

CITY COUNCIL MEETING

MARCH 13, 1983

BASIN LOCATION
IN G DRAINAGE
AREA DETERMINED

Agenda item K-5 - "Determination of basin location in G Drainage Area" was introduced by City Manager Graves. Council had, at an earlier Informal Informational Meeting (Shirtsleeve Session), reviewed the "G-Area Storm Drain Basin Study" as prepared by the City of Lodi Public Works Department.

The study evaluated two alternate storm drain basin/pipe systems to serve the G-area. Alternate A consists of two basins--G-north and G-south, and Alternate B consists of one larger basin located at the G-south site. The pipe systems are similar except the main line between G-north and G-south is substantially larger in Alternate B due to the elimination of G-north Basin.

The study procedure involved the following:

- 1) Determined basic engineering criteria and making various assumptions or decisions to insure the comparisons are done on an equal basis.
- 2) Designing the alternate systems - basin size/depth and pipe sizes.
- 3) Making cost estimates of the system excluding land costs.
- 4) Determining total system cost versus variable land costs.
- 5) Preparation of draft written report.
- 6) In-house technical review.
- 7) Outside review by interested consulting engineers.
- 8) Preparation of the final report.

The study concluded that from a simple total cost standpoint, Alternate B - the combined system is slightly favorable over Alternate A - two basins. When other considerations such as construction staging and park/open space are taken into account, Alternate A is more

From an engineering standpoint, either Alternate will perform the drainage functions for which they are designed. The Public Works Department made no recommendation on either Alternate.

Mr. Glen Baumbach, of Baumbach and Piazza, 323 West Elm Street, Lodi, and Mr. Kenneth Glantz, 1150 West Robinhood Drive, Stockton, addressed the Council indicating that they favored the single basin concept.

Following discussion, on motion of Mayor Pro Tempore Murphy, Olson second, Council selected Alternate B which consists of one larger basin located at the G-south site.

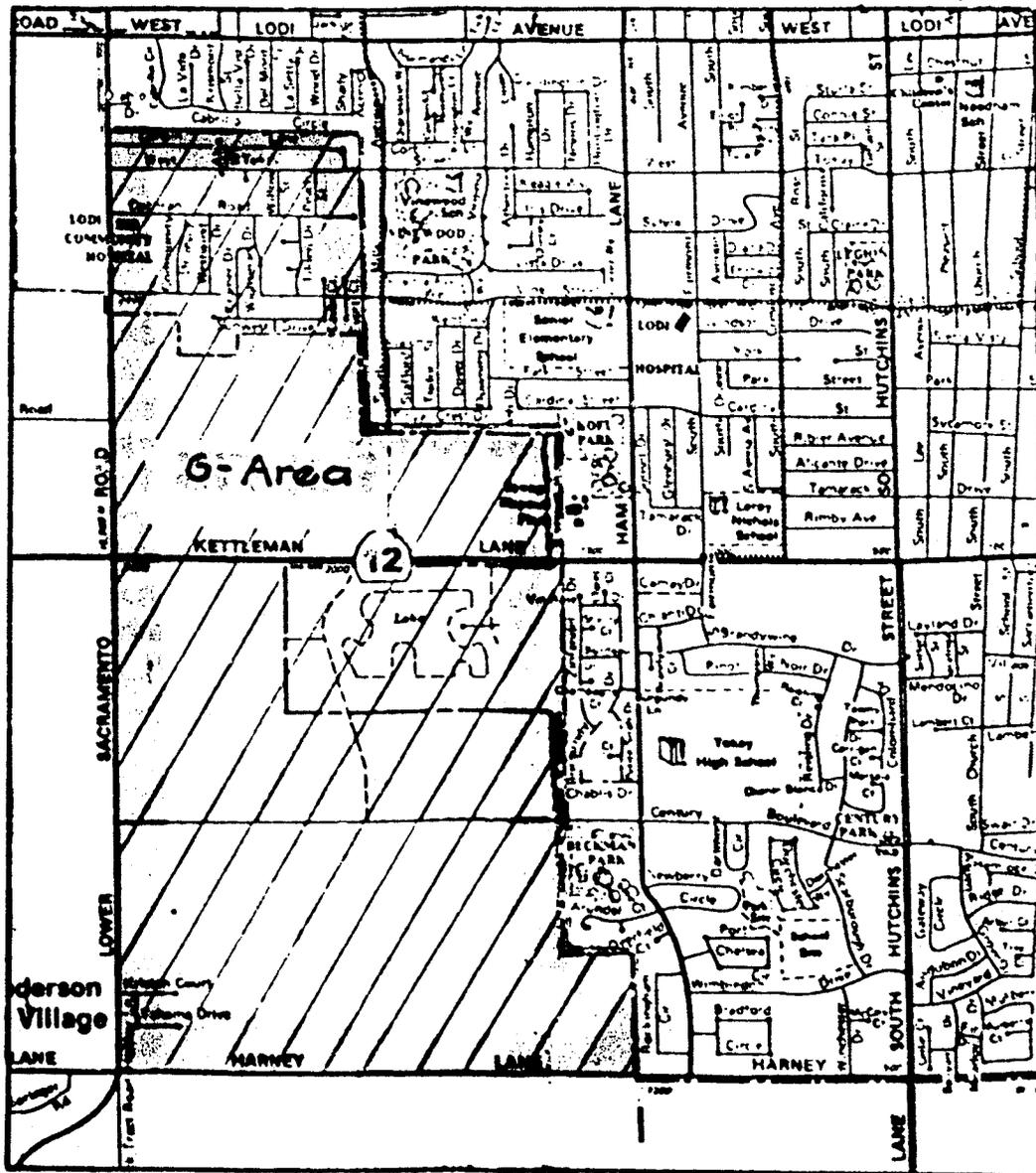


G-AREA STORM DRAIN BASIN STUDY

City of Lodi Public Works Department

January 1983

CITY OF LODI
DEPARTMENT OF PUBLIC WORKS



G-AREA STORM DRAIN BASIN STUDY

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PREFACE

This report is intended to analyze two alternative storm drain systems to find the most desirable drainage solution for a certain area. A number of assumptions are made concerning future development without regard to Measure A (Ordinance 1237), past General Plans or other legal considerations. These assumptions are based on the report staffs' engineering judgment and experience gained from recent development projects and storm drain design. These assumptions are necessary to provide an equal basis for comparison, and are not intended to predestine development. A complete environmental, planning and legal review should be made prior to selection of an alternate.

G--AREA STORM DRAIN BASIN STUDY

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G-AREA STORM DRAIN BASIN STUDY

Introduction

The purpose of this study is to evaluate two alternate storm drain basin/pipe systems to serve the G-area. Alternate A consists of two basins -- G-North and G-South, and Alternate B consists of one larger basin located at the G-south site. The pipe systems are similar except the main line between G-North and G-South is substantially larger in Alternate B due to the elimination of G-North Basin.

