

Lower Mississippi River
Watershed Management Organization

JOINT POWERS AGREEMENT

September, 1985

JOINT POWERS AGREEMENT
ESTABLISHING A WATERSHED MANAGEMENT ORGANIZATION
FOR THE LOWER MISSISSIPPI WATERSHED

The parties to this agreement are cities which have land that drain surface water into the Mississippi River. This agreement is made pursuant to the authority conferred upon the parties by Minn. Stat. 471.59 and 473.875, et.seq.

1. **Name.** The parties hereby create and establish the Lower Mississippi River Watershed Management Organization.

2. **General Purpose.** The purpose of this agreement is to provide an organization to preserve and use the natural water storage and retention of the Lower Mississippi River watershed to (a) reduce to the greatest practical extent capital expenditures necessary to control excessive volumes and rates of runoff, (b) improve water quality, (c) prevent flooding and erosion from surface flows, (d) promote ground water recharge, (e) protect and enhance fish and wildlife habitat and water recreational facilities, (f) secure the other benefits associated with the proper management of surface water, and (g) carry out all the duties and responsibilities outlined in Minn. Stat. 473.875 through 473.883.

3. **Definitions.**

Subdivision 1. "Rate of Flow" means the discharge of surface water runoff as a function of time which has been calculated according to the design criteria identified in Section 8, Subdivision 6. The rate of flow shall apply to the design and construction of open channels and storm sewer conduits.

Subdivision 2. "Volume of Flow" means the total discharge of all surface water runoff which has been calculated according to the design criteria identified in Section 8, Subdivision 6. The volume of runoff flow shall apply to the design and construction of detention facilities.

Subdivision 3. "Allowable Flow" means the rate and volume of flow, according to the design criteria identified in Section 8, Subd. b, at which a Member community may discharge into the drainage system without financial obligation and as the rate and volume of surface water runoff from a tributary area under natural conditions, with a drainage system in place which has been designed and constructed according to the criteria stated herein, excluding diverted waters. Current topographic data that exists on the enactment date of this agreement shall be used for the determination of the natural conditions and calculation of the allowable flow.

Subdivision 4. "Excessive Flow" means that rate and volume of flow, calculated according to the design criteria in Section 8, Subdivision 6, from a Member which is in excess of the allowable flow of that Member.

Subdivision 5. "Board" means the Board of Managers of the WMO.

Subdivision 6. "Council" means the governing body of a governmental unit which is a member of this WMO.

Subdivision 7. "Drainage Facilities" means any improvement constructed for the conveyance or storage of surface water.

Subdivision 8. "Drainage System" means the combination of drainage facilities required to safely control or convey runoff water from a major tributary drainage area(s) to a point of final discharge into a water body.

Subdivision 9. "Governmental unit" means any city.

Subdivision 10. "Lower Mississippi River Watershed" or "watershed" means the area within a line drawn around the extremities of all terrain whose surface drainage is tributary to the Mississippi River and within the mapped areas delineated on the map filed with the Water Resources Board pursuant to Minnesota Statutes 473.877, Subd. 2.

Subdivision 11. "Member" means a governmental unit which enters into this agreement.

Subdivision 12. "Natural Conditions" means the characteristics of the land on the date of enactment without regard to any urban development including structures, parking lots, or other man-made improvements.

Subdivision 13. "Watershed Management Organization or "WMO" means the organization created by this agreement the full name of which is "Lower Mississippi River Watershed Management Organization". It shall be a public agency of its Members.

4. **Membership.** The membership of the WMO shall consist of the following governmental units. Each Member shall be entitled to the following eligible votes:

City of Inver Grove Heights	3 votes
City of Lilydale	1 vote
City of Mendota Heights	2 votes
City of Saint Paul	2 votes
City of South St. Paul	2 votes
City of Sunfish Lake	1 vote
City of West St. Paul	2 votes

No change in governmental boundaries, structure, organizational status or character shall affect the eligibility of any Member listed above to be represented on the WMO, so long as such Member continues to exist as a separate political subdivision. A majority of all eligible votes shall be sufficient for all matters, unless otherwise provided for in this agreement. A majority vote of all members, with each Member having one vote, shall be required for Section 7, Subdivisions 1 and 7, and Section 8. A Member community may not cast a split vote. Any Member that fails to contribute their share of the WMO annual administration fund or their allocation of a capital improvement cost, shall be declared ineligible for voting on all matters before the WMO, until such contribution is made to the WMO.

5. **Advisors.** The following shall be requested to appoint a non-voting advisory member to the WMO: Dakota County; Ramsey County; Dakota County Soil and Water Conservation District. The Counties and District shall not contribute funds

for the operation of the WMO, except as provided in Minn. Stat. 473.883, but may provide technical services.

6. Board of Managers.

Subdivision 1. Appointment. The governing body of the WMO shall be its Board. Each Member shall be entitled to appoint one representative and an alternate on the Board, and said representative shall be called a "Manager". The alternate shall have the right to vote in absence of their representative.

Subdivision 2. Eligibility or Qualification. The Council of each Member shall determine the eligibility or qualification of its representative on the WMO.

Subdivision 3. Term. The members of the WMO Board of Managers shall not have a fixed term, but shall serve at the pleasure of the governing body of the local unit appointing such member to the WMO.

Subdivision 4. Managers shall serve without compensation from the WMO, but this shall not prevent a Member from providing compensation for a manager for serving on the Board.

Subdivision 5. At the first meeting of the Board and in January of each year thereafter, the Board shall elect from its managers a chair, a vice chair, a secretary, a treasurer and such other officers as it deems necessary to conduct its meetings and affairs. At the organizational meeting or as soon thereafter as it may be reasonably done, the WMO shall adopt rules and regulations governing its meetings. Such rules and regulations may be amended from time to time at either a regular or a special meeting of the WMO, provided that at least ten days' prior notice of the proposed amendment has been furnished to each person to whom notice of the Board meetings is required to be sent.

7. Powers and Duties of the WMO.

Subdivision 1. The WMO, acting by a majority vote of all members of the Board with each member having one vote;

(a) Shall prepare and adopt a watershed management plan meeting the requirements of Minn. Stat. 473.878;

(b) Shall review and approve local water management plans as provided in Minn. Stat. 473.879;

(c) Upon the adoption of the watershed plan, the WMO may exercise the authority of a watershed district under Minn. Stat. Chapter 112 to regulate the use and development of land when one or more of the following conditions exist:

(1) The local government unit exercising planning and zoning authority over the land under Minn. Stat. 366.10 to 366.19, 394.21 to 394.37 or 462.351 to 462.364 does not have a local water management plan approved and adopted in accordance with requirements of Minn. Stat. 473.879 or has not adopted the implementation program described in the plan.

(2) An application to the local governmental unit for a permit for the use and development of land which requires a variance from the adopted local water management plan or implementation program of the local unit.

(3) The local governmental unit has authorized the WMO to require permits for the use and development of land.

Subdivision 2. The WMO may employ such persons as it deems necessary to accomplish its duties and powers.

Subdivision 3. The WMO may contract for space and for material and supplies to carry on its activities either with a Member or elsewhere.

Subdivision 4. The WMO may acquire necessary personal and real property to carry out its powers and its duties.

Subdivision 5. The WMO may make necessary surveys or use other reliable surveys and data, and develop projects to accomplish the purposes for which the WMO is organized.

Subdivision 6. The WMO may cooperate or contract with the State of Minnesota or any subdivision thereof or federal agency or private or public organization to accomplish the purposes for which it is organized.

Subdivision 7. The WMO may acquire, operate, construct and maintain the drainage system improvements delineated in the capital improvement program adopted by the Board.

Subdivision 8. The WMO may contract for or purchase such insurance as the Board deems necessary for the protection of the WMO.

Subdivision 9. The WMO may establish and maintain devices for acquiring and recording hydrological and water quality data within the Lower Mississippi watershed area, as defined by the Board.

Subdivision 10. The WMO may enter upon lands within or without the watershed to make surveys and investigations to accomplish the purposes of the WMO, and are liable for actual damages resulting from surveys and investigations per Minn. Stat. 112.43, Subd. 1.

Subdivision 11. The WMO shall provide any Member with technical data or any other information of which the WMO has knowledge which will assist the Member in preparing land use classifications or local water management plans within the watershed.

Subdivision 12. The WMO may provide legal and technical assistance in connection with litigation or other proceedings between one or more of its members and any other political subdivision, commission, board, agency, corporation or individual relating to the planning or construction of facilities to drain or pond storm waters or relating to water quality within the Lower Mississippi River watershed.

Subdivision 13. The WMO may accumulate reserve funds for the purposes herein mentioned and may invest funds of the WMO not currently needed for its operations.

Subdivision 14. The WMO may collect money subject to the provisions of this agreement, from its members and from any other source approved by the Board.

Subdivision 15. The WMO may make contracts, incur expenses and make expenditures necessary and incidental to the effectuation of its purposes and powers subject to the provisions of Minn. Stat. 471.345.

Subdivision 16. The WMO shall cause to be made an annual audit of the books and accounts of the WMO and shall make and file a report to its Members at least once each year including the following information:

- (a) The financial condition of the WMO
- (b) The status of all WMO projects and work within the watershed;
- (c) The business transacted by the WMO and other matters which affect the interests of the WMO. Copies of the report shall be transmitted to the clerk of each Member by March 31 of each year.

Subdivision 17. The WMO's books, reports and records shall be available for and open to inspection by its Members or their respective designated representatives at all reasonable times.

Subdivision 18. The WMO may recommend changes in this agreement to its Members. Any amendments shall require ratification by all Members.

Subdivision 19. The WMO may exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth herein and as outlined and authorized by Minn. Stat. 473.875 through 473.883.

Subdivision 20. Each Member reserves the right to conduct separate or concurrent studies on any matter under study by the WMO.

8. Construction of Improvements.

Subdivision 1. All construction, reconstruction, extension or maintenance of the Lower Mississippi Watershed, including outlets, lift stations, dams, reservoirs, or appurtenances of a surface water or storm sewer system ordered by the WMO which involve potential construction by or assessment against any Member or against privately or publicly owned land within the watershed shall follow the

procedures outlined herein. The Board shall secure from its engineers or some other competent person a preliminary report advising the Board whether the proposed improvement is feasible, whether there are feasible alternatives, whether the proposed improvement shall best be made as proposed or in connection with some other improvement, a determination of the quantity of storm and surface water contributed to the improvement by each Member, the estimated cost of the improvement(s), including maintenance, and the estimated cost to each Member. The Board shall then hold a public hearing on the proposed improvement after mailed notice to the clerk of each Member and published notice in the Board's official newspaper. The WMO shall not be required to mail notice except by notice to the clerk. The notice shall be mailed not less than 45 days before the hearing, shall state the time and place of the hearing, the general nature of the improvement, the estimated total cost and the estimated cost to each Member.

To order the improvement, a resolution setting forth the order shall require a majority vote of all members of the Board, with each Member having one vote. The order shall describe the improvement, shall allocate in percentages the cost allocation among the Members, shall designate the engineers to prepare plans and specifications, and shall designate who will contract for the improvement.

The Board shall allow an adequate amount of time and in no event less than 90 days, nor more than 270 days, for each Member to conduct hearings in accordance with the provisions of appropriate State Statutes or the charter requirements of any city, or to ascertain the method of financing which the Member will use to pay its proportionate share of the costs of the improvement.

If the WMO proposes to use Dakota County's and/or Ramsey County's bonding authority, or if the WMO proposes to certify all or any part of a capital improvement to Dakota and/or Ramsey County for payment, then and in that event all proceedings shall be carried out in accordance with Minn. Stat. 473.883.

The Board shall not order and no engineer shall prepare plans and specifications before the Board has adopted a resolution ordering the improvement.

