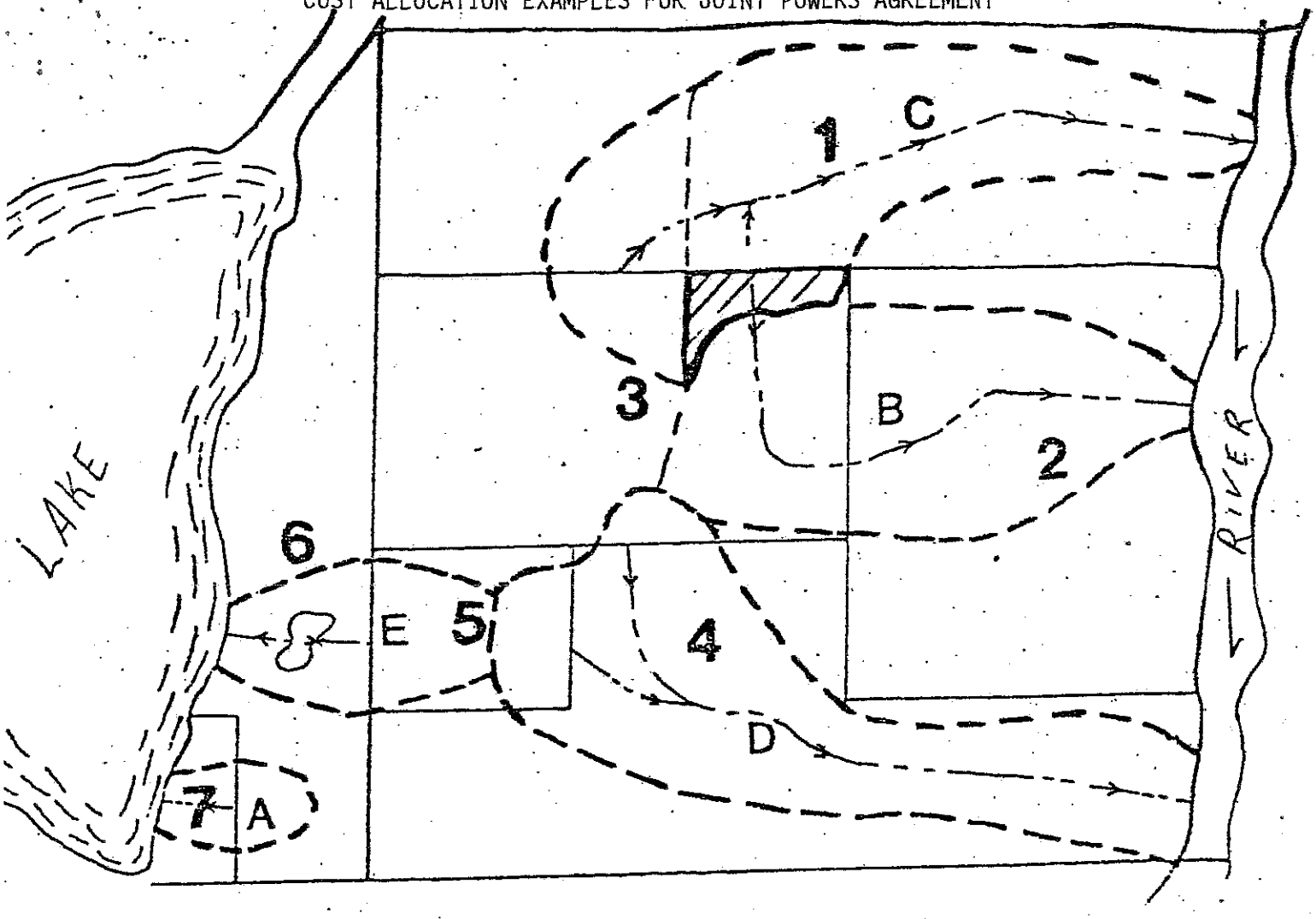
COST ALLOCATION EXAMPLES FOR JOINT POWERS AGREEMENT



EXAMPLE	DESCRIPTION
A.	Two Cities
B.	Two Cities With Diversion In
C.	Two Cities With Diversion Out
D.	Three Cities
E.	Added Ponding

