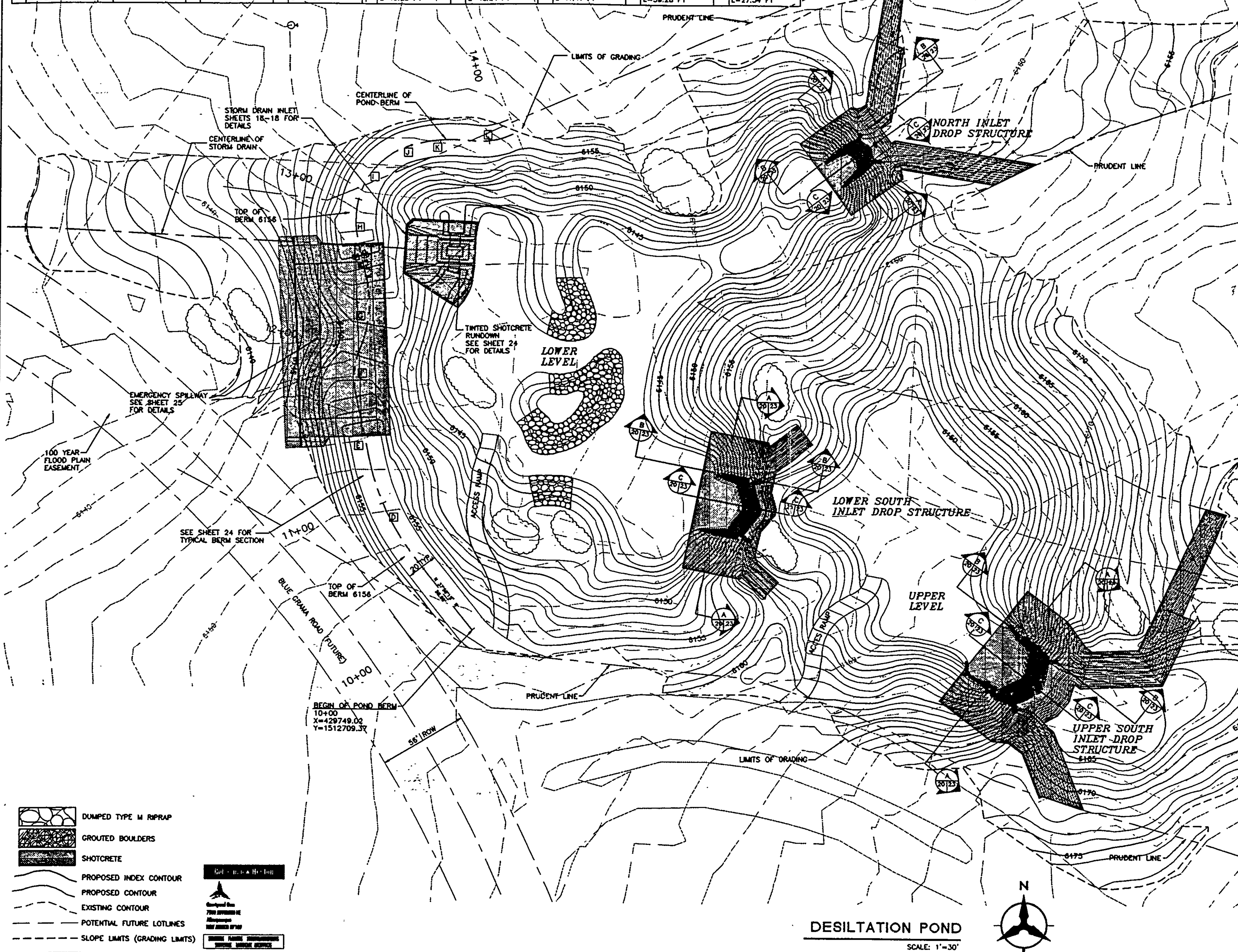
CURVE DATA

| | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|
| PI STA | 10+95.63 | 11+51.69 | 11+87.81 | 12+26.51 | 12+79.97 | 13+15.81 | 13+43.54 | 13+69.13 | 14+02.51 |
| I | 26°56'13" | 01°59'02" | 35°19'53" | 35°34'02" | 15°08'22" | 58°05'21" | 15°42'48" | 23°34'33" | 31°13'07" |
| Dc | 37°08'54" | 04°50'31" | 116°41'19" | 76°23'40" | 78°29'15" | 118°16'05" | 137°46'18" | 60°00'58" | 114°10.01" |
| T | 36.94 FT | 20.49 FT | 15.64 FT | 24.06 FT | 9.70 FT | 26.25 FT | 5.74 FT | 19.92 FT | 14.02 FT |
| R | 154.23 FT | 1183.35 FT | 49.10 FT | 75.00 FT | 73.00 FT | 49.28 FT | 41.59 FT | 96.47 FT | 50.19 FT |
| L | 72.51 FT | 40.97 FT | 30.28 FT | 46.56 FT | 19.29 FT | 48.24 FT | 11.41 FT | 39.28 FT | 27.34 FT |




## NOTES:

1 SEE FINISHED GRADE GRID MAP FOR POINT NUMBERS AND ELEVATIONS.

2 ANY STATIONING AND OFFSET SHOWN ON THIS SHEET IS FOR THE POND BERM CENTERLINE.

3 ALL EXISTING TREES WITHIN GRADING LIMITS WILL BE FENCED AND PROTECTED DURING CONSTRUCTION. SEE DETAIL THIS SHEET.

4 MAXIMUM SLOPE OF ACCESS RAMPS SHALL BE 8:1

5 SEE SHEET 22 FOR INLET DROP STRUCTURE LAYOUT PLANS.

TREE TRUNK

ERECT 40 LF OF 6' TALL TEMPORARY FENCE WITH 4 POSTS

PROTECTIVE TREE FENCE DETAIL

AS-BUILT INFORMATION: CONTRACTOR / DATE; WORK STAKED BY / DATE; INSPECTOR'S ACCEPTANCE BY / DATE; FIELD VERIFICATION BY / DATE; DRAWINGS CORRECTED BY / DATE

MICRO-FILM INFORMATION: RECORDED BY / DATE; NO.

BENCH MARKS

THE BENCH MARK IS A STANDARD USC&G BRASS TABLET STAMPED "TUMBLE 1969" SET IN CONCRETE LOCATED APPROXIMATELY 35 FEET NORTH AND 489 FEET WEST OF THE INTERSECTION OF TENNYSON STREET AND SAN ANTONIO DRIVE. PLANE COORDINATES: X=425,465.55 Y=1,513,470.01 GROUND-TO-GRID FACTOR 0.99961970 ELEVATION = 6009.155 FEET

SURVEY INFORMATION — FIELD NOTES: NO. / BY / DATE

ENGINEER'S SEAL

REVISIONS: NO. / DATE / REMARKS / BY — DESIGN; DESIGNED BY C.W.H./D.E.B. DATE 8-97; DRAWN BY TONYM DATE 7-97; CHECKED BY C.W.H. DATE 8-97

LEGEND: DUMPED TYPE M RIPRAP; GROUTED BOULDERS; SHOTCRETE; PROPOSED INDEX CONTOUR; PROPOSED CONTOUR; EXISTING CONTOUR; POTENTIAL FUTURE LOTLINES; SLOPE LIMITS (GRADING LIMITS)

DESILTATION POND

SCALE: 1"=30'

N

# CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

SOUTH PINO TRIBUTARY STORM DRAIN
DESILTATION POND GRADING PLAN

| DESIGN REVIEW COMMITTEE | CITY ENGINEER APPROVAL | MO./DAY/YR. | MO./DAY/YR. |
|---|---|---|---|
| LAST DESIGN UPDATE | | | |

| CITY PROJECT NO. | ZONE MAP NO. | SHEET | OF |
|---|---|---|---|
| 571282 | D-23 | 20 | 26 |



BHI-MAIN.(H97260.HYDRO.DESIGN.EP)PONDGRD.DWG

EXHIBIT A

CITY OF
Albuquerque
Public Works Department

May 7, 1997

Martin J. Chávez, Mayor

Robert E. Gurulé, Director

Craig Hoover, P.E.
Bohannan-Huston, Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

**RE: South Pino Tributary Storm Drain Design Analysis Report (E23/D3I) Submitted for Work Order Approval, Report Dated April 1997.**

Dear Mr. Hoover:

Based on the information provided in the submittal of April 14, 1997, the above referenced design analysis report is acceptable for the storm drain.

The report states that the City will not accept the use of aluminized steel pipe. Due to problems with the joints in aluminized steel pipe and in precast box culverts, the City will not accept either of these alternatives on the Work Order plans.

If you should have any question, please feel free to call me at 924-3982.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Jack Eichorn, High Desert Investment Corp.
Michial Emery, Bohannan-Huston
File

# DRAINAGE COVENANT

This Drainage Covenant, between High Desert Investment Corp. ("Owner"), whose address is 13000 Academy Rd., NE, Albuq., NM 87111, and the City of Albuquerque, New Mexico municipal corporation ("City"), whose address is P.O. Box 1293, Albuquerque, New Mexico 87103, is made in Albuquerque, Bernalillo County, New Mexico and is entered into as of the date Owner signs this Covenant.

1. Recital. Owner is the owner of certain real property described as: South Pino Tributary Desiltation Pond within Tract 15 of High Desert Subdivision in Bernalillo County, New Mexico (the "Property").

Pursuant to City ordinances, regulations and other applicable laws, the Owner is required to construct and maintain certain Drainage Facilities on the Property, and the parties wish to enter into this Agreement to establish the obligations and responsibilities of the parties.

2. Description and Construction of Drainage Facilities. Owner shall construct the following "Drainage Facility" within the Property at Owner's sole expense in accordance with the standards, plans and specifications approved by the City pursuant to Drainage File No. 571282: South Pino Tributary Storm Drain

The Drainage Facility is more particularly described in the attached Exhibit A. The Owner will not permit the Drainage Facility to constitute a hazard to the health or safety of the general public.

3. Maintenance of Drainage Facility. The Owner will maintain the Drainage Facility at Owner's cost in accordance with the approved Drainage Report and plans.

4. City's Right of Entry. The City has the right to enter upon the Property at any time and perform whatever inspection, maintenance or repair of the Drainage Facility it deems appropriate, without liability to the Owner.

5. Demand for Construction or Repair. The City may send written notice ("Notice") to the Owner requiring the Owner to construct or repair the Drainage Facility within 30 days ("Deadline") of receipt of the Notice, as provided in Section 11, and the Owner will comply promptly with the requirements of the Notice. The Owner will perform all required work by the Deadline, at Owner's sole expense.

6. Failure to Perform by Owner and Emergency Work by City. If the Owner fails to comply with the terms of the Notice by the Deadline, or if the City determines that an emergency condition exists, the City may perform the work itself. The City may assess the Owner for the cost of the work and for any other expenses or damages which result from Owner's failure to perform. The Owner agrees promptly to pay the City the amount assessed. If the Owner fails to pay the City within thirty (30) days after the City gives the Owner written notice of the amount due, the City may impose a lien against Owner's Property for the total resulting amount.

(Approved by Legal Dept.
as to form only 06/90)

7. Liability of City for Repair after Notice or as a Result of Emergency. The City shall not be liable to the Owner for any damages resulting from the City's repair or maintenance following notice to the Owner as required in this agreement or in an emergency unless the damages are the result of the reckless conduct or gross negligence of the City.

