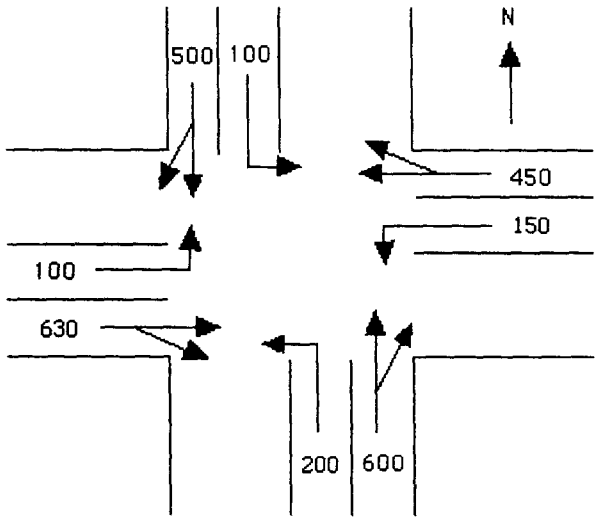
Transportation Engineering **Total score: 100%**

參考用

Note: You can write your answers in Chinese. For the first four problems, please write down your calculation procedures instead of answers only.

Problem 1 (20%): Estimate the optimal cycle length and the green intervals for the intersection shown in the following figure. Assume that phase A serves the north-south traffic and phase B serves the east-west traffic. Lost time is equal to 3 seconds per phase and amber is equal to 4 seconds. The width of each lane is 12 feet and the prevailing saturation flows are as follows:



The hourly saturation flows are listed as follows:
S(TH+RT) = 1700
S(LT) = 500 for permitted left turn movement

Hints: cycle length $C_0 = (1.5L+5)/(1-Y)$
minimum green time $C_p = 7 + W/4 - Y'$
where:
L: total lost time during a cycle (assume 6 seconds)
Y: sum of the flow ratios of critical movements
W: width of the crossing, in feet
Y': total change interval time (amber plus all red, if exists)

注意:背面有試題

參考用

Problem 2 (10%): In this problem you are solving the amber duration to prevent dilemma zones in an intersection. Assuming a comfortable deceleration (a^*) of 3 m/sec^2, an intersection width (w) of 19 m, a perception-reaction time (δ) of 1.5 seconds, and a designed vehicle length (L) of 5 m, what is the minimum amber duration (τ_{min})? What is the speed limit (v_0) set with respect to τ_{min}?

Problem 3 (10%): The following stopped vehicles were observed as part of a delay study on the northbound approach of the Main Street-Church Street intersection:

Minute	Seconds into minute			
	0 sec	15 sec	30 sec	45 sec
7:20 AM	3	2	1	1
7:21	5	3	2	2
7:22	5	3	2	1
7:23	6	4	4	3
7:24	5	4	2	1
7:25	4	3	3	0
7:26	5	4	1	0
7:27	6	3	3	2
7:28	4	2	0	2
7:29	6	3	2	2

The discharge was 90 vehicles during the period, and the arrival was 95 vehicles. Estimate the total delay on the approach and the delay per vehicle.

Problem 4 (20%): Suppose that an urban highway follows the following relationship: s = 1/(100-u), where u is the vehicle speed and s is the gap between two continued vehicles. (u: km/hr, s: km)

(a) (10%) Please find free-flow speed (u_f), congested density (k_j), capacity (q_{max}), and speed (u_m), density (k_m) at capacity.

(b) (10%) If the vehicular stream on this highway is traveling at 80 km/hr and then interrupted by a police for 6 minutes, please estimate how many stationary vehicles are accumulated in front of the police at the end of 6 minutes.

Problem 5 (40%): Answer the following questions:

(a) (5%) What are classifications of transportation systems?

(b) (5%) Please explain what "park-and-ride" and "kiss-and-ride" mean.

(c) (5%) What are the definition of transportation planning and its purpose?

(d) (5%) Please explain the "license plate" approach for surveying origin-destination (O/D) data.

(e) (10%) What are the four conventional steps in the sequential demand-forecasting process? Please show an existed model in each step?

(f) (10%) Please describe the problems that the Taiwan domestic airlines currently face and what they can do to improve their operations in the future.

注意：背面有試題