LEGEND

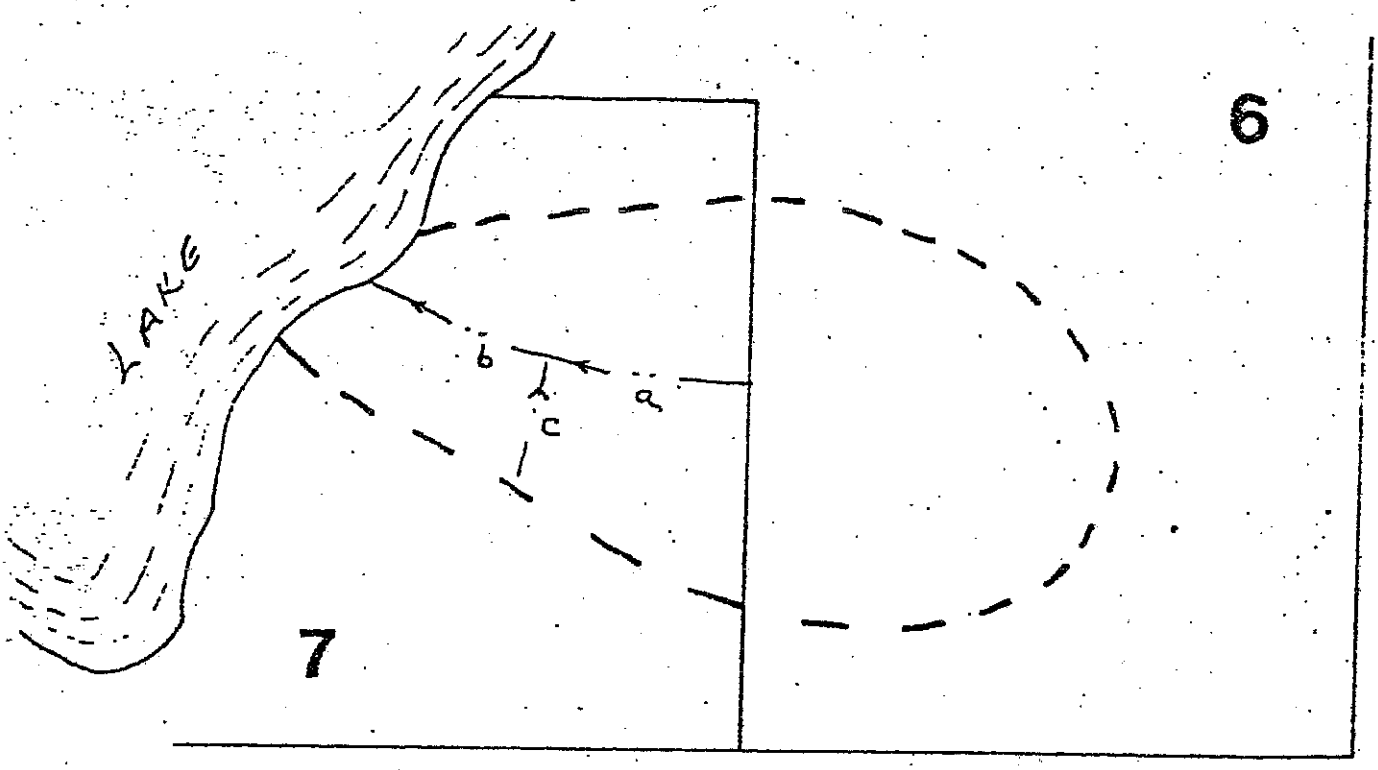
Watershed Boundary

Drainage Facility

City Boundary

Detention Pond

Diverted Area



EXAMPLE "A" - TWO CITIES

Project: Construct project (Segments "a" and "b") in City #7 to provide drainage for Cities #6 and #7 under fully developed conditions.

Cost Allocation:

City #6: Cost share $= \frac{Q_{E6}}{Q_T} \times$ Total project cost for "a".

City #7: Cost share = Total project cost $- \left(\frac{Q_{E6}}{Q_T} \times \text{Total project cost} \right)$

Where: $Q_{E6} = Q_{T6} - Q_{A6}$;

