

SOFTWARE DRENAR

BY SANEGRAPH LTDA.

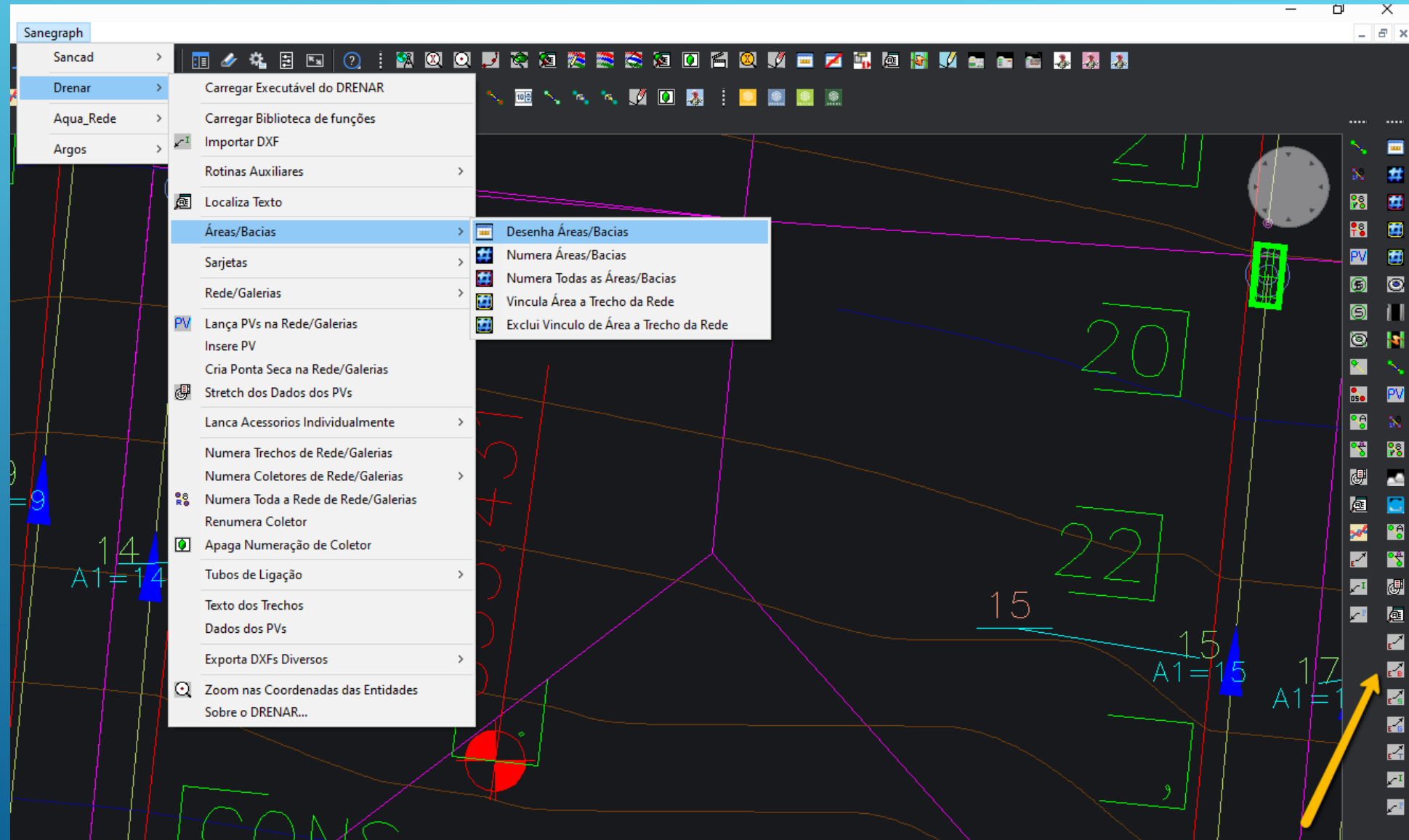
Funcionamento esquemático do software

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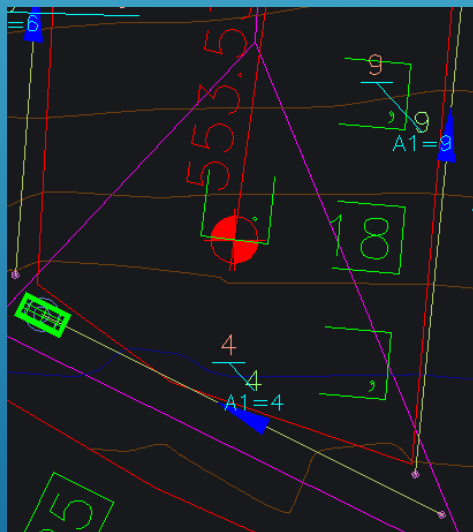
Micro drenagem urbana

Customização do CAD – menu superior e barra de ferramenta (Interface do usuário)

