Constraints (single) - Optimal

							$\delta_{\rm H}$	IC(L)			$\delta_{\text{HCU}(L)}$							$\delta_{HC}(P)$						$\delta_{\text{HCU}}(P)$							$\delta_{HC}(S)$							$\delta_{\text{HCU}}(S)$				
#	$ \mathcal{G} $	% Obs	0	$ G^* $	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S		
		10	1.25	8.0	28.42	7 0.42	0.35	0.23	91.7	9.89	18.711	0.42	0.35	0.23	91.7	9.89	29.079	0.44	0.32	0.24	91.7	8.17	19.204	0.44	0.32	0.24	91.7	8.17	19.073	0.45	0.26	0.3	88.9	8.03	12.571	0.45	0.26	0.3	88.9	8.03		
8.		30	3.08	3.97	28.37	5 0.33	0.32	0.35	83.3	3.92	18.792	0.31	0.37	0.31	86.1	6.22	29.133	0.43	0.31	0.26	75.0	3.86	19.146	0.43	0.31	0.26	75.0	3.86	19.034	0.43	0.19	0.38	80.6	2.86	12.571	0.39	0.29	0.32	83.3	5.11		
BLOCKS (936)	20.3	50	4.42	2.5	28.50	1 0.46	0.33	0.21	80.6	3.17	18.915	0.46	0.33	0.21	83.3	3.53	29.136	0.44	0.37	0.19	69.4	3.03	19.128	0.45	0.38	0.18	72.2	3.39	18.947	0.55	0.26	0.19	88.9	3.22	12.55	0.5	0.32	0.18	88.9	4.86		
1 40		70	6.67	1.94	28.54	0.54	0.21	0.25	72.2	1.86	18.853	0.55	0.23	0.22	77.8	2.19	26.156	0.58	0.35	0.07	83.3	3.03	17.604	0.57	0.38	0.05	88.9	3.75	17.064	0.75	0.15	0.1	97.2	2.08	11.716	0.66	0.24	0.1	97.2	2.67		
		100	8.83	1.83	28.58	0.58	0.21	0.22	75.0	2.0	18.808	0.58	0.21	0.22	75.0	2.0	20.413	0.62	0.35	0.03	91.7	3.42	14.688	0.62	0.35	0.03	91.7	3.42	14.377	0.82	0.1	0.08	100.0	1.92	9.519	0.82	0.1	0.08	100.0	1.92		
		10	1.63	2.71	11.38	3 0.92	0.08	0.0	100.0	3.1	7.565	0.92	0.08	0.0	100.0	3.1	11.91	0.4	0.56	0.03	97.9	7.06	7.953	0.4	0.56	0.03	97.9	7.06	11.449	0.65	0.19	0.15	79.2	3.29	7.507	0.65	0.19	0.15	79.2	3.29		
IPC-GRID (1248)		30	4.0	1.21	11.44	1 0.97	0.02	0.01	97.9	1.23	7.541	0.95	0.04	0.01	97.9	1.4	12.016	0.25	0.74	0.01	100.0	6.77	8.039	0.25	0.74	0.01	100.0	6.77	11.455	0.73	0.19	0.08	93.8	1.88	7.552	0.71	0.24	0.05	97.9	2.46		
è 55	7.5	50	6.19	1.13	11.44	0.97	0.01	0.02	97.9	1.1	7.537	0.96	0.02	0.02	97.9	1.13	11.978	0.27	0.71	0.03	91.7	6.27	7.982	0.27	0.71	0.03	91.7	6.27	11.423	0.83	0.11	0.06	93.8	1.31	7.581	0.81	0.16	0.03	100.0	1.83		
1 No.		70	8.69	1.04	11.43	6 0.97	0.02	0.01	97.9	1.06	7.556	0.97	0.02	0.01	97.9	1.06	11.976	0.3	0.64	0.06	72.9	5.0	7.989	0.3	0.64	0.06	72.9	5.0	11.469	0.9	0.08	0.02	97.9	1.27	7.597	0.89	0.1	0.01	100.0	1.42		