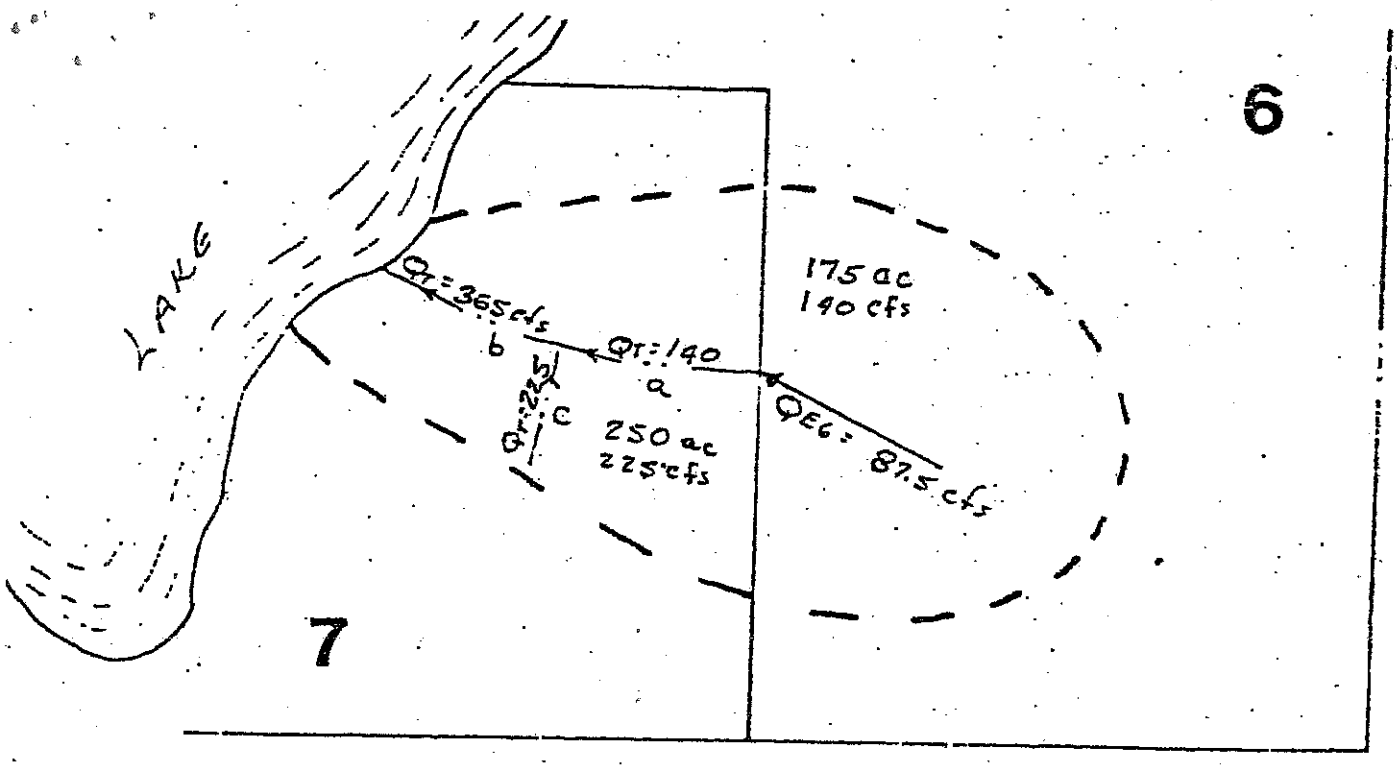
Q_{E6} is the design flow rate from City #6 which is in excess of the allowable flow rate from City #6;

Q_{A6} is the allowable flow rate from City #6;

Q_{T6} is the total design flow rate from City #6;

Q_T is the total flow rate for which the project is designed in each Segment.

City #6: Cost share for Segment "c" = Zero dollar (no tributary flow).



EXAMPLE "A" - TWO CITIES

Sample Calculations

Assume:

City #6 - Area of Watershed within City #6 = 175 acres
Full development runoff (Q_{T6}) = CIA = 0.40 x 2.0"/h x 175 = 140 cfs
Predevelopment runoff (Q_{A6}) = CIA = 0.15 x 2.0"/h x 175 = 52.5 cfs

Then:

Excess runoff (Q_{E6}) (from formulae: $Q_E = Q_T - Q_A$) = 87.5 cfs

1. City #6 cost share for Segment "a" = $\frac{87.5}{140}$ x project cost for "a" = .63 x Project cost for "a".

(From formulae: share = $\frac{Q_E}{Q_T}$ x Project cost)

Note: Segment "a" ends at first point of entry into the system from City #7.

Assume:

City #7 - Area of Watershed within City #7 = 250 acres and all flows from City #7 enter system by way of Segment "c".
Full development runoff (Q_{T7}) = CIA = .50x1.8x250 = 225 cfs
Design flow for Segment "b" = $Q_{T(SEG.\ "a")} + Q_{T7}$ = 140 + 225 = 365 cfs

2. City #6 has no cost share obligation in Segment "c" when there is no tributary flow from City #6.

(continued)

Then:

3. City #6 cost share for Segment "b" = $\frac{87.5}{365}$ x Project cost for "b" = 0.24 Project cost of "b".

(From formulae: Share = $\frac{Q_{E6}}{Q_T}$ x Project cost)

Note:

City #6 can reduce the excess flow (Q_{E6}) by detention ponding even to the amount that the rate of flow from City #6 (Q_{T6}) is no greater than the allowable flow rate (Q_{A6}). Any reduction in the total rate from City #6 would be applied to the excess rate and thereby reduce the obligation of City #6 to share in the cost of constructing any conveyance system in City #7.

SUMMARY OF COSTS

Segment "a":

City #6: Cost share = $\frac{87.5}{140}$ x Project cost for "a".

City #7: Cost share = $\frac{52.5}{140}$ x Project cost for "a".

