FINAL DRAINAGE DESIGN ANALYSIS REPORT

FOR

MONTGOMERY/EUBANK INTERSECTION IMPROVEMENTS PROJECT

September 10, 2009

PREPARED FOR

City of Albuquerque
Municipal Development Department
Transportation Division
P.O. Box 1293
Albuquerque, NM 87103

Martin J. Chavez, Mayor

COA Project #7546.91

PREPARED BY

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October 27, 2009

Mr. Bradley Bingham, P.E., C.F.M.
City Hydrologist/City Flood Plain Administrator
City of Albuquerque
Planning Department
600 2nd Street NW
Albuquerque, New Mexico 87102

RE: Montgomery and Eubank Intersection Project
COA Project No. 7546.91
Final Drainage Design Analysis Report

Dear Mr. Bingham,

Per our previous discussion on October 21, 2009, GFW is pleased to provide this copy of the Final Drainage Design Analysis Report for the above referenced project. At this time, the project has been put on hold by the City and GFW has been instructed to stop work.

Although the drainage analysis is complete, this report is lacking the final storm drain plan and profile sheets (Appendix E). Therefore, this report has not been sealed, is not being distributed to other City staff and is being provided as a courtesy. If and when the project is revived, GFW will finish the storm drain design so that this report can be finalized and sealed.

Please do not hesitate to call me at 265-8468 ext. 116 if you have any questions regarding this report. Thank you for your assistance and guidance on this important project.

Sincerely,
Gannett Fleming West, Inc.

Ray Smith

Raymond J. Smith, P.E.
Drainage Engineer

Attachments: One (1) Final DAR (Unsigned)

cc: File 50393

FINAL DRAINAGE DESIGN ANALYSIS REPORT

FOR

MONTGOMERY/EUBANK INTERSECTION IMPROVEMENTS PROJECT

CITY OF ALBUQUERQUE

Martin J. Chavez, Mayor

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Raymond J. Smith, PE, Drainage Engineer
Brad Steele, CADD Manager
Kathleen Ray, CADD Technician

I, **Raymond J. Smith**, being a licensed Professional Engineer in the state of New Mexico (NMPE #18738) certify that this report was prepared by me or under my direct supervision.

_____

Raymond J. Smith Date

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1. INTRODUCTION

Gannett Fleming West, Inc. (GFW) was retained by the City of Albuquerque to design improvements to the intersection of Montgomery Boulevard and Eubank Boulevard. This study was added to our original contract as Additional Service #1. The scope of services for this study is detailed in the proposal letter dated March 17, 2009 and identified as '*2nd Revision*'. A copy of the proposal letter is included in **Appendix A**. The City of Albuquerque project number is 7546.91.

1.1 Project Background

The Montgomery/Eubank Intersection Improvements project involves the widening of Montgomery Boulevard and Eubank Boulevard. The project includes dedicated right turn lanes, dual left turn lanes, an additional northbound thru lane on Eubank, bus bays, and reconfiguration of the center medians. The project limits are Montgomery Boulevard from Piedra Blanca Street on the west to approximately 750 feet east of Eubank Blvd., and Eubank Blvd. from Ritt Place on the south to Dona Marguerita on the north.

In order to evaluate future drainage requirements and to allow for the planning of future construction, the limits of this drainage study were expanded beyond the limits of the intersection improvements themselves. The limits of this study are Montgomery Boulevard from the high point approximately 450 feet East of Pitt Street and Moon Street on the West. The limits on Eubank are the high point approximately 500 feet North of Montgomery and the high point approximately 950 feet South of Montgomery.

A meeting with Brad Bingham, P.E., C.F.M., the City Hydrologist and Jame Eisenberg, P.E., with City Storm Drainage Design was held on April 22, 2009 to discuss the project area, drainage concepts and previous studies. During that meeting Mr. Bingham indicated that there is a low point in Montgomery at Inca, which is farther to the east from the limits of this study. Mr. Bingham expressed the desire that this study look at the feasibility of a storm drain extending to Inca Road. If it is feasible, then the intersection improvements could stub out a pipe to the east to allow for a future storm drain to extend to Inca Road in order to drain that intersection. Also, Mr. Bingham said that he would prefer that the storm drain facilities on Montgomery be increased, rather than diverting runoff to the back of the Sierra Vista Shopping Center, which was a concept that was being discussed at the time. A copy of the minutes from this meeting is included in **Appendix A**.

The Preliminary Drainage Design Analysis Report was submitted to the City of Albuquerque on July 20, 2009. The DRC meeting to review the study and the 60% Intersection Improvement Plans was held on August 4, 2009. GFW received comments on the preliminary study at the DRC meeting and also as separate transmittals. A copy of the comments received is included in **Appendix A**. This Final Drainage Design Analysis Report addresses those comments and incorporates any changes in the intersection improvements. One of the significant comments received was from City Construction Coordination. They expressed the desire that all inlets in the project either be Type 'A' or have a Type 'A' in front of a Type 'C'. Therefore, GFW will examine the feasibility of replacing existing Type 'C' inlets with Type 'A' or placing a Type 'A' in front of any existing Type 'C's.

1.2 Study Location

The intersection of Montgomery Boulevard and Eubank Boulevard is in the Northeast Heights region of Albuquerque, New Mexico. Montgomery Boulevard runs east and west and Eubank Boulevard runs north and south. The limits of the project are comprised of mostly commercial developments. The Sierra Vista

Shopping Center is on the Southwest corner of the intersection and Paradise Square Shopping Center is on the Southeast corner. **Exhibit 1.2** shows a vicinity map for the project location. The rectangle represents the limits of the study in each direction of Montgomery Blvd and Eubank Blvd.

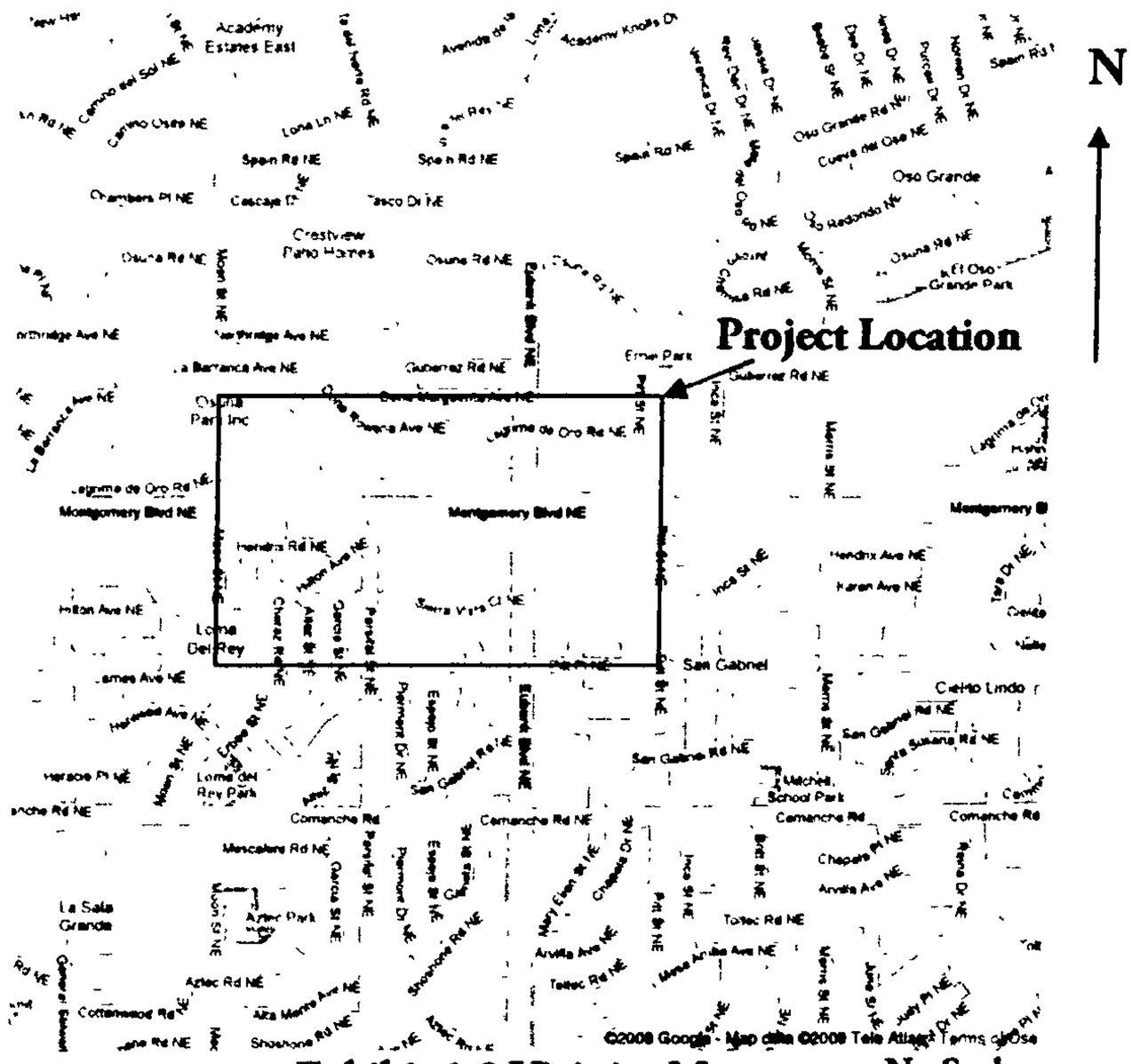


Exhibit 1.2 Vicinity Map **No Scale**

1.3 Purpose and Objectives

The purpose of this study is to examine the drainage conditions on Montgomery Boulevard and Eubank Boulevard and determine the necessary improvements. While this study will examine the requirements of the entire storm drain system, only those improvements which lie within the intersection improvements project will be incorporated into those plans at the 65% level. The remaining improvements, which lie outside the limits of the intersection improvements project, will be left for future construction.

