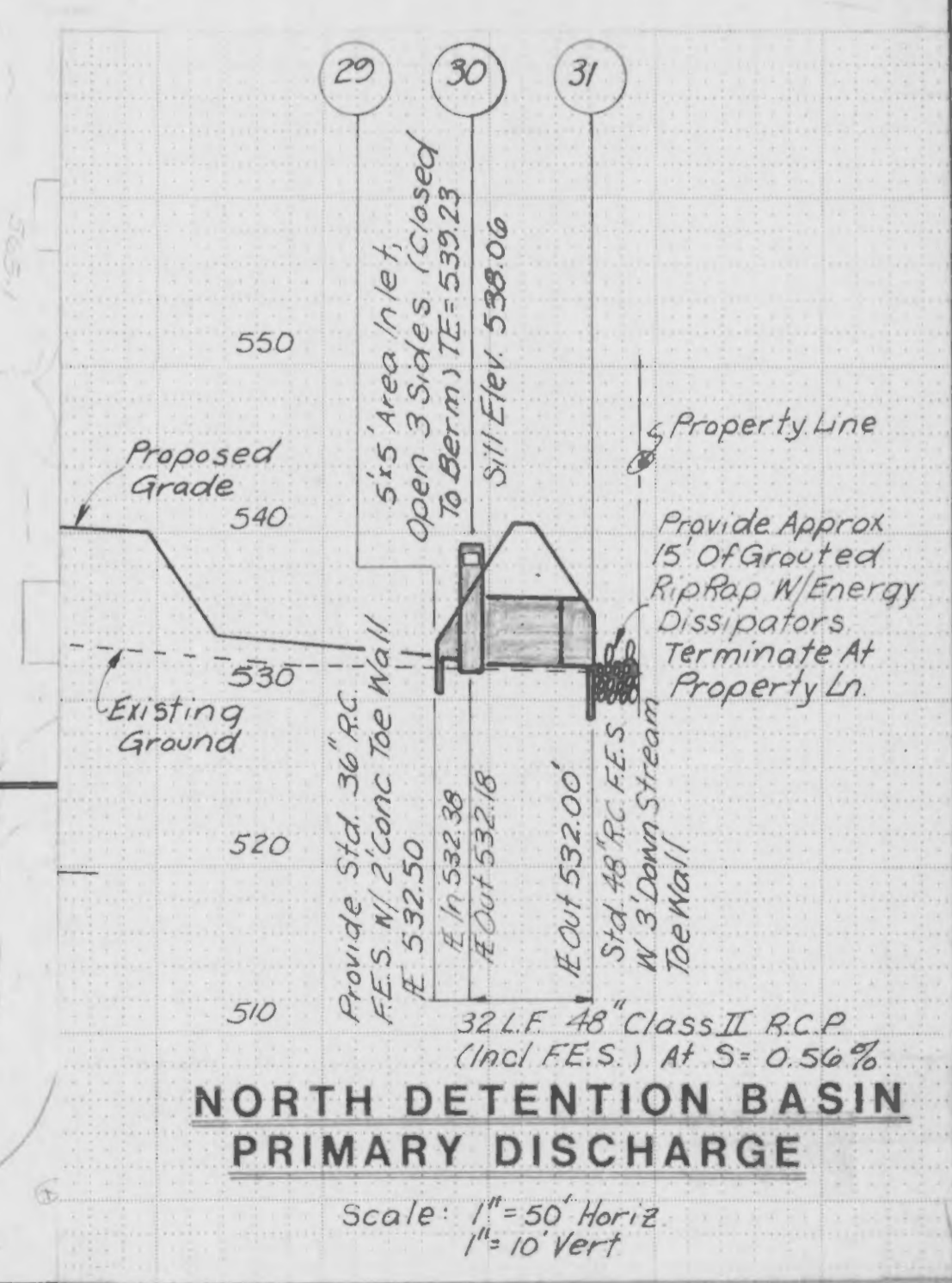
