Task Order:

Task Description	Date	Time	CS Staff	CT Staff	S/W used	Ref. material provided? YES/NO	What was accomplished	Links (scripts, runs, PowerPoints, etc.)	Pros	Cons
Model Volume Adjustments: Peak Period to Peak Hour Volume Development/Adjustments	7/12/2016 & 7/13/2016	9:00 a.m. to 5:00 p.m.	Chao Wang	Hanwen Yi Wei Xia Sarah Ramos (Shahmiri Ali & Maurice Eaton if desired)	TransCAD / GISDK	Yes - we will provide digital files of ppt slides and GISDK code at the end of the sessions				

**Describe Modeling and Forecasting knowledge level improvement for each staff member*

AGENDA

Day 1: Tuesday (7/12/2016)

Start at 9:00 a.m.	
9:00 a.m. - 9:15 a.m.	Training Sessions Overview (what we will be working and accomplishing in the two day working sessions)
9:15 a.m. - 9:30 a.m.	A brief introduction of GISDK
9:30 a.m. - 9:50 a.m.	Best purposes/uses for custom scripting
9:50 a.m. - Noon	Script block architecture and documentation (Discussion of the flowchart)
Noon - 1:15 p.m.	Lunch break
1:15 p.m. - 5:00 p.m.	Standard structured script development procedures

Day 2: Wednesday (7/13/2016)

Start at 9:00 a.m.	
9:00 a.m. - 10:30 a.m.	Standard script testing and de-bugging procedures, how to be efficient
10:30 a.m. - Noon	Scripting tips and tricks
Noon - 1:15 p.m.	Lunch break
1:15 - 2:30 p.m.	How to use the tool
2:30 p.m. - 3:30 p.m.	Best practices when using the tools, how to evaluate and interpret results (reasonableness checks)
3:30 p.m. - 3:45 p.m.	Solving common issues and error checking
3:45 p.m. - 4:00 p.m.	Tips and tricks when using the tools
4:00 p.m. - 5:00 p.m.	Files transferring and wrap up

Caltrans District 11 Training

presented by

Cambridge Systematics, Inc.

Chao Wang

July 12-13, 2016

CAMBRIDGE SYSTEMATICS

Agenda (Day 1 Morning)

- 9:00 a.m. - 9:15 a.m.
  - Training Sessions Overview (what we will be working and accomplishing in the two day working sessions)
- 9:15 a.m. - 9:30 a.m.
  - A brief introduction of GISDK
- 9:30 a.m. - 9:50 a.m.
  - Best purposes/uses for custom scripting
- 9:50 a.m. – Noon
  - Script block architecture and documentation (Discussion of the flowchart)

Agenda (Day 1 Afternoon)

- 1:15 p.m. - 5:00 p.m.
  - Standard structured script development procedures

Agenda (Day 2 Morning)

- 9:00 a.m. - 10:30 a.m.
  - Standard script testing and de-bugging procedures, how to be efficient
- 10:30 a.m. – Noon
  - Scripting tips and tricks

Agenda (Day 2 Afternoon)

- 1:15 p.m. - 2:30 p.m.
  - How to use the tool
- 2:30 p.m. - 3:30 p.m.
  - Best practices when using the tools, how to evaluate and interpret results
- 3:30 p.m. – 4:00 p.m.
  - Solving common issues and error checking
  - Tips and tricks when using the tools
- 4:00 p.m. - 5:00 p.m.
  - Files transferring and wrap up

Training Sessions Overview

- Goal
  - Present and discuss methods used in the D11 Highway Post Processor (the tool)
  - Check and test the tool
  - Train on how to write GISDK code
  - Train on how to use the tool

A Brief Introduction of GISDK

- Geographic Information System Developer's Kit
- A complete programming language for
  - » designing menus and dialog boxes
  - » writing macros

Best Purposes/Uses for Custom Scripting

- Tasks that will be repeated in the future
- Tasks that likely introduce human errors
- Tasks that requires tracking how the results are developed
- Tasks that requires a lot of knowledge but needs participation of junior staff

Script Block Architecture and Documentation

- Review of Flowchart
  - Corridor direction
    - One-way links with corridor direction information in the street name field
    - One-way links without corridor direction information in the street name field
    - Two-way links

Script Block Architecture and Documentation

- Review of Flowchart
  - Corridor definition file
    - Correspondence of corridor ID and route ID, e.g., Corridor 1 is Interstate 5 (I-5)
      - Highway network has the corridor ID information
      - Count station file has the route ID information
      - With the corridor definition file, it is guaranteed that count stations are matched to the right highway network links on the same corridor (no tagging is performed)
    - Served as an index of corridors

Script Block Architecture and Documentation

- Review of Flowchart
  - Tag count stations with link attributes
    - In the count station file, add these fields
      - Corridor ID, Link ID, hwycov ID and Link_ABBA
    - Find out on which link the count station is located
    - Find out the direction of the link if a count station is located on a two-way link
    - By corridor and direction

Script Block Architecture and Documentation

- Review of Flowchart
  - Creation of the lookup table
    - What does a lookup table look like
    - Peak Hour Factor (PHF) can be calculated based on the count file alone
    - Adjustment Ratio (AR) can only be obtained by comparing the counts and the base year model assignment results on the link where the count station is located
      - Tag count stations with link attributes (Corridor ID, Link ID, hwycov ID and Link_ABBA)