The Board may order the advertising for bids upon receipt of notice from each Member who will be assessed that it has completed its hearing or determined its method of payment, or upon expiration of 270 days after the mailing of the preliminary report to the Members, whichever occurs first.

Subdivision 2. Any Member aggrieved by the determination of the Board as to the allocation of the costs of an improvement shall have 30 days after the WMO resolution ordering the improvement to appeal the determination. The appeal shall be in writing and shall be addressed to the Board asking for arbitration. The determination of the Member's appeal shall be referred to a Board of Arbitration. Arbitration must be completed within the 270 day period provided for in Section 8, Subdivision 1. The Board of Arbitration shall consist of three persons: one to be appointed by the Board of Managers, one to be appointed by the appealing Member, and the third person, appointed by the other two persons, shall not be a resident of any Member. In the event the two persons so selected do not appoint the third person within 15 days after their appointment, then the chief judge of the District Court of Dakota County shall have jurisdiction to appoint, upon application of either or both of the two earlier selected, the third person to the Board, after notice of that application to Member cities. The third person selected shall not be a resident of any Member and if appointed by the chief judge, shall be a person knowledgeable in the subject matter. The arbitrators' expenses and fees, together with the other expenses, not including counsel fees, incurred in the conduct of the arbitration shall be divided equally between the WMO and the appealing Member. Arbitration shall be conducted in accordance with the Uniform Arbitration Act, Minn. Stat. Chapter 572.

Subdivision 3. Contracts for Improvements. All improvement contracts ordered by the Board shall be let in accordance with Minn. Stat. 429.041. The bidding and contracting of the work may be let by any one of the Member or by the Board as determined by the Board of Managers after compliance with the statutes. Contracts and bidding procedures shall comply with the legal requirements applicable to Member statutory cities.

Subdivision 4. Supervision. All improvement contracts shall be supervised by the entity awarding the contract. The WMO shall also be authorized to observe and review the work in progress and the Members agree to cooperate with the WMO in accomplishing its purposes. Representatives of the WMO shall have the right to enter upon the place or places where the improvement work is in progress for the purpose of making reasonable tests and inspections. The WMO shall report and advise and recommend to the Board on the progress of the work.

Subdivision 5. Land Acquisition. The WMO shall have the power of eminent domain. All easements or interest in land which are necessary will be negotiated or condemned in accordance with Minn. Stat. Chapter 117 by the Board or, if directed by the Board, by the Member where the land is located, and each Member agrees to acquire the necessary easement or right of way or partial or complete interest in land upon order of the Board to accomplish the purposes of this agreement. All reasonable costs of the acquisition, including attorney's fees, shall be considered as a cost of the improvement, and shall be allocated according to the formula for allocating Capital Improvement cost as found in Section 9, Subd. 6. If a Member determines it is in the best interests of that Member to acquire additional lands, in conjunction with the taking of lands for storm and surface drainage or storage, for some other purposes, the costs of the acquisition will not be included in the improvement costs of the ordered project. The Board in determining the amount of the improvement costs to be assessed to each Member may take into consideration the land use for which the additional lands are being acquired and may credit the acquiring municipality for the land acquisition to the extent that it benefits the other Members of this agreement. Any credits may be applied to the cost allocation of the improvement project under construction or the Board if feasible and necessary may defer the credits to a future project.

Members may not condemn or negotiate for land acquisition to pond or drain storm and surface waters within the corporate boundaries of another Member within the Lower Mississippi River Watershed except upon order of the Board.

Subdivision 6. Drainage Facility Design Criteria. For trunk sewer construction, the design criteria shall be for a critical precipitation event that has a probable frequency in any one year of 10% (ten year storm). For open channel conveyance and/or detention basin construction, the design criteria shall be for a 24-hour precipitation event that has a probable frequency in any one year of 1% (100 year storm). Variances to this standard may apply in areas where in-place storm sewers are designed for a five year storm frequency.

9. Finances.

Subdivision 1. The WMO funds may be expended by the Board in accordance with this agreement in a manner determined by the Board. The Board shall designate one or more national or state bank or trust companies authorized to receive deposits of public monies to act as depositories for the WMO funds. In no event shall there be a disbursement of WMO funds without the signature of at least two Board members, one of whom shall be the treasurer. The treasurer shall be required to file with the secretary of the Board a bond in the sum of at least \$10,000 or such higher amount as shall be determined by the Board. The WMO shall pay the premium on said bond.

Subdivision 2. General Administration. Each Member agrees to contribute each year to a general fund, said fund to be used for general administration purposes including, but not limited to: salaries, rent, supplies, development of an overall plan, insurance, bonds, and to purchase and maintain devices to measure hydrological and water quality data. Each Member's percentage share of the total annual budget, shall be calculated each year and shall be equal to the average of the following two percentages: (1) the percentage of the preceding year's total assessed valuation of all real property within the watershed which lies within the Members' boundaries; and (2) the percentage of the total area in the watershed which lies within the Member's boundaries. In no event shall the annual administrative budget for the WMO exceed the amount which results when any Member's share of the budget, as determined under this Subdivision, equals one-half

(1/2) mill of the assessed valuation of its territory in the watershed. No Member shall be assessed for any additional annual administrative costs when any Member's share reaches the 1/2 mill limit.

Subdivision 3. Maintenance. The WMO Board shall have the option of funding maintenance work through the general administration budget, or funding as a capital improvement in accordance with Subdivision 5 of this Section. Maintenance costs that are associated with a project in the approved Capital Improvement Program, shall be allocated according to the same formula as is applicable for allocating capital improvement costs as identified in Section 9, Subdivision 6. The cities affected by the improvement shall decide on the level of maintenance to be applied to the improvement. If the cities can not agree, the Board shall make the decision.

Subdivision 4. On or before July 1 of each year, the Board shall adopt a general administrative budget for the ensuing year and decide upon the total amount necessary for the general fund. A majority of eligible votes shall be sufficient to adopt the general administrative budget. The secretary of the Board shall certify the budget on or before July 1 to the clerk of each Member, together with a statement of the proportion of the budget to be provided by each Member. The council of each Member agrees it will review the budget, and the Board shall upon notice from any Member received prior to August 1, hear objections to the budget, and may, upon notice to all Members and after a hearing, modify or amend the budget, and then give notice to the Members of any and all modifications or amendments. Each Member agrees to provide the funds required by the budget by January 15 of each year, and said determination shall be conclusive.

Subdivision 5. Capital Improvement.

(a) All capital improvements ordered by the Board must be included in the WMO's adopted capital improvement program. An improvement fund shall be established for each improvement project ordered by the WMO. Each Member shall pay its proportionate share of the engineering, legal and administrative costs as

determined by the amount to be assessed against each Member as a cost of the improvement. The Board, or the Members awarding the contract, shall submit in writing a statement to each Member, setting forth in detail the expenses incurred by the WMO for each project.

Each Member further shall pay its proportionate share of the cost of the improvement in accordance with the determination of the Board under Section 9, Subdivision 6. The Board or the Member awarding the contract shall submit in writing copies of the engineer's certificate authorizing payment during construction and the Member being billed shall pay its proportionate share of the costs within 30 days after receipt of the statement. The Board or the Member awarding the contract shall advise other contributing Members of the tentative time schedule of the work and the estimated times when the contributions shall be necessary.

(b) Notwithstanding the provisions of paragraph (a) of this subdivision, the WMO may fund all or any part of the cost of a capital improvement contained in the capital improvement program of the plan in accordance with Minn. Stat. 473.883. The WMO and Dakota and/or Ramsey County may establish a maintenance fund to be used for normal and routine maintenance of an improvement constructed in whole or in part with money provided by Dakota and/or Ramsey County pursuant to Minn. Stat. 473.883. The levy and collection of an ad valorem tax levy for maintenance shall be by Dakota and/or Ramsey County based upon a tax levy resolution adopted by the WMO and remitted to the county(ies) on or before October 1st of each year. If it is determined to levy for maintenance, the WMO shall be required to follow the hearing process established by Minn. Stat. 112.611. Mailed notice shall also be sent to the clerk of each Member municipality at least 30 days prior to the hearing.

Subdivision 6. Capital Cost Allocation of Improvements in the Board's Watershed Management Plan. All capital improvement costs of improvements designated in the Board's adopted watershed management plan for construction by the Board which the Board determines includes more than one Member shall be apportioned to Members on the following basis:

(a) A Member shall be responsible for the costs of construction of that portion of a drainage system that is located within its borders and that is necessary to accommodate its allowable flow and the allowable flow of all other tributary Members.

(b) A Member shall also be responsible for the proportionate share of construction costs of a drainage system, whether or not that system is located within its borders, that is necessary to convey excessive flows originating within the borders of said Member.

(c) Increased costs of construction incurred for acquisition of lands, easements and rights of way within natural watercourses shall be the obligation of the Member in which the easement lies and shall not be apportioned to other Members to the extent that such costs exceed costs which would have been incurred if there had been no improvement on such lands, easements or rights of way.

(d) Costs of construction shall include all costs associated with a WMO approved improvement (whether trunk sewer or natural conveyance and) whether or not actually constructed, including but not limited to, project costs for design, administration, construction supervision, legal fees, acquisition of lands and improvements and actual construction and maintenance costs.

(e) The Watershed Management Organization shall consider any grant money received or to be received by a Member city for sanitary/storm sewer separation or for the construction, reconstruction or replacement of storm sewer facilities before making cost allocations among Member cities and may consider the application of any grant proceeds toward the cost of the project before allocating costs between or among the cities involved, provided that such allocation would not violate the terms and conditions of the grant.

(f) The attached Exhibit A is incorporated by reference and serves as a compilation of general examples of cost allocation under this agreement for the hypothetical circumstances stated in the examples.

10. **Special Assessments.** The WMO shall not have the power to levy special assessments. All such assessments shall be levied by the Member wherein the land is located.

11. Duration.

Subdivision 1. Each Member agrees to be bound by the terms of this agreement until January 1, 2000, and it may be continued thereafter upon the agreement of all the parties.

Subdivision 2. Any Member may petition the Board to dissolve the agreement. Upon 30 days' notice in writing to the clerk of each Member governmental unit, the Board shall hold a hearing and upon a favorable vote by 10/13 of all eligible votes of then existing Board members, the Board may by resolution recommend that the WMO be dissolved. The resolution shall be submitted to each Member governmental unit and if ratified by 3/4 of the governing bodies of all eligible Members within 60 days, the Board shall file petition allowing for the creation of a watershed district under Minn. Stat., Chapter 112.

12. Dissolution. Upon dissolution of the WMO, all property of the WMO shall be transferred to the Chapter 112 Watershed District.

13. Effective Date. This agreement shall be in full force and effect when all 7 potential Members, delineated in paragraph four of this agreement, file a certified copy of a resolution approving this agreement and upon the execution of this agreement by all the parties. All Members need not sign the same copy. The resolution and signed agreement shall be filed with the city clerk of the City of West St. Paul, who shall notify all Members in writing of its effective date and set a date for the Board's first meeting. The first meeting shall take place at the West St. Paul City Hall within 60 days after the effective date.

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this agreement to be executed in accordance with the authority of Minn. Stat. 471.59.

