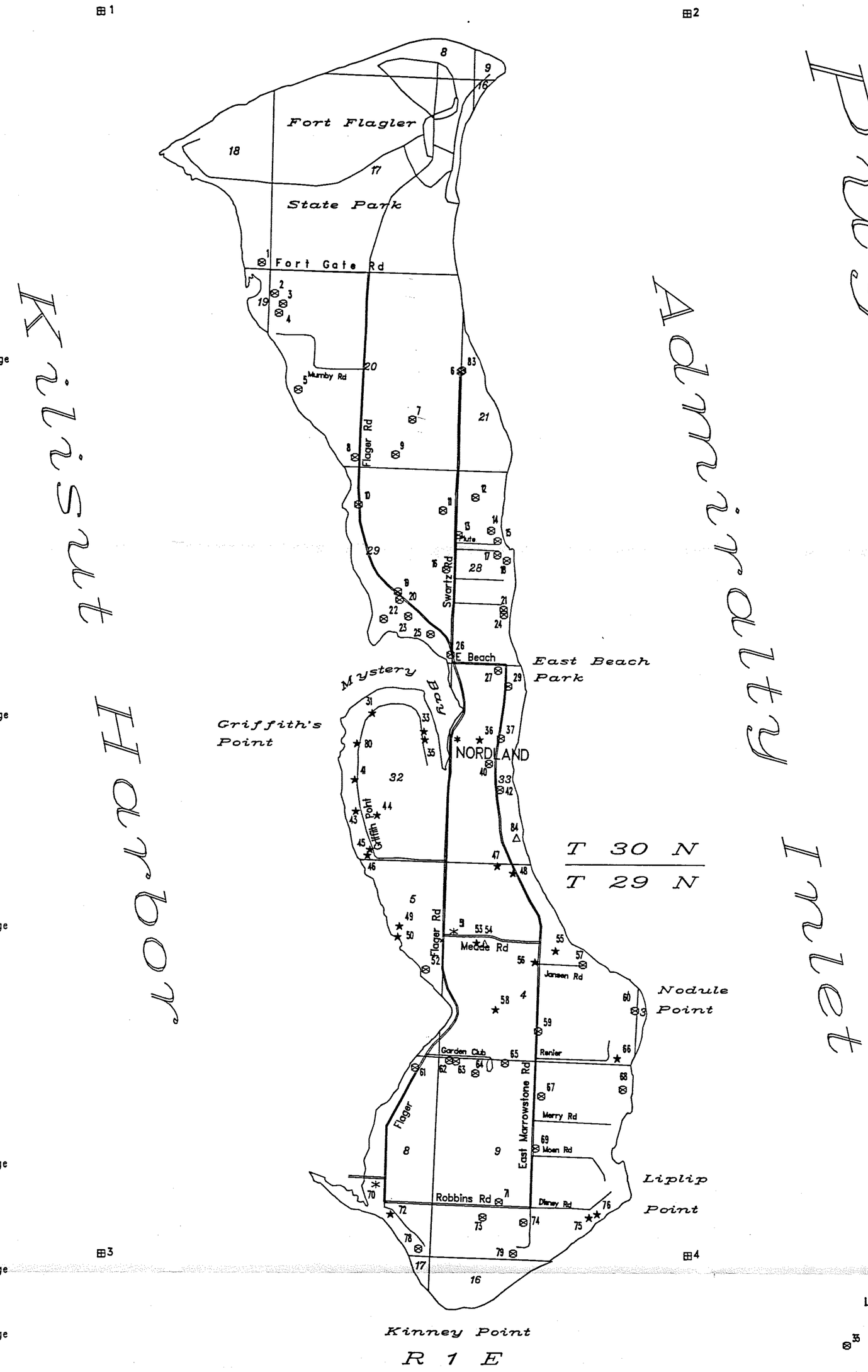


Map-Code	Well-ID	
1	AAB051	Rain Gauge
2	AAB050	
3	AAB049	
4	GC-048	
5	AAB047	
6	AAB046	
7	AAB045	
8	AAB043	
9	AAB044	
10	AAB042	
11	AAB037	
12	AAB085	
13	AAB034	
14	GC-035	
15	GC-033	
16	AAB036	
17	AAB032	
18	AAB031	
19	AAB041	
20	AAB068	
21	AAB030	
22	GC-040	
23	AAB039	
24	GC-029	
25	AAB038	
26	AAB084	
27	AAB028	
29	AAB026	Rain Gauge
31	AAB061	
33	GC-063	
35	AAB065	
36	AAB083	
37	AAB025	
40	AAB024	
41	AAB056	
42	GC-082	
43	AAB054	
44	GC-055	
45	AAB053	
46	AAB052	
47	AAB023	
48	AAB022	
49	GC-018	
50	AAB015	Rain Gauge
51	AAB017	
52	GC-014	
53	AAB021	
54	AAB020	
55	AAB081	
56	AAB080	
57	GC-008	
58	AAB009	
59	AAB078	
60	AAB019	
61	AAB012	
62	GC-076	
63	GC-077	
64	AAB010	
65	AAB011	
66	AAB079	
67	AAB006	
68	AAB007	Rain Gauge
69	AAB005	
70	AAB013	
71	AAB071	
72	GC-072	
73	AAB073	
74	AAB074	
75	GC-075	
76	AAB004	Rain Gauge
78	AAB069	
79	AAB070	
80	GC-058	
83	AAB087	
84	GC-088	Rain Gauge