8. Indemnification. Owner agrees to indemnify and save the City, its officials, agents and employees harmless from all claims, actions, suits and proceedings arising out of or resulting from the Owner's negligent maintenance, construction, repair or use of the Drainage Facility. To the extent, if at all, Section 56-7-1 NMSA 1978 is applicable to this Agreement, this Agreement to indemnify will not extend to liability, claims, damages, losses or expenses, including attorney's fees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the indemnitee, or the agents or employees of the indemnitee; or (2) the giving of or the failure to give direction or instructions by the indemnitee, where such giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property.

9. Cancellation of Agreement and Release of Covenant. This Agreement may be released if the Drainage Facility is no longer required for the protection of the public health, safety and welfare by the City filing a "Notice of Release" with the Bernalillo County Clerk. The Notice of Release must be signed by the City's Chief Administrative Officer, or his designee, and the approval of the City Hydrologist must be endorsed thereon.

10. Assessment. Nothing in this agreement shall be construed to relieve the Owner, his heirs, assigns, and successors from an assessment against Owner's Property for improvements to the property under a duly authorized and approved Special Assessment District. The parties specifically agree that the value of the Drainage Facility will not reduce the amount assessed by the City.

11. Notice. For purposes of given formal written notice to the Owner, Owner's address is:

High Desert Investment Corp.
13000 Academy Rd. NE
Albuquerque, NM 87111

Notice may be given to the Owner either in person or by mailing the notice by regular U.S. mail, postage paid. Notice will be considered to have been received by the Owner within three days after the notice is mailed if there is no actual evidence of receipt. The Owner may change Owner's address by given written notice of the change by Certified Mail, return receipt requested, to the City Public Works Department, P.O. Box 1293, Albuquerque, New Mexico, 87103.

12. Term. This Agreement shall continue until terminated by the City pursuant to Section 9 above.

(Approved by Legal Dept.
as to form only 06/90)

13. Binding on Owner's Property. The covenants and obligations of the Owner said forth herein shall be binding on Owner, its heirs, personal representatives, assigns and successors and on Owner's Property and shall constitute covenants running the Owner's Property until released by the City.

14. Entire Agreement. This Agreement contains the entire agreement of the parties and supercedes any and all other agreements or understanding, oral or written, whether previous to the execution hereof or contemporaneous herewith regarding this subject matter.

15. Changes to Agreement. Changes to this Agreement are not binding unless made in writing, signed by both parties.

16. Construction and Severability. If any part of this Agreement is held to be invalid or unenforceable, the remainder of the Agreement will remain valid and enforceable if the remainder is reasonably capable of completion.

17. Captions. The captions to the sections or paragraphs of this Agreement are not part of this Agreement and will not affect the meaning or construction of any of its provisions.

OWNER:

By: [signature]
Its: President
Dated: 9-24-97

STATE OF NEW MEXICO )
) ss
COUNTY OF BERNALILLO )

instrument was acknowledged before me on SEPTEMBER 24, 1997, [by name of person:] DOUGLAS H. COLLISTER, [title or capacity, for instance "president" or "owner":] PRESIDENT of [Subdivider:] HIGH DESERT INVESTMENT CORP.

[signature]
Notary Public

My Commission Expires:
7-14-98

CITY OF ALBUQUERQUE:

Approved:

By: __________
Title: __________
Dated: __________

(EXHIBIT A ATTACHED)

(Approved by Legal Dept.
as to form only 06/90)

(WP+124529)

Draft
High Desert Subdivision
South Pino Tributary Storm Drain
Design Analysis Report

April, 1997

# DRAFT
# HIGH DESERT SUBDIVISION
# SOUTH PINO TRIBUTARY STORM DRAIN
# DESIGN ANALYSIS REPORT

Prepared for:

**High Desert Investment Corporation**
**13000 Academy Boulevard NE**
**Albuquerque, NM 87111**

Prepared by:


BOHANNAN-HUSTON INC.
*ENGINEERS ARCHITECTS PHOTOGRAMMETRISTS SURVEYORS*

COURTYARD I, 7500 JEFFERSON NE ALBUQUERQUE, NM 87109 TEL (505) 823-1000 FAX (505) 821-0892

# I. INTRODUCTION

## A. Background

As development continues in the High Desert Subdivision the need to construct drainage improvements along the South Pino Tributary Arroyo is rapidly becoming a reality. Located in the far northeast heights of Albuquerque approximately 6500' of the South Pino Tributary Arroyo lies within the High Desert Subdivision. See Vicinity Map, Figure 1. In November 1993, Bohannan-Huston Inc. (BHI) prepared the "High Desert Subdivision Drainage Issues - Letter of Understanding and Tract Development." One of the purposes of that document was to enable the City of Albuquerque (City) to determine drainage infrastructure needed before the development of each tract within the High Desert Subdivision. That document was based on the 1993 "High Desert Drainage Management Master Plan" (High Desert DMMP). The South Pino Tributary Storm Drain was linked with the development of Tracts 4, 9 and the westerly leg of Tract 15. Since 1993, modifications to the High Desert DMMP have allowed the development of Tract 4. Currently approval is also being requested to develop the west half of Tract 9 (Tract 9A) before construction of this storm drain system. The drainage report supporting these changes for Tract 9 is being submitted to the City in conjunction with this report. That drainage report, entitled "Drainage Report for Sunset Ridge at High Desert Tract 9A", proposes grading Tract 9A to drain south to the existing Academy Storm Drain System.

In October 1995, BHI prepared a draft prudent line analysis for the South Pino Tributary Arroyo from Imperata Street to Tramway Boulevard. This report investigated the possibility of deviating from the original storm drain concept by allowing the arroyo to remain natural. Upon completion of the draft report, the City, the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), High Desert Investment Corporation (HDIC) and BHI met to discuss this possibility. The City had strong

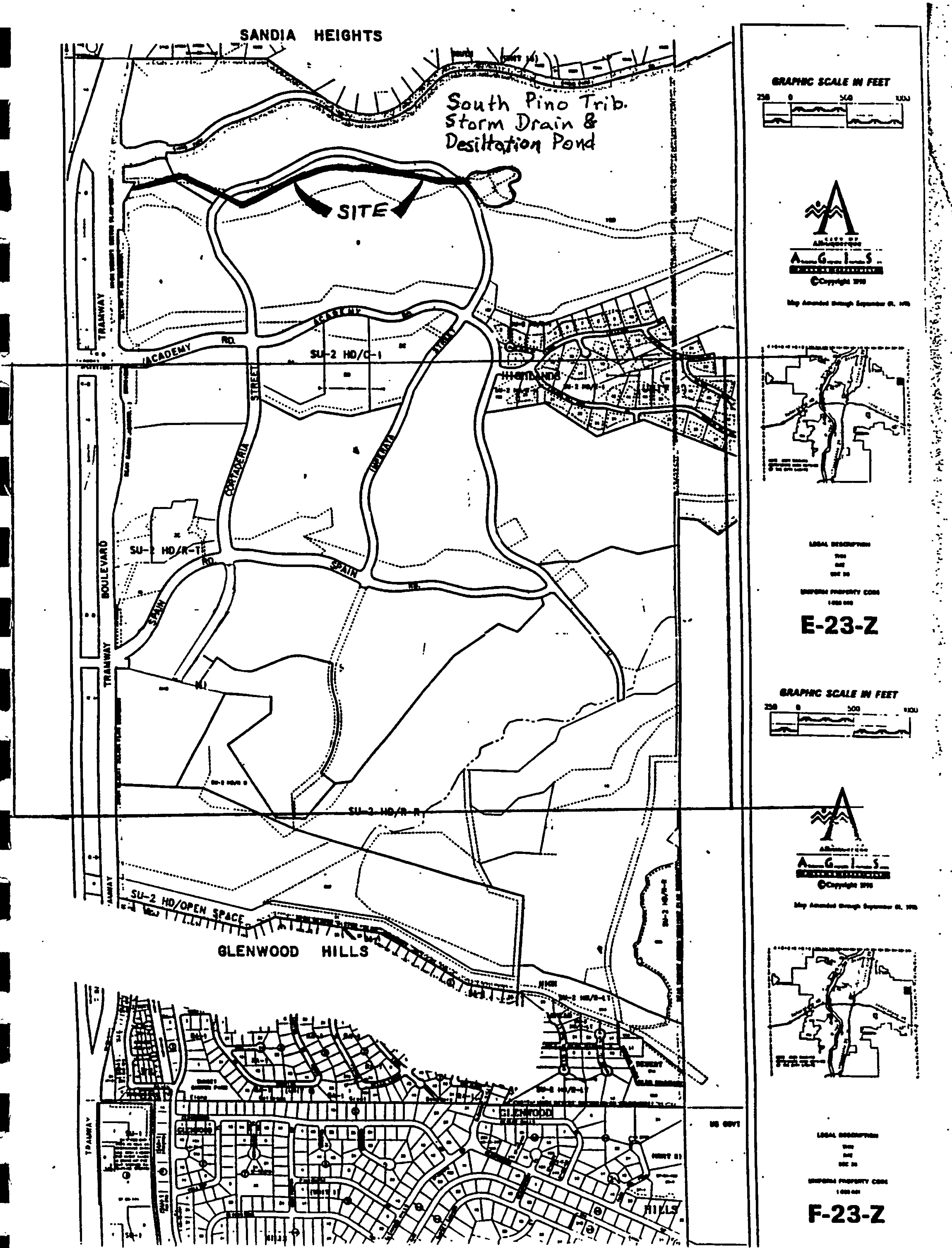



FIGURE 1
VICINITY MAP
NOT TO SCALE

reservations about leaving the arroyo natural and rejected the idea. Consequently, the storm drain and desiltation pond concept became the preferred drainage management approach once again.

This report examines in detail the use of a desiltation pond and closed conduit storm drain for drainage management in the South Pino Tributary Arroyo. Due to the large flow rate to be conveyed by a closed conduit system several options in addition to reinforced concrete pipe are being considered. This report will develop drainage systems using various other conduits such as cast-in-place pipe and concrete box culverts. Comparison of multiple options will allow determination of the most inexpensive and best suited drainage system. The final design for the system will be based on the findings of this report.

In addition to the conveyance system the desiltation pond is a major component of the drainage system. The pond will be located at the west edge of the Highlands portion of High Desert, near one of the entrances to the Highlands. Consequently, an attractive visually pleasing appearance is crucial to HDIC. Therefore, this report includes a preliminary layout for the pond to ensure that sufficient land area is reserved to produce the desired pond appearance.

### B. Purpose

The purpose of this report is twofold. First is to establish the most cost effective conveyance system for the South Pino Tributary Arroyo from Imperata Street to Tramway Boulevard. Second is to determine the required land area and potential grading for the desiltation pond immediately upstream of Imperata Street.

### C. System Description

This report defines the South Pino Tributary Storm Drain System to include the following:

- Construction of the permanent South Pino Tributary Desiltation Pond immediately east of Imperata Street.

- Construction of an inlet structure to convey runoff from the pond to a closed conduit storm drain.

- Construction of a closed conduit storm drain from the downstream end of the inlet structure to just upstream of Tramway Boulevard.

- Construction of a transition structure east of Tramway. This structure will split the flow from the single storm drain to five of the existing 60" culverts under Tramway. The sixth culvert will remain open for local flows.