Approved by the City Council

October 14, 1985.
(Date)

CITY OF INVER GROVE HEIGHTS

By William J. Sand, Mayor
Attest Loretta Givney, Deputy Clerk

Approved by the City Council

_____, 1985.
(Date)

CITY OF LILYDALE

By _____

Attest _____

Approved by the City Council

October 1, 1985.
(Date)

CITY OF MENDOTA HEIGHTS

By Robert L. Lockwood

Attest Mary Ann DeLaRosa
Deputy Clerk

Approved by the City Council

_____, 1985.
(Date)

CITY OF ST. PAUL

By _____
(Mayor)

Form Approved:

(Assistant County Attorney)

By _____
(Director Finance & Mgmt. Services)

Approved by the City Council

Oct. 7, 1985.
(Date)

CITY OF SOUTH ST. PAUL

By Gene W. Benner

Attest CPM D. Smith

Approved by the City Council

October 21, 1985.
(Date)

CITY OF SUNFISH LAKE

By James W. Baird

Attest Mary L. Thompson

Approved by the City Council

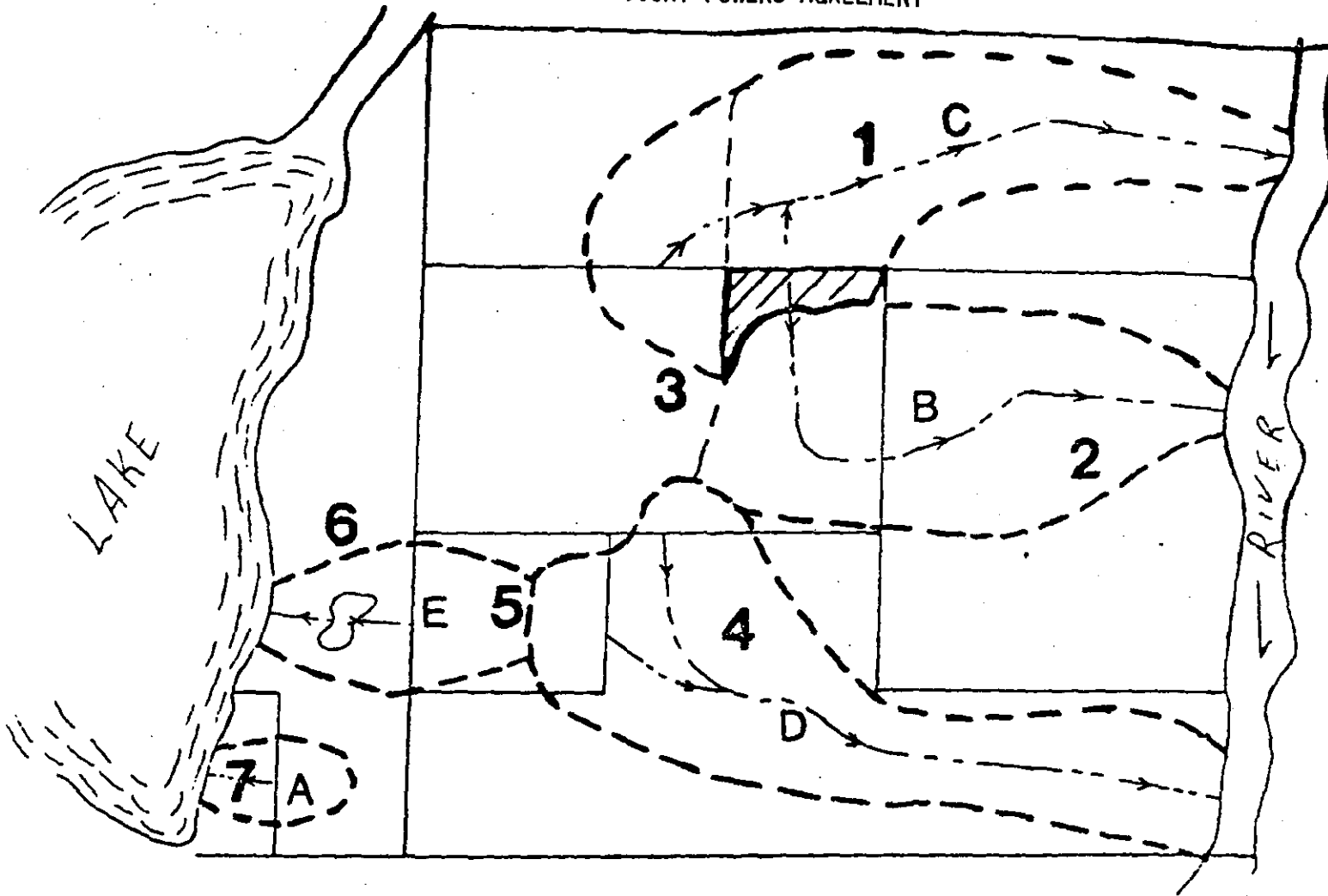
October 7, 1985.
(Date)

CITY OF WEST ST. PAUL



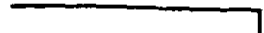
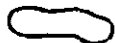

By Kenneth H. Kube
Kenneth H. Kube, Mayor

Attest Patricia J. Morrison
Patricia J. Morrison, City Clerk

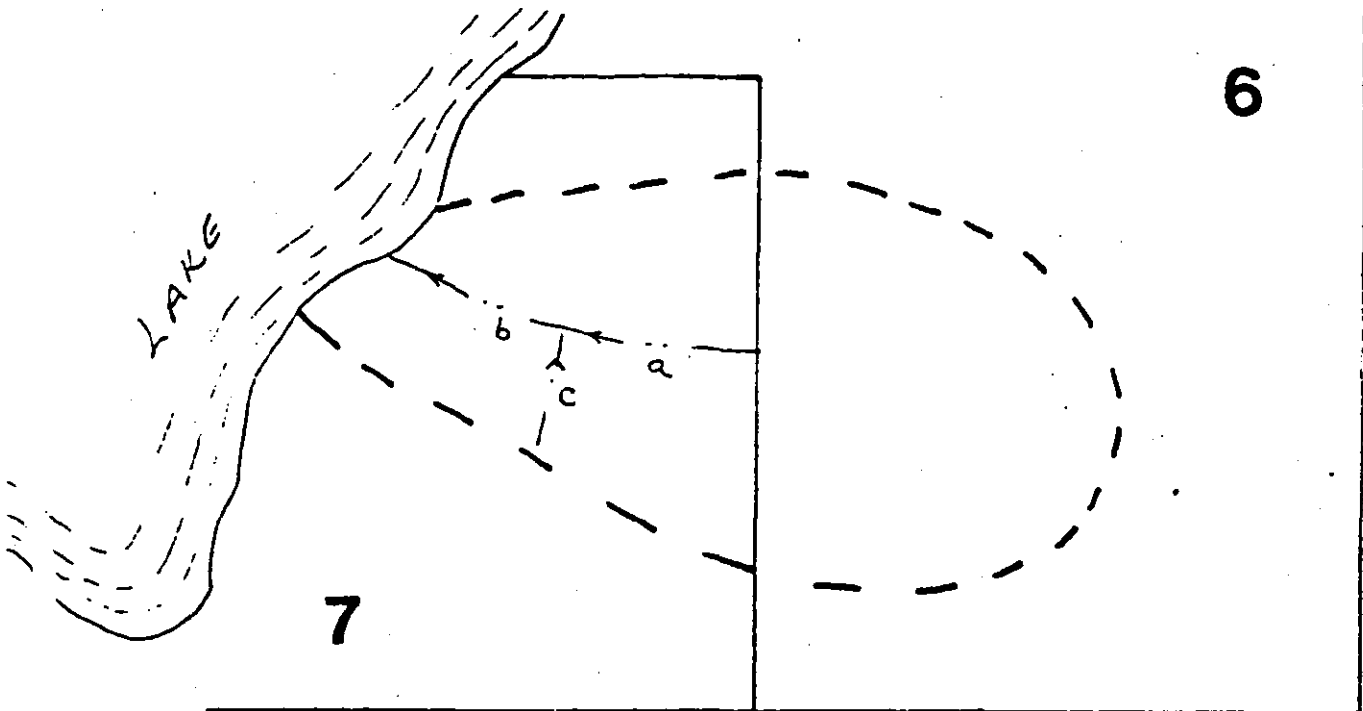
COST ALLOCATION
EXAMPLES FOR JOINT POWERS AGREEMENT



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

<u>LEGEND</u>	
	Watershed Boundary
	Drainage Facility
	City Boundary
	Detention Pond
	Diverted Area

JOINT POWERS AGREEMENT



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 = $\frac{Q_{E6}}{Q_T}$ x Total project cost for "a".

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

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;

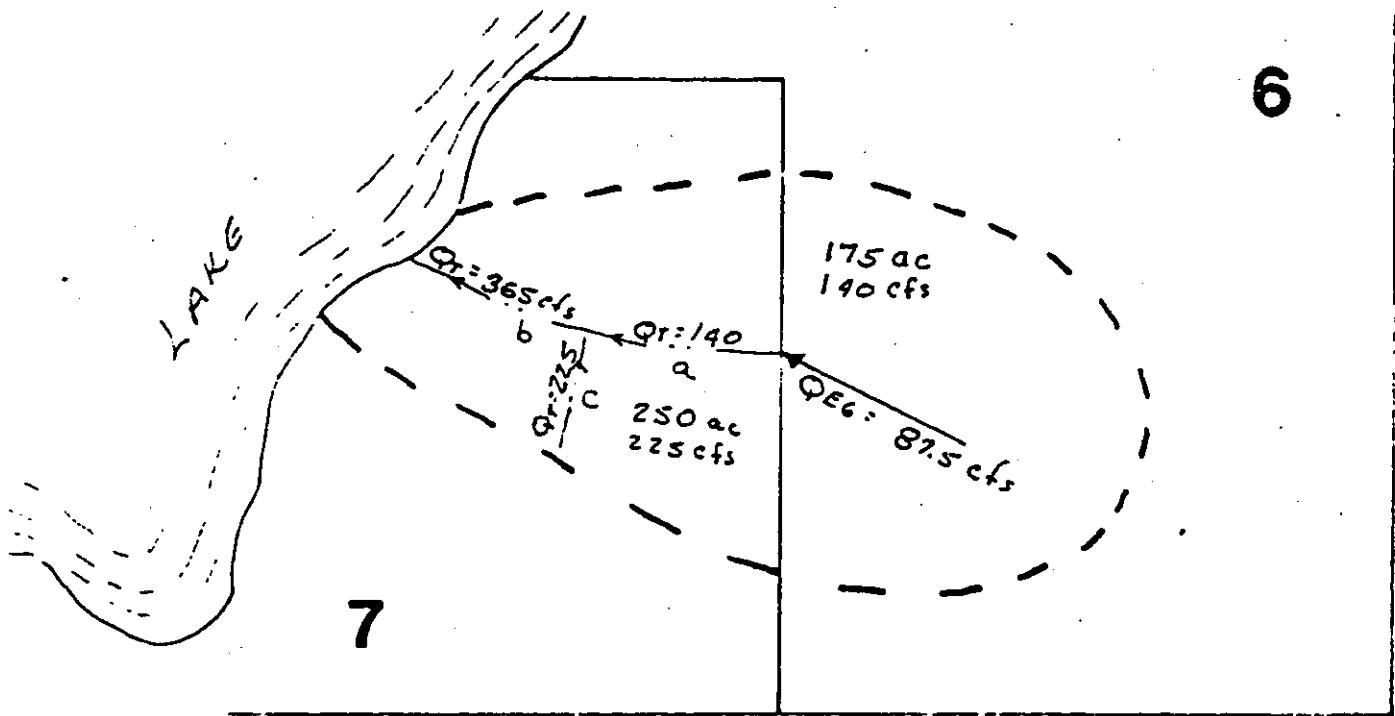
Q_{A6} is the allowable flow rate from City #6;

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).

JOINT POWERS AGREEMENT



EXAMPLE "A" - TWO CITIES

Sample Calculations

Assume:

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

Then:

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

.) 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 = $.50 \times 1.8 \times 250 = 225$ cfs
 Design flow for Segment "b" = $Q_{T(SEG. "a")} + Q_{T7} = 140 + 225 = 365$ cfs

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

(continued)

Then:

.) 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".