Segment "b":

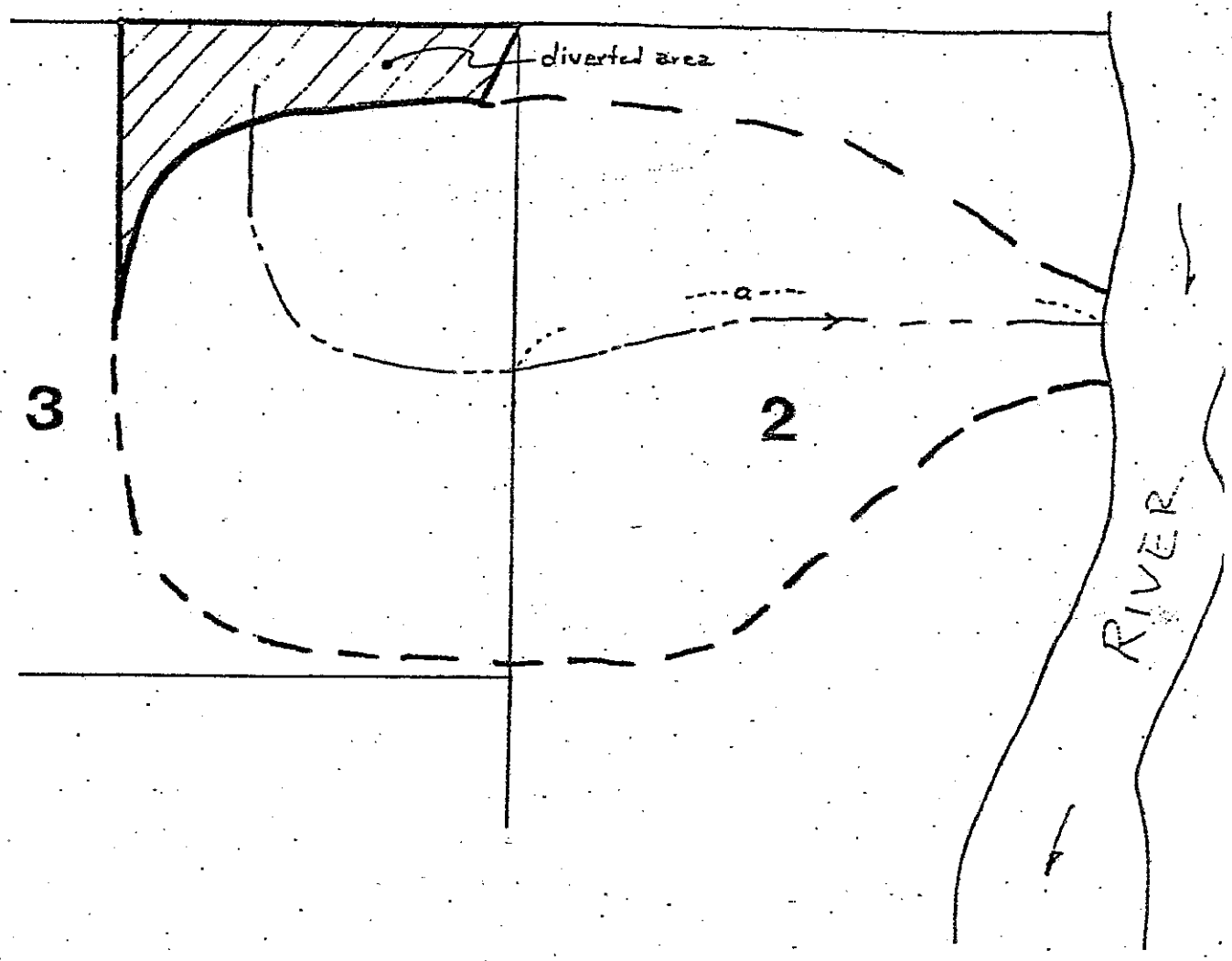
City #6: Cost share = $\frac{87.5}{365}$ x Project cost for "b".

City #7: Cost share = $\frac{277.5}{365}$ x Project cost for "b".

Segment "c":

City #6: Cost share = Zero dollar (no tributary flow).

City #7: Cost share = All of Project cost for "c".



EXAMPLE "B" - TWO CITIES WITH DIVERSION IN

Project: Construct Trunk facility "a" in City #2 only for Cities #2 and #3 under fully developed conditions.