The existing pond at Tramway will be at least partially filled to cover the new pipe connection. The system also includes provisions for local flows and stub-outs for future pipe-to-pipe connections to serve Tracts 9 and 15.

### D. Key Report Elements

The key elements of this report include the following:

- Hydrological model of the South Pino Tributary Arroyo Watershed. The model, taken from the High Desert DMMP, includes some minor modifications to reflect the latest proposed layout and drainage plans for Tract 9.

- Sediment analysis and design calculations for the desiltation pond.

- Preliminary pond layout and configuration.

- Hydraulic analysis of the proposed South Pino Tributary Storm Drain systems including the desiltation pond, inlet structure, and the transition structure at Tramway.

- Cost estimates for the proposed storm drain systems.

## II. HYDROLOGY

### A. General

The hydrology presented in this report is taken from the High Desert DMMP and is based on the City's Development Process Manual (DPM), Chapter 22, as revised January 1993. Both AMAFCA and the City have approved the High Desert DMMP. For purposes of this study, only proposed development conditions are modeled. Please reference the above report for existing conditions hydrologic information. Storm runoff volumes and flow rates were determined using the hydrologic computer program (HYMO) as modified for the AMAFCA/Albuquerque region (AHYMO).

### B. Watersheds and Basins

The South Pino Tributary watershed contains approximately 767.4 acres (1.20 square miles) reaching from nearly 3 miles east of Tramway Boulevard to Tramway Boulevard. The watershed has been subdivided into basins typically 30 acres or smaller to determine runoff rates and volumes at key locations. The basins within this watershed, as used in this report, are the same as those identified by the High Desert DMMP with the following exceptions:

- Basin SPT-7A has been subdivided into basins SPT-7A1 and SPT-7A2. This modification was made to allow determination of runoff volumes and flow rates at each entry point to the proposed desiltation pond. Land use values for each subdivided basin were assumed to be the same as the original single basin.
- Basins NBT-2B and SPT-8B have been reconfigured to reflect the modifications to the grading and drainage plan for Tract 9. Basin NBT-2B is non-contributing. Tract 9 is no longer divided into north and south halves with the south half discharging to the Academy Storm Drain and the North half discharging to the South Pino Tributary Storm Drain. The tract is now divided

into east and west halves with the east half discharging to the South Pino Tributary Storm Drain and the west half discharging to the Academy Storm Drain. The relative areas going to each storm drain system has not been changed substantially from the original masterplan. Land use values for each reconfigured basin were assumed to be the same as the original basins. The change in the basin configuration moves the point of introduction of flows to the South Pino Tributary Storm Drain. Flows from Tract 9 will now enter the storm drain approximately 1000' east of Cortaderia Street rather than at Cortaderia Street.

(Please refer to the watershed and basin map shown in Plate A.)

Appendix A provides a summary of the basin land uses and time of concentration values as taken from the High Desert DMMP with the above modifications to Basins SPT-7A, SPT-8B and NBT-2B. See Table 1 for a summary of basin runoff flow rates.

**TABLE 1**
**BASIN HYDROLOGY SUMMARY**
**FULLY DEVELOPED CONDITIONS 100 YEAR STORM**

| BASIN NO. | BASIN ID | AREA (ACRES) | DISCHARGES TO | UNBULKED Q (cfs) | BULKED Q (cfs) |
|---|---|---|---|---|---|
| 30 | SPT-1 | 133.1 | Basin 33 | 401 | 441 |
| 31 | SPT-2 | 151 | Basin 34 | 563 | 618 |
| 32 | SPT-3 | 51.2 | Basin 36 | 118 | 130 |
| 33 | SPT-4 | 81.3 | Basin 35 | 147 | 162 |
| 34 | SPT-5 | 103.7 | Basin 33 | 240 | 264 |
| 35 | SPT-6A | 30.1 | Basin 37B | 71 | 78 |
| 36 | SPT-6B | 89.6 | Basin 37A | 213 | 234 |
| 37A | SPT-7A1 | 18.9 | Desiltation Pond | 54 | 59 |
| 37B | SPT-7A2 | 19.5 | Desiltation Pond | 55 | 61 |
| 38 | SPT-7B | 29.4 | Proposed Storm Drain | 83 | 92 |
| 39 | SPT-8A | 17.3 | Proposed Storm Drain | 47 | 50 |
| 40A | SPT-8B | 10.4 | Basin 40A | 44 | 45 |
| 40B | SPT-8C | 11.5 | Proposed Storm Drain | 49 | 50 |
| 40C | SPT-8D | 1.1 | Proposed Storm Drain | 4 | 5 |
| 41 | SPT-9 | 19.2 | Proposed Storm Drain | 50 | 55 |

### C. Rainfall

The South Pino Tributary Storm Drain System is designed to convey the 100 - year, 24 hour storm event. Contributing watershed rainfall values are from isopluvials provided in the DPM as used in the High Desert DMMP. The rainfall values used in the AHYMO model for the 100-year, 24-hour storm event are as follows:

| | |
|---|---|
| Rain One (1 hour - 100 year) | 2.23 inches |
| Rain Six (6 hour - 100 year) | 2.90 inches |
| Rain Day (24 hour - 100 year) | 3.65 inches |

More frequent storm events, such as the 2-year and 10-year storms were estimated using DPM Table A-3 "Return Period Factors." Area reduction factors were not applied since the overall combined area of the watersheds, 1.20 square miles, is less than 5 square miles. Appendix B provides the AHYMO input and summary output files for:

- The 100-year storm - fully developed conditions with sediment bulking for desiltation pond and storm drain design.
- The 10-year storm - fully developed conditions with sediment bulking and desiltation ponds for desiltation pond design.
- The 2-year storm - fully developed conditions with and without sediment bulking for average annual sediment estimation.

Refer to Section III for further information on desiltation pond design.

### D. Sediment Bulking

The following sediment bulking factors taken from the High Desert DMMP were used.

| Land Use or Development Type | Bulking Factor |
|---|---|
| Undeveloped Areas and Estate Development | 10% |
| Conventional Development | 2% |

Estate development, as used in this report, applies to the areas within Tract 15. Tract 15, which is commonly referred to as the "Highlands," is planned to have a density of 1 du/acre and no mass grading. The remainder of the contributing basins, within High Desert that are not within Tract 15, are considered conventional development. Conventional development includes mass grading and has densities ranging from 3 du to 5 du/acre. (Please refer to Plate A for Tract locations and the High Desert DMMP for additional land use and sediment bulking information.)

# III. DESILTATION POND DESIGN

## A. General

Desiltation at the upstream end of the system before the introduction of flows to a closed conduit is required. To meet this requirement a desiltation pond referred to as the South Pino Tributary Desiltation Pond is proposed. Located immediately upstream of Imperata Street the pond is approximately 1100' north of Academy Boulevard. The pond is designed to remove sediment before the introduction of runoff to the closed pipe portion of the storm drain system. The pond has also been designed to minimize its visual impact within the development. A preliminary layout for the pond is shown on Plate B. The following sections provide the design criteria for the pond and a summary of the design calculations. Appendices C and D provide complete pond calculations.

## B. Design Criteria

The South Pino Tributary Arroyo Desiltation Pond conceptual layout was based on the following criteria:

- Minimum 3.0' of freeboard from the 100-year fully developed conditions water surface to the top of the pond or berm.
- The inlet structures into the pond will be designed to convey the 100-year fully developed conditions storm with a minimum freeboard of 2'.
- The inlet structure into the storm drain has a minimum of 3' of freeboard for the 100 year fully developed conditions storm.
- Minimum sediment storage volume equal to 5 times the average annual

sediment volume plus. The 2-year storm is considered equivalent to the average annual storm. The average annual sediment volume was calculated by multiplying the 2-year clear water volume by an average bulking factor. This average bulking factor was taken from the draft "High Desert South Pino Tributary Arroyo Prudent Line Study" (Draft Prudent Line Study). See Appendix C.

- The pond configuration and settling pool dimensions were sized for the worst case of either the 2-year storm event with 100% of very fine sand (0.06 millimeters particle size) being trapped or the 10-year storm with 100% of fine sand (0.010 millimeters particle size) being trapped. This is equivalent to 96% of the total sediment load for the 10-year storm event. (Please reference Appendix D for a copy of the sieve analysis results for test holes upstream of the ponds.)

## C. Summary of Hydrologic and Sediment Design Calculations

Runoff enters the pond via two existing swales at two distinct locations. Consequently, there will be a minimum of two inlet drop structures required with the pond to drop the flow into the bottom of the pond without incurring excessive erosion. With the preliminary configuration shown on Plate B up to five drop structures will be needed since the pond has multiple levels. A summary of the flow rates and volumes entering the pond for the 2-year and 100-year storms is as follows:

**South Pino Tributary Pond**

| Storm Event | South Inlet | North Inlet |
|---|---|---|
| 2-year Peak Discharge* | 23 cfs | 117 cfs |
| 2-year Volume* | 1.35 ac-ft. | 6.33 ac-ft. |
| 100-year Peak Discharge** | 349 cfs | 1388 cfs |
| 100-year Volume** | 14.4 ac-ft. | 54.0 ac-ft. |

*Clear water
**Bulked water

The total sediment storage volume was calculated from these flow rates and average sediment bulking factors developed in the draft Prudent Line Study. The average annual sediment bulking factor for the South Pino Tributary Arroyo, upstream of the proposed pond, was estimated at 3.08%. This value was multiplied by the clear water (no sediment bulking) runoff volumes generated for the 2-year storm from the AHYMO model, resulting in the average annual sediment yield. These resulting average annual sediment volumes are summarized below. (See Appendix C for detailed calculations.)

**South Pino Tributary Pond**

| | Average Annual Sediment |
|---|---|
| North Inlet | 0.0318 ac-ft. |
| South Inlet | 0.1950 ac-ft. |
| Total | 0.2268 ac-ft. |
| 5 x Avg. Annual | 1.1340 ac-ft. |

Sediment bulking internal to the AHYMO model was used to estimate the 100-year storm sediment load. As noted previously, a conservative bulking factor of 10% was used for much of the watershed. The pond was sized using the Route Reservoir command within AHYMO by subtracting 5 times the average annual sediment volume from the actual pond storage volume and then routing the 100-year bulked flow through the pond. (See Appendix B for AHYMO input and output listings.)

### D. Preliminary Pond Configuration

The South Pino Tributary Desiltation Pond must not only be functional in terms of intercepting sediment and reducing the peak runoff flow rate but it must also be visually pleasing. Located near one of the future entrances to the Highlands portion of High Desert the pond is in an area of high visibility. As such the pond configuration is elaborate with multiple levels and varying side slopes. The preliminary configuration shown on Plate B represents only a conceptual draft layout for the pond. Revisions to the pond, including the addition of baffle structures, will be made during the final design of the pond once the lot layout for Tract 15 is prepared. The overall area of the pond may ultimately be reduced slightly by increasing the side slopes. The pond side slopes shown on Plate B are typically 5 to 1 horizontal to vertical. The total volume of the pond however, will be maintained to insure sediment storage and assumed peak attenuation.