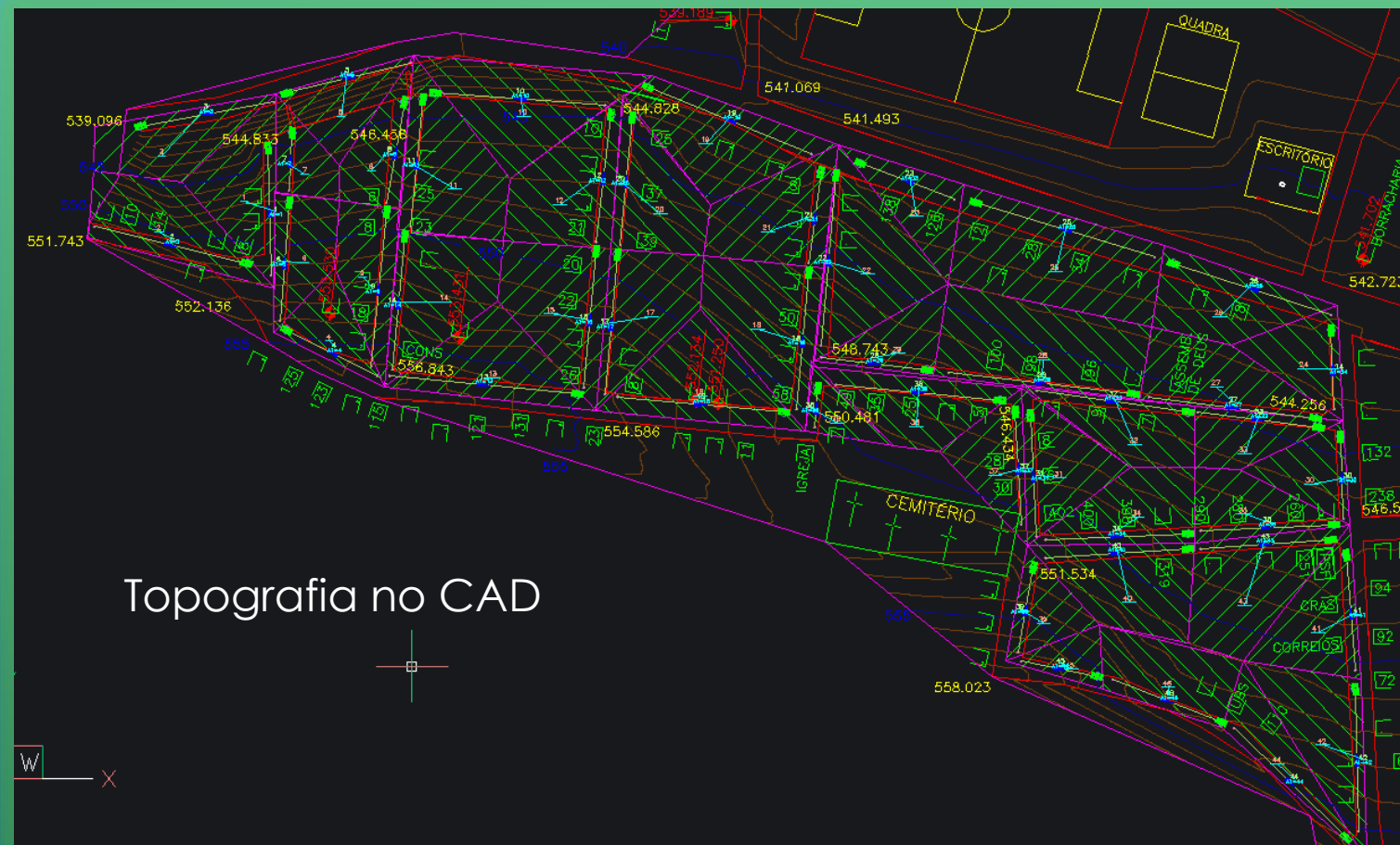


Etapa 1 – Ambiente gráfico em CAD – lançamento das estruturas

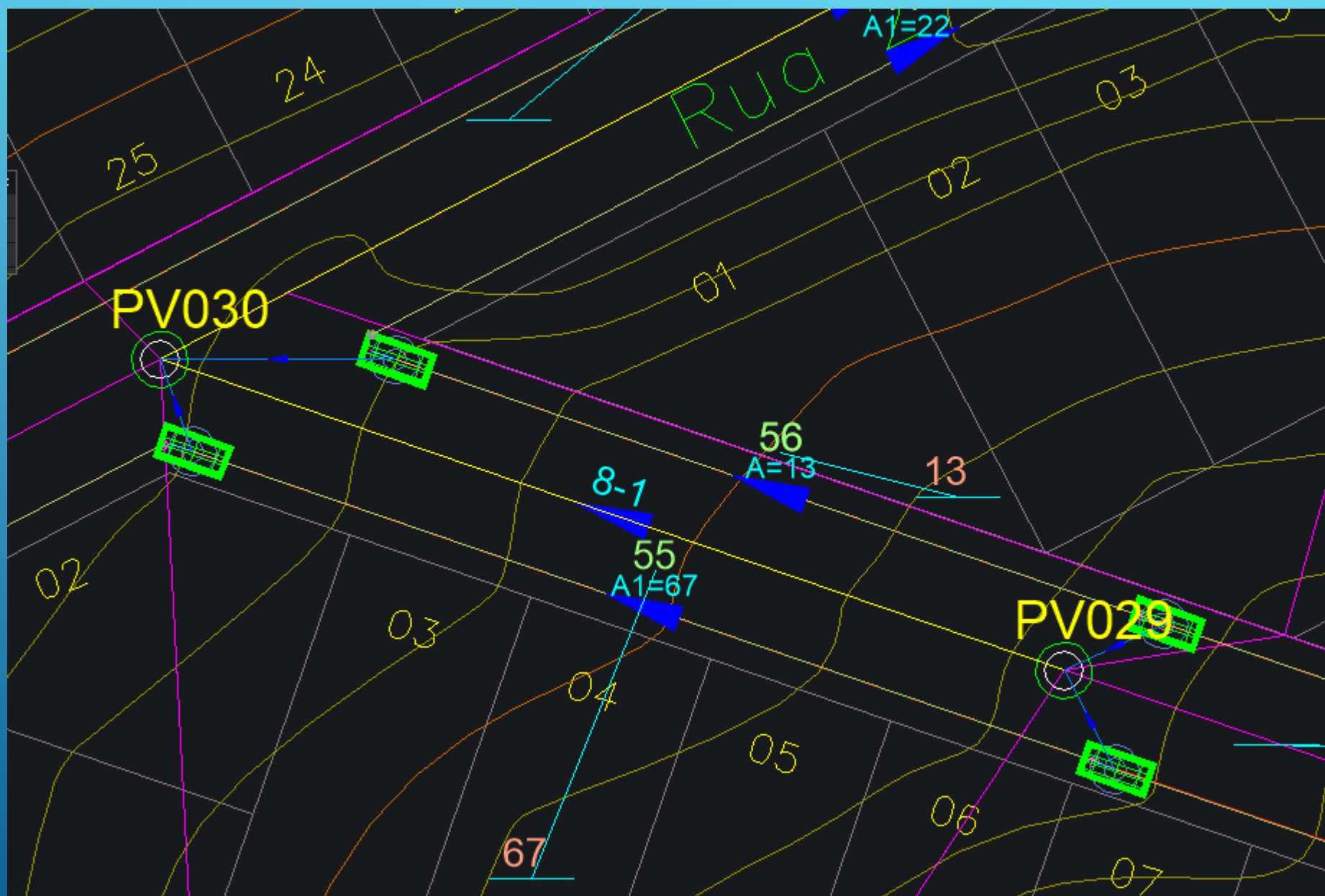
- Áreas drenadas
- Sarjetas
- Caixas de Ralo (Bocas de Lobo – BLs)
- Tubos de Ligação (TLs)
- Rede/Galerias



