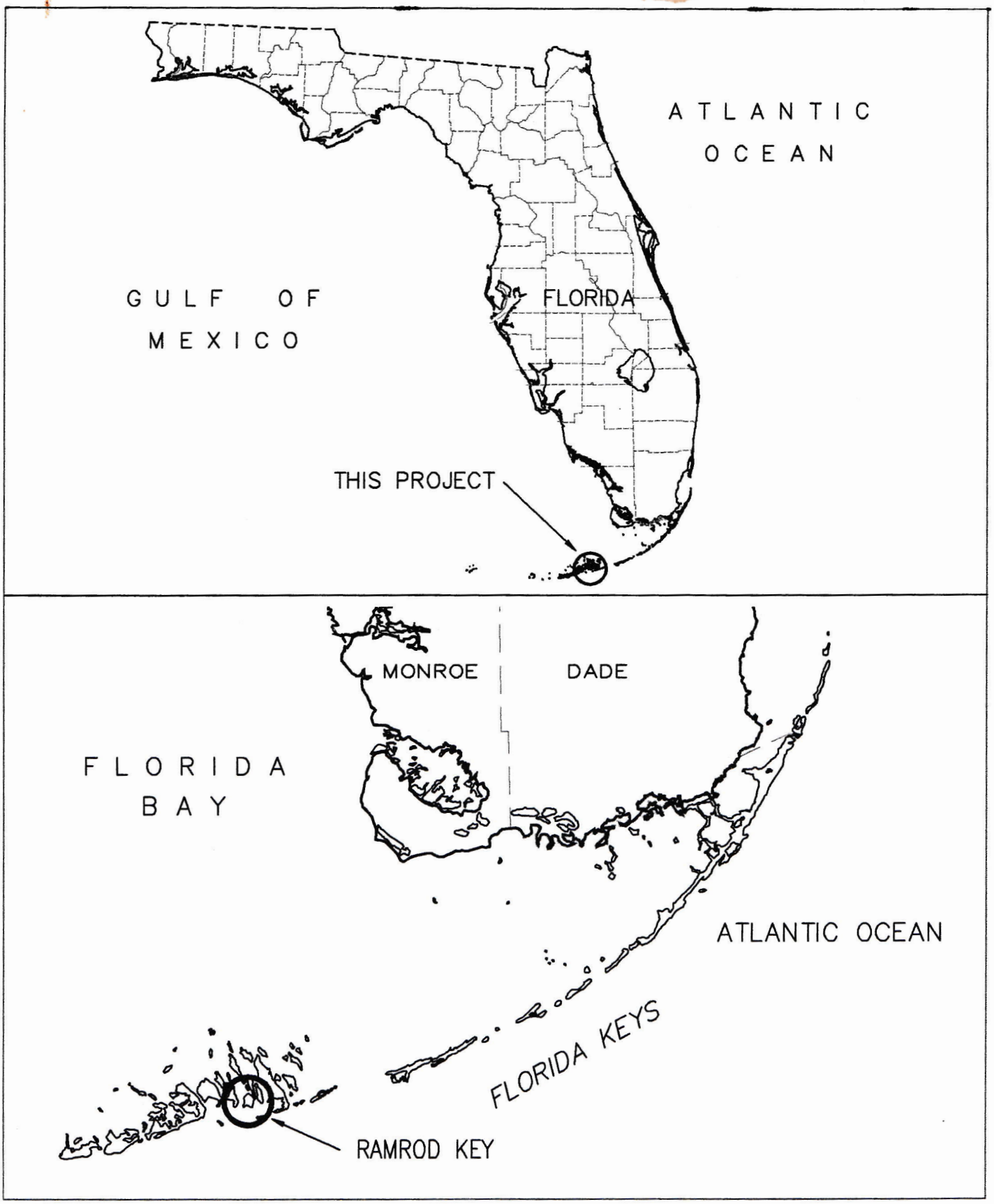

FIGURE 1
LOCATION MAP

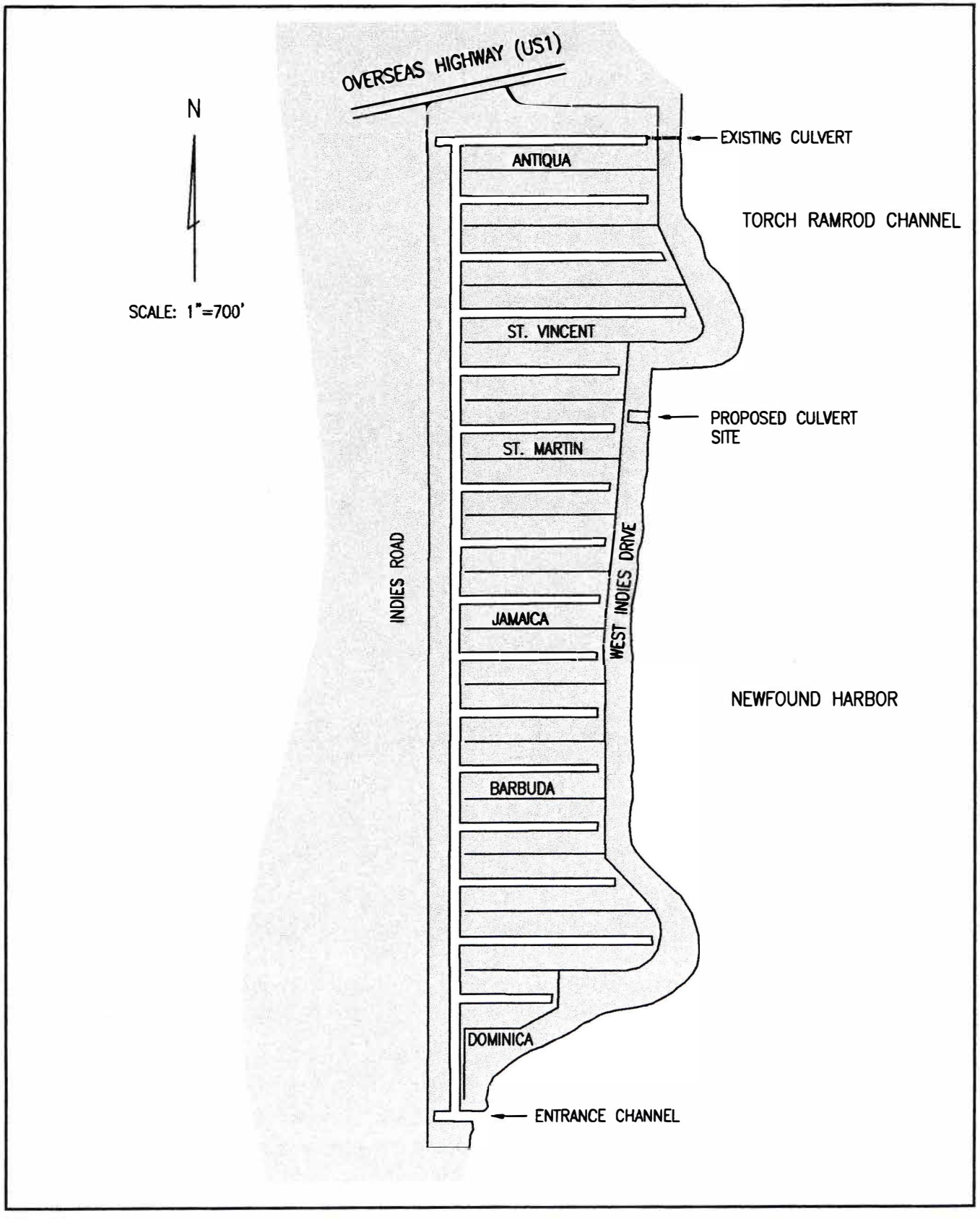

FIGURE 2
SITE PLAN

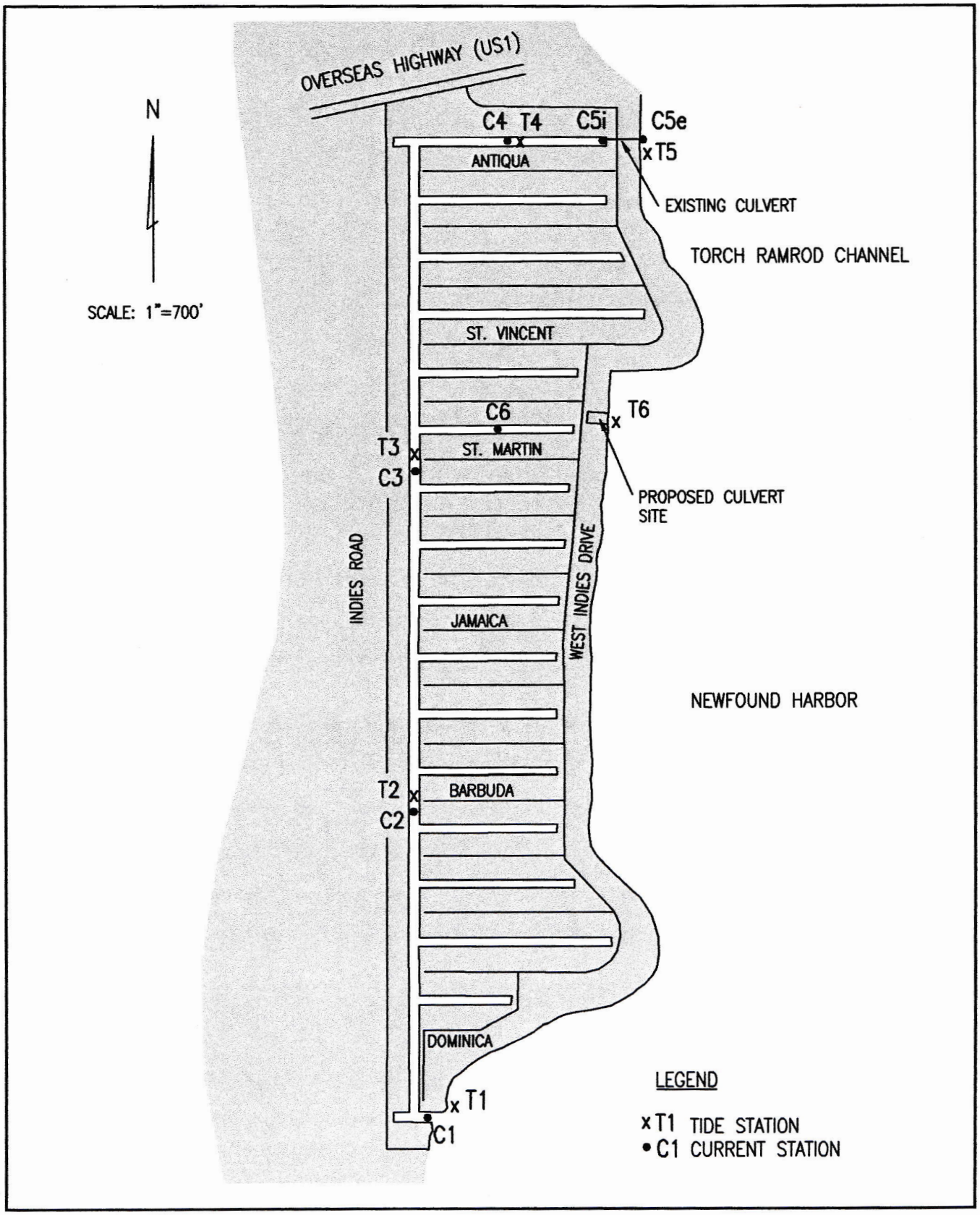

FIGURE 3
TIDE AND CURRENT MEASURING STATIONS

Table 1 Tidal Variation[1] at Ramrod Key

T1		T2		T3		T4		T5		T6	
Time	Elev.[2]	Time	Elev.	Time	Elev.	Time	Elev.	Time	Elev.	Time	Elev.
December 6, 2003											
7:40	2.21	7:59	2.51	8:10	4.67	9:21	2.19	7:16	3.27	9:41	1.99
8:35	2.22	8:42	2.55	9:00	4.67	10:09	2.07	8:27	3.30	10:16	1.90
9:47	2.08	10:00	2.38	10:04	4.50	10:49	1.97	9:28	3.25	11:21	1.65
10:23	2.00	10:29	2.30	10:45	4.40	12:12	1.70	10:11	3.18	12:25	1.47
11:28	1.77	11:41	2.05	12:00	4.17	13:09	1.52	11:15	3.00	13:27	1.30
12:34	1.59	13:00	1.82	13:05	3.97	14:10	1.52	12:16	2.88	15:28	1.67
13:37	1.45	14:00	1.79	14:05	3.94	15:52	1.92	13:17	2.79	18:26	2.45
13:55	1.48	15:40	2.13	15:46	4.31	18:59	2.71	14:15	2.79	19:26	2.51
15:35	1.80	16:56	2.51	16:36	4.85	20:01	2.71	14:30	2.80	20:20	2.57
16:28	2.10	18:48	2.94	18:54	5.10			15:24	2.93		
18:40	2.60	19:41	2.92	19:46	5.10			18:10	3.62		
19:35	2.61							19:20	3.75		
								20:12	3.79		
December 7, 2003											
7:51	2.00	7:58	2.31	8:02	4.49	8:19	2.08	7:31	3.00	7:45	1.89
10:05	2.02	9:52	2.35	9:34	4.51	9:31	2.12	9:35	3.20	9:95	1.93

Note: 1. Tidal measurements were conducted on December 6 and 7, 2003
2. Elevation reading at each tide staff was in feet.

