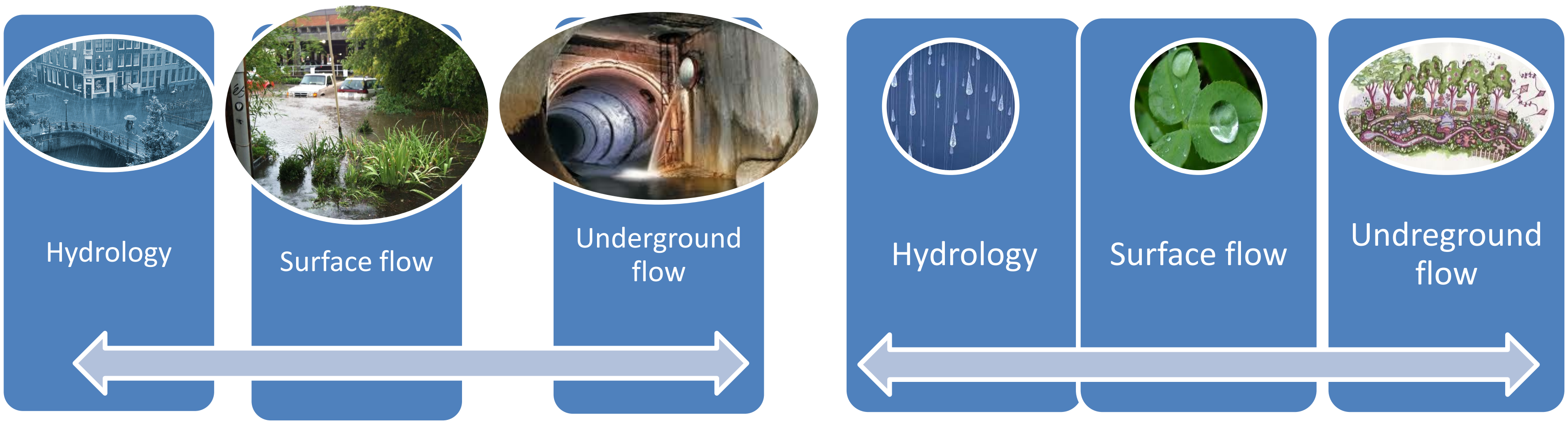
URBAN DRAINAGE SIMULATION MODEL SENSITIVITY ANALISYSIS ON RUNOFF CONTROL ELEMENTS

Željka Ostojić[1] , Sanja Marčeta[2], Dušan Prodanović[3], Ljiljana Janković[4] , Srđan Tomić[5]

[1,2] HIDROPROJEKAT SAOBRAĆAJ, SERBIA, zeljka.ostojic@hps.rs, sanja.marceta @hps.rs
[3,4] UNIVERSITY of CIVIL ENGINEERING, BELGRAD, SERBIA,
[5] ACO, BELGRAD, SERBIA,

9th International Conference on Urban Drainage Modelling
Belgrade 2012

RUNOFF CONTROL ELEMENTS IN DUAL DRAINAGE CONCEPT



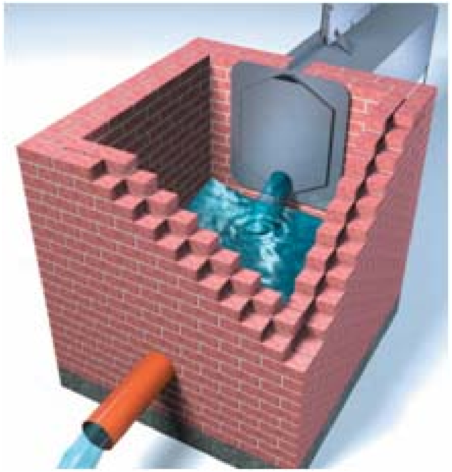
❖ In link/node simulating models runoff control elements