## IV. STORM DRAIN DESIGN

### A. General

The South Pino Tributary Arroyo Storm Drain System represents the third major storm drain trunk planned for the High Desert Subdivision. See Plate A. The first trunk along Spain Road was completed up to Imperata Street in the fall of 1994. The second trunk along Academy Boulevard was completed in September 1995. Beginning at the permanent desiltation pond east of Imperata Street the South Pino Tributary Arroyo Storm Drain runs west to Tramway Boulevard. The major components of the storm drain system are:

- The permanent desiltation pond immediately upstream of Imperata Street
- The inlet structure at the desiltation pond
- The transition structure at Tramway Boulevard and
- The storm drain connecting these two structures.

Five options are being considered as means of conveying runoff in a closed conduit from Imperata Street to Tramway Boulevard. Depending on the design requirements for each type of conduit, the conduit connecting the structures will vary in size and cross section. The five conveyance systems being considered are as follows:

1. Standard Reinforced Concrete Pipe (RCP)
2. Cast in Place Concrete Pipe (CIPCP)

3. Precast Concrete Box Culvert (CBC)

4. Cast in Place Concrete Box Culvert (CIPCBC)

5. Aluminized Steel Pipe (ASP)

Under each of these options the structures at the ends of the system will remain essentially the same. The size of the inlet structure is dependent primarily upon inlet control hydraulic conditions. In other words the size of the opening depends on how deep the water can be "stacked up" to force it into the mouth of the structure. The transition structure at Tramway Boulevard is controlled by head losses associated with splitting the flow and conveying into the inlets of the five existing 60" pipes. Consequently, the type of conveyance does not significantly effect the hydraulic performance of either of these two structures.

### B. Design Criteria

The design of the storm drain system included in this report is based on the following design criteria and the preliminary storm drain design provided in the High Desert DMMP.

- Position the storm drain vertically and horizontally to avoid impacting any of the large existing trees in and near the arroyo bottom. Avoid disturbance to the existing arroyo as much as possible.

- Position the storm drain vertically and horizontally to allow stub-outs to serve Tracts 9 and 15 as well as water-harvesting systems along the arroyo. (See Plate A for Tract locations.) It should be noted that no reduction in flow rates has been credited for any water-harvesting. The design flow rates represent the total fully developed 100-year runoff flow rate.

- Locate the storm drain horizontally as close to Blue Grama Road. as possible (paralleling the existing arroyo), to reduce disturbance to the more dense vegetation in and near the arroyo. Due to the size and required depth to meet the above criteria the storm drain cannot however be located under the Blue Grama roadway section. Such a location would result in a trench prism that engulfs the entire roadway violating City criteria. The alignment of the storm drain is thus offset to the south of the street centerline to insure that the trench prism for the storm drain impacts at most the south half of Blue Grama Road.

- Position and size the storm drain to allow for all five conveyance options.
- Position the storm drain vertically and horizontally to avoid the existing 24" waterline crossing at Cortaderia Street.
- Position the storm drain vertically and horizontally to avoid the proposed 8" sanitary sewer crossing west of Cortaderia Street to serve Tract 15.

## C. Hydraulic Analysis

Of the five conveyance systems being considered all but one can be subject to pressurized flow according to industry and government standards. CIPCP is generally designed to avoid pressure flow conditions. Since two distinct hydraulic conditions must be maintained two separate hydraulic analyses were completed. The first analysis assuming pressure flow conditions covers RCP, CBC, CIPCBC, and ASP. Of these, both RCP and ASP have equal roughness coefficients making the hydraulic analysis identical. For the two options using boxes rather than circular pipes the analysis using circular pipes can be converted to equivalent boxes for sizing and cost estimating purposes. The second non-pressure analysis is specific to CIPCP.

For each hydraulic analysis flow rates at junction points where obtained from the AHYMO model for 100 year developed conditions. Routing of the flow through the proposed permanent desiltation pond was included in the hydrology model.

For hydraulic analysis the following roughness coefficients (Manning's n values) have been used.

| | | |
|---|---|---|
| 1. | Standard Reinforced Concrete Pipe (RCP) | 0.013 |
| 2. | Cast in Place Concrete Pipe (CIPCP) | 0.014 |
| 3. | Precast Concrete Box Culvert (CBC) | 0.015 |
| 4. | Cast in Place Concrete Box Culvert (CIPCBC) | 0.015 |
| 5. | Aluminized Steel Pipe (ASP) | 0.013 |

**1. Pressure Flow Analysis**

For RCP, CBC, CIPCBC and ASP pressure flow conditions are permissible. To reduce the amount of analysis a single HGL determination was completed using RCP, see Appendix E. A single analysis is sufficient since ASP is hydraulically equal to RCP and the circular pipe can be converted to equivalent box sections.

The pressure flow hydraulic analysis based on a computer spreadsheet using the City DPM procedures begins at the bottom of the system. The flow at the open channel outlet of the six culverts on the west side of Tramway, will be at critical depth. See Appendix E. Starting from this point the HGL was determined to be just below the top of the pipe at the east end of the Tramway culverts. Continuing upstream the transition structure which splits the flow from a single conduit to the five 60" RCP's was modeled. Entrance losses, friction losses (along the length of the structure) and transition (expansion) losses were calculated in the structure to establish the HGL at the upstream end of the structure (the downstream end of the proposed storm drain). This HGL then served as the beginning point for the computer spreadsheet analysis.

Working upstream, pipe sizes where selected that insured the HGL did not exceed manhole rim elevations or result in excessive hydraulic constraints for the future connecting laterals.

The final part of the hydraulic analysis was for the inlet structure at the desiltation pond. In this reach two factors had to be considered in the hydraulic analysis. The first was inlet control conditions to determine the size of the storm drain opening at the pond. The second was the transfer of inlet control conditions to points of pipe size changes downstream. The existing ground slope from Imperata Street to Cortaderia Street is fairly steep, approximately 4%. Consequently, once the flow is in the pipe the pipe size can be reduced to lower infrastructure costs.

To ensure proper functioning of the system at each point of size reduction inlet control conditions must be checked and met. For example, the most feasible inlet structure opening size was found to be a 18' x 8' rectangular box. However, once the flow was in the box the large cross sectional area was no longer needed to convey the flow. Consequently, the size tapers down to a 9' x 9' box approximately 30' downstream. At the point where the 9' x 9' box begins the invert elevation needs to be low enough to produce a headwater depth capable of pushing the flow in the 9' x 9' box as if it were the pond opening. The headwater depth is measured from the maximum water surface elevation in the pond to the box invert. Based on inlet control at each cross section reduction point the optimum conduit sizes were determined. It should be noted that to insure inlet control conditions, rather than outlet control, the HGL must be at or below the conduit soffit at the most downstream point of cross section reduction. Head water depth requirements for inlet control conditions were determined using U.S. Department of Transportation

Federal Highway Administration Hydraulic Engineering Circular No. 5 (HEC 5) nomographs.

## 2. Non-Pressure Flow Analysis

For CIPCP pressure flow conditions are not generally recommended. Consequently, for a CICCP conveyance system a separate hydraulic analysis is required in which the pipe is sized to insure non-pressure flow conditions.

The non-pressure flow analysis is very similar to the pressure flow analysis except the pipes are sized slightly larger to insure non-pressure flow. The beginning HGL at the downstream end of the CIPCP was determined in the same manner as for the option using RCP. From this point head losses were calculated using the above mentioned spreadsheet. Strictly speaking this spreadsheet is not applicable in non-pressure conditions, which is what is desired for CIPCP. However, at the very bottom of the system, west of the proposed sanitary sewer crossing the slope of the storm drain is fairly flat and the storm drain will approach full flow conditions and for a very short reach actually be under pressure. The amount of head on the pipe is minimal though less than 1' and considered to be acceptable for CIPCP. Upstream of the sanitary sewer crossing the slope of the storm drain increases significantly and the flow regime becomes clearly open channel in nature. From this point upstream the HGL is calculated based on normal depth calculations using Manning's equation. At the upstream end of the system the inlet structure analysis is the same as for the RCP analysis. Again inlet control conditions govern and determine the minimum conduit sizes and slopes.

# V. CONVEYANCE SYSTEM OPTIONS

## A. General

As noted in the previous section, five runoff conveyances options were examined as part of this study. The major components, costs and advantages and disadvantages for each of these options are presented in the following sections.

## B. Option 1 - Reinforced Concrete Pipe (RCP)

Under Option 1 as shown in Plates 1A - 1D standard RCP is proposed to convey runoff from the South Pino Tributary Desiltation Pond to Tramway Boulevard. This option includes the construction of the desiltation pond, storm drain inlet structure, transition structure at Tramway Boulevard and the connecting storm drain between the two structures. Pressure flow conditions exist where possible to allow for the smallest size RCP.

As part of Option 1 the storm drain will consist of nearly 3050 linear feet of 102" RCP. The storm drain inlet structure will be a cast in place concrete box with a 18' by 8' opening. The invert of the inlet structure will be recessed 3' below the pond bottom with a concrete rundown connecting it to the pond. A concrete or soil cement sill will be placed at the top of this rundown to facilitate sediment removal. Notches in the sill will allow the pond to drain preventing retention of runoff. To minimize the length of the inlet structure to only 26.5 feet a 2 to 1 slope is proposed over this 26.5 feet. The inlet structure will taper down to a 9' by 9' concrete box culvert. Downstream of the inlet structure will be 200 linear feet of 9' by 9' CBC at a slope of roughly 5 percent. A 9' by 9' box was selected based on hydraulics and available standard precast box sizes. At the downstream end of the 9'x9' CBC, there will be a short transition to a 102" (8.5' diameter) RCP. From this point west to the transition structure at Tramway