Table 2 Tidal Flows[1] at Ramrod Key

C1		C5i[3]		C5e[4]	
Time	Vel. (ft/sec)[2]	Time	Vel. (ft/sec)	Time	Vel. (ft/sec)
December 6, 2003					
8:35	0.0	9:35	-1.3	9:41	-1.4
10:50	-0.4	10:20	-0.5	12:20	0.9
11:35	-0.3	11:10	0.8	13:20	1.8
12:50	-0.4	12:10	2.0	14:35	1.3
13:55	0.0	13:14	3.6	18:20	-1.0
16:20	0.0	14:20	3.0	19:18	-1.8
16:25	0.3	15:35	1.0	20:12	-1.2
18:37	0.2	18:22	-1.2		
19:34	0.0	19:16	-1.8		
		20:15	-1.1		
December 7, 2003					
7:54	0.10	6:20	-1.0	6:22	-1.2
10:10	-0.10	9:40	-1.2	9:40	-1.3

Note: 1. Flow measurements were conducted on December 6 and 7, 2003
2. (+) sign means flows entered the canals; (-) sign means flows out of the canals.
3. Flows were measured at the opening of a 43"-diameter culvert (into the canal).
4. Flows were measured at the opening of a rectangular-shaped drainage culvert (into the bay)

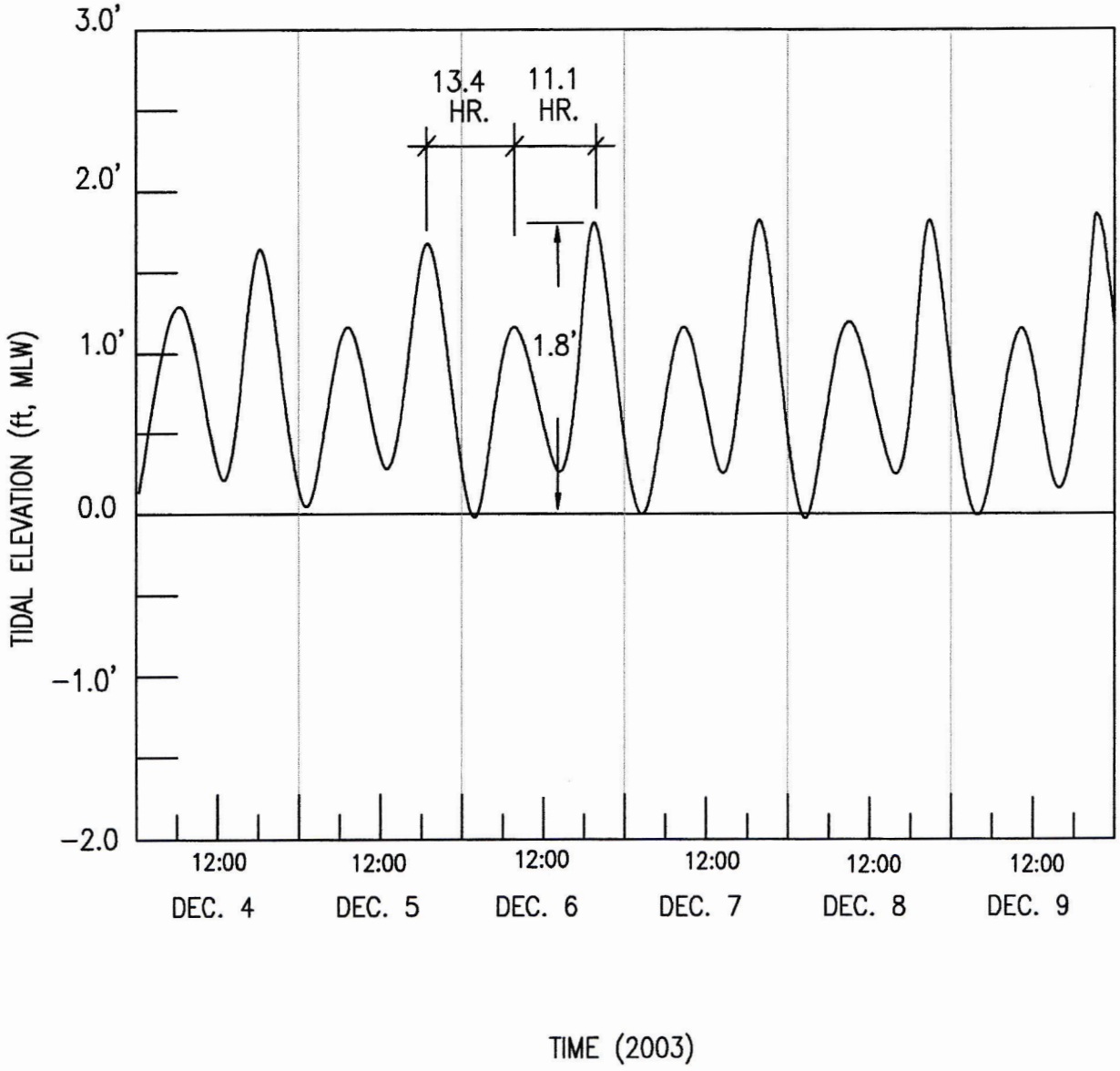

FIGURE 4
TIDAL VARIATION AT NEWFOUND HARBOR

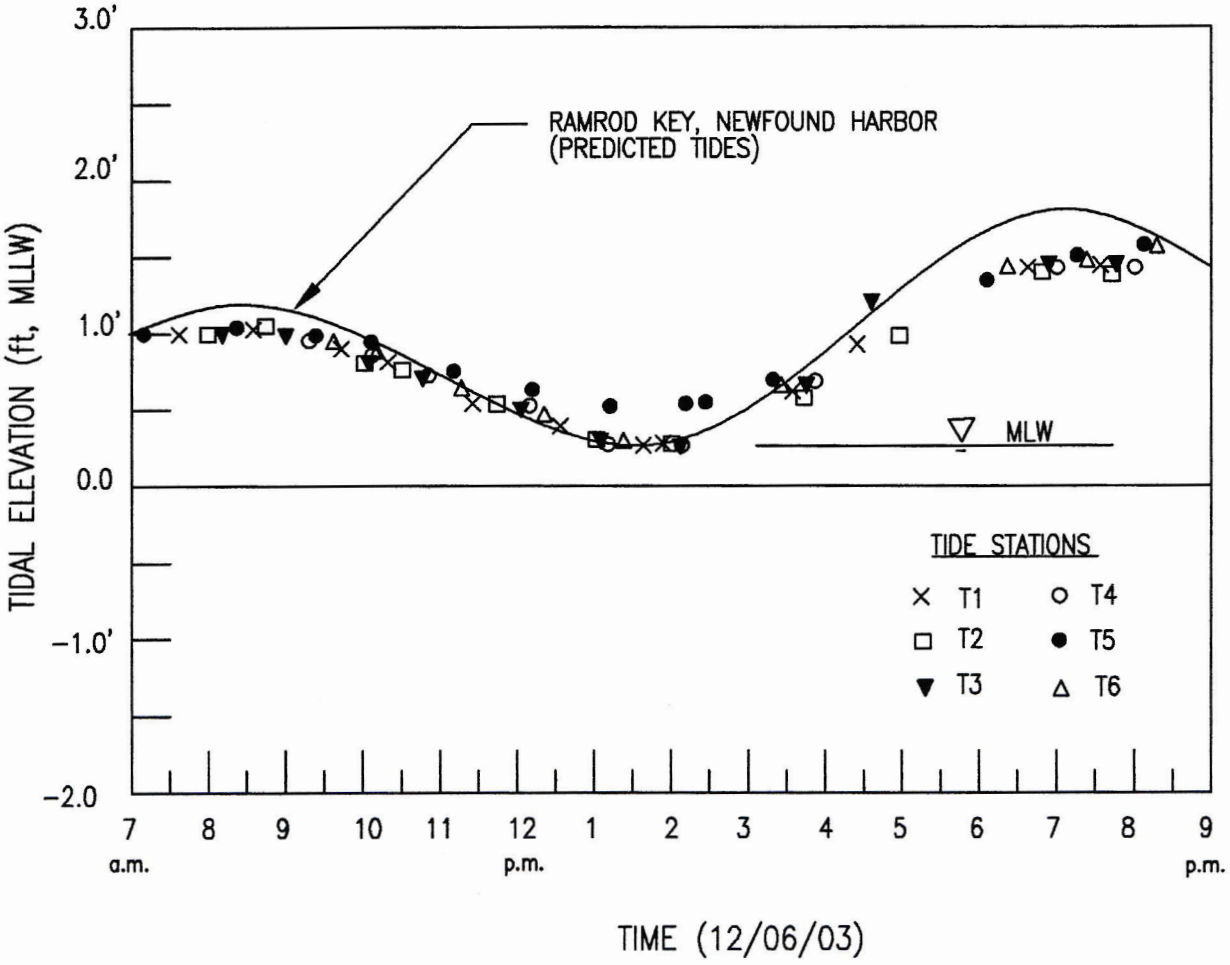

FIGURE 6
TIDAL VARIATION AT RAMROD KEY

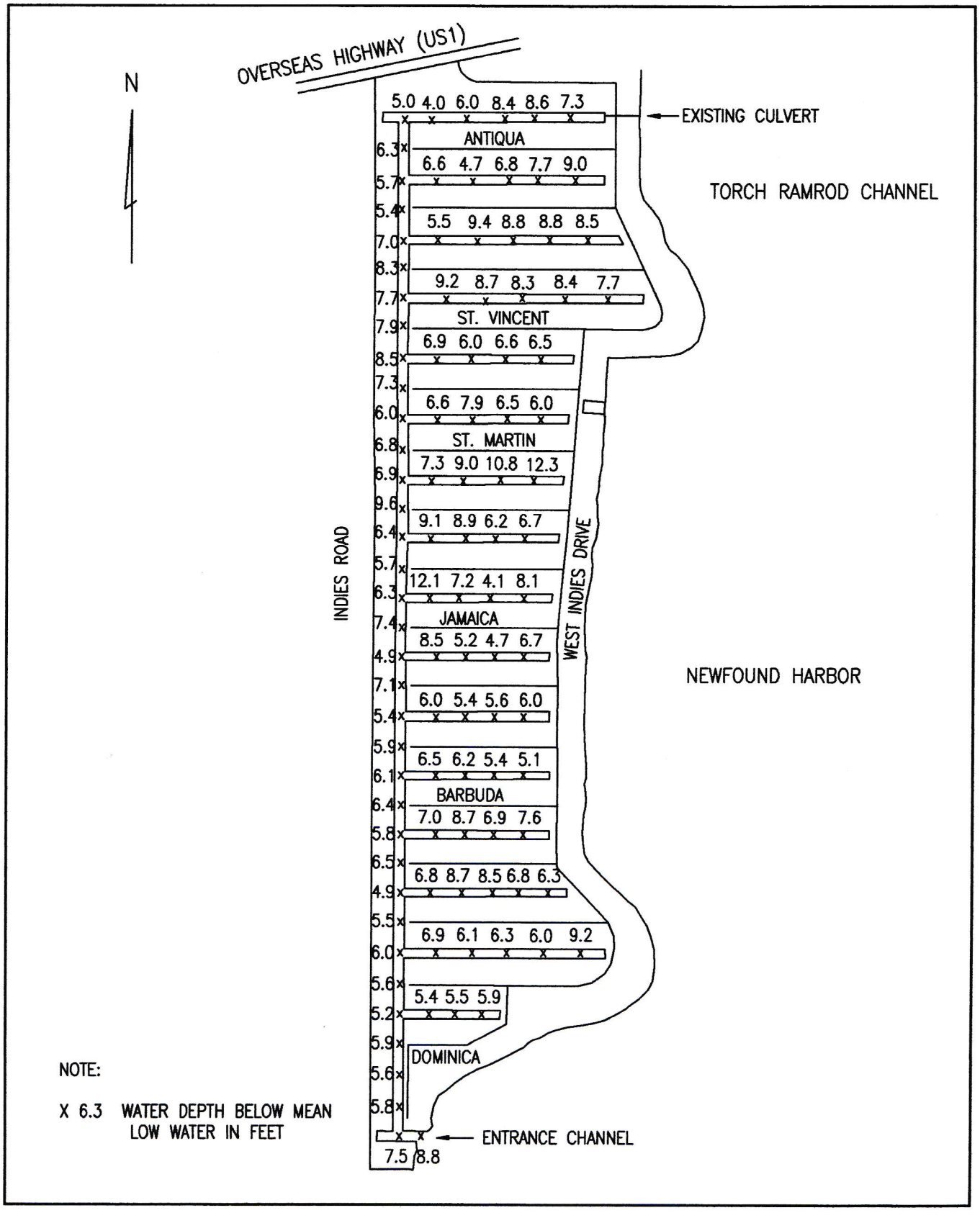

FIGURE 7
WATER DEPTHS IN CANALS

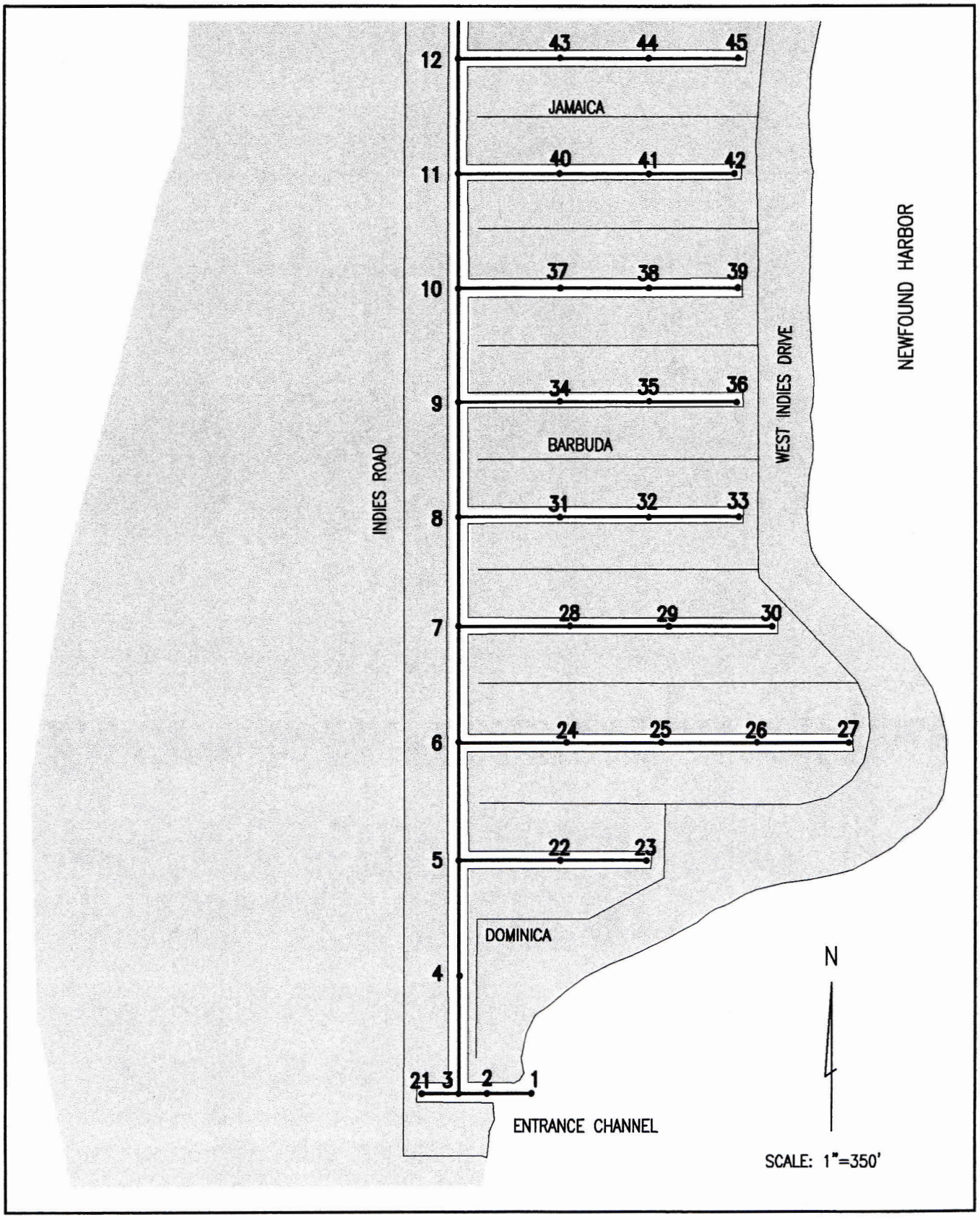

FIGURE 8a
GRID SYSTEM FOR MODEL SIMULATION

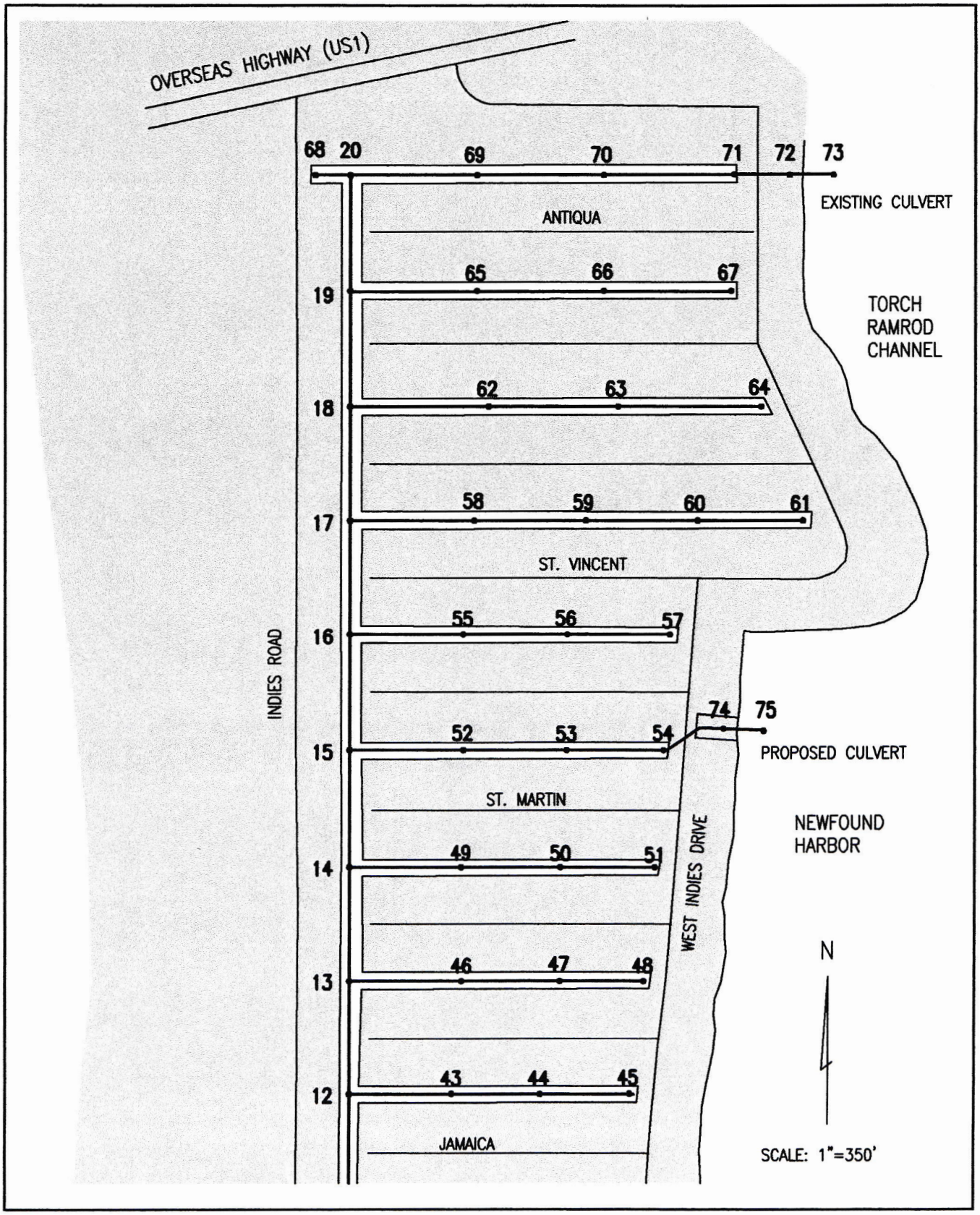

FIGURE 8b
GRID SYSTEM FOR MODEL SIMULATION (II)

Paul Sinept. @ 3/25/04 mtg.

Dyn-new8x5

```
DYNHYD5 EXAMPLE - FILE: newculvert1.INP
BBECA culvert - Alt.3 - 175' long, 8' wide, 5' deep - 10 DAYS

***** PROGRAM CONTROL DATA ******************************************************
   75   74    0    5    0    1 0000   11 0000
**** print out control ********************************************************
     00.00       0.50   75
    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
   16   17   18   19   20   21   22   23   24   25   26   27   28   29   30
   31   32   33   34   35   36   37   38   39   40   41   42   43   44   45
   46   47   48   49   50   51   52   53   54   55   56   57   58   59   60
   61   62   63   64   65   66   67   68   69   70   71   72   73   74   75
***** SUMMARY CONTROL DATA ******************************************************
    1    1  000 6.50   12  100
***** JUNCTION DATA *************************************************************
    1      10.00  11400.00      7.30    1    0    0    0    0    0
    2      10.00    400.00      7.30    1    2    0    0    0    0
    3      10.00   1023.00      7.70    2    3   20    0    0    0
    4      10.00   1285.00      8.30    3    4    0    0    0    0
    5      10.00   1988.00      8.40    4    5   21    0    0    0
    6      10.00   1884.00      8.20    5    6   23    0    0    0
    7      10.00   1981.00      8.50    6    7   27    0    0    0
    8      10.00   1822.00      8.20    7    8   30    0    0    0
    9      10.00   1744.00      8.10    8    9   33    0    0    0
   10      10.00   1899.00      8.40    9   10   36    0    0    0
   11      10.00   1615.00      8.50   10   11   39    0    0    0
   12      10.00   1761.00      8.10   11   12   42    0    0    0
   13      10.00   1852.00      8.00   12   13   45    0    0    0
   14      10.00   1859.00      7.90   13   14   48    0    0    0
   15      10.00   1925.00      8.20   14   15   51    0    0    0
   16      10.00   1814.00      7.40   15   16   54    0    0    0
   17      10.00   1890.00      7.70   16   17   57    0    0    0
   18      10.00   2050.00      7.90   17   18   61    0    0    0
   19      10.00   1787.00      8.30   18   19   64    0    0    0
   20      10.00   1441.00      8.50   19   67   68    0    0    0
   21      10.00    218.00      8.20   20    0    0    0    0    0
   22      10.00    825.00      8.30   21   22    0    0    0    0
   23      10.00    446.00      8.20   22    0    0    0    0    0
   24      10.00   1077.00      8.00   23   24    0    0    0    0
   25      10.00   1019.00      8.10   24   25    0    0    0    0
   26      10.00    950.00      8.10   25   26    0    0    0    0
   27      10.00    500.00      7.70   26    0    0    0    0    0
   28      10.00   1007.00      7.60   27   28    0    0    0    0
   29      10.00    882.00      7.70   28   29    0    0    0    0
   30      10.00    488.00      8.10   29    0    0    0    0    0
   31      10.00    942.00      7.60   30   31    0    0    0    0
   32      10.00    852.00      7.60   31   32    0    0    0    0
   33      10.00    478.00      7.70   32    0    0    0    0    0
   34      10.00    805.00      8.10   33   34    0    0    0    0
   35      10.00    787.00      8.20   34   35    0    0    0    0
   36      10.00    417.00      8.40   35    0    0    0    0    0
   37      10.00   1035.00      8.30   36   37    0    0    0    0
   38      10.00    988.00      8.30   37   38    0    0    0    0
   39      10.00    522.00      8.20   38    0    0    0    0    0
   40      10.00    954.00      7.90   39   40    0    0    0    0
   41      10.00    797.00      8.50   40   41    0    0    0    0
   42      10.00    432.00      8.00   41    0    0    0    0    0
   43      10.00    940.00      7.10   42   43    0    0    0    0
   44      10.00    845.00      8.30   43   44    0    0    0    0
   45      10.00    454.00      7.50   44    0    0    0    0    0
   46      10.00   1040.00      7.30   45   46    0    0    0    0
   47      10.00    858.00      7.70   46   47    0    0    0    0
   48      10.00    466.00      8.00   47    0    0    0    0    0
```

49	10.00	970.00	7.50	48	49	0	0	0	0
50	10.00	863.00	7.00	49	50	0	0	0	0
51	10.00	458.00	6.50	50	0	0	0	0	0
52	10.00	1048.00	7.80	51	52	0	0	0	0
53	10.00	918.00	7.80	52	53	0	0	0	0
54	10.00	530.00	8.20	53	73	0	0	0	0
55	10.00	1095.00	8.00	54	55	0	0	0	0
56	10.00	950.00	8.10	55	56	0	0	0	0
57	10.00	538.00	8.00	56	0	0	0	0	0
58	10.00	1290.00	7.30	57	58	0	0	0	0
59	10.00	1119.00	7.40	58	59	0	0	0	0
60	10.00	1117.00	7.50	59	60	0	0	0	0
61	10.00	586.00	7.70	60	0	0	0	0	0
62	10.00	1296.00	7.70	61	62	0	0	0	0
63	10.00	1365.00	7.30	62	63	0	0	0	0
64	10.00	757.00	7.40	63	0	0	0	0	0
65	10.00	1305.00	8.30	64	65	0	0	0	0
66	10.00	1254.00	7.80	65	66	0	0	0	0
67	10.00	665.00	7.50	66	0	0	0	0	0
68	10.00	210.00	8.80	67	0	0	0	0	0
69	10.00	1247.00	8.50	68	69	0	0	0	0
70	10.00	1350.00	7.40	69	70	0	0	0	0
71	10.00	715.00	7.80	70	71	0	0	0	0
72	10.00	300.00	8.90	71	72	0	0	0	0
73	10.00	11400.00	9.00	72	0	0	0	0	0
74	10.00	300.00	8.50	73	74	0	0	0	0
75	10.00	11400.00	8.20	74	0	0	0	0	0

******** CHANNEL DATA **********

1	100.00	100.00	2.00	270	0.0300	0.00	1	2
2	21.30	15.20	1.80	270	0.0200	0.00	2	3
3	89.90	15.20	1.40	0	0.0200	0.00	3	4
4	89.90	15.20	1.50	0	0.0200	0.00	4	5
5	89.90	15.20	1.40	0	0.0200	0.00	5	6
6	90.50	15.20	1.40	0	0.0200	0.00	6	7
7	85.30	15.20	1.60	0	0.0200	0.00	7	8
8	88.40	15.20	1.60	0	0.0200	0.00	8	9
9	88.40	15.20	1.50	0	0.0200	0.00	9	10
10	88.40	15.20	1.70	0	0.0200	0.00	10	11
11	88.40	15.20	1.80	0	0.0200	0.00	11	12
12	88.40	15.20	1.40	0	0.0200	0.00	12	13
13	88.40	15.20	2.10	0	0.0200	0.00	13	14
14	91.40	15.20	1.60	0	0.0200	0.00	14	15
15	89.90	15.20	1.70	0	0.0200	0.00	15	16
16	88.40	15.20	1.80	0	0.0200	0.00	16	17
17	88.40	15.20	1.90	0	0.0200	0.00	17	18
18	88.40	15.20	1.30	0	0.0200	0.00	18	19
19	91.40	15.20	1.50	0	0.0200	0.00	19	20
20	32.00	15.20	1.50	270	0.0200	0.00	3	21
21	77.70	13.70	1.30	90	0.0200	0.00	5	22
22	70.10	13.70	1.40	90	0.0200	0.00	22	23
23	82.30	13.70	1.60	90	0.0200	0.00	6	24
24	73.20	13.70	1.50	90	0.0200	0.00	24	25
25	73.20	13.70	1.40	90	0.0200	0.00	25	26
