



Detention Basin Calculations
 (See Sheet 3 of 12).

DETENTION BASIN VOLUME		
531	13,825 s.f.	13,163 c.f.
530	5,70 s.f.	12,500 s.f.
529	11,175 s.f.	11,838 c.f.
528	3,94 s.f.	9,850 s.f.
527	8,538 s.f.	10,513 c.f.
526	2,89 s.f.	8,538 s.f.
525	3,613 s.f.	9,194 c.f.
524.5	-0-	7,882 c.f.
		5,419 c.f.
		903 c.f.
		-0-

Maximum Proposed discharge from Detention Facility:
 15 Year existing discharge from site:
 10.38 Ac. @ 1.87 cfs/Ac. = 19.41 c.f.s.

25 year offsite discharge (existing development) routed thru tract to be developed:
 Royal Oaks Plat built in 1968 is considered as offsite discharge (3.86 Ac.).
 3.86 Ac. @ 3.42 c.f.s./Ac. = 13.29 c.f.s. (25 yr)
 Existing school to the west is considered as commercial tract.
 3.74 Ac. @ 4.43 c.f.s./Ac. = 16.57 c.f.s. (25 yr)
 0 = 16.57 + 13.29 = 29.77 c.f.s.

25 year developed discharge from tract being developed which cannot be intercepted by the storm sewer system & routed into the detention facility:
 4.36 Ac. @ 4.43 c.f.s./Ac. = 19.31 c.f.s. (25 yr)
 Maximum allowable discharge from detention facility:
 Q = 19.41 + 29.77 + 19.31 = 29.87 c.f.s.

Maximum inflow to detention facility:
 Offsite:
 3.86 Ac. @ 2.97 c.f.s./Ac. = 11.48 c.f.s.
 3.74 Ac. @ 3.85 c.f.s./Ac. = 25.86 c.f.s.

Onsite:
 (10.38 Ac. + 4.36 Ac.) @ 2.97 c.f.s./Ac. = 17.88 c.f.s.

15 Year Inflow = 25.86 + 17.88 c.f.s. = 43.74 c.f.s.
 25 Year Inflow = 43.74 + 1.35 + 50.30 c.f.s.

Required detention volume:
 (50.30 - 29.87) x 1800 = 36,774 c.f.

314	45,748
529	36,774
	33,911
2843	
11838	- 0.24

Required 25 year elevation is 529.24
 Maximum allowable discharge Q = 29.87 c.f.s.
 Try 24" pipe, A = π (12)² = 3.14 ft²

Available Head: 529.24 - 524.50 = 272 = 3.74'
 $Q_{max} = 602 (3.14) \sqrt{(32.2)(3.74)}$
 $Q_{max} = 29.34 c.f.s.$

Basin will store a little more runoff than the required runoff.
 $Q_{adj} = 29.87 - 29.34 = 0.53 c.f.s.$
 Adjusted 25 year elevation 529.28 (found after four iterations)
 Use same 24" pipe, A = 3.14 ft²
 Available Head 529.28 - 524.50 = 272 = 3.78'
 $Q_{max} = 602 (3.14) \sqrt{(32.2)(3.78)}$
 $Q_{max} = 29.50 c.f.s.$
 $V = (50.30 - 29.50) 1800 = 37,440 c.f.$

Stage	Volume
529	45,748
529	37,440
529	33,911

A = 3529 + .30
 11838

25 Year elevation = 529.30

Now find U.S. Derive a 15 year storm event for the tailwater elevation for storm sewer design.
 Try U.S. = 529.65
 Available Head = 529.65 - 524.50 = 272 = 3.15'
 $Q_{max} = 602 (3.14) \sqrt{(32.2)(3.15)}$
 $Q_{max} = 26.93 c.f.s.$
 Volume at U.S. = 529.65
 $V = (33911 - 23398) 65 + 23398 = 30,371 c.f.$
 $V_{req'd} = (43.74 - 26.93) 1800 = 30,258 c.f.$

Now design 100 year spillway
 15 Year Inflow = 43.74 c.f.s.
 100 Year Inflow = 43.74 x 1.39 = 60.80 c.f.s.

