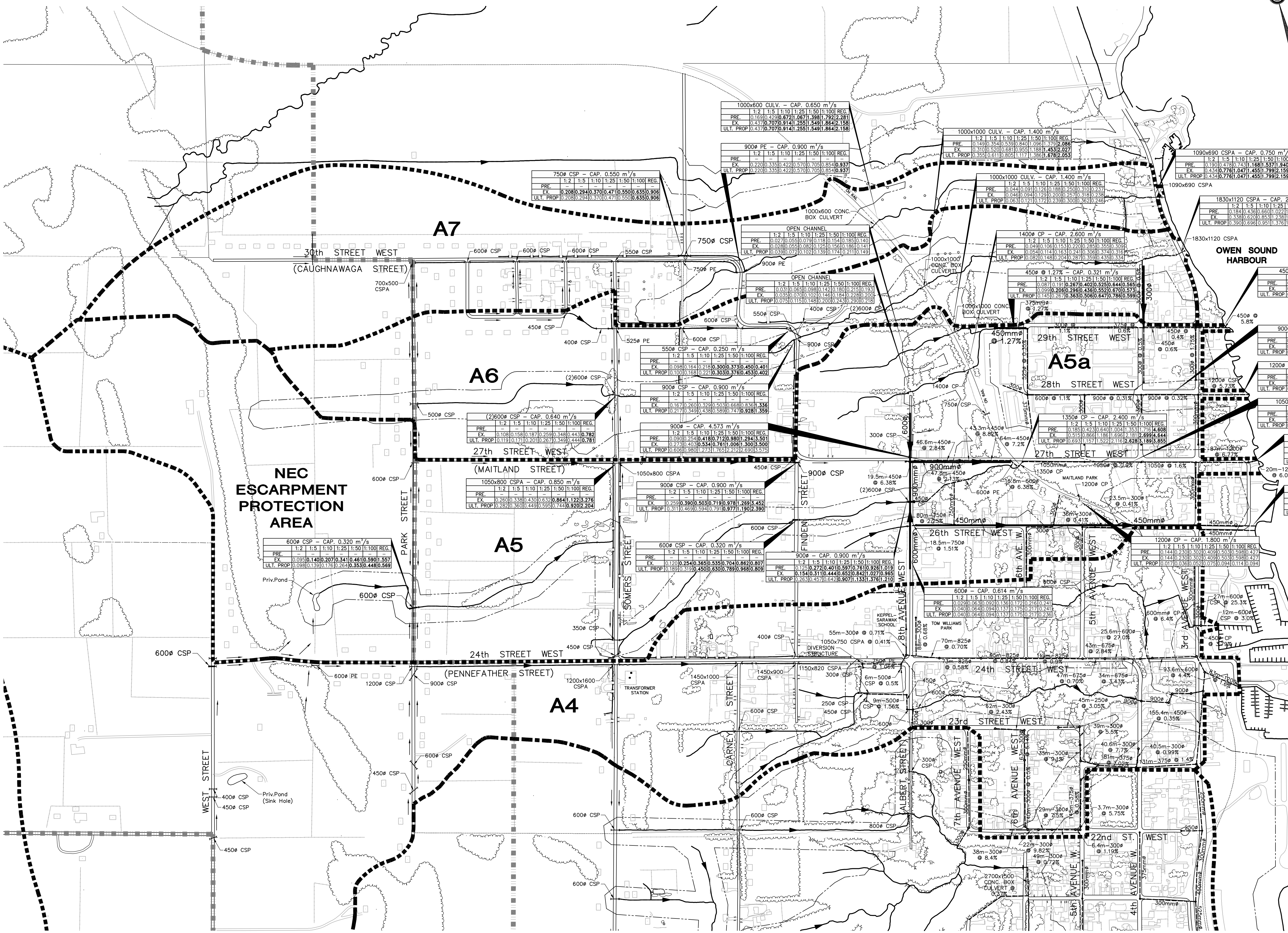

600ø CSP – CAP. 0.320 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.095	**0.140**	**0.207**	**0.341**	**0.461**	**0.590**	**1.557**
ULT. PROP	0.098	0.139	0.176	0.264	**0.353**	**0.448**	**0.569**

1050x800 CSPA – CAP. 0.850 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.260	0.338	0.430	0.632	**0.864**	**1.122**	**3.276**
ULT. PROP	0.282	0.360	0.449	0.595	0.744	**0.920**	**2.204**

(2)600ø CSP – CAP. 0.640 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.108	0.158	0.187	0.259	0.348	0.443	**0.782**
ULT. PROP	0.119	0.171	0.201	0.267	0.349	0.444	**0.781**

