Worksheet 3.1: Analysis of the Work Zone

Work Zone: _____ **Normal Capacity:** _____

Percent Trucks: _____ **Percent Cars:** _____ **Work Zone/Detour Capacity:** _____

Directional ADT: _____ **Year:** _____ **Lanes Under Normal Operation:** _____

3.1(A)	3.1(B)	3.1(C)	3.1(D)	3.1(E)	3.1(F)	3.1(G)	3.1(H)	3.1(I)	3.1(J)	3.1(K)
Time Period (hour)	Hourly Traffic (%)	Vehicle Demand (vph)	Lanes Open (#)	Roadway Capacity (vph)	Queue Rate (vph)	Queued Vehicles (vph)	Average Queued Vehicles (vph)	Vehicles that Travel Work Zone (vph)	Vehicles that Travel Detour (vph)	Vehicles that Travel Queue (vph)
12-1 AM										
1-2										
2-3										
3-4										
4-5										
5-6										
6-7										
7-8										
8-9										
9-10										
10-11										
11-12 PM										
12-1										
1-2										
2-3										
3-4										
4-5										
5-6										
6-7										
7-8										
8-9										
9-10										
10-11										
11-12										
TOTALS										

Project: _____ **Date:** _____

Description: _____

Worksheet 3.2: Queue Delay

	3.2(A) Queue Period (hour)	3.2(B) Queue Volume (veh/hr)	3.2(C) Normal Capacity (veh/hr)	3.2(D) V/C Ratio	3.2(E) Average Queue Speed (mph)	3.2(F) Unrestricted Speed (mph)	3.2(G) Average Queued Vehicles per Queue Period (#)	3.2(H) Queue Lanes (#)
1								
2								
3								
4								
5								

	3.2(I) Average Vehicle Length (feet/veh)	3.2(J) Average Queue Length (mile)	3.2(K) Queue Travel Time at Unrestricted Speed (hr/veh)	3.2(L) Queue Travel Time at Queue Speed (hr/veh)	3.2(M) Added Time to Travel Queue (hr/veh)	3.2(N) Affected Vehicles per Queue Period (#)	3.2(O) Added Time per Queue Period (hour)
1							
2							
3							
4							
5							
			Totals				
			Added Time Weighted Average				hr/veh

Project: _____ **Date:** _____

Description: _____

Worksheet 3.3: Work Zone and Circuity (Detour) Delays

Work Zone Delay

3.3(A)	3.3(B)	3.3(C)	3.3(D)	3.3(E)	3.3(F)
Work Zone Length (mile)	Work Zone Speed (mph)	Unrestricted Speed (mph)	Work Zone Travel Time at Unrestricted Speed (hr/veh)	Work Zone Travel Time at Work Zone Speed (hr/veh)	Added Time to Travel Work Zone (hr/veh)

Circuity (Detour) Delay

3.3(G)	3.3(H)	3.3(I)	3.3(J)	3.3(K)	3.3(L)
Travel Length without Detour (mile)	Travel Length with Detour (mile)	Added Travel Length (mile)	Travel Time without Detour (hr/veh)	Travel Time with Detour (hr/veh)	Added Time to Travel Detour (hr/veh)

Alternating Traffic (Flagging) Delay

Flagging Zone Length (mile)	Flagging Zone Speed (mph)	Unrestricted Speed (mph)	Flagging Zone Travel Time at Unrestricted Speed (hr/veh)	Flagging Zone Travel Time at Flagging Zone Speed (hr/veh)	Added Time to Travel Flagging Zone (hr/veh)	Approach Vehicle Wait Time (hr/veh)

Project: _____ **Date:** _____

Description: _____

Worksheet 3.4: Escalation Factors and Cost Rates

Escalation Factors

3.4(A)	3.4(B)	3.4(C)	3.4(D)
Cost Factors	**1970 (CPI-U)**	**Current (CPI-U)***	**Escalation Factor**
IDLING and VOC (transportation component)	**37.5**		
TIME VALUE (all components)	**38.8**		

*** CPI-U = Unadjusted Consumer Price Index for all Urban Consumers, US City Average**

Cost Rates

3.4(E)	3.4(F)	3.4(G)	3.4(H)	3.4(I)	3.4(J)	3.4(K)
Vehicle Class	**1970 Time Value Cost Rate ($/veh-hr)**	**1970 Idling Cost Rate ($/veh-hr)**	**1970 VOC Cost Rate ($/mile)**	**Current Time Value Cost Rate ($/veh-hr)**	**Current Idling Cost Rate ($/veh-hr)**	**Current VOC Cost Rate ($/mile)**
CAR	**3.00**	**0.1819**	**0.06**			
TRUCK	**5.00**	**0.2092**	**0.12**			

Project: _____ **Date:** _____

Description: _____

Worksheet 3.5: Road User Costs

3.5(A)	3.5(B)	3.5(C)	3.5(D)	3.5(E)	3.5(F)	3.5(G)	3.5(H)
Road User Cost Component	Vehicle Class	Percent Class (%)	Total Vehicles (#)	Added Travel Length (mile/veh)	Added Time (hr/veh)	Cost Rate ($/veh-hr, $/mile)	Road User Cost ($)
Queue Delay (Added Time)	CAR						
	TRUCK						
Queue Idling VOC (Added Cost)	CAR						
	TRUCK						
Work Zone Delay (Added Time)	CAR						
	TRUCK						
Circuity Delay (Added Time)	CAR						
	TRUCK						
Circuity VOC (Added Cost)	CAR						
	TRUCK						

Daily Road User Cost	
Calculated Road User Cost (CRUC)	
Number of Work Zone Days	
Total Road User Cost	

Total Vehicles that Travel Queue: _____

Total Vehicles that Travel Work Zone: _____

Total Vehicles that Travel Detour: _____

Percent Passenger Cars: _____

Percent Trucks: _____

Project: _____ **Date:** _____

Description: _____