The objectives of this study are as follows:

1. Determine the drainage patterns for the adjacent properties and for the roadway itself.
2. Use hydrologic analysis to calculate the peak runoff rate for the project basins.
3. Use hydraulic analysis and curb capacities to determine the location of storm drain inlets.
4. Use hydraulic analysis to determine the size of the main storm drain system.
5. Estimate the total construction cost of the system.

2. EXISTING CONDITIONS

2.1 Flood Zones

Current FEMA flood plain maps were researched on the FEMA Map Service Center website. As shown on **Exhibits 2.1A and 2.1B,** FEMA Firmettes, the limits of the study area do not contain any flood hazard zones.

2.2 Previous Studies

Each of the developments adjacent to the roadways should have produced an individual drainage study. **Exhibit 2.2** shows previous drainage studies for the project area that are listed in the City GIS system. GFW personnel researched City drainage archives and were able to locate four of them. A description of each is included in the following subsections and a copy of the grading and drainage plan for each study is included in **Appendix B**.

2.2.1 Extra Space Storage *(FID 3926, 3975, 3976, 3979)*

The commercial development for Extra Space Storage includes the Starbucks, the Circle K and the Valvoline Oil Change. The site is located on Montgomery Boulevard, east of Eubank Boulevard and lies between the Staples and the Veterinary Care Animal Hospital. The grading and drainage plan was prepared by D. Mark Goodwin & Associates, P.A. in November of 1996 and indicates that the site is divided into three regions. The Extra Space Storage and the Starbucks drain into an underground retention system, the Circle K drains to an above ground retention pond and the Valvoline Oil Change drains to a sidewalk culvert, which discharges directly into Montgomery Boulevard.

2.2.2 Staples *(FID 3958)*

According to the grading and drainage plan, the Staples store on the northeast corner of Montgomery and Eubank used to be a bank. The grading and drainage plan for Security Federal Addition No.1 was prepared by Dekker Perich Sabatini and is dated February 21, 2000. According to the plan, the entire site drains to a modified Type 'C' inlet at the southwest corner of the lot. This inlet discharges into the back of a curb inlet in Eubank Boulevard via a 12" connector pipe.

2.2.3 Pinnacle Commons Office Complex *(FID 3983)*

The Pinnacle Commons office development lies on Montgomery Boulevard, just west of Dona Marguerita Ave. The grading and drainage plan was prepared by Dekker Perich Sabatini and is dated February 14, 2000. According to the plan, the entire site drains to the southwest corner of the property where it discharges directly onto Montgomery Boulevard via three (3) 24" sidewalk culverts.

2.2.4 Sierra Vista Shopping Center *(FID 4085)*

The Sierra Vista Shopping Center lines on the southwest corner of Montgomery Blvd and Eubank Blvd. The shopping center contains several stores and restaurants including; Kmart, Taco Bell, Panda Express, Samurai Sushi and Firestone Tires. In researching drainage studies for the shopping center, GFW located an 'Update to Drainage Master Plan', which was prepared by Leedshill-Herkenhoff, Inc. and is dated September 27, 1993. The purpose of this update was for the addition of an equipment building for Bell Atlantic Metro Mobile. A notation on the plan states that it is based upon the Drainage Master Plan developed by Goodwin Eng. It is presumed that this refers to D. Mark Goodwin & Associates, P.A. The original Drainage Master Plan could not be located in City records. However, the update does contain the original flow routing and states that the project results in no net change to impervious area or existing drainage paths. According to the plan, runoff for the entire shopping center drains toward the south and enters a drainage easement.

2.3 Existing Drainage Patterns

GFW personnel conducted a field investigation of the project limits on May 19, 2009, to determine the existing drainage patterns. This information was used to develop the drainage basin maps shown in

Exhibits 2.3A and 2.3B. For clarity, the drainage area was divided into regions and a separate numbering sequence was used for the basins in each region. The offsite drainage patterns for each region are discussed in their own sections and then the drainage for each street is addressed. **Table 2.3** summarizes the offsite drainage basins.

Table 2.3
Drainage Basins Summary

Basin	Description	Area (Acres)	Area (Sq mi)	Comment
105	Staples	1.77	0.00277	Discharge to SD
110	Valvoline	0.39	0.00062	Sidewalk Culvert to Montgomery
120	4550 Eubank	1.17	0.00183	Discharge onto Eubank
125	Circle K/Valvoline	0.59	0.00093	Discharge to Montgomery
130	Circle K	0.98	0.00154	Detention Pond
140	Storage/Starbucks	4.87	0.00761	Underground Retention
145	VCA Animal Hospital	2.32	0.00362	On-site Retention
150	Pitt Street	0.34	0.00053	Discharge to Montgomery
155	First Christian Church	1.90	0.00296	Discharge to Montgomery
160	Church Parking	1.90	0.00297	Discharge to Pitt Street
205	Paradise Square	7.54	0.01178	Discharge to Low Point on Eubank
210	Comfort Foods/BBQ/Sonic	3.63	0.00568	Sidewalk Culvert to Montgomery
215	Sierra Meadows Apts.	7.69	0.01201	Discharge to Low Point on Eubank
220	State Farm/Vacant	1.60	0.00249	Discharge to Montgomery
305	Sierra Vista Shopping Center	19.31	0.03018	Drains South to Separate SD
310	Firestone Entrance	0.12	0.00018	Discharge to Montgomery
315	Offices/Karate	1.74	0.00273	Discharge to Montgomery
320	Commercial	1.84	0.00288	Discharge to Alley
325	Enterprise	0.18	0.00028	Discharge to Montgomery
405	Chevron	0.69	0.00108	French Drain
410	Landscape Strip	0.09	0.00013	Sidewalk Culvert to Montgomery
415	People's Flower's	0.29	0.00046	Discharge to Montgomery
420	Lower Terrace Circle	0.31	0.00049	Discharge to Montgomery
425	Pizza Hut/DDS	0.88	0.00138	Discharge to Lower Terrace Circle
430	MVD Express	0.45	0.00071	On-site Retention
435	MVD Entrance	0.02	0.00003	Discharge to Lower Terrace Circle
440	Fishback Dance Studio	0.86	0.00135	On-site Retention
445	Kinder Care/Wendy's	1.56	0.00244	Detention Pond
450	Dona Marguerita	0.35	0.00055	Discharge to Montgomery

455	Pinnacle Commons	3.48	0.00543	Sidewalk Culvert to Montgomery
465	ABQ Health Partners	1.64	0.00257	On-site Retention

2.3.1 North of Montgomery, East of Eubank

The eastern limit of the watershed is a high point in Montgomery Boulevard east of Pitt Street. The property adjacent and on the north side of Montgomery Blvd is the First Christian Church. The Church is divided into two basins. The parking lot for the Church and the back portion of the building make up **Basin 160**, which drains to the southwest corner of the lot and onto Pitt Street. The remainder of the Church building and property makes up **Basin 155**, which drains south onto Montgomery Blvd. Pitt Street, north of Montgomery Blvd makes up **Basin 150** and drains south to Montgomery Blvd. The Veterinary Care Animal Hospital and a portion of the town houses behind it make up **Basin 145**. This basin drains to a retention pond in the front of the hospital. It is believed that this pond is retention as no outfall could be seen. **Basin 140** is comprised of the Extra Space Storage facility and a Starbucks. Both sites drain to inlets located on the property which, as shown on the grading and drainage plan, discharge into an underground retention system. Most of the Circle K on the property makes up **Basin 130**, which drains to a detention pond at the front of the site. The pond outfall discharges directly into the Montgomery Blvd storm drain. Portions of the Circle K and the Valvoline Oil Change, along with a dirt lot in the back, make up **Basin 125**. This basin discharges directly onto Montgomery Blvd. The remainder of the Valvoline Oil Change, **Basin 110**, drains to a sidewalk culvert, which discharges directly onto Montgomery Blvd. **Basin 105** is the Staples at the northeast corner of Montgomery Blvd and Eubank Blvd. As shown on the grading and drainage plan, it does drain to an inlet at the southwest corner. There is a small area west of the building that appears to pond due to the grading of the lot. Behind the Staples is an office building at 4550 Eubank Blvd. This site makes up **Basin 120**, which drains west to Eubank Blvd.