Place weir at 25 Year elevation = 529.30
 Available Head 531 - 529.30 = 1.70'
 (Weir board provided for 100 year emergency spillway since top of detention basin is located at Elevation 531.0).

Flow from triangular portion of weir:
 $Q_{max} = 0.57 (4/15) (4.20)(1.70) \sqrt{(32.2)(1.70)}$
 $Q_{max} = 11.36 c.f.s.$

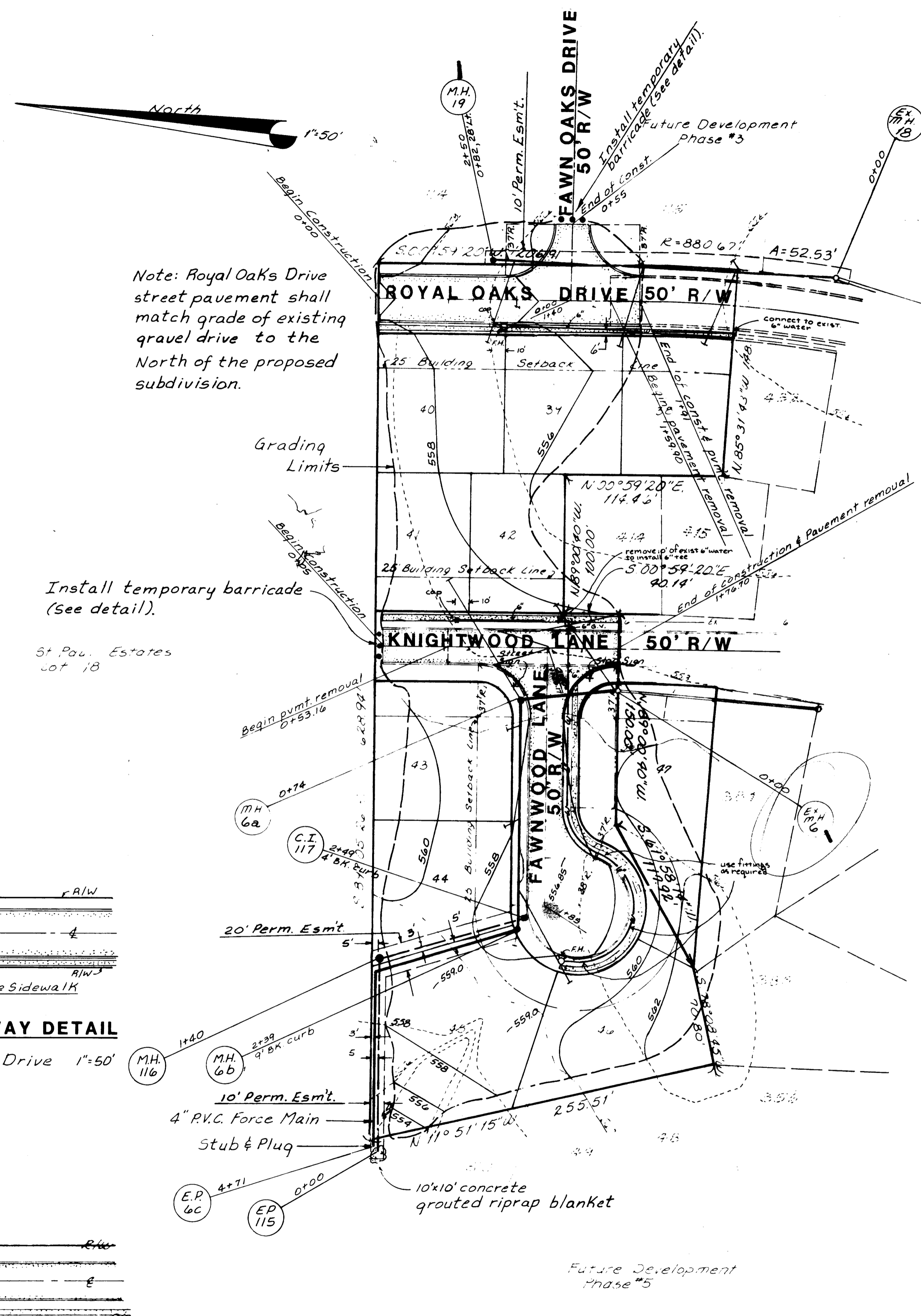
Remaining flow for rectangular portion of weir:
 $60.80 - 11.36 = 49.44 c.f.s.$
 $Q = 3.33 (1 - 0.28) h^{1.5}$
 $49.44 = 3.33 (1 - 0.28) h^{1.5}$
 $h = 7.04'$

