

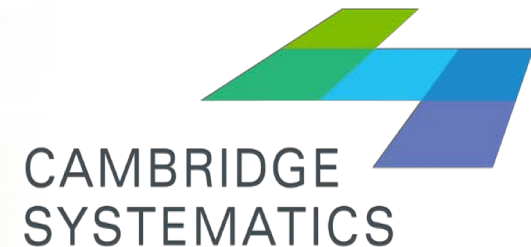
TransModeler Training 3-Turning Movement Count

presented to

Caltrans, District 1-Eureka

presented by

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Think  Forward

Creating universal traffic data format (UTDF)

➤ Input:

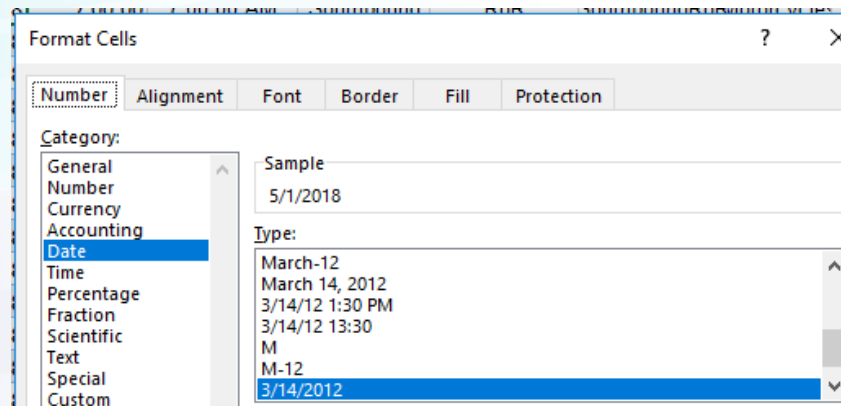
Interval	Approach	Movement	Class	Volume		Begin 5/1 AM
7:00 AM	Southbound	R	Motorcycles	0		
7:00 AM	Southbound	RoR	Motorcycles	0		
7:00 AM	Southbound	T	Motorcycles	0		
7:00 AM	Southbound	L	Motorcycles	1		
7:00 AM	Southbound	U	Motorcycles	0		

➤ Output:

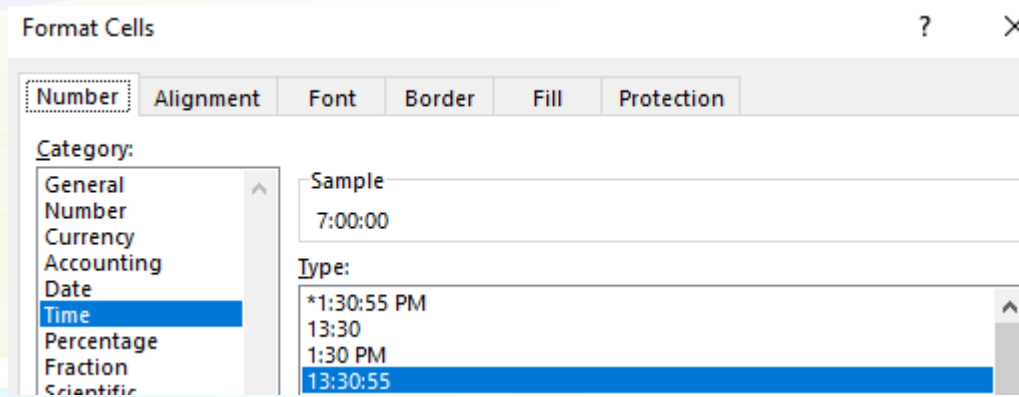
TIME	INTID	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
7:00 AM	21	211	449	0	0	621	112	275	0	304	0	0	0
7:00 AM	22	0	533	382	265	656	0	0	0	0	125	0	222
7:00 AM	7	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	5	18	74	66	1	192	2	18	8	0	8	32	60
7:00 AM	6	31	125	0	0	235	35	90	0	33	0	0	0
7:00 AM	8	0	89	122	161	172	0	0	0	0	67	2	34

Creating Additional Columns

- Create date and time columns to split time and date in “Interval” column
 - insert a column for date, format the cells as date



- insert a column for time, format the cells as time



Creating Additional Columns

- In Date column, type the formula:

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H
1	Date	Time	Interval	Approac	Movemen	TurnDef	Class	Volum
2	=INT(C2)	7:00:00	7:00:00 AM	Southbound	R	SouthboundR	Motorcycles	0
3	5/1/2018	7:00:00	7:00:00 AM	Southbound	RoR	SouthboundRoR	Motorcycles	0

- In Time column, type the formula:

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H
1	Date	Time	Interval	Approac	Movemen	TurnDef	Class	Volum
2	5/1/2018	=[@Interval]-A2	7:00:00 AM	Southbound	R	SouthboundR	Motorcycles	0

Creating Additional Columns

➤ Create Turn Def column (combining approach and movement columns)

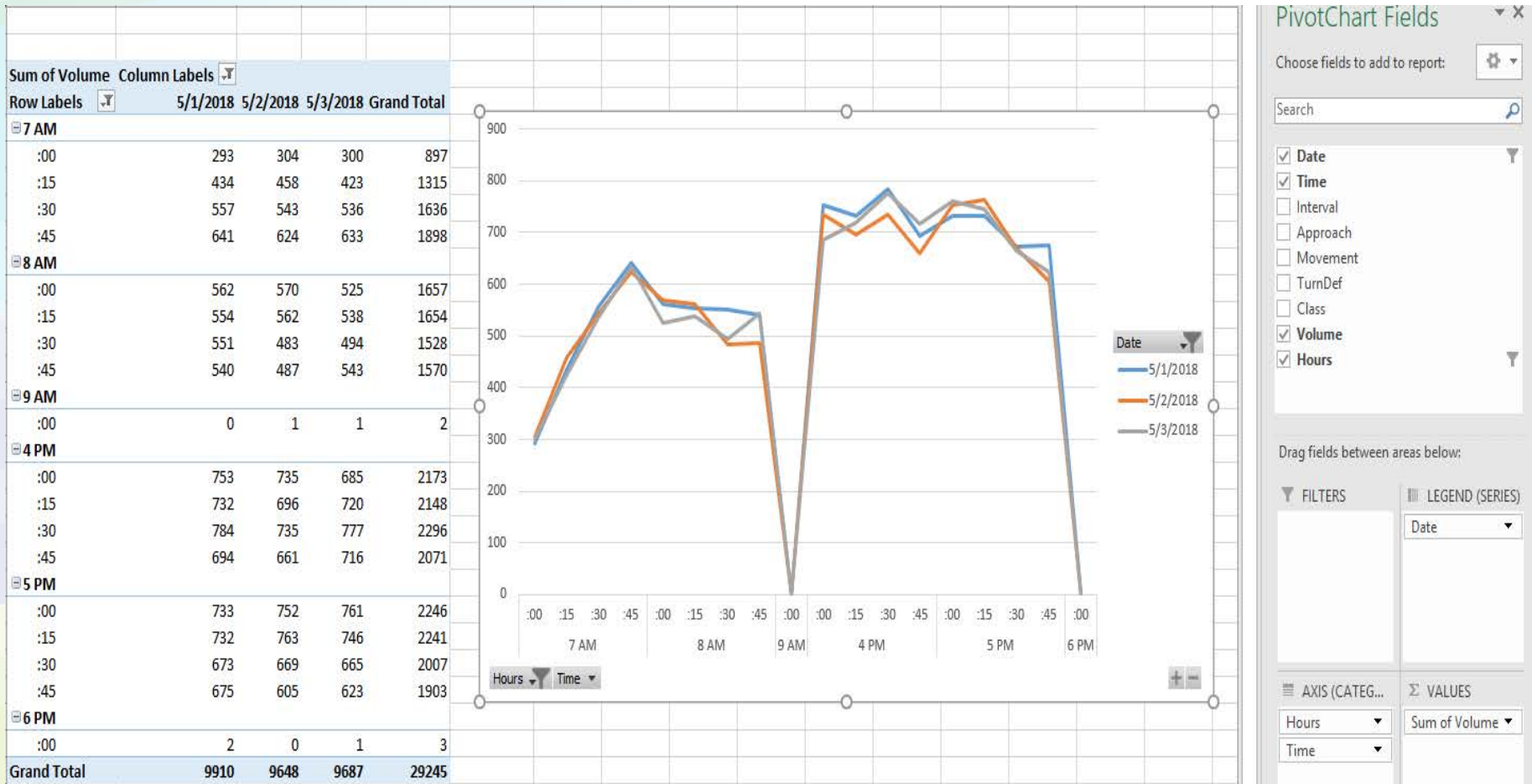
The screenshot shows an Excel spreadsheet with a formula bar at the top containing the formula `=[@Approach]&E2`. Below the formula bar, a table is visible with the following columns and data:

	A	B	C	D	E	F
1	Date	Time	Interval	Approach	Movement	TurnDef
2	5/1/2018	7:00:00	7:00:00 AM	Southbound	R	=[@Approach]&

Create Simple Pivot Table

- The purpose is to observe day to day variation of the data
- Select all data range
- Click on insert → Pivot Table
- Arrange the data as shown in the next slide

Create Simple Pivot Table



PivotChart Fields

Choose fields to add to report:

Search

- Date
- Time
- Interval
- Approach
- Movement
- TurnDef
- Class
- Volume
- Hours

Drag fields between areas below:

FILTERS

LEGEND (SERIES)

Date

AXIS (CATEG...)

Hours

Time

SUMMARY VALUES

Sum of Volume

Create Average Table

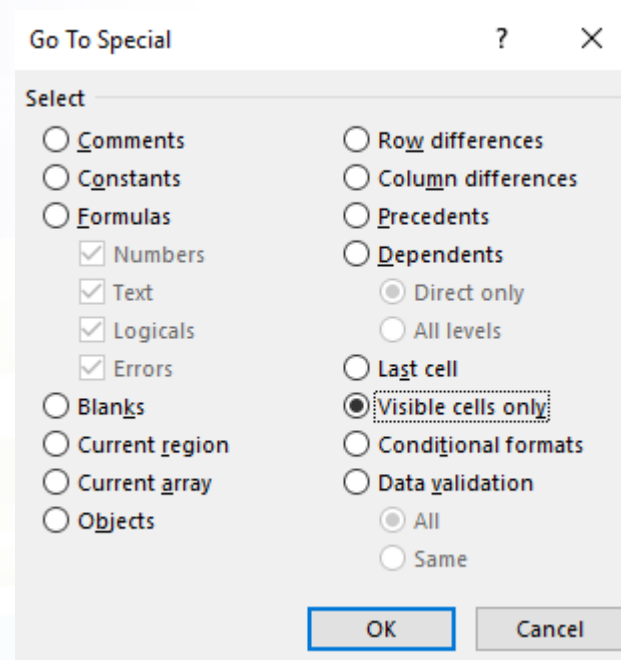
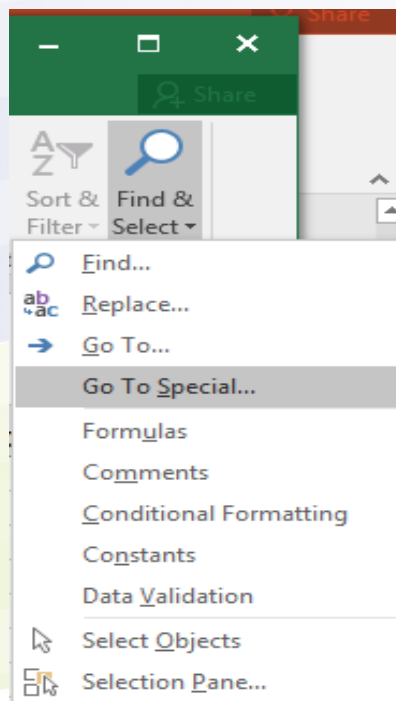
➔ create 3 separate work sheets for every date

Filter the column “date” for the desired day

Find&Select→ Go To Special

Select “Visible Cells Only”

Copy and paste the table in new worksheet



Create Pivot table from the Average table

- create a new table where the column “Volume” is average (or rounded average) of 3 days.
- Create a pivot table based on this table.
- Make sure time is displayed in 15-minute interval
- Group classes to passenger car (PC) and truck
- Sort the header (TurnDef) as appears in the UTDF format