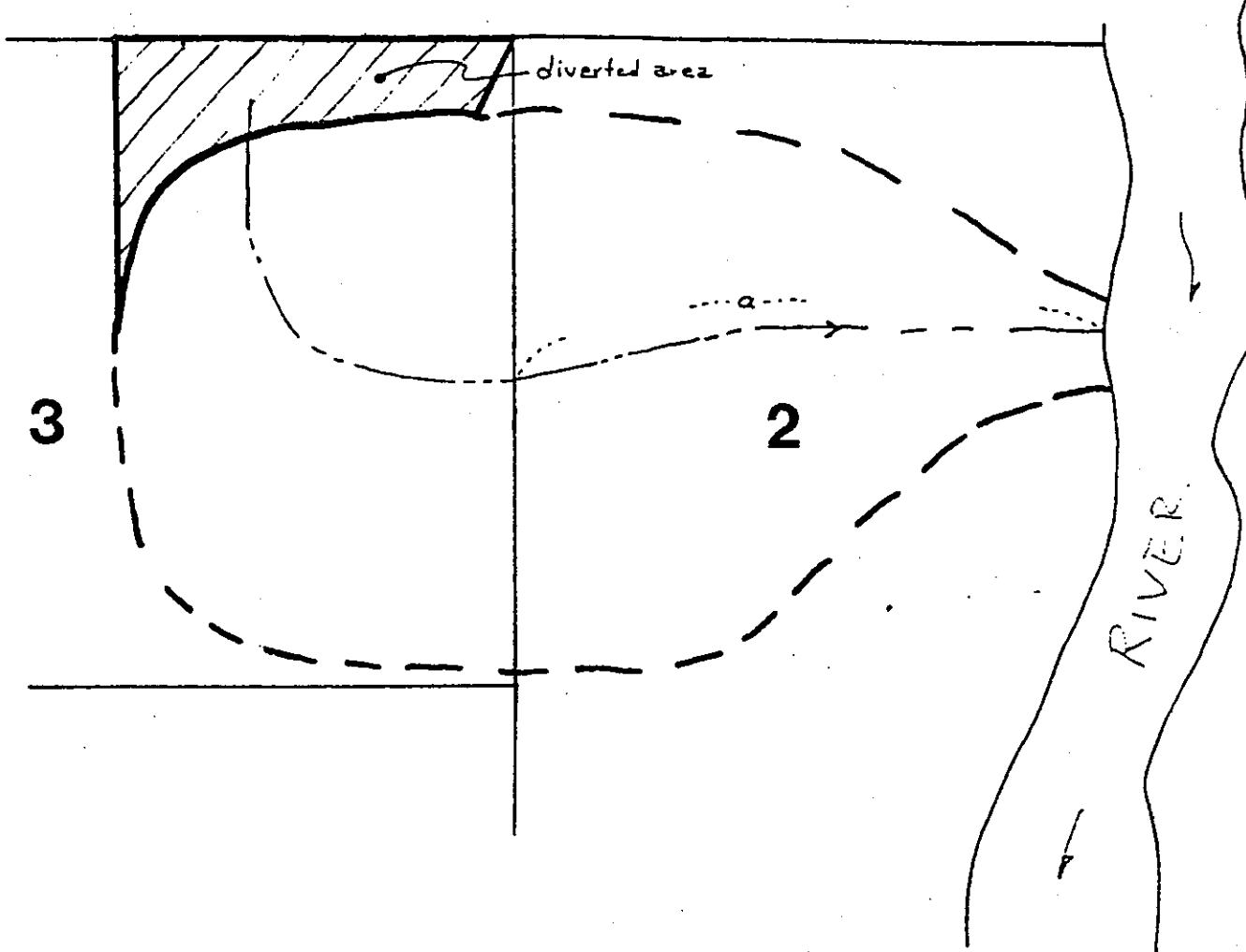
City #7: Cost share = $\frac{277.5}{365}$ x Project cost for "b".

Segment "c":

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

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

JOINT POWERS AGREEMENT



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 = $\frac{Q_{E3}}{Q_T}$ x Total project cost.

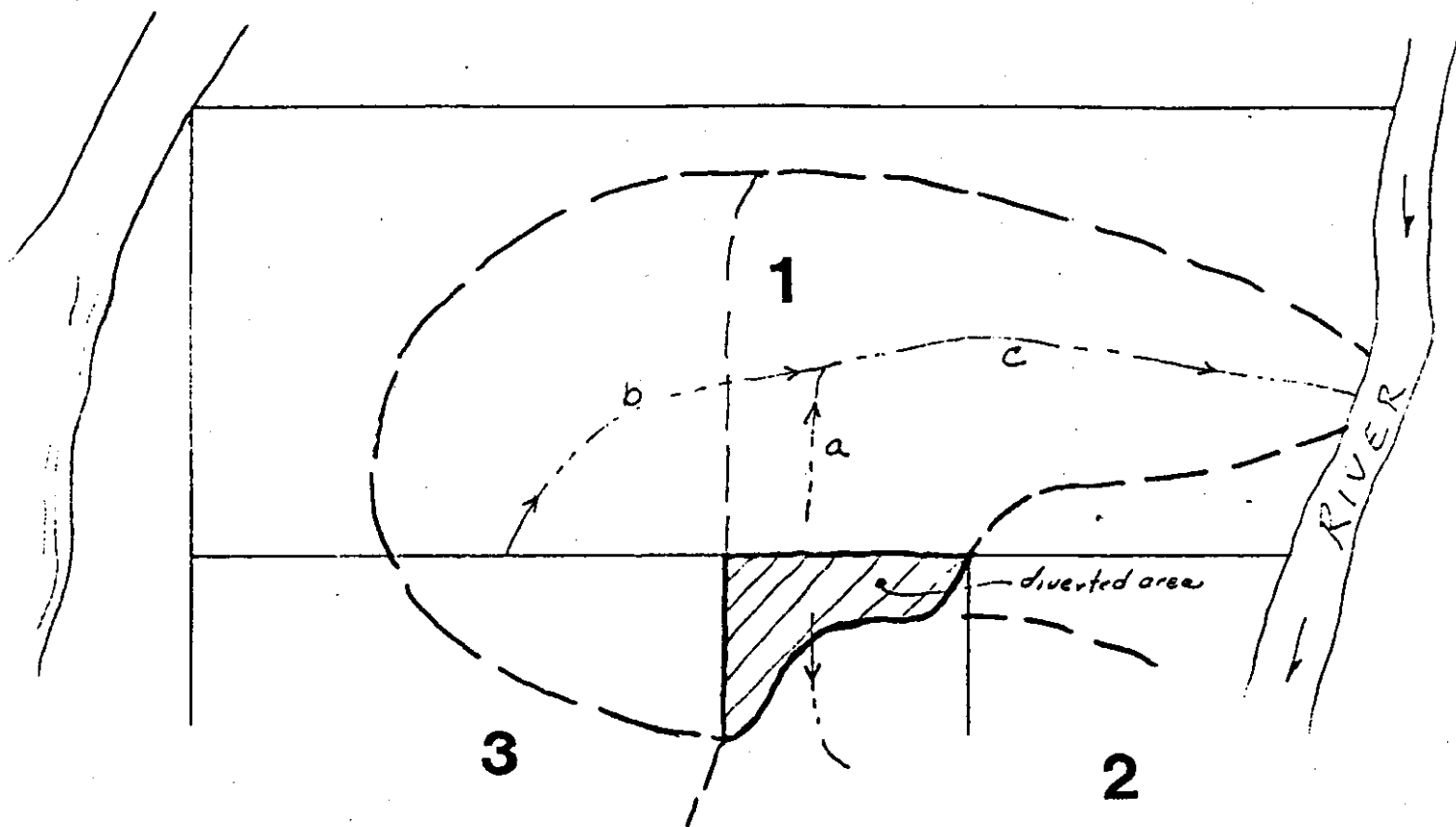
Where: $Q_{E3} = Q_{T3} - Q_{A3}$

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.

JOINT POWERS AGREEMENT



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" = $\frac{Q_{E3}}{Q_T}$ x Total project cost for "b".

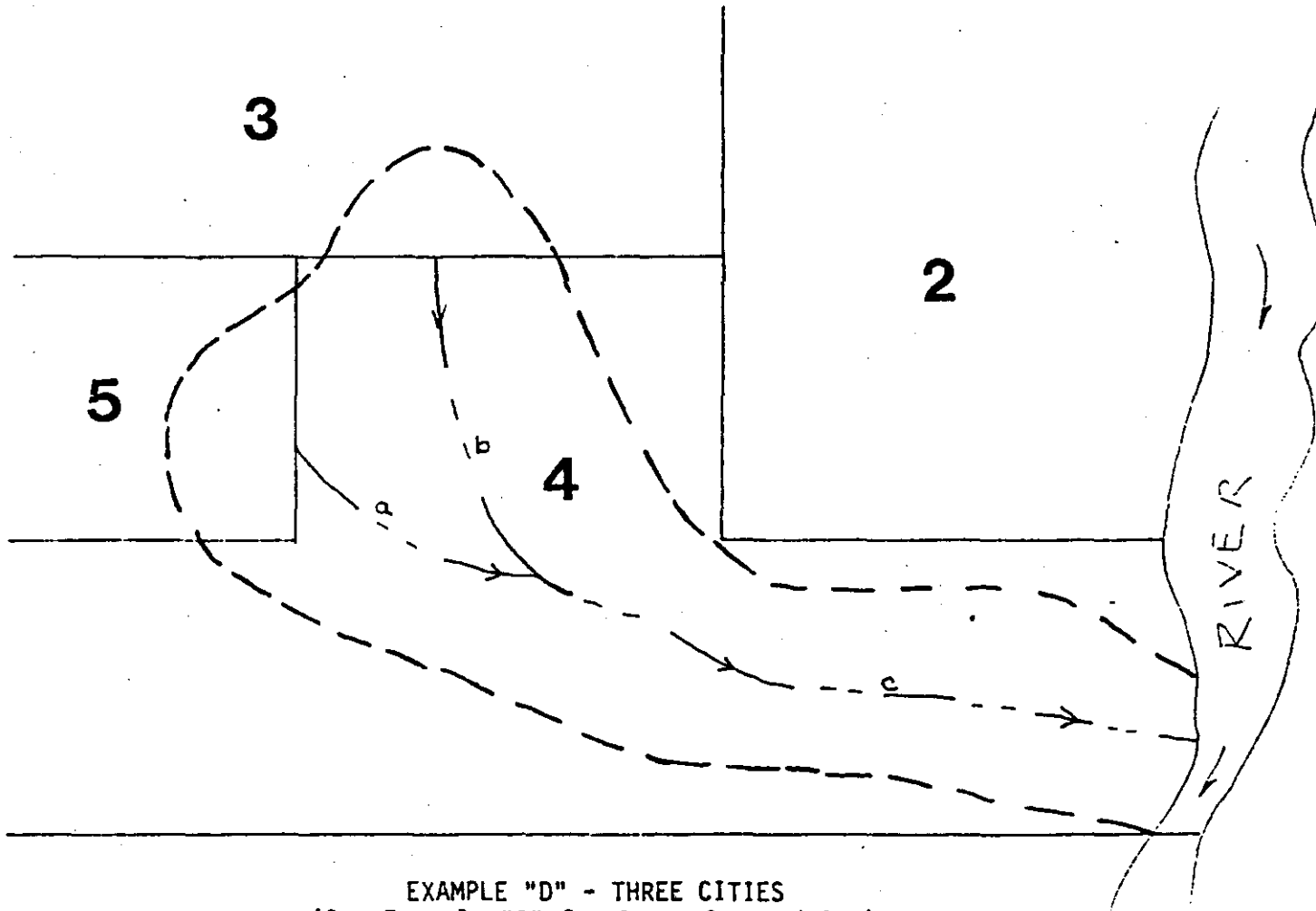
Where: Q_{E3} is the excess flow from City #3 that is tributary to Segment "b" only.