2.3.2 South of Montgomery, East of Eubank

The property adjacent and on the south side of the watersheds eastern limit is a portion of a residential subdivision. This area drains to the south and does not contribute to the runoff on Montgomery Blvd. The first basin on the south side is **Basin 220**, which is comprised of the intersection of Pitt Street, a State Farm Insurance office and a vacant commercial building. This basin drains north directly onto Montgomery Blvd. West of **Basin 220** is a commercial development consisting of a Sonic Drive-in, the Whole Hog BBQ Café and a large building in the back. The large building in the back is divided between the Comfort Foods and a Tae Kwon Do school. This entire development, with the exception of the west half of the large building makes up **Basin 210**. **Basin 210** drains to the northwest corner of the site. At this point the runoff enters concrete channels, which wrap around the Whole Hog BBQ. These channels also catch roof runoff from the BBQ Café and discharge onto Montgomery Blvd via a large sidewalk culvert. **Basin 205**, at the southeast corner of Montgomery and Eubank is the Paradise Square shopping center. There are water blocks at the entrance points on Montgomery and the site drains west to Eubank. South of Paradise Square is the Sierra Meadows apartment complex. This complex makes up **Basin 215** and is the southern limit of the watershed on Eubank. **Basins 205 and 215** discharge onto Eubank Blvd and their runoff is collected at the low point by a large cattle guard inlet, which straddles the entrances to both developments.

2.3.3 North of Montgomery, West of Eubank

The northern limit of the watershed is a high point in Eubank Boulevard. Adjacent to this highpoint, on the west side of the street is MVD Express. Most of this site is **Basin 430** and drains to a retention pond in the

back of the property. A small portion of the parking lot does drain south onto Lower Terrace Circle and was separated as **Basin 435**. **Basin 425** is comprised of most of the Pizza Hut and a Dental Office. This basin drains north onto Lower Terrace Circle. Lower Terrace Circle, **Basin 420,** has a water block on the east end at Eubank and drains west and south to Montgomery Blvd. The Fishback Dance Studio on the north side of Lower Terrace Circle is **Basin 440**. This property drains to a retention pond in the back, northwest corner. **Basin 445** is comprised of the Kinder Care facility and the Wendy's restaurant. Both of these sites drain to two ponds at the west end, which are connected in series by a pipe. There is a small discharge pipe from the pond, which runs southwest and ends in the face of the curb on Montgomery Blvd. It is our opinion that these two ponds act as a sort of French drain, which discharges into Montgomery at a very low rate. The People's Flower Shop on the northeast corner of Montgomery Blvd and Lower Terrace Circle makes up **Basin 415** and drains south onto Montgomery Blvd. The Chevron station at the northwest corner of Eubank and Montgomery makes up **Basin 405**. This basin drains to a low point at the southwest corner of the lot, into what appears to be a French drain. **Basin 410** is a landscape strip between the Chevron and People's Flower Shop. This landscaping drains to a sidewalk culvert on the south and directly onto Montgomery Blvd.

West of the Wendy's restaurant, the area from Piedra Blanca to Dona Marguerita is part of a residential subdivision. Piedra Blanca has a water block and drains north. The residential lots along Montgomery Blvd face north and drain in that direction. Dona Marguerita also has a water block, but it appears to be far enough north that the first home on the corner would drain to the south. Therefore, a portion of the street and this house was designated as **Basin 450**. West of Dona Marguerita is the Pinnacle Commons office complex. This was designated as **Basin 455** and, as shown in the grading and drainage plan it does drain to sidewalk culverts at the southwest corner of the property. Adjacent to the west end of the property is a drainage channel, which discharges south onto Montgomery as well. This appears to be the drain for the back side of the buildings and was included in **Basin 455**. West of the Pinnacle Commons office complex is ABQ Health Partners, which makes up **Basin 465**. This basin drains west to an on-site retention/detention pond. An outfall for the pond could not be located and this discharge point would lie outside the limits of this study.

2.3.4 South of Montgomery, West of Eubank

The southwest corner of the intersection of Montgomery Blvd and Eubank Blvd contains the Sierra Vista Shopping Center. This site is defined as **Basin 305** and is lower than either street. However, there are water blocks at all the entrances and it does not appear that any runoff enters the shopping center. As shown in the grading and drainage plan, runoff on the site drains to the south end of the property. The drainage easement shown on the plan contains a series of concrete lined channels, which act as a detention pond system. At the west end of the shopping center is an access to the Firestone Tire store. There is a water block in this access, but it was deemed to be far enough south that a portion of the access was designated as **Basin 310**. West of the shopping center, between **Basin 310** and Hilton Place is a row of commercial properties, which were designated as **Basin 315**. **Basin 315** is comprised of offices, a karate school and an empty lot. All of these sites drain north onto Montgomery Blvd, thus they were combined into one basin. Between Hilton Place and Moon Street is another row of commercial properties, **Basin 320**. However, there is an alley way behind these lots with a valley gutter running down the middle of it. All of these lots, with the exception of part of one, drain to the south into this alley way. The alley way drains west into Moon Street and therefore, **Basin 320** drains outside the limits of this study. The front half of the Enterprise Car Rental lot does drain north directly onto Montgomery Blvd and was therefore designated as a separate basin, **Basin 325**.

2.3.5 Montgomery Boulevard Drainage

Montgomery Boulevard drains east to west, beginning at the high point east of Pitt Street. On the north side of Montgomery Blvd, east of Eubank, it appears that runoff in the street is exceeding curb capacity at some of the entrances. For example, **Photo 2.3.5A** shows evidence of erosion behind the sidewalk at the west end of the entrance into Staples. This would seem to indicate that runoff is flowing up the curb ramp and into the landscape area. This is due to a sufficient velocity caused by the relatively steep grade of Montgomery Blvd (approximately 3%).

Photo 2.3.5A - North Side of Montgomery, East of Eubank
Evidence of Erosion Behind Sidewalk

At the intersection of Eubank Blvd, it appears that runoff along the north curb line flows away from the curb, toward the median, before it gets to the intersection. Therefore, it appears that the existing inlets at the northeast curb return are ineffective in collecting runoff. **Photo 2.3.5B** shows the existing inlets at the northeast curb return. It is possible to see that, not only does the road tend to slope away from them, but the wear in the road surface forces runoff to channelize away from them, outside the gutter pan. Both of these conditions would seem to indicate that, either the storm drain lacks capacity or the location of inlets is inadequate to collect runoff in appropriate locations.

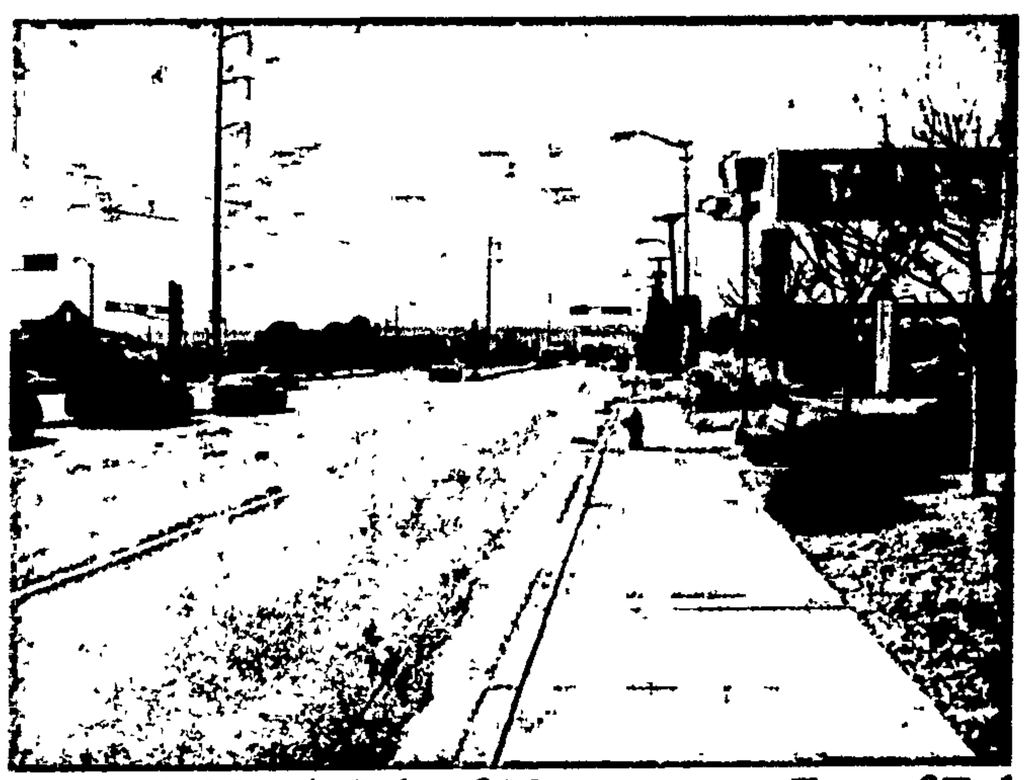


Photo 2.3.5B-North Side of Montgomery, East of Eubank
Curb Inlets at Northeast Return

At the southwest corner of the intersection it appears that runoff does overtop the curb at the return and flows through the landscaping for the Taco Bell property. GFW interviewed the manager of the Taco Bell and she indicated that erosion damage occurs at least once a year, primarily during severe storm events. She stated that the runoff tends to cause flooding of their drive thru area. Visually, it does appear that there is a low point in front of their drive thru window that would result in permanent retention. **Photo 2.3.5C** shows clear evidence of erosion damage on the Taco Bell property. This particular instance is the result of a storm that occurred on the evening of July 21, 2009.