26	73.20	13.70	2.00	90	0.0200	0.00	26	27
27	85.30	12.20	1.60	90	0.0200	0.00	7	28
28	76.20	12.20	1.80	90	0.0200	0.00	28	29
29	83.80	12.20	1.40	90	0.0200	0.00	29	30
30	78.60	13.10	1.60	90	0.0200	0.00	8	31
31	68.60	13.10	1.70	90	0.0200	0.00	31	32
32	72.20	13.10	1.70	90	0.0200	0.00	32	33
33	77.70	12.20	1.50	90	0.0200	0.00	9	34
34	68.30	12.20	1.40	90	0.0200	0.00	34	35
35	71.60	12.20	1.30	90	0.0200	0.00	35	36

```
   36     78.60     13.70     1.40      90    0.0200     0.00   10   37
   37     68.60     13.70     1.40      90    0.0200     0.00   37   38
   38     71.60     13.70     1.40      90    0.0200     0.00   38   39
   39     78.60     12.50     1.80      90    0.0200     0.00   11   40
   40     68.60     12.50     1.20      90    0.0200     0.00   40   41
   41     71.00     12.50     1.50      90    0.0200     0.00   41   42
   42     78.60     12.50     2.30      90    0.0200     0.00   12   43
   43     68.00     12.50     1.30      90    0.0200     0.00   43   44
   44     74.70     12.50     1.80      90    0.0200     0.00   44   45
   45     86.00     13.10     2.00      90    0.0200     0.00   13   46
   46     76.20     13.10     1.70      90    0.0200     0.00   46   47
   47     69.20     13.10     1.50      90    0.0200     0.00   47   48
   48     85.30     12.50     1.60      90    0.0200     0.00   14   49
   49     76.20     12.50     2.00      90    0.0200     0.00   49   50
   50     75.30     12.50     2.30      90    0.0200     0.00   50   51
   51     87.80     12.50     1.50      90    0.0200     0.00   15   52
   52     79.20     12.50     1.60      90    0.0200     0.00   52   53
   53     77.70     12.50     1.40      90    0.0200     0.00   53   54
   54     87.50     13.10     1.60      90    0.0200     0.00   16   55
   55     80.20     13.10     1.50      90    0.0200     0.00   55   56
   56     85.00     13.10     1.50      90    0.0200     0.00   56   57
   57     94.50     13.10     2.00      90    0.0200     0.00   17   58
   58     85.30     13.10     1.90      90    0.0200     0.00   58   59
   59     86.00     13.10     1.90      90    0.0200     0.00   59   60
   60     86.90     13.10     1.70      90    0.0200     0.00   60   61
   61    106.70     13.10     1.30      90    0.0200     0.00   18   62
   62     99.10     13.10     1.90      90    0.0200     0.00   62   63
   63    114.60     13.10     1.90      90    0.0200     0.00   63   64
   64     97.50     13.10     1.50      90    0.0200     0.00   19   65
   65     96.90     13.10     1.60      90    0.0200     0.00   65   66
   66    102.10     13.10     1.90      90    0.0200     0.00   66   67
   67     30.50     13.70     1.20     270    0.0200     0.00   20   68
   68     97.50     13.70     1.00      90    0.0200     0.00   20   69
   69     97.50     13.70     1.90      90    0.0200     0.00   69   70
   70    100.60     13.70     1.70      90    0.0200     0.00   70   71
   71     45.70      1.10     0.40      90    0.0800     0.00   71   72
   72    100.00    100.00     0.90      90    0.0300     0.00   72   73
   73     53.30      2.40     0.70      45    0.0600     0.00   54   74
   74    100.00    100.00     2.00      90    0.0300     0.00   74   75
****** CONSTANT INFLOWS ************************************************************
    0
***** VARIABLE INFLOWS ************************************************************
    0
***** SEAWARD BOUNDARY DATA *******************************************************
    3
    3    1   40   20  .01  0.1    0  1.0
    1 0000      10.00    1 0600      10.37    1 1130      10.09    1 1700      10.55
    2 0030      10.00    2 0630      10.37    2 1200      10.09    2 1730      10.55
    3 0100      10.00    3 0700      10.37    3 1230      10.09    3 1800      10.55
    4 0130      10.00    4 0730      10.37    4 1300      10.09    4 1830      10.55
    5 0200      10.00    5 0800      10.37    5 1330      10.09    5 1900      10.55
    6 0230      10.00    6 0830      10.37    6 1400      10.09    6 1930      10.55
    7 0300      10.00    7 0900      10.37    7 1430      10.09    7 2000      10.55
    8 0330      10.00    8 0930      10.37    8 1500      10.09    8 2030      10.55
    9 0400      10.00    9 1000      10.37    9 1530      10.09    9 2100      10.55
   10 0430      10.00   10 1030      10.37   10 1600      10.09   10 2130      10.55
    3   73   40   20  .01  0.1    0  1.0
    1 0000      10.00    1 0630      10.37    1 1200      10.18    1 1730      10.55
    2 0100      10.09    2 0700      10.37    2 1230      10.18    2 1800      10.55
    3 0130      10.09    3 0730      10.37    3 1300      10.18    3 1830      10.55
    4 0200      10.09    4 0800      10.37    4 1330      10.18    4 1900      10.55
    5 0230      10.09    5 0830      10.37    5 1400      10.18    5 1930      10.55
    6 0300      10.09    6 0900      10.37    6 1430      10.18    6 2000      10.55
```

```
     7 0330      10.09     7 0930      10.37     7 1500      10.18     7 2030      10.55
     8 0400      10.09     8 1000      10.37     8 1530      10.18     8 2100      10.55
     9 0430      10.09     9 1030      10.37     9 1600      10.18     9 2130      10.55
    10 0500      10.09    10 1100      10.37    10 1630      10.18    10 2200      10.55
     3   75    40   20   .01  0.1    0  1.0
     1 0000      10.00     1 0615      10.37     1 1145      10.09     1 1715      10.55
     2 0045      10.00     2 0645      10.37     2 1215      10.09     2 1745      10.55
     3 0115      10.00     3 0715      10.37     3 1245      10.09     3 1815      10.55
     4 0145      10.00     4 0745      10.37     4 1315      10.09     4 1845      10.55
     5 0215      10.00     5 0815      10.37     5 1345      10.09     5 1915      10.55
     6 0245      10.00     6 0845      10.37     6 1415      10.09     6 1945      10.55
     7 0315      10.00     7 0915      10.37     7 1445      10.09     7 2015      10.55
     8 0345      10.00     8 0945      10.37     8 1515      10.09     8 2045      10.55
     9 0415      10.00     9 1015      10.37     9 1545      10.09     9 2115      10.55
    10 0445      10.00    10 1045      10.37    10 1615      10.09    10 2145      10.55
***** WIND DATA ************************************************************************
     0
***** PRECIPITATION OR EVAPORATION DATA ***********************************************
     0
***** JUNCTION GEOMETRY DATA ***********************************************************
     0
***** CHANNEL GEOMETRY DATA ************************************************************
     0
***** MAP TO WASP5 *********************************************************************
     0   75
     1    1
     2    2
     3    3
     4    4
     5    5
     6    6
     7    7
     8    8
     9    9
    10   10
    11   11
    12   12
    13   13
    14   14
    15   15
    16   16
    17   17
    18   18
    19   19
    20   20
    21   21
    22   22
    23   23
    24   24
    25   25
    26   26
    27   27
    28   28
    29   29
    30   30
    31   31
    32   32
    33   33
    34   34
    35   35
    36   36
    37   37
    38   38
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39	39
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67	67
68	68
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71	71
72	72
73	73
74	74
75	75