Script Block Architecture and Documentation

- Review of Flowchart
  - Ramp type
    - Process all links with IFC = 9
      - On ramp (from IFC <> 1 to IFC = 1)
      - Off ramp (from IFC = 1 to IFC <> 1)
      - Freeway to freeway ramp (from IFC = 1 to IFC = 1)
      - Ramp to ramp (from IFC = 9 to IFC = 9)

Script Block Architecture and Documentation

- Review of Flowchart
  - Match links to count stations
    - Each of the corridor links should be matched to a count station, in order to apply the station specific PHF and AR
    - Off ramps and freeway to freeway ramps should also be matched to count stations
    - All other links use the regional PHF and AR
    - In the highway network, add these fields
      - Count_Station_ID, COSTAT (not matched to a certain direction yet)

Script Block Architecture and Documentation

- Review of Flowchart
  - Post process traffic forecasts
    - Apply the PHF to get the peak hour volumes
    - Apply the PHF and AR to get the adjusted peak hour volumes

Standard Structured Script Development Procedures

1. Develop the Flowchart
2. Consider Functions and Methods
3. Write Macros
4. Develop the Interface
5. Test and Debug

Elements of GISDK Macros

- Data type
  - Variable
  - Vector
  - Array
  - Matrix
- Flow control
  - For statement
  - If statement
  - While statement

Elements of GISDK Macros

- Call GISDK macros
- Call custom macros
- Input / Output
  - Open a map
  - Open a dataview
  - Export
  - Write a text file

Functions and Methods

- Corridor direction identification
  - One-way links with corridor direction information in the street name field
    - Use the corridor direction information in the street name field
  - One-way links without corridor direction information in the street name field
    - Use the corridor direction information of the upstream or downstream links
  - Two-way links
    - Use the direction of a sequence of links

Functions and Methods

- Tag count stations with link attributes
  - By corridor and direction
  - Steps:

    For each corridor and direction (e.g. for Corridor 1 NB)

    1. In the count station file, select all stations on the studied corridor with the studied direction
    2. In the highway network, export
       - all one-way links on the same corridor and with the studied corridor direction
       - all two-way links on the same corridor
    3. Tag selected count stations from step 1 with link attributes from links generated in step 2

Functions and Methods

- Create lookup table
  - PHF based on counts only
  - Adjustment Ratio
    - Join the count station file with the base year traffic assignment results
      - For one way links, join based on tagged link ID
      - For two way links, join based on tagged link ID and tagged Link_ABBA
  - Export the lookup table
  - Apply the lower bound and upper bound

Functions and Methods

- Ramp type identification
  - Process all links with IFC = 9
    - On ramp (from IFC <> 1 to IFC = 1)
    - Off ramp (from IFC = 1 to IFC <> 1)
    - Freeway to freeway ramp (from IFC = 1 to IFC = 1)
    - Ramp to ramp (from IFC = 9 to IFC = 9)

Functions and Methods

- Match links to count stations
  - For corridor non-ramp links
    - Match to the nearest count station on the same corridor
      - Select the non-ramp corridor links in the highway network
      - Export count stations on the same corridor
      - Find the nearest count station based on the midpoint of each link
  - For off ramps and freeway to freeway ramps
    - Use the count station of immediate upstream links

Functions and Methods

- Post process traffic forecasts
  - Join the count station file with the base year traffic assignment results
    - For one way links, join based on COSTAT by direction (COSTAT2). Each COSTAT2 is matched to one link.
    - For two way links, join based on link ID and Link_ABBA. Each COSTAT2 is matched to one direction (either AB or BA) of a two-way link.
    - Copy PHF and AR to corresponding links and directions

Develop the Interface

- Elements
  - Tab
  - Button
  - Text
  - Radio button
  - Frame
  - Checkbox
  - Edit real

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CAMBRIDGE SYSTEMATICS

Agenda (Day 2 Morning)

- 9:00 a.m. - 10:20 a.m.
  - Standard script testing and de-bugging procedures, how to be efficient
  - Scripting tips and tricks
- 10:30 a.m. – Noon
  - How to use the tool
  - Best practices when using the tools, how to evaluate and interpret results
  - Solving common issues and error checking
  - Tips and tricks when using the tools

Agenda (Day 2 Afternoon)

- 1:15 p.m. - 2:20 p.m.
  - Files transferring and wrap up
  - Discuss action items and next steps
- 2:30 p.m. – 4:00 p.m.
  - TransCAD training
  - Set up the SANDAG ABM and/or ICTM
  - Others

Standard Script Testing and De-bugging

- Script Testing
  - Manually calculate the results and compare to the tool final output
  - Review the results of each step

Standard Script Testing and De-bugging

- De-bugging
  - TransCAD debugger
    - Open and trigger the debugger
    - Debugger windows: breakpoints, call stack, variables, watch
    - Set breakpoints
    - Flow control

Scripting Tips and Tricks

- Refer to other script and make modifications
- Batch mode recording

How to use the tool

- "Corridor_ID" should be filled by users in the highway network before running the tool
- Tool suggested values vs. user reviewed values
- How to check the model results at each step
- How to retain user reviewed values and transfer from one network to another