The study procedure involved the following:

- o Determining basic engineering criteria and making various assumptions or decisions to insure the comparisons are done on an equal basis;
- o Designing the alternate systems - basin size/depth and pipe sizes;
- o Making cost estimates of the system excluding land costs;
- o Determining total system cost versus variable land costs;
- o Preparation of draft written report;
- o In-house technical review;
- o Outside review by interested consulting engineers;
- o Preparation of final report.

BACKGROUND

The G-Area is bounded by Lower Sacramento Road on the west, Harney Lane on the south and the Woodbridge Irrigation District (W.I.D.) Canal on the east and north. Kettleman Lane (Hwy 12) divides the area into G-North and G-South. The area is partially developed with "temporary" drainage facilities. In the north, the Westdale and Sunwest subdivisions utilize temporary ponds that drain to the already overtaxed Shady Acres pump station located in the fully developed B-1 area (Exhibit 1). In the south, Lakeshore Village utilizes a recreational lake to hold storm water which is eventually discharged to the Beckman (A-2) pump station (Exhibit 2).

The City's Master Storm Drain Plan first identified the two alternates under study. Exhibits 3 and 4 show the alternates. Since the adoption of the Master Plan in 1963, a number of changes have taken place:

- o the southern boundary of the G-Area has been extended from Century Boulevard to Harney Lane;
- o the E-Area has been designed to drain to the B-2 basin;
- o the combined B-2 basin has been built to drain to the Lodi Lake Pump Station;
- o the F-basin is still planned to drain to the G-Area system;
- o the Beckman Pump Station which presently drains the A-1, A-2 and D Areas, will need modification to serve the F and G Areas;
- o developments are taking place with high densities and different land uses than assumed in the Master plan and runoff coefficients were increased in the 1976 Design Standards. These two factors have substantially increased basin and pipe sizes shown in the Master Plan;
- o the City acquired 27+ acres for the G-South site in 1974.

In this area, additional temporary drainage systems are unacceptable to the City Council. The Council has also determined that additional lakes are unacceptable drainage solutions until their performance in Lodi is proven satisfactory. Thus, future developments must be served by the Master Drainage System.

The existing systems are designed such that they will function with either G-Area alternate. However, two proposed developments are prompting a decision on which alternate is to be built. They are Lobaugh Meadows, located between Kettleman Lane and Century Boulevard west and south of Lakeshore Village, and Sunwest Unit IV, located between Lower Sacramento Road and the W.I.D. Canal, south of Vine Street.

Lobaugh Meadows is a planned unit development which, as a Planning Commission recommended condition of approval, will construct a portion of the G-South basin. Since expansion of the basin site (most likely to the east) is required under Alternate B, the design of Lobaugh Meadows must take this into account. Sunwest Unit IV, although presently outside the City limits, is in the design stage in preparation for election/annexation proceedings as required under Measure A. In order to proceed, the developers must know if they will have to provide for a portion of G-North or plan on constructing an outfall pipe and a portion of G-South Basin.