		100	11.88	1.0	11.45	3 1.0	0.0	0.0	100.0	1.0	7.481	1.0	0.0	0.0	100.0	1.0	11.902	0.23	0.57	0.19	43.8	3.38	7.97	0.23	0.57	0.19	43.8	3.38	11.425	1.0	0.0	0.0	100.0	1.0	7.615	1.0	0.0	0.0	100.0	1.0		
		10	2.0	2.83	13.43	5 0.89	0.11	0.0	100.0	3.64	8.741	0.89	0.11	0.0	100.0	3.64	13.498	0.71	0.25	0.04	97.2	4.0	8.896	0.71	0.25	0.04	97.2	4.0	13.479	0.85	0.15	0.0	100.0	3.89	8.866	0.85	0.15	0.0	100.0	3.89		
(936)		30	5.75	1.19	13.44	6 0.92	0.08	0.0	100.0	1.44	8.871	0.88	0.12	0.0	100.0	1.58	13.517	0.67	0.33	0.0	100.0	2.19	8.932	0.61	0.39	0.0	100.0	2.69	13.51	0.86	0.14	0.0	100.0	1.75	8.822	0.65	0.35	0.0	100.0	3.14		
936 36	10.0	50	9.42	1.06	13.47	7 0.96	0.04	0.0	100.0	1.17	8.789	0.96	0.04	0.0	100.0	1.17	13.566	0.72	0.28	0.0	100.0	1.69	8.864	0.71	0.29	0.0	100.0	1.75	13.438	0.93	0.07	0.0	100.0	1.25	8.887	0.79	0.21	0.0	100.0	1.69		
1 80		70	13.25	1.03	13.48	8 1.0	0.0	0.0	100.0	1.03	8.873	1.0	0.0	0.0	100.0	1.03	13.442	0.71	0.29	0.0	100.0	1.67	8.761	0.71	0.29	0.0	100.0	1.67	13.47	0.99	0.01	0.0	100.0	1.06	8.93	0.99	0.01	0.0	100.0	1.06		
		100	18.17	1.0	13.61	4 1.0	0.0	0.0	100.0	1.0	8.758	1.0	0.0	0.0	100.0	1.0	13.507	0.69	0.31	0.0	100.0	1.67	8.848	0.69	0.31	0.0	100.0	1.67	13.515	1.0	0.0	0.0	100.0	1.0	9.03	1.0	0.0	0.0	100.0	1.0		
		10	2.0	2.53	8.525	0.8	0.2	0.0	100.0	3.39	5.579	0.8	0.2	0.0	100.0	3.39	8.515	0.62	0.38	0.0	100.0	4.19	5.679	0.62	0.38	0.0	100.0	4.19	8.493	0.73	0.27	0.0	100.0	3.78	5.534	0.71	0.29	0.0	100.0	3.94		
1 2		30	5.42	1.22	8.536	0.77	0.23	0.0	100.0	1.78	5.573	0.77	0.23	0.0	100.0	1.78	8.526	0.63	0.37	0.0	100.0	2.25	5.558	0.32	0.68	0.0	100.0	4.25	8.495	0.63	0.37	0.0	100.0	2.25	5.601	0.36	0.64	0.0	100.0	4.28		
MICONIC (936)	6.0	50	8.42	1.06	8.46	0.9	0.1	0.0	100.0	1.28	5.613	0.9	0.1	0.0	100.0	1.28	8.514	0.81	0.19	0.0	100.0	1.5	5.615	0.51	0.49	0.0	100.0	3.0	8.559	0.81	0.19	0.0	100.0	1.5	5.607	0.45	0.55	0.0	100.0	3.36		
¥ .		70	11.92	1.0	8.468	0.97	0.03	0.0	100.0	1.08	5.673	0.97	0.03	0.0	100.0	1.08	8.509	0.91	0.09	0.0	100.0	1.19	5.631	0.79	0.21	0.0	100.0	1.5	8.526	0.91	0.09	0.0	100.0	1.19	5.586	0.69	0.31	0.0	100.0	1.86		