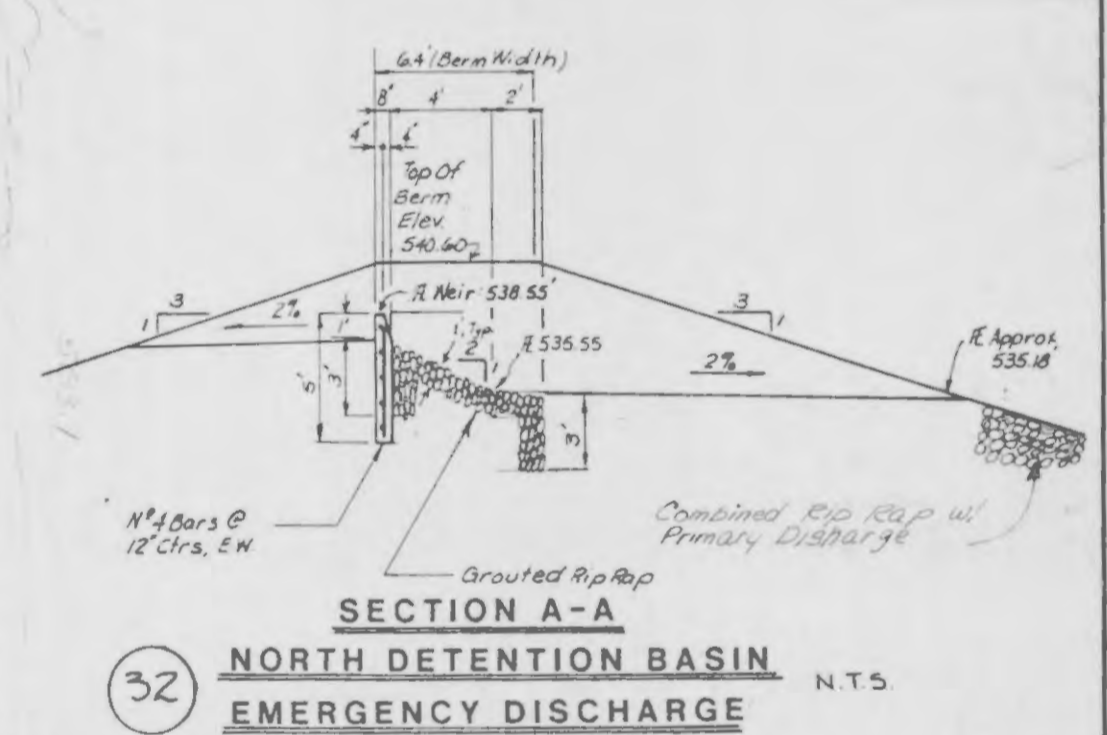
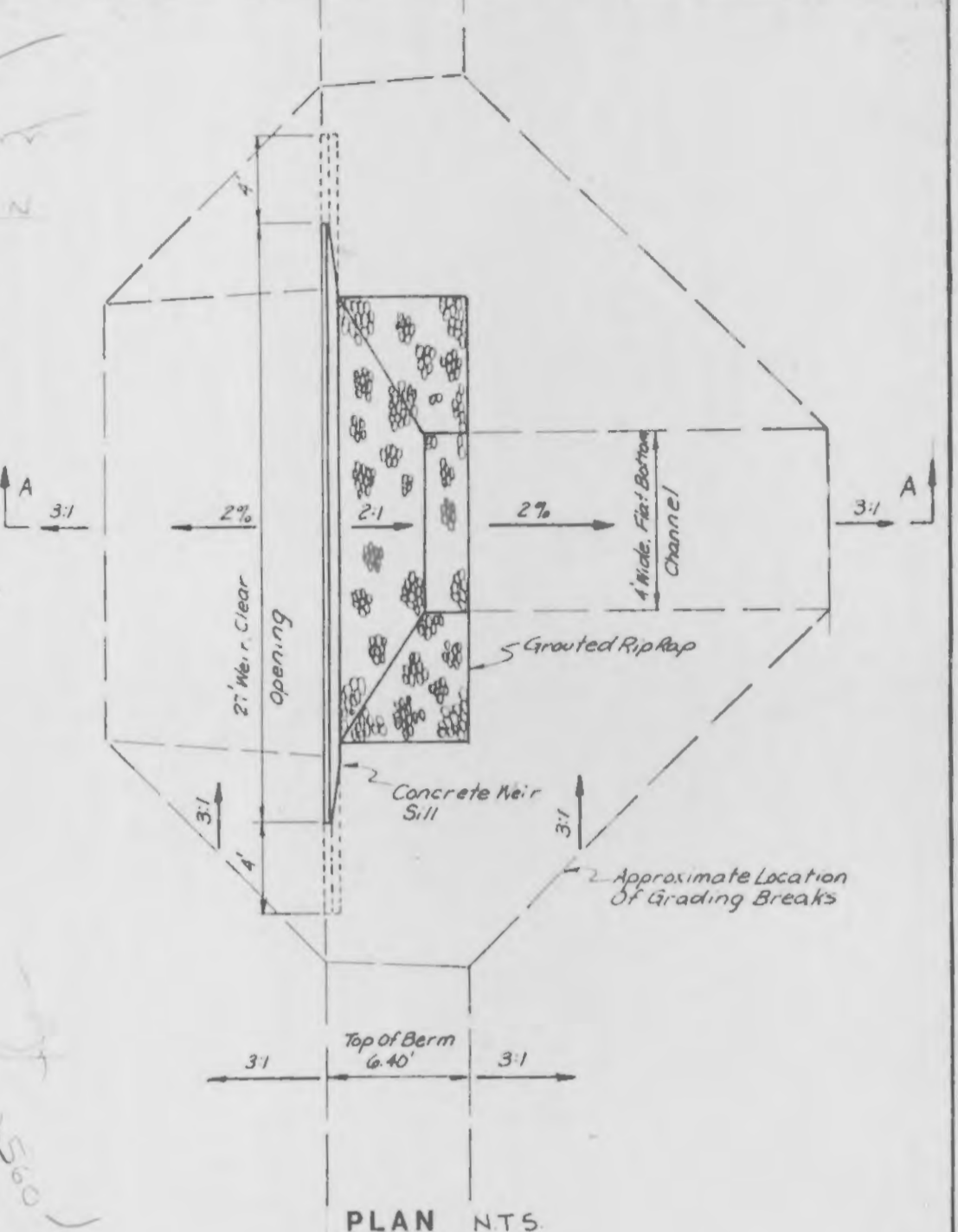