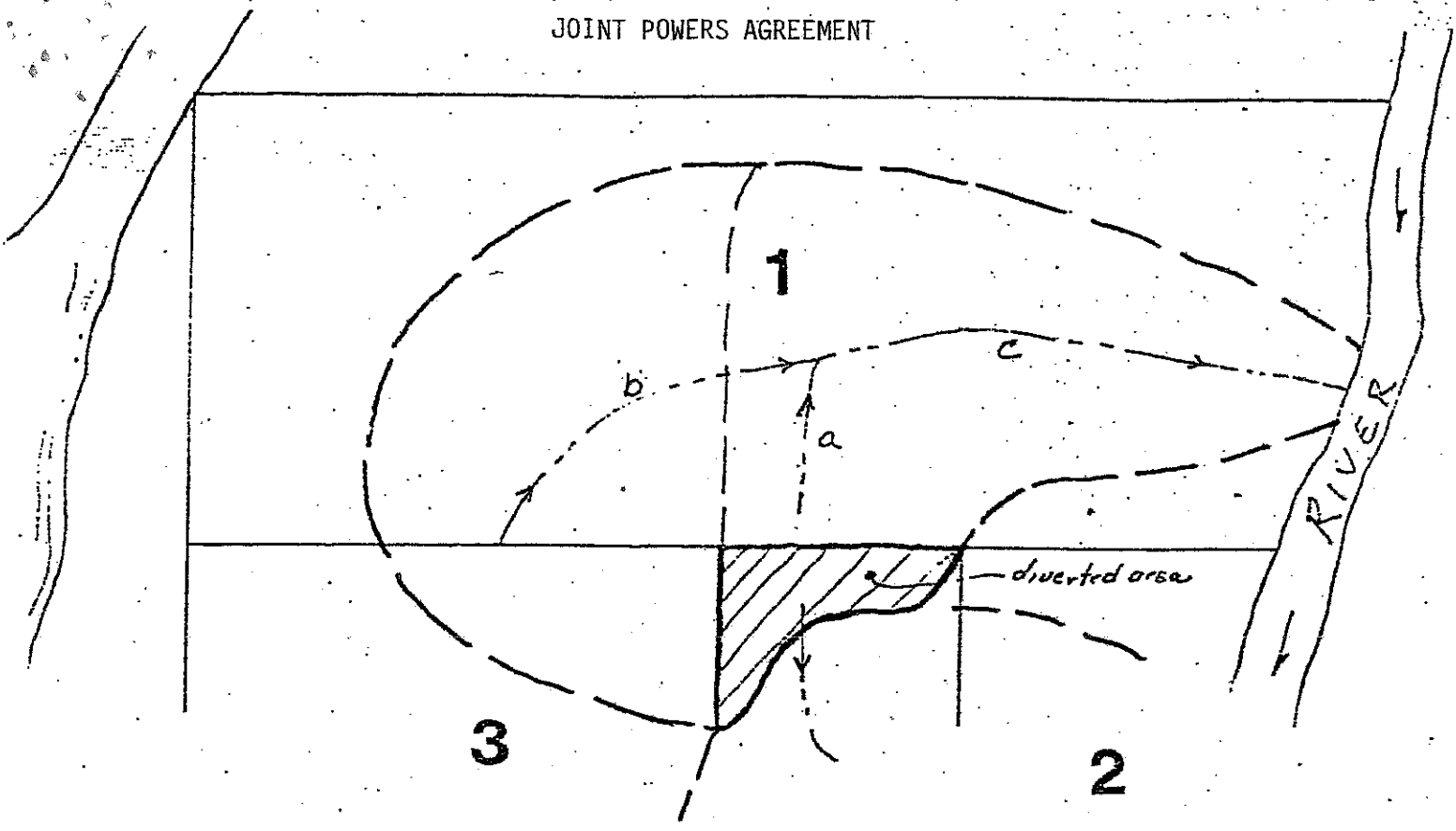
Cost Allocation:

City #3: Cost share $= \frac{Q_{E3}}{Q_T} \times$ Total project cost.

Where: $Q_{E3} = Q_{T3} - Q_{A3}$
And Q_{E3} is the design flow from City #3 as described in Example "A" plus all flows coming from the area diverted. All facilities within City #3 are constructed by City #3. Detention in City #3 can reduce Q_{E3};

Q_T and Q_A are as defined in Example "A".

Note: This case applies only where waters are diverted from one City to another City or from one major drainage district to another.



EXAMPLE "C" - TWO CITIES WITH DIVERSION OUT

Project: Construct Trunk Segments "a", "b", "c" in City #1 under fully developed conditions.

Cost Allocation:

City #3: Cost share for Segment "a" = Zero dollars (all flows have been diverted away)

Cost share for Segment "b" $= \frac{Q_{E3}}{Q_T} \times$ Total project cost for "b".