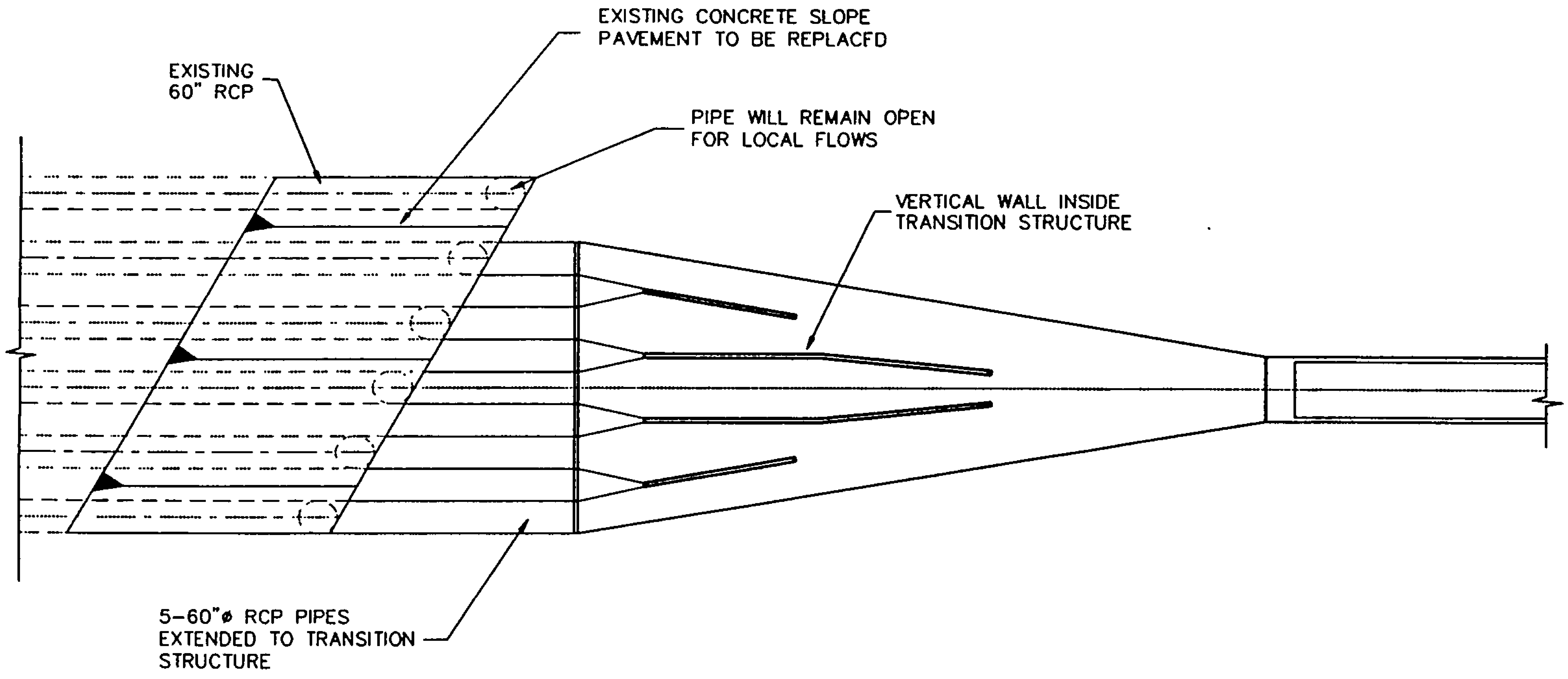
Boulevard the conduit will be a 102" RCP. The transition structure under this option will be 109.5' feet long and will be cast in place concrete construction. At the downstream end of the structure the width of the structure will be 45 feet inside to inside. Consequently, to reduce the span of the top (deck) of the structure interior walls similar to those shown in Figure 2 will be required. The final configuration of this structure including the interior walls will be determined during the final design of the system.

The preliminary estimated construction cost for Option 1 including contingencies is $2,455,800.00. See Appendix F for detailed cost estimate information.

### C. Option 2 - Cast-In-Place Concrete Pipe (CIPCP)

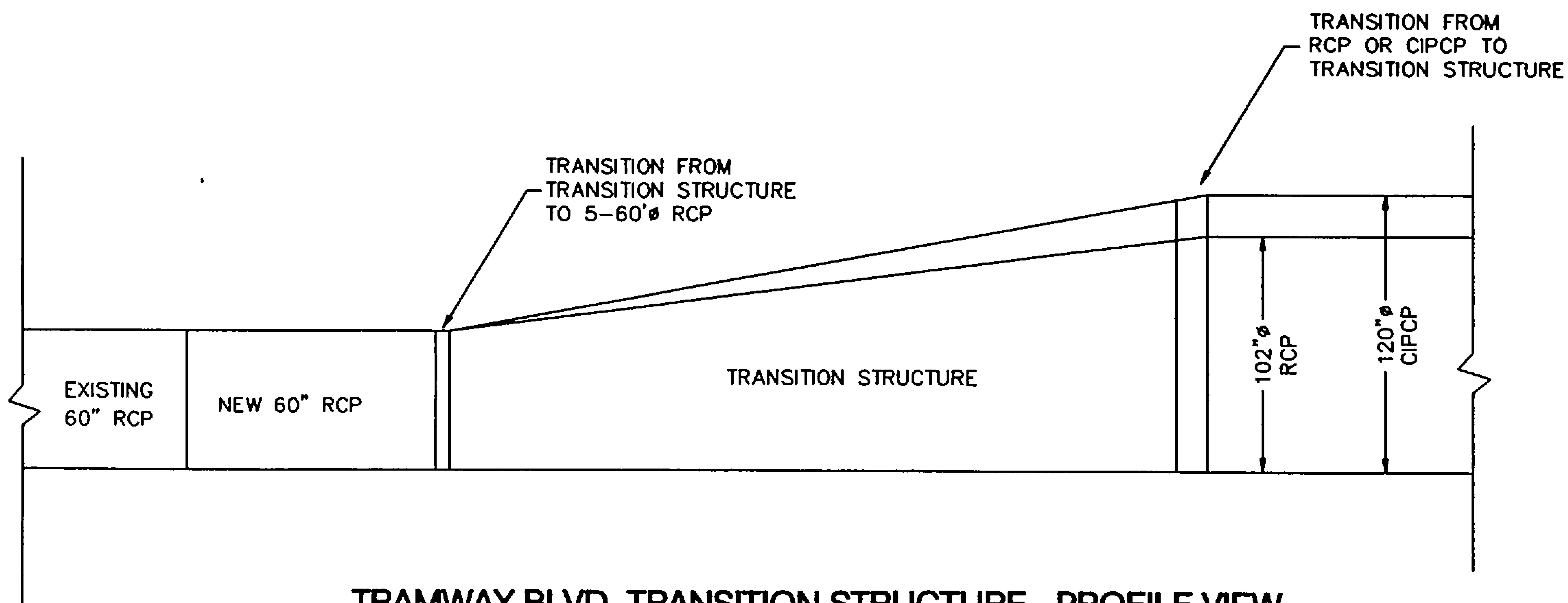
Option 2 which is shown in Plates 2A - 2D uses CIPCP to convey flows from the South Pino Tributary Desiltation Pond to Tramway Boulevard. This option also includes the construction of the desiltation pond, storm drain inlet structure, transition structure at Tramway and the connecting storm drain between the two structures. Unlike Option 1 pressure flow conditions generally do not occur within the closed conduit between the structures at each end of the system.

Under Option 2 the storm drain will vary in size. The storm drain will be 120" diameter below the proposed sanitary sewer crossing and 108" upstream of this point. This equates to roughly 460 linear feet of 120" CIPCP and 2,590 linear feet of 108" CICCP. The storm drain inlet structure is the same as for Option 1 since inlet control conditions govern the structure dimensions. Also as in Option 1 downstream of the inlet structure will be 200 linear feet of 9' by 9' CBC at a slope of roughly 5 percent. The 108" CICCP will begin at the downstream end of this box. The transition structure at Tramway under this option will be 105' feet long and will be cast in place concrete construction.




## TRAMWAY BLVD. TRANSITION STRUCTURE - PLAN VIEW

N.T.S.




## TRAMWAY BLVD. TRANSITION STRUCTURE - PROFILE VIEW

N.T.S.

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
COURTYARD 1, 7800 JEFFERSON NE, ALBUQUERQUE, NM 87109 TEL (505) 823-1000 FAX (505) 821-0892

FIGURE 2

Again the transition structure will require interior walls and will be similar to Option 1 and Figure 2.

The preliminary estimated construction cost for Option 2 including contingencies is $2,161,500.00. See Appendix F for detailed cost estimate information.

**D. Option 3 - Precast Concrete Box Culvert (CBC)**

Option 3 like Option 1 uses precast conduits for the conveyance system. The difference is that under Option 3 the conduits are rectangular boxes rather than circular pipes. The inlet structure and the transition structure will be cast in place construction and will be essentially identical to Option 1. The hydraulics of Option 3 are essentially the same as Option 1 except hydraulically equivalent box sections are used instead of circular pipes. Equivalent box sizes are shown in the following table.

| RCP | Equivalent CBC (Span x Rise) |
|---|---|
| 102" | 10'x7 or 9'x8' |

Note: For RCP n=0.013
For CBC and CIPCBC n=0.015

Based on the above equivalent box sizes and cost considerations, the conveyance system under Option 3 will consist of 3050 linear feet of 9' by 8' CBC.

The preliminary estimated construction cost for Option 3 including contingencies is $2,560,900.00. See Appendix F for detailed cost estimate information.

## E. Option 4 - Cast-in-Place Concrete Box Culvert (CIPCBC)

Option 4 is very similar to Option 3. The only difference is the use of cast-in-place rectangular conduits rather than precast. Like Options 1 and 3 pressure flow occurs where possible. It is important to note that the cast-in-place boxes under Option 4 unlike the CIPCP in Option 2 are reinforced concrete and can thus be put under pressure. The hydraulics of Option 4 are identical to Option 3, consequently, the conveyance system under Option 4 will also consist of 3050 linear feet of 9' by 8' CBC.

The preliminary estimated construction cost for Option 4 including contingencies is $3,033,400.00. See Appendix F for detailed cost estimate information.

## F. Option 5 - Aluminized Steel Pipe (ASP)

Option 5 is identical to Option 1 as shown in Plates 1A - 1D except for the type of conveyance conduit. Under Option 5, ASP rather than standard RCP is proposed. Currently ASP is not approved for use by the City of Albuquerque. However, the proprietors of the product are attempting to gain approval by the City and may have approval by the time this project is ready to go to construction. Consequently, for comparison purposes ASP has been included in this report.

The preliminary estimated construction cost for Option 5 including contingencies is $1,960,700.00. See Appendix F for detailed cost estimate information.

## G. Cost Summary

The preliminary estimated costs for each of the five options (rounded to the nearest 100 dollars) are summarized in the following table.

| Option | Construction Cost* | Soft Cost** | Total Cost |
|---|---|---|---|
| 1- RCP | $2,017,300.00 | $438,500.00 | $2,455,800.00 |
| 2 - CIPCP | $1,774,700.00 | $385,800.00 | $2,160,500.00 |
| 3 - CBC | $2,103,600.00 | $457,300.00 | $2,560,900.00 |
| 4 - CIPCBC | $2,491,700.00 | $541,700.00 | $3,033,400.00 |
| 5 - ASP | $1,610,600.00 | $350,100.00 | $1,960,700.00 |

* *Includes 15% contingencies.*
** *Soft Cost estimated at 25% include engineering, City review and inspection, construction survey, testing, bond/letter of credit, and NMGRT.*

## VI. CONCLUSION

The most inexpensive conveyance system for the South Pino Tributary Arroyo is Option 5 - ASP. However, aluminized steel pipe has not been approved at this time by the City. Consequently this option is not recommended. The second least expensive option is Option 2 - CICCP. In past major High Desert storm drain projects CIPCP has been an option but bids using it were not received. Consequently the design for the project needs to allow the flexibility to construct the project as either CIPCP or RCP which is the next least expensive option.

The design plans can be modified from a normal single material design to allow for the use of either CIPCP or RCP. This may be done most simply by establishing a single profile based on the hydraulic requirements of the CIPCP. The CIPCP controls the profile since it must be non-pressure flow.

The plans can be thus set up primarily for CIPCP, with an option for RCP. This option can be shown on the same plan and profile sheets simply by listing the smaller pipe sizes for the RCP and providing alternate hydraulic grade line information and alternate invert elevations for wyes. The invert elevations for the main pipe profile will be the same for both pipe materials in most cases.

Exceptions will be accommodated using notes. The inlet structure at the desiltation pond is the same for either options so a single design will serve both options. At the downstream end of the 9' x 9' CBC (downstream of the inlet structure) the transition will vary depending on the option. The size of the pipe, 108" for CIPCP or 102" for RCP will require two different transition sections. The design will reflect the transition to a 108" CIPCP with an alternate design for the RCP option.

