Team C-rious

Milestone 4

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Content

- Data collection
- Input and output variables
- Difficulties faced and limitations on the accuracy
- Cost analysis
- Project progress
- Lessons learned


Engelmann-Energien mbH - Photovoltaik...
Norma
W
Wolfenbütteler Str.
Neue Apotheke
Pfarrei St Magdeb...
B (E)
Braunschweiger Str.
B (w)
Braunschweiger Str.
Arbeitsvermittlung Danial
Hyperion
Parkplatz
S
MDC-Großhandel
R
Deluxe Cosmetics
Schöninger Str.
Motorradsport Schadenberg
Motorcycle dealer
Freddy Fresh Pizza Magdeburg-Sudenburg
Pizza Delivery
Rottersdorfer Str.
Grünes und Schö
Florist

Data Collection

- Throughput
- Inter-arrival time
- Waiting time
- Turning direction

Data Collection

Starting time: 5:00 - 5:15

Wolfenbütteler Str to

Street Name	Tally	Total Count
Rottersdorfer Straße	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	18
Schöninger Straße		0
Braunschweiger Straße (W)	𝍸 𝍸 𝍸	3

21

Schöninger Straße to

Street Name	Tally	Total Count
Braunschweiger Straße (W)		0
Wolfenbütteler Str	𝍸 𝍸	2
Rottersdorfer Straße	𝍸 𝍸 𝍸 𝍸	4

6

Traffic Data Collection at Junctions: Tallying Car Directions

Starting time: 5:15 - 5:30

Braunschweiger Straße (W) to

Street Name	Tally	Total Count
Wolfenbütteler Str.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	6
Rottersdorfer Straße	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	15
Schöninger Straße	𝍸 𝍸 𝍸	3

Braunschweiger Straße (O) to

Street Name	Tally	Total Count
Braunschweiger Straße (W)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	12
Wolfenbütteler Str.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	10
Rottersdorfer Straße	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	17
Schöninger Straße		0

Data Collection

CAR	W (InterArrival)	W (Waiting)	INTER-ARRIVAL TIME B (O) (InterArrival)	B (O) (Waiting)
1	2:31		0:20	
2	0:07		0:19	
3	0:26	[2 sec]	0:02	
4	0:26		0:40	
5	0:25		0:58	
6	1:01		0:25	
7	2:10		0:19	
8	0:51		0:02	[2 sec]
9	0:12	[3sec]	0:06	
10	0:02		0:51	
11	0:17		1:11	
12	0:14		0:09	
13	3:59	[4:30pm]	0:33	
14	7:34		0:24	
15	0:16		0:12	
16	1:34		0:22	
17	0:05		0:15	
18	0:30		0:15	[2sec]
19	3:24		0:14	
20	0:18	[4:45pm]	0:23	
21	3:15		0:02	
22	0:59		2:37	
23	0:27		0:03	
24	0:08	[2sec]	1:35	
25	0:43		0:15	
26	0:09		0:03	
27	0:13		0:12 [4:30pm]	
28	0:09	[2sec]	1:11	
29	1:51		2:58	
30	0:10		0:23	
31	0:29		0:37	
32	0:05	[2sec]	0:15	
33	0:30	[4 sec]	0:27	

CAR	W (InterArrival)	W (Waiting)	B (O) (InterArrival)	B (O) (Waiting) Inter-arrival
34	0:54		2:10	51) 0:48
35			1:21	52) 0:14
36	2:24	15pm	0:06	53) 0:29
37	3:36		0:36	54) 0:39
38	2:21		1:10	55) 0:20
39	1:04		0:14	56) 0:21
40	0:10	[3sec]	0:42	57) 0:06 [2 sec]
41	0:30	[4sec]	0:43	58) 0:26
42	0:35		0:02	59) 0:32
43	2:48	[2sec]	0:02 [4:45pm]	60) 0:29
44	1:02		1:05	61) 0:16
45	2:22		0:12	62) 0:02
46	3:26	[2sec]	0:52	63) 0:57
47	0:05	15:15pm	0:02	64) 0:28
48			0:27	65) 0:40
49			1:18	66) 0:44 [2 sec]
50			0:02 [2sec]	67) 0:42