750ø CSP – CAP. 0.550 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	**0.208**	**0.294**	**0.370**	**0.471**	**0.550**	**0.635**	**0.906**
ULT. PROP	0.208	0.294	0.370	0.471	0.550	**0.635**	**0.906**

900ø CSP – CAP. 0.900 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.259	**0.390**	**0.503**	**0.719**	**0.978**	**1.269**	**3.452**
ULT. PROP	0.311	0.469	0.594	0.791	**0.977**	**1.190**	**2.390**

600ø CSP – CAP. 0.320 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.120	**0.254**	**0.365**	**0.535**	**0.704**	**0.862**	**0.807**
ULT. PROP	0.189	0.319	**0.450**	**0.630**	**0.789**	**0.968**	**0.809**

900ø – CAP. 4.573 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.090	0.254	**0.418**	**0.712**	**0.980**	**1.294**	**3.501**
EX.	0.273	0.403	**0.534**	**0.761**	**1.006**	**1.300**	**3.500**
ULT. PROP	0.606	0.980	1.273	1.765	2.212	2.690	3.575

900ø CSP – CAP. 0.900 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.167	0.260	0.329	0.503	0.668	0.836	**1.336**
ULT. PROP	0.217	0.349	0.438	0.589	0.747	**0.928**	**1.359**

550ø CSP – CAP. 0.250 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.098	0.164	0.218	**0.300**	**0.373**	**0.450**	**0.401**
ULT. PROP	0.100	0.168	0.221	**0.303**	**0.376**	**0.453**	**0.402**

900ø – CAP. 0.900 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.125	**0.272**	**0.401**	**0.597**	**0.761**	**0.926**	**1.019**
EX.	**0.154**	**0.311**	**0.444**	**0.652**	**0.842**	**1.027**	**0.965**
ULT. PROP	0.263	0.457	0.642	**0.907**	**1.133**	**1.376**	**1.210**

600ø – CAP. 0.614 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.029	0.063	0.092	0.136	0.172	0.216	0.241
EX.	0.040	0.064	0.094	0.137	0.175	0.217	0.241
ULT. PROP	0.040	0.064	0.094	0.137	0.175	0.217	0.236

OPEN CHANNEL

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.027	0.055	0.079	0.118	0.154	0.185	0.140
EX.	0.028	0.055	0.082	0.125	0.156	0.186	0.141
ULT. PROP	0.039	0.072	0.102	0.139	0.174	0.211	0.149

OPEN CHANNEL

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.031	0.065	0.098	0.142	0.180	0.215	0.193
EX.	0.035	0.070	0.102	0.146	0.184	0.228	0.200
ULT. PROP	0.075	0.115	0.148	0.200	0.243	0.290	0.218

900ø PE – CAP. 0.900 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	–	–	–	–	–	–	–
EX.	0.220	0.335	0.422	0.570	0.705	0.854	**0.937**
ULT. PROP	0.220	0.335	0.422	0.570	0.705	0.854	**0.937**

1000x600 CULV. – CAP. 0.650 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.169	0.429	**0.672**	**1.067**	**1.398**	**1.792**	**2.281**
EX.	0.437	**0.707**	**0.914**	**1.255**	**1.549**	**1.864**	**2.158**
ULT. PROP	0.437	**0.707**	**0.914**	**1.255**	**1.549**	**1.864**	**2.158**

1000x1000 CULV. – CAP. 1.400 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.149	0.354	0.539	0.840	1.096	1.379	**2.086**
EX.	0.310	0.520	0.681	0.955	1.188	**1.453**	**2.027**
ULT. PROP	0.355	0.611	0.805	1.117	1.386	**1.678**	**2.053**

1000x1000 CULV. – CAP. 1.400 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.044	0.091	0.126	0.188	0.250	0.310	0.237
EX.	0.046	0.094	0.129	0.200	0.257	0.318	0.238
ULT. PROP	0.063	0.121	0.172	0.239	0.300	0.362	0.246

1400ø CP – CAP. 2.600 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.049	0.106	0.153	0.220	0.285	0.355	0.309
EX.	0.054	0.114	0.163	0.241	0.306	0.374	0.316
ULT. PROP	0.082	0.148	0.204	0.287	0.359	0.435	0.334

450ø @ 1.27% – CAP. 0.321 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.087	0.191	**0.267**	**0.402**	**0.525**	**0.644**	**0.565**
EX.	0.099	**0.206**	**0.296**	**0.436**	**0.552**	**0.670**	**0.573**
ULT. PROP	0.145	0.267	**0.363**	**0.506**	**0.647**	**0.786**	**0.599**