Área 4 vinculada à sarjeta 4



Estruturas lançadas no CAD



Ambiente de cálculo

Dados físicos
das estruturas

Dados
Hidrológicos

Condicionantes
hidráulicas

Trecho	PVM	PVJ	Comp (m)	CTM (m)	CTJ (m)	CCM (m)	CCJ (m)	PRFM (m)	PRFJ (m)	D Com (mm)	Decl Terr (m/m)	Decl (m/m)	Tempo conc	Tempo perc	Área Local (ha)	Área Total (ha)	Coefficientes Imp	Def	Vazão (l/s)	Veloc (m/s)	H/D (%)	Observação
0009-002	PV-045	PV-046	54.00	232.049	226.000	230.500	224.697	1.549	1.303	600	0.11202	0.10746	15.98	16.27	0.28	0.38	0.80	0.70	87.17	3.09	0.16	DG 0.372
0009-003	PV-046	PV-003	47.00	226.000	226.000	224.325	224.090	1.675	1.910	600	0.00000	0.00500	16.27	17.12	0.57	0.95	0.80	0.70	217.10	0.92	0.78	
0008-001	PV-043	PV-024	27.00	232.056	232.671	230.756	230.621	1.300	2.050	600	-0.02278	0.00500	15.00	15.56	0.34	0.34	0.80	0.69	76.23	0.80	0.37	DG 0.700
0007-001	PV-040	PV-041	50.00	254.004	250.004	252.704	248.704	1.300	1.300	600	0.08000	0.08000	15.00	15.27	0.46	0.46	0.80	0.69	102.32	3.04	0.18	DG 0.073
0007-002	PV-041	PV-042	46.00	250.004	247.554	247.554	246.181	1.373	1.373	600	0.05326	0.05326	15.27	15.53	0.43	0.89	0.80	0.69	206.05	2.92	0.30	DG 0.281
0007-003	PV-042	PV-021	29.00	247.554	247.014	245.900	245.433	1.654	1.581	600	0.01862	0.01610	15.53	15.92	0.42	1.31	0.80	0.69	290.26	1.25	0.77	DG 3.938
0006-001	PV-037	PV-038	46.00	244.004	236.565	242.704	235.265	1.300	1.300	600	0.16172	0.16172	15.00	15.32	0.09	0.09	0.80	0.69	19.81	2.37	0.07	DG 0.058
0006-002	PV-038	PV-039	47.00	236.565	233.818	235.207	232.460	1.358	1.358	600	0.05845	0.05845	15.32	15.68	0.21	0.29	0.80	0.69	67.10	2.20	0.16	DG 0.334
0006-003	PV-039	PV-022	88.00	233.818	237.550	232.126	231.686	1.692	5.864	600	-0.04241	0.00500	15.68	17.51	0.47	0.76	0.80	0.70	175.01	0.80	0.72	DG 0.200
0005-001	PV-029	PV-030	42.00	232.039	231.818	230.739	230.518	1.300	1.300	600	0.00526	0.00526	15.00	15.83	0.15	0.15	0.80	0.69	33.53	0.84	0.20	DG 0.006
0005-002	PV-030	PV-031	45.00	231.818	232.000	230.512	230.287	1.306	1.713	600	-0.00404	0.00500	15.83	16.77	0.00	0.15	0.80	0.70	34.47	0.80	0.21	DG 0.048
0005-003	PV-031	PV-032	40.00	232.000	232.000	230.239	230.039	1.761	1.961	600	0.00000	0.00500	16.77	17.60	0.09	0.24	0.80	0.71	54.50	0.80	0.29	DG 0.067
0005-004	PV-032	PV-033	44.00	232.000	231.044	229.972	229.677	2.028	1.367	600	0.02173	0.00670	17.60	18.52	0.14	0.38	0.80	0.72	85.39	0.80	0.40	
0005-005	PV-033	PV-034	42.00	231.044	230.053	229.677	228.753	1.367	1.300	600	0.02360	0.02200	18.52	19.03	0.13	0.51	0.80	0.74	113.30	1.36	0.34	
0005-006	PV-034	PV-035	31.00	230.053	227.584	228.753	226.284	1.300	1.300	600	0.07965	0.07965	19.03	19.21	0.07	0.58	0.80	0.74	128.05	2.94	0.21	DG 0.084
0005-007	PV-035	PV-036	62.00	227.584	225.946	226.200	224.562	1.384	1.384	600	0.02642	0.02642	19.21	19.71	0.25	0.83	0.80	0.74	182.85	2.06	0.35	
0005-008	PV-036	PV-011	51.00	225.946	223.637	223.637	222.337	1.384	1.300	600	0.04527	0.04363	19.71	20.04	0.00	0.83	0.80	0.75	181.76	2.59	0.30	DG 2.597
0004-001	PV-019	PV-020	33.00	249.909	249.514	248.609	248.214	1.300	1.300	600	0.01197	0.01197	15.00	15.54	0.11	0.11	0.80	0.69	24.39	1.02	0.14	DG 0.044
0004-002	PV-020	PV-021	39.00	249.514	247.014	248.170	245.670	1.344	1.344	600	0.06410	0.06410	15.54	15.78	0.40	0.51	0.80	0.69	117.66	2.66	0.21	DG 4.175
0004-003	PV-021	PV-022	58.00	247.014	237.550	241.495	236.250	5.519	1.300	600	0.16317	0.09043	15.92	16.11	1.11	2.42	0.80	0.70	486.56	4.97	0.38	DG 4.764