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

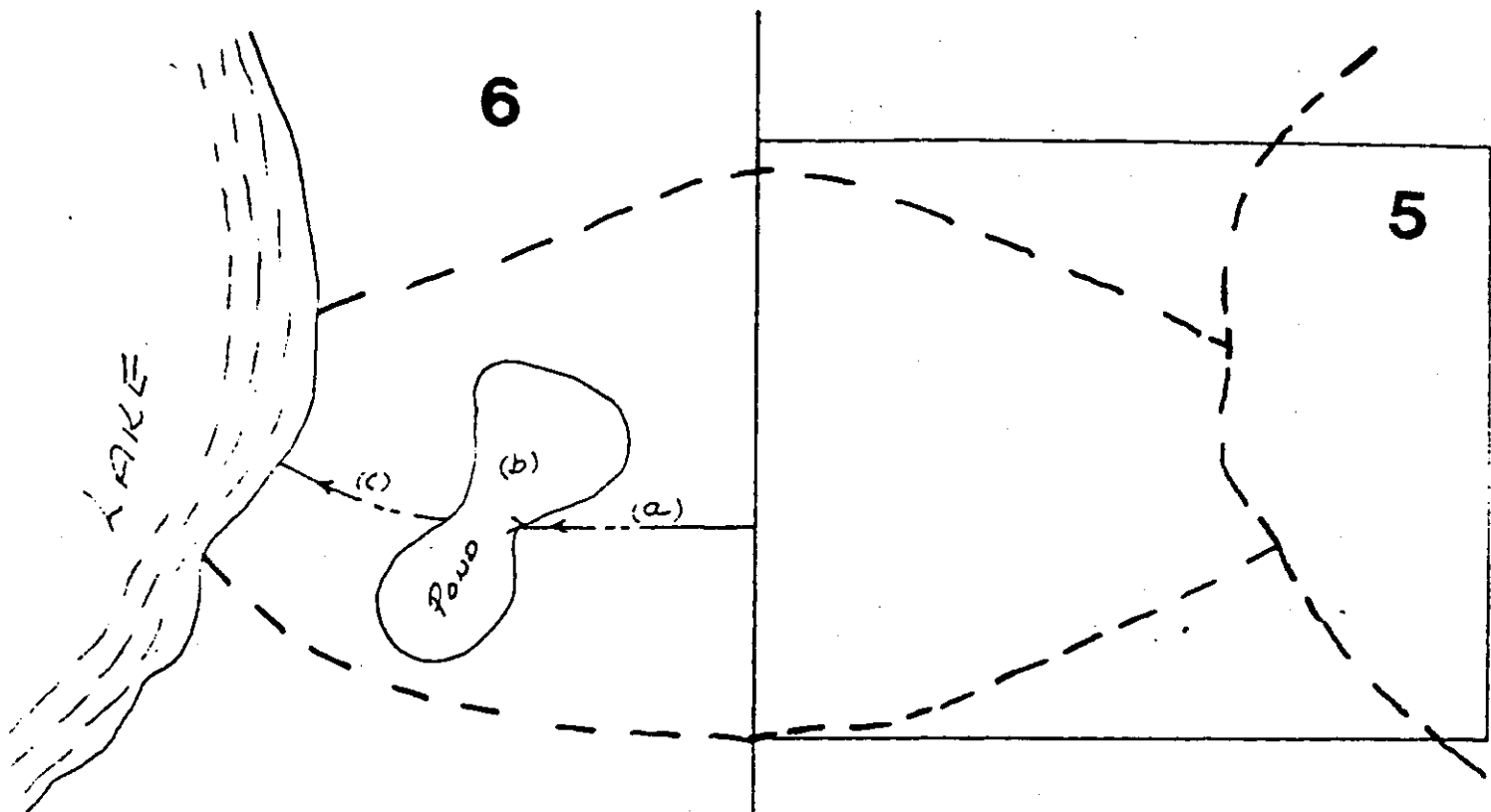
Cost share Segment "c" = $\frac{Q_{E3}}{Q_T}$ x Project cost for "c".

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.

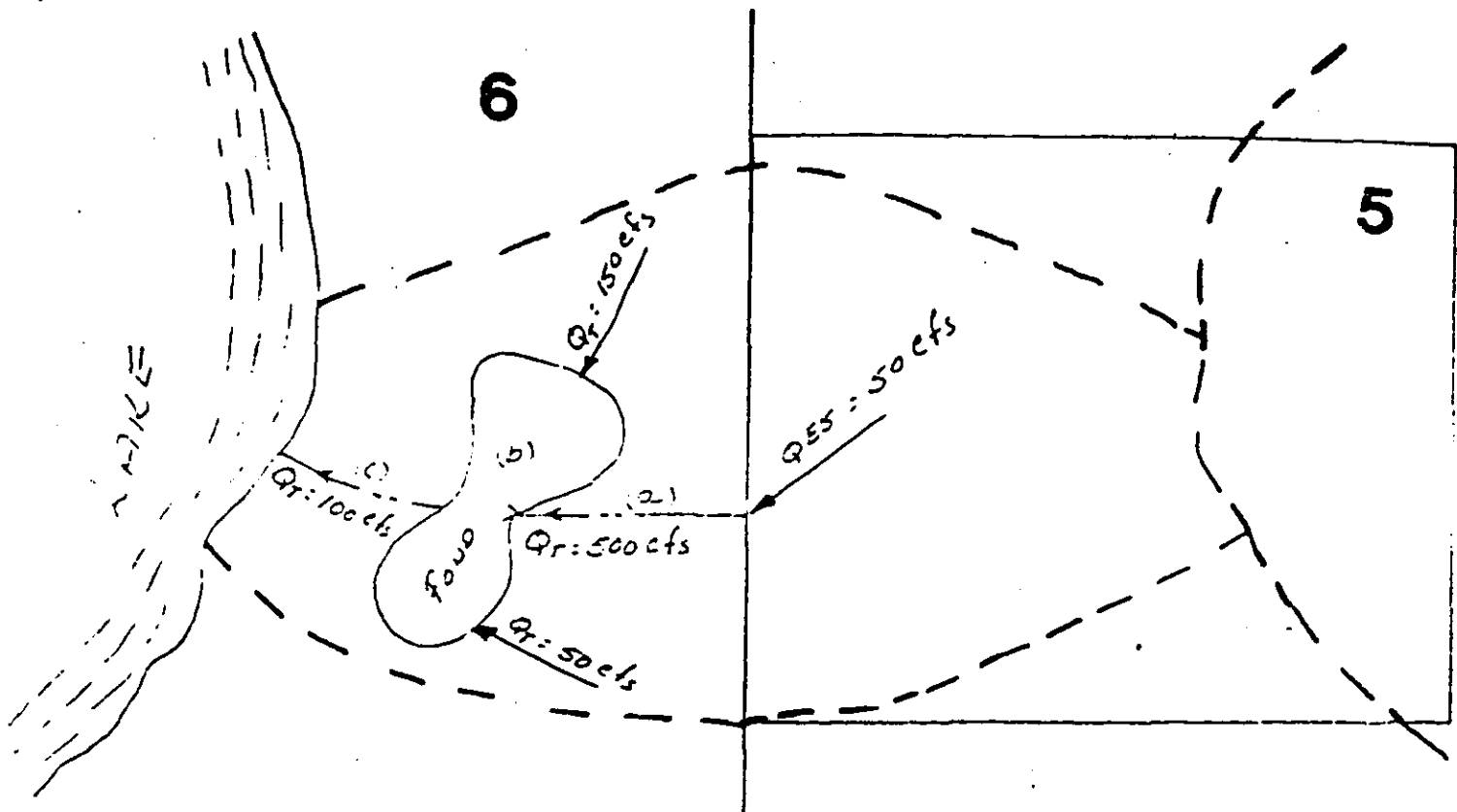
City #5 (Outlet "c"): Cost share = $\frac{Q_{E5}}{Q_T}$ x Project cost of Outlet "c".

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 calculation.



EXAMPLE "E" - ADDED PONDING

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

Assume:

- $Q_{E5} = 50 \text{ cfs}$
- $Q_T \text{ Pond inflow in Segment "a"} = 500 \text{ cfs}$
- $Q_T \text{ Pond inflow from other areas} = 200 \text{ cfs}$
- $\Sigma Q_T \text{ Pond inflow} = 700 \text{ cfs}$
- $Q_T \text{ Pond Outlet "c"} = 100 \text{ cfs}$

And:

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

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

Then:

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

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

**AMENDMENT TO JOINT POWERS AGREEMENT
ESTABLISHING A WATERSHED MANAGEMENT ORGANIZATION
FOR THE LOWER MISSISSIPPI RIVER WATERSHED**

THE PARTIES TO THIS AGREEMENT are members of the Lower Mississippi River Watershed Management Organization. This amendment is made pursuant to the authority conferred upon the parties by Minn. Stat. Sections 471.59 and 473.875, et seq.

1. **EXISTING AGREEMENT.** The existing Joint Powers Agreement for the Lower Mississippi River Water Management Organization is incorporated herein and shall remain in full force and effect, except as specifically amended by this Agreement.

2. **PARAGRAPH 11, SUBDIVISION 1** of the Joint Powers Agreement is amended to provide:

Each member agrees to be bound by the terms of this Agreement until January 1, 2002, and it may be continued thereafter upon the agreement of all the parties.

3. **EFFECTIVE DATE.** This agreement shall be in full force and effect when all existing members approve and sign this Agreement. All members need not sign the same copy.

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat 471.59.

CITY OF SOUTH ST. PAUL

By: _____

Dated: _____

Attest: _____

CITY OF INVER GROVE HEIGHTS

By: _____

Dated: _____

Attest: _____

**AMENDMENT TO JOINT POWERS AGREEMENT
ESTABLISHING A WATERSHED MANAGEMENT ORGANIZATION
FOR THE LOWER MISSISSIPPI RIVER WATERSHED**

Page two

CITY OF WEST ST. PAUL

By: _____

Dated: _____

Attest: _____

CITY OF SUNFISH LAKE

By: _____

Dated: _____

Attest: _____

CITY OF MENDOTA HEIGHTS

By: _____

Dated: _____

Attest: _____

CITY OF LILYDALE

By: _____

Dated: _____

Attest: _____

CITY OF ST. PAUL

By: _____

Dated: _____

Attest: _____

MEMORANDUM

TO: Lower Mississippi River Watershed Management Organization
FROM: James R. Langseth
DATE: June 12, 1992
RE: Allowable Flow, Summary of Understanding Based on the
Discussions at the Meetings Held December 13, 1991 and May 15, 1992

These meetings addressed four topics.

1. Allowable flow for conveyance systems designed for 100-year frequency storms.
2. Allowable volume.
3. Cost apportionment downstream of ponds (detention basins).
4. Cost allocation principles for diversions where more than one city contributes flow.

These interpretations use the definitions for watershed, land use, and drainage system set forth in the March 9, 1988 Allowable Flow memorandum. The current memorandum provides an interpretation of the allowable flow for cases where the design is not based on a 10-year storm, as well as amplifying the principles to be used for diversion of drainage.

1. Allowable Flow for 100-Year Frequency Storm Design Conveyance Systems

The Joint Powers Agreement, Section 3, Subd. 3, states that the allowable flow is a rate and volume of flow according to the design criteria in Section 8, Subd. 6. Section 8, Subd. 6 provides that detention basins and open channel conveyance systems be designed for a 100-year return frequency storm.

Consistent with these provisions, for drainage systems for which the design criteria are 100-year return frequency precipitation events, the allowable flow shall be computed as a 100-year rate and volume flow.