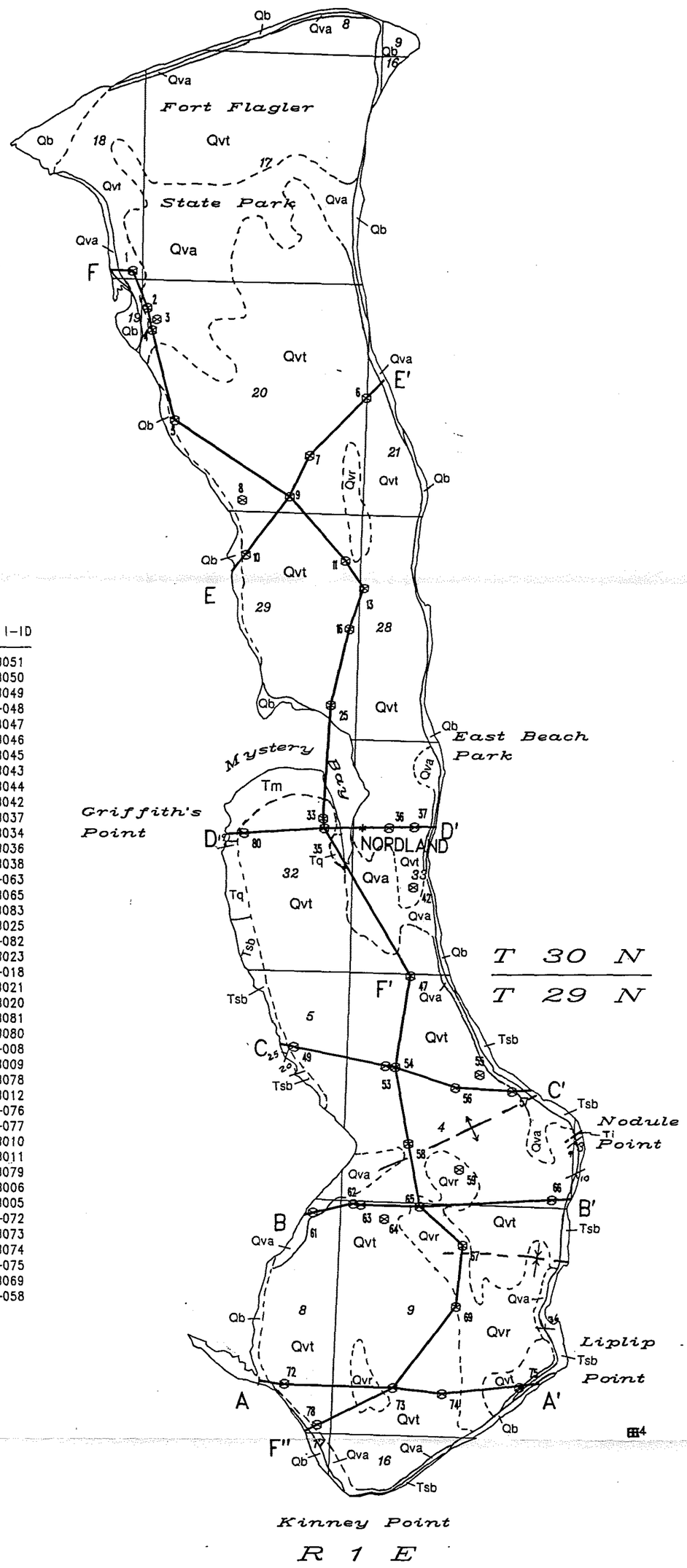
Legend

- ⊗35 — Wells used in study which produce water from glacial deposits – Showing location of well and Map-Code number
- ★35 — Wells used in study which produce water from bedrock deposits – Showing location of well and Map-Code number
- △35 — Wells used in study which produce water from both glacial and bedrock deposits – Showing location of well and Map-Code number
- *35 — Wells used in study for which source of water is unknown – Showing location of well and Map-Code number

Scale = 1:24,000

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Plate 1
LOCATION OF WELLS AND RAIN GAUGES
MARROWSTONE ISLAND,
JEFFERSON COUNTY, WASHINGTON



Map-Code	Well-ID
1	AAB051
2	AAB050
3	AAB049
4	GC-048
5	AAB047
6	AAB046
7	AAB045
8	AAB043
9	AAB044
10	AAB042
11	AAB037
13	AAB034
16	AAB036
25	AAB038
33	GC-063
35	AAB065
36	AAB083
37	AAB025
42	GC-082
47	AAB023
49	GC-018
53	AAB021
54	AAB020
55	AAB081
56	AAB080
57	GC-008
58	AAB009
59	AAB078
61	AAB012
62	GC-076
63	GC-077
64	AAB010
65	AAB011
66	AAB079
67	AAB006
69	AAB005
72	GC-072
73	AAB073
74	AAB074
75	GC-075
78	AAB069
80	GC-058

DESCRIPTIONS OF STRATIGRAPHIC UNITS
MARROWSTONE ISLAND

Qb — **Beach Deposits** (Holocene)
Moderately to well sorted, loose sand, gravel, and wave worn shell fragment accumulations along shorelines. Beach deposits form spits along protected shorelines and are prevalent on the north and east sides of Marrowstone Island.

Qvr — **Glacial Recessional Drift** (Pleistocene, Fraser Glaciation)
Recessional outwash, ice-contact stratified drift, and some ablation till deposited during and just after the retreat of the Vashon-age ice sheet. Generally unconsolidated. Consists of gravel with some sand, silt, and clay (Grimstad and Carson, 1981). Relatively thin lenses overly the till layer and probably range from zero to a few feet thick.

Qvt — **Glacial Till** (Pleistocene, Fraser glaciation)
Poorly sorted detritus deposited directly by the Vashon-age ice sheet. Silt, sand and clay in varying proportions, constitute a coherent to friable, moderately to highly compact matrix in which courser components (pebbles, cobbles, and boulders) are firmly embedded. The till is typically massive but contains isolated lenses of stratified sand, silt, and gravel. Thickness ranges from 0 to 90 feet (0 to 27 meters).

Qva — **Glacial Advance Outwash** (Pleistocene, Fraser glaciation)
Sand, gravel, silt, and clay deposited by meltwater flowing from advancing ice margin of the Puget lobe of Vashon age. Moderate to well sorted, distinctly stratified, light-gray to tan, medium to course sand and pebbly sand containing minor amounts of fine sandy silt, and scattered lenses and layers of pebble/cobble gravel. Cross-stratification and cut-and-fill structures are common. Thickness ranges from 0 to about 150 feet (0 to 46 meters) or more. Good examples of these deposits are exposed on the north and east sides of Marrowstone Island.

Tm — **Marrowstone Shale** (Late Eocene)
Mostly orangish-brown to gray, friable, thin to thickly layered, blocky, contorted, and highly fractured sandstone interbedded with siltstone, mudstone, some occasional silty claystone, and minor shales. Orange, calcareous sandstone concretions and concretionary lenses are common in the Marrowstone Island outcrops. Clastic dikes and sills, 0.5 to 1.5 feet (0.15 to 0.46 m) thick are exposed in the unit on the west side of Griffith's Point. Most ground water in this unit is transmitted by the fracture system. Thickness is about 850 feet (259 m) (Rauch, 1985).

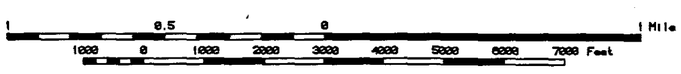
Tq — **Quimper Sandstone** (Late Eocene)
Greenish-gray, fine-to medium-grained, hard, poorly sorted, massive, extensively fractured, feldspathic sandstone. Most commonly massive in character but includes some thin bedded to laminated sections and is occasionally crossbedded. According to Durham (1944) the thickness is about 700 feet (213 m).