```
Alt. 3 - 10% flushing time simulation - TOXI EXAMPLE - FILE: newculvert3.INP
BBECA Culvert, Chemical 1 no decay 10 days, New Culvert: 175'(L) x 8'(W) x 5'(D)
NSEG NSYS ICFL MFLG JMAS NSLN INTY ADFC   DD HHMM        A:MODEL OPTIONS
  75    5    0    0    1    0    0  0.0    1 0000
   1    2    3    4    5    6
   1
     0.05      10.0
   1
     0.05      10.0
   0    1    1    1    1    1
   1    0    +    *    +    *    +    *    +    *    +    *    B:EXCHANGES
   1       1.0    1.0                                (water column diffusion)
  75
    270.0     100.0    0    1
    270.0     100.0    1    2
     35.0      21.3    2    3
     25.8      89.9    3    4
     27.4      89.9    4    5
     25.8      89.9    5    6
     25.8      90.5    6    7
     30.4      85.3    7    8
     30.4      88.4    8    9
     27.4      88.4    9   10
     33.4      88.4   10   11
     35.0      88.4   11   12
     25.8      88.4   12   13
     44.1      88.4   13   14
     31.9      91.4   14   15
     33.4      89.9   15   16
     36.5      88.4   16   17
     38.0      88.4   17   18
     24.3      88.4   18   19
     28.9      91.4   19   20
     27.4      32.0    3   21
     21.9      77.7    5   22
     24.7      70.1   22   23
     28.8      82.3    6   24
     26.0      73.2   24   25
     24.7      73.2   25   26
     38.4      73.2   26   27
     25.6      85.3    7   28
     31.7      76.2   28   29
     23.2      83.8   29   30
     27.5      78.6    8   31
     30.1      68.6   31   32
     30.1      72.2   32   33
     24.4      77.7    9   34
     22.0      68.3   34   35
     19.5      71.6   35   36
     24.7      78.6   10   37
     23.3      68.6   37   38
     24.7      71.6   38   39
     32.5      78.6   11   40
     18.8      68.6   40   41
     25.0      71.0   41   42
     46.3      78.6   12   43
     21.3      68.0   43   44
     31.3      74.7   44   45
     36.7      86.0   13   46
     30.1      76.2   46   47
     26.2      69.2   47   48
     27.5      85.3   14   49
     37.5      76.2   49   50
```

```
    46.3      75.3   50   51
    25.0      87.8   15   52
    27.5      79.2   52   53
    22.5      77.7   53   54
    27.5      87.5   16   55
    24.9      80.2   55   56
    26.2      85.0   56   57
    36.7      94.5   17   58
    34.1      85.3   58   59
    34.1      86.0   59   60
    30.1      86.9   60   61
    22.3     106.7   18   62
    35.4      99.1   62   63
    34.1     114.6   63   64
    26.2      97.5   19   65
    27.5      96.9   65   66
    35.4     102.1   66   67
    19.2      30.5   20   68
    16.4      97.5   20   69
    35.6      97.5   69   70
    30.1     100.6   70   71
     1.0      45.7   71   72
    90.0     100.0   72   73
     3.7      53.3   54   74
   270.0     100.0   74   75
  2
   .1e-4       0.    0.1e-4      365.
  0    1    1    1    1    1
  2    0       1.0    +    *    +    *    +    *    +    *    C: VOLUMES
 1.00       1.0000
      1         0         1     30780       0.0      0.40     10.52      0.60
      2         1         1      1080       0.0      0.40     10.52      0.60
      3         2         1      2353       0.0      0.40     10.52      0.60
      4         3         1      2185       0.0      0.40     10.52      0.60
      5         4         1      3181       0.0      0.40     10.52      0.60
      6         5         1      3391       0.0      0.40     10.52      0.60
      7         6         1      2972       0.0      0.40     10.52      0.60
      8         7         1      3280       0.0      0.40     10.52      0.60
      9         8         1      3314       0.0      0.40     10.52      0.60
     10         9         1      3038       0.0      0.40     10.52      0.60
     11        10         1      2423       0.0      0.40     10.52      0.60
     12        11         1      3346       0.0      0.40     10.52      0.60
     13        12         1      3704       0.0      0.40     10.52      0.60
     14        13         1      3980       0.0      0.40     10.52      0.60
     15        14         1      3465       0.0      0.40     10.52      0.60
     16        15         1      4716       0.0      0.40     10.52      0.60
     17        16         1      4347       0.0      0.40     10.52      0.60
     18        17         1      4305       0.0      0.40     10.52      0.60
     19        18         1      3038       0.0      0.40     10.52      0.60
     20        19         1      2162       0.0      0.40     10.52      0.60
     21         3         1       392       0.0      0.40     10.52      0.60
     22         5         1      1403       0.0      0.40     10.52      0.60
     23        22         1       803       0.0      0.40     10.52      0.60
     24         6         1      2154       0.0      0.40     10.52      0.60
     25        24         1      1936       0.0      0.40     10.52      0.60
     26        25         1      1805       0.0      0.40     10.52      0.60
     27        26         1      1150       0.0      0.40     10.52      0.60
     28         7         1      2417       0.0      0.40     10.52      0.60
     29        28         1      2029       0.0      0.40     10.52      0.60
     30        29         1       927       0.0      0.40     10.52      0.60
     31         8         1      2261       0.0      0.40     10.52      0.60
     32        31         1      2045       0.0      0.40     10.52      0.60
     33        32         1      1099       0.0      0.40     10.52      0.60
```

```
        34          9          1       1530        0.0       0.40      10.52       0.60
        35         34          1       1417        0.0       0.40      10.52       0.60
        36         35          1        670        0.0       0.40      10.52       0.60
        37         10          1       1760        0.0       0.40      10.52       0.60
        38         37          1       1680        0.0       0.40      10.52       0.60
        39         38          1        940        0.0       0.40      10.52       0.60
        40         11          1       2003        0.0       0.40      10.52       0.60
        41         40          1       1196        0.0       0.40      10.52       0.60
        42         41          1        864        0.0       0.40      10.52       0.60
        43         12          1       2726        0.0       0.40      10.52       0.60
        44         43          1       1437        0.0       0.40      10.52       0.60
        45         44          1       1135        0.0       0.40      10.52       0.60
        46         13          1       2808        0.0       0.40      10.52       0.60
        47         46          1       1973        0.0       0.40      10.52       0.60
        48         47          1        932        0.0       0.40      10.52       0.60
        49         14          1       2425        0.0       0.40      10.52       0.60
        50         49          1       2589        0.0       0.40      10.52       0.60
        51         50          1       1603        0.0       0.40      10.52       0.60
        52         15          1       2306        0.0       0.40      10.52       0.60
        53         52          1       2020        0.0       0.40      10.52       0.60
        54         53          1        943        0.0       0.40      10.52       0.60
        55         16          1       2190        0.0       0.40      10.52       0.60
        56         55          1       1805        0.0       0.40      10.52       0.60
        57         56          1       1076        0.0       0.40      10.52       0.60
        58         17          1       3483        0.0       0.40      10.52       0.60
        59         58          1       2909        0.0       0.40      10.52       0.60
        60         59          1       2793        0.0       0.40      10.52       0.60
        61         60          1       1348        0.0       0.40      10.52       0.60
        62         18          1       2981        0.0       0.40      10.52       0.60
        63         62          1       3686        0.0       0.40      10.52       0.60
        64         63          1       1968        0.0       0.40      10.52       0.60
        65         19          1       2219        0.0       0.40      10.52       0.60
        66         65          1       2759        0.0       0.40      10.52       0.60
        67         66          1       1663        0.0       0.40      10.52       0.60
        68         20          1        252        0.0       0.40      10.52       0.60
        69         20          1       2141        0.0       0.40      10.52       0.60
        70         69          1       3510        0.0       0.40      10.52       0.60
        71         70          1       1573        0.0       0.40      10.52       0.60
        72         71          1        330        0.0       0.40      10.52       0.60
        73         72          1      11400        0.0       0.40      10.52       0.60
        74         54          1        457        0.0       0.40      10.52       0.60
        75         74          1      11400        0.0       0.40      10.52       0.60
 3      1 Ramrod1.hyd  +     *     +     *     +     *     +     *     D: FLOWS
 0      1     1     1     1     1
        3     +     *     +     *     +     *     +     *     +     *     E: BOUNDARIES
    1.00       1.00                                                C1
 1      2
    0.00        0.        0.00       365.
73      2
    0.00        0.        0.00       365.
75      2
    0.00        0.        0.00       365.
        3
    1.00       1.00                                                S1
 1      2
    0.00        0.        0.00       365.
73      2
    0.00        0.        0.00       365.
75      2
    0.00        0.        0.00       365.
        3
    1.00       1.00                                                S2
 1      2
```