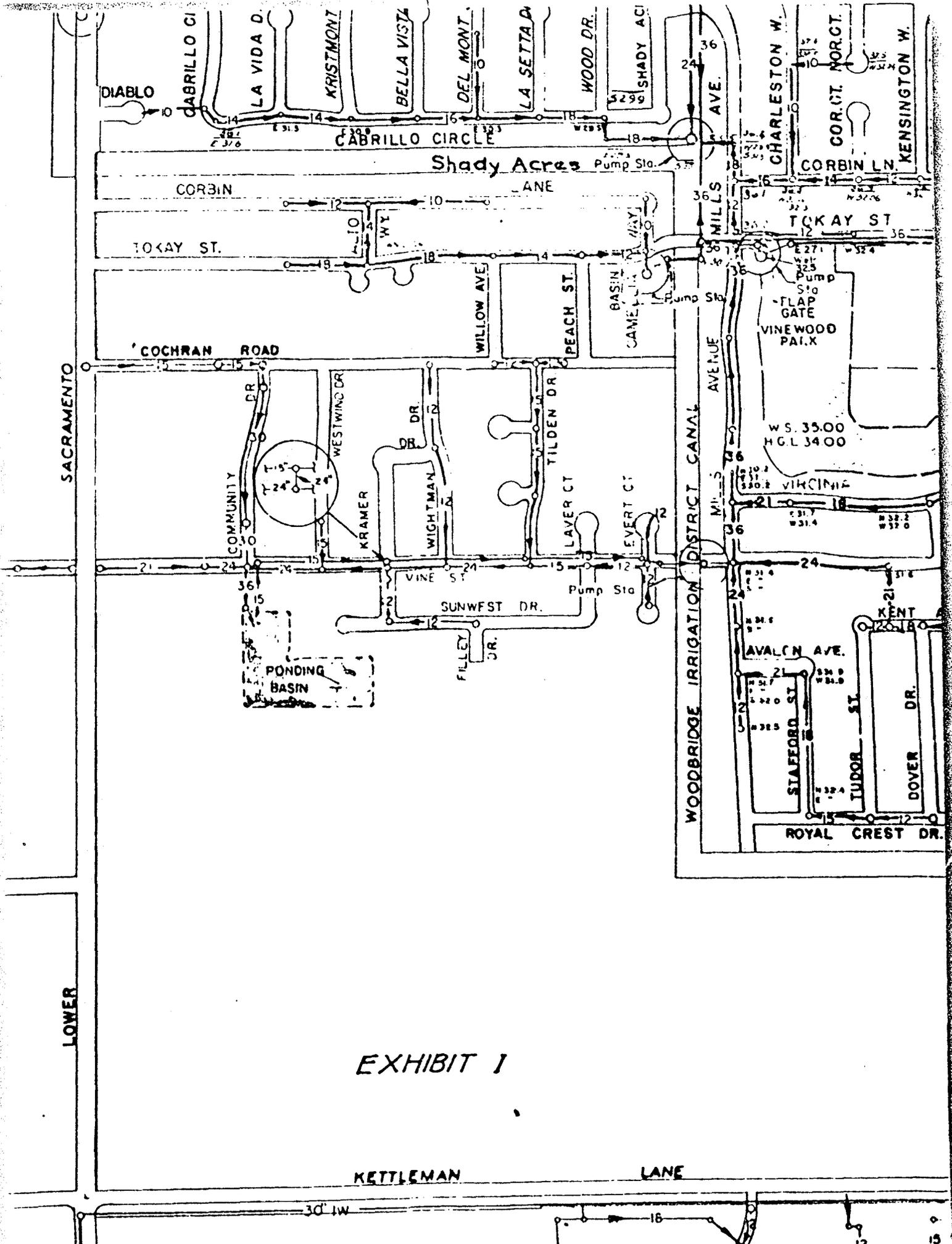


EXHIBIT 1

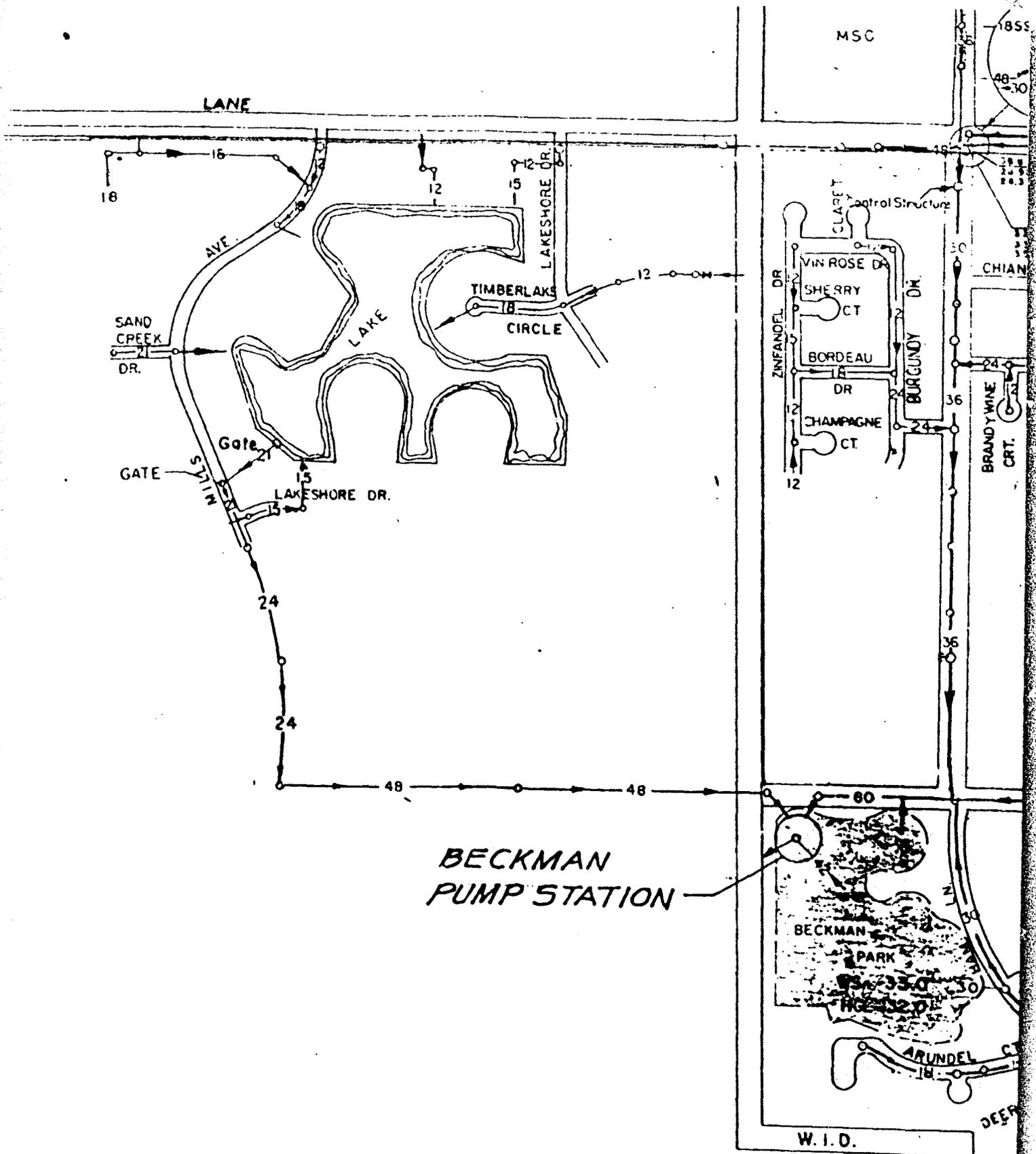


EXHIBIT 2

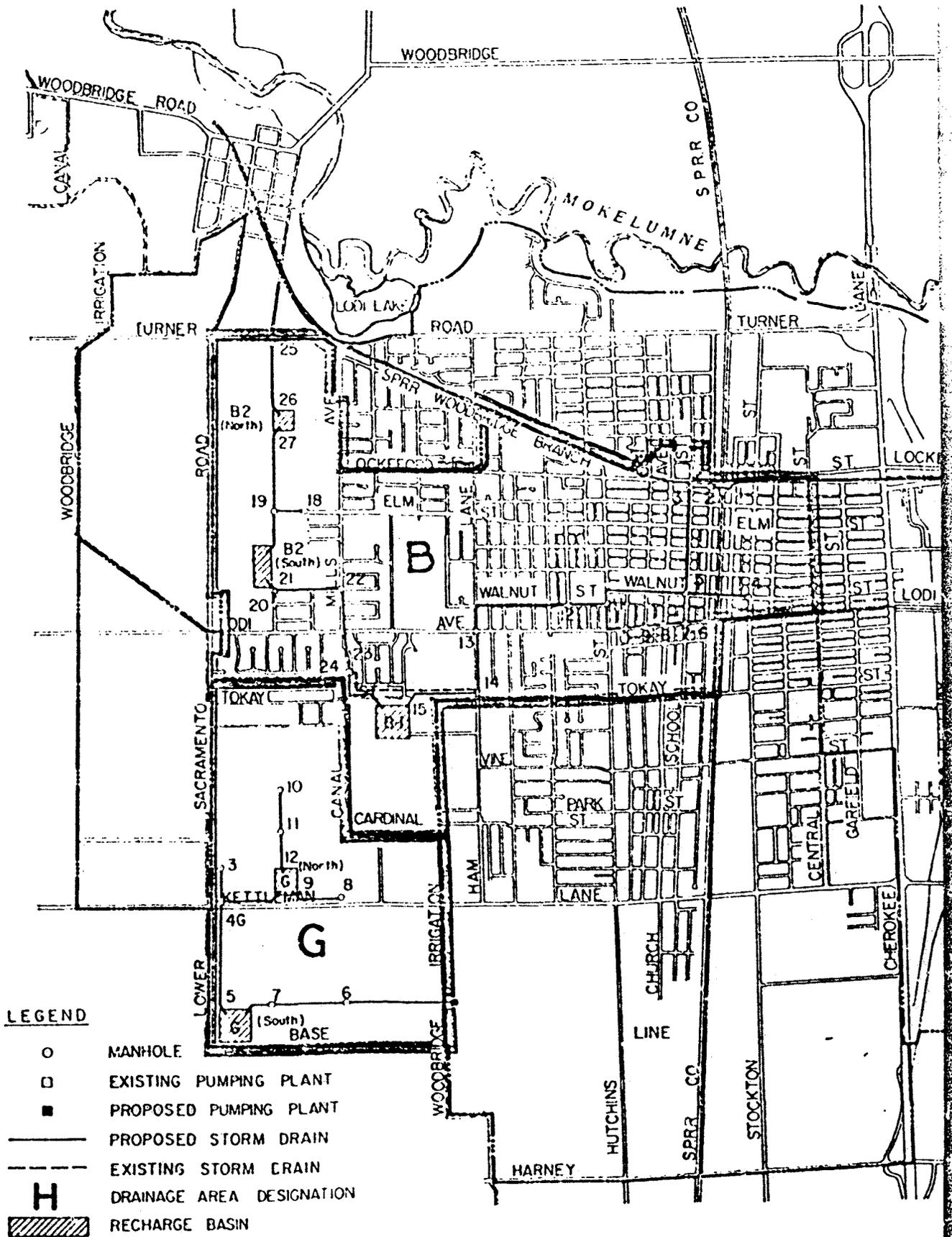


Fig 6-3 ALTERNATE STORM DRAINAGE
 EXHIBIT 3
 ALTERNATE A
 TWO BASINS
 LODI URBAN DRAINAGE AREA

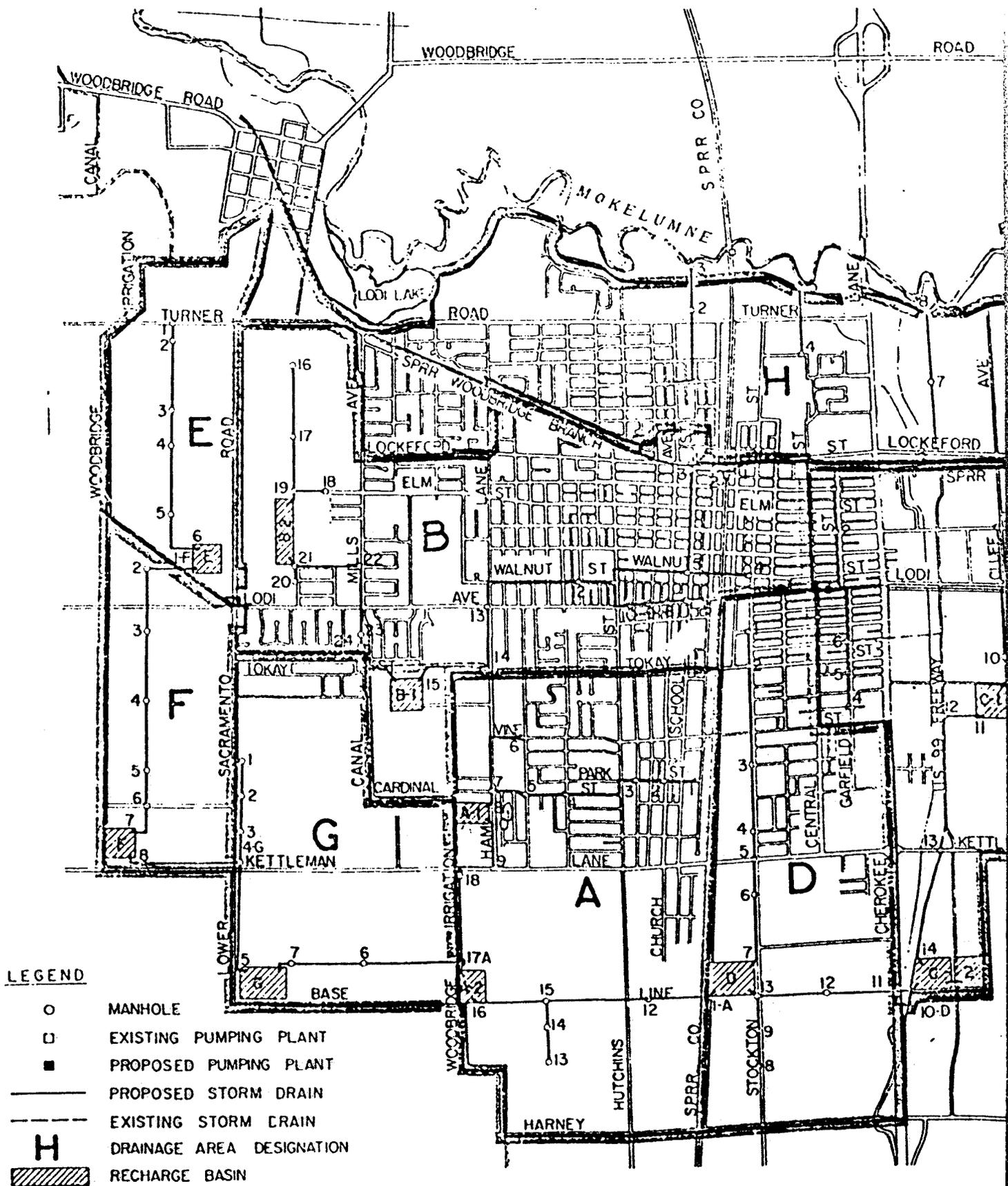


Fig. 6-2 PROPOSED STORM DRAINAGE FAC
 EXHIBIT 4 LODI URBAN DRAINAGE AREA
 ALTERNATE B
 ONE BASIN

BASIC CRITERIA AND ASSUMPTIONS

The Storm Drain Master Plan and the City of Lodi Design Standards adopted in 1976 provide the basic criteria for storm system design. The main points are:

- 1) Design Flow - per Rational Method $Q = CiA$
where:
 - Q is the flow in cubic ft. per second,
 - C is the runoff coefficient (varies with land use, 0.4 for single family residential, 0.8 for commercial)
 - i is the 2 year storm rainfall intensity in inches per hour
 - A is the area served in acres
- 2) Design basin volume - adapted from Rational Method
 $V = CIA$
where:
 - V is the volume in cubic feet
 - C, A per above
 - I is the total rainfall in a 48 hour, 100 year storm: 0.4 ft. (4.8 inches)
- 3) Basin elevation - maximum water surface to be at least one foot below
the top of the lowest catch basin in the drainage area
- 4) System hydraulics - designed with Mannings equation, $n = 0.013$ and the Rational Method; the hydraulic grade line (theoretical water surface in pipes, manholes and catch basins) must be one foot below the top of any catch basin served when the basin is one foot below the maximum water surface (See Exhibit 5)
- 5) Basin Side Slope - 6 horizontal to 1 vertical
- 6) Outflow during storm - varies; Beckman Pump Station is designed to pump 40 cfs during a storm - 26 cfs from D-Area, 10 cfs from A-1 Area and 4 cfs from A-2 Area. The remaining basins (F&G) must hold all storm flows. After a storm, all basins will be emptied equally, as fast as possible. Total time required @ 40 cfs is 6 days for the A-1, A-2, D, G and F Areas