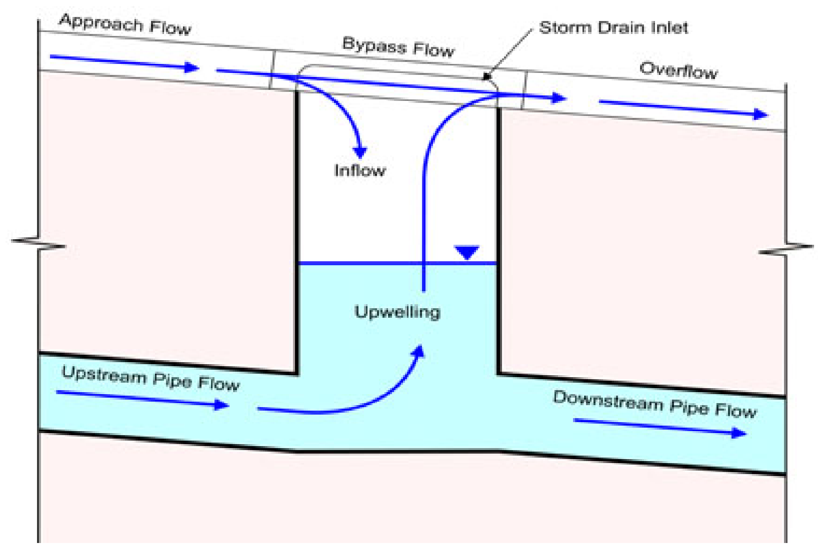
• Grate *inlets* • Curb opening *inlets* • Slotted *inlets* • Combination *inlets*

are

links between *surface runoff* routing model, simulating hydraulics on the catchments surface and a *pipe flow model* simulating the hydraulics of in the pipe system.

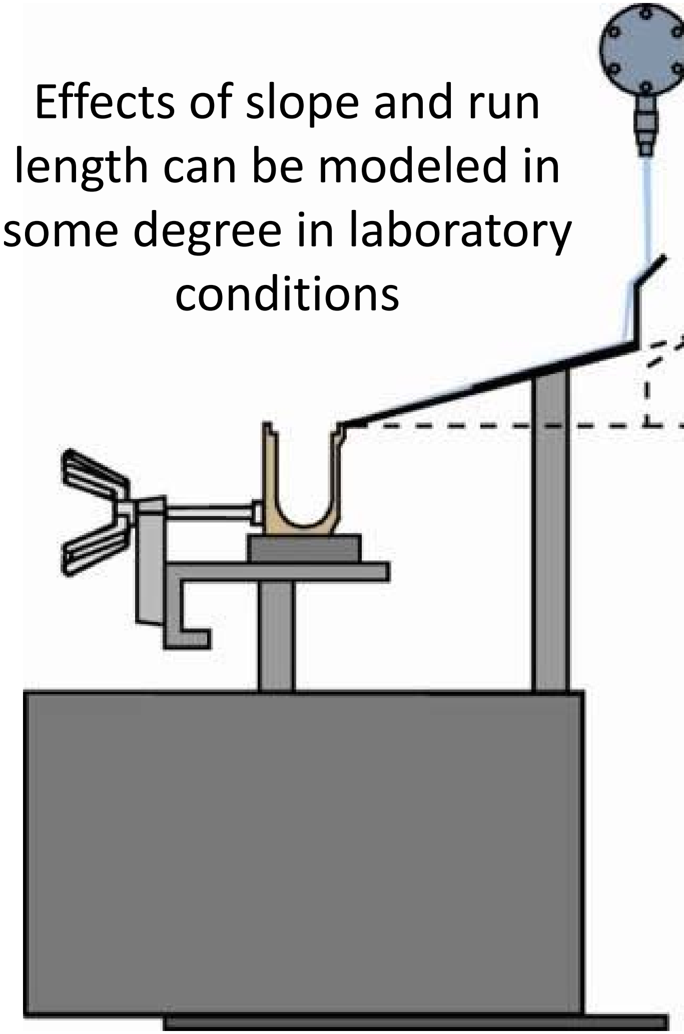
POINT AND LINEAR DRAINAGE





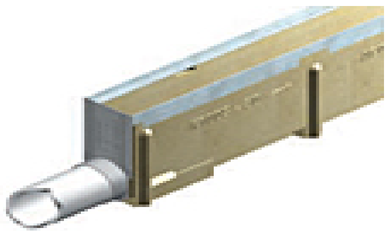
LABORATORY TRENCH TESTING

Effects of slope and run length can be modeled in some degree in laboratory conditions



