b>			<u>Unit Cost</u>	<u>Section Cost</u>
Subtotal Sections 1 - 5	<u>\$ 4 101 581</u>	x( 10% )*	<u>\$ 410 158</u>	
			Total Minor Items	<u>\$ 410 158</u>

<b>Section 7 Roadway Mobilization</b>				
Develop Section 7 Roadway Mobilization	<u>\$ 4 101 581</u>			#
Minor Items	<u>\$ 410 158</u>			#
Sum	<u>\$ 4 511 739</u>	x( 10% )*	<u>\$ 451 174</u>	
			Total Roadway Mobilization	<u>\$ 451 174</u>

<b>Section 8 Roadway Additions</b>				
<i>Supplemental</i>				
Subtotal Sections 1 - 5	<u>\$ 4 101 581</u>			
Minor Items	<u>\$ 410 158</u>			
Sum	<u>\$ 4 511 739</u>	x( 10% )*	<u>\$ 451 174</u>	

<i>Contingencies</i>				
Subtotal Sections 1 - 5	<u>\$ 4 101 581</u>			
Minor Items	<u>\$ 410 158</u>			
Sum	<u>\$ 4 511 739</u>	x( 35% )**	<u>\$ 1 579 109</u>	
			Total Roadway Additions	<u>\$ 2 030 282</u>
TOTAL ROADWAY ITEMS - (Total of Section 1 - 8)				<u>\$ 6 993 195</u>

Estimate Prepared By OMNI-MEANS Phone                      Date                       
 (Print Name)

\* Use 5% - 10%  
 \*\*Use 25% at the PSR stage or a higher or lower rate if justified