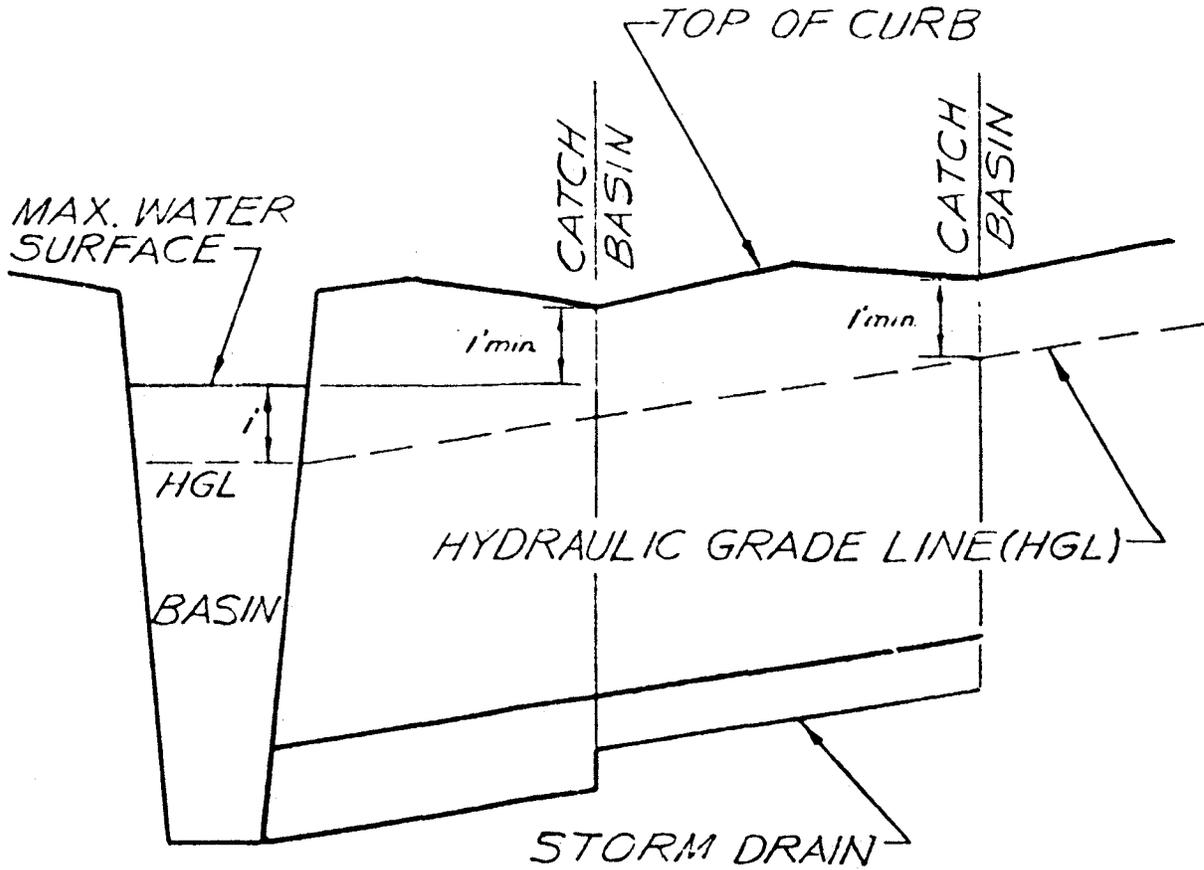
In addition to the basin criteria, a number of assumptions are made based on the experience City staff has gained from the design, construction and operation of the existing basins and collection systems. These assumptions are described below:



CITY OF LODI

PUBLIC WORKS DEPARTMENT

SYSTEM HYDRAULIC CRITERIA



Drawn <i>W.O.</i>	No.	Date	Approved	Approved By
Checked				
Date				
			Public Works Director RCE	Date

EXHIBIT 5

- 1) Basin configuration - Assumed rectangular with a 20 foot-border between the top of the slope and the property line and a 300' x 300' "high ground" area in one corner. Due to aesthetic considerations or the need for parking, restrooms or other uses, not all of the basin sites have been available for water storage. This assumption provides a more realistic estimate of the gross acreage needed to store the design volume.
- 2) Basin bottom elevation - Assumed maximum of 1-foot below the outlet elevation. In order to provide good slopes for drainage, an interior drainage system is installed in new basins. As it is impractical to totally drain this system by gravity, small pump stations are also installed. Allowing the bottom of the basin to be below the outlet makes better use of the pump station and results in less area being needed for the basin.
- 3) Future development - Assumed to be similar to the average of new developments in the area. The Storm Drain Master Plan assumed the entire G-Area would be low density residential. Subsequent changes in the General Plan have allowed a mix of commercial and high density residential as well. The runoff coefficients assumed for the study are the actual factors for developed areas and the average of Lakeshore Village, Sunwest IV and Lobaugh Meadows for undeveloped areas except a 200-foot strip fronting Kettleman Lane is calculated as commercial.

SYSTEM DESIGN

The alternate systems are shown in Exhibit 6* and summarized in Table 1. The pipe systems shown are approximate and should not be used for final design. Without actual street layout and top of curb elevations, the exact sizes and lengths of the necessary pipes cannot be determined. However, similar criteria is used in both cases, thus the results are comparable. Table 1 also includes data for Basins A-1 (Kofu), A-2 (Beckman), D (Salas) and F (future) for information and comparison.

Examination of Exhibit 6* and Table 1 will reveal the following points:

- 1) The total basin acreage needed for the G-North and G-South system is 43.0 acres versus 35.5 acres for the combined G system. This is due to: (a) G-South basin can be up to 8-feet deep while G-North is only 6-feet, and (b) G-South has 4-feet of freeboard (vertical distance between existing ground and the water surface) while G-North has 5-feet - this uses more land area. A graph of volume vs. land area for various depths is shown in Exhibits 7 and 8. Note that smaller basins are less efficient with regard to land usage.
- 2) The collection system for the two alternates is essentially the same except for the line generally in Lower Sacramento Road between the G-South site and the end of the existing 36" pipe in Community Drive south of Vine Street.

In Alternate B, this line must carry area-wide storm flows to the G-South site. Thus, the pipe is much larger than in Alternate A where it only drains the G-North basin or serves adjacent land.