91) 0:03
92) 0:08
93) 0:21
94) 0:16
95) 0:33
96) 0:04
97) 0:24
98) 1:54
99) 0:47
100) 0:48
101) 0:23
102) 0:11
103) 0:14
104) 0:29
105) 0:17
106) 0:15
107) 0:02
108) 0:02
109) 1:06
110) 0:31

111) 0:02
112)

68) 0:05
69) 1:05
70) 0:09
71) 0:09
72) 1:01
73) 0:07 5pm
74) 0:25
75) 0:27
76) 0:09
77) 0:37
78) 0:13
79) 0:64
80) 0:51
81) 0:07
82) 0:48
83) 0:03
84) 0:11
85) 0:20
86) 0:25
87) 1:02
88) 0:02
89) 0:27
90) 0:14

Input and output variables

Throughput

- Confidence interval 2 to 8 cars per minute
- Mean 5 cars per minute

		Going into the junction				
		B(E)	B(W)	W	S	R
Total number of cars		431	258	206	69	-
Probability		0.45	0.27	0.21	0.07	-

		Going out from junction				
		B(E)	B(W)	W	S	R
Total number of cars		-	222	189	45	508
Probability		-	0.23	0.2	0.05	0.52

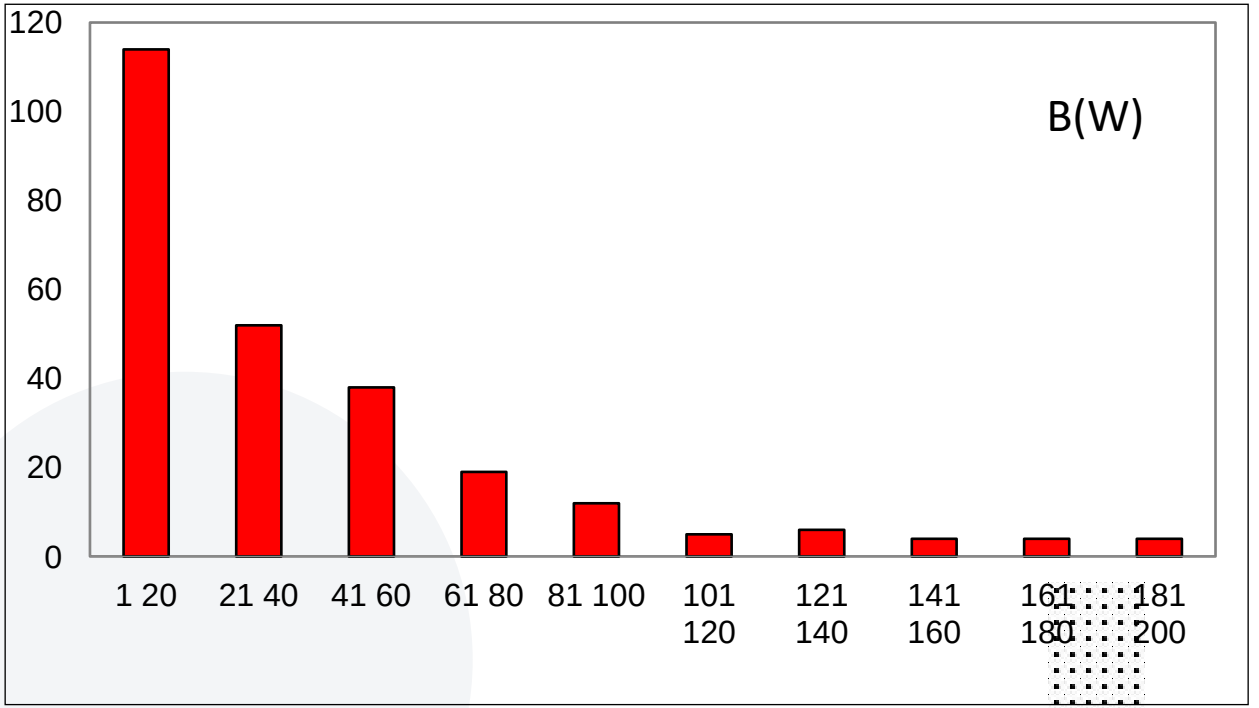
Input and output variables

Waiting times

Waiting Time (s)	Total cars			
	B(W)	B(E)	S	W
0	259	416	64	148
1	0	2	0	8
2	0	9	0	19
3	0	0	0	14
4	0	0	1	10
6	0	0	0	2
7	0	0	0	1
9	0	0	0	1