0004-004	PV-022	PV-023	45.00	237.550	234.018	231.486	231.331	6.064	2.687	800	0.07849	0.00344	17.51	18.00	2.70	3.46	0.80	0.72	646.10	1.52	0.79	
0004-005	PV-023	PV-024	26.00	234.018	232.671	231.331	231.071	2.687	1.600	800	0.05181	0.01000	18.00	18.24	0.80	4.26	0.80	0.73	766.36	1.81	0.79	DG 1.150
0004-006	PV-024	PV-025	57.00	232.671	228.000	229.921	226.400	2.750	1.600	800	0.08195	0.06177	18.24	18.43	0.48	4.74	0.80	0.73	836.68	4.92	0.37	DG 2.630
0004-007	PV-025	PV-026	40.00	228.000	225.045	223.770	222.745	4.230	2.300	1000	0.07388	0.02563	18.43	18.75	1.08	5.82	0.80	0.73	993.85	2.10	0.58	DG 0.204
0004-008	PV-026	PV-027	34.00	225.045	224.000	222.541	221.896	2.504	2.104	1000	0.03074	0.01897	18.75	19.11	0.39	6.21	0.80	0.74	1046.09	1.58	0.78	DG 0.301
0004-009	PV-027	PV-028	32.00	224.000	223.000	221.595	220.799	2.405	2.201	1000	0.03125	0.02488	19.11	19.41	0.80	7.01	0.80	0.74	1154.53	1.78	0.77	
0004-010	PV-028	PV-016	35.00	223.000	223.000	220.799	220.674	2.201	2.326	1000	0.00000	0.00357	19.41	19.73	0.12	7.13	0.80	0.75	1167.09	1.80	0.77	DG 0.324
0003-001	PV-015	PV-016	41.00	223.000	223.000	221.700	221.495	1.300	1.505	600	0.00000	0.00500	15.00	15.85	0.19	0.19	0.80	0.69	43.11	0.80	0.25	DG 1.145
0003-002	PV-016	PV-017	40.00	223.000	223.000	220.350	220.310	2.650	2.690	1500	0.00000	0.00100	19.73	20.30	0.55	7.68	0.80	0.75	1238.45	1.16	0.58	DG 0.016
0003-003	PV-017	PV-018	32.00	223.000	223.000	220.294	220.262	2.706	2.738	1500	0.00000	0.00100	20.30	20.76	0.33	8.01	0.80	0.76	1274.93	1.17	0.59	DG 0.004
0003-004	PV-018	PV-006	47.00	223.000	223.012	220.258	220.211	2.742	2.801	1500	-0.00026	0.00100	20.76	21.43	0.12	8.13	0.80	0.76	1284.24	1.17	0.59	DG 0.173
0002-001	PV-012	PV-013	31.00	223.000	223.000	221.700	221.529	1.300	1.471	600	0.00000	0.00553	15.00	15.65	0.12	0.12	0.80	0.69	27.22	0.80	0.18	DG 0.222
0002-002	PV-013	PV-014	47.00	223.000	223.032	221.307	221.072	1.693	1.960	600	-0.00068	0.00500	15.65	16.63	0.42	0.55	0.80	0.70	126.70	0.80	0.55	DG 0.064
0002-003	PV-014	PV-008	28.00	223.032	223.000	221.008	220.868	2.024	2.132	600	0.00114	0.00500	16.63	17.21	0.14	0.69	0.80	0.71	156.95	0.80	0.65	DG 0.983
0001-001	PV-001	PV-002	43.00	245.027	238.708	243.727	237.408	1.300	1.300	600	0.14695	0.14695	15.00	15.22	0.28	0.28	0.80	0.69	62.53	3.25	0.12	DG 0.006
0001-002	PV-002	PV-003	54.00	238.708	226.000	237.402	224.694	1.306	1.306	600	0.23533	0.23533	15.22	15.43	0.10	0.39	0.80	0.69	90.35	4.21	0.13	DG 0.604
0001-003	PV-003	PV-004	63.00	226.000	224.019	222.719	222.719	1.910	1.300	600	0.03144	0.02176	17.12	17.62	0.51	1.46	0.80	0.72	311.83	2.11	0.52	DG 0.472
0001-004	PV-004	PV-005	42.00	224.019	223.003	222.247	221.231	1.772	1.772	800	0.02419	0.02419	17.62	17.98	0.60	2.06	0.80	0.72	415.22	1.95	0.44	DG 0.244
0001-005	PV-005	PV-006	31.00	223.003	223.012	220.987	220.925	2.016	2.087	800	-0.00029	0.00197	17.98	18.43	0.28	2.34	0.80	0.73	460.66	1.15	0.75	DG 0.887
0001-006	PV-006	PV-007	36.00	223.012	223.012	220.038	220.002	2.974	3.010	1500	0.00000	0.00100	21.43	21.92	2.91	11.04	0.80	0.77	1652.90	1.23	0.71	DG 0.005
0001-007	PV-007	PV-008	38.00	223.012	223.000	219.997	219.959	3.015	3.041	1500	0.00032	0.00100	21.92	22.43	0.14	11.18	0.80	0.78	1661.43	1.23	0.71	DG 0.074
0001-008	PV-008	PV-009	59.00	223.000	223.018	219.885	219.826	3.115	3.192	1500	-0.00031	0.00100	22.43	23.22	1.20	12.38	0.80	0.78	1801.50	1.25	0.76	DG 0.002
0001-009	PV-009	PV-010	37.00	223.018	223.042	219.824	219.787	3.194	3.255	1500	-0.00065	0.00100	23.22	23.71	0.15	12.53	0.80	0.79	1804.23	1.25	0.76	