		100	16.33	1.0	8.554	1.0	0.0	0.0	100.0	1.0	5.501	1.0	0.0	0.0	100.0	1.0	8.488	1.0	0.0	0.0	100.0	1.0	5.685	1.0	0.0	0.0	100.0	1.0	8.493	1.0	0.0	0.0	100.0	1.0	5.617	1.0	0.0	0.0	100.0	1.0		
		10	1.67	2.28	9.259	0.78	0.14	0.08	91.7	2.64	6.064	0.78	0.14	0.08	91.7	2.64	9.264	0.67	0.33	0.0	100.0	4.08	6.169	0.67	0.33	0.0	100.0	4.08	9.232	0.61	0.39	0.0	100.0	4.44	6.112	0.58	0.42	0.0	100.0	4.75		
220		30	3.67	1.31	9.232	0.91	0.09	0.0	100.0	1.53	6.062	0.91	0.09	0.0	100.0	1.53	9.275	0.8	0.2	0.0	100.0	1.94	6.074	0.59	0.41	0.0	100.0	3.33	9.243	0.57	0.43	0.0	100.0	2.97	6.135	0.4	0.6	0.0	100.0	4.5		
ROVERS (936)	6.0	50	5.75	1.19	9.26	0.94	0.03	0.03	97.2	1.19	6.155	0.94	0.03	0.03	97.2	1.19	9.318	0.91	0.09	0.0	100.0	1.42	6.092	0.67	0.33	0.0	100.0	2.22	9.26	0.78	0.22	0.0	100.0	1.83	6.109	0.51	0.49	0.0	100.0	3.61		
2		70	8.17	1.0	9.219	0.99	0.01	0.0	100.0	1.03	6.09	0.99	0.01	0.0	100.0	1.03	9.253	1.0	0.0	0.0	100.0	1.0	6.073	0.96	0.04	0.0	100.0	1.08	9.256	0.89	0.11	0.0	100.0	1.28	6.131	0.59	0.41	0.0	100.0	2.61		
		100	10.83	1.0	9.29	1.0	0.0	0.0	100.0	1.0	6.19	1.0	0.0	0.0	100.0	1.0	9.284	1.0	0.0	0.0	100.0	1.0	5.978	1.0	0.0	0.0	100.0	1.0	9.275	1.0	0.0	0.0	100.0	1.0	6.079	1.0	0.0	0.0	100.0	1.0		
		10	2.33	2.11	18.21	5 0.38	0.56	0.06	88.9	5.58	12.334	0.38	0.56	0.06	88.9	5.58	19.544	0.24	0.71	0.04	91.7	7.47	13.223	0.24	0.71	0.04	91.7	7.47	18.736	0.38	0.26	0.36	44.4	1.78	12.617	0.34	0.34	0.32	52.8	2.42		
3 G		30	6.5	1.25	18.27	4 0.41	0.45	0.14	72.2	2.33	12.246	0.36	0.5	0.14	75.0	2.94	19.651	0.14	0.75	0.11	63.9	4.83	13.365	0.14	0.75	0.11	63.9	4.83	18.665	0.59	0.24	0.17	72.2	1.39	12.441	0.57	0.41	0.02	97.2	2.86		
0KOBAN (936)	8.7	50	10.33	1.22	18.26	2 0.53	0.32	0.15	83.3	1.78	12.218	0.48	0.39	0.13	86.1	2.58	19.656	0.21	0.55	0.25	47.2	2.56	13.38	0.22	0.56	0.22	52.8	2.75	18.778	0.82	0.09	0.09	88.9	1.25	12.631	0.75	0.22	0.02	100.0	1.97		
sos		70	14.67	1.03	18.28	7 0.73	0.22			1.58	12.267			0.04	91.7	1.94	19.66	0.21	0.48	0.31	30.6	1.69	13.259			0.3		1.78	15.787	0.93	0.06	0.01	100.0	1.11	10.334			0.0	100.0	1.33		