* folded map at end of report

TABLE I

DRAINAGE AREA	ACRES	BASIN		ELEVATION			DEPTH		
		Vol. Ac-ft	Area Ac	Approx. Ex. Ground	Water Surf.	Bottom	Outlet	Basin Ft.	Water Ft.
G-N	302	66	18.0	34	29.0	23.0	24.0'±	11	6
G-S	568	136	27.5*	31	27.0	19.0	20.0'±	12	8
G	880	202	35.5	31	27.0	19.0	20.0'±	12	8
A-1 (Kofu)	570	43	120	38	37.0	30.5' ±0.5'	32.3	7.5' ±0.5'	6.5' ±0.5'
A-2 (Beckman)	525	60	16.6	35.5	33.0	24.5' ±1'	19.3	11 ±1'	8.5' ±1'
D (Salas)	862	94	21.0	42.5	39.2	32.4' ±3'	31.6	10.1' ±3'	6.8' ±3'
F	392	91	20**	30	27.0**	20.0**	23.0±	10'***	7'***

* Existing site; only 25 Acres needed for 8' deep basin

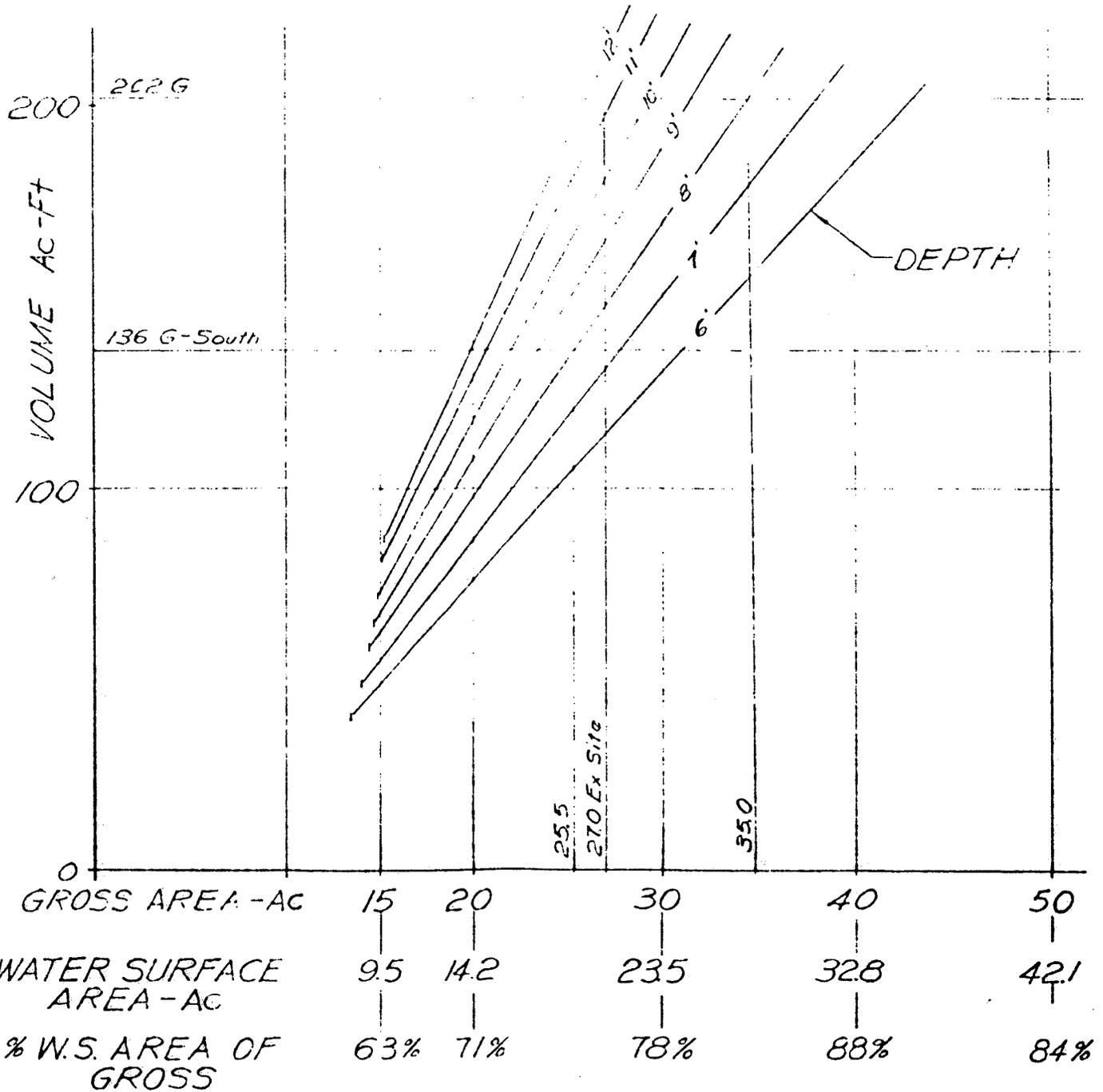
** Tentative



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G-SOUTH BASIN



Drawn W.Q.	No.	Date	Approved	Approved By
Checked				
Date				

Public Works Director
RCE

Date

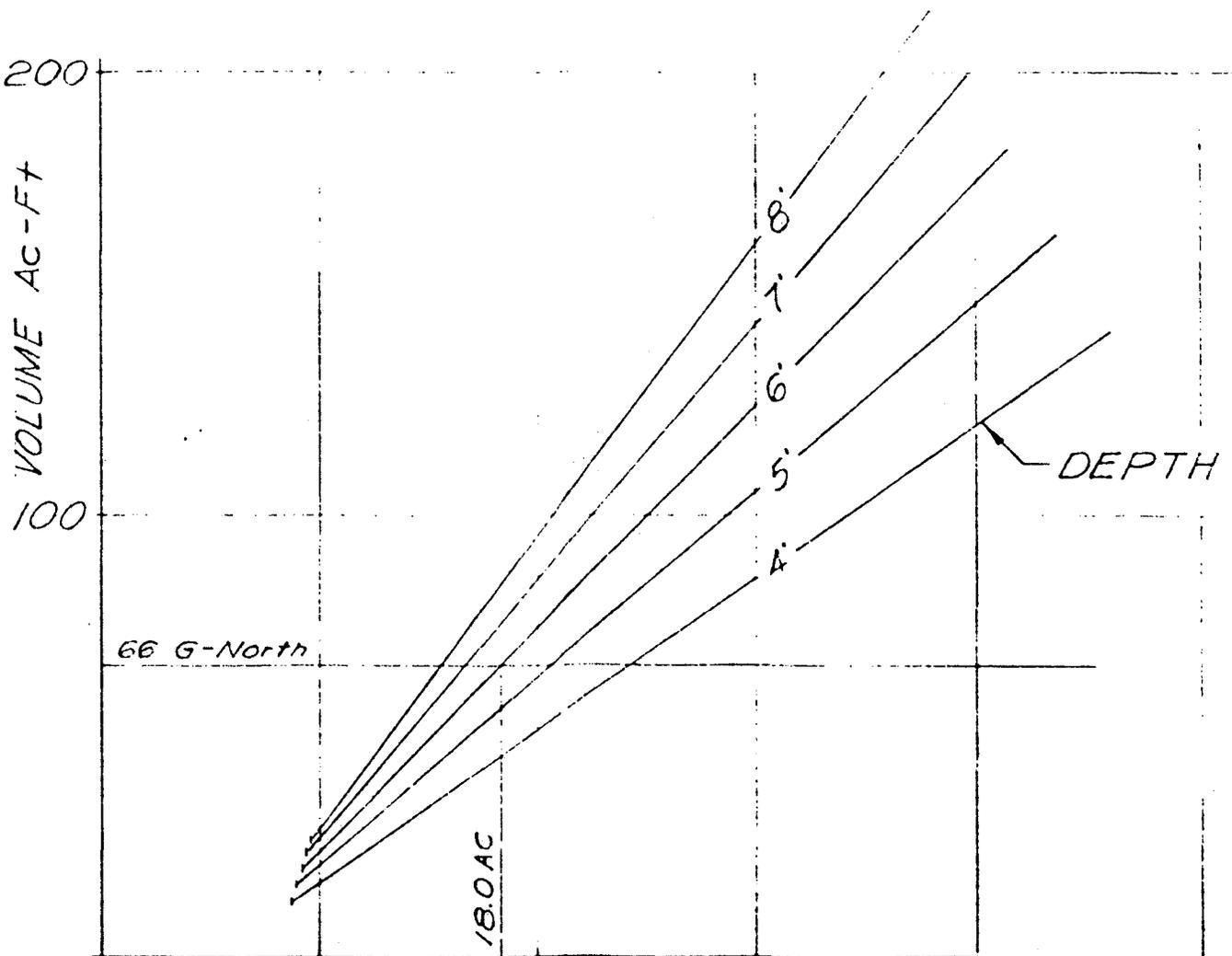
EXHIBIT 7



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G-NORTH BASIN



GROSS AREA	10	20	30	40	50
Ac					
WATER SURFACE	5.1	13.8	22.6	31.4	40.2
AREA - AC					
% W.S. AREA	51%	69%	76%	79%	81%
OF GROSS					

Drawn	W.O.	No.	Date	Approved	Approved By
Checked					
Date					

Public Works Director
RCE

Date

EXHIBIT 8

SYSTEM COST

The costs for the alternate systems are summarized in Table 2. As with the design, the costs are approximate and cannot be accurately determined until a final design is completed. However, they are all based on similar data and are comparable.