Planilhas de
dimensionamento

Planta final

Perfis longitudinais

Quantitativos
(N-BR-12266)

DRENAR - versão: FOX - módulo em execução: P0056PE

SANEGRAPH
SERVIÇOS DE INFORMÁTICA

Modelos de Chuva - Vazão usados no DRENAR

Lista Único

Equação	Padrão
Racional	
Racional Modificado	T
McMath	
I-Pai-Wu	
Burkli-Ziegler	
► Hidrograma Unitario	

Equação	Padrão
Racional	
Racional Modificado	T
McMath	
I-Pai-Wu	
Burkli-Ziegler	
► Hidrograma Unitario	

Dados Hidrológicos – Tabela de Cidades a serem usadas pelo DRENAR

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Arquivo Dados Diversos Rotinas de Cálculo Quantitativos Utilitários Relatórios Sobre...

DRENAR - versão: FOX - módulo em execução: P0109PE

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Tabela de Cidades - Parâmetros de Equações de Chuvas

Nova cidade

Lista Único

Nome da Cidade	UF	Otto A	Otto B	Otto C	Gen A	Gen B	Gen C	Gen D
AAAAA CIDADE TESTE	RS	0.0	0	0	63.60000	-0.44000	13.30000	0.79000
ALEGRETE	RS	0.3	33	20	0.00000	0.00000	0.00000	0.00000
ALTO ITATIAIA	RJ	0.7	26	20	0.00000	0.00000	0.00000	0.00000
ALTO ITATIAIA	PR	0.7	26	20	0.00000	0.00000	0.00000	0.00000
ALTO TAPAJOS	PA	0.4	35	20	0.00000	0.00000	0.00000	0.00000
ALTO TERESOPOLIS	RJ	0.8	41	10	0.00000	0.00000	0.00000	0.00000
APARACA	AM	0.0	0	0	0.00000	0.00000	0.00000	0.00000
APUCARANA	PR	0.0	0	0	1301.0700	0.17700	15.00000	0.83600
ARACAJU	SE	0.6	24	20	0.00000	0.00000	0.00000	0.00000
AURORA DO TOCANTINS	TO	0.0	0	0	1082.4500	0.15400	13.42300	0.77800
AURORA-TO	TO	0.7	26	20	1082.0450	0.15400	13.42300	0.77800
AVARE	SP	0.3	25	20	0.00000	0.00000	0.00000	0.00000
BAGE	RS	0.5	23	20	0.00000	0.00000	0.00000	0.00000
BANGU	RJ	0.1	30	20	0.00000	0.00000	0.00000	0.00000
BARBACENA	MG	0.5	18	60	1754.2420	0.18700	36.00000	0.82300
BARRA BONITA	SP	0.0	0	0	1784.2700	0.11800	23.62000	0.84100

Busca Incremental por Nome da Cidade:

Possibilidade
de inclusão
de novas
cidades

Dados Hidrológicos – Equações IDF de Chuvas Intensas

$$\frac{A \times T^B}{(t + C)^D}$$

Genérica

$$\frac{A * T^b}{(t + C)^{(D * T^E)}}$$

Genérica modificada

$$i_{t,T} = A (t + B)^C + D (t + E)^F \cdot [G + H \cdot \ln \ln [T / (T - 1)]]$$

Isoietas anuais

$$P = K [at + b \cdot \log (1 + ct)]$$

onde

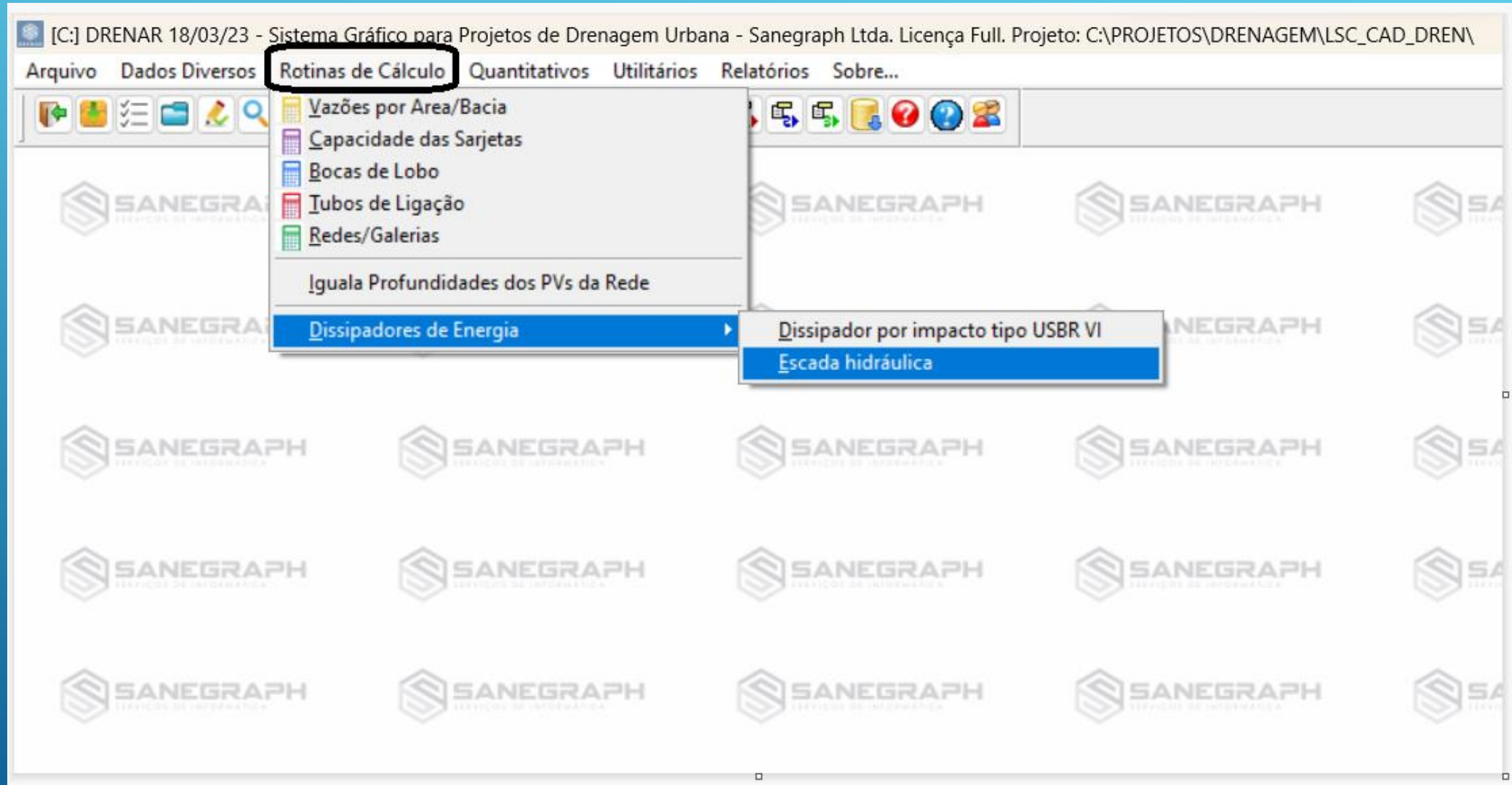
$$K = T_R \left(\alpha + \frac{\beta}{T_R^\gamma} \right)$$