The most difficult design item for flexibility is the transition structure at Tramway Boulevard. To avoid generation of two structural designs for the transition structure we recommend designing it for the CIPCP option. Under this option the structure is taller (10' versus 8.5') but shorter in length (105' versus 109.5'). The construction cost of the two structures is essentially equal. The base design will also include a CIPCP option transition to the proposed 120" pipe upstream. A transition from a 10' x 10' box section to a 102" RCP will be included as an alternate. This transition and the one at the 9' x 9' CBC will be the only major items which will require two designs.

The right-of-way or easement required for the desiltation pond is approximately 5.3 acres based on the conceptual layout shown in Plate B. As progress is made on the lot layout for Tract 15 the pond configuration will be modified and an effort will be made to decrease this area. The pond volumes however, are established. These volumes are based on capturing 100% of the sediment equal to or larger in size than very fine sand for the 2-year storm and 100% of fine sand (or 96% of all sediment) for the 10-year storm. The pond is also designed to safely convey the 100-year storm into the storm drain system, while maintaining a minimum freeboard of 3.0'.

With the construction of the South Pino Tributary Storm Drain all of the drainage infrastructure for the South Pino Tributary Arroyo will be completed.

This in turn will satisfy the drainage infrastructure requirements for the east half of Tract 9, and the remainder of Tract 15.

# HIGH DESERT SUBDIVISION
# SOUTH PINO TRIBUTARY STORM DRAIN
# BASIN LAND USE FULLY DEVELOPED CONDITIONS

| BASIN NO. | BASIN NAME | AREA (SQ. MILES) | LAND TREATMENT TYPES (%) | | | | tp |
|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | |
| 30 | SPT-1 | 0.208 | 5.00 | 33.17 | 61.83 | 0.00 | 0.170 |
| 31 | SPT-2 | 0.236 | 5.00 | 8.05 | 86.95 | 0.00 | 0.133 |
| 32 | SPT-3 | 0.080 | 90.00 | 8.00 | 2.00 | 0.00 | 0.133 |
| 33 | SPT-4 | 0.127 | 89.25 | 7.60 | 2.30 | 0.85 | 0.192 |
| 34 | SPT-5 | 0.162 | 88.38 | 9.20 | 2.11 | 0.31 | 0.142 |
| 35 | SPT-6A | 0.047 | 72.76 | 5.74 | 8.00 | 13.50 | 0.168 |
| 36 | SPT-6B | 0.140 | 64.93 | 18.86 | 8.00 | 8.21 | 0.167 |
| 37A | SPT-7A1 | 0.0296 | 74.85 | 0.00 | 8.00 | 17.15 | 0.133 |
| 37B | SPT-7A2 | 0.0304 | 74.85 | 0.00 | 8.00 | 17.15 | 0.133 |
| 38 | SPT-7B | 0.046 | 74.85 | 0.00 | 8.00 | 17.15 | 0.133 |
| 39 | SPT-8A | 0.027 | 75.00 | 3.00 | 2.00 | 20.00 | 0.143 |
| 40A | SPT-8B | 0.0163 | 0.00 | 37.00 | 12.00 | 51.00 | 0.133 |
| 40B | SPT-8C | 0.018 | 0.00 | 100.00 | 0.00 | 0.00 | 0.133 |
| 40C | SPT-8D | 0.0017 | 0.00 | 37.00 | 12.00 | 51.00 | 0.133 |
| 41 | SPT-9 | 0.030 | 83.32 | 0.00 | 5.31 | 11.37 | 0.133 |

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =03/11/1997
INPUT FILE = SPT-B100.HYM USER NO.= BOHN_HNM.STE



| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| *SUMMARY | 1 | | | | | | | | | |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 2.900 |
| *S BASIN SPT-1 (30) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT1 | - | 1 | .20800 | 441.07 | 15.584 | 1.40482 | 1.533 | 3.313 | PER IMP= .00 |
| ROUTE | RSPT1 | 1 | 2 | .20800 | 440.59 | 15.584 | 1.40483 | 1.567 | 3.310 | |
| *S BASIN SPT-4 (33) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT4 | - | 3 | .12700 | 161.57 | 6.283 | .92764 | 1.567 | 1.988 | PER IMP= .85 |
| ADD HYD | SPT1&4 | 2& 3 | 4 | .33500 | 602.16 | 21.867 | 1.22389 | 1.567 | 2.809 | |
| *S BASIN SPT-2 (31) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT2 | - | 5 | .23600 | 618.88 | 19.091 | 1.51677 | 1.500 | 4.097 | PER IMP= .00 |
| ROUTE | RSPT2 | 5 | 6 | .23600 | 480.83 | 19.091 | 1.51678 | 1.567 | 3.183 | |
| *S BASIN SPT-5 (34) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT5 | - | 7 | .16200 | 264.24 | 7.949 | .92003 | 1.533 | 2.549 | PER IMP= .31 |
| ADD HYD | SPT2&5 | 6& 7 | 8 | .39800 | 727.92 | 27.039 | 1.27384 | 1.567 | 2.858 | |
| ROUTE | RSPT2&5 | 8 | 9 | .39800 | 730.88 | 27.039 | 1.27384 | 1.567 | 2.869 | |
| ADD HYD | AP23 | 4& 9 | 10 | .73300 | 1333.04 | 48.906 | 1.25101 | 1.567 | 2.842 | |
| ROUTE | RAP23 | 10 | 1 | .73300 | 1309.01 | 48.906 | 1.25101 | 1.600 | 2.790 | |
| *S BASIN SPT-6A (35) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT6A | - | 2 | .04700 | 77.91 | 3.035 | 1.21060 | 1.533 | 2.590 | PER IMP= 13.50 |
| ADD HYD | AP24 | 1& 2 | 3 | .78000 | 1381.05 | 51.941 | 1.24857 | 1.600 | 2.767 | |
| *S BASIN SPT-3 (32) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT3 | - | 4 | .08000 | 129.74 | 3.882 | .90985 | 1.500 | 2.534 | PER IMP= .00 |
| ROUTE | RSPT3 | 4 | 5 | .08000 | 101.96 | 3.882 | .90986 | 1.600 | 1.991 | |
| *S BASIN SPT-6B (36) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT6B | - | 6 | .14000 | 234.19 | 8.521 | 1.14124 | 1.533 | 2.614 | PER IMP= 8.21 |
| ADD HYD | SPT3&6B | 5& 6 | 7 | .22000 | 329.97 | 12.403 | 1.05704 | 1.567 | 2.344 | |
| ROUTE | RAP25 | 7 | 8 | .22000 | 303.60 | 12.403 | 1.05704 | 1.600 | 2.156 | |
| ROUTE | RAP24 | 3 | 9 | .78000 | 1347.74 | 51.941 | 1.24857 | 1.633 | 2.700 | |
| *S BASIN SPT-7A1 (37A) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7A1 | - | 1 | .02960 | 59.08 | 2.003 | 1.26876 | 1.500 | 3.119 | PER IMP= 17.15 |
| ADD HYD | AP26A | 8& 1 | 2 | .24960 | 348.73 | 14.405 | 1.08213 | 1.600 | 2.183 | |
| *S BASIN SPT-7A2 (37B) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7A2 | - | 15 | .03040 | 60.68 | 2.057 | 1.26876 | 1.500 | 3.119 | PER IMP= 17.15 |
| ADD HYD | AP26B | 9&15 | 16 | .81040 | 1387.29 | 53.997 | 1.24932 | 1.633 | 2.675 | |
| ROUTE RESERVOIR | PONDB | 16 | 90 | .81040 | 1364.74 | 53.837 | 1.24562 | 1.633 | 2.631 | AC-FT= 3.287 |
| ADD HYD | AP26PONDC | 90& 2 | 17 | 1.06000 | 1706.13 | 68.243 | 1.20712 | 1.633 | 2.515 | |
| ROUTE RESERVOIR | PONDC | 17 | 94 | 1.06000 | 1551.70 | 68.243 | 1.20712 | 1.700 | 2.287 | AC-FT= 5.812 |
| *S ROUTE POND OUTLOW THROUGH STORM DRAIN INLET STRUCTURE | | | | | | | | | | |
| ROUTE | RPONDOUT | 94 | 95 | 1.06000 | 1546.17 | 68.243 | 1.20712 | 1.700 | 2.279 | |
| ROUTE | RAP26 | 95 | 3 | 1.06000 | 1550.40 | 68.242 | 1.20712 | 1.700 | 2.285 | |
| *S BASIN SPT-7B (38) | | | | | | | | | | |

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7B | - | 4 | .04600 | 91.65 | 3.113 | 1.26876 | 1.500 | 3.113 | PER IMP= 17.15 |
| ADD HYD | AP27 | 4& 3 | 5 | 1.10600 | 1593.59 | 71.361 | 1.20979 | 1.700 | 2.251 | |
| ROUTE | RAP27 | 5 | 6 | 1.10600 | 1595.46 | 71.361 | 1.20979 | 1.700 | 2.254 | |
| *S BASIN SPT-8B (40A) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT2C | - | 50 | .01630 | 44.66 | 1.698 | 1.95311 | 1.500 | 4.281 | PER IMP= 51.00 |
| ROUTE | RB26A | 50 | 51 | .01630 | 44.46 | 1.698 | 1.95313 | 1.500 | 4.262 | |
| *S BASIN SPT-8C (40B) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT8C | - | 52 | .01800 | 49.59 | 1.890 | 1.96913 | 1.500 | 4.305 | PER IMP= 52.00 |
| ADD HYD | AP28A | 51&52 | 53 | .03430 | 94.05 | 3.588 | 1.96141 | 1.500 | 4.284 | |
| ROUTE | RAP28A | 53 | 50 | .03430 | 93.76 | 3.588 | 1.96144 | 1.500 | 4.271 | |
| ADD HYD | AP27A | 6&50 | 51 | 1.14030 | 1640.13 | 74.949 | 1.23240 | 1.700 | 2.247 | |
| ROUTE | RAP27 | 51 | 6 | 1.14030 | 1633.24 | 74.949 | 1.23239 | 1.700 | 2.238 | |
| *S BASIN SPT-8A (39) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.08 |
| COMPUTE NM HYD | SPT8A | - | 7 | .02700 | 50.37 | 1.832 | 1.27230 | 1.533 | 2.915 | PER IMP= 20.00 |
| ADD HYD | AP28 | 6& 7 | 56 | 1.16730 | 1659.38 | 76.781 | 1.23331 | 1.700 | 2.221 | |
| ROUTE | RAP28 | 56 | 60 | 1.16730 | 1657.39 | 76.781 | 1.23331 | 1.700 | 2.219 | |
| *S BASIN SPT-8D (40C) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT8D | - | 55 | .00170 | 4.68 | .177 | 1.95311 | 1.500 | 4.299 | PER IMP= 51.00 |
| ADD HYD | AP29 | 60&55 | 8 | 1.16900 | 1659.54 | 76.958 | 1.23436 | 1.700 | 2.218 | |
| ROUTE | RAP29 | 8 | 1 | 1.16900 | 1659.24 | 76.958 | 1.23436 | 1.733 | 2.218 | |
| *S BASIN SPT-9 (41) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT9 | - | 2 | .03000 | 55.30 | 1.819 | 1.13672 | 1.500 | 2.880 | PER IMP= 11.37 |
| ADD HYD | AP31 | 1& 2 | 13 | 1.19900 | 1681.25 | 78.776 | 1.23191 | 1.733 | 2.191 | |
| FINISH | | | | | | | | | | |