Pivot Table Field arrangement

Sum of Volume	Column Labels	EastboundL	EastboundR	EastboundT	WestboundL	WestboundR	WestboundT	NorthboundL	NorthboundR	NorthboundT
7 AM										
Articulated Trucks	0.33333333	0	0	0	0.66666667	0	2.33333333	0.33333333		5.66666667
Bicycles on Road	0	0	0	0	0	0	0	0		0
Buses	0	0	0	0	0	0	0	0		0
Cars	0	0	0	0	0.66666667	0	1	0.33333333		113.66666667
Light Goods Vehicles	0.33333333	0	0	0	0	0	0.66666667	0		0
Motorcycles	0	0	0	0	0	0	0	0		0.33333333
Single-Unit Trucks	0	0	0	0	0	0	0.66666667	0		6.33333333
7:15	0.66666667	0.33333333	0	1	0	0	0	3		2
Articulated Trucks	0	0	0	0	0	0	0	0		0
Bicycles on Road	0	0	0	0	0	0	0	0		0.33333333
Buses	0	0	0	0	0	0	0	0		1
Cars	0.33333333	0	0	0.66666667	0	0	1	1		1
Light Goods Vehicles	0.33333333	0.33333333	0	0.33333333	0	0	2	0		0
Motorcycles	0	0	0	0	0	0	0	0		0.33333333
Single-Unit Trucks	0	0	0	0	0	0	0	0		10.33333333
7:30	0.33333333	0	0	1	0	0.66666667	5	2		342.66666667
Articulated Trucks	0	0	0	0	0	0	0	0		0
Bicycles on Road	0	0	0	0	0	0	0	0		0.66666667
Buses	0	0	0	0	0	0	0	0		0
Cars	0	0	0	1	0	0.33333333	1.33333333	1.66666667		243.33333333
Light Goods Vehicles	0.33333333	0	0	0	0	0.33333333	3.66666667	0.33333333		80.66666667
Motorcycles	0	0	0	0	0	0	0	0		0
Single-Unit Trucks	0	0	0	0	0	0	0	0		0

PivotTable Fields

Choose fields to add to report: ⚙️

Search

- Date
- Time
- Interval
- Approach
- Movement
- TurnDef
- Class
- Volume
- Hours

MORE TABLES...

Drag fields between areas below:

FILTERS	COLUMNS
	TurnDef

ROWS	VALUES
Hours	Sum of Volume
Time	
Class	

Desirable Time Aggregation

The screenshot shows the Microsoft Excel interface with the PivotTable Tools ribbon active. The 'Analyze' tab is selected, and the 'Group Selection' button is highlighted with a red box. The PivotTable field list shows 'Time' as the active field. The 'Grouping' dialog box is open, showing 'Starting at: 7:00:00 AM' and 'Ending at: 6:00:00 PM'. The 'By' dropdown is set to 'Hours', which is also highlighted with a red box. The background shows a PivotTable with columns for 'WestboundL', 'WestboundR', 'WestboundT', and 'Northbound' and rows for various vehicle types.

	WestboundL	WestboundR	WestboundT	Northbound
7 AM	2.666666667	1.666666667	0.666666667	16.66666
Articulated Trucks	0	0	0	0
Bicycles on Road	0	0	0	0
Buses	0	0	0	0
Cars	2.333333333	1.666666667	0.333333333	5.333333
Light Goods Vehicles	0.333333333	0	0.333333333	10.33333
Motorcycles	0	0	0	0
Single-Unit Trucks	0	0	0	0

Group Classes

- Click and hold Ctrl to select classes that you want together, click on Group Selection, and rename the selection. Create groups for PC and Truck

The screenshot shows the Microsoft Excel interface with the PivotTable ribbon active. The 'Group Selection' button is highlighted with a red box. A tooltip for 'Group Selection' is displayed, stating 'Create a group containing the selected items.' The spreadsheet below shows a PivotTable with 'Sum of Volume' as the value field and 'Column Labels' as the filter. The data includes categories like 'Articulated Trucks', 'Bicycles on Road', 'Buses', 'Cars', 'Light Goods Vehicles', and 'Motorcycles'.