Tsb — **Scow Bay Formation** (Middle Eocene)
Light greenish-brown, very fine to medium grained, poorly sorted, subangular to subrounded, non-calcarious, massive sandstone. The sandstone is interbedded with faintly bedded to massive dark-gray to black siltstone. Locally contains rounded shale clasts and many round, calcarious concretions such as those found on Nodule Point. According to Allison (1944) and Melim (1985) the thickness is about 1800 feet (549 m).

Ti — **Volcanic Intrusive** (Eocene)
Basalt dikes intruded into the Scow Bay formation described above. The only basalt dike found on Marrowstone Island is located on the south side of Nodule Point. It is about 23 feet wide; trends in an orientation of about N 56 E and is essentially vertical. It appears as a wide, rectangular trough that extends from the base of a grass covered cliff toward Admiralty Inlet.

Legend

- Wells used in Cross-Sections – Showing location of well and Map-Code number for each well
- A——A' Shows Cross-Section Location
- Formation Contact – Solid where visible in field, dashed where inferred as interpreted from Soil Conservation Service maps
- Anticline – Showing approximate location of anticline axis
- Syncline – Showing approximate location of syncline axis
- Strike and Dip – Showing direction of strike (by the orientation of the top of the "T") and the direction and angle of dip, in degrees (the leg of the "T" points down dip)

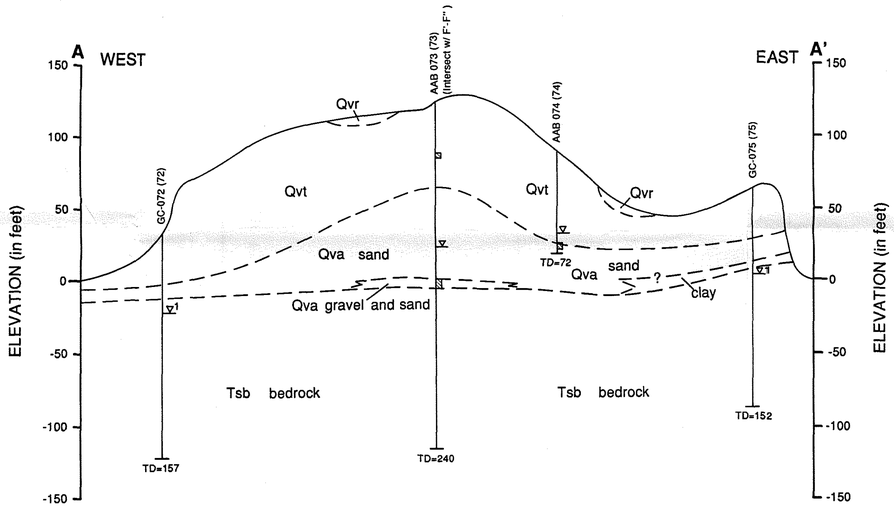


Scale = 1:24,000

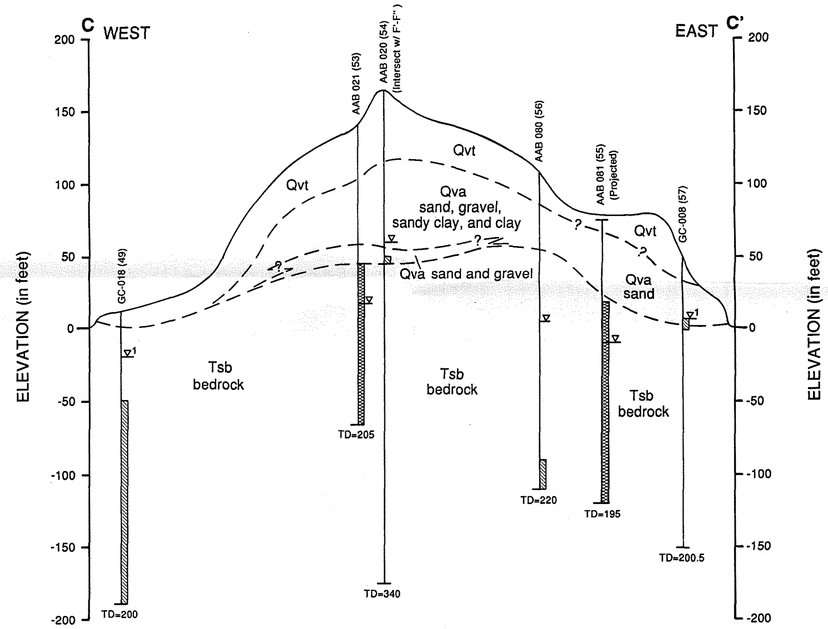
WASHINGTON STATE DEPARTMENT OF ECOLOGY

PLATE 2
GEOLOGIC MAP AND CROSS-SECTION LOCATIONS
MARROWSTONE ISLAND,
JEFFERSON COUNTY, WASHINGTON

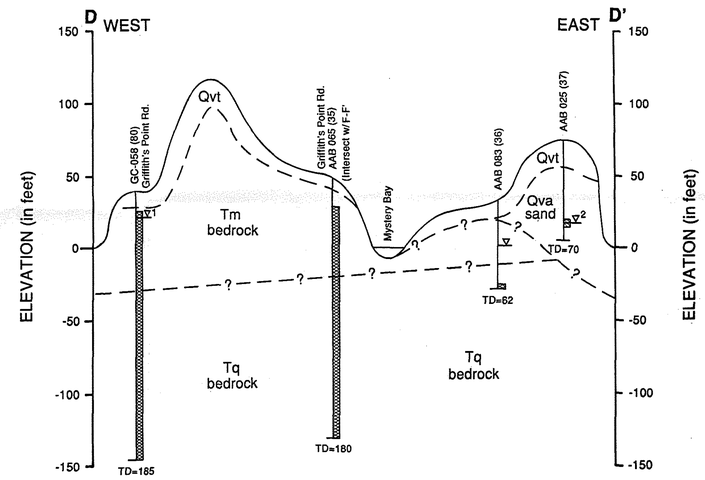
CROSS SECTION A-A'