Input and output variables

xmin	xmax	Observed
1	20	114
21	40	52
41	60	38
61	80	19
81	100	12
101	120	5
121	140	6
141	160	4
161	180	4
181	200	4
201	120	0
221	240	0
241	260	1

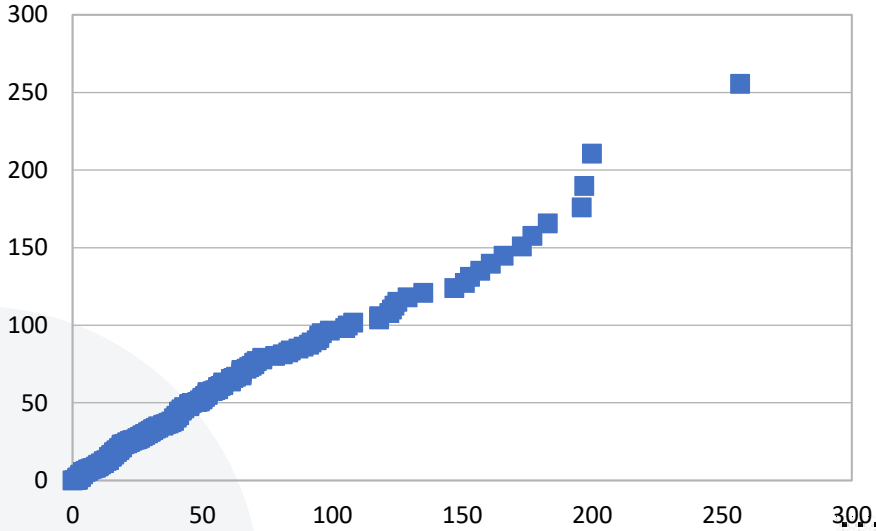


Histogram

Looks like exponentially distributed!

Input and output variables

Total no of observations = 259
Lambda = 0.025
Average = 40



Q-Q plot

Exponentially distributed!