	Column Labels	EastboundL	EastboundR	EastboundT	Westbound
7 AM		2	0.333333333	0.666666667	2.666666667
Articulated Trucks		0	0	0	
Bicycles on Road		0	0	0	
Buses		0	0	0	
Cars		0.666666667	0	0.333333333	2.333333333
Light Goods Vehicles		1.333333333	0.333333333	0.333333333	0.333333333
Motorcycles		0	0	0	

Sort the Header

➤ Desired header sorting is:

EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

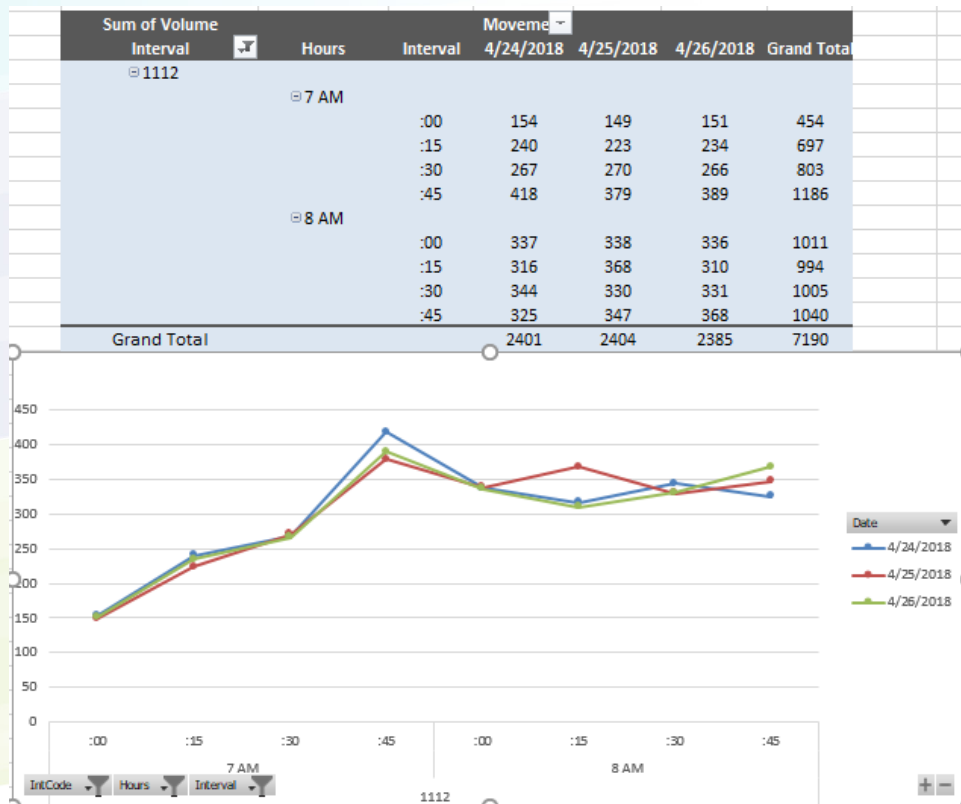
➤ sort the header as desired somewhere.

A	B	C	D	E	F	G	H	I	J	K	L
EastboundL	EastboundR	EastboundT	WestboundL	WestboundR	WestboundT	NorthboundL	NorthboundR	NorthboundT	SouthboundL	SouthboundR	SouthboundT

- File → Options → Advanced → General → Edit Custom Lists, select the range and click “Import”.
- Get back to the Pivot table, click on the header, sort from A to Z

Turning Movement Count

- Add date and intersection code to the raw table
- With pivot table, arrange the data as desired and evaluate the data consistency



Turning Movement Count Coding

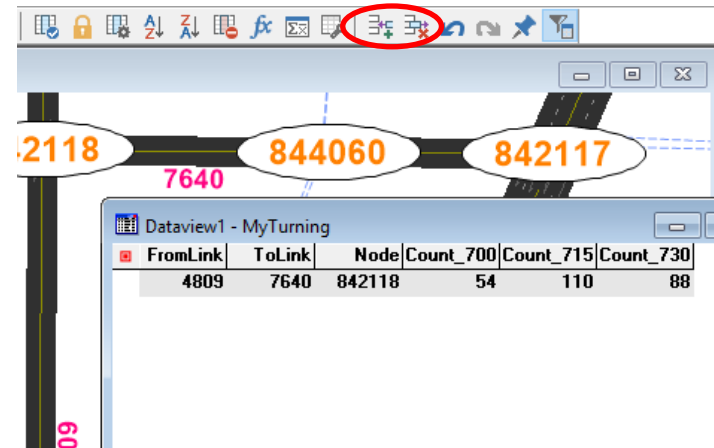
- Create a .bin table: File → New → Table → Fixed_format binary
- Add these attributes: FromLink, ToLink, Node, Count_700, Count715, etc