So, use spillway 8 foot flat bottom, 3:1 side slopes and H.E. = 529.30

Note: Contractor shall dispose of all concrete street slabs removed from Royal Oaks Drive and Knightwood Lane at the sewage lagoon onsite.

Note: Contractor shall install 4" thick, 18" wide concrete street pavement on Knightwood Lane R/W, centered in the Right of Way for the existing residence at 1099 Crestwood Lane to prevent construction shall begin at the east property line of 1099 Crestwood Lane and terminate four (4) feet to the east. Street Pavement shall be 4" thick p.c.c., non-reinforced pavement with a 2" curb.

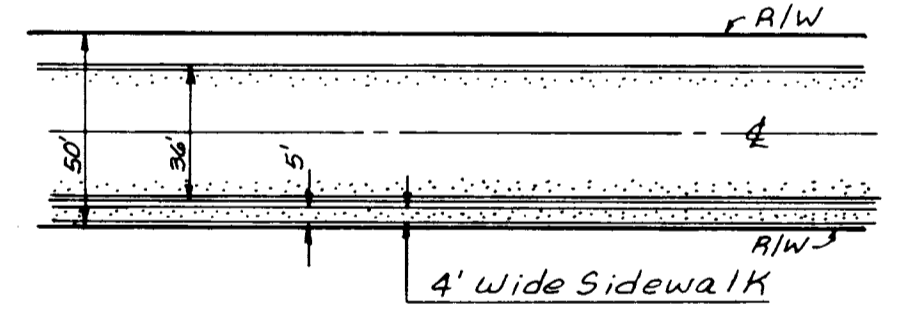
Note: Detention for the North Section of Phase 2 (This Sheet) will be provided at the time Phase 5 of Royal Oaks Subdivision is Developed.



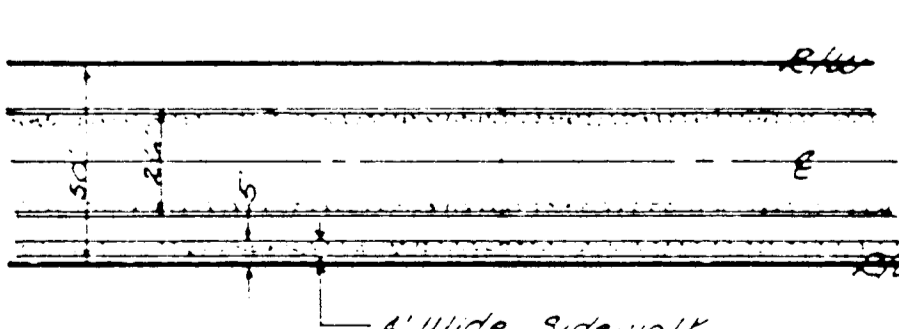
Note: Royal Oaks Drive street pavement shall match grade of existing gravel drive to the North of the proposed subdivision.

Install temporary barricade (See detail).

St. Paul Estates Lot 18



TYPICAL ROADWAY DETAIL
 Royal Oaks Drive 1'-50'



TYPICAL ROADWAY DETAIL
 Knightwood Lane & Fawnwood Lane

NOTE:
 Existing underground (U/G), overhead (O.H.) utilities and drainage structures have been plotted from available information and therefore, their locations must be considered approximate only. It is the responsibility of the individual Contractors to notify the utility companies before actual construction.