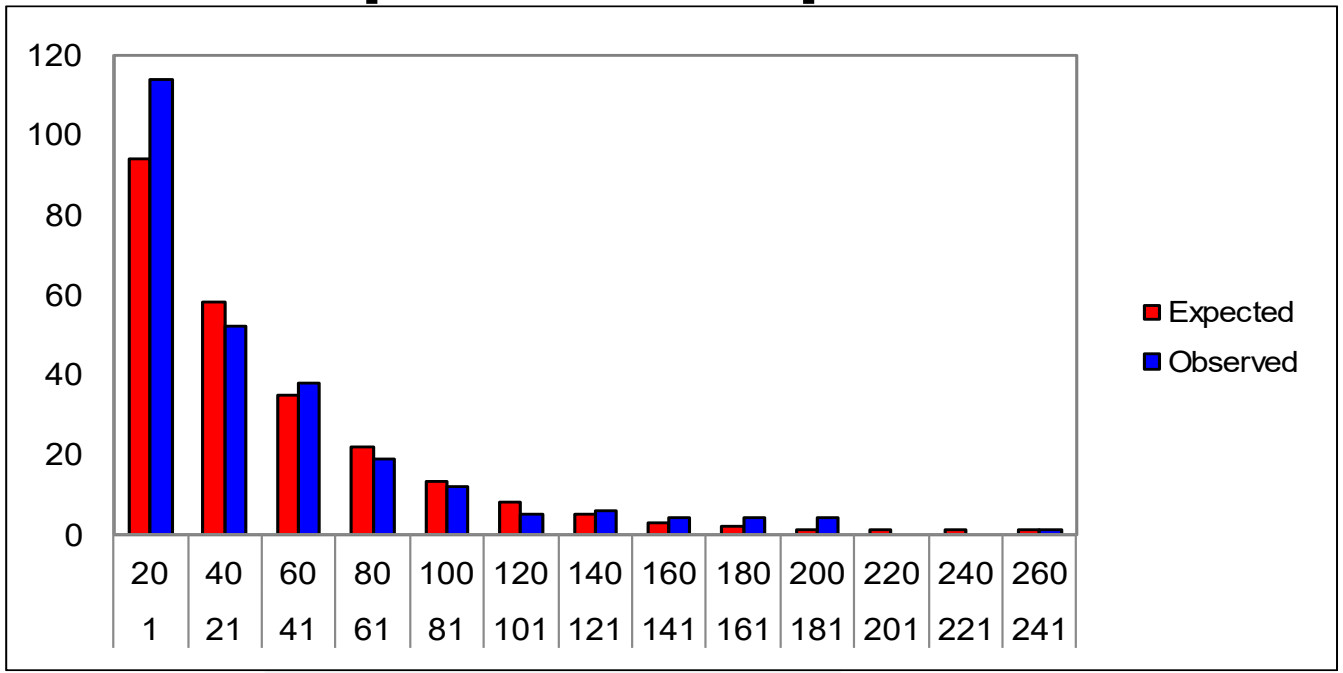
Input and output variables

		xmin	xmax	Expected	Observed	(Ei-Oi)^2/Ei
		1	20	94	114	4.26
f	**11**	21	40	58	52	0.62
alpha	**0.01**	41	60	35	38	0.26
chisq	**24.725**	61	80	22	19	0.41
Result	**ACCEPT**	81	100	13	12	0.08
		101	120	8	5	1.13
		121	140	5	6	0.20
		141	160	3	4	0.33
		161	180	2	4	2.00
		181	200	1	4	9.00
		201	220	1	0	1.00
		221	240	1	0	1.00
		241	260	1	1	0.00
					chi	**20.27749898**

Chi-Squared test

We accept, so we failed to prove that the data is not exponentially distributed!

Input and output variables



Chi-Squared test

Looks exponentially distributed!

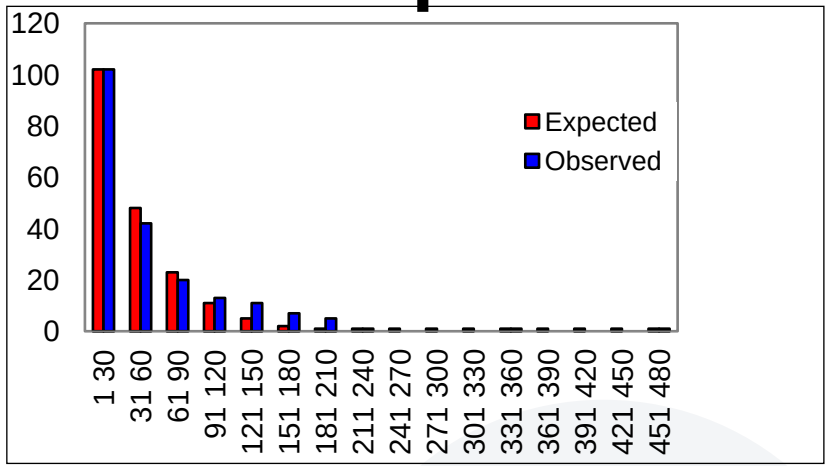
Input and output variables

		xmin	xmax	Expected	Observed	(Ei-Oi)^2/Ei
f	**2**	1	20	94	114	4.26
alpha	**0.01**	21	40	58	52	0.62
chisq	**9.210**	41	60	35	38	0.26
Result	**ACCEPT**	61	260	56	55	0.02
					chi	**5.15**