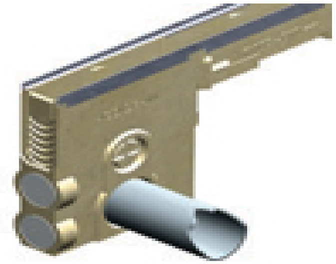
Liquid velocity and height changes at successive cross sections along the trench

TRENCH OUTLET TYPES AND MODELING

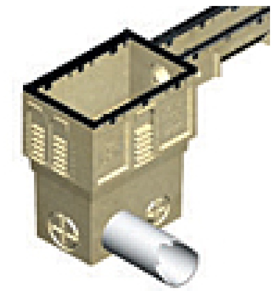


END OUTLET

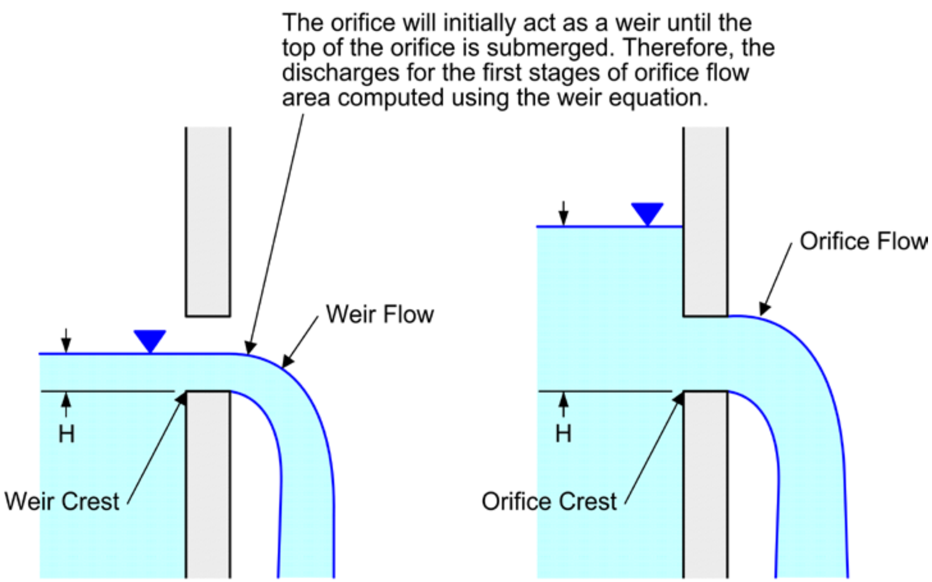
BOTTOM OUTLET