```
      0.00        0.       0.00       365.
 73     2
      0.00        0.       0.00       365.
 75     2
      0.00        0.       0.00       365.
         3
      1.00      1.00                                    S3
  1     2
      0.00        0.       0.00       365.
 73     2
      0.00        0.       0.00       365.
 75     2
      0.00        0.       0.00       365.
         3
      1.00      1.00                                    C2
  1     2
      0.00        0.       0.00       365.
 73     2
      0.00        0.       0.00       365.
 75     2
      0.00        0.       0.00       365.
         0         *    +    *    +    *    (C1)    *    +    *    F: LOADS
  0                                         (S1)
  0                                         (S2)
  0                                         (S3)
  0                                         (C2)
  0                                              (NPS LOADS)
         0    +    *    +    *    +    *    +    *    +    *    G: PARAMETERS
         0    +    *    +    *    +    *    +    *    +    *    H: CONSTANTS
   GLOBALS         0         *         *         *         *
 CHEMICAL1         1         *         *         *         *
 reactions         2
        KV       140       0.0        KO       256       0.0
 SEDIMENT1         0         *         *         *         *
 SEDIMENT2         0         *         *         *         *
 SEDIMENT3         0         *         *         *         *
 CHEMICAL2         1         *         *         *         *
 reactions         2
        KO       856       0.0        KD       711       0.0
         0    +    *    +    *    +    *    +    *    +    *    I:TIME FUNCTIONS
C1                                          1  0.0     1.E10   J:INITIAL Cs
   1:    0.0000        1.0   2:   0.00000      1.0   3:   0.00000  1.0
   4:    0.0000        1.0   5:   0.00000      1.0   6:   0.00000  1.0
   7:    0.0000        1.0   8:   0.00000      1.0   9:   0.00000  1.0
  10:    0.0000        1.0  11:   0.00000      1.0  12:   0.00000  1.0
  13:    0.0000        1.0  14:   0.00000      1.0  15:   0.01000  1.0
  16:    0.0000        1.0  17:   0.00000      1.0  18:   0.00000  1.0
  19:    0.0000        1.0  20:   0.00000      1.0  21:   0.00000  1.0
  22:    0.0000        1.0  23:   0.00000      1.0  24:   0.00000  1.0
  25:    0.0000        1.0  26:   0.00000      1.0  27:   0.00000  1.0
  28:    0.0000        1.0  29:   0.00000      1.0  30:   0.00000  1.0