		100	20.17	1.0	18.33	9 0.85	0.1	0.04	91.7	1.25	12.246	0.85	0.1	0.04	91.7	1.25	19.724	0.23	0.48	0.29	41.7		13.387						13.544				100.0		8.298	0.96	0.04	0.0	100.0	1.08		
Average					14.90	8 0.8	0.14	0.06	93.68	2.17	9.854	0.79	0.15	0.06	94.33	2.34	14.947	0.56	0.37	0.07	86.32	3.31	9.972	0.52	0.41	0.07	86.78	3.58	12.916	0.78	0.15	0.07	94.19	2.12	8.538	0.7	0.25	0.05	96.18	2.8		

Table 1: Results for each contraint set, for optimal observations. L for Landmarks, P for Post-hoc, and S for State equation.

Constraints (single) - Suboptimal

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							$\delta_{\rm H}$	c(L)			$\delta_{\text{HCU}}(L)$							$\delta_{HC}(P)$								(P)			$\delta_{HC}(S)$							$\delta_{\text{HCU}}(S)$					
#	$ \mathcal{G} $	% Obs	O	$ G^* $	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	Time	AR	FPR	FNR	Acc	S	
		10	1.42	7.61	28.499	0.41	0.32	0.27	94.4	8.97	18.778	0.41	0.32	0.27	94.4	8.97	29.106	0.39	0.39	0.23	97.2	8.64	19.135	0.39	0.39	0.23	97.2	8.64	19.076	0.44	0.28	0.28	94.4	8.25	12.56	0.44	0.28	0.28	94.4	8.39	
S_		30	3.83	3.58	28.483	0.44	0.29	0.27	80.6	4.03	18.813	0.36	0.42	0.22	88.9	6.89	29.12	0.41	0.37	0.21	80.6	4.17	19.265	0.41	0.37	0.21	80.6	4.17	18.993	0.5	0.23	0.27	83.3	3.72	12.592	0.34	0.42	0.24	86.1	7.03	
(936)	20.3	50	5.92	3.19	28.531	0.37	0.25	0.39	58.3	2.06	18.705	0.39	0.32	0.29	72.2	3.28	29.071	0.51	0.33	0.16	83.3	3.5	19.29	0.51	0.33	0.16	83.3	3.5	19.002	0.5	0.25	0.25	86.1	3.22	12.727	0.42	0.41	0.18	94.4	5.92	
m		70	8.5	2.53	28.564	0.45	0.24	0.31	77.8	2.25	18.759	0.5	0.26	0.24	88.9	2.69	26.164	0.55	0.29	0.16	83.3	3.06	17.66	0.54	0.3	0.16	83.3	3.14	17.122	0.64	0.17	0.19	97.2	2.36	11.593	0.55	0.31	0.14	100.0	3.19	
		100	11.83	2.25	28.584	0.52	0.18	0.29	75.0	2.0	19.078	0.6	0.21	0.19	91.7	2.58	20.127	0.58	0.32	0.1	91.7	3.5	14.546	0.58	0.32	0.1	91.7	3.5	14.414	0.74	0.1	0.16	100.0	1.92	9.548	0.74	0.1	0.16	100.0	1.92	
		10	2.06	1.58	11.441	0.86	0.14	0.0	100.0	2.0	7.581	0.8	0.2	0.0	100.0	2.56	11.954	0.25	0.74	0.01	100.0	7.23	8.003	0.25	0.74	0.01	100.0	7.23	11.438	0.6	0.31	0.09	91.7	3.1	7.583	0.55	0.37	0.08	93.8	3.85	