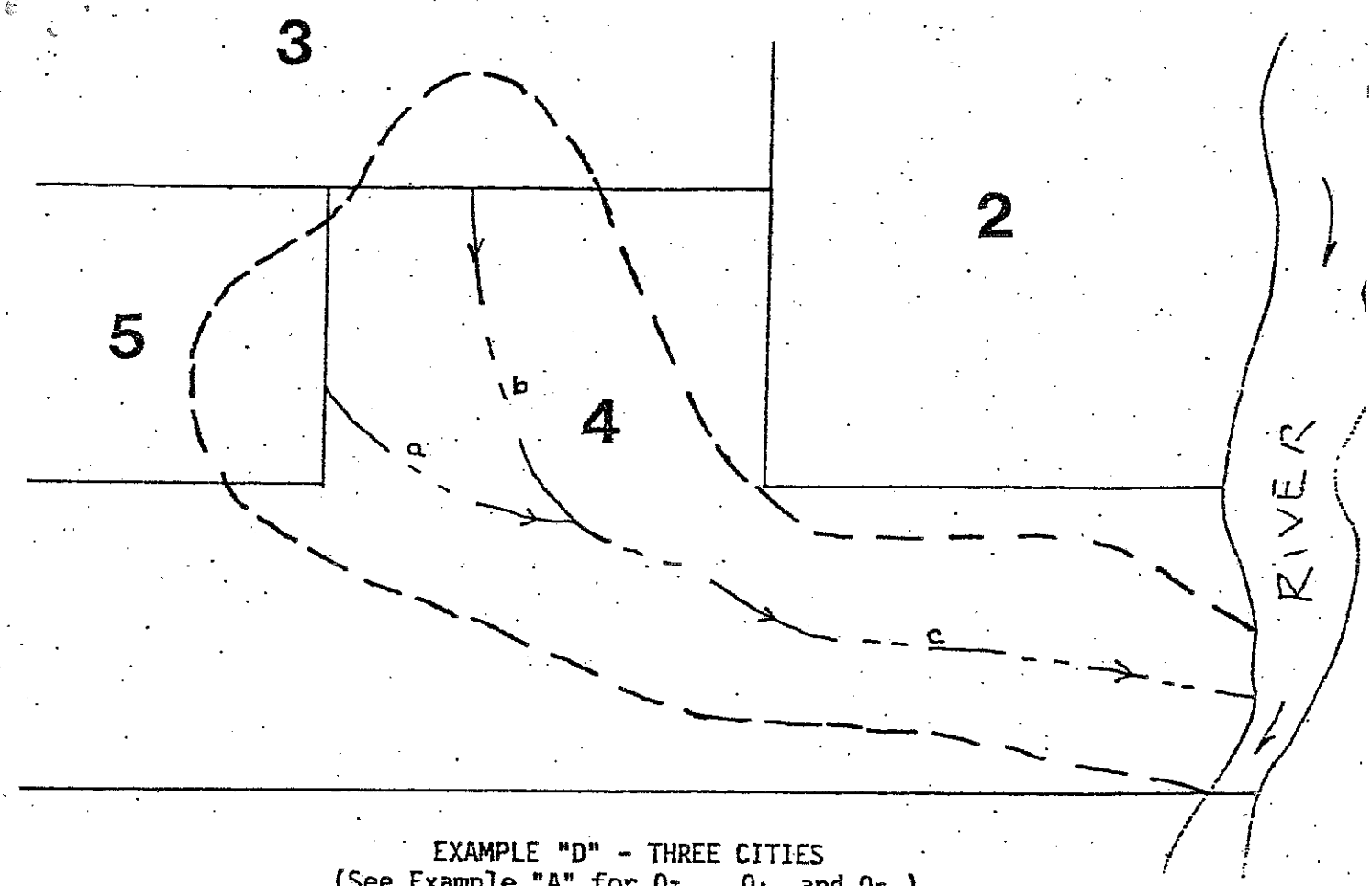
Where: Q_{E3} is the excess flow from City #3 that is tributary to Segment "b" only.

City #3: Cost share for Segment "c" $= \frac{Q_{E3}}{Q_T} \times$ Total project cost for "c".

Where: Q_{E3} is the excess flow from City #3 that is tributary to Segment "c" calculated as Q_{E3} tributary to "b" minus Q_{A3} that would have been tributary to "a" had there been no diversion out of the drainage district.

Q_T and Q_A are as defined in Example "A".

Note: This case applies only where waters are diverted from one City to another City or from one major drainage district to another.



EXAMPLE "D" - THREE CITIES
(See Example "A" for Q_T, Q_A and Q_E)

Project: Construct Project (Segments "a", "b" and "c") in City #4 to provide drainage for Cities #3, #4, and #5 under fully developed conditions.

Cost Allocations:

City #3: Cost share Segment "b" = $\frac{Q_{E3}}{Q_T}$ x Project cost for "b".

Cost share Segment "a" = Zero dollars (no tributary flow).