1350ø CP – CAP. 2.400 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.185	0.423	0.640	1.004	1.353	1.716	**4.608**
EX.	0.515	0.866	1.186	1.696	2.181	**2.699**	**4.644**
ULT. PROP	0.693	1.157	1.522	2.116	**2.628**	**3.189**	**3.855**

1200ø CP – CAP. 1.800 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.144	0.230	0.302	0.409	0.503	0.598	0.427
EX.	0.144	0.230	0.302	0.409	0.503	0.598	0.427
ULT. PROP	0.017	0.036	0.052	0.075	0.094	0.114	0.094

(2)450ø @ 7.4% – CAP. 0.840 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.018	0.024	0.029	0.036	0.041	0.047	0.026
EX.	0.018	0.024	0.029	0.036	0.041	0.047	0.026
ULT. PROP	0.135	0.199	0.258	0.340	0.406	0.474	0.388

1200ø @ 6.0% – CAP. 5.173 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.283	0.538	0.800	1.230	1.630	2.040	5.063
EX.	0.621	1.068	1.465	2.111	2.672	3.312	5.100
ULT. PROP	0.704	1.191	1.612	2.274	2.860	3.477	4.128

1050ø @ 0.9% – CAP. 1.403 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.240	0.520	0.771	1.193	**1.572**	**1.969**	**4.971**
EX.	0.609	1.044	**1.425**	**2.032**	**2.572**	**3.193**	**5.008**
ULT. PROP	0.704	1.190	**1.577**	**2.203**	**2.770**	**3.369**	**4.038**

1200ø CSP @ 5.73% – CAP. 5.055 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.472	0.716	0.909	1.226	1.503	1.781	1.406
EX.	0.509	0.777	0.997	1.331	1.607	1.890	1.417
ULT. PROP	0.516	0.772	0.973	1.265	1.512	1.761	1.256

900ø @ 0.32% – CAP. 1.024 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.443	0.677	0.865	**1.164**	**1.433**	**1.702**	**1.348**
EX.	0.482	0.741	0.955	**1.269**	**1.537**	**1.812**	**1.359**
ULT. PROP	0.493	0.738	0.931	**1.204**	**1.444**	**1.686**	**1.202**

450ø @ 5.8% – CAP. 0.687 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.157	0.233	0.292	0.356	0.415	0.467	0.271
EX.	0.157	0.233	0.292	0.356	0.415	0.467	0.271
ULT. PROP	0.176	0.263	0.331	0.406	0.473	0.534	0.299

1830x1120 CSPA – CAP. 2.600 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.184	0.436	0.660	1.022	1.325	1.685	**2.665**
EX.	0.338	0.620	0.853	1.238	1.580	1.958	**2.625**
ULT. PROP	0.390	0.696	0.951	1.376	1.749	2.155	**2.640**

1090x690 CSPA – CAP. 0.750 m³/s

	1:2	1:5	1:10	1:25	1:50	1:100	REG.
PRE.	0.190	0.478	0.743	**1.168**	**1.537**	**1.940**	**2.597**
EX.	0.434	**0.776**	**1.047**	**1.455**	**1.799**	**2.159**	**2.490**
ULT. PROP	0.434	**0.776**	**1.047**	**1.455**	**1.799**	**2.159**	**2.490**

LEGEND

- MAJOR DRAINAGE DIVIDE
- ZONING LINE FOR NEC PROTECTION AREA
- A7 — MAJOR DRAINAGE BASIN
- G.S.C.A. REGULATED AREA
- WATER COURSE
- FLOW DIRECTION

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

LICENSED PROFESSIONAL ENGINEER
J. B. SLOCOMBE
PROVINCE OF ONTARIO

NO.	DATE	REVISION DESCRIPTION	CH'KD
4	JULY 21/08	ISSUED FOR FINAL REPORT	D.J.R.
3	APR 10/08	ISSUED FOR FINAL DRAFT REPORT	D.J.R.
2	MAR 6/08	ISSUED FOR 90% COMPLETED REPORT	D.J.R.
1	JAN 11/08	UPDATED CULVERT & FLOW INFO	D.J.R.

Gamsby and Mannerow ENGINEERS

BROOKE AREA STORMWATER MANAGEMENT STUDY

TWP. OF GEORGIAN BLUFFS & CITY OF OWEN SOUND

DRAINAGE AREAS A5, A6 & A7 PROPOSED CAPITAL WORKS DESIGN FLOWS

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
K.B.	J.B.S.	M-1586	12
DESIGNED BY :	DATE :	SCALE :	
J.B.S.	SEPT. 2007	1:4000	

Plotted On: July 21, 2008 M1586DRAINAGE-K.dwg