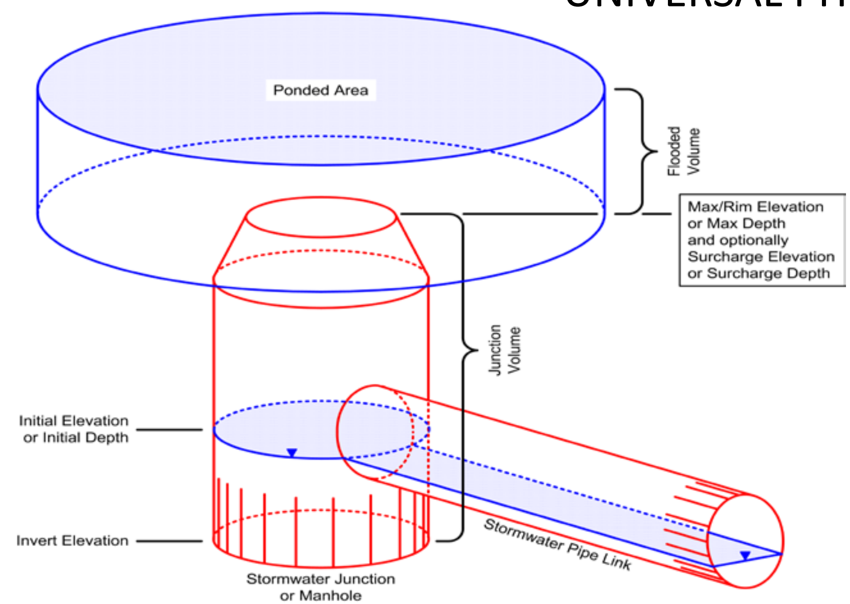


IN-LINE PIT

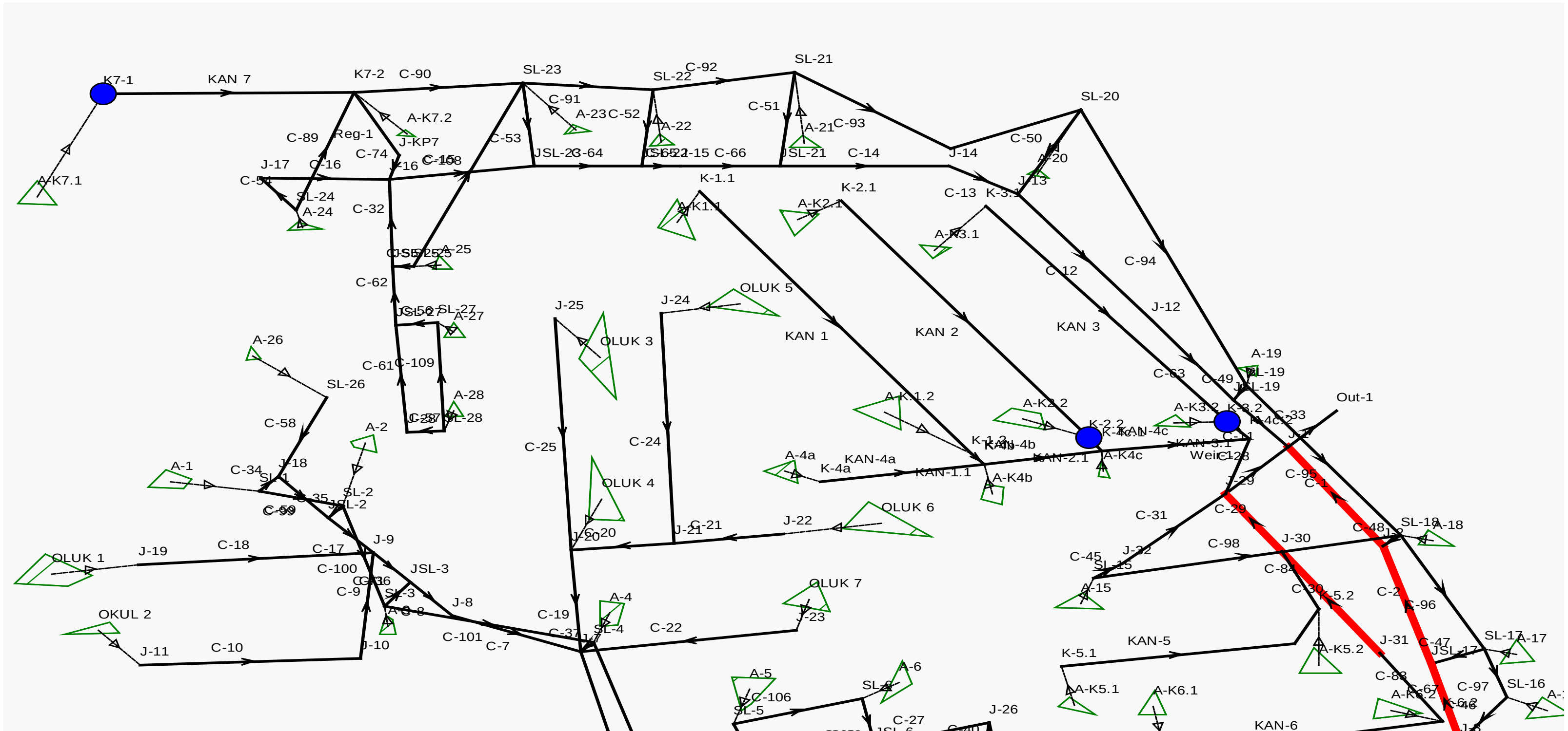


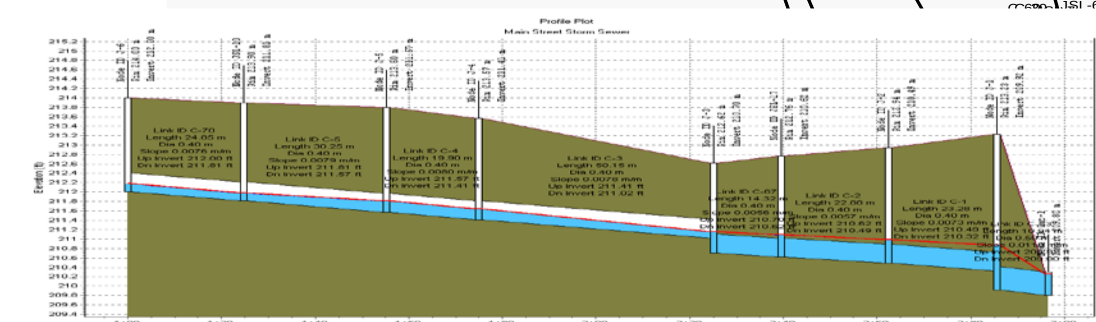
UNIVERSAL PIT





CASE STUDY- KRALJEVO WARHOUSE



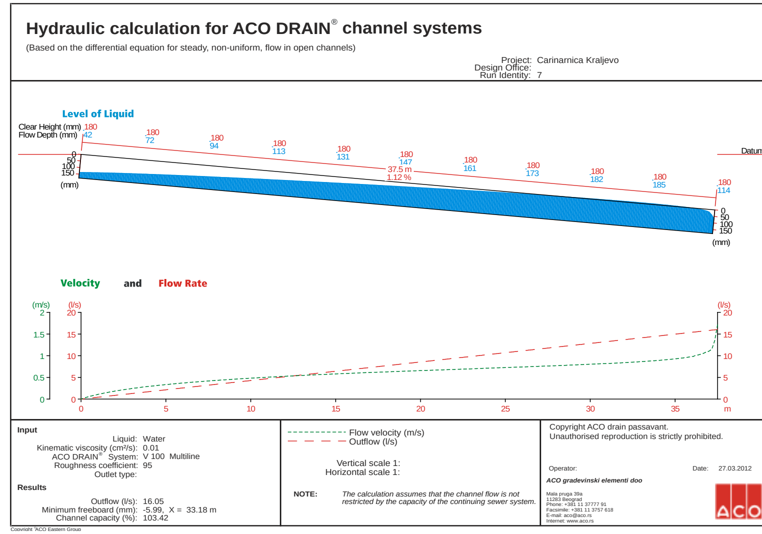


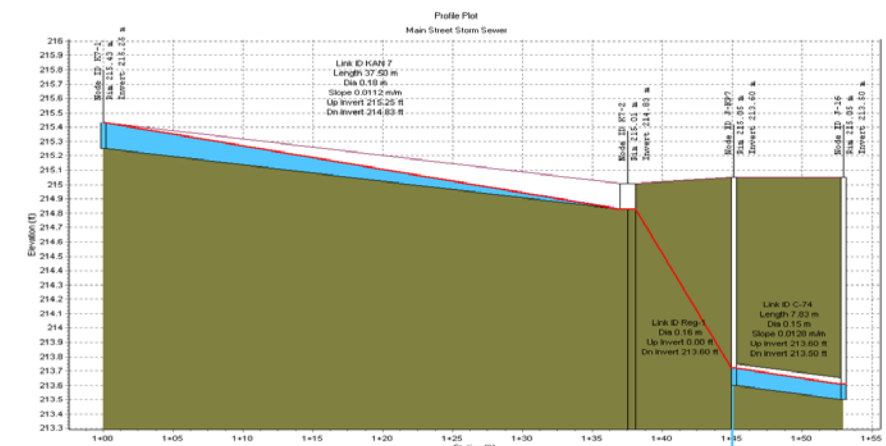
Node ID:	J-6	JSL-10	J-5	J-4	J-3	JSL-17	J-2	J-1	Out-1
Rim (m):	214.00	213.90	213.80	213.57	212.62	212.76	212.94	213.23	
Invert (m):	212.00	211.81	211.57	211.41	210.70	210.62	210.49	209.92	209.80
Max HGL (ft):	212.18	211.98	211.81	211.64	211.16	211.09	210.99	210.87	210.26