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| *SUMMARY | 1 | | | | | | | | | |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 1.930 |
| *S BASIN SPT-1 (30) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT1 | - | 1 | .20800 | 224.70 | 7.098 | .63987 | 1.533 | 1.688 | PER IMP= .00 |
| ROUTE | RSPT1 | 1 | 2 | .20800 | 224.39 | 7.098 | .63988 | 1.567 | 1.686 | |
| *S BASIN SPT-4 (33) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT4 | - | 3 | .12700 | 58.11 | 2.241 | .33087 | 1.567 | .715 | PER IMP= .85 |
| ADD HYD | SPT1&4 | 2& 3 | 4 | .33500 | 282.50 | 9.339 | .52272 | 1.567 | 1.318 | |
| *S BASIN SPT-2 (31) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT2 | - | 5 | .23600 | 334.80 | 9.037 | .71802 | 1.500 | 2.217 | PER IMP= .00 |
| ROUTE | RSPT2 | 5 | 6 | .23600 | 236.72 | 9.037 | .71802 | 1.600 | 1.567 | |
| *S BASIN SPT-5 (34) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT5 | - | 7 | .16200 | 98.35 | 2.804 | .32459 | 1.533 | .949 | PER IMP= .31 |
| ADD HYD | SPT2&5 | 6& 7 | 8 | .39800 | 321.56 | 11.842 | .55787 | 1.567 | 1.262 | |
| ROUTE | RSPT2&5 | 8 | 9 | .39800 | 321.29 | 11.842 | .55787 | 1.600 | 1.261 | |
| ADD HYD | AP23 | 4& 9 | 10 | .73300 | 602.25 | 21.181 | .54180 | 1.567 | 1.284 | |
| ROUTE | RAP23 | 10 | 1 | .73300 | 576.38 | 21.181 | .54180 | 1.633 | 1.229 | |
| *S BASIN SPT-6A (35) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT6A | - | 2 | .04700 | 35.66 | 1.363 | .54374 | 1.533 | 1.185 | PER IMP= 13.50 |
| ADD HYD | AP24 | 1& 2 | 3 | .78000 | 605.30 | 22.544 | .54192 | 1.633 | 1.213 | |
| *S BASIN SPT-3 (32) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT3 | - | 4 | .08000 | 48.53 | 1.354 | .31734 | 1.533 | .948 | PER IMP= .00 |
| ROUTE | RSPT3 | 4 | 5 | .08000 | 28.82 | 1.354 | .31735 | 1.633 | .563 | |
| *S BASIN SPT-6B (36) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT6B | - | 6 | .14000 | 101.65 | 3.623 | .48527 | 1.533 | 1.134 | PER IMP= 8.21 |
| ADD HYD | SPT3&6B | 5& 6 | 7 | .22000 | 126.34 | 4.977 | .42417 | 1.567 | .897 | |
| ROUTE | RAP25 | 7 | 8 | .22000 | 107.67 | 4.977 | .42418 | 1.633 | .765 | |
| ROUTE | RAP24 | 3 | 9 | .78000 | 580.97 | 22.544 | .54192 | 1.667 | 1.164 | |
| *S BASIN SPT-7A1 (37A) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7A1 | - | 1 | .02960 | 27.98 | .932 | .59031 | 1.500 | 1.477 | PER IMP= 17.15 |
| ADD HYD | AP26A | 8& 1 | 2 | .24960 | 125.01 | 5.909 | .44387 | 1.633 | .783 | |
| *S BASIN SPT-7A2 (37B) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7A2 | - | 15 | .03040 | 28.73 | .957 | .59031 | 1.500 | 1.477 | PER IMP= 17.15 |
| ADD HYD | AP26B | 9&15 | 16 | .81040 | 595.94 | 23.501 | .54373 | 1.667 | 1.149 | |
| ADD HYD | AP26 | 16& 2 | 17 | 1.06000 | 715.92 | 29.409 | .52022 | 1.667 | 1.055 | |
| ROUTE | RAP26 | 17 | 3 | 1.06000 | 719.76 | 29.410 | .52022 | 1.667 | 1.061 | |
| *S BASIN SPT-7B (38) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7B | - | 4 | .04600 | 43.39 | 1.448 | .59031 | 1.500 | 1.474 | PER IMP= 17.15 |
| ADD HYD | AP27 | 4& 3 | 5 | 1.10600 | 742.45 | 30.860 | .52318 | 1.667 | 1.049 | |

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| ROUTE | RAP27 | 5 | 6 | 1.10600 | 745.17 | 30.860 | .52318 | 1.667 | 1.053 | |
| *S BASIN SPT-8B (40A) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT2C | - | 50 | .01630 | 27.32 | .978 | 1.12465 | 1.500 | 2.618 | PER IMP= 51.00 |
| ROUTE | RB26A | 50 | 51 | .01630 | 27.04 | .978 | 1.12466 | 1.500 | 2.592 | |
| *S BASIN SPT-8C (40B) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT8C | - | 52 | .01800 | 30.41 | 1.092 | 1.13726 | 1.500 | 2.639 | PER IMP= 52.00 |
| ADD HYD | AP28A | 51&52 | 53 | .03430 | 57.45 | 2.069 | 1.13120 | 1.500 | 2.617 | |
| ROUTE | RAP28A | 53 | 50 | .03430 | 57.07 | 2.069 | 1.13122 | 1.533 | 2.600 | |
| ADD HYD | AP27A | 6&50 | 51 | 1.14030 | 775.39 | 32.930 | .54147 | 1.667 | 1.062 | |
| ROUTE | RAP27 | 51 | 6 | 1.14030 | 780.18 | 32.930 | .54147 | 1.667 | 1.069 | |
| *S BASIN SPT-8A (39) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.08 |
| COMPUTE NM HYD | SPT8A | - | 7 | .02700 | 24.08 | .871 | .60492 | 1.533 | 1.394 | PER IMP= 20.00 |
| ADD HYD | AP28 | 6& 7 | 56 | 1.16730 | 794.09 | 33.801 | .54293 | 1.667 | 1.063 | |
| ROUTE | RAP28 | 56 | 60 | 1.16730 | 795.08 | 33.801 | .54293 | 1.667 | 1.064 | |
| *S BASIN SPT-8D (40C) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT8D | - | 55 | .00170 | 2.86 | .102 | 1.12465 | 1.500 | 2.629 | PER IMP= 51.00 |
| ADD HYD | AP29 | 60&55 | 8 | 1.16900 | 796.52 | 33.903 | .54378 | 1.667 | 1.065 | |
| ROUTE | RAP29 | 8 | 1 | 1.16900 | 799.18 | 33.903 | .54378 | 1.667 | 1.068 | |
| *S BASIN SPT-9 (41) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT9 | - | 2 | .03000 | 24.37 | .786 | .49133 | 1.500 | 1.269 | PER IMP= 11.37 |
| ADD HYD | AP31 | 1& 2 | 13 | 1.19900 | 812.10 | 34.689 | .54246 | 1.667 | 1.058 | |
| FINISH | | | | | | | | | | |

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =02/24/1997
INPUT FILE = spt-b2.hym USER NO.= BOHN_HNM.STE



| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| *SUMMARY | 1 | | | | | | | | | |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 1.260 |
| *S BASIN SPT-1 (30) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT1 | - | 1 | .20800 | 76.48 | 2.362 | .21297 | 1.567 | .575 | PER IMP= .00 |
| ROUTE | RSPT1 | 1 | 2 | .20800 | 73.44 | 2.363 | .21297 | 1.600 | .552 | |
| *S BASIN SPT-4 (33) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT4 | - | 3 | .12700 | 5.72 | .238 | .03509 | 1.600 | .070 | PER IMP= .85 |
| ADD HYD | SPT1&4 | 2& 3 | 4 | .33500 | 79.16 | 2.600 | .14553 | 1.600 | .369 | |
| *S BASIN SPT-2 (31) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT2 | - | 5 | .23600 | 130.84 | 3.288 | .26122 | 1.533 | .866 | PER IMP= .00 |
| ROUTE | RSPT2 | 5 | 6 | .23600 | 75.98 | 3.288 | .26122 | 1.633 | .503 | |
| *S BASIN SPT-5 (34) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT5 | - | 7 | .16200 | 8.63 | .261 | .03019 | 1.533 | .083 | PER IMP= .31 |
| ADD HYD | SPT2&5 | 6& 7 | 8 | .39800 | 82.94 | 3.549 | .16718 | 1.600 | .326 | |
| ROUTE | RSPT2&5 | 8 | 9 | .39800 | 82.70 | 3.549 | .16718 | 1.633 | .325 | |
| ADD HYD | AP23 | 4& 9 | 10 | .73300 | 157.68 | 6.149 | .15729 | 1.633 | .336 | |
| ROUTE | RAP23 | 10 | 1 | .73300 | 133.71 | 6.149 | .15729 | 1.700 | .285 | |
| *S BASIN SPT-6A (35) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT6A | - | 2 | .04700 | 11.35 | .460 | .18357 | 1.533 | .377 | PER IMP= 13.50 |
| ADD HYD | AP24 | 1& 2 | 3 | .78000 | 140.53 | 6.609 | .15887 | 1.700 | .282 | |
| *S BASIN SPT-3 (32) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT3 | - | 4 | .08000 | 3.96 | .109 | .02552 | 1.533 | .077 | PER IMP= .00 |
| ROUTE | RSPT3 | 4 | 5 | .08000 | 2.30 | .109 | .02552 | 1.667 | .045 | |
| *S BASIN SPT-6B (36) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT6B | - | 6 | .14000 | 25.61 | 1.027 | .13751 | 1.533 | .286 | PER IMP= 8.21 |
| ADD HYD | SPT3&6B | 5& 6 | 7 | .22000 | 27.29 | 1.136 | .09678 | 1.567 | .194 | |
| ROUTE | RAP25 | 7 | 8 | .22000 | 19.68 | 1.136 | .09678 | 1.700 | .140 | |
| ROUTE | RAP24 | 3 | 9 | .78000 | 128.82 | 6.609 | .15887 | 1.766 | .258 | |
| *S BASIN SPT-7A1 (37A) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7A1 | - | 1 | .02960 | 9.49 | .345 | .21871 | 1.500 | .501 | PER IMP= 17.15 |
| ADD HYD | AP26A | 8& 1 | 2 | .24960 | 24.72 | 1.481 | .11123 | 1.633 | .155 | |
| *S BASIN SPT-7A2 (37B) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7A2 | - | 15 | .03040 | 9.75 | .355 | .21871 | 1.500 | .501 | PER IMP= 17.15 |
| ADD HYD | AP26B | 9&15 | 16 | .81040 | 132.46 | 6.963 | .16111 | 1.766 | .255 | |
| ADD HYD | AP26 | 16& 2 | 17 | 1.06000 | 155.19 | 8.444 | .14937 | 1.733 | .229 | |
| ROUTE | RAP26 | 17 | 3 | 1.06000 | 155.59 | 8.444 | .14937 | 1.766 | .229 | |
| *S BASIN SPT-7B (38) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT7B | - | 4 | .04600 | 14.73 | .537 | .21871 | 1.500 | .500 | PER IMP= 17.15 |
| ADD HYD | AP27 | 4& 3 | 5 | 1.10600 | 161.10 | 8.982 | .15226 | 1.767 | .228 | |