Photo 2.3.5C-Evidence of Erosion Damage On Taco Bell Property (July 22, 2009)

West of Eubank, on Montgomery Blvd, there is evidence that the storm drain system is not functioning properly due to maintenance concerns. **Photo 2.3.5D** shows the existing inlet at Analysis Point 9 (AP-9) is clogged with sediment and debris.

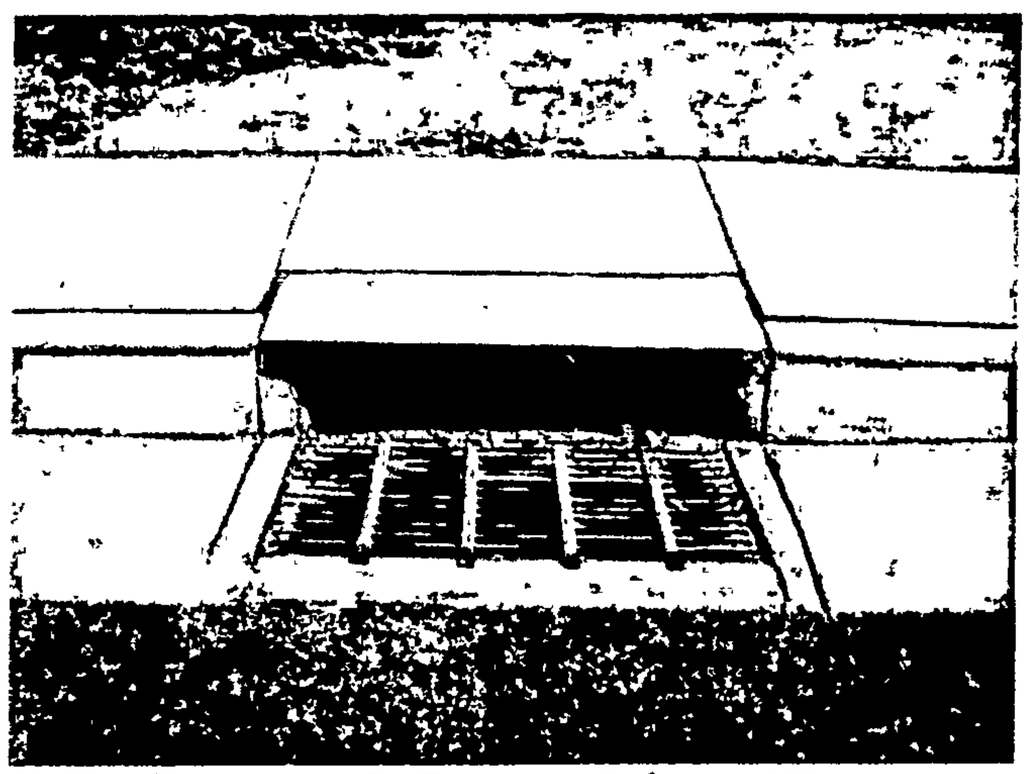


Photo 2.3.5D-Existing Inlet at AP-9 is Clogged with Sediment and Debris

2.3.6 Eubank Boulevard Drainage

Eubank Boulevard drains north to south, beginning at a high point in front of the MVD Express. The low point, south of Montgomery is in front of the Sierra Meadows Apartment Complex. There is a large 'cattle guard' inlet on the east side of the street, which collects the runoff from the apartment complex as well as the Paradise Square shopping center. The high point on the south end of the watershed is just past the end of the apartment complex.

2.4 Existing Storm Drain System

GFW has obtained information on the existing storm drain system from five different sources. Surveying Control, Inc. performed a topographic survey for the design of the intersection improvements in April of 2008. TBE Group performed Subsurface Utility Engineering Plans for the intersection improvements in April of 2009. GFW also obtained as-built drawings and GIS system mapping from the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Lastly, the City of Albuquerque Master Drainage Study was consulted as well. All five sources appear to be consistent and show the main storm drain, inlet locations and laterals. **Exhibit 2.4** shows the GIS system mapping from the ABCWUA for the existing storm drain system and **Table 2.4,** on the following page, shows the information for the existing main line from the Albuquerque Master Drainage Study.

Table 2.4
Albuquerque Master Drainage Study Inventory of Existing Storm Sewers[1]

San Gabriel Village Storm Sewer System 322		Pipe Size (in.)	Type	Length (ft.)	Slope (ft/ft)	Velocity (ft/s)	Capacity (cfs)	10-yr Discharge (cfs)	100-yr Discharge (cfs)	Map No.
From	To									
S-CO 640' E. OF EUBANK	S-OO 340' E. OF EUBANK	27"	RCP	300'	0.0213	9.9	39	23	64	G-21
S-OO 340' E. OF EUBANK	S-16 EUBANK	27"	RCP	340'	0.0213	9.9	39	31	89	G-21
S-16 EUBANK	S-15 2300' E. OF MOON	27"	RCP	250'	0.026	10.9	43	39	109	G-20
S-15 2300' E. OF MOON	S-14 2050' E. OF MOON	27"	RCP	250'	0.026	10.9	43	40	113	G-20
S-14 2050' E. OF MOON	S-13 1750' E. OF MOON	27"	RCP	300'	0.026	10.9	43	41	118	G-20
S-13 1750' E. OF MOON	S-12 1400' E. OF MOON	27"	RCP	350'	0.026	10.9	43	42	124	G-20
S-12 1400' E. OF MOON	S-11 1050' E. OF MOON	27"	RCP	350'	0.026	10.9	43	43	130	G-20
S-11 1050' E. OF MOON	S-10 700' E. OF MOON	27"	RCP	350'	0.026	10.9	43	44	136	G-20
S-10 700' E. OF MOON	S-9 350' E. OF MOON	27"	RCP	350'	0.030	11.7	46	46	112	G-20
S-9 350' E. OF MOON	S-8 MOON	30"	RCP	350'	0.0173	9.5	47	47	118	G-20

3. INTERSECTION IMPROVEMENTS

The intersection improvements project involves the redesign of the intersection to provide better traffic flow and capacity. As stated in **Section 1.1**, the Montgomery/Eubank Intersection Improvements project involves

[1] *Albuquerque Master Drainage Study, Volume III*, Bohannan-Huston, Inc., January 1981, (3B-12 - 3B-13)

the widening of Montgomery Boulevard and Eubank Boulevard. The project includes dedicated right turn lanes, dual left turn lanes, an additional northbound thru lane on Eubank, bus bays, and reconfiguration of the center medians. The project limits are Montgomery Boulevard from Piedra Blanca Street on the west to approximately 750 feet east of Eubank Blvd., and Eubank Blvd. from Pitt Place on the south to Dona Marguerita on the north. The two elements of the intersection improvements, which are likely to affect drainage, are the widening of the roadway and the modification of the crown transitions on the legs of the intersection. **Exhibit 3** shows a plan view of the proposed improvements with proposed contours to illustrate flow patterns in the intersection. Drainage basins for both Montgomery and Eubank were created based on the flow patterns created by the intersection improvements and are also shown on **Exhibits 2.3A and 2.3B**.

4. ENGINEERING ANALYSIS

4.1 Methodology and Criteria

The analyses in this study were performed according to the requirements in the *City of Albuquerque Development Process Manual (DPM), October 2008 Revision; Chapter 22 - Drainage, Flood Control and Erosion Control.* The hydrologic analysis was performed using the AHYMO_97 computer program. Street capacity calculations were performed in accordance with the DPM and were checked against the *Street Capacity Plate 22.3 D-3*, contained in the DPM. Inlet capacity was determined using *Grating Capacities for Type 'A', 'C' and 'D' – Plate 22.3 D-5* and *Grating Capacities for Type Double 'C' and 'D' – Plate 22.3 D-6*, contained in the DPM. The hydraulic design of the storm drain system was created using Bentley's StormCAD V8i design software.