  31:    0.0000        1.0  32:   0.00000      1.0  33:   0.00000  1.0
  34:    0.0000        1.0  35:   0.00000      1.0  36:   0.00000  1.0
  37:    0.0000        1.0  38:   0.00000      1.0  39:   0.00000  1.0
  40:    0.0000        1.0  41:   0.00000      1.0  42:   0.00000  1.0
  43:    0.0000        1.0  44:   0.00000      1.0  45:   0.00000  1.0
  46:    0.0000        1.0  47:   0.00000      1.0  48:   0.00000  1.0
  49:    0.0000        1.0  50:   0.00000      1.0  51:   0.00000  1.0
  52:    0.0000        1.0  53:   0.00000      1.0  54:   0.00000  1.0
  55:    0.0000        1.0  56:   0.00000      1.0  57:   0.00000  1.0
  58:    0.0000        1.0  59:   0.00000      1.0  60:   0.00000  1.0
  61:    0.0000        1.0  62:   0.00000      1.0  63:   0.00000  1.0
  64:    0.0000        1.0  65:   0.00000      1.0  66:   0.00000  1.0
```

67:	0.0000	1.0	68:	0.00000	1.0	69:	0.00000	1.0
70:	0.0000	1.0	71:	0.00000	1.0	72:	0.00000	1.0
73:	0.0000	1.0	74:	0.00000	1.0	75:	0.00000	1.0

S1

3 2.6 1.E10

1:	0.0000	1.0	2:	0.00000	1.0	3:	0.00000	1.0
4:	0.0000	1.0	5:	0.00000	1.0	6:	0.00000	1.0
7:	0.0000	1.0	8:	0.00000	1.0	9:	0.00000	1.0
10:	0.0000	1.0	11:	0.00000	1.0	12:	0.00000	1.0
13:	0.0000	1.0	14:	0.00000	1.0	15:	0.00000	1.0
16:	0.0000	1.0	17:	0.00000	1.0	18:	0.00000	1.0
19:	0.0000	1.0	20:	0.00000	1.0	21:	0.00000	1.0
22:	0.0000	1.0	23:	0.00000	1.0	24:	0.00000	1.0
25:	0.0000	1.0	26:	0.00000	1.0	27:	0.00000	1.0
28:	0.0000	1.0	29:	0.00000	1.0	30:	0.00000	1.0
31:	0.0000	1.0	32:	0.00000	1.0	33:	0.00000	1.0
34:	0.0000	1.0	35:	0.00000	1.0	36:	0.00000	1.0
37:	0.0000	1.0	38:	0.00000	1.0	39:	0.00000	1.0
40:	0.0000	1.0	41:	0.00000	1.0	42:	0.00000	1.0
43:	0.0000	1.0	44:	0.00000	1.0	45:	0.00000	1.0
46:	0.0000	1.0	47:	0.00000	1.0	48:	0.00000	1.0
49:	0.0000	1.0	50:	0.00000	1.0	51:	0.00000	1.0
52:	0.0000	1.0	53:	0.00000	1.0	54:	0.00000	1.0
55:	0.0000	1.0	56:	0.00000	1.0	57:	0.00000	1.0
58:	0.0000	1.0	59:	0.00000	1.0	60:	0.00000	1.0
61:	0.0000	1.0	62:	0.00000	1.0	63:	0.00000	1.0
64:	0.0000	1.0	65:	0.00000	1.0	66:	0.00000	1.0
67:	0.0000	1.0	68:	0.00000	1.0	69:	0.00000	1.0
70:	0.0000	1.0	71:	0.00000	1.0	72:	0.00000	1.0
73:	0.0000	1.0	74:	0.00000	1.0	75:	0.00000	1.0

S2

4 2.6 1.E10

1:	0.0000	1.0	2:	0.00000	1.0	3:	0.00000	1.0
4:	0.0000	1.0	5:	0.00000	1.0	6:	0.00000	1.0
7:	0.0000	1.0	8:	0.00000	1.0	9:	0.00000	1.0
10:	0.0000	1.0	11:	0.00000	1.0	12:	0.00000	1.0
13:	0.0000	1.0	14:	0.00000	1.0	15:	0.00000	1.0
16:	0.0000	1.0	17:	0.00000	1.0	18:	0.00000	1.0
19:	0.0000	1.0	20:	0.00000	1.0	21:	0.00000	1.0