Pipe prices are based on cast-in-place concrete pipe with a 15% surcharge for pipes adjacent to Lower Sacramento Road. Jacked pipe prices were used for the Kettleman Lane crossing.

Basin prices are based on recent prices for Salas Park and include structures, pumps, telemetry, interior drainage, turf, sprinklers, fencing and major street improvements. Minor street improvement costs are omitted as it is assumed they would be comparable in each case and cannot be determined until a street layout is designed. Excavation is assumed to be at no cost. Engineering or contingencies are not included, nor are modifications to the Beckman Pump Station or F-Basin related costs, as they are common to both alternates.

Land costs are difficult to estimate without designating a specific parcel and having an appraisal done. Therefore, Exhibit 9 shows the total system cost versus land cost.

TABLE 2
SYSTEM COSTS

	<u>Alternate A</u>	<u>Alternate B</u>
Collection System	\$ 636,000	\$ 820,000
Basin	\$ 417,000 G-North	\$ 814,000
	\$ 660,000 G-South*	
	<hr/>	<hr/>
TOTAL	\$ 1,713,000	\$ 1,634,000
Land Needed	16.5 acres net	8 acres

* Based on 25 acre basin; \$679,000 if entire 27.5 acres are developed with shallower basin or more "high ground".

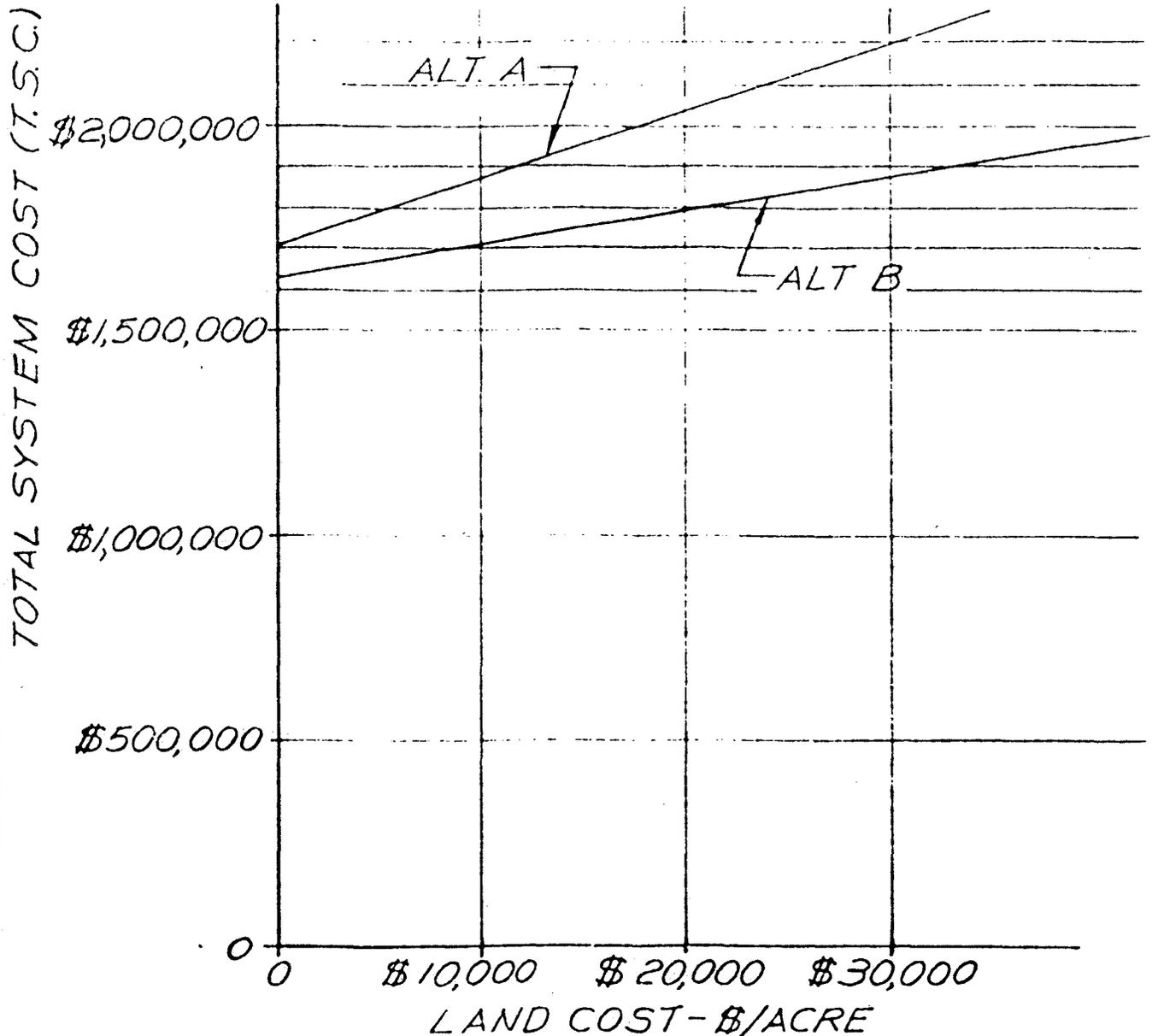
In all cases, Alternate A is more expensive than Alternate B, although the difference is small. The total costs are within 10% of each other up to a land cost of \$11,000 per acre.