New Table

Table Structure

Field Name	Type	Width	Deci	Index	Default	Format	Display Name
FromLink	Integer (4 bytes)	8		<input type="checkbox"/>		None	
ToLink	Integer (4 bytes)	8		<input type="checkbox"/>		None	
Node	Integer (4 bytes)	8		<input type="checkbox"/>		None	
Count_700	Integer (4 bytes)	8		<input type="checkbox"/>		None	
Count_715	Integer (4 bytes)	8		<input type="checkbox"/>		None	
Count_730	Integer (4 bytes)	8		<input type="checkbox"/>		None	

Buttons: OK, Cancel, Add Field, Drop Field, Move Up, Move Down



- Depends on how many counts collected, it might be easier to automatically create .bin files such as turning delay (created by TransModeler) and edit the file, instead of creating one from scratch.

Segment Count Coding

- Set the current layer to Segment
- Dataview → Table → Modify
- Add attributes: AB_Count_700, BA_Count_700, AB_Count_7:15, BA_Count_715, etc,

Modify Table

Field Name	Type	Width	Deci	Index	Default	Format	Display Name
FA_NO	Character	10		<input type="checkbox"/>		None	
DO_NCHRP	Integer (4 bytes)	8		<input type="checkbox"/>		None	
BASEVOL	Real (8 bytes)	10	2	<input type="checkbox"/>		None	
AB_DaySpd	Real (8 bytes)	9	2	<input type="checkbox"/>		None	
BA_DaySpd	Real (8 bytes)	9	2	<input type="checkbox"/>		None	
AB_DyFlow	Real (8 bytes)	9	2	<input type="checkbox"/>		None	
BA_DyFlow	Real (8 bytes)	9	2	<input type="checkbox"/>		None	
Tot_DyFlow	Real (8 bytes)	9	2	<input type="checkbox"/>		None	
SUBAREA_SET	Integer (4 bytes)	10		<input type="checkbox"/>		None	
CLASS	Integer (4 bytes)	12		<input type="checkbox"/>		None	
AB_Count_700	Integer (4 bytes)	12		<input type="checkbox"/>		None	

Buttons: OK, Cancel, Add Field, Drop Field, Move Up, Move Down, Attach Codes, Drop Codes, Export Codes

- Fill them with available counts for the associated segment.

Dataview1 - Segments Info

ID	7642
AB_DaySpd	28.49
BA_DaySpd	28.45
AB_DyFlow	15000.78
BA_DyFlow	15378.42
Tot_DyFlow	30379.20
SUBAREA_SET	1
CLASS	203
AB_Count_700	1200
BA_Count_700	900

Indirect segment Count

- Matrix estimation process does not produce turning volume output, but only segment volume output. Therefore, to see how well our turning movements are replicated, we need to generate segment count from the observed turning counts.
- TrnasModeler can create “link” count based on turning counts which is explained in next webinar. The counts can be added as attributes to link layer. Link layer then should be joined to the segment layer, so segment attributes for count could be filled with link count attribute (as discussed earlier, there is no 1-1 relation between link and segments, sometimes a link can include more than a segment)
- Segment counts should be spot checked to make sure link to segment join/attribute transfer is done properly.