22:	0.0000	1.0	23:	0.00000	1.0	24:	0.00000	1.0
25:	0.0000	1.0	26:	0.00000	1.0	27:	0.00000	1.0
28:	0.0000	1.0	29:	0.00000	1.0	30:	0.00000	1.0
31:	0.0000	1.0	32:	0.00000	1.0	33:	0.00000	1.0
34:	0.0000	1.0	35:	0.00000	1.0	36:	0.00000	1.0
37:	0.0000	1.0	38:	0.00000	1.0	39:	0.00000	1.0
40:	0.0000	1.0	41:	0.00000	1.0	42:	0.00000	1.0
43:	0.0000	1.0	44:	0.00000	1.0	45:	0.00000	1.0
46:	0.0000	1.0	47:	0.00000	1.0	48:	0.00000	1.0
49:	0.0000	1.0	50:	0.00000	1.0	51:	0.00000	1.0
52:	0.0000	1.0	53:	0.00000	1.0	54:	0.00000	1.0
55:	0.0000	1.0	56:	0.00000	1.0	57:	0.00000	1.0
58:	0.0000	1.0	59:	0.00000	1.0	60:	0.00000	1.0
61:	0.0000	1.0	62:	0.00000	1.0	63:	0.00000	1.0
64:	0.0000	1.0	65:	0.00000	1.0	66:	0.00000	1.0
67:	0.0000	1.0	68:	0.00000	1.0	69:	0.00000	1.0
70:	0.0000	1.0	71:	0.00000	1.0	72:	0.00000	1.0
73:	0.0000	1.0	74:	0.00000	1.0	75:	0.00000	1.0

S3

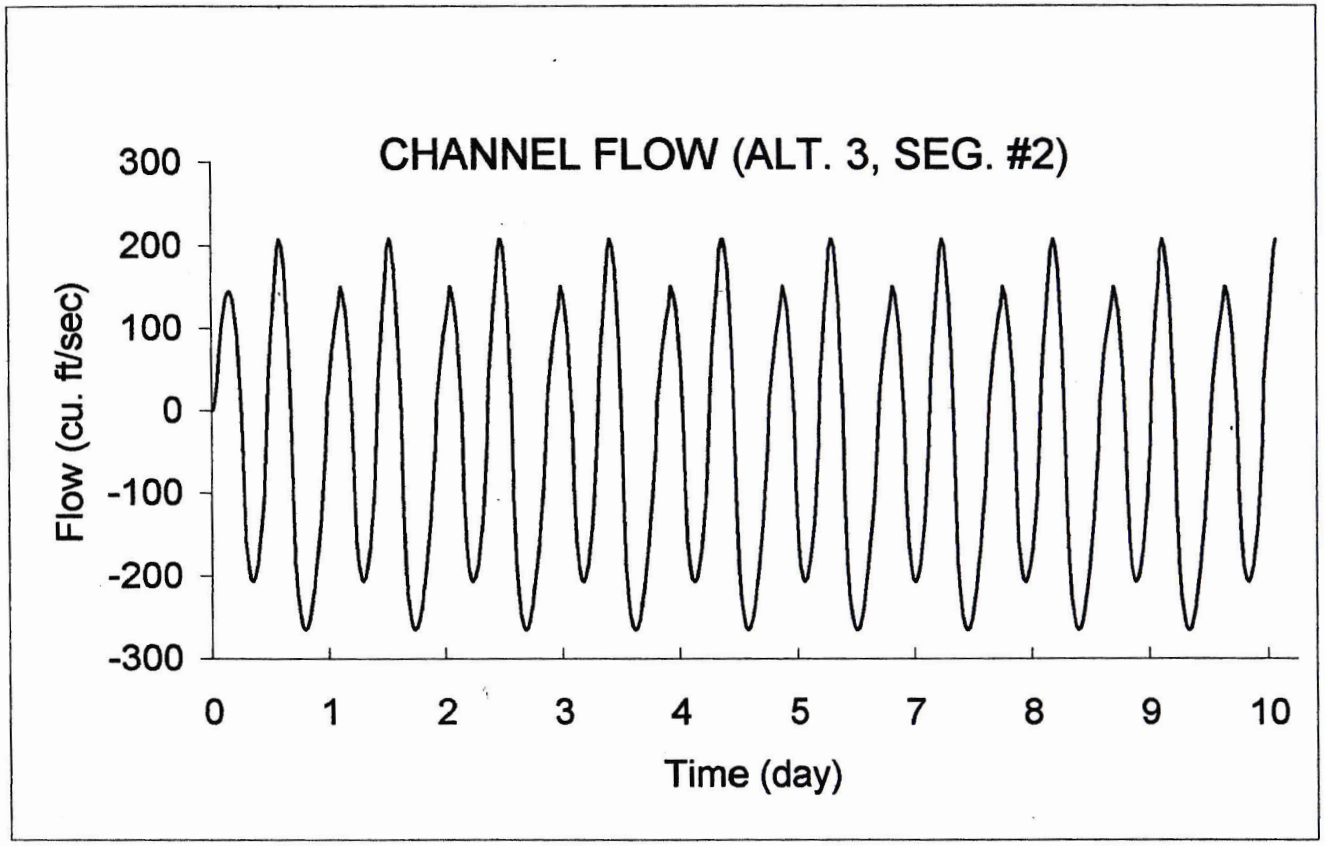
5 2.6 1.E10

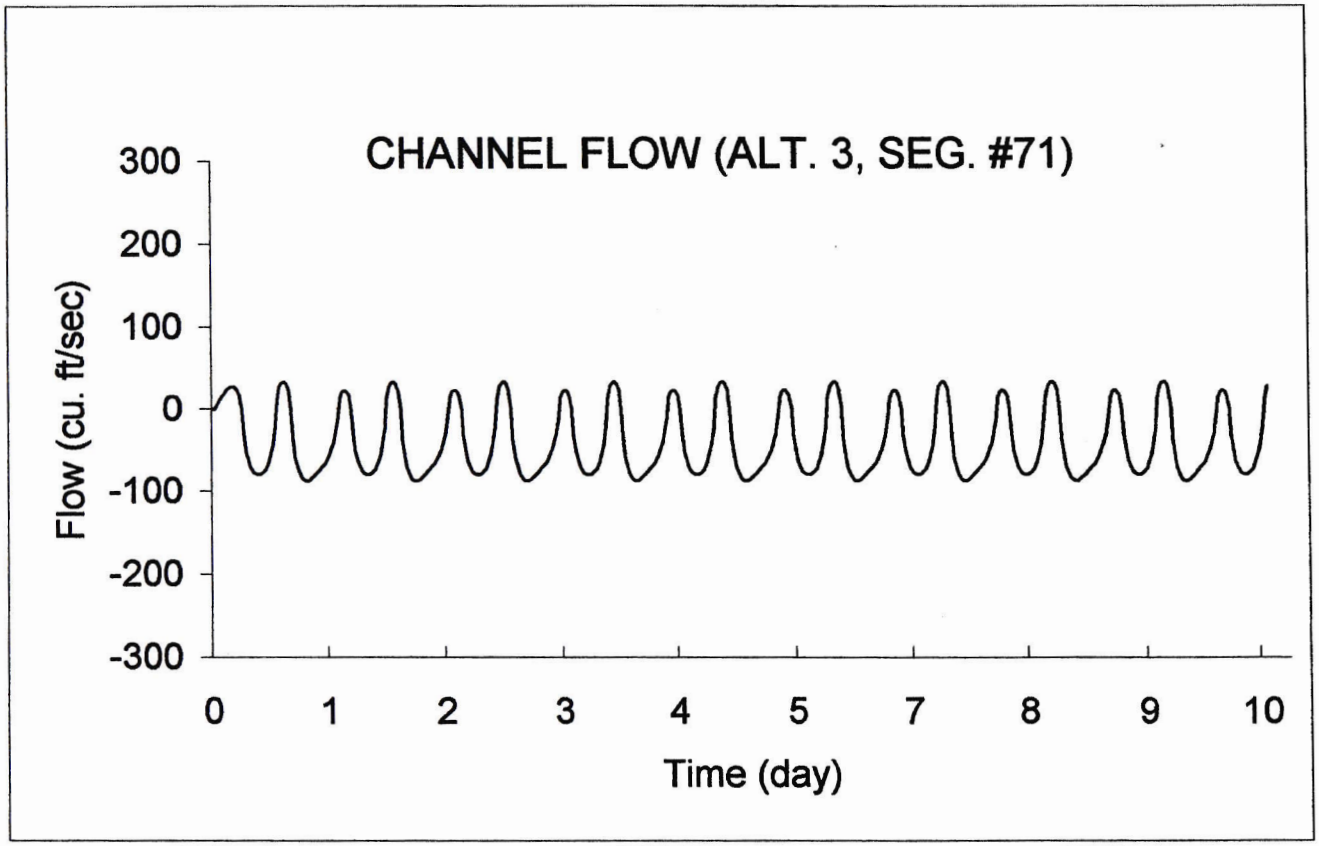
1:	0.0000	1.0	2:	0.00000	1.0	3:	0.00000	1.0
4:	0.0000	1.0	5:	0.00000	1.0	6:	0.00000	1.0
7:	0.0000	1.0	8:	0.00000	1.0	9:	0.00000	1.0
10:	0.0000	1.0	11:	0.00000	1.0	12:	0.00000	1.0
13:	0.0000	1.0	14:	0.00000	1.0	15:	0.00000	1.0
16:	0.0000	1.0	17:	0.00000	1.0	18:	0.00000	1.0
19:	0.0000	1.0	20:	0.00000	1.0	21:	0.00000	1.0

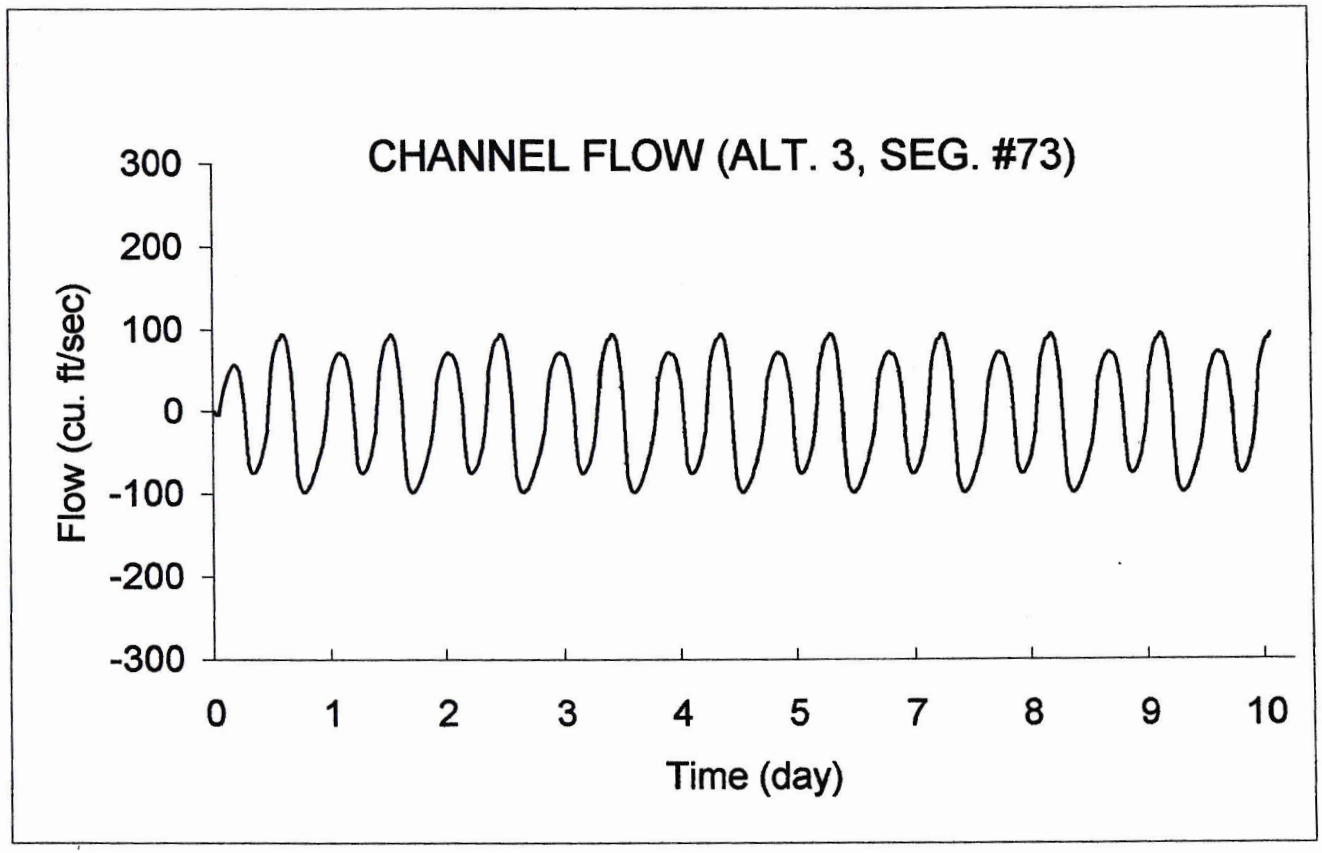
22:	0.0000	1.0	23:	0.00000	1.0	24:	0.00000	1.0
25:	0.0000	1.0	26:	0.00000	1.0	27:	0.00000	1.0
28:	0.0000	1.0	29:	0.00000	1.0	30:	0.00000	1.0
31:	0.0000	1.0	32:	0.00000	1.0	33:	0.00000	1.0
34:	0.0000	1.0	35:	0.00000	1.0	36:	0.00000	1.0
37:	0.0000	1.0	38:	0.00000	1.0	39:	0.00000	1.0
40:	0.0000	1.0	41:	0.00000	1.0	42:	0.00000	1.0
43:	0.0000	1.0	44:	0.00000	1.0	45:	0.00000	1.0
46:	0.0000	1.0	47:	0.00000	1.0	48:	0.00000	1.0
49:	0.0000	1.0	50:	0.00000	1.0	51:	0.00000	1.0
52:	0.0000	1.0	53:	0.00000	1.0	54:	0.00000	1.0
55:	0.0000	1.0	56:	0.00000	1.0	57:	0.00000	1.0
58:	0.0000	1.0	59:	0.00000	1.0	60:	0.00000	1.0
61:	0.0000	1.0	62:	0.00000	1.0	63:	0.00000	1.0
64:	0.0000	1.0	65:	0.00000	1.0	66:	0.00000	1.0
67:	0.0000	1.0	68:	0.00000	1.0	69:	0.00000	1.0
70:	0.0000	1.0	71:	0.00000	1.0	72:	0.00000	1.0
73:	0.0000	1.0	74:	0.00000	1.0	75:	0.00000	1.0

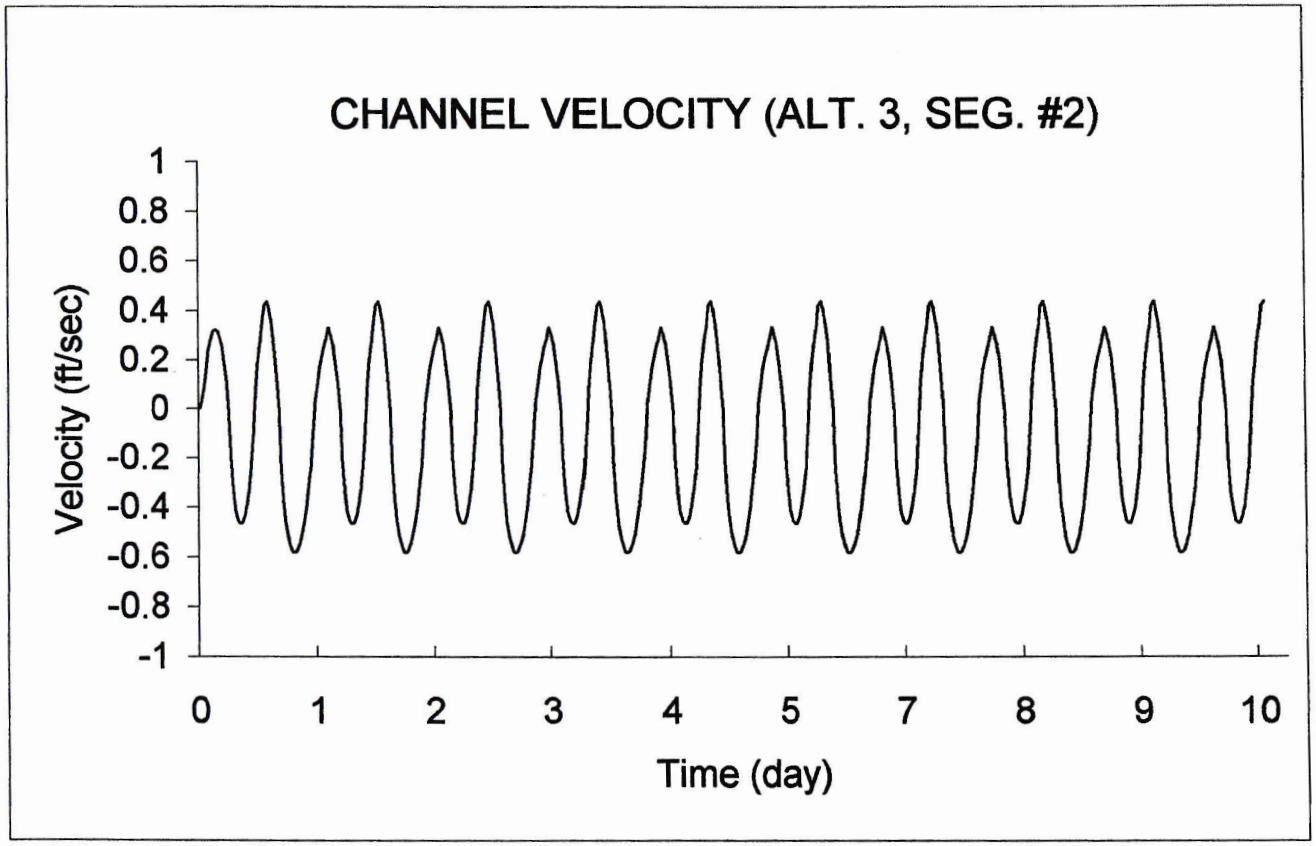
C2 3 1.E10

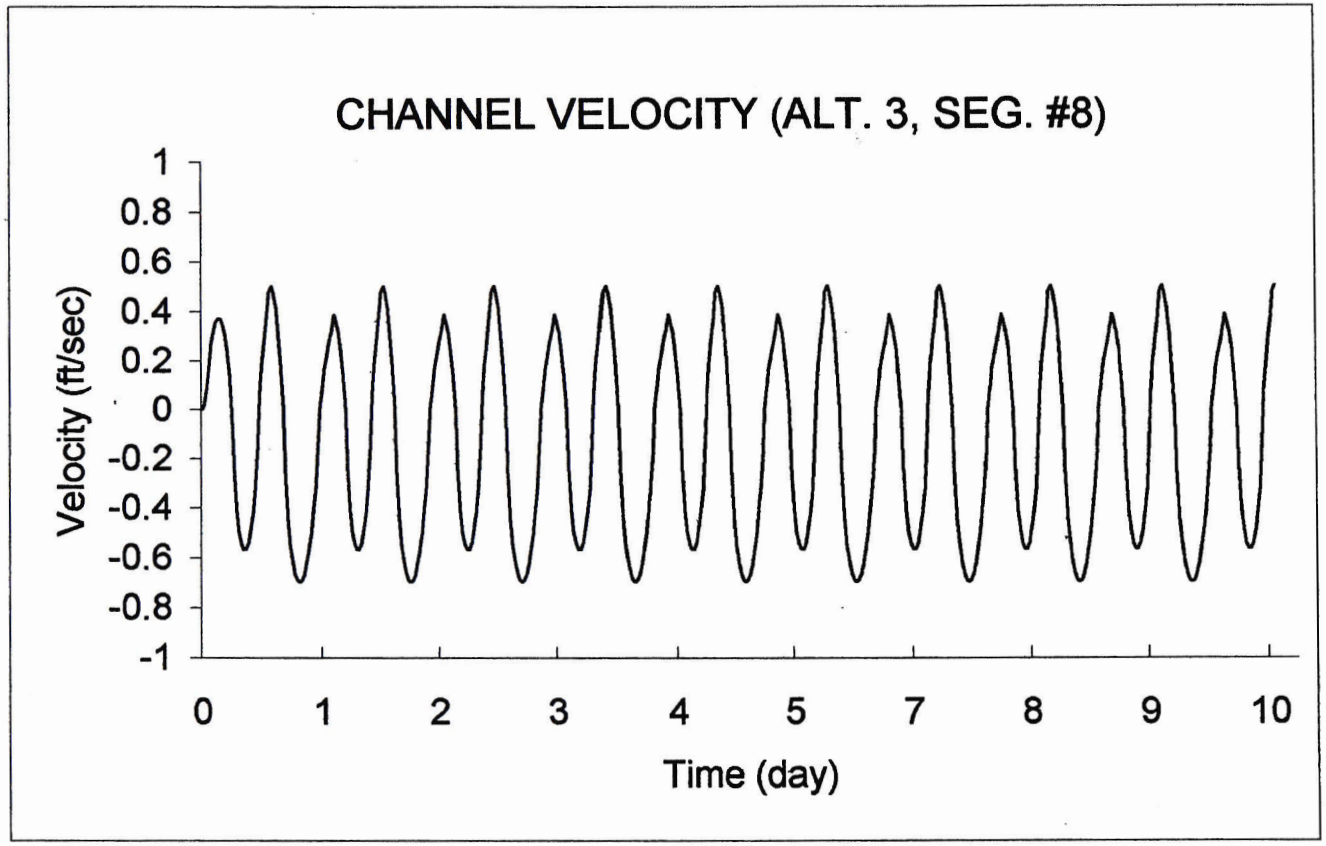
1:	0.0000	1.0	2:	0.00000	1.0	3:	0.00000	1.0
4:	0.0000	1.0	5:	0.00000	1.0	6:	0.00000	1.0
7:	0.0000	1.0	8:	0.00000	1.0	9:	0.00000	1.0
10:	0.0000	1.0	11:	0.00000	1.0	12:	0.00000	1.0
13:	0.0000	1.0	14:	0.00000	1.0	15:	0.00000	1.0
16:	0.0000	1.0	17:	0.00000	1.0	18:	0.00000	1.0