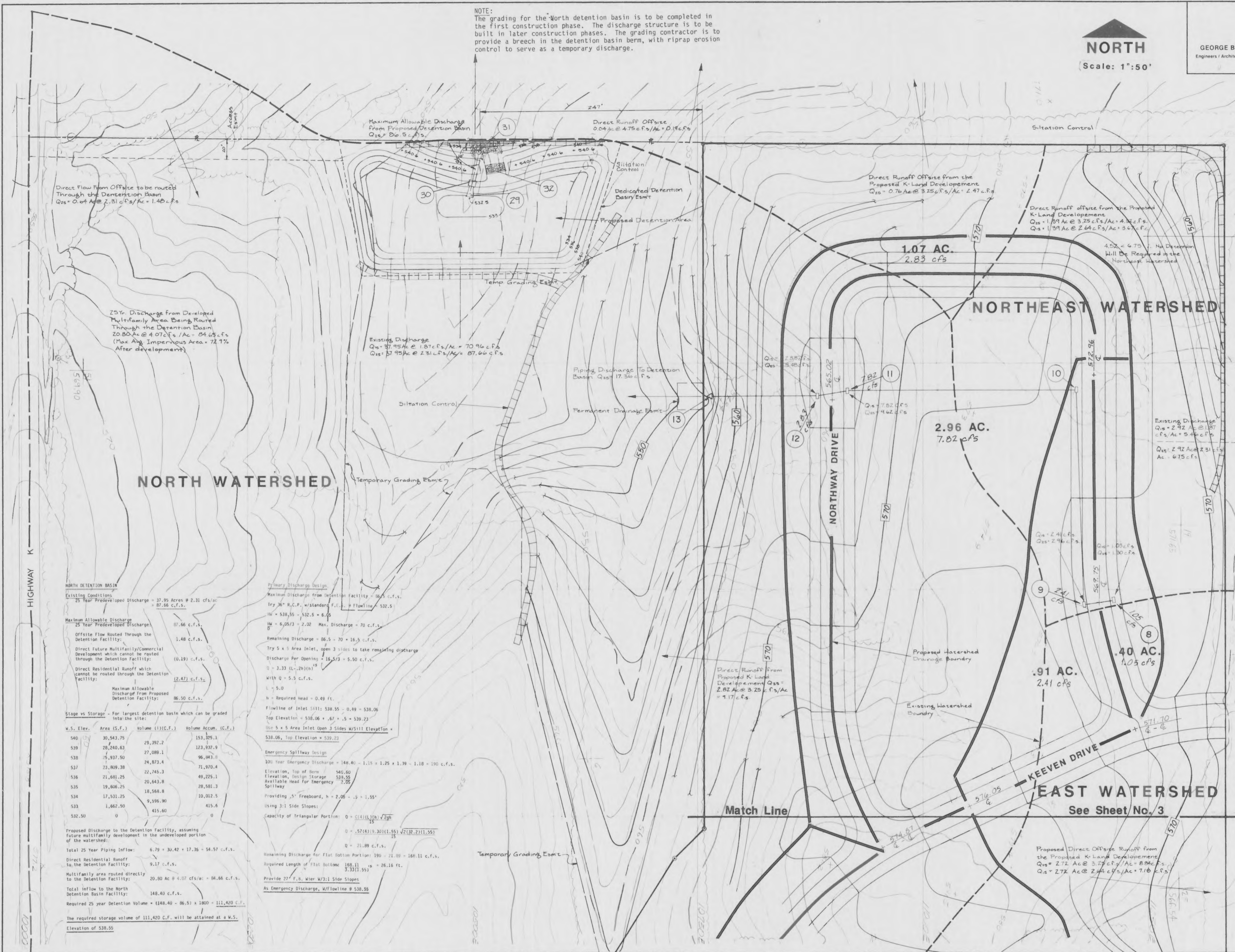