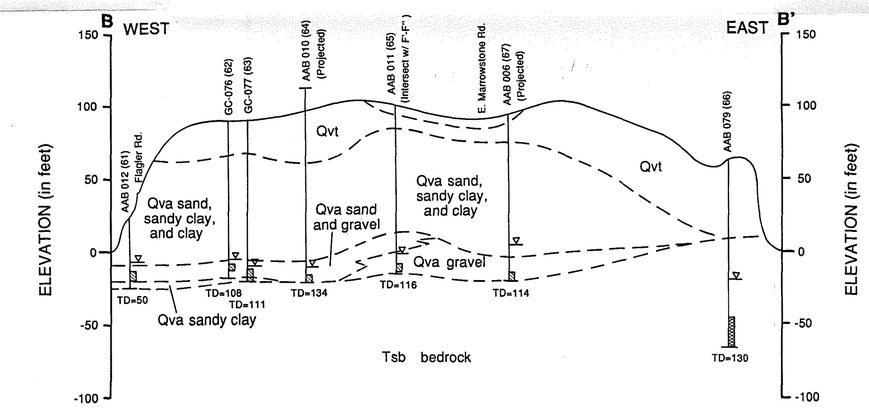
CROSS SECTION C-C'



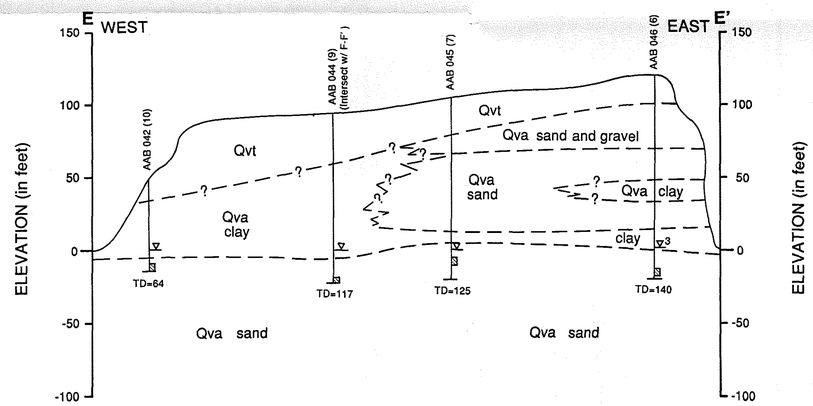
CROSS SECTION D-D'



CROSS SECTION B-B'



CROSS SECTION E-E'



Footnotes:
1 Static water level reported by driller
2 Static water level measurement from 12/9/92
3 Static water level shown is from adjacent well AAB 087

Scale: Horizontal = 1:8000 or 1 inch = 667 feet
Vertical = 1:600 or 1 inch = 50 feet
Vertical exageration = 13.3 x

LEGEND

AAB 021 (53) **Well Identification Number** - Showing the Department of Ecology Unique Well Identification Number (AAB numbers) or wells that were used in this study for geologic control only (GC numbers). The number in parentheses is the map code number for the well - the number by which the wells are identified on Plates 1 and 2. See Table 5 and Appendices A and D for more well information.

Screened Interval - Indicates blank casing above and below screened interval.

Interval Completed As An Open Hole In Bedrock - Indicates that blank casing extends from surface to open interval.

TD=116 **No Screen Or Open Hole Shown** - Indicates that well is completed with blank casing to total depth. Water enters well through open end of casing at the bottom of the well. TD, total depth.

Static Water Level - Indicates water level measured in December, 1990, unless otherwise noted in footnote.

Qvr **Vashon Recessional Drift** - As described in text and on geologic map.

Qvt **Vashon Till** - As described in text and on geologic map.

Qva **Vashon Advance Outwash** - As described in text and on geologic map. Lithologic designations are interpreted from driller descriptions as shown in Appendix D.

Tm **Marrowstone Formation** - As described in text and on geologic map.

Tq **Quimper Sandstone** - As described in text and on geologic map.

Tsb **Scow Bay Formation** - As described in text and on geologic map.