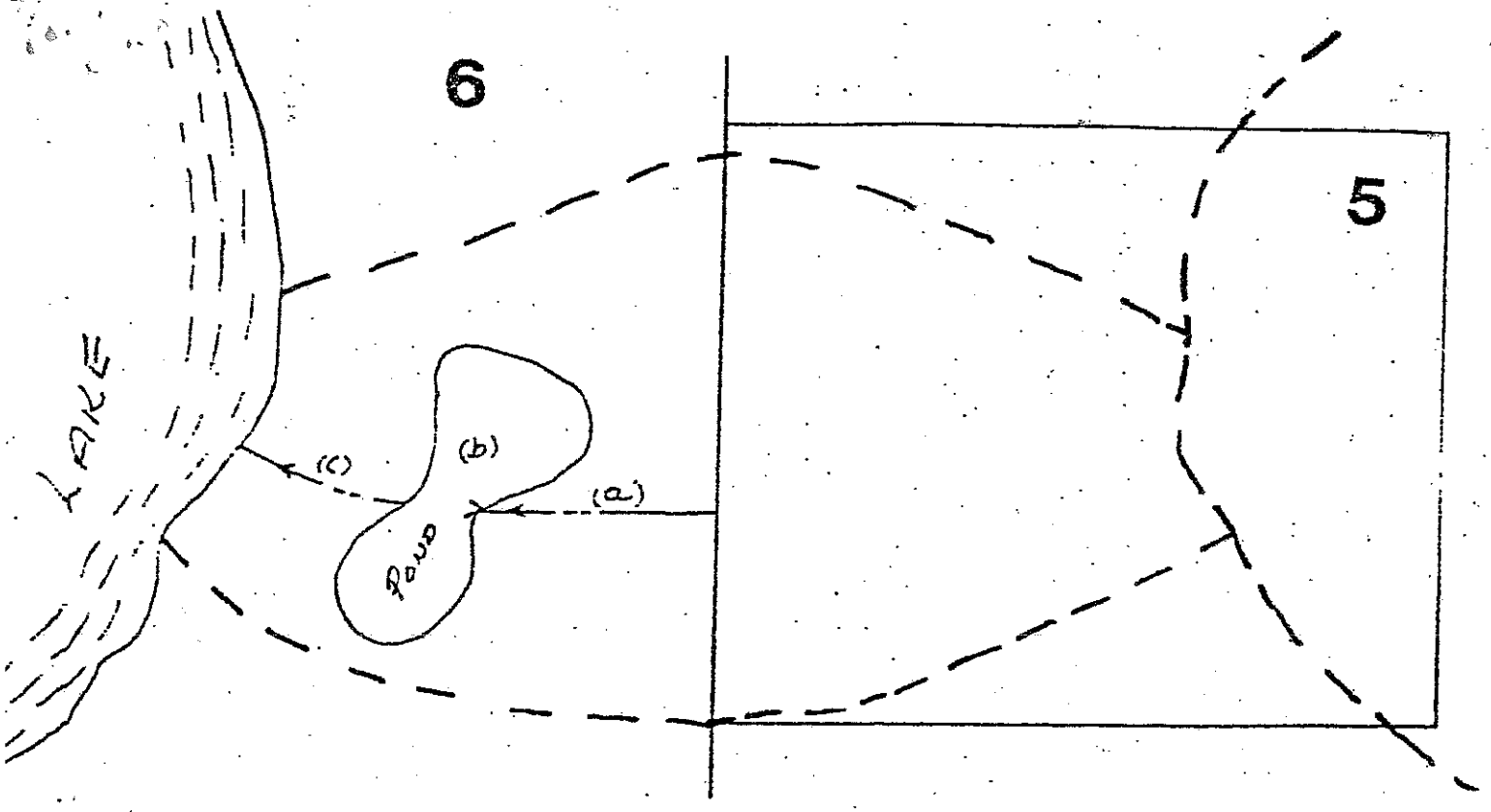
Cost share Segment "c" = $\frac{Q_{E3}}{Q_T}$ x Project cost for "c".

City #5 Cost share Segment "a" = $\frac{Q_{E5}}{Q_T}$ x Project cost for "a".

Cost share Segment "b" = Zero Dollars (no tributary flow).

Cost share Segment "c" = $\frac{Q_{E5}}{Q_T}$ x Project cost for "c".

Where: Q_T is the total flow rate for which each respective Segment is designed.



EXAMPLE "E" - ADDED PONDING
(See Example "A" for definition of Q_T , Q_A and Q_E)

Project: Construct Trunk "a", Detention Pond "b" and Outlet "c" for cities #5 and #6 under fully developed conditions.

Cost Allocation:

City #5 (Trunk "a"): Cost share $= \frac{Q_{E5}}{Q_T}$ x Project cost of Trunk "a".

Where: Q is the total flow rate in Trunk "a".

City #5 (Pond "b"): Cost share $= \frac{V_{E5}}{V_T}$ x Project cost of Pond "b".

Where: V_{E5} is the design Volume of runoff from City #5 which is in excess of the allowable Volume from City #5;