Engº Otto Pfafstetter

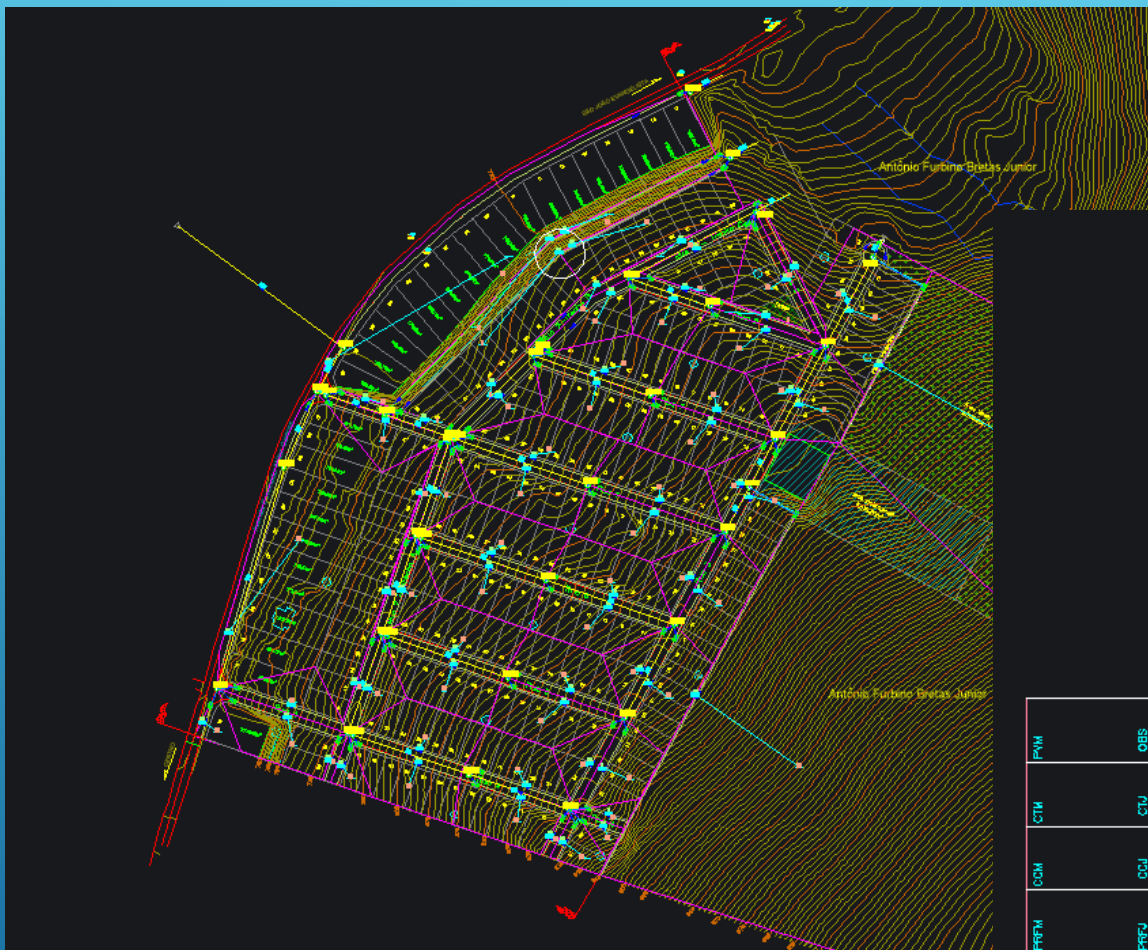
$$I_{T,i} = 0,76542 \times D^{-0,7059} \times P^{0,5360} \times \mu_{T,d}$$

LnLn – DAAE de SP

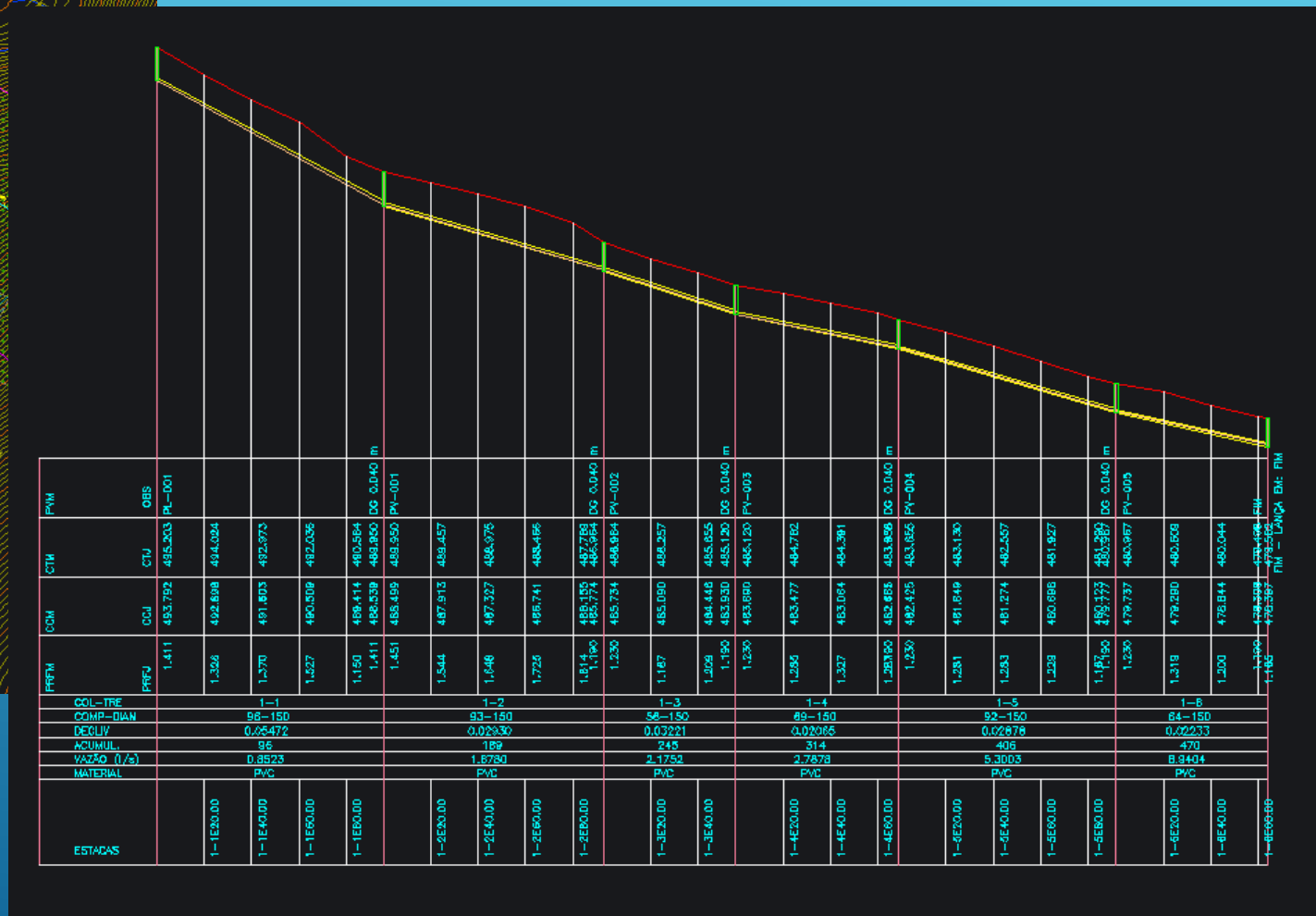
Cálculo dos diversos tipos de estruturas hidráulicas



