CIVL 6970 Geometric Design Notes

Michael Chen

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Contents

1 Horizontal Curves

2 Vertical Curves

2.1 Terms

1. Centerline - ?

2. Tangents -

3. Vertical curves -

4. a profile view - ?

5. grade - + or - ratio, n feet in elevation per 100 feet distance

2.2 Goals

1. constraints of maximum grade and minimum lengths of VCs

2. conform to the existing terrain

3. balance earthwork

4. avoid placing the start of a horizontal curve at the bottom of a steep grade (due to high speed!)

5. ideally, vertical curves should be located within horizontal curves or on horizontal tangents

2.3 maximum grades - AASHTO Green book 2011

Road Type	Maximum Grade (%)
Freeways (based on design speed and terrain)	3% to 6%
Freeways (70 mi/h design speed, level terrain)	3%
Interstate System (regardless of terrain)	4%
Interstate System (with exception)	Up to 5% downgrades

Road Type	Design Speed	Maximum Grade (%)
Arterials	60 mi/h or greater (level)	3%
Arterials	40 mi/h (mountainous)	Up to 8%
Collectors	70 mi/h (level)	4%
Collectors	20 mi/h (mountainous)	Up to 14%
Local Roads and Streets	-	Up to 17% (mountainous terrain)

2.4 minimum grade

Urban design - min grade is 0.5%, but 0.3% may be used

3 Writing Formulas

3.1 Equation - ONLY support one formula per line

$$formula1 : f(x) = x^2 - - - -formula2 : \prod_{2}^{n} \tag{1}$$

3.2 Align - support MULTIPLE formulas in the same block

NOTE: need use package amsmath to enable Align

$$f(x) = x \qquad\qquad 2$$
$$g(x) = \frac{1}{x}$$
$$F(x) = f(x) + g(x) = \int_{a}^{b} \frac{1}{3} x^3$$
$$W(x) = \frac{1}{\sqrt{x}} + \frac{1}{\sqrt[3]{y}}$$
$$Z(x) = (3+2) * 2$$

3.2.1

So which one, align or equation, will you use?

3.3 Inline math

The form is used for $f(x) = x^2$ or λ, so you can easily to use them. https://github.com/LucaCappelletti94/adigraph

3.4 Matrics

$$\begin{bmatrix} 3 & 2 & \\ 9 & 4 & x \end{bmatrix}$$

4 Embedding Pictures/Figures

4.1 One figure

NOTE: need to use package graphicshttps://github.com/LucaCappelletti94/adigraph to enable figure

4.2 Use float and H

Use package float and attribute H to strictly fix the pictures' posisiton to HERE.
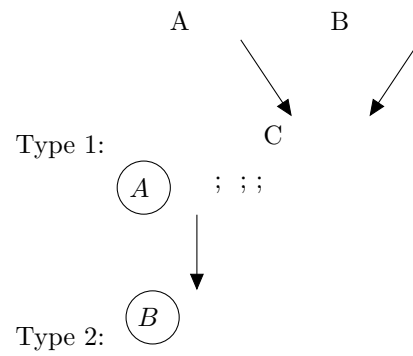
Listing 1: An Example

```
\usepackage{float}
...


\begin{figure}[H]
  ....
\end{figure}
```

5   Drawing Bayesian Network and Graph

5.1   Use pagckages: tikz and bayesnet

Use 2 packages: tikz and bayesnet to draw Bayesian Network chat.

A   B

Type 1:   C

$\textcircled{A}$; ; ;

$\textcircled{B}$
Type 2:

5.2   Use pagckages: adigraph

6 Using packages

Packages are like plugins to extend the Latex' capabilities. Some common commands are listed here.

Listing 2: tlmgr commands and etc

```
tlmgr list --only-installed    # show installed packages

tlmgr search <package-name>    # search a packages
tlmgr info <package-name>      # show a package's intro, no matter
    installed or not
tlmgr install <package-name>   # install a new packages

tlmgr update --self --all      # update package index

kpsewhich article.sty          # locate a package's .sty file

# env variables can define additional directories to be searched.
echo $TEXMFHOME $TEXMFLOCAL $TEXMFSYSCONFIG
```

7   Generate Slides

Use the package beamer to generate a pdf file of slides from an article

Listing 3: Changes in .tex file

```
% \documentclass{article}
\documentclass{beamer}
\usetheme{Madrid}
```