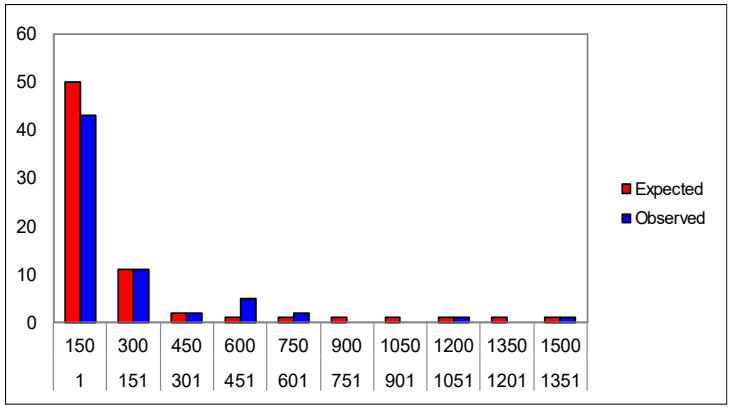
With resized buckets

Resizing the buckets did not change the outcome

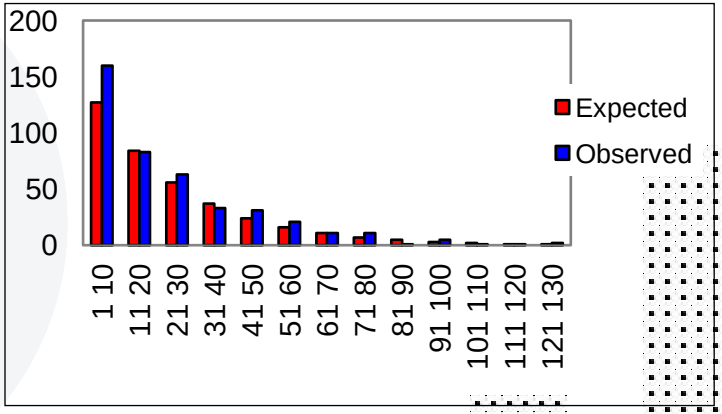
Input and output variables



W



S



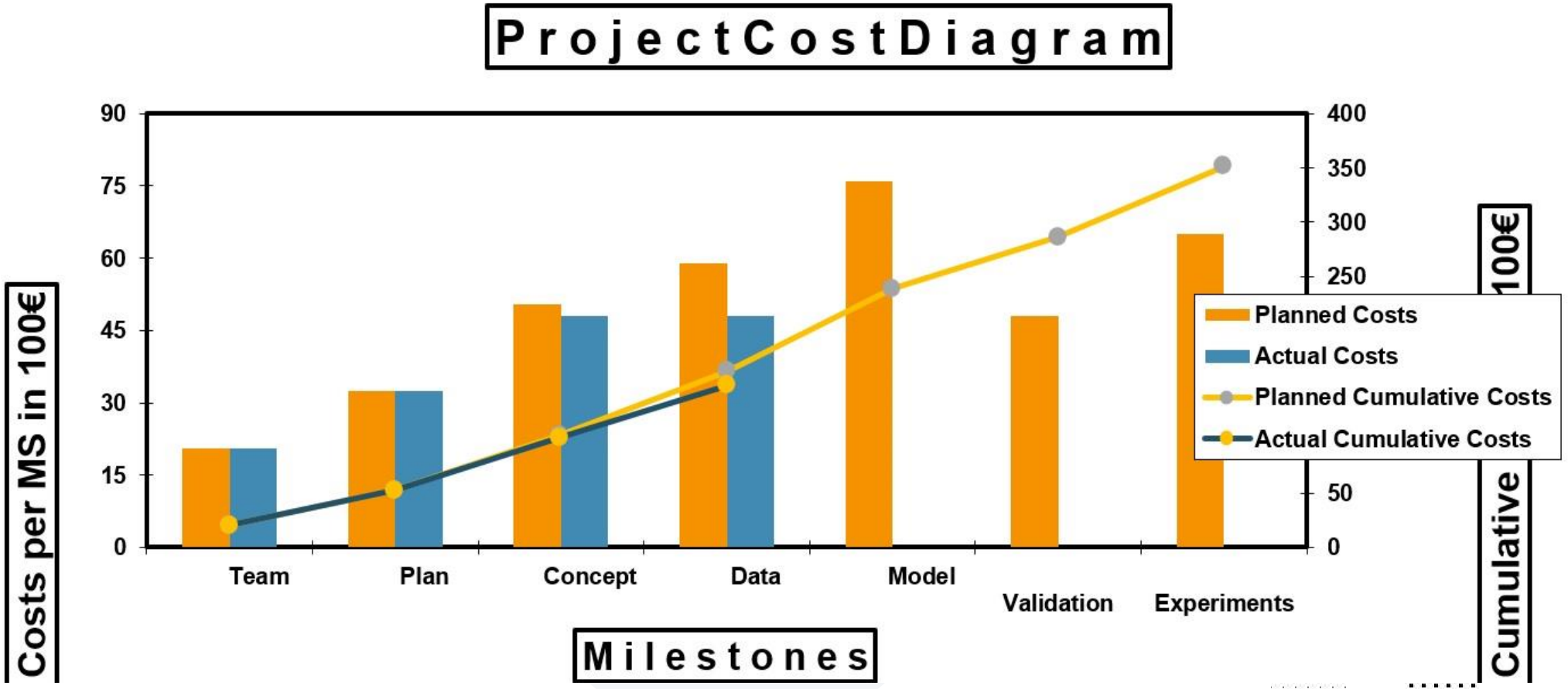
B(E)