19:	0.0000	1.0	20:	0.00000	1.0	21:	0.00000	1.0
22:	0.0000	1.0	23:	0.00000	1.0	24:	0.00000	1.0
25:	0.0000	1.0	26:	0.00000	1.0	27:	0.00000	1.0
28:	0.0000	1.0	29:	0.00000	1.0	30:	0.00000	1.0
31:	0.0000	1.0	32:	0.00000	1.0	33:	0.00000	1.0
34:	0.0000	1.0	35:	0.00000	1.0	36:	0.00000	1.0
37:	0.0000	1.0	38:	0.00000	1.0	39:	0.00000	1.0
40:	0.0000	1.0	41:	0.00000	1.0	42:	0.00000	1.0
43:	0.0000	1.0	44:	0.00000	1.0	45:	0.00000	1.0
46:	0.0000	1.0	47:	0.00000	1.0	48:	0.00000	1.0
49:	0.0000	1.0	50:	0.00000	1.0	51:	0.00000	1.0
52:	0.0000	1.0	53:	0.00000	1.0	54:	0.00000	1.0
55:	0.0000	1.0	56:	0.00000	1.0	57:	0.00000	1.0
58:	0.0000	1.0	59:	0.00000	1.0	60:	0.00000	1.0
61:	0.0000	1.0	62:	0.00000	1.0	63:	0.00000	1.0
64:	0.0000	1.0	65:	0.00000	1.0	66:	0.00000	1.0
67:	0.0000	1.0	68:	0.00000	1.0	69:	0.00000	1.0
70:	0.0000	1.0	71:	0.00000	1.0	72:	0.00000	1.0
73:	0.0000	1.0	74:	0.00000	1.0	75:	0.00000	1.0

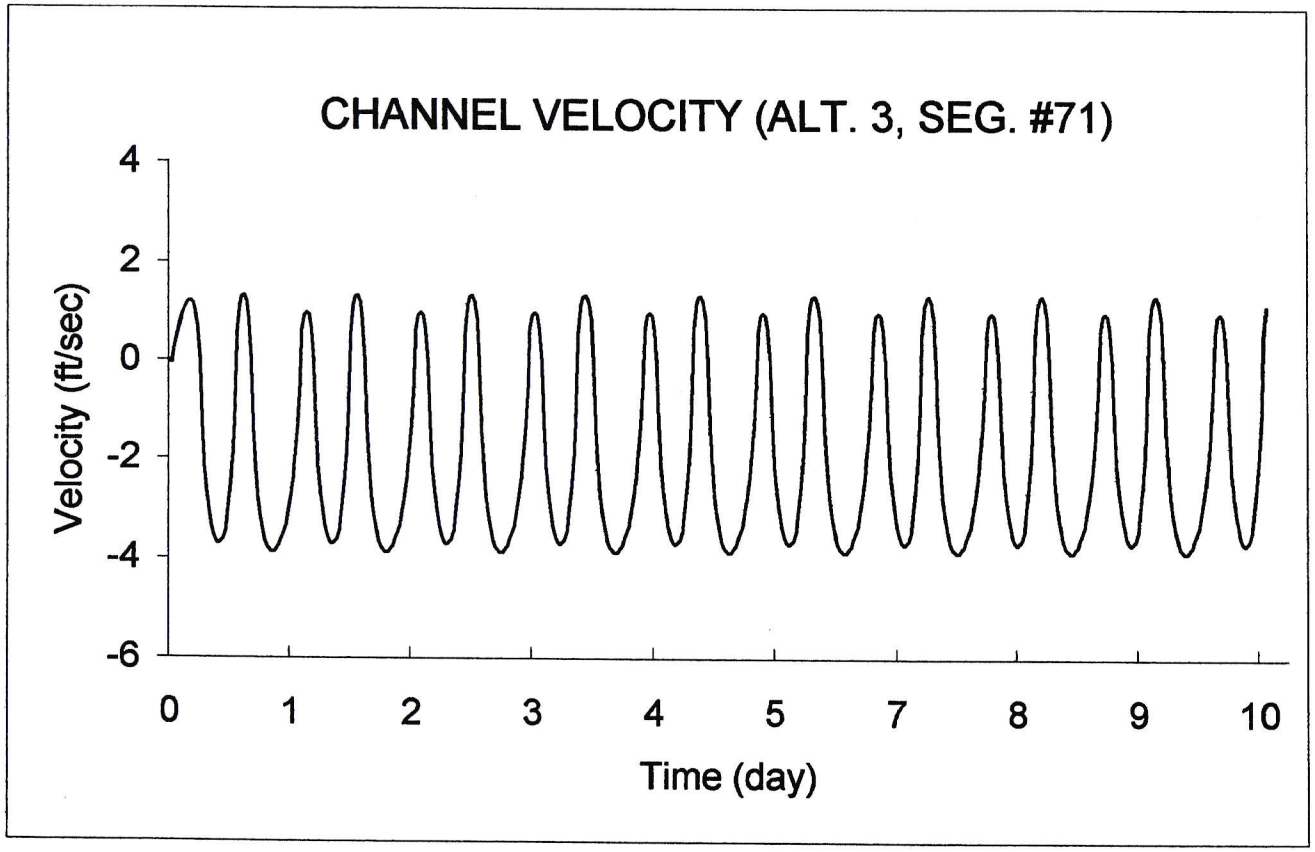

CHANNEL FLOW (ALT. 3, SEG. #2)
Flow (cu. ft/sec)
300
200
100
0
-100
-200
-300
0
1
2
3
4
5
7
8
9
10
Time (day)

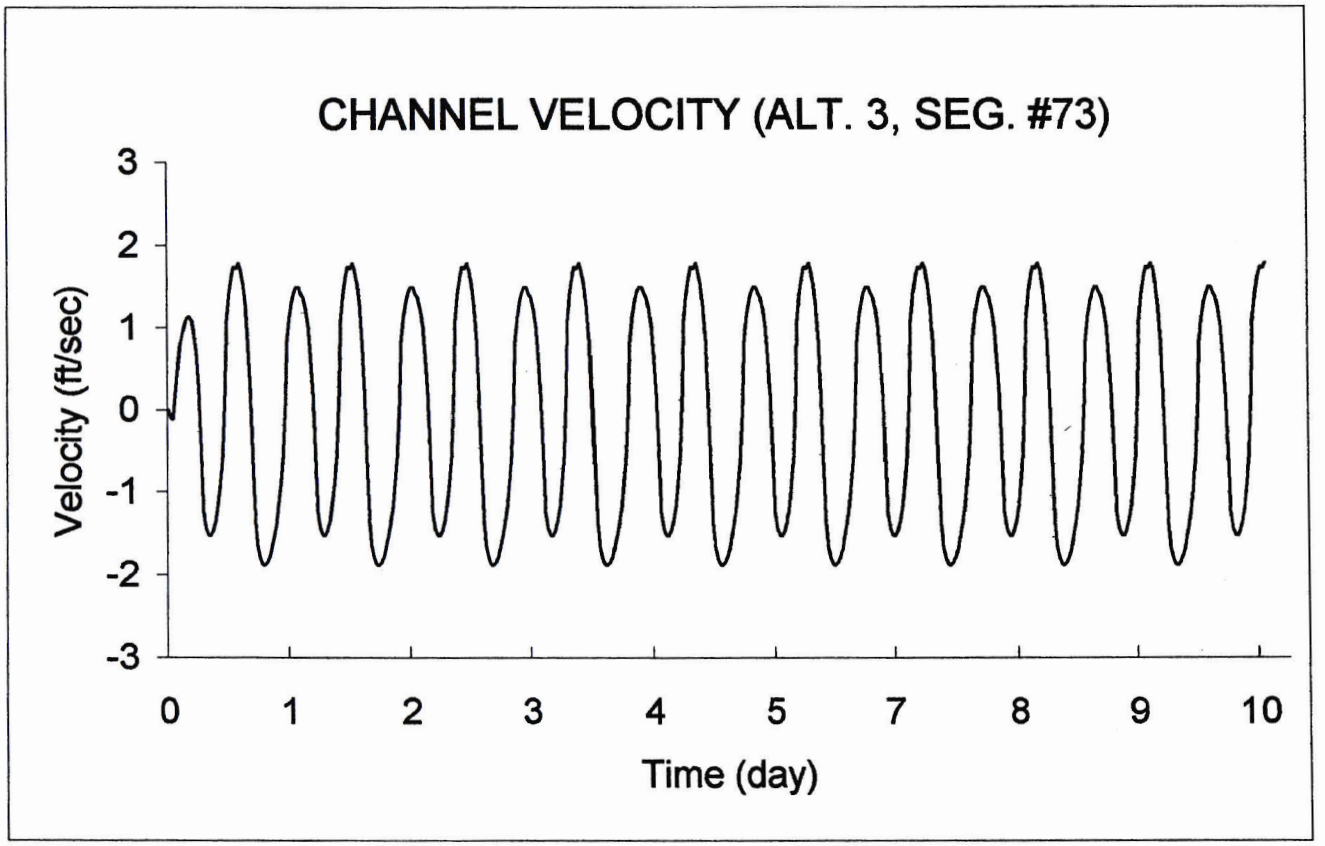

CHANNEL FLOW (ALT. 3, SEG. #71)
Flow (cu. ft/sec)
300
200
100
0
-100
-200
-300
0
1
2
3
4
5
7
8
9
10
Time (day)

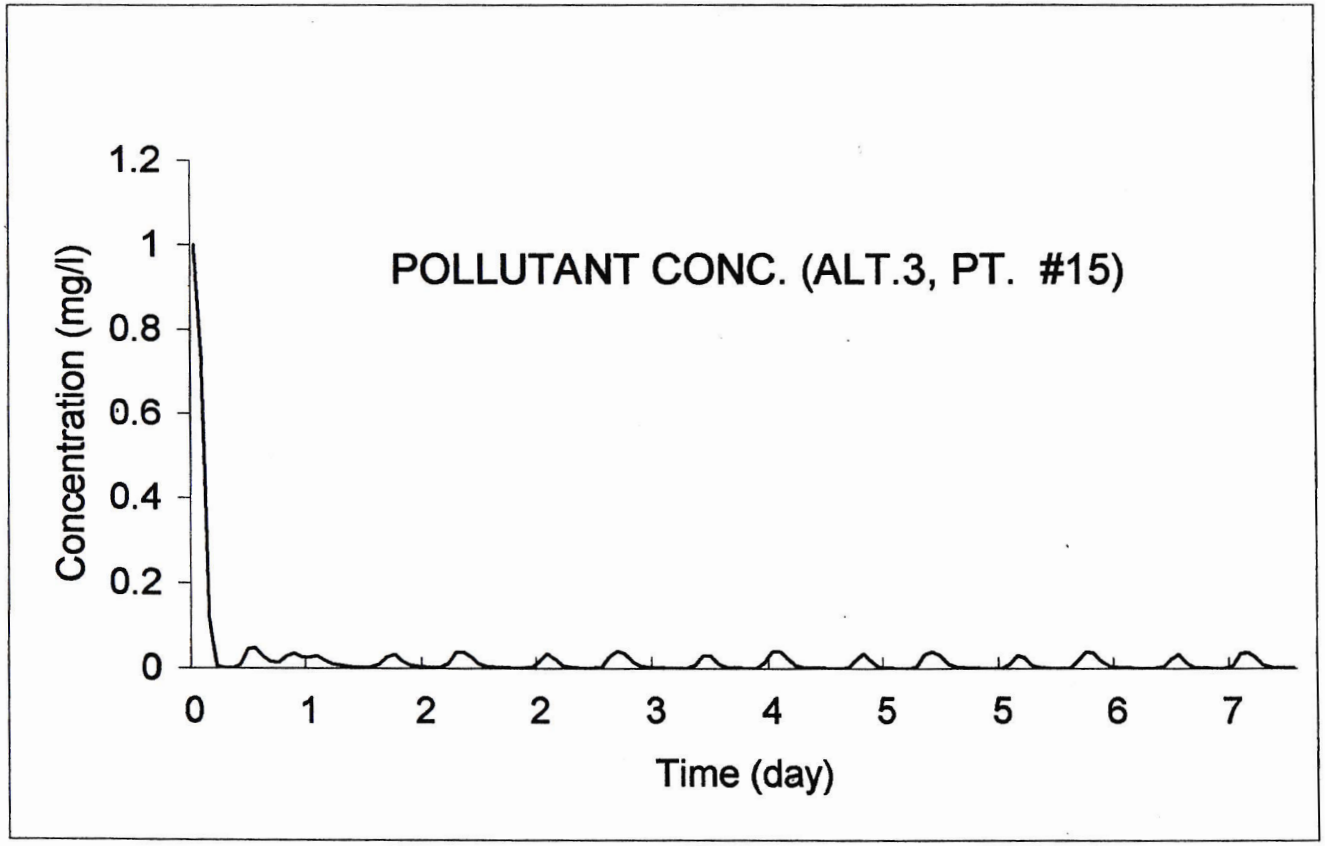

CHANNEL FLOW (ALT. 3, SEG. #73)
Flow (cu. ft/sec)
300
200
100
0
-100
-200
-300
0
1
2
3
4
5
7
8
9
10
Time (day)


CHANNEL VELOCITY (ALT. 3, SEG. #2)
Velocity (ft/sec)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
1
2
3
4
5
7
8
9
10
Time (day)


CHANNEL VELOCITY (ALT. 3, SEG. #8)
Velocity (ft/sec)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
1
2
3
4
5
7
8
9
10
Time (day)


CHANNEL VELOCITY (ALT. 3, SEG. #71)
Velocity (ft/sec)
4
2
0
-2
-4
-6
0
1
2
3
4
5
7
8
9
10
Time (day)


CHANNEL VELOCITY (ALT. 3, SEG. #73)
Velocity (ft/sec)
3
2
1
0
-1
-2
-3
0
1
2
3
4
5
7
8
9
10
Time (day)


POLLUTANT CONC. (ALT.3, PT. #15)
Concentration (mg/l)
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
2
3
4
5
5
6
7
Time (day)

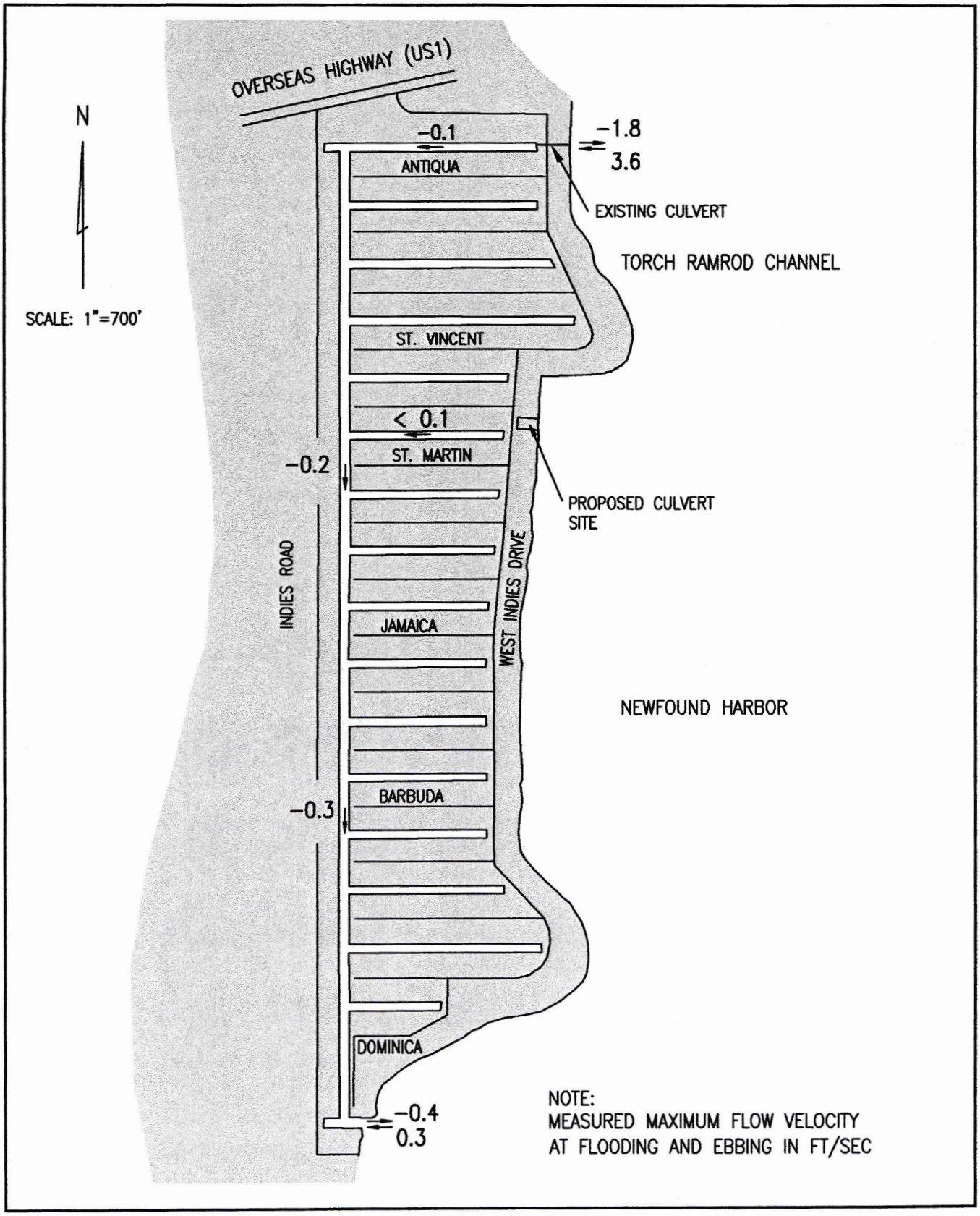


FIGURE 9
MEASURED MAXIMUM FLOW VELOCITY

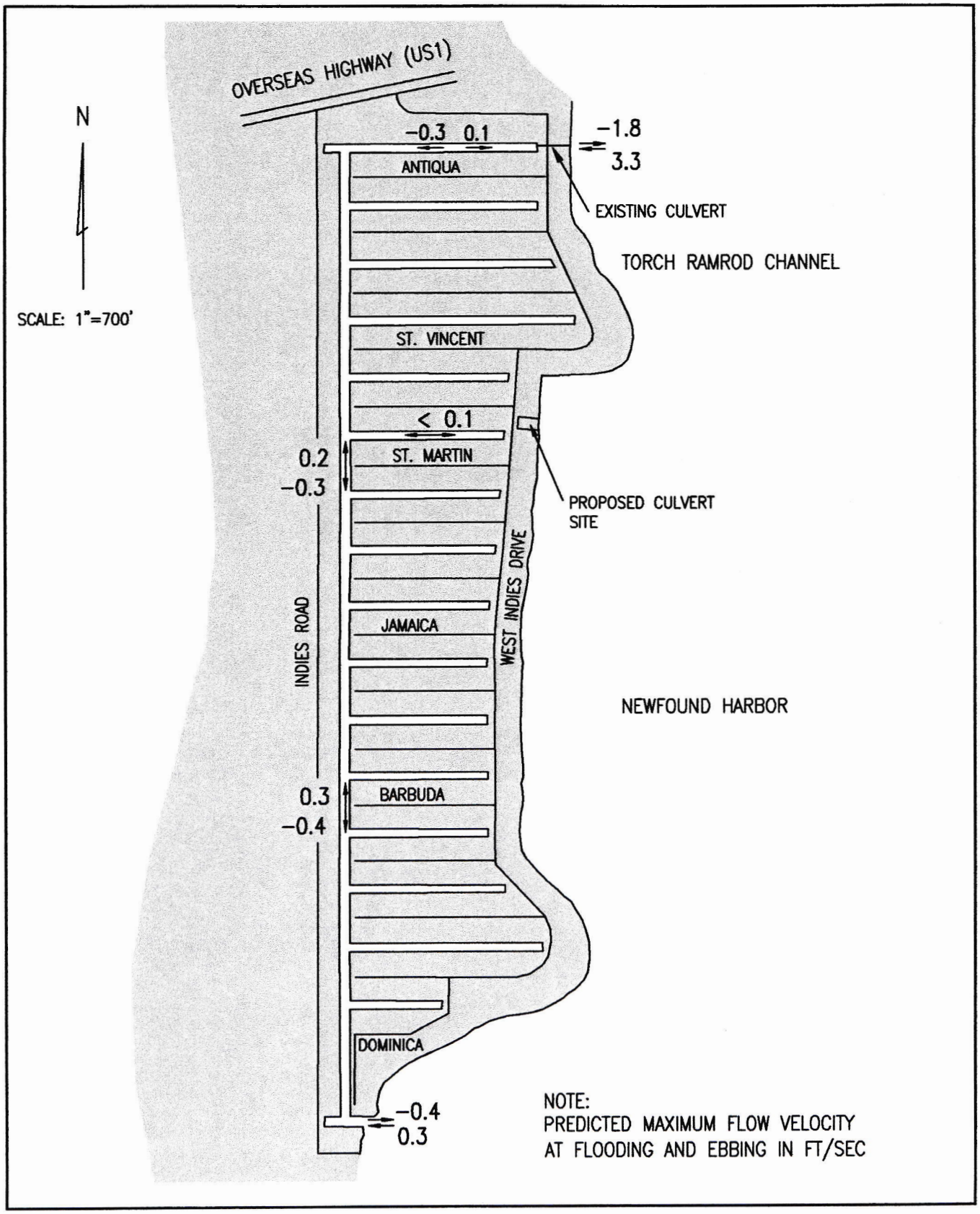


FIGURE 10
PREDICTED MAXIMUM FLOW VELOCITY
FOR EXISITNG CONDITIONS

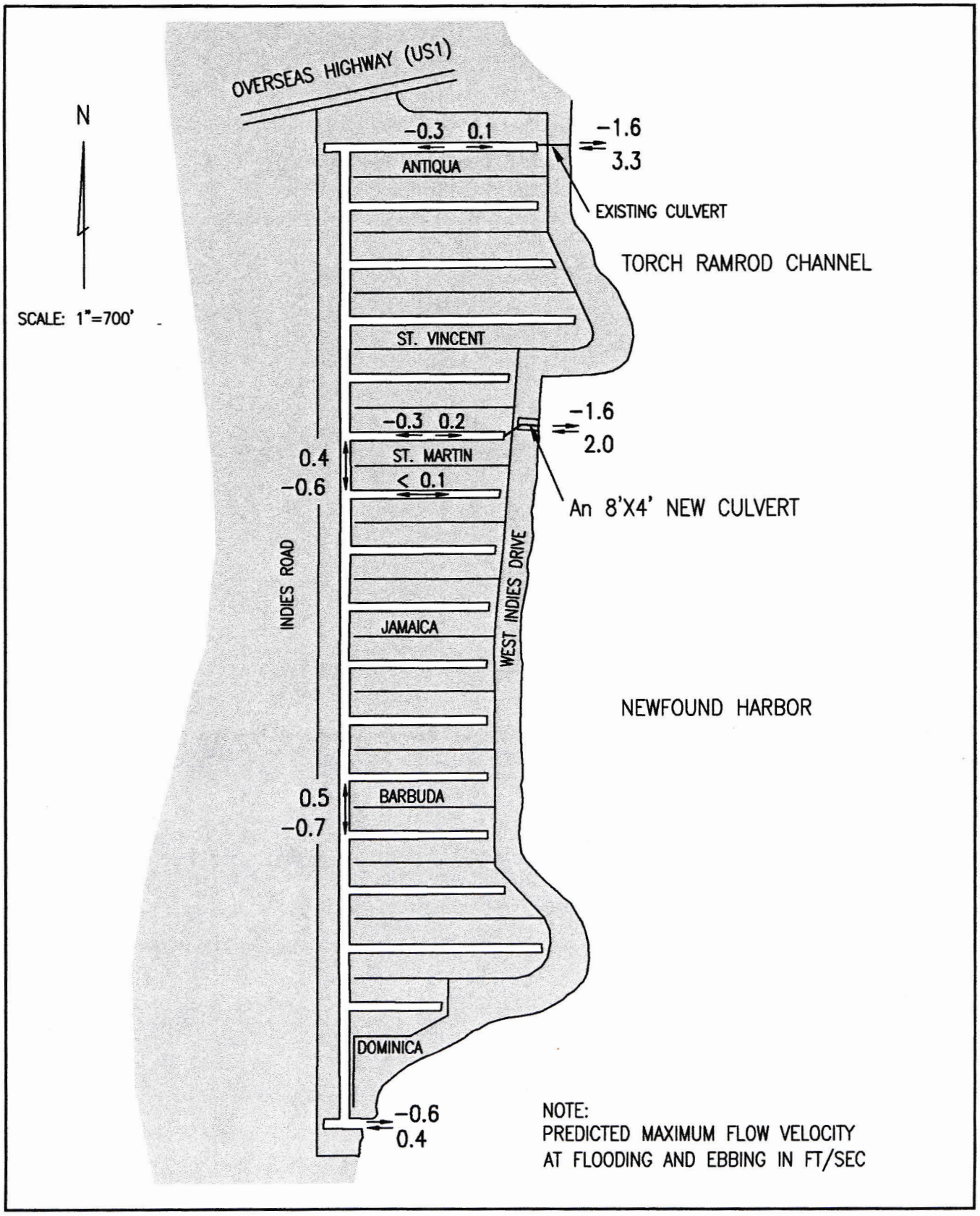


FIGURE 11
PREDICTED MAXIMUM FLOW VELOCITY
FOR AN 8'X4' NEW CULVERT

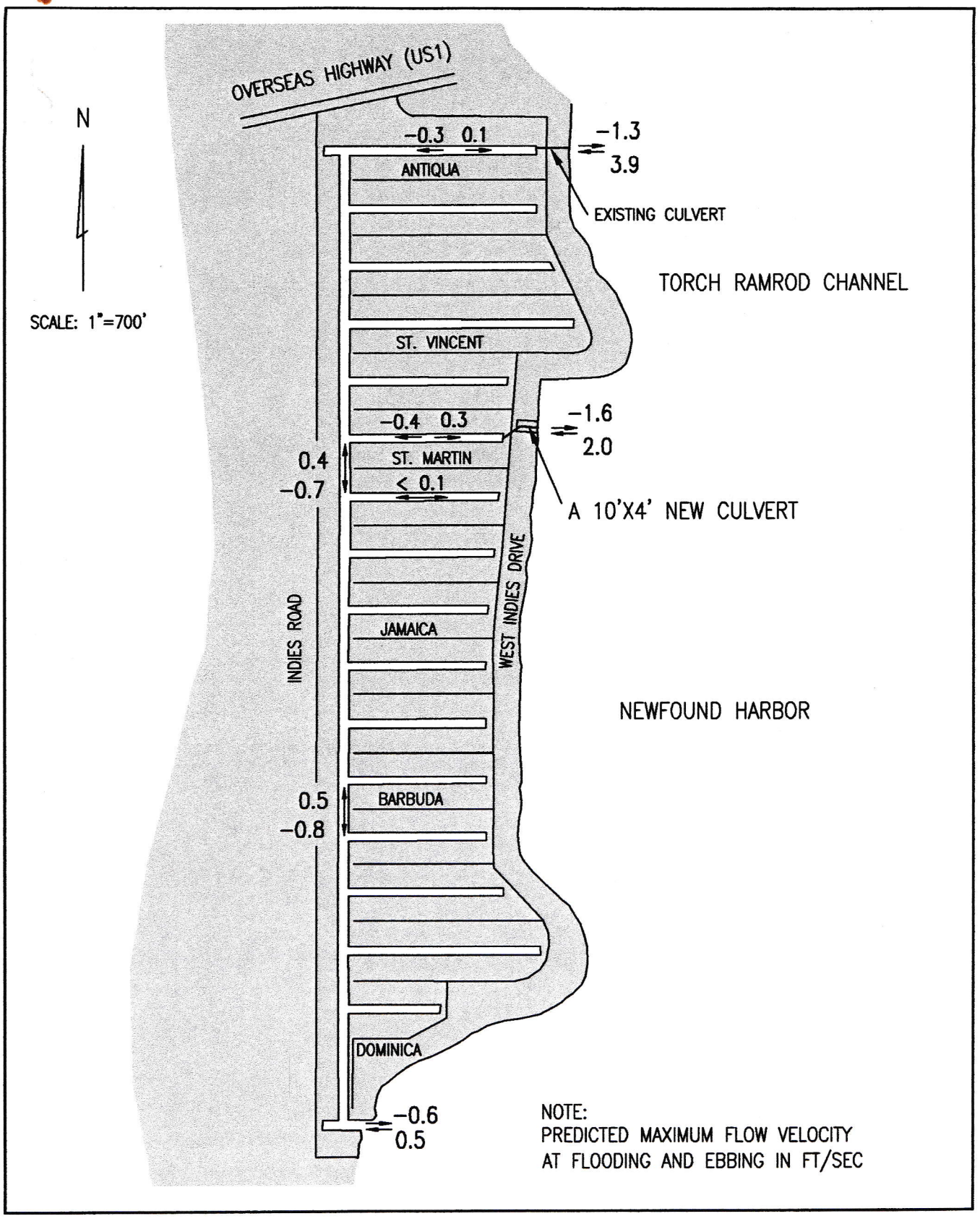


FIGURE 12
PREDICTED MAXIMUM FLOW VELOCITY
FOR A 10'X4' NEW CULVERT

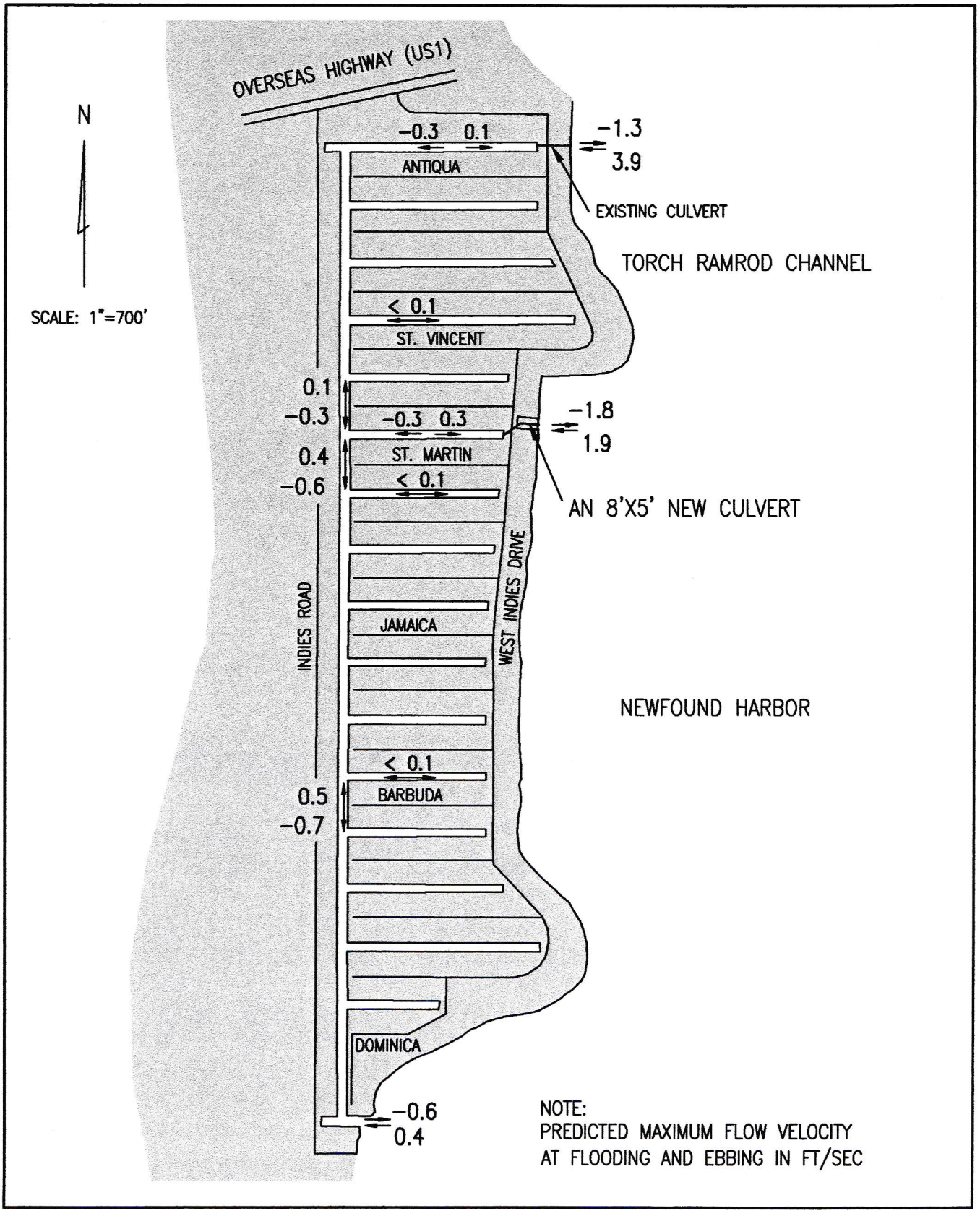


FIGURE 13
PREDICTED MAXIMUM FLOW VELOCITY
FOR AN 8'X5' NEW CULVERT