**CE 2710 Quiz 2 Study Guide**

**Fall 2020**

**Transportation Forecasting**

**Overview**

1. What is the 4-step process and what is it used for?
2. What are the steps and the purpose of each of the 4 steps?

**Trip Assignment**

1. What is it?
2. Know how the network is represented?
3. Know how to interpret network graph, link table and link array
4. Know what a tree diagram is
5. Know how to determine tree diagram from network graph or link array
6. Know how to interpret a tree table
7. Know the meaning of the term ‘all-or-nothing’ assignment
8. Know how to use tree diagram and 'all-or-nothing' assignment to assign trips to links

**Traffic Flow**

1. Know and understand the relationship between i) spacing and concentration, ii) headway and flow
2. Know the definition and equations for determining time-mean-speed and space-mean-speed
3. Know where to use TMS versus SMS
4. Know how to construct and use the time-distance diagram to get spacing, headway, flow, concentration and speed
5. Understand how vehicle spacing changes with speed
6. Know the relationships between flow, speed and concentration
7. Know the general shape of the speed-concentration, speed-flow and flow-concentration diagrams
8. Understand why slower speeds might result in higher flow
9. Understand the concept of a shock wave – how it forms and under what condition
10. Know the procedure and formulas to analyze the propagation or dissipation of shock waves

**Traffic Data**

1. Know, in general, how traffic volume can vary in time and space and the factors contributing to this variation
2. Understand how temporal and spatial variations in traffic volume affect the design
3. Know how non-design approaches can help to deal with the inefficiencies caused by temporal variations
4. Know what directional distribution is; what factors contribute to it and how it affects design
5. Understand the relationship between land use type and directional distribution
6. Understand, in general, how traffic is counted and by whom

**Street Capacity**

1. Know the definition of AADT
2. Know the basics of how the state collects data to calculate AADT
3. Know why AADT is not sufficient information on which to base design decisions
4. Know how a design hour is selected and the trade-off involved in choosing a design hour
5. Understand how to interpret and use the AASHTO (or similar) chart for estimating design hour volume from the AADT
6. Understand the concept of Level of Service and its relationship to capacity or DHSV
7. Know the trade-off involved with using different LOS
8. Know how to calculate the number of lanes for a road based on DHSV and DHV
9. Understand the problems associated with 'predict and provide' planning and how ‘predict and provide’ is related to estimating DHV

**Alignment Design**

**Horizontal Alignment**

1. What are the elements of the horizontal alignment?

Circular Curve

1. Know how to sketch a circular curve and to label the key locations.
2. Know the definition of degree of curvature (D).
3. Know the difference between degree of curvature and external angle (DELTA).
4. Know how to derive the relationship between R and D.
5. Know how to derive the relationship between L and R.

Spiral Curve

1. What is the purpose of the spiral curve?
2. What are the basic properties of the spiral curve?
3. Know the definition of the 'k' value for the spiral curve.
4. Know the relationship between the lengths (and the central angle) of the spiral and circular legs in a spiral/circular composite curve.
5. Know how to use the equations for calculating length of curves and DELTAS

**Vertical Alignment**

Parabolic Curve

1. Know how to sketch a parabolic curve and to label the key locations.
2. Know the difference between sag and crest curve.
3. Know the definition for the rate of change of curvature parameter (K).
4. Know how to calculate A.
5. Know the definition of the rate of change of grade (r).
6. Know how to determine the grade at each point on a vertical curve.
7. Know how to determine station and elevation of the turning point.
8. Know how to determine elevation at all locations on a vertical curve.

**Designing 3-D Alignments**

# Know how to produce and interpret a 1/R Plot.

1. Know the definition of a continuous alignment
2. Know and understand the 5 guidelines for producing a continuous 3-D alignment.
3. Know how the 1/R Plot can be used to assess these 5 guidelines for producing a continuous 3-D alignment.

**Formulae Given on Exam**

**Shockwaves**

Time until queue or platoon dissipate

**T = t usw2 / (usw2 - usw1 )**

### **Circular Curves**

## **R = 5730/D**

**L = (R Δ /57.3)**

### **Spiral Curves**

### **k = 100 D/ Ls**

### **Δs = Ls D / 200**

**Δ = Δc + 2 Δs**

### **Parabolic Curves**

**y = yo + g1 x + r x2/2**

**r = (g2 - g1 )/L**

**xt = - g1 / r**

**K = L / | G2 - G1 |**