We accept

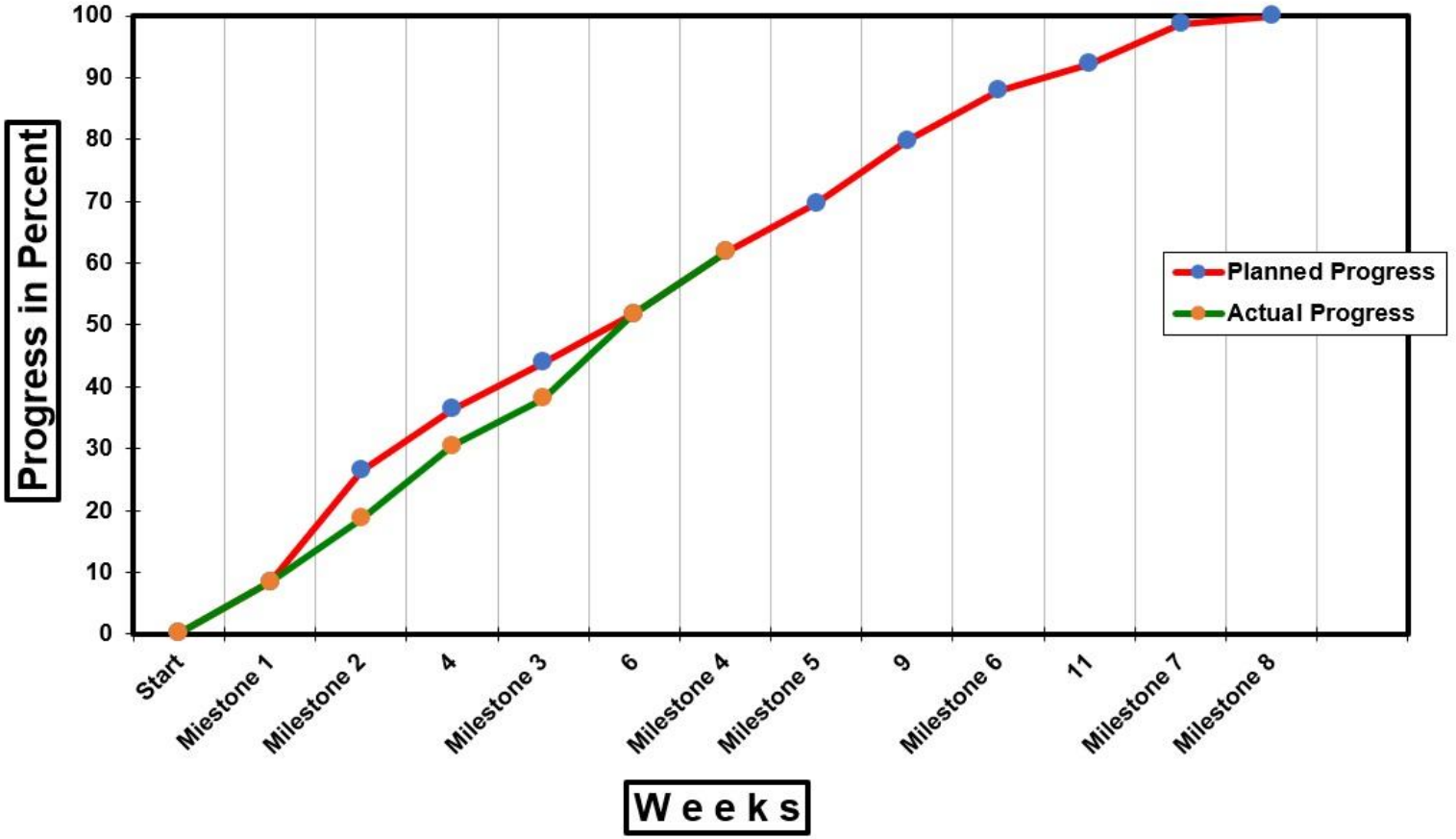
Difficulties faced and Limitations on the accuracy

- Not a lot of data points for throughput
- Not a lot of cars in general even at rush hour
- Waiting time is practically 0 everywhere
- This traffic node needs no improvement because it is so empty

Cost Analysis



Project Progress



Lessons Learned

- Collection of real-time data gave a better understanding
- More number of data gives more accurate results
- Working as a team made everything simpler

Thank you