GBA
GEORGE BUTLER ASSOCIATES, INC.
Engineers / Architects / Landscape Architects / Planners

NORTH
Scale: 1" = 50'

NOTE:
The grading for the North detention basin is to be completed in the first construction phase. The discharge structure is to be built in later construction phases. The grading contractor is to provide a breach in the detention basin berm, with riprap erosion control to serve as a temporary discharge.



WATER DETENTION BASIN

Existing Conditions
25 Year Probable Inlet Discharge = 37.95 Acres @ 2.31 cfs/acre = 87.66 c.f.s.

Maximum Allowable Discharge
25 Year Probable Inlet Discharges = 87.66 c.f.s.
Offsite Flow Routed Through the Detention Facility: 1.48 c.f.s.
Direct Future Multifamily/Commercial Development which cannot be routed through the Detention Facility: (0.19) c.f.s.
Direct Residential Runoff which cannot be routed through the Detention Facility: (2.47) c.f.s.
Maximum Allowable Discharge from Proposed Detention Facility: 86.50 c.f.s.

Stage vs Storage - For largest detention basin which can be graded into the site:

W.S. Elev.	Area (S.F.)	Volume (111 C.F.)	Volume Accum. (C.F.)
540	30,543.75	29,392.7	153,325.1
539	28,240.83	27,089.1	123,932.9
538	25,937.50	24,873.4	96,043.9
537	23,809.38	22,745.3	71,970.4
536	21,681.25	20,643.8	49,225.1
535	19,606.25	18,643.8	28,581.3
534	17,531.25	16,568.8	10,012.5
533	1,662.50	9,596.90	415.6
532.50	0	415.60	0

Proposed Discharge to the Detention Facility, assuming future multifamily development in the undeveloped portion of the watershed:

Total 25 Year Piping Inflow: 6.79 + 30.42 + 17.36 = 54.57 c.f.s.
Direct Residential Runoff to the Detention Facility: 9.17 c.f.s.
Multifamily area routed directly to the Detention Facility: 20.80 Ac @ 4.07 cfs/acre = 84.66 c.f.s.
Total Inflow to the North Detention Basin Facility: 148.40 c.f.s.
Required 25 year Detention Volume = (148.40 - 86.5) x 1800 = 111,420 C.F.
The required storage volume of 111,420 C.F. will be attained at a W.S. Elevation of 538.55

Primary Discharge Design
Maximum Discharge from Detention Facility = 86.5 c.f.s.
Try 36" R.C.P. w/standard F.E.S. @ Flowline = 532.5
HW = 538.55 - 532.5 = 6.05
HW = 6.05/3 = 2.02 Max. Discharge = 70 c.f.s.
Remaining Discharge = 86.5 - 70 = 16.5 c.f.s.
Try 5' x 5' Area Inlet, open 3 sides to take remaining discharge
Discharge Per Opening = 16.5/3 = 5.50 c.f.s.
Q = 3.33 (L - 2H)(H)^{1.5}
With Q = 5.5 c.f.s.
L = 5.0
h = Required Head = 0.49 ft.
Flowline of Inlet Sill: 538.55 - 0.49 = 538.06
Top Elevation = 538.06 + .47 + .5 = 539.23
Use 5' x 5' Area Inlet Open 3 Sides W/Sill Elevation = 538.06, Top Elevation = 539.23

Emergency Spillway Design
100 Year Emergency Discharge = 148.40 - 1.15 + 1.25 + 1.39 - 1.18 = 190 c.f.s.
Elevation, Top of Berm = 540.60
Elevation, Design Storage = 534.55
Available Head for Emergency Spillway = 2.05

Providing 5' Freeboard, h = 2.05 - .3 = 1.55'
Using 3:1 Side Slopes:
Capacity of Triangular Portion: $Q = \frac{5.49(L)^{1.48} V^{.78}}{15}$
 $Q = \frac{5.49(190)^{1.48} (1.55)^{.78}}{15}$
 $Q = 21.89 c.f.s.$
Remaining Discharge for Flat Bottom Portion: 190 - 21.89 = 168.11 c.f.s.
Required Length of Flat Bottom: $168.11 \div 0.26 = 26.18 ft.$
 $3.33(1.55)$
Provide 27" F.B. Weir W/3:1 Side Slopes
As Emergency Discharge, W/Flowline @ 538.55

Included contours may be used as side.