The land treatments used by the AHYMO Computer program for hydrologic modeling are described in Section 22.2 of the DPM and are shown below in **Table 4.1A**.

Table 4.1A
Land Treatment Classifications

Treatment	Land Condition
A	Soil uncompacted by human activity with 0 to 10 percent slopes. Native grasses, weeds and shrubs in typical densities with minimal disturbance to grading, groundcover and infiltration capacity. Croplands. Unlined arroyos
B	Irrigated lawns, parks and golf courses with 0 to 10 percent slopes. Native grasses, weeds and shrubs, and soil uncompacted by human activity with slopes greater than 10 percent and less than 20 percent.
C	Soil compacted by human activity. Minimal vegetation. Unpaved parking, roads, trails. Most vacant lots. Gravel or rock on plastic (desert landscaping). Irrigated lawns and parks with slopes greater than 10 percent. Native grasses, weeds and shrubs, and soil uncompacted by human activity with slopes at 20 percent or greater. Native grass, weed and shrub areas with clay or clay loam soils and other soils of very low permeability as classified by SCS Hydrologic Soil Group D.
D	Impervious areas, pavement and roofs.

In lieu of measuring the impervious area of each drainage basin, the DPM gives a table of the percent of impervious area for land use types. **Table 4.1B**, on the following page, shows the percent of Treatment D that can be assigned to each basin. The percentage of the remaining land treatments was assigned to each basin based on field observations.

Table 4.1B
Percent Treatment D Based on Land Use

Land Use	Percent D
Commercial	90
Single Family Residential N=units/acre, N≤6	$7*\sqrt{((N*N)+(5*N))}$
Multiple Unit Residential Detached Attached	 60 70
Industrial Light Heavy	 70 80
Parks, Cemeteries	7
Playgrounds	13
Schools	50
Collector & Arterial Streets	90

The following excerpt from the DPM contains the design criteria for the hydraulic design of storm drain systems with regard to allowable street flow.

Street Hydraulics[2]

Critical street hydraulic design criteria are as follows:

a. Manning's roughness coefficient is 0.017.
b. Conjugate and/or sequent depth in the event of the 100-year design discharge may not exceed 0.2 feetabove curb height and shall be contained within the street right-of-way.
c. Flow depths in the event of the 10-year design discharge may not exceed 0.5 feet in any collector or arterial street. One lane free of flowing or standing water in each traffic direction must be preserved on arterial streets.
d. The product of depth times velocity shall not exceed 6.5 in any location in any street in the event of a 10-year design storm (with velocity calculated as the average velocity measured in feet per second and depth measured at the gutter flowline in feet.)

For streets with more than two driving lanes in each direction:

a. The product of depth times velocity may not exceed 6.5 at any location in any street in the event of a 10-year design storm (with velocity calculated as the average velocity measured in feet per second and depth measured at the gutter flowline in feet).

[2] *Development Process Manual (DPM): Chapter 22.3 Street Hydraulics,* City of Albuquerque, October 2008 Revision.

b. Inverted crown streets are prohibited.

c. The assumption of equal flow distribution between gutters on undivided streets and between street sections on divided streets is only valid where its validity can be demonstrated.

4.2 Rainfall Data

In accordance with the DPM, the design storm for this study is the 100-year, 6-hour event as defined by the NOAA Atlas 2, *Precipitation-Frequency Atlas of the Western United States.* The approximate location for the project area was determined to be 35.1305d N and 106.5183d W. Using this location; Point Precipitation Frequency Estimates were downloaded from the National Weather Service's Precipitation Frequency Data Server (PFDS). The printout from the PFDS website is included in **Appendix C. Table 4.2** below summarizes the rainfall depths for design storm events.

Table 4.2
Rainfall Depths for Design Storm Events

Precipitation Duration	Storm Event (in)		
	2yr	10yr	100yr
15 min	0.44	0.70	1.12
1 hr	0.73	1.17	1.86
6 hr	1.08	1.63	2.50
24 hr	1.39	2.03	3.03

4.3 Hydrology

Because they do not contribute to the runoff on either Montgomery Blvd or Eubank Blvd, the following basins were excluded from the hydrologic modeling; 140, 145, 305, 320, 405, 430, 440, 465. **Table 4.3A** shows the land treatments assigned to each of the remaining basins that are included in the hydrologic model. The 500 series was assigned to the roadway basins.

Table 4.3A
Drainage Basin Land Treatments

Basin	Area (Sq mi)	Land Treatment %			
		A	B	C	D
105	0.00277	0	0	10	90
110	0.00062	0	0	10	90
120	0.00183	0	0	10	90
125	0.00093	0	5	5	90
130	0.00154	0	5	5	90
150	0.00053	0	0	0	100
155	0.00296	0	5	5	90
160	0.00297	0	0	10	90

205	0.01178	0	0	10	90
210	0.00568	0	0	10	90
215	0.01201	0	20	10	70
220	0.00249	0	0	10	90
310	0.00018	0	0	0	100
315	0.00273	0	0	10	90
325	0.00028	0	0	10	90
410	0.00013	0	10	40	50
415	0.00046	0	0	10	90
420	0.00049	0	0	0	100
425	0.00138	0	0	10	90
435	0.00003	0	0	0	100
445	0.00244	0	0	10	90
450	0.00055	0	10	10	80
455	0.00543	0	0	10	90
510	0.00147	0	0	10	90
515	0.00221	0	0	10	90
520	0.00050	0	0	10	90
525	0.00146	0	0	10	90
530	0.00050	0	0	10	90
535	0.00064	0	0	10	90
540	0.00116	0	0	10	90
545	0.00160	0	0	10	90
550	0.00119	0	0	10	90
555	0.00157	0	0	10	90
560	0.00100	0	0	10	90
565	0.00125	0	0	10	90
570	0.00093	0	0	10	90
575	0.00108	0	0	10	90

Using the basin maps, a flow diagram was created, which shows the routing of runoff through the project. The flow diagram is shown on the following page, in **Exhibit 4.3**. Each analysis point represents a proposed inlet or series of inlets. A dashed line represents a basin (130 & 105) that discharges directly into the storm drain system via an offsite area inlet or detention pond. The hydrologic model was created in AHYMO_97 and **Table 4.3B**, on the following page, summarizes the peak 100 year flow rates for each analysis point. The output reports from the AHYMO_97 modeling are included in **Appendix C**.