The allowable rate of flow shall be computed by $Q = CIA$

where:

Q is the allowable flow rate in cubic feet per second.

C is the runoff coefficient, defined to be 0.15.

I is the 100-year return frequency rainfall intensity appropriate to the watershed time of concentrations, in inches per hour.

A is the watershed area in acres.

Excess flow is the 100-year design flow less the 100-year allowable flow.

This approach shall be applied for conveyance systems where the design is governed by 100-year return frequency events. This includes detention basin outlets, conveyance systems downstream of detention basins, open channels, and other conveyance that is designed for 100-year return frequency events. Similar logic would apply to any system for which the design criteria was neither 10-year or 100-year. See Example F for an illustration of a 100-year excess flow calculation.

2. Allowable Volume

The allowable volume is the total runoff volume from the design storm, for a watershed with the land use defined in the March 9, 1988 memorandum. Where the ponding in the upstream community is negligible, the allowable volume may be estimated as being in the same proportion to the design volume as the allowable flow is to the design flow.

In general, the allowable volume may be computed with the same techniques used to determine the design volume, provided the technique also accurately calculates the allowable discharge rate.

The excess volume is the difference between design and allowable volume.

Where there is upstream ponding, the volume of those ponds is deducted from the excess volume to the extent the upstream detention reduces the volume needed in downstream ponds. Thus, only the storage in upstream detention basins at the time of peak of the downstream detention basin may be used to reduce the excess volume from the upstream community. For instance, assume the peak elevation at a downstream community pond occurs at 6 hours. Assume the upstream community pond stores 10 acre-feet at its peak at 3 hours, but only 5 acre-feet at 6 hours. The "excess volume" from the upstream community would be reduced by 5 acre-feet to account for the storage. See Example G for an illustration of this case.

3. Cost Apportionment Downstream of Ponds

In the Joint Power Agreement, Exhibit A, page 9 of 9, the formula for adjustment of excess flow as a result of ponding is presented:

$$Q_{\text{excess}}(\text{outlet})^{\text{adj}} = Q_{\text{excess}}(\text{inlet}) \times \frac{Q_{\text{total}}(\text{outlet})}{\Sigma Q_{\text{total}}(\text{inlet})}$$

The proportioning $Q_{\text{total}}(\text{outlet})/\Sigma Q_{\text{total}}(\text{inlet})$ shall be computed on the same return frequency event used for the pond design. If the pond is designed for a 100-year event, the adjustment in excess flow through the pond shall be based on the 100-year outflow and inflow values. Thus, if a 10-year design governs cost sharing for construction downstream of a pond, the 10-year excess flow would be reduced as follows:

$$Q_{\text{excess}} \text{ 10-year (outlet)} = Q_{\text{excess}} \text{ 10-year (inlet)} \times \frac{Q_{\text{total}} \text{ 100-year (outlet)}}{\sum Q_{\text{total}} \text{ 100-year (inlet)}}$$

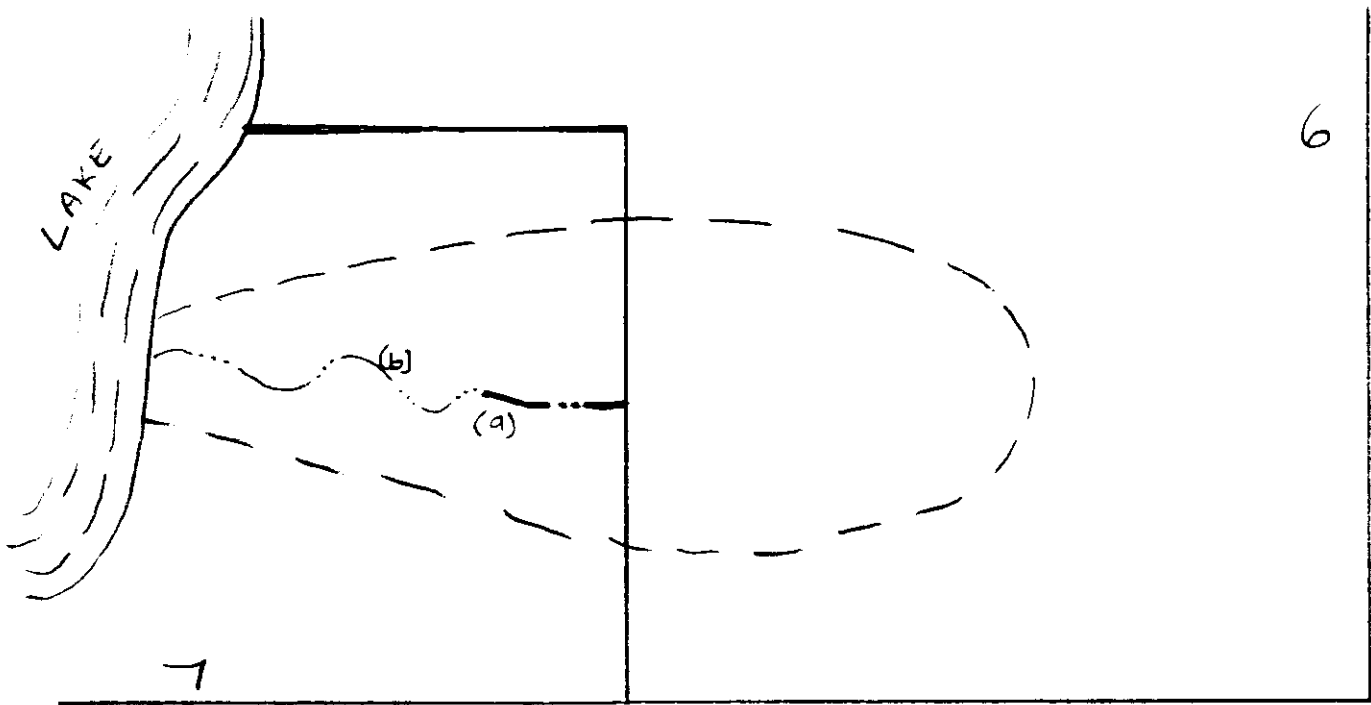
See Example H for an illustration of this case.

4. Cost Allocation Principles for Diversion Where More Than One City Contributes Flow

For diversion of water out of its current watershed, into a watershed to which it did not previously flow, there is no allowable flow associated with the diverted water. Consequently, the excess flow from the diverted area equals the design flow. If more than one city contributes water to the diversion, the excess flow from each community is their portion of the design flow from the diverted area. Thus, the cost allocation proportion for each city is their proportion of the design flow.

The "diversion in" is associated with an equal area of "diversion out" of another watershed. The cities retain their allowable flow in the watershed from which the area was "diverted out." This is illustrated for "diversion out" by one city on Page 6 of 9 of Exhibit A to the Joint Powers Agreement.

This principal was applied to the Lexington Avenue drainage case with Lilydale and Mendota Heights. The situation is illustrated conceptually in Example I.



Example F - Other than 10-year Design

Project: Construct storm sewer "a" and open channel "b" in City #7 to provide drainage for Cities #6 and #7 under fully developed conditions.

Cost Allocation:

City #6 Cost Share: $\frac{Q_{E6-10}}{Q_{D-10}} \times \text{Total Project Cost for "a"}$

$\frac{Q_{E6-100}}{Q_{D-100}} \times \text{Total Project Cost for "b"}$

$Q_{E6-10} = 10 \text{ year excess flow from City \#6} = Q_{D6-10} - Q_{A6-10}$

$Q_{D6-10} = 10 \text{ year design flow from City \#6}$

$Q_{A6-10} = 10 \text{ year allowable flow from City \#6}$

$Q_{D-10} = 10 \text{ year design flow for storm sewer "a"}$

$Q_{E6-100} = 100 \text{ year excess flow from City \#6} = Q_{D6-100} - Q_{A6-100}$

$Q_{D6-100} = 100 \text{ year design flow from City \#6}$

$Q_{A6-100} = 100 \text{ year allowable flow from City \#6}$

$Q_{D-100} = 100 \text{ year design flow for open channel "b"}$

Example F - Continued

City # 7 Cost Share: Total Project Cost - (City # 6 Cost Share)

Sample Calculations

City # 6 - Watershed area = 100 acres

$$Q_{D6-10} = .40 \times 2''/\text{hr} \times 100 = 80 \text{ cfs}$$

$$Q_{A6-10} = .15 \times 2''/\text{hr} \times 100 = 30 \text{ cfs}$$

$$Q_{E6-10} = 80 - 30 = 50 \text{ cfs}$$

1. City # 6 cost share for storm sewer "a" = $\frac{50 \text{ cfs}}{80 \text{ cfs}} \times \text{"a" Project Cost} =$
 $= 0.625 \times \text{"a" Project Cost}$

2. City # 6 cost share for open channel "b" :

$$Q_{D6-100} = .40 \times 4''/\text{hr} \times 100 = 160 \text{ cfs}$$

$$Q_{A6-100} = .15 \times 4''/\text{hr} \times 100 = 60 \text{ cfs}$$

$$Q_{E6-100} = 160 - 60 = 100 \text{ cfs}$$

Assume $Q_{D,100}$ for channel "b" = 200 cfs

$$\text{City \#6 cost share} = \frac{100 \text{ cfs}}{200 \text{ cfs}} \times \text{"b" Project Cost}$$
$$= 0.5 \times \text{"b" Project Cost}$$

Summary of Costs:

Segment "a"
(10 year design)

City # 6 Cost Share = 0.625 x Project Cost for "a"

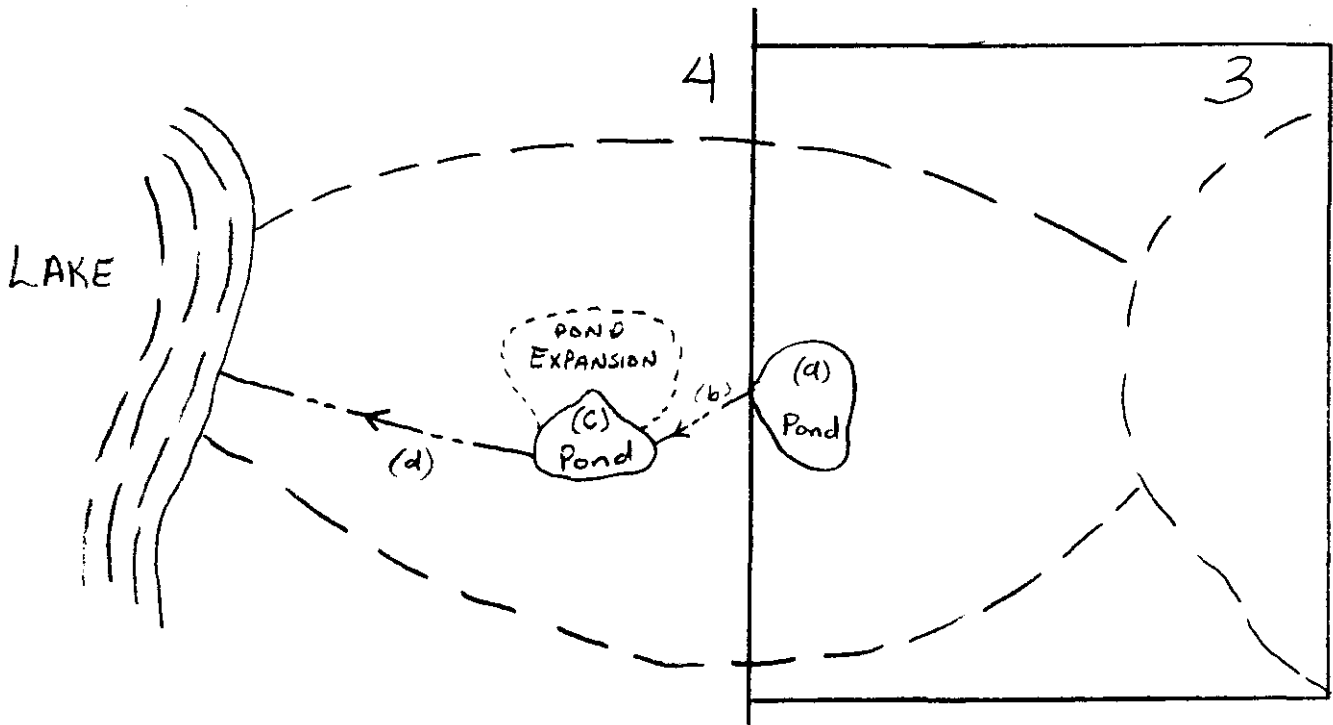
City # 7 Cost Share = 0.375 x Project Cost for "a"

Segment "b"
(100 year design)

City # 6 Cost Share = 0.5 x Project Cost for "b"

City # 7 Cost Share = 0.5 x Project Cost for "b"

EXAMPLE G



EXAMPLE G : ALLOWABLE VOLUME

Pond "c" is to be expanded from a 10 acre-foot (AF) storage capacity to a 50 AF storage capacity detention basin. The critical design storm for Pond "c" will be the 6-hour 100 year return frequency rainfall.