8∞		30	5.56	1.4	11.364	0.88	0.05	0.07	100.0	1.21	7.488	0.77	0.2	0.03	100.0	2.44	11.959	0.23	0.72	0.05	89.6	6.67	7.917	0.23	0.72	0.05	89.6	6.67	11.415	0.69	0.18	0.14	85.4	1.77	7.623	0.64	0.3	0.06	95.8	3.33	
PC-GRID (1248)	7.5	50	8.88	1.35	11.36	0.89	0.04	0.07	97.9	1.13	7.581	0.82	0.12	0.06	100.0		11.974			0.08	72.9	5.21	7.964	0.29	0.63	0.08	72.9	5.21	11.442	0.81	0.13	0.06	100.0	1.31	7.599	0.65	0.33	0.02	100.0	2.77	
E		70	12.56	1.31	11.427	0.91	0.02	0.07	100.0	1.06	7.547	0.88	0.05	0.07	100.0	1.13	11.983	0.08	0.66	0.26	20.8	3.54	8.013	0.08	0.66	0.26	20.8	3.54	11.462	0.87	0.05	0.08	97.9	1.1	7.434	0.8	0.13	0.07	97.9	1.42	
		100	17.25	1.5	11.461	0.94	0.0	0.06	100.0	1.0	7.475	0.94	0.0	0.06	100.0	1.0	12.073	0.05	0.54	0.41	0.0	1.94	7.981	0.05	0.54	0.41	0.0	1.94	11.359	0.94	0.0	0.06	100.0	1.0	7.551	0.94	0.0	0.06	100.0	1.0	
		10	2.67	2.0	13.527	0.81	0.19	0.0	100.0	3.0	8.888	0.81	0.19	0.0	100.0	3.11	13.498	0.78	0.22	0.0	100.0	2.97	8.827	0.76	0.24	0.0	100.0	3.19	13.503	0.8	0.2	0.0	100.0	3.06	8.892	0.65	0.35	0.0	100.0	4.89	
OGISTICS (936)		30	7.5	1.14	13.466	0.93	0.07	0.0	100.0	1.31	8.809	0.78	0.22	0.0	100.0	1.97	13.461	0.7	0.3	0.0	100.0	1.94	8.901	0.69	0.31	0.0	100.0	2.03	13.447	0.85	0.15	0.0	100.0	1.5	8.927	0.55	0.45	0.0	100.0	4.08	
936	10.0	50	11.92	1.06	13.499	0.94	0.06	0.0	100.0	1.19	8.898	0.84	0.16	0.0	100.0	1.47	13.509	0.7	0.3	0.0	100.0	1.72	8.938	0.7	0.3	0.0	100.0	1.72	13.482	0.87	0.13	0.0	100.0	1.33	8.924	0.67	0.33	0.0	100.0	2.89	
9		70	16.67	1.03	13.488	0.99	0.01	0.0	100.0	1.06	8.878	0.95	0.05	0.0	100.0	1.14	13.542	0.71	0.29	0.0	100.0	1.67	8.91	0.71	0.29	0.0	100.0	1.67	13.505	0.96	0.04	0.0	100.0	1.11	8.77	0.87	0.13	0.0	100.0	1.33	
		100	23.17	1.0	13.591	1.0	0.0	0.0	100.0	1.0	8.953	1.0	0.0	0.0	100.0	1.0	13.556	0.69	0.31	0.0	100.0	1.67	8.939	0.69	0.31	0.0	100.0	1.67	13.578	1.0	0.0	0.0	100.0	1.0	8.879	1.0	0.0	0.0	100.0	1.0	
		10	3.0	1.83	8.497	0.68	0.32	0.0	100.0	3.14	5.598	0.68	0.32	0.0	100.0	3.19	8.575	0.51	0.49	0.0	100.0	4.03	5.673	0.45	0.55	0.0	100.0	4.81	8.526	0.54	0.46	0.0	100.0	3.94	5.571	0.44	0.56	0.0	100.0	5.03	
P		30	7.67	1.25	8.48	0.77	0.22	0.01	100.0	1.78	5.532	0.64	0.36	0.0	100.0	2.58	8.602	0.6	0.39	0.01	100.0	2.42	5.629	0.3	0.7	0.0	100.0	4.97	8.489	0.6	0.39	0.01	100.0	2.42	5.627	0.26	0.74	0.0	100.0	5.42	