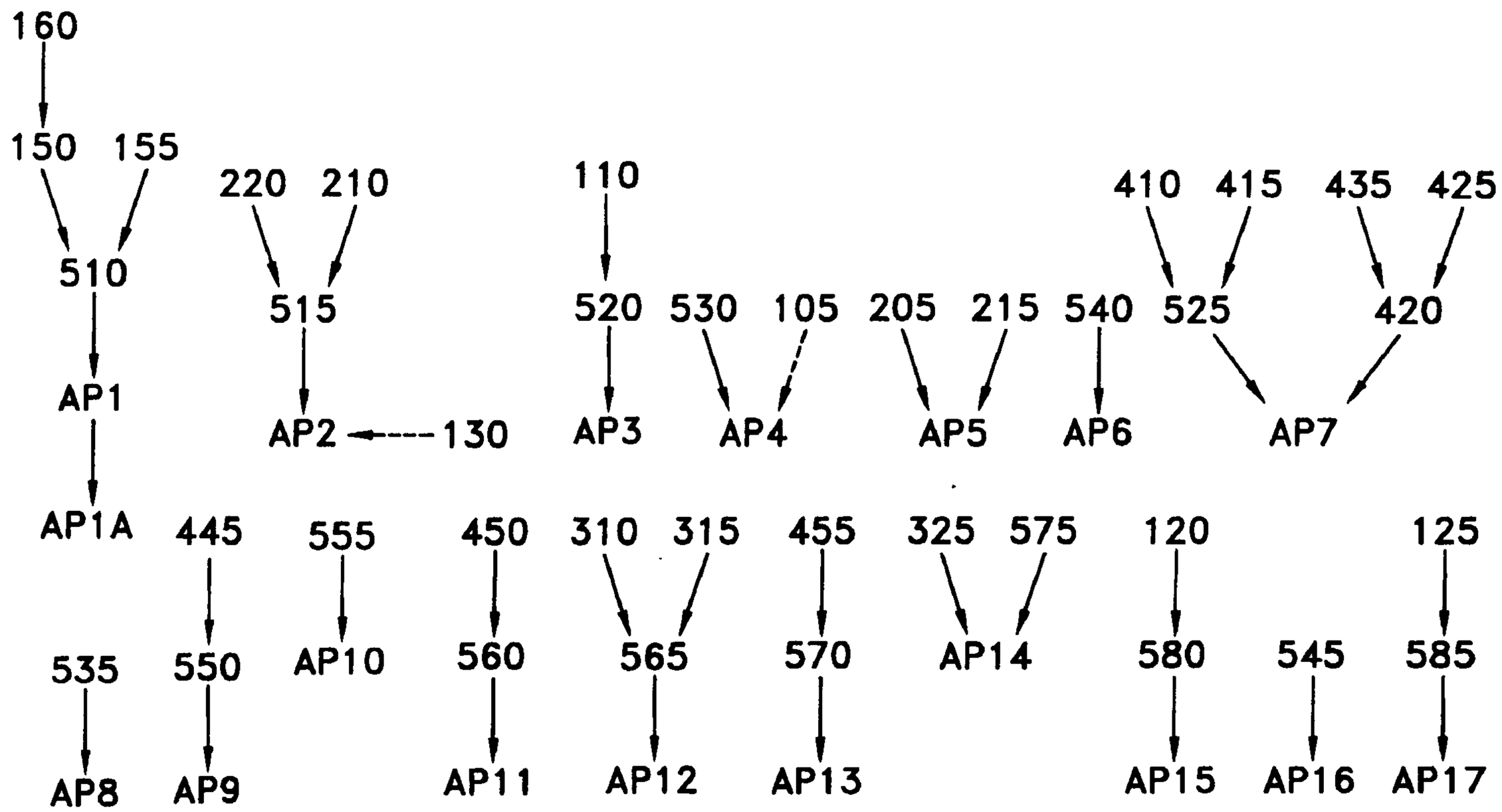


Exhibit 4.3 Flow Diagram

Table 4.3B Peak Flow Rates by Analysis Point									
Analysis Point	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
Peak 100 yr Q	22.60	28.26	3.22	1.44	64.41	3.32	7.82	1.84	
Analysis Point	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Peak 100 yr Q	10.37	4.49	4.37	11.90	18.14	3.90	8.72	4.57	4.00

4.4 Street and Inlet Capacity

Inlet placement was determined not only by street capacity but by the flow patterns created by the intersection improvements, to help ensure that inlets will be effective. The street capacity, inlet capacity and inlet spacing were calculated using a spreadsheet, which was based on the DPM Plates. A copy of the spreadsheet is included in **Appendix D** and the results are summarized below in **Table 4.4**. Pursuant to the comments from the City of Albuquerque, GFW examined the feasibility of replacing the existing Type 'C' inlets at Analysis Points 9, 10 & 12 and found that they could be replaced with Type 'A' inlets.

Table 4.4 Street Hydraulics Summary								
Analysis Point	**Q (cfs)**	**Q (Carry Over)**	**Q Total (cfs)**	**Total Capture (cfs)**	**Bypass (cfs)**	**Bypass Target**	**Exist Inlets**	**Proposed Inlets**
AP-1	22.60	0.00	22.60	22.60	0.00	NA	None	Triple D "Cattle Guard"
AP-2	28.26	0.76	29.02	29.02	0.00	NA	None	Single A + Single A
AP-3	3.22	0.00	3.22	3.22	0.00	NA	None	6.5' Median Inlet, No

								Grate
AP-4	1.44	0.00	1.44	1.44	0.00	NA	None	6.5' Median Inlet, No Grate
AP-5	64.41	0.00	64.41	64.41	0.00	NA	Cattle Guard In Sump	Keep Existing
AP-6	3.32	0.00	3.32	3.32	0.00	NA	Type A In Sump	Keep Existing
AP-7	7.82	1.04	8.86	8.86	0.80	NA	None	Single A
AP-8	1.84	0.00	1.84	0.00	1.84	AP-10	None	None
AP-9	10.37	0.00	10.37	10.37	0.00	NA	Single C	Replace w/ Single A*
AP-10	4.49	1.84	6.33	6.33	0.00	NA	Single C	Replace w/ Single A*
AP-11	4.37	0.00	4.37	0.00	6.24	AP-13	None	None
AP-12	11.90	0.00	11.90	11.60	0.29	AP-14	Double C	Replace w/ Single A*
AP-13	18.14	4.37	22.51	23.60	0.00	NA	None	Single A + Single C
AP-14	3.90	0.29	4.19	0.00	3.90	OUT	None	None
AP-15	8.72	0.00	8.72	7.70	1.04	AP-7	None	Single A
AP-16	4.57	0.00	4.57	4.57	0.00	NA	None	6.5' Median Inlet, No Grate
AP-17	4.00	0.00	4.00	3.24	0.76	AP-2	None	6.5' Median Inlet, No Grate

*Existing Type 'C' Inlets show sufficient capacity, replacement with Type 'A' at the discretion of the City.

4.5 Storm Drain Hydraulics

The existing main line storm drain was analyzed with the new inlet placement and flow rates and found to be inadequate. Therefore, the system was designed with a new main line storm drain. Within the limits of the intersection improvements, a 36" main line is required. West of the improvements project limits the storm drain increases to a 42" and then a 48" main line. The StormCAD output for the entire study length, including a pipe report, plan views and conceptual profiles is contained in **Appendix D**.

A conceptual evaluation of the intersection of Montgomery Blvd and Inca Road found that it is feasible for a storm drain to be extended in order to drain that intersection. The distance from the east end of the proposed main line storm drain to the intersection is approximately 1,488 feet and the relative elevation difference was found to be approximately 33 feet. Therefore, a storm drain could be extended to the intersection at a grade of approximately 2%.

5. RECOMMENDATIONS

Based on an examination of the hydrology and hydraulics of the intersection of Montgomery Blvd and Eubank Blvd, it is apparent that not only are the existing inlets not functioning due to placement, but the main storm drain is undersized. It is recommended that a new inlet configuration be constructed in conjunction with the intersection improvements and the existing main line storm drain be removed and replaced with a 36" diameter pipe. It is also recommended that a stub out from the easternmost manhole be constructed to allow for the possibility of extending the storm drain east in order to drain the intersection of Montgomery Blvd and Inca Road.

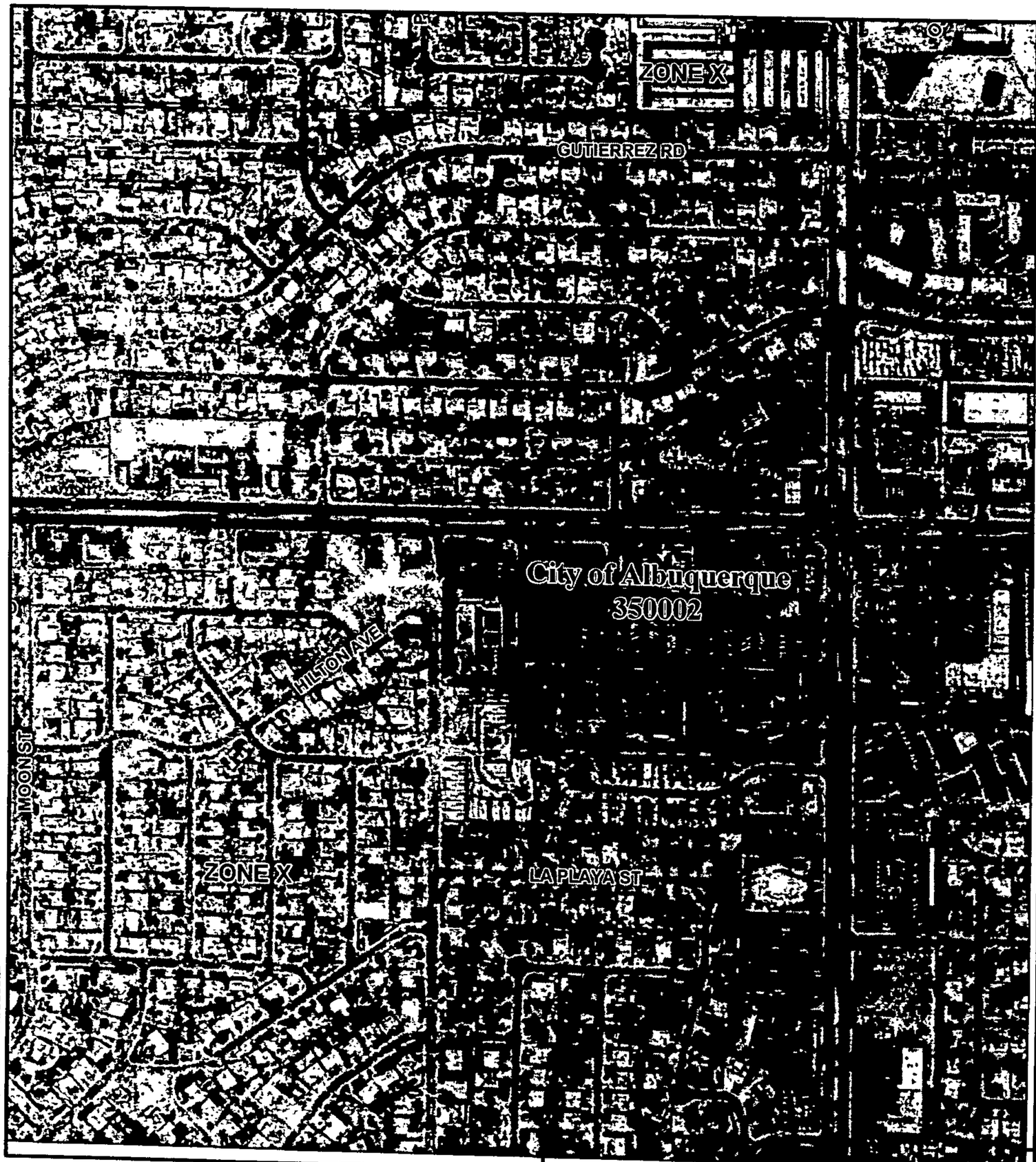
If it is the City of Albuquerque's wish to have a Type 'A' inlet as the first upstream inlet at any inlet location, then it is recommended that the existing Type 'C' inlets at AP-9, AP-10 & AP-12 be replaced with Type 'A'

inlets. In our opinion it is not necessary to add additional inlets at those locations. The existing inlets show sufficient capacity. However, Type 'C' inlets do show that they may present a maintenance problem.