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G-AREA TOTAL SYSTEM COST VS. LAND COST



ALT. A - Separate G-N & G-S Basins
 $TSC = \$1,713,000 + (18.0 \text{ Ac.} - 1.5 \text{ Ac.}) \text{ Land Cost } \$/\text{Ac.}$
G-N Excess @ G-S

ALT. B - Combined G-S Basin
 $TSC = \$1,634,000 + (8.0 \text{ Ac.}) \text{ Land Cost } \$/\text{Ac.}$
Add'l @ G-S

Drawn	W.O.	No	Date	Approved	Approved By
Checked					
Date					

Public Works Director
 ACE

Date

EXHIBIT 9

OTHER CONSIDERATIONS

Because the capital costs of the total systems are so close to each other, it is reasonable to consider other factors in making a choice between the alternates. Certainly many factors could be discussed and it is beyond the scope of this study to adequately review all of them.

Other considerations include:

- 1) Construction staging - Alternate B, while lower in total system cost, would be initially more expensive if Sunwest IV were to develop prior to development of the land north of G-South Basin. This is due to the larger diameter pipes required in Lower Sacramento Road, which would have to be constructed in the first phase.
- 2) Operation and Maintenance - Certainly O&M costs of two basins are greater than those of one. Two basins provide some additional drainage flexibility and a higher safety factor in the event of a storm exceeding the design storm. However, two basins present additional control problems over one basin.
- 3) Park Space - The Master Drain Plan was conceived not only as a drainage plan, but a neighborhood park/open space plan as well. The City's General Plan Open Space - Conservation Element, adopted in 1973, includes a park standard of 5.0 acres per 1,000 persons and a serving radius of no more than $\frac{1}{2}$ mile.

The Element included then existing parks and basins and planned basins, and indicated a need for an additional 166.93 Acres to meet the standard for the General Plan Growth Area. The planned C-2 basin/park has since been eliminated from the Storm Drain Master Plan, reducing planned park land by 20 acres.

Within the G-area itself, the ultimate population could be between 9,300 and 17,200 (based on 5.75 to 10.0 dwelling units per gross acre and 2.46 persons per dwelling unit). Park area per 1,000 persons would be between 4.6 and 2.5 for Alternate A and 3.8 and 2.1 for Alternate B.

This consideration strongly favors Alternate A - two basin/parks from both park area and distribution standpoints; although Alternate B and a small neighborhood park in the G-North area could meet this need.

- 4) Environmental Impact - An Environmental Impact Report was prepared on the G-South acquisition in 1974. The EIR assumed that a G-North basin would be built. No significant impacts were associated with the proposed purchase. However, it was recommended that a follow-up EIR be prepared prior to construction.

5) Legal/Measure A Considerations - As stated in the preface, these considerations are beyond the scope of this report. Discussion of Measure A and its relation to the Storm Drain Master Plan will have to take place before a decision on the Alternates is made.

CONCLUSION

From a simple total cost standpoint, Alternate B - the combined system - is slightly favorable over Alternate A - two basins. When other considerations such as construction staging and park/open space are taken into account, Alternate A is more advantageous.

From an engineering standpoint, either Alternate will perform the drainage function for which they are designed. The Public Works Department makes no recommendation on either Alternate.

REPORT STAFF

Jack L. Ronsko, Public Works Director - general direction and review
Glenn E. Robison - Assistant City Engineer - general review
Glen Baltzer, Street Supervisor - operational review
Richard C. Prima, Jr., Associate Civil Engineer - design, report
Wes Fujitani, Junior Civil Engineer - design review
James Monroe, UOP Co-op Intern - design check
Wesley Ouye, Civil Engineering Technician - graphics
Diane Wood, Word Processing

COMMENTS

Copies of this study have been sent to the following parties and their comments are noted: (as of 1-31-83)

Community Development Dept. - no comment

Parks & Recreation Dept. - requested a presentation
be made to Parks & Recreation Commission
(to be made 2-1-83)

Glen Baumbach (engineer for Sunwest IV) - see attached letter.

Ken Glantz (engineer for Lobaugh Meadows) - called in question
regarding pipe alignment and will send letter. Alternate
pipe alignment is being studied.

civil engineers

323 West Elm Street
Lodi, California 95240



BAUMBACH & PIAZZA

Phone (209) 368-6618

January 20, 1983

Mr. Richard Prima
Department of Public Works
City of Lodi
Lodi, California

RE: G-Area Basin Study

Dear Rich:

The report as prepared shows a master plan for the entire Gn and Gs basin area. The report appears to be complete and will be helpful in the future. It is always easy to review someones report and criticize, and that is not the intent of this letter. The report does indicate to me that there are some other options to consider and we offer the following comments:

One Basin or Two Basins

I believe it would be in the best interest of the City to have one basin for operation and maintenance. Initial costs of two basins with pumps, electrical controls and telemetering, landscaping, etc., would be more costly.

Gs Basin is necessary under any option, and if you decide to use two basins and build Gn Basin, the Gn Basin will not function without Gs Basin.

The area immediately north of Kettleman Lane (between Kettleman Lane and the south line of proposed Sunwest IV) may be better served by a line running south through the Lobaugh property to the Gn Basin. The line should have been run in Mills Avenue location and would have better divided the area. The plan as shown proposes all the drainage run westerly to Lower Sacramento Road and then southerly. We also believe there should be a line in Lower Sacramento Road to serve the area in the future "F" Basin area and possibly future development along Lower Sacramento Road. This would also provide a certain amount of flexibility and perhaps allow development that would not be totally dependent on other developers.

RECEIVED

JAN 20 1983



CITY OF LODI

In regards to the proposed Sunwest No. 4 development, we would recommend eliminating the Gn Basin and provide a pipeline down Lower Sacramento Road and build the northerly portion of Gs Basin. We also recommend that the master plan provide for a line from the area north of Kettleman Lane through the Lobaugh property to the Gs Basin. This area is too big to not have a master line not run through it. This would provide the greatest amount of flexibility to the entire area.

The necessity of a park in the vicinity of Sunwest No. 4 should not be a condition for basin determinations. Park requirements should stand on their own merits. We also realize that a park is an additional benefit due to basins.

We appreciate the opportunity to comment on this report and feel that a lot of valuable information is now available due to this study to provide for good planning for this area.

Sincerely,


GLEN I. BAUMBACH

GIB:jm

cc: Fred Baker