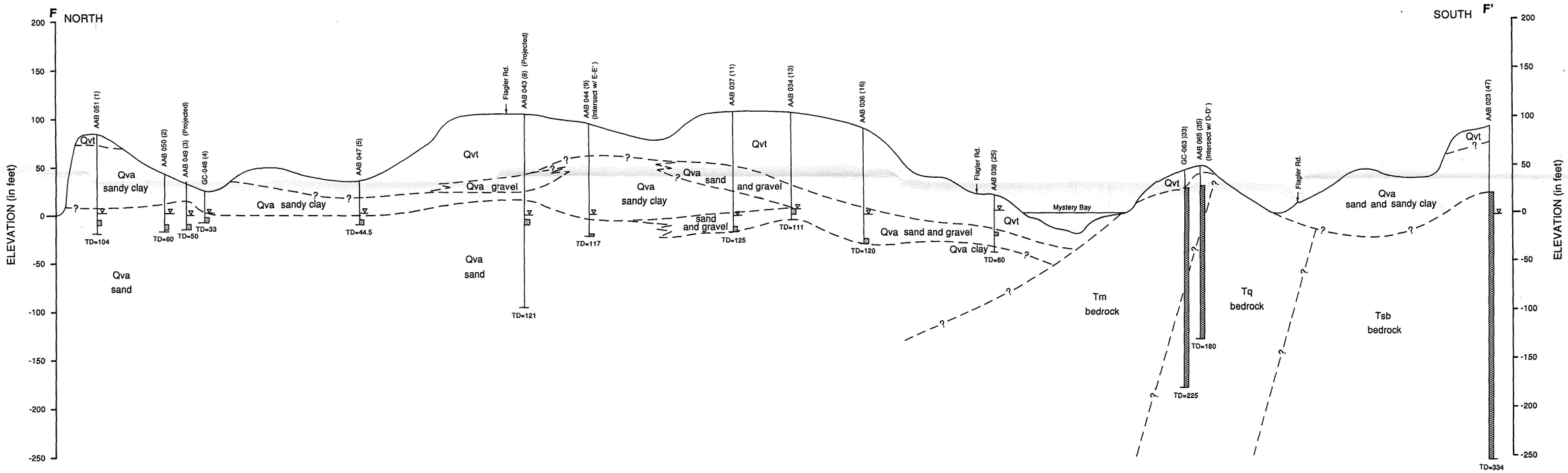
WASHINGTON STATE DEPARTMENT OF ECOLOGY

PLATE 3

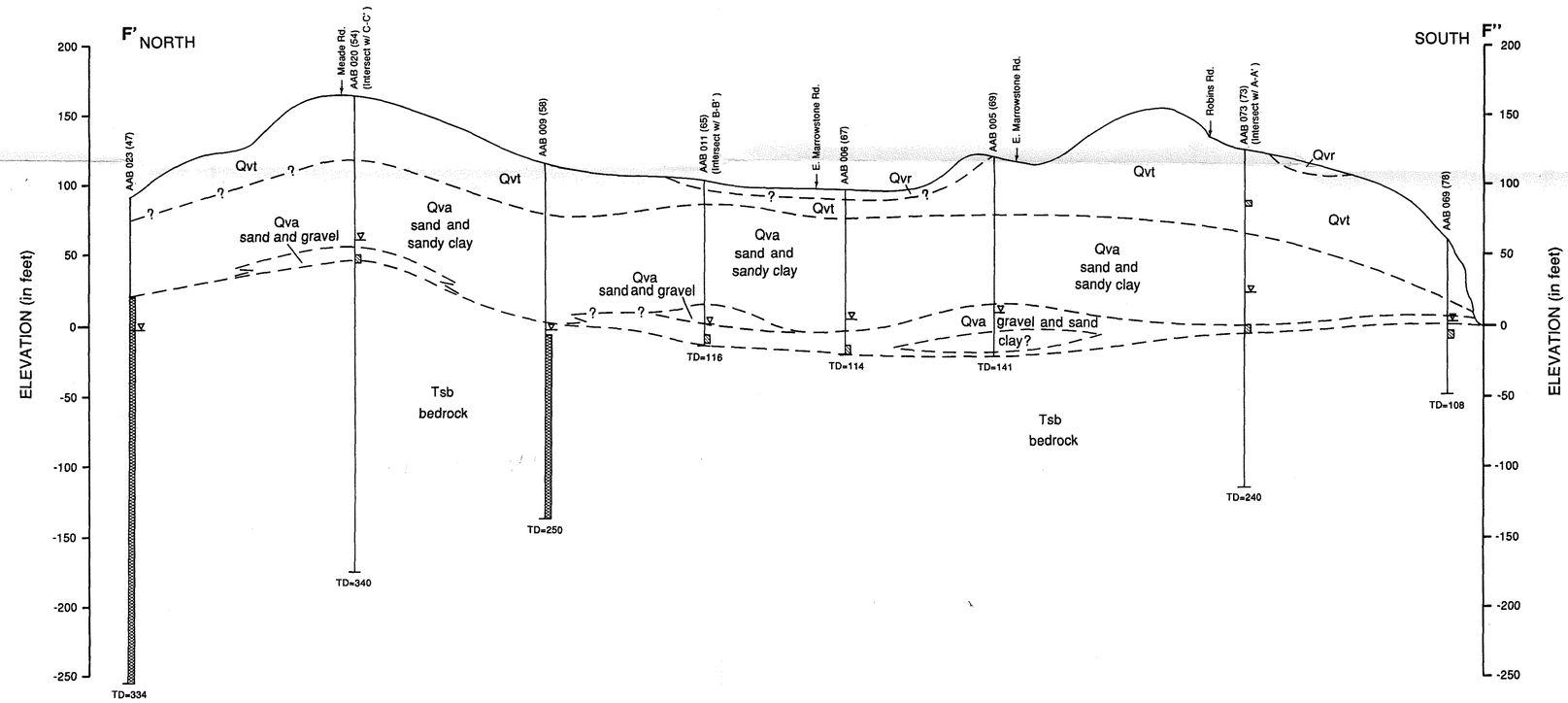
GEOLOGIC CROSS SECTIONS
A-A', B-B', C-C', D-D', and E-E'
MARROWSTONE ISLAND
JEFFERSON COUNTY,
WASHINGTON

Water Supply Bulletin No. 59

CROSS SECTION F-F'



CROSS SECTION F'-F"



Horizontal scale = 1:8000 or 1 inch = 667 feet
Vertical scale = 1:600 or 1 inch = 50 feet
Vertical exageration = 13.3 x

LEGEND

AAB 069 (78) **Well Identification Number** - Showing the Department of Ecology Unique Well Identification Number (AAB numbers) or wells that were used in this study for geologic control only (GC numbers). The number in parentheses is the map code number for the well - the number by which the wells are identified on Plates 1 and 2. See Table 5 and Appendices A and D for more well information.

Screened Interval - Indicates blank casing above and below screened interval.

Interval Completed As An Open Hole In Bedrock - Indicates that blank casing extends from surface to open interval.

TD=108 **No Screen Or Open Hole Shown** - Indicates that well is completed with blank casing to total depth. Water enters well through open end of casing at the bottom of the well. TD, total depth.

Static Water Level - Indicates water level measured in December, 1990, unless otherwise noted in footnote.

Qvr **Vashon Recessional Drift** - As described in text and on geologic map.

Qvt **Vashon Till** - As described in text and on geologic map.

Qva **Vashon Advance Outwash** - As described in text and on geologic map. Lithologic designations are interpreted from driller descriptions as shown in Appendix D.

Tm **Marrowstone Formation** - As described in text and on geologic map.

Tq **Quimper Sandstone** - As described in text and on geologic map.

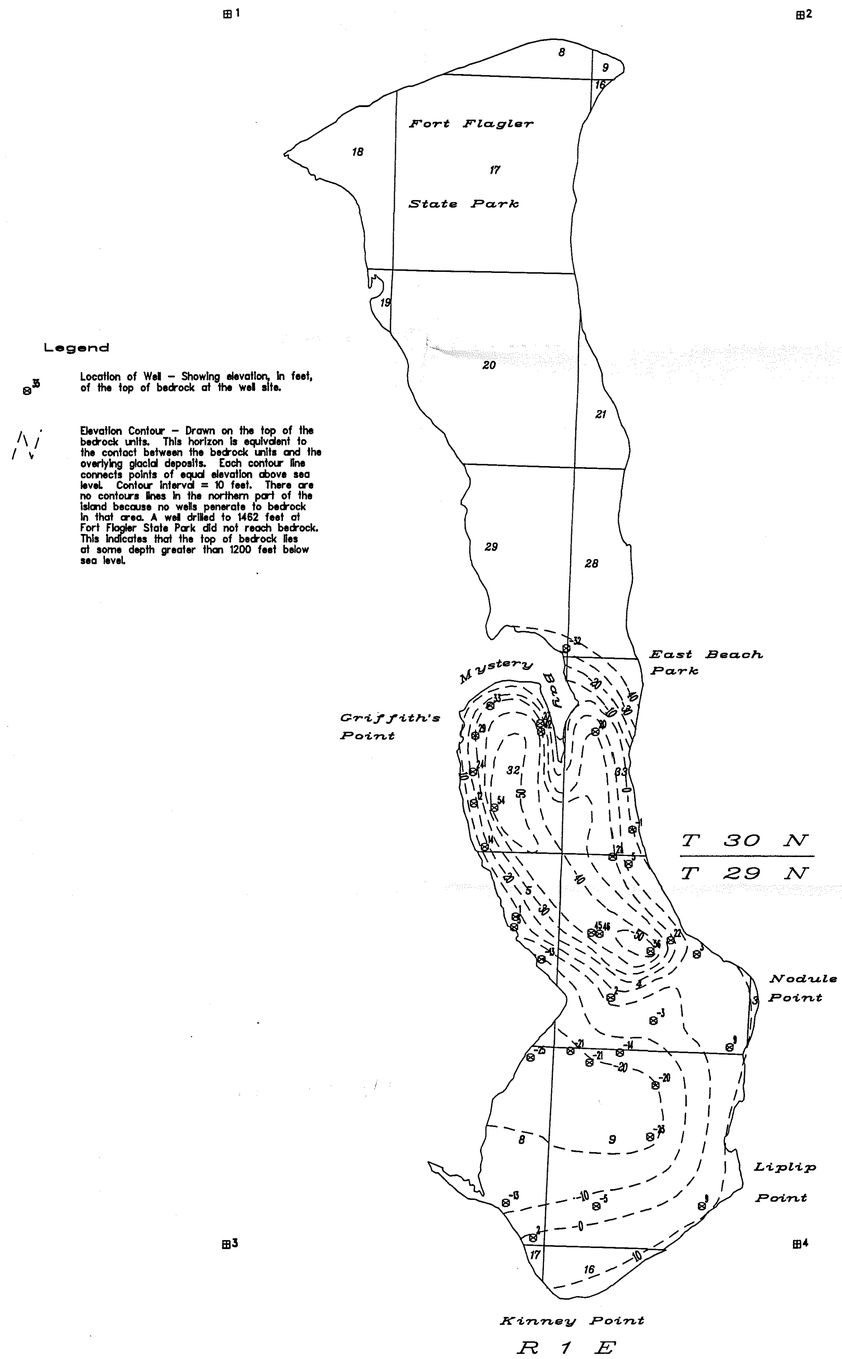
Tsb **Scow Bay Formation** - As described in text and on geologic map.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