CONIC (936)	6.0	50	12.25	1.03	8.524	0.97	0.03	0.0	100.0	1.11	5.577	0.8	0.2	0.0	100.0	1.53	8.575	0.88	0.12	0.0	100.0	1.31	5.657	0.37	0.63	0.0	100.0	3.53	8.46	0.88	0.12	0.0	100.0	1.31	5.597	0.29	0.71	0.0	100.0	4.39	
2		70	17.33	1.0	8.52			0.0	100.0	1.03	5.586					1.11	8.567				100.0		5.656	0.6	0.4		100.0		8.541				100.0		5.617				100.0		
		100	24.0	1.0	8.42	1.0	0.0	0.0	100.0	1.0	5.726	1.0	0.0	0.0	100.0	1.0	8.563	1.0	0.0		100.0	_	5.524	1.0	0.0	0.0	100.0	1.0	8.57	1.0	0.0	0.0	100.0	1.0	5.512	1.0	0.0	0.0	100.0	1.0	
		10	1.83	2.39	9.216				94.4				0.17		94.4		9.254				100.0		6.095		0.34		100.0		9.194				100.0		6.082	0.55	0.45		100.0		
8 G		30	4.5	1.39	9.217			0.03	100.0	1.61	6.112	0.79	0.19		100.0		9.279				100.0		6.118	0.5	0.5		100.0		9.273				100.0		6.149			0.0	100.0	4.69	
(936)	6.0	50	7.17	1.11	9.227				100.0		6.106				100.0		9.268				100.0		6.111				100.0		9.239				100.0		6.144			0.0	100.0	4.64	
ž -		70	10.0	1.06	9.286				100.0		6.062				100.0	1.25	9.349				100.0		6.275						9.266				100.0		6.104				100.0		
\Box		100	13.67	1.0	9.15	1.0	0.0	0.0	100.0	1.0	6.085	1.0	0.0			1.0	9.4	_	0.0		100.0	1.0	6.035				100.0	1.0			0.0		100.0		6.076	1.0	0.0	0.0	100.0	1.0	
		10	3.33	1.83	18.258			0.16	69.4	4.36	12.194					4.61	19.587				91.7		13.354					6.58	18.748						12.577					3.64	
1 8 G		30	8.67	1.28	18.33					2.81	12.237				91.7		19.721			0.32	33.3		13.394				33.3		18.708					1.19	12.553						
0KOBAN (936)	8.7	50	13.75	1.33	18.328				75.0	1.94	12.255				100.0				0.41		16.7		13.499					1.67	18.692						12.379				100.0		
S		70	19.33	1.36	18.309			0.2	80.6	1.53	12.338						19.815					1.53	13.49										100.0		10.257				100.0		
\vdash		100	27.0	1.33																			13.467						13.149										100.0		
Average					14.908	0.76	0.15	0.09	92.34	2.04	9.871	0.72	0.21	0.07	95.93	2.6	14.977	0.54	0.36	0.11	80.74	3.03	10.009	0.47	0.43	0.11	81.11	3.41	12.903	0.75	0.17	0.08	94.63	2.13	8.518	0.61	0.34	0.06	97.64	3.44	

Table 2: Results for each contraint set, for suboptimal observations. L for Landmarks, P for Post-hoc, and S for State equation.