Background & Assumptions:

$$Q_{D_b-100} = \text{Design flow (100 year) in segment b} = 50 \text{ cfs}$$

$$Q_{A_3-100} = \text{Allowable flow (100 year) from City \# 3} = 60 \text{ cfs}$$

i.e. $.15 \times 4 \text{ in/hr} \times 100 \text{ acres} = 60 \text{ cfs}$

$$Q_{E_3-100} = \text{Excess flow (100 year) from City \# 3}$$

$$= Q_{D_b-100} - Q_{A_3-100} = 50 - 60 = -10 \text{ cfs}$$

Therefore there is no excess flow from City # 3, and City # 3 does not participate financially in conveyance system improvements or conveyance system maintenance in the downstream community, City # 4.

City # 3 may nevertheless be obligated to share in

EXAMPLE "G" continued

the Pond expansion costs and maintenance costs of the pond expansion (not of the whole pond).

Excess Volume Calculation

$$V_{E3} = V_{D3} - V_{A3} - V_{P3}$$

V_{E3} = Excess volume, from City #3, for the Pond "c" critical design storm (i.e. 100year-6 hour storm)

V_{D3} = Design volume of runoff from City #3 for the Pond "c" critical design storm.

V_{A3} = Allowable volume of runoff from City #3 for the Pond "c" critical design storm.

V_{P3} = Volume of runoff stored in ponds in City #3 at the time of the peak volume stored in Pond "c" for the Pond "c" critical design storm.

Assume:

$$V_{D3} = 75 \text{ AF}$$

$$V_{A3} = 35 \text{ AF}$$

$V_{P3} = 10 \text{ AF}$. Say Pond "a" was designed to store 30 AF for its critical storm - a 1-hour 100 year storm. But, say the time of peak at Pond "c" is 6 hours later, so only 10 AF remains stored in Pond "a" at the time of peak in Pond "c".

$$V_{E3} = 75 \text{ AF} - 35 \text{ AF} - 10 \text{ AF} = 30 \text{ AF}$$

Thus, although there is no excess flow (flowrate) from City #3, there is excess volume from City #3.

The allowable volume should be calculated using the same methodology as used to calculate the design volume, but the land use should be converted to 100% turf or pasture in good condition.

Example "C" continued

COST ALLOCATION

Cost share for Pond "c" expansion:

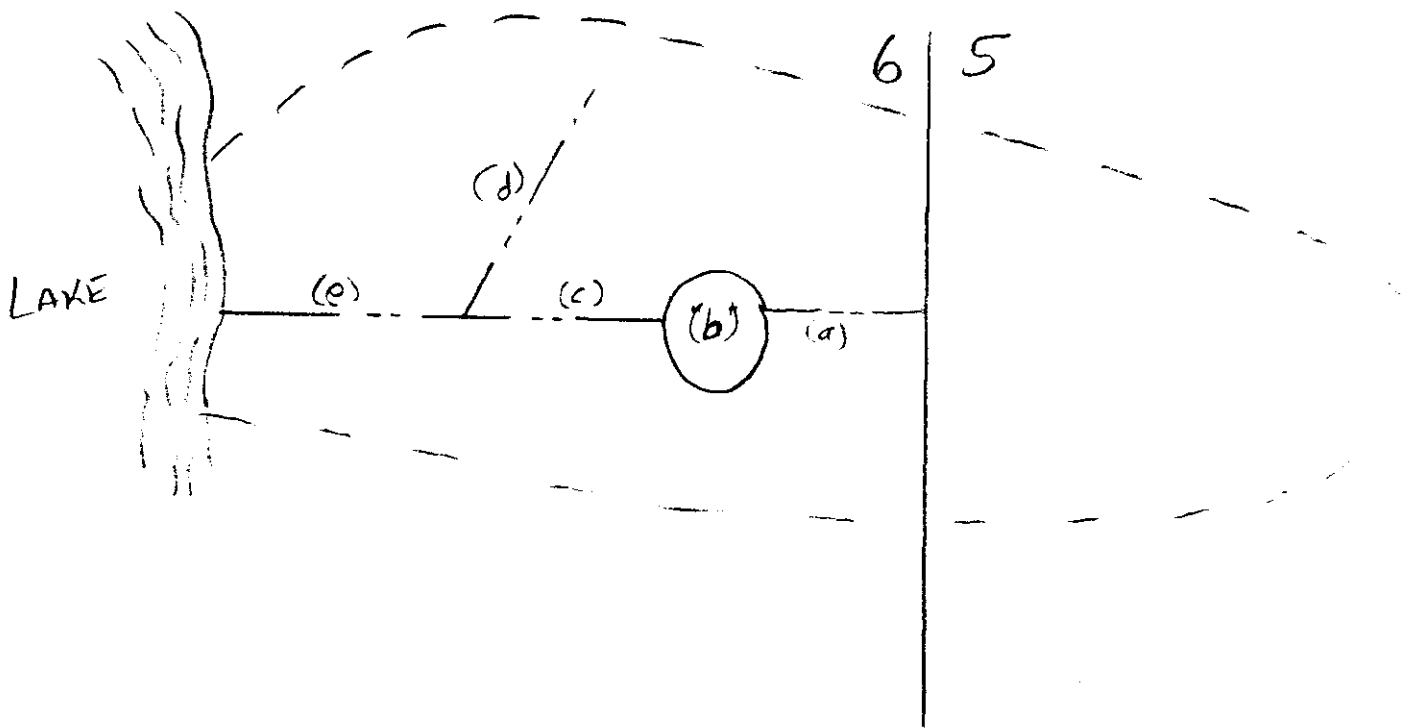
$$\text{City \#3 cost share: } \frac{V_{E3}}{V_T} \times \text{Project Cost for Pond "c" expansion}$$

where V_T = the design increase in storage volume of Pond "c" for the critical storm. Note - this does not include the former design volume of the pond. The former design volume of the pond (before expansion) should be computed as the volume of detention storage below the 'design level' for the former pond, for the Pond "c" expansion design storm at the time of peak for the Pond "c" expansion.

For instance, say former Pond "c" was designed for a 25-year storm, and held 10 AF. But in the 6-hour-100-year design storm, the pond would overtop, cause flooding, and the storage at the pond and surrounding area would be 15 AF.

Only the 10 AF design volume is counted as the "former design volume" for V_T .

Note that for maintenance costs, the City #3 share applies only to the pond expansion, not to maintenance of the whole pond.



EXAMPLE H

Refer to Example E of the Joint Powers Agreement

Assume

Pond "b" reduces outflow to 10% of inflow.

$$\text{i.e. } \frac{Q_T(\text{outlet})_{100\text{year}}}{\Sigma Q_T(\text{inlet})_{100\text{year}}} = 0.1$$

$$Q_{E_5-100} = 100\text{-year excess flow from City \#5} = 100 \text{ cfs}$$

$$Q_{E_5-10} = 10\text{-year excess flow from City \#5} = 70 \text{ cfs}$$

Then, for segments "c" and "e":

$$c: 100 \text{ year design} : Q_{E_5-100} = 100 \times 0.1 = 10 \text{ cfs}$$

$$e: 10 \text{ year design} : Q_{E_5-10} = 70 \times 0.1 = 7 \text{ cfs}$$

Assume

$$Q_{D,100} \text{ for segment c} = 50 \text{ cfs}$$

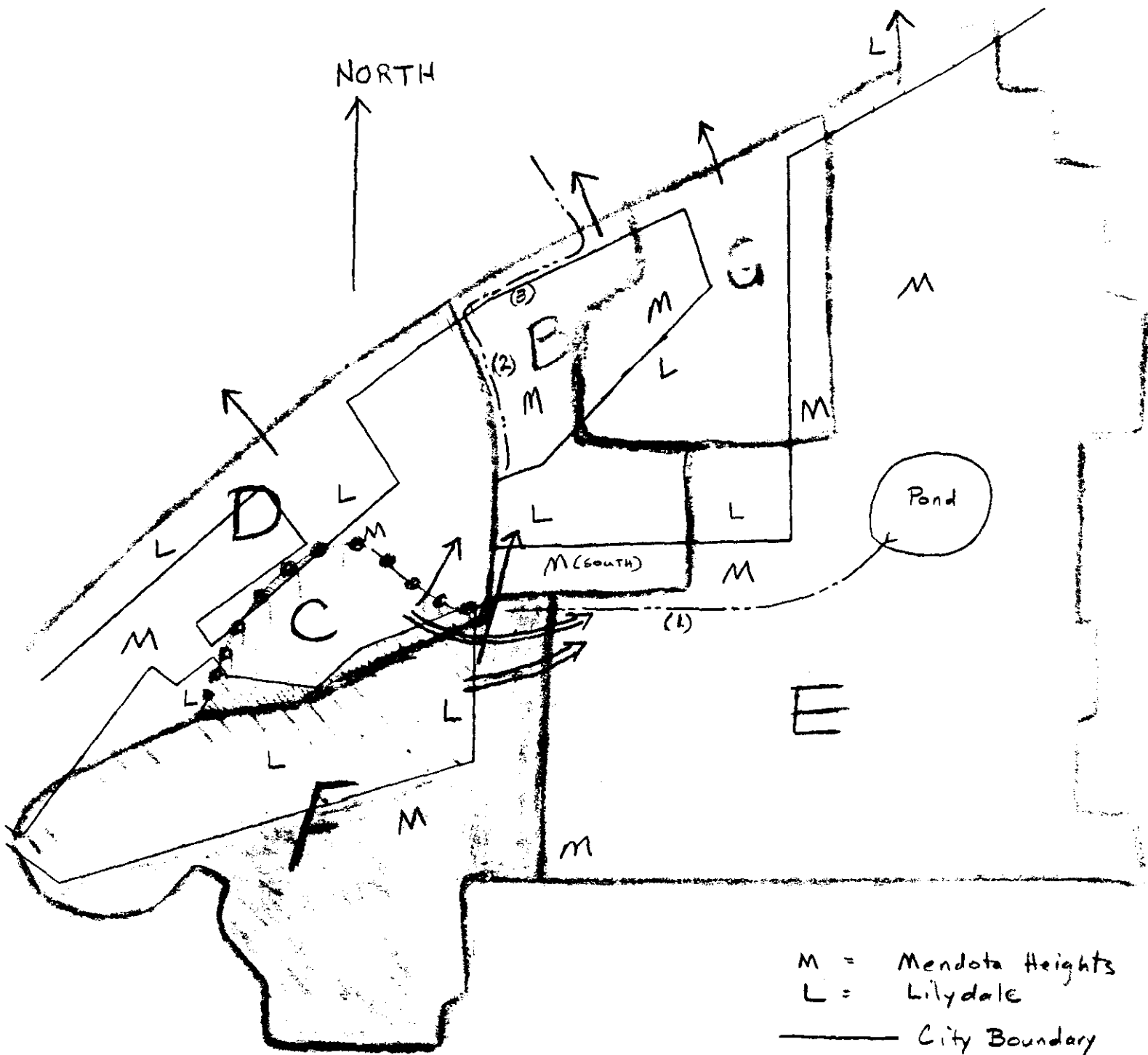
$$Q_{D,10} \text{ for segment e} = 70 \text{ cfs}$$