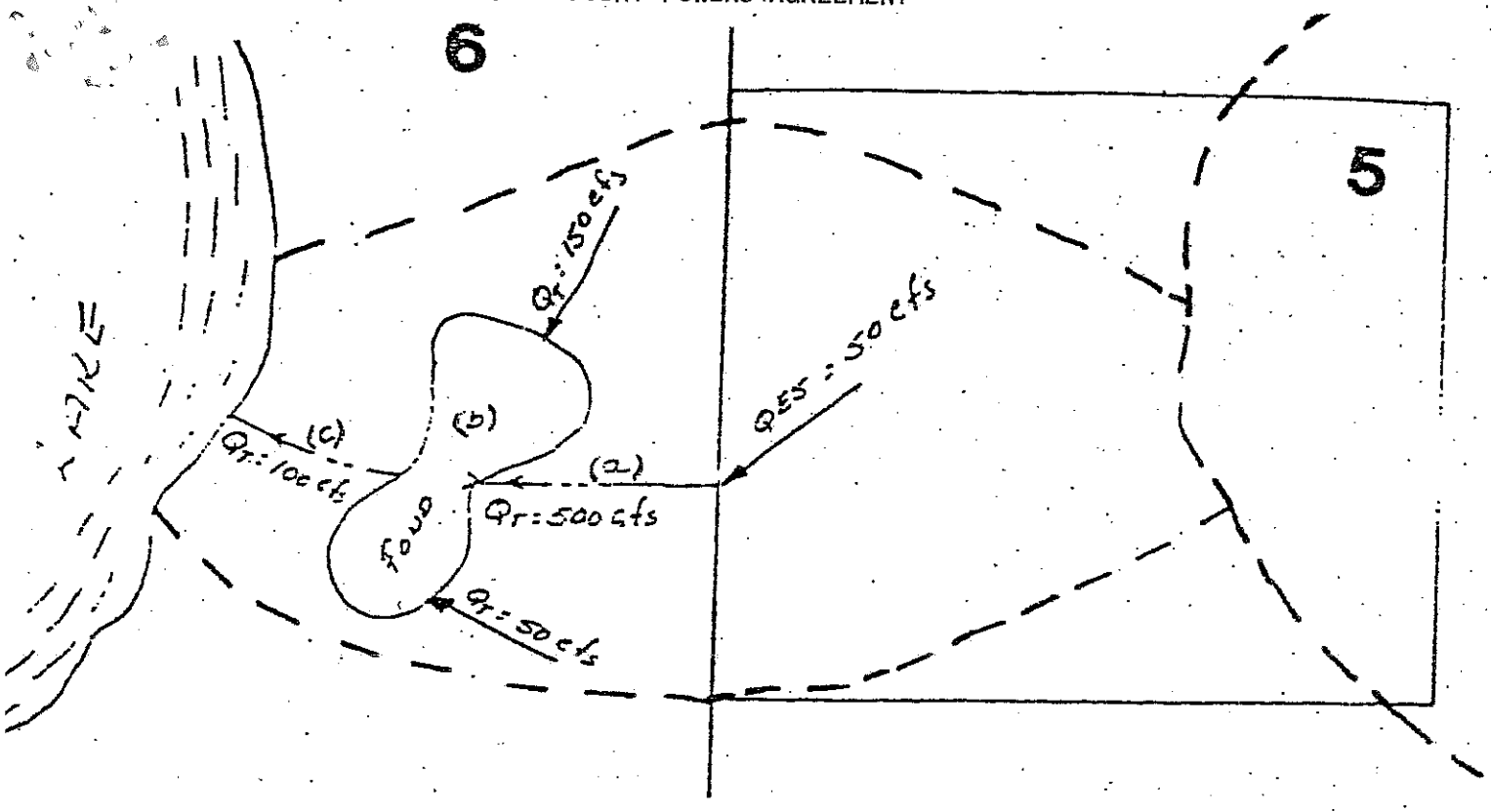
V_T is the total Volume used in the design of the detention pond.

City #5 (Outlet "c"): Cost share $= \frac{Q_{E5}}{Q_T}$ x Project cost of Outlet "c".

Where: Q_{E5} is reduced from Trunk "a" Inlet Q_{E5} by the ratio of $\frac{\text{Outlet } Q_T}{\text{Inlet } Q_T}$;

Inlet Q_T is the summation of all flows into the pond;
Outlet Q_T is the total flow rate out of the pond under design conditions.

Note: See Page 9 for sample calculations



EXAMPLE "E" - ADDED PONDING

Sample calculation for City #5 cost share for Outlet "c":

Assume:

Q_{E5} = 50 cfs

Q_T Pond inflow in Segment "a" = 500 cfs

Q_T Pond inflow from other areas = 200 cfs

ΣQ_T Pond inflow = 700 cfs

Q_T Pond Outlet "c" = 100 cfs

And:

$$Q_{E5\ (OUTLET)} = Q_{E5\ (INLET)} \times \frac{Q_{T\ (OUTLET)}}{\Sigma Q_{T\ (INLET)}}$$

$$\text{City \#5 cost share} = \frac{Q_{E5\ (OUTLET)}}{Q_{T\ (OUTLET)}} \times \text{Project cost of Outlet "c"}$$

Then:

$$Q_{E5}\ \text{(for Segment "c")} = \frac{100}{700} \times 50 = 7.14\ \text{cfs}$$

$$\text{City \#5 cost share} = \frac{7.14}{100} \times \text{Project cost of Outlet "c"}$$