PAGE = 2

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| ROUTE | RAP27 | 5 | 6 | 1.10600 | 161.84 | 8.982 | .15226 | 1.766 | .229 | |
| *S BASIN SPT-8B (40A) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT2C | - | 50 | .01630 | 14.86 | .524 | .60296 | 1.500 | 1.424 | PER IMP= 51.00 |
| ROUTE | RB26A | 50 | 51 | .01630 | 14.66 | .524 | .60297 | 1.533 | 1.405 | |
| *S BASIN SPT-8C (40B) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT8C | - | 52 | .01800 | 16.63 | .588 | .61221 | 1.500 | 1.443 | PER IMP= 52.00 |
| ADD HYD | AP28A | 51&52 | 53 | .03430 | 30.88 | 1.112 | .60777 | 1.500 | 1.407 | |
| ROUTE | RAP28A | 53 | 50 | .03430 | 31.14 | 1.112 | .60779 | 1.533 | 1.418 | |
| ADD HYD | AP27A | 6&50 | 51 | 1.14030 | 173.46 | 10.093 | .16597 | 1.766 | .238 | |
| ROUTE | RAP27 | 51 | 6 | 1.14030 | 174.46 | 10.093 | .16597 | 1.766 | .239 | |
| *S BASIN SPT-8A (39) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.08 |
| COMPUTE NM HYD | SPT8A | - | 7 | .02700 | 8.83 | .341 | .23682 | 1.500 | .511 | PER IMP= 20.00 |
| ADD HYD | AP28 | 6& 7 | 56 | 1.16730 | 178.02 | 10.434 | .16760 | 1.766 | .238 | |
| ROUTE | RAP28 | 56 | 60 | 1.16730 | 178.20 | 10.434 | .16760 | 1.766 | .239 | |
| *S BASIN SPT-8D (40C) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.02 |
| COMPUTE NM HYD | SPT8D | - | 55 | .00170 | 1.55 | .055 | .60296 | 1.500 | 1.429 | PER IMP= 51.00 |
| ADD HYD | AP29 | 60&55 | 8 | 1.16900 | 178.75 | 10.489 | .16824 | 1.766 | .239 | |
| ROUTE | RAP29 | 8 | 1 | 1.16900 | 178.54 | 10.489 | .16824 | 1.766 | .239 | |
| *S BASIN SPT-9 (41) | | | | | | | | | | |
| SEDIMENT BULK | | | | | | | | | | PK BF = 1.10 |
| COMPUTE NM HYD | SPT9 | - | 2 | .03000 | 6.64 | .240 | .15003 | 1.500 | .346 | PER IMP= 11.37 |
| ADD HYD | AP31 | 1& 2 | 13 | 1.19900 | 181.03 | 10.729 | .16778 | 1.766 | .236 | |
| FINISH | | | | | | | | | | |

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =03/11/1997
INPUT FILE = SPT-U2.HYM USER NO.= BOHN_HNM.STE

PAGE = 1

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| *SUMMARY | 1 | | | | | | | | | |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 1.260 |
| *S BASIN SPT-1 (30) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT1 | - | 1 | .20800 | 69.53 | 2.148 | .19360 | 1.567 | .522 | PER IMP= .00 |
| ROUTE | RSPT1 | 1 | 2 | .20800 | 66.63 | 2.148 | .19361 | 1.600 | .501 | |
| *S BASIN SPT-4 (33) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT4 | - | 3 | .12700 | 5.20 | .216 | .03190 | 1.600 | .064 | PER IMP= .85 |
| ADD HYD | SPT1&4 | 2& 3 | 4 | .33500 | 71.84 | 2.364 | .13230 | 1.600 | .335 | |
| *S BASIN SPT-2 (31) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT2 | - | 5 | .23600 | 118.95 | 2.989 | .23747 | 1.533 | .788 | PER IMP= .00 |
| ROUTE | RSPT2 | 5 | 6 | .23600 | 67.83 | 2.989 | .23748 | 1.633 | .449 | |
| *S BASIN SPT-5 (34) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT5 | - | 7 | .16200 | 7.85 | .237 | .02744 | 1.533 | .076 | PER IMP= .31 |
| ADD HYD | SPT2&5 | 6& 7 | 8 | .39800 | 73.98 | 3.226 | .15198 | 1.600 | .290 | |
| ROUTE | RSPT2&5 | 8 | 9 | .39800 | 73.29 | 3.226 | .15198 | 1.633 | .288 | |
| ADD HYD | AP23 | 4& 9 | 10 | .73300 | 141.49 | 5.590 | .14299 | 1.633 | .302 | |
| ROUTE | RAP23 | 10 | 1 | .73300 | 118.14 | 5.590 | .14299 | 1.700 | .252 | |
| *S BASIN SPT-6A (35) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT6A | - | 2 | .04700 | 10.32 | .418 | .16688 | 1.533 | .343 | PER IMP= 13.50 |
| ADD HYD | AP24 | 1& 2 | 3 | .78000 | 124.33 | 6.008 | .14443 | 1.700 | .249 | |
| *S BASIN SPT-3 (32) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT3 | - | 4 | .08000 | 3.60 | .099 | .02320 | 1.533 | .070 | PER IMP= .00 |
| ROUTE | RSPT3 | 4 | 5 | .08000 | 2.09 | .099 | .02320 | 1.667 | .041 | |
| *S BASIN SPT-6B (36) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT6B | - | 6 | .14000 | 23.28 | .933 | .12501 | 1.533 | .260 | PER IMP= 8.21 |
| ADD HYD | SPT3&6B | 5& 6 | 7 | .22000 | 24.81 | 1.032 | .08798 | 1.567 | .176 | |
| ROUTE | RAP25 | 7 | 8 | .22000 | 17.89 | 1.032 | .08798 | 1.700 | .127 | |
| ROUTE | RAP24 | 3 | 9 | .78000 | 113.19 | 6.008 | .14443 | 1.766 | .227 | |
| *S BASIN SPT-7A1 (37A) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT7A1 | - | 1 | .02960 | 8.63 | .314 | .19882 | 1.500 | .456 | PER IMP= 17.15 |
| ADD HYD | AP26A | 8& 1 | 2 | .24960 | 22.47 | 1.346 | .10112 | 1.633 | .141 | |
| *S BASIN SPT-7A2 (37B) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT7A2 | - | 15 | .03040 | 8.86 | .322 | .19882 | 1.500 | .456 | PER IMP= 17.15 |
| ADD HYD | AP26B | 9&15 | 16 | .81040 | 116.50 | 6.330 | .14647 | 1.766 | .225 | |
| ADD HYD | AP26 | 16& 2 | 17 | 1.06000 | 136.59 | 7.677 | .13579 | 1.766 | .201 | |
| ROUTE | RAP26 | 17 | 3 | 1.06000 | 137.23 | 7.677 | .13579 | 1.766 | .202 | |
| *S BASIN SPT-7B (38) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT7B | - | 4 | .04600 | 13.39 | .488 | .19882 | 1.500 | .455 | PER IMP= 17.15 |
| ADD HYD | AP27 | 4& 3 | 5 | 1.10600 | 142.24 | 8.165 | .13842 | 1.767 | .201 | |

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| ROUTE | RAP27 | 5 | 6 | 1.10600 | 142.73 | 8.165 | .13842 | 1.766 | .202 | |
| *S BASIN SPT-8B (40A) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.02 | | | | | | | | |
| COMPUTE NM HYD | SPT2C | - | 50 | .01630 | 14.56 | .514 | .59114 | 1.500 | 1.396 | PER IMP= 51.00 |
| ROUTE | RB26A | 50 | 51 | .01630 | 14.37 | .514 | .59115 | 1.533 | 1.377 | |
| *S BASIN SPT-8C (40B) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.02 | | | | | | | | |
| COMPUTE NM HYD | SPT8C | - | 52 | .01800 | 16.30 | .576 | .60021 | 1.500 | 1.415 | PER IMP= 52.00 |
| ADD HYD | AP28A | 51&52 | 53 | .03430 | 30.27 | 1.090 | .59585 | 1.500 | 1.379 | |
| ROUTE | RAP28A | 53 | 50 | .03430 | 30.52 | 1.090 | .59588 | 1.533 | 1.391 | |
| ADD HYD | AP27A | 6&50 | 51 | 1.14030 | 154.12 | 9.255 | .15218 | 1.766 | .211 | |
| ROUTE | RAP27 | 51 | 6 | 1.14030 | 154.00 | 9.255 | .15218 | 1.766 | .211 | |
| *S BASIN SPT-8A (39) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.075 | | | | | | | | |
| COMPUTE NM HYD | SPT8A | - | 7 | .02700 | 8.21 | .317 | .22029 | 1.500 | .475 | PER IMP= 20.00 |
| ADD HYD | AP28 | 6& 7 | 56 | 1.16730 | 157.31 | 9.572 | .15376 | 1.766 | .211 | |
| ROUTE | RAP28 | 56 | 60 | 1.16730 | 157.30 | 9.572 | .15376 | 1.766 | .211 | |
| *S BASIN SPT-8D (40C) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.02 | | | | | | | | |
| COMPUTE NM HYD | SPT8D | - | 55 | .00170 | 1.52 | .054 | .59114 | 1.500 | 1.401 | PER IMP= 51.00 |
| ADD HYD | AP29 | 60&55 | 8 | 1.16900 | 157.84 | 9.626 | .15439 | 1.766 | .211 | |
| ROUTE | RAP29 | 8 | 1 | 1.16900 | 157.30 | 9.626 | .15439 | 1.800 | .210 | |
| *S BASIN SPT-9 (41) | | | | | | | | | | |
| *SEDIMENT BULK | TYPE=1 | BULKING FACTOR=1.10 | | | | | | | | |
| COMPUTE NM HYD | SPT9 | - | 2 | .03000 | 6.03 | .218 | .13639 | 1.500 | .314 | PER IMP= 11.37 |
| ADD HYD | AP31 | 1& 2 | 13 | 1.19900 | 159.37 | 9.844 | .15394 | 1.800 | .208 | |
| FINISH | | | | | | | | | | |

South Pino Tributary Pond - Sediment Volume

* Minimum Sediment storage volume = 5 × (Average annual sediment volume)

2yr Storm = Average Annual Storm

From the "High Desert Prudent Line Study" the average annual sediment bulking factor is 3.077% (See Following)

North Inlet (AP26A)

From AHYMO:

2-yr clear water volume = 1.346 Ac.-Ft.

(1.032 Ac.-Ft)(0.0308) = (0.0318 ac-ft.) × 5 = 0.159 ac-ft

South Inlet (AP26B)

From AHYMO:

2-yr clear water volume = 6.330 ac.-ft.

(6.330 ac-ft)(0.0308) = (0.1950 ac-ft) × 5 = 0.975 ac-ft

Minimum Storage Volume = (5)[(0.0318 ac-ft) + (0.195 ac-ft)]

= (5)(0.2268 ac-ft)

= 1.134 ac.-ft.

BOHANNAN-HUSTON INC.
ENGINEERS · PLANNERS · PHOTOGRAMMETRISTS · SURVEYORS · LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

PROJECT NAME South Pino Trib. Storm Drain SHEET OF

PROJECT NO. 97140 A01 BY DEB DATE 2/18/97

SUBJECT Desiltation Pond Calculations CH'D DATE