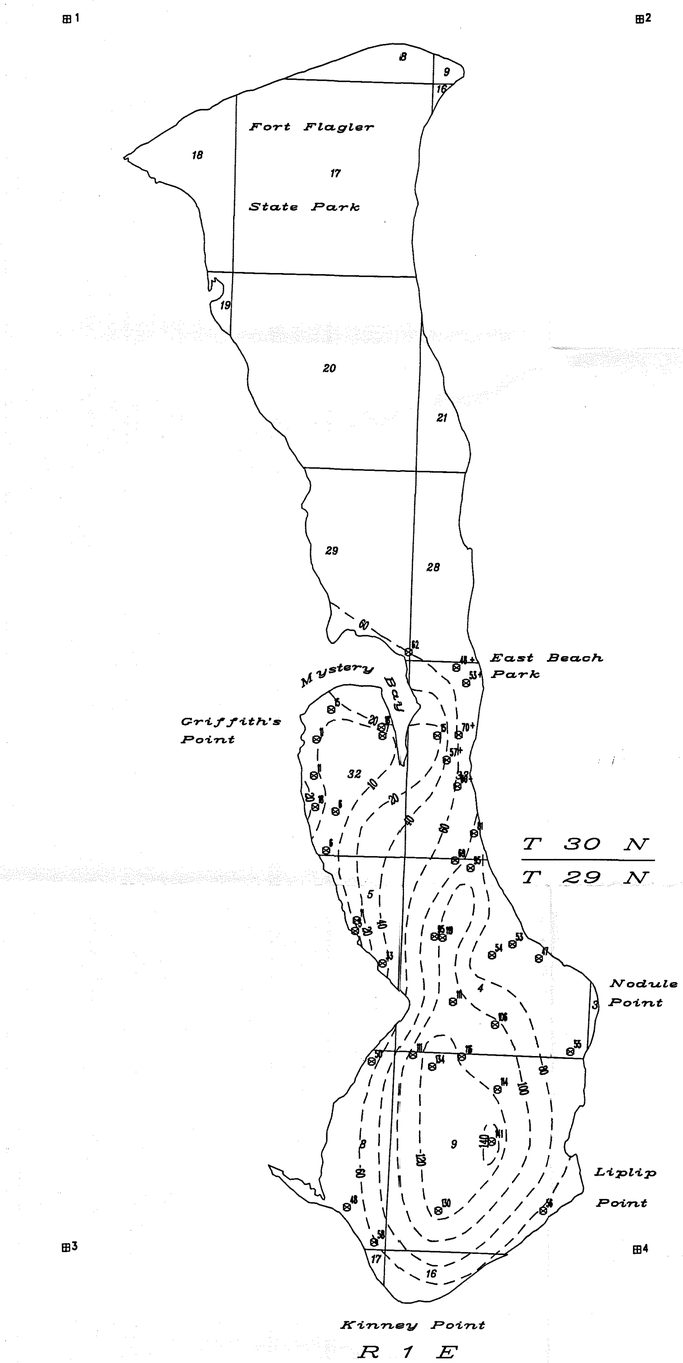
PLATE 4

GEOLOGIC CROSS SECTIONS F-F' AND F'-F"
MARROWSTONE ISLAND
JEFFERSON COUNTY
WASHINGTON

Water Supply Bulletin No. 59



Bedrock Elevation Contours



Thickness of Glacial Deposits

WASHINGTON STATE DEPARTMENT OF ECOLOGY

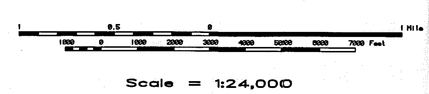
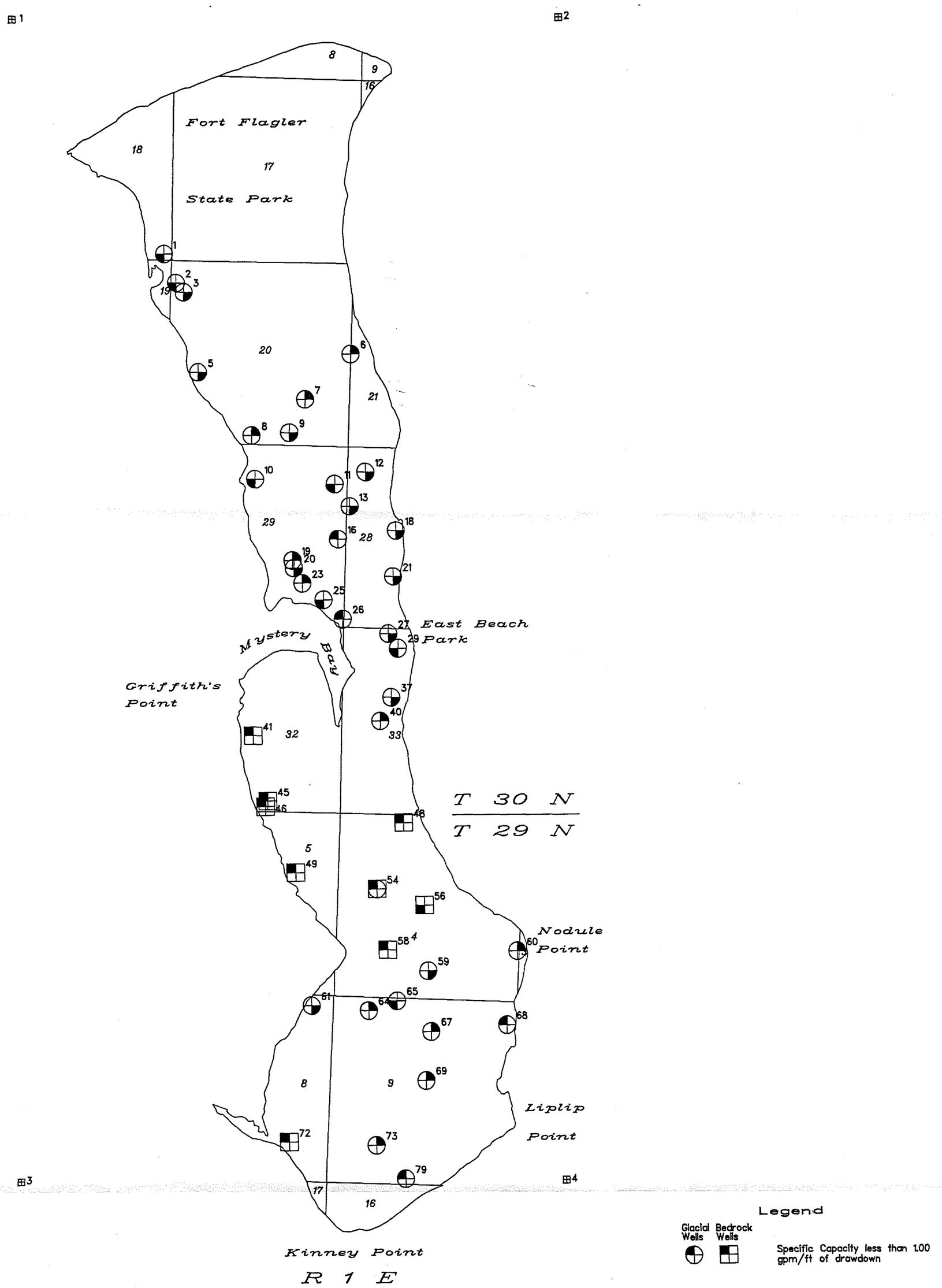


Plate 5
BEDROCK ELEVATION CONTOURS
AND
THICKNESS OF GLACIAL DEPOSITS
MARROWSTONE ISLAND,
JEFFERSON COUNTY, WASHINGTON