Planta e Perfis Longitudinais



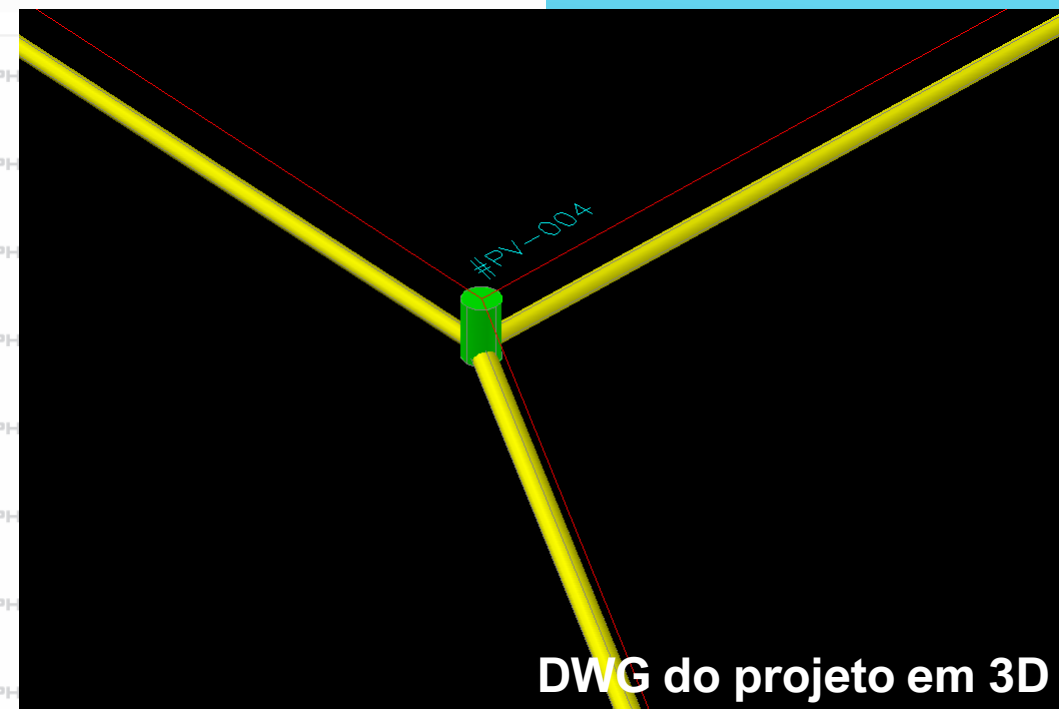
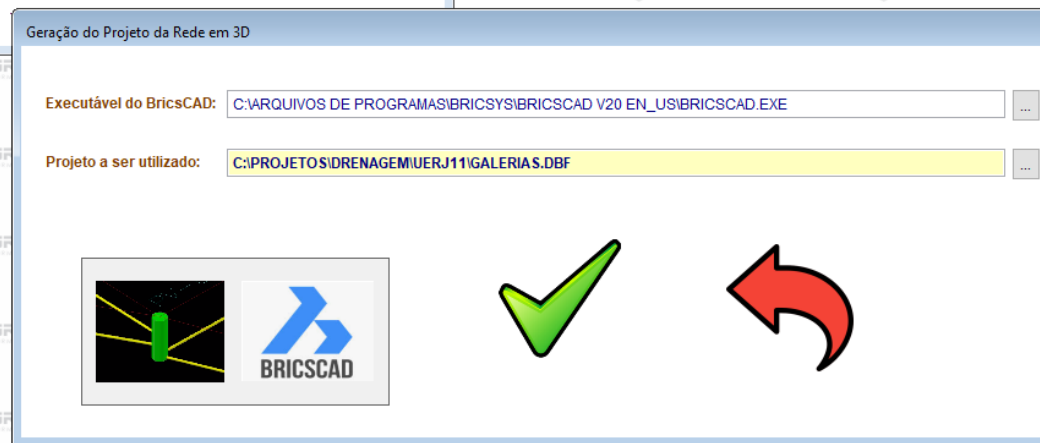
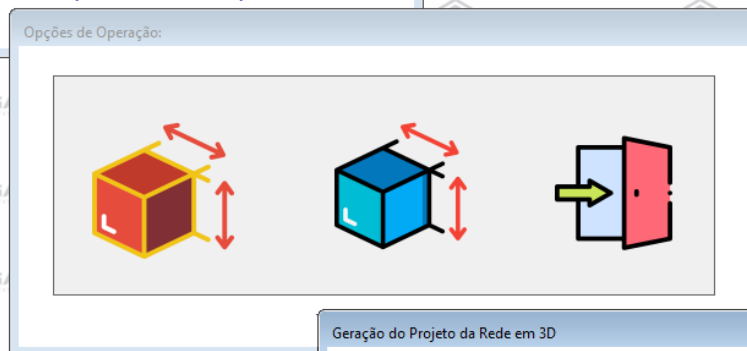
Planta do projeto