The preliminary plan and profile sheets for the proposed storm drain system, within the limits of the intersection improvements are included in **Appendix E**. It is recommended that these plans be included in the construction of the intersection improvements. It is also recommended that the remainder of the storm drain system be reconstructed when possible. At the very least, cleaning of the existing inlet at AP-9 and the addition of inlets at AP-13 would improve the drainage of Montgomery Blvd, west of the intersection improvements.

6. ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

The construction cost for the entire study area storm drain system is approximately $802,000, including current NMGRT rates. The construction cost for the storm drain within the intersection improvements is approximately $380,000, including current NMGRT rates. These estimates are for the storm drain portion of the construction only and do not include any potential roadway work, such as removal and replacement of asphalt, curb & gutter etc. However, they do include a 30% contingency. A copy of the detailed cost estimate spreadsheets is contained in **Appendix F**.



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0143G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 143 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE CITY OF	350002	0143	G

Notice to User The **Map Number** shown below should be used when placing map orders the **Community Number** shown above should be used on insurance applications for the subject community

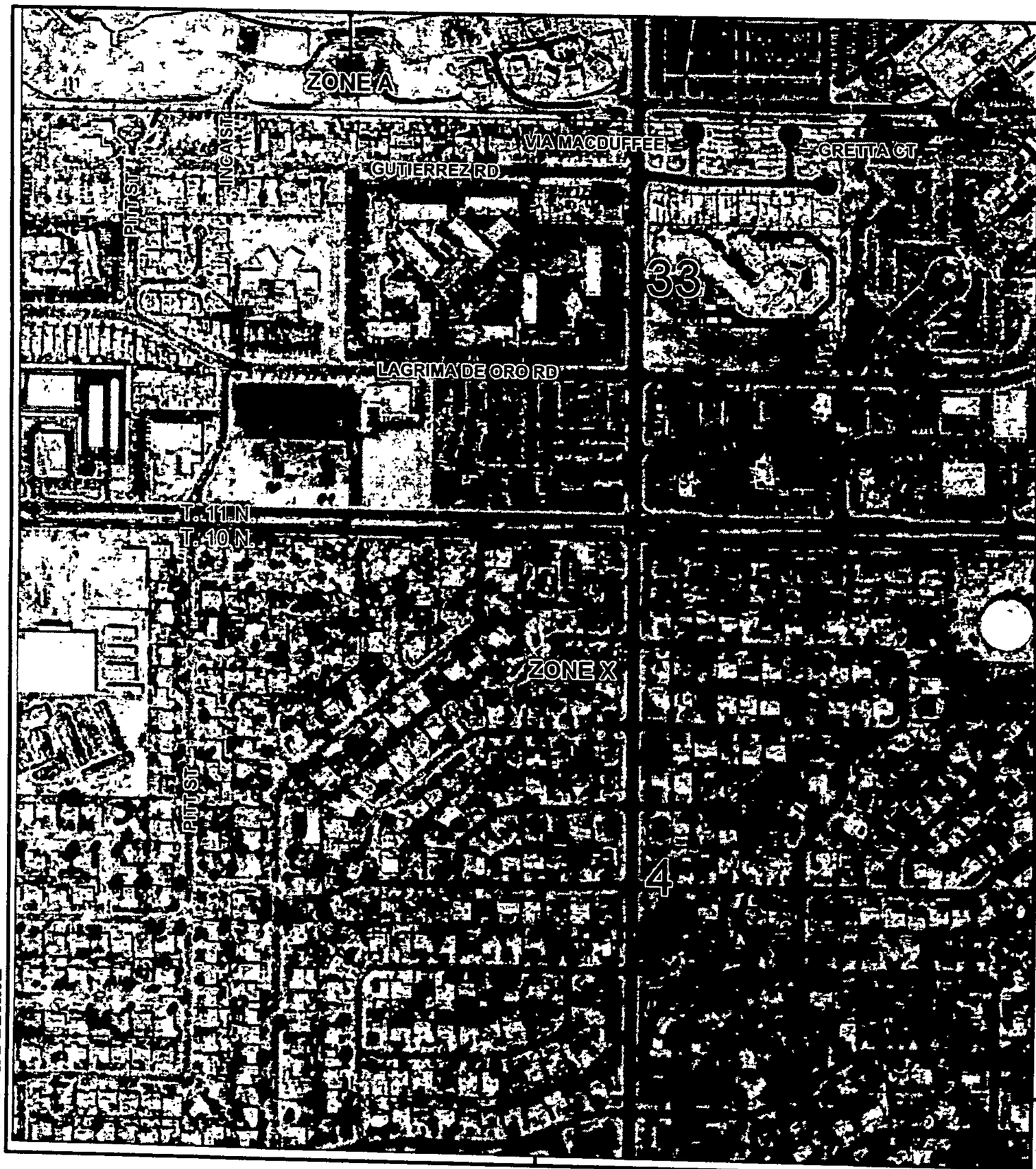
MAP NUMBER
35001C0143G

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map It was extracted using F-MIT On-Line This map does not reflect changes or amendments which may have been made subsequent to the date on the title block For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc fema gov

EXHIBIT 2.1A



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0144G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 144 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE CITY OF	350002	0144	G

Notice to User The **Map Number** shown below should be used when placing map orders the **Community Number** shown above should be used on insurance applications for the subject community

MAP NUMBER
35001C0144G

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

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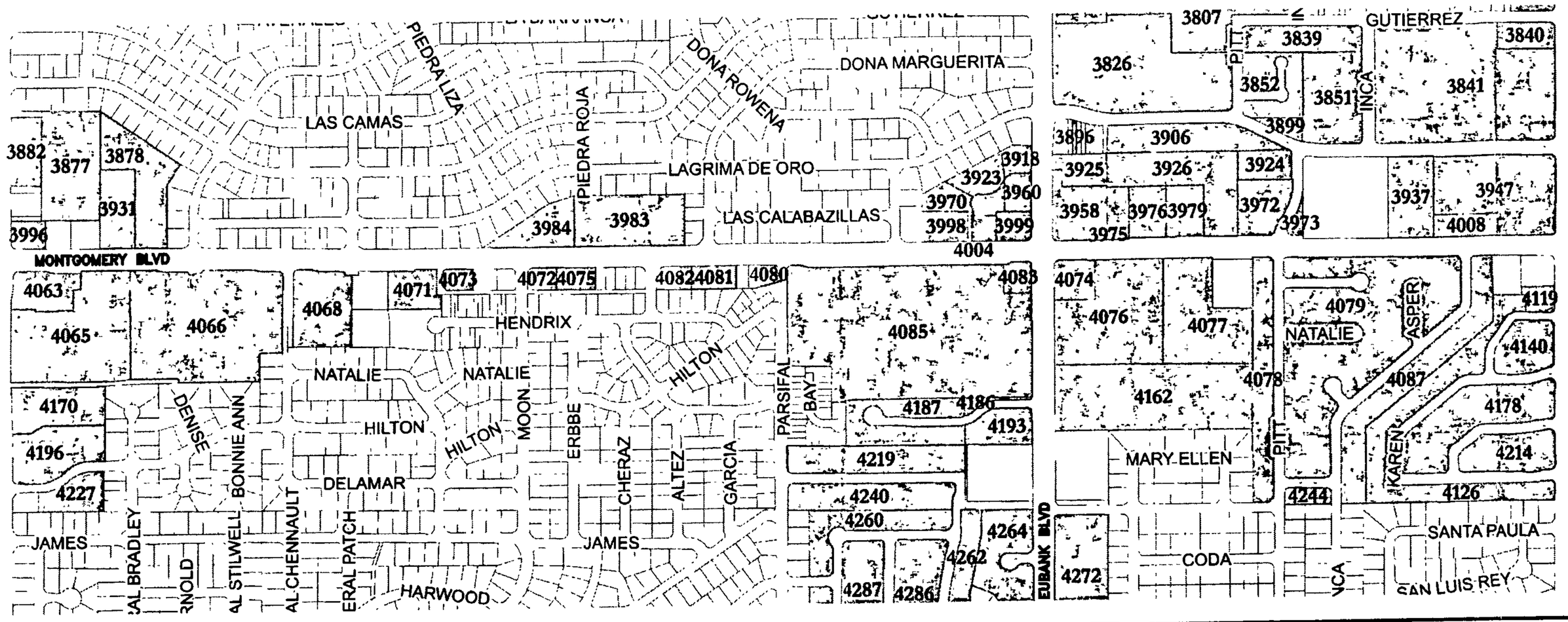
EXHIBIT 2.1B