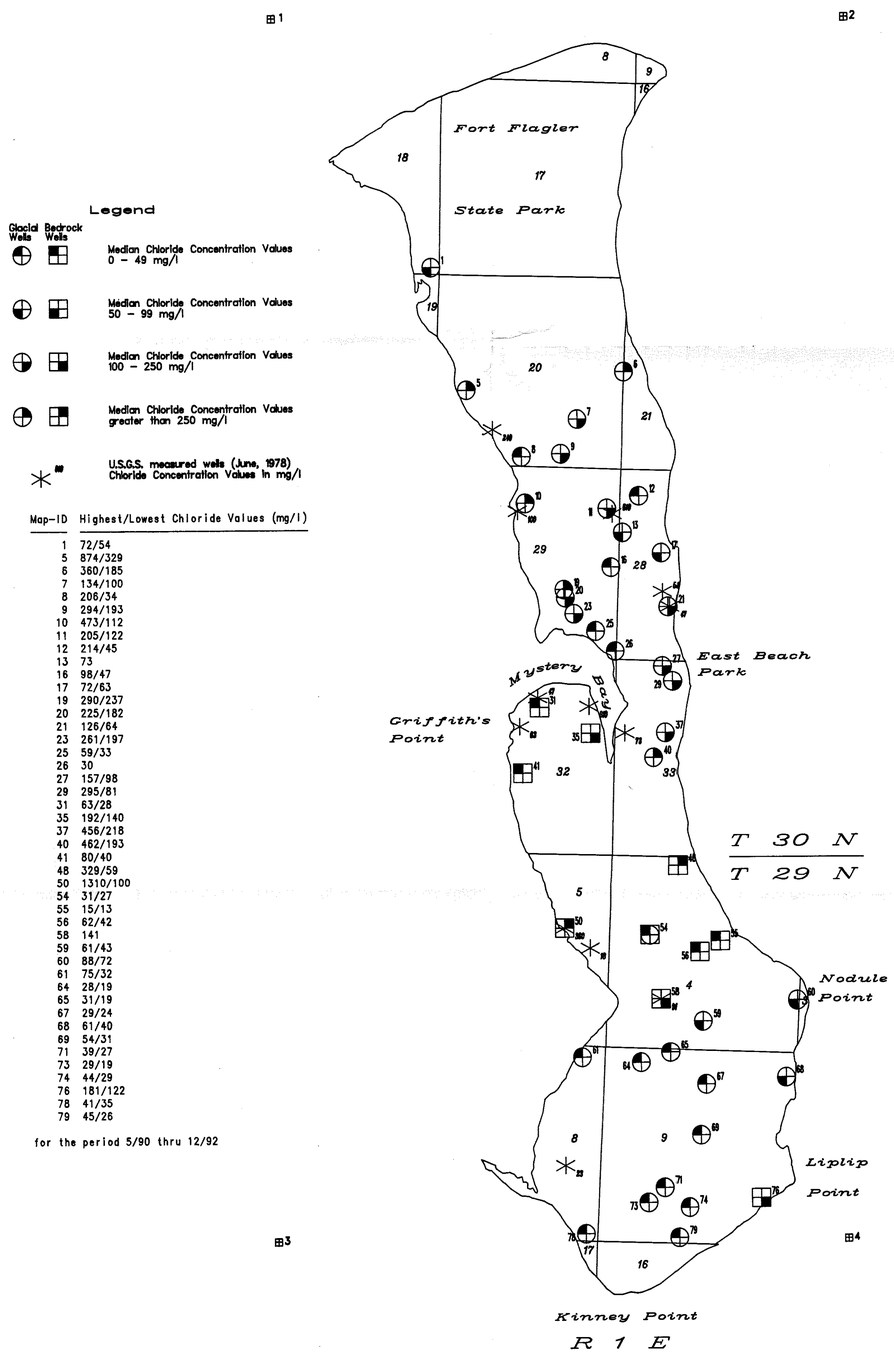


Map-ID	Well ID
1	AAB051
2	AAB050
3	AAB049
5	AAB047
6	AAB046
7	AAB045
8	AAB043
9	AAB044
10	AAB042
11	AAB037
12	AAB085
13	AAB034
16	AAB036
18	AAB031
19	AAB041
20	AAB068
21	AAB030
23	AAB039
25	AAB038
26	AAB084
27	AAB028
29	AAB026
37	AAB025
40	AAB024
41	AAB056
45	AAB053
46	AAB052
48	AAB022
49	GC-018
54	AAB020
56	AAB080
58	AAB009
59	AAB078
60	AAB019
61	AAB012
64	AAB010
65	AAB011
67	AAB006
68	AAB007
69	AAB005
72	GC-072
73	AAB073
79	AAB070