Link ID:	C-70	C-5	C-4	C-3	C-67	C-2	C-1	C-33
Length (m):	24.85	30.25	19.90	50.15	14.32	22.88	23.28	10.94
Dia (m):	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50
Slope (m/m):	0.0076	0.0079	0.0080	0.0078	0.0056	0.0057	0.0073	0.0110
Up Invert (ft):	212.00	211.81	211.57	211.41	210.70	210.62	210.49	209.92
Dn Invert (ft):	211.81	211.57	211.41	211.02	210.62	210.49	210.32	209.80
Max Q (lps):	56.0800	60.1800	86.1100	90.0100	94.7400	99.9000	112.0700	505.4300
Max Vel (ft/s):	1.06	0.93	1.12	1.24	0.92	1.00	1.18	2.61
Max Depth (m):	0.18	0.21	0.24	0.22	0.40	0.40	0.40	0.48

TRENCH MODELING AND RESULTS

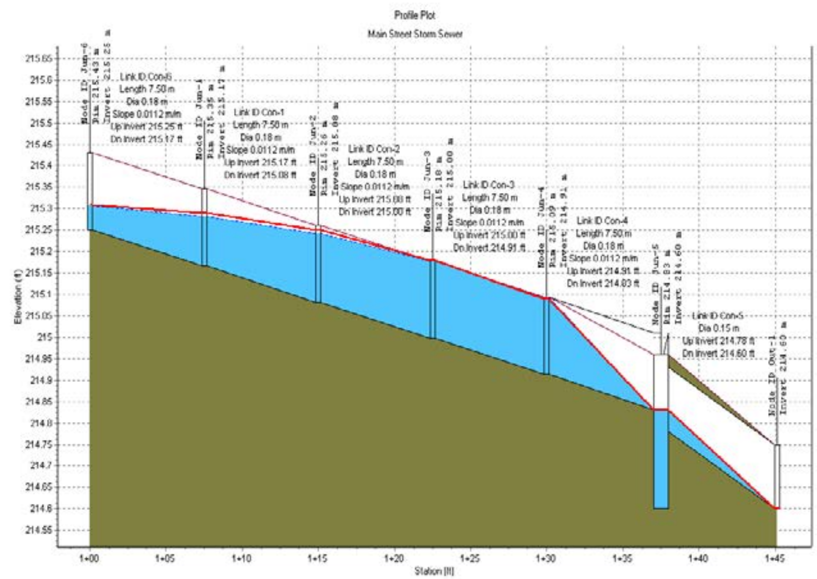
Comparison of these hydraulic profiles induced division of trench drain into 5 equal length sections, with the appropriate catchments subdivision.





Node ID:	K7-1	K7-2	J-KP7	J-16
Rim (m):	215.43	215.01	215.05	215.05
Invert (m):	215.25	214.83	213.60	213.50
Max HGL (ft):	215.43	214.83	213.72	213.61

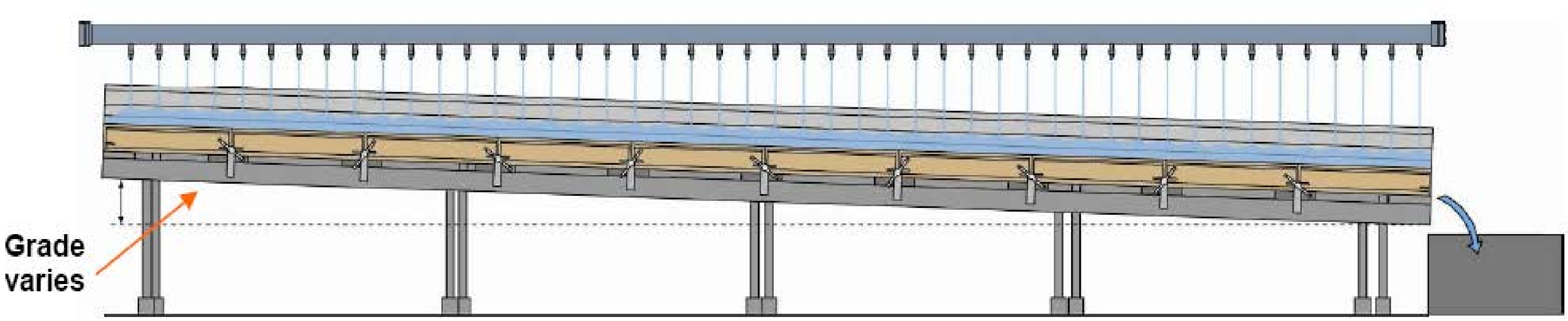
Link ID:	KAN 7	Reg-1	C-74
Length (m):	37.50		7.83
Dia (m):	0.18	0.16	0.15
Slope (m/m):	0.0112		0.0128
Up Invert (ft):	215.25	0.00	213.60
Dn Invert (ft):	214.83	213.60	213.50
Max Q (lps):	4.2500	0.0000	12.0000
Max Vel (ft/s):	0.71	0.00	1.12
Max Depth (m):	0.09	0.00	0.12