Perfil longitudinal

Geração da rede em 3D e arquivo IFC

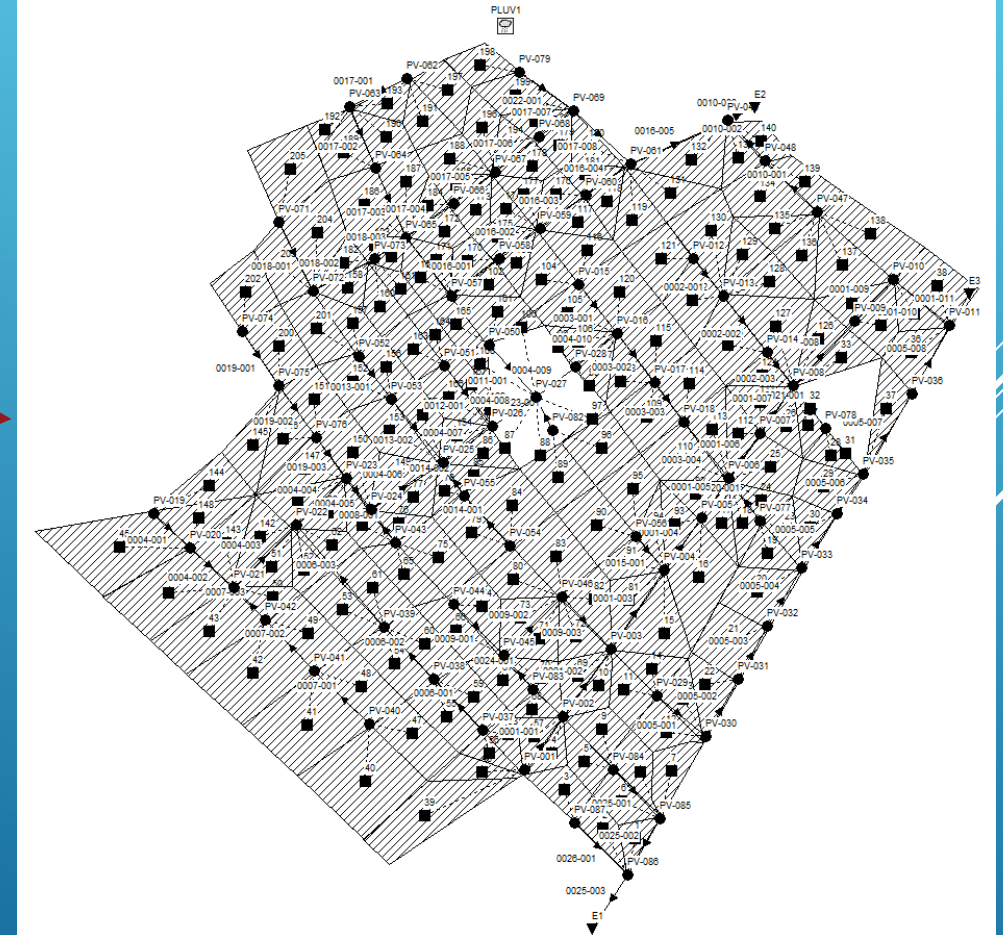
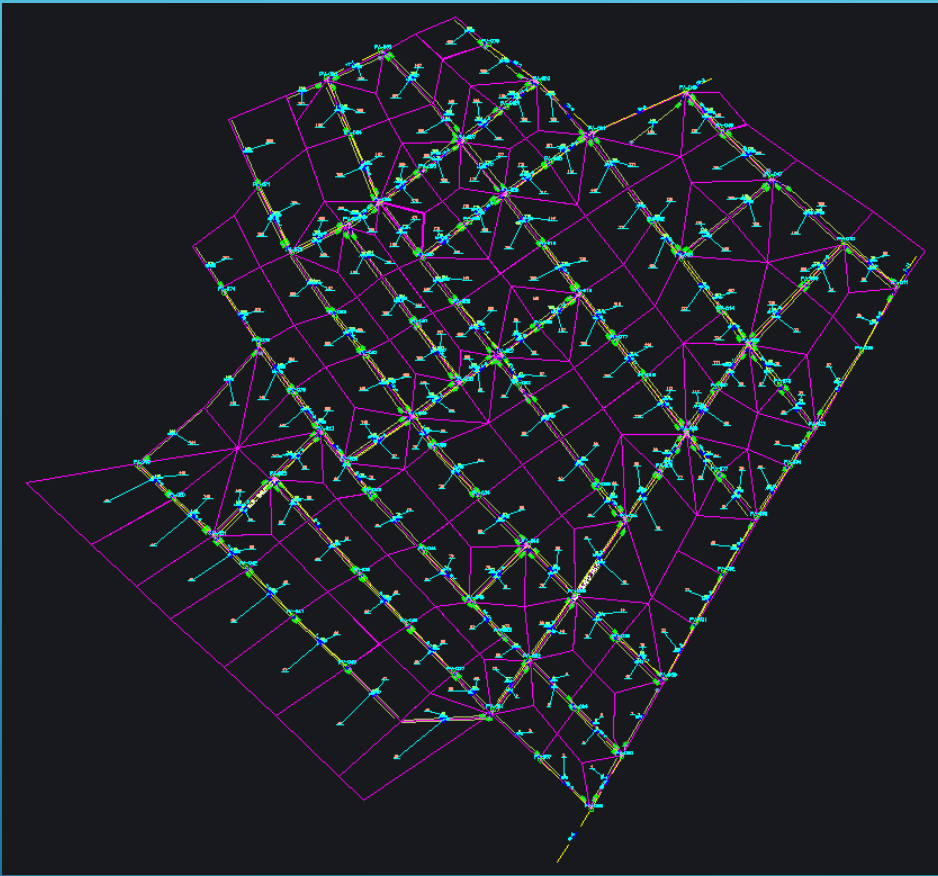
SANE_IFC 02/03/2021 - IFC para Projetos de Água, Esgoto e Drenagem - Sanegraph Ltda.



DWG do projeto em 3D

Exportação do projeto do DRENAR para o software SWMM

Projeto no DRENAR



Mesmo projeto aberto no SWMM