Scale = 1:24,000

WASHINGTON STATE DEPARTMENT OF ECOLOGY

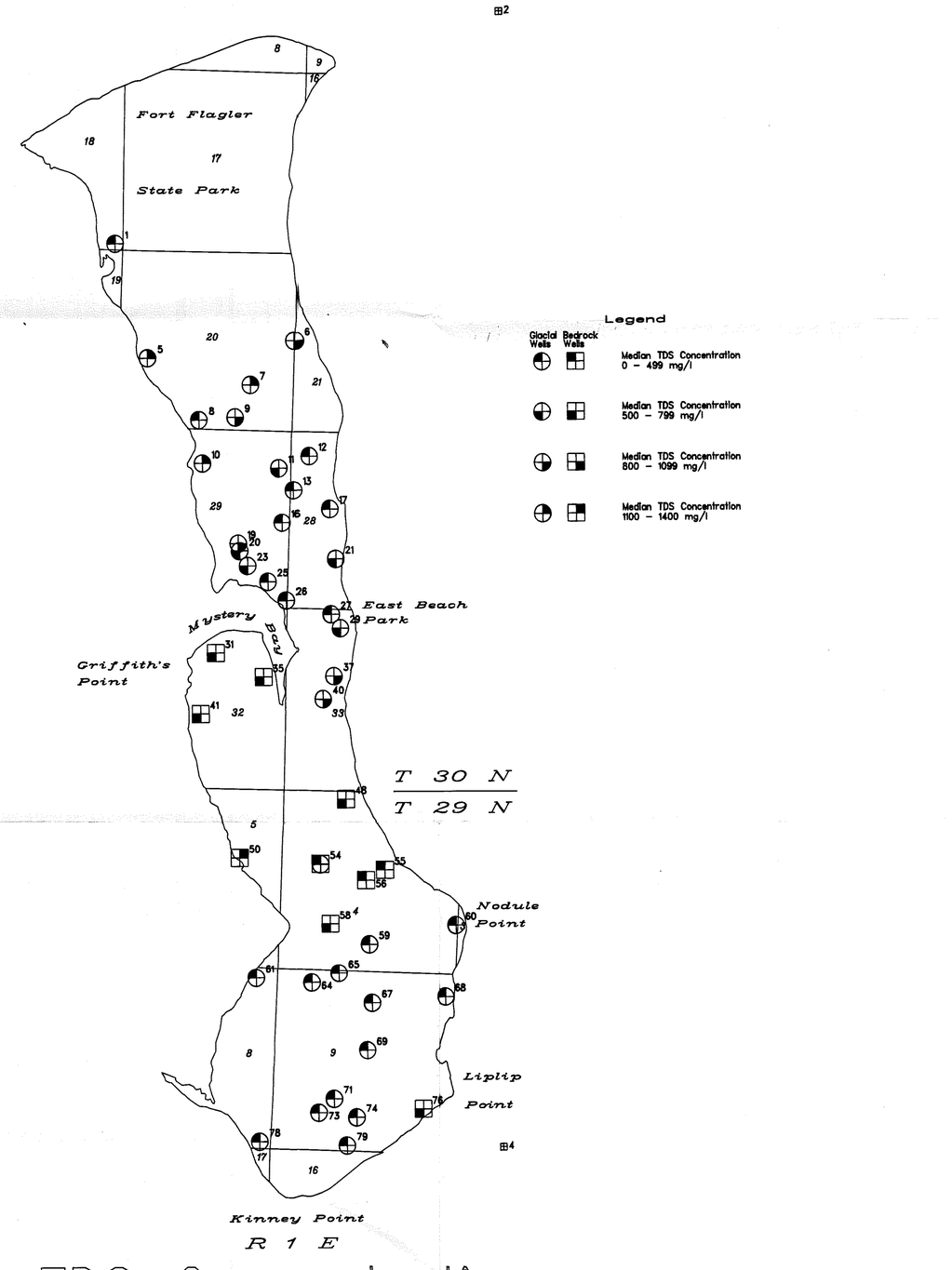
Plate 6
SPECIFIC CAPACITY OF WELLS
MARROWSTONE ISLAND,
JEFFERSON COUNTY, WASHINGTON



Map-ID	Highest/Lowest Chloride Values (mg/l)
1	72/54
5	874/329
6	360/185
7	134/100
8	206/34
9	294/193
10	473/112
11	205/122
12	214/45
13	73
16	98/47
17	72/63
19	290/237
20	225/182
21	126/64
23	261/197
25	59/33
26	30
27	157/98
29	295/81
31	63/28
35	192/140
37	456/218
40	462/193
41	80/40
48	329/59
50	1310/100
54	31/27
55	15/13
56	62/42
58	141
59	61/43
60	88/72
61	75/32
64	28/19
65	31/19
67	29/24
68	61/40
69	54/31
71	39/27
73	29/19
74	44/29
76	181/122
78	41/35
79	45/26

for the period 5/90 thru 12/92

Chloride Concentrations



Map-ID	Well ID
1	AAB051
5	AAB047
6	AAB046
7	AAB045
8	AAB043
9	AAB044
10	AAB042
11	AAB037
12	AAB085
13	AAB034
16	AAB036
17	AAB032
19	AAB041
20	AAB068
21	AAB030
23	AAB039
25	AAB038
26	AAB084
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41	AAB056
48	AAB022
50	AAB015
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67	AAB006
68	AAB007
69	AAB005
71	AAB071
73	AAB073
74	AAB074
76	AAB004
78	AAB069
79	AAB070

TDS Concentrations

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N

Scale = 1:24,000

Plate 7
CHLORIDE AND TDS CONCENTRATIONS
MARROWSTONE ISLAND,
JEFFERSON COUNTY, WASHINGTON