SENSITIVITY ANALYSIS - ROUGHNESS AND PONDING

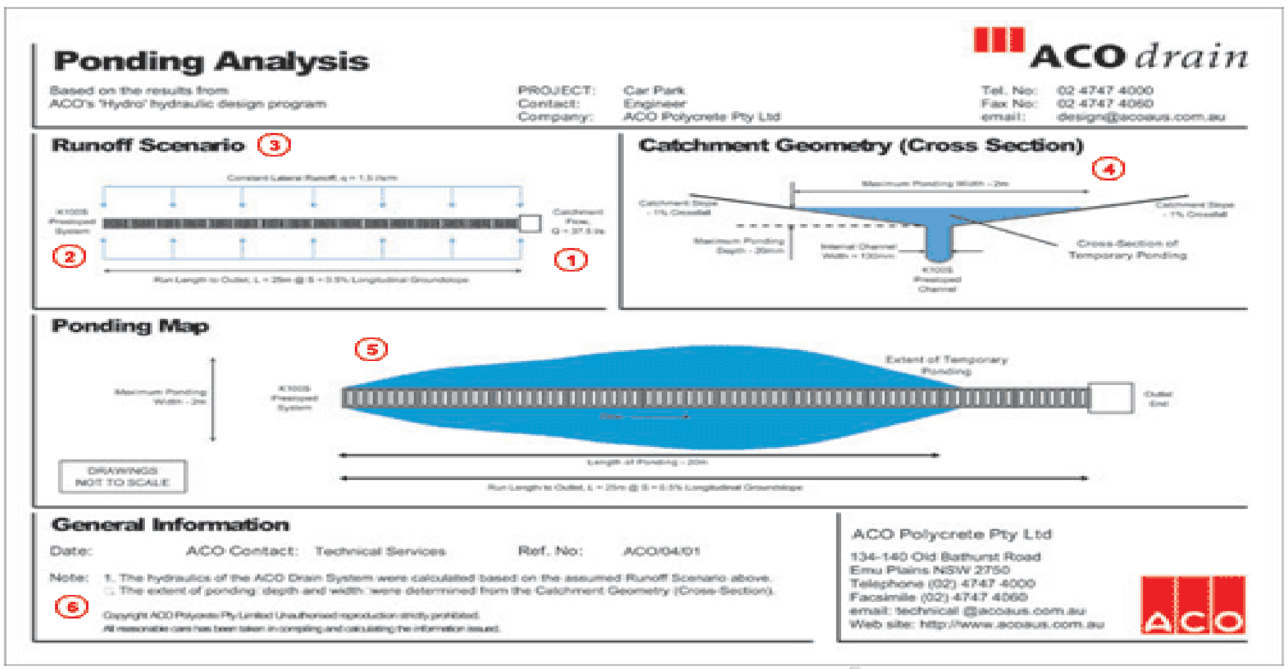
The scenarios of limited sensitive analysis are:

- channel K7 is rectangular with roughness n = 0.015 or n = 0.024, with no ponding area in junctions
- channel K7 is rectangular with roughness n = 0.015 or n = 0.024, with ponding area of $10m^2$ in junctions



CONCLUSIONS

- The design flow capacity for channel decreases with Manning’s n-value increase
- Peak inflows to middle positioned junctions are higher when pond areas has been jointed to trench drain
- Peak outflows at the end junction are higher when pond areas has been jointed, the difference might been significant for network sizing



- THANK YOU FOR ATTENTION
- I BELIVE THIS WORK SHOULD BE CONTINUED

- QUESTIONS