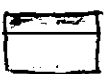
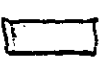
EXAMPLE H continued

COST ALLOCATION

$$\begin{aligned}\text{Segment "c", City #5 cost share} &= \frac{10\text{cfs}}{50\text{cfs}} \times \text{Segment "c" Project Cost} \\ &= 0.20 \times \text{Segment "c" Project Cost}\end{aligned}$$


$$\begin{aligned}\text{Segment "e", City #5 cost share} &= \frac{7\text{cfs}}{70\text{cfs}} \times \text{Segment "e" Project Cost} \\ &= 0.10 \times \text{Segment "e" Project Cost}\end{aligned}$$

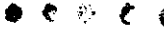


-  Portions of Lilydale diverted from B to E
-  Portions of Lilydale diverted from D to E
-  Portions of Mendota Heights diverted from B to E
-  Portions of Mendota Heights diverted from D to E


M = Mendota Heights
L = Lilydale

———— City Boundary

 Principal Watershed Divide

 New Principal Watershed Divide as a result of Diversion

 Original Flow Pattern

EXAMPLE "I"  Changed Flow Pattern as a result of Diversion

COST ALLOCATIONS, Segment '1' in Watershed E

Segment '1' serves Area C and Area F, which have been diverted into Area E. Because this is a diversion, there is no allowable flow attributable to any of Areas C or F diverted into Area E. The cost allocations for Segment '1' are in proportion to the flow contributions from the 2 communities from Areas C and F.

Q_{D1} = design flow for segment '1' from Area C plus Area F.

Q_{D1L} = design flow from Lilydale in Area C plus Area F.

Q_{D1M} = design flow from Mendota Heights in Area C plus Area F.

$$\text{Lilydale Cost Share} = \frac{Q_{D1L}}{Q_{D1}} \times \text{Project Cost for Segment '1'}$$

$$\text{Mendota Heights Cost Share} = \frac{Q_{D1M}}{Q_{D1}} \times \text{Project Cost for Segment '1'}$$

COST ALLOCATIONS, Segment '2' in Watershed B

Area F (but not Area C) has been diverted out of Area B and into Area E. The allowable flow from Area F is still counted for cost allocation in Area B and the Watersheds downstream of Area B. In addition, portions of both Mendota Heights and Lilydale contribute to Segment '2'. Segment '2' is considered to be constructed entirely in Mendota Heights.

Q_{D2} = design flow for segment '2'

Q_{Dm_s} = design flow from the portion of Mendota Heights labeled "M (south)" in Area B

Q_{AL} = allowable flow for Lilydale for segment '2'

Q_{EL} = excess flow for Lilydale for segment '2'

EXAMPLE "I" continued

$$Q_{EL} = Q_{D2} - Q_{DMs} - Q_{AL}$$

$$Q_{AL} = Q_{AFL} + Q_{ABL}$$

Q_{AFL} = allowable flow for that portion of Area F which is Lilydale.

Q_{ABL} = allowable flow for that portion of Area B which is Lilydale

Assume: $Q_{D2} = 20 \text{ cfs}$

$Q_{DMs} = 6 \text{ cfs}$

$Q_{AFL} = 12 \text{ cfs}$

$Q_{ABL} = 6 \text{ cfs}$

$$Q_{EL} = 20 \text{ cfs} - 6 \text{ cfs} - (12 \text{ cfs} + 6 \text{ cfs}) = -4 \text{ cfs}$$

Thus Lilydale has no excess flow in Segment (2).

Lilydale Cost Share = Zero Dollar.

Mendota Heights Cost Share = 100% of Project Cost for Segment (2).
(note - these are assumed values. The analysis of the actual case may lead to other conclusions.)

COST ALLOCATION, Segment (3) in Watershed B (and immediately downstream of Watershed B).

This case is similar to the cost allocation for Segment (2) except that Mendota Heights has an allowable flow, since segment (3) is constructed in Lilydale.

Q_{D3} = design flow for segment (3).

Q_{DL} = design flow for the portion of Lilydale in Area B.

Q_{AM} = allowable flow for Mendota Heights for segment (3).

Q_{EM} = excess flow for Mendota Heights for segment (3).

EXAMPLE 'I' continued

$$Q_{EM} = Q_{D3} - Q_{DL} - Q_{AM}$$

$$Q_{AM} = Q_{AFM} + Q_{ABM}$$

Q_{AFM} = allowable flow for that portion of Area F
which is Mendota Heights

Q_{ABM} = allowable flow for that portion of Area B
which is Mendota Heights

Assume:

$$Q_{D3} = 40 \text{ cfs}$$

$$Q_{DL} = 14 \text{ cfs}$$

$$Q_{AFM} = 15 \text{ cfs}$$

$$Q_{ABM} = 10 \text{ cfs}$$

Then:

$$Q_{AM} = 15 \text{ cfs} + 10 \text{ cfs} = 25 \text{ cfs}$$

$$Q_{EM} = 40 \text{ cfs} - 14 \text{ cfs} - 25 \text{ cfs} = 1 \text{ cfs}$$

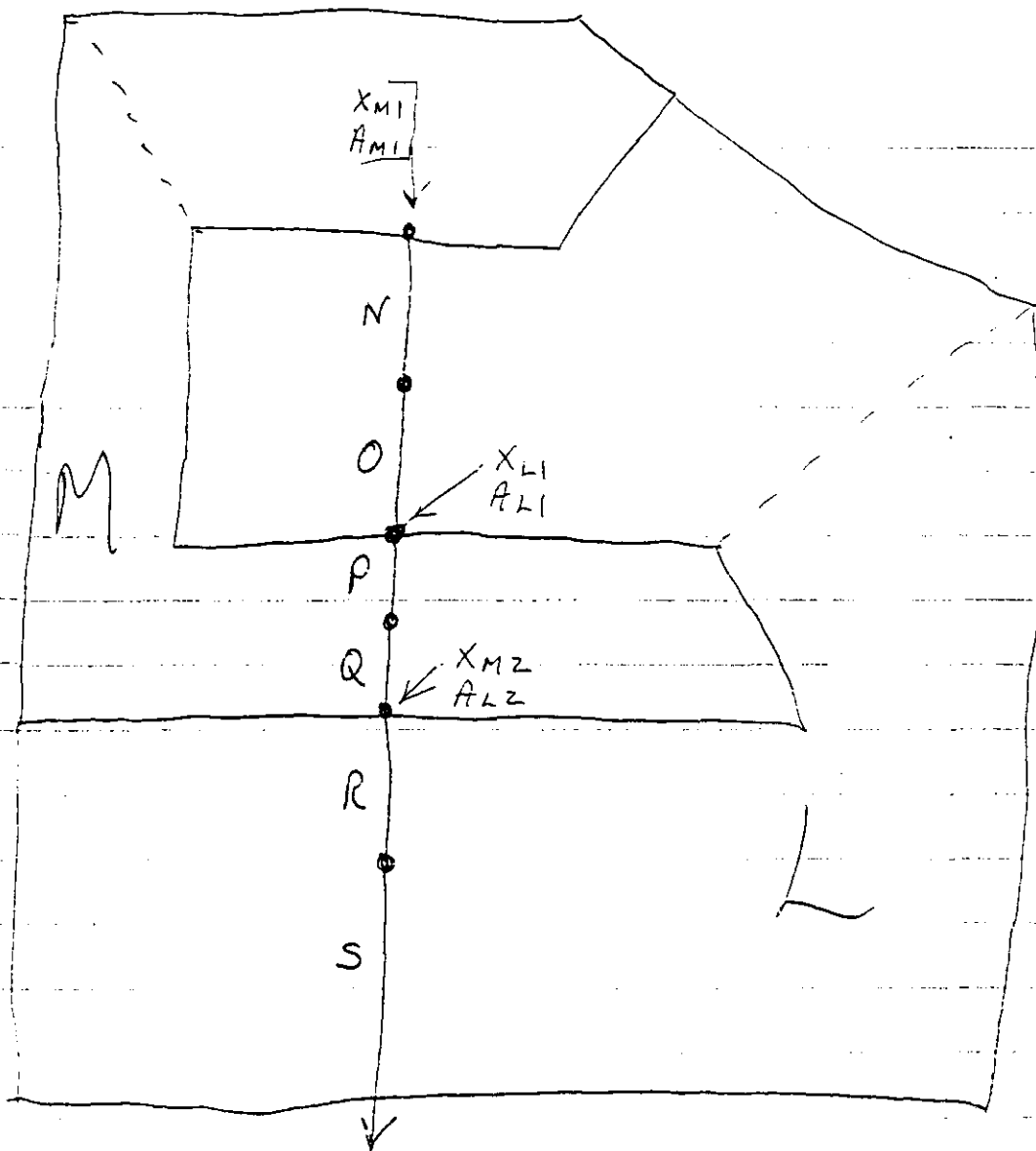
$$\begin{aligned} \text{Lilydale Cost Share} &= \frac{Q_{D3} - Q_{EM}}{Q_{D3}} \times \text{Project Cost for Segment (3)} \\ &= \frac{40 - 1}{40} \times \text{Cost} = \frac{39}{40} \times \text{Project Cost, seg. (3)} \end{aligned}$$

$$\begin{aligned} \text{Mendota Heights Cost Share} &= \frac{Q_{EM}}{Q_{D3}} \times \text{Project Cost for Segment (3)} \\ &= \frac{1}{40} \times \text{Project Cost for Segment (3)}. \end{aligned}$$

(note - these are assumed values. The analysis of the actual case may lead to other conclusions)

The attached sheet, Appendix A, presents cost allocation for the case of no diversion, but flow re-entering communities after it has once left them.

M = COMMUNITY M
 L = COMMUNITY L
 X = EXCESS FLOW
 A = ALLOWABLE FLOW
 C = COST
 D = DESIGN FLOW



COST SHARES

SECTION N $M_N = C_N \left(\frac{X_{M1}}{D_N} \right)$

$L_N = C_N \left(\frac{A_{M1}}{D_N} \right)$

SECTION O $M_O = C_O \left(\frac{X_{M1}}{D_O} \right)$

$L_O = C_O \left(\frac{A_{M1}}{D_O} \right)$

SECTION P $M_P = C_P \left(\frac{D_P - X_{L1}}{D_P} \right)$

$L_P = C_P \left(\frac{X_{L1}}{D_P} \right)$

SECTION Q $M_Q = C_Q \left(\frac{D_Q - X_{L1}}{D_Q} \right)$

$L_Q = C_Q \left(\frac{X_{L1}}{D_Q} \right)$

SECTION R $M_R = C_R \left(\frac{X_{M1} + X_{M2}}{D_R} \right)$

$L_R = C_R \left(\frac{D_R - X_{M1} - X_{M2}}{D_R} \right)$

SECTION S $M_S = C_S \left(\frac{X_{M1} + X_{M2}}{D_S} \right)$

$L_S = C_S \left(\frac{D_S - X_{M1} - X_{M2}}{D_S} \right)$