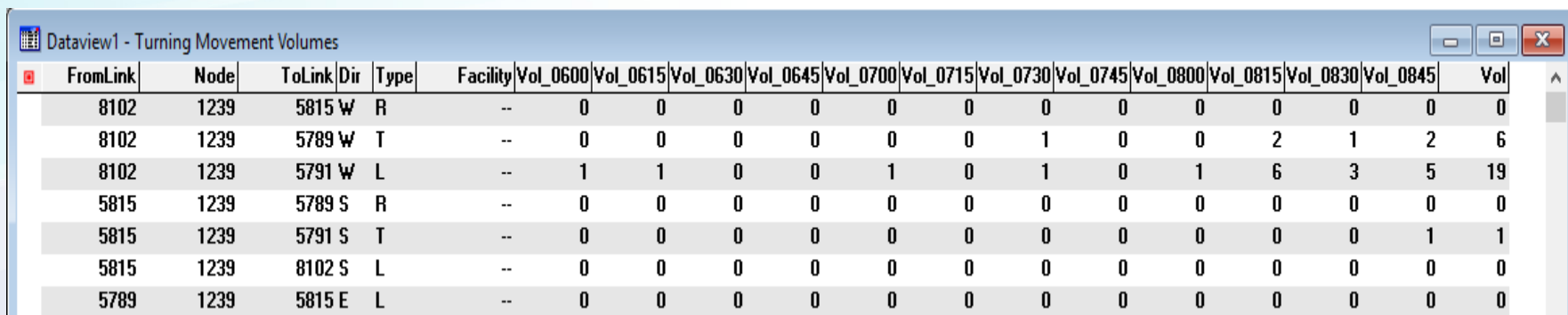
Generating Turning movement Volume

The screenshot displays the 'Output Manager' window, which is divided into three main sections:

- Runs:** A list of runs with the date and time '05/24/18 14:11:03' selected.
- Reports:** A tree view of report categories. The 'Turning Movement Table' is highlighted under the 'Output Tables' category. Other visible reports include Trip Histogram, Flow & Travel Time, Delay, Queues, Sensor Data, Emissions, Travel Time Tables, Transit Travel Time Tables, and Path Flow Table.
- Filters:** A section at the bottom for configuring report parameters:
 - From:** 08:00:00
 - To:** 09:00:00
 - Interval:** 60 minutes
 - Selection:** All Records

Generating Turning movement Volume

- Each Transmodeler simulation run, automatically produces a file “simulation name”+Turning Movement Volumes.bin that looks like this:



FromLink	Node	ToLink	Dir	Type	Facility	Vol_0600	Vol_0615	Vol_0630	Vol_0645	Vol_0700	Vol_0715	Vol_0730	Vol_0745	Vol_0800	Vol_0815	Vol_0830	Vol_0845	Vol
8102	1239	5815 W	R		--	0	0	0	0	0	0	0	0	0	0	0	0	0
8102	1239	5789 W	T		--	0	0	0	0	0	0	1	0	0	2	1	2	6
8102	1239	5791 W	L		--	1	1	0	0	1	0	1	0	1	6	3	5	19
5815	1239	5789 S	R		--	0	0	0	0	0	0	0	0	0	0	0	0	0
5815	1239	5791 S	T		--	0	0	0	0	0	0	0	0	0	0	0	1	1
5815	1239	8102 S	L		--	0	0	0	0	0	0	0	0	0	0	0	0	0
5789	1239	5815 E	L		--	0	0	0	0	0	0	0	0	0	0	0	0	0

- This bin file can generate volume for any user-specific time period, if generated through Output Manager: (you may be asked to identify the run based on which you want this output)

Generating Turning movement Volume

➤ Before running the simulation:

1- Identify how many runs are needed (more than 1 run is usually desired to smooth out the results and lower the variations between runs due to simulation stochasticity)

2- Make sure for each scenario, the inputs are correctly defined in Project Settings (network, trip matrix, signal timing file, historical travel time, parameter files)

If you input a TM table, you can visualize the values at any controlled intersection.

Project → Settings → Network → Turning Movement Variables browse and find the desired file, save the simulation database.

Generating Turning movement Volume

- Open the Intersection Toolbar. Click on any controlled intersection, under “Turn” tab, you can visualize the turning volume.

The screenshot displays the Intersection Control Editor interface. The main window shows a diagram of a T-intersection where Humboldt St meets IST. Blue arrows indicate turning movements with associated volume values: 0.0 for left turns, 0.0 for through/right turns from Humboldt St, and 1.0, 36.0, and 0.0 for movements from IST.

The Turn Movement Table is visible on the right side of the interface, showing the following data:

From \ To	IST	HUMBOLDT ST	HUMBOLDT ST
HUMBOLDT ST	0	0	0
HUMBOLDT ST	0	0	0
IST	36	1	0