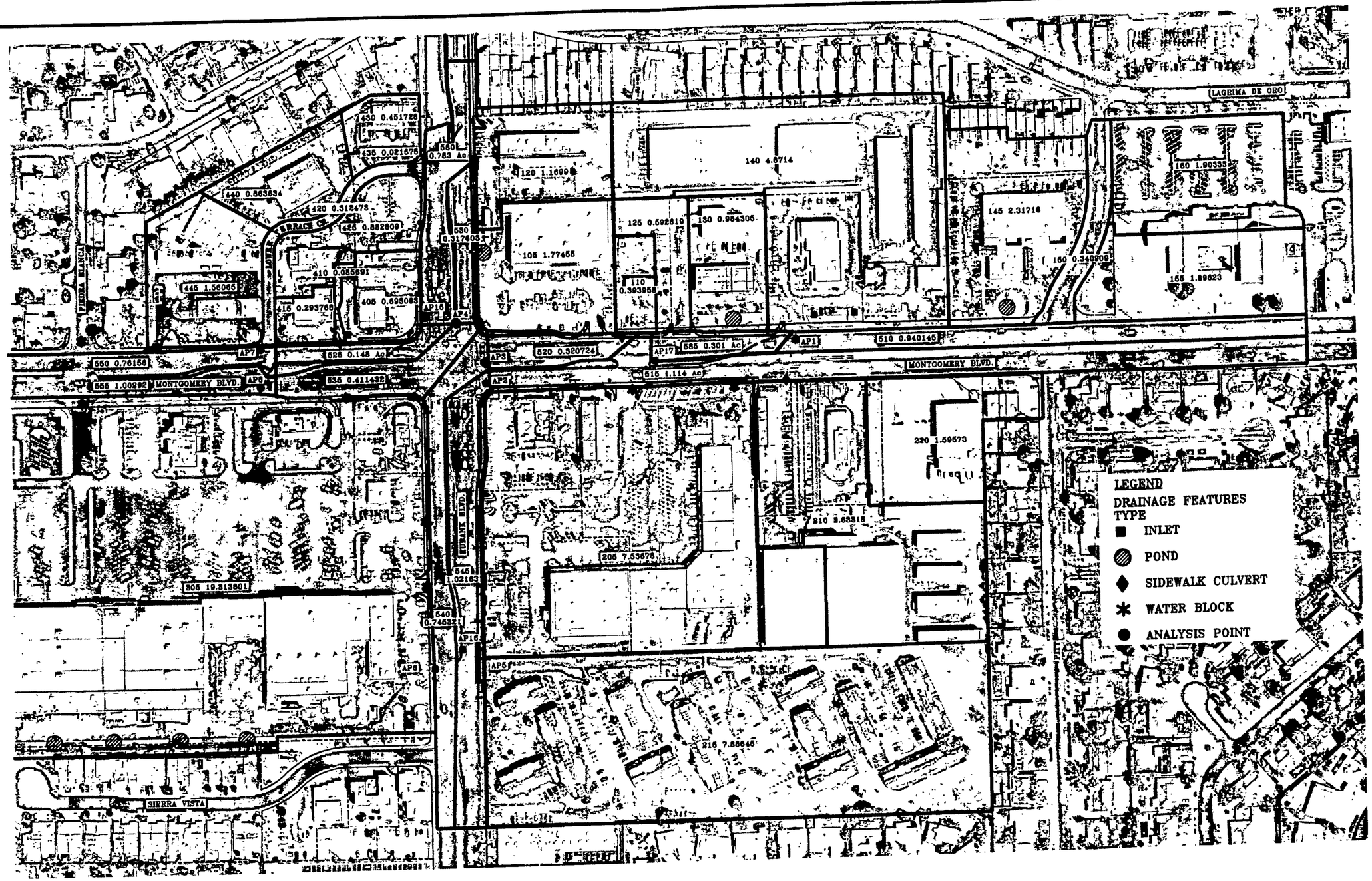
FID	NUMBER	HYDRO_	HYDRO_ID	PROJECT	ENGINEER	RECEIVED
3807	045	3809	106	FAR NE HEIGHTS SENIOR CITIZEN CENTER	E=DMJM/AHA	8/31/1984
3826	039	3828	112	PARK ARROYO APTS.	TRINITY ENTERPRISES	
3839	055	3841	114	BRYANT-WEAVER JOINT VENTURE	BOYLE ENGINEERING CORP.	6/16/1986
3840	056	3842	115	DAY CARE CENTER	LOGAN/GROSS & ASSOC.	9/24/1986
3841	041	3843	116	LINCOLN MEADOWS APARTMENTS	BOHANNAN-HUSTON INC.	4/2/1984
3851	054	3853	117	HERITAGE HEALTH CARE	BPLW ARCH. & ENG.	6/18/1990
3852	061	3854	118	CHAPARRAL COURTYARDS	RESOURCE TECHNOLOGY INC	6/16/1986
3877	019	3879	57	THOMAS RESERVOIR	TOM MANN & ASSOCIATES, INC.	4/24/1987
3878	025	3880	58	GOLDEN TARGET STORAGE	ALDAZ ENGINEERING & SURVEYING	9/20/1995
3882	005	3884	59	QUARTERS BEEF RESTAURANT	CHAVEZ-GRIEVES	9/22/1995
3896	071	3898	122	MOUNTAIN BREEZE SUB	MARVIN KORTUM	11/3/1997
3899	048	3901	123	LAGRIMA DE ORO TOWNHOUSE	DUANE LOGAN	7/22/1985
3906	032	3908	127	LAGRIMN DE ORO	EARL L MAYNE ARCH.	
3918	015	3920	60	TR 16- OFIAMIANO GUTIERREZ (LOWER TERRACE)		
3923	015A	3925	61	FISHBACK SCHOOL OF DANCE	ENCHANTMENT ENGINEERING	12/12/1984
3924	053B	3926	129	KRUZICH-PRD	BPLW	3/1/1993
3925	012A	3927	130	P & R DEVELOPMENT CO.	HALL ENGINEERING	9/14/1984
3926	053	3928	131	CONTINENTAL SQUARE	EASTERLING & ASSOCIATES INC.	2/28/1986
3931	020	3933	62	GOLDEN CORRAL	BOHANNAN-HUSTON, INC	6/23/1987
3937	057	3939	134	10151 MONTGOMERY NE	TOM MANN & ASSOCIATES INC.	12/3/1986
3947	035	3949	142	FIRST CHRISTIAN CHURCH	JEFF MORTENSEN & ASSOCIATES	12/27/1996
3958	012	3960	143	SECURITY SERVICE CORP.	THOMAS MANN	
3960	015F	3962	63	PIZZA HUT		
3969	015D	3971	64	WORMAN OFFICE BUILDING -	A & E ENGINEERING	9/30/1985
3970	015	3972	65	TR 16- OFIAMIANO GUTIERREZ (LOWER TERRACE)		
3972	053A	3974	144	LA GRIMA DE ORO VET CLINIC	WEISS-HINES ENGINERRING INC.	12/6/1988
3973	053A	3975	145	LA GRIMA DE ORO VET CLINIC	WEISS-HINES ENGINERRING INC.	12/6/1988
3975	053D	3977	147	VALVOLINE	MARK GOODWIN	5/30/1997
3976	053C	3978	148	PHILLIPS 66	MARK GOODWIN & ASSOCIATES	10/4/1996
3979	053E	3981	151	MONTGOMERY PROPERTIES	MOLZEN CORBIN	6/24/1997
3983	026	3985	66	PINNACLE COMMONS	ISAACSON & ARFMAN	10/26/1999
3984	023	3986	67	LOVELACE HEALTH CLINIC	WEISS-HINES ENGINEERING, INC	5/16/1990
3996	027	3998	68	TEXACO @ MONTGOMERY/WYOMING	MARK GOODWIN & ASSOCIATES	12/23/2000
3998	015B	4000	69	WENDY'S OLD FASHIONED HAMBURGERS	REX/NORTON	8/1/1978
3999	015E	4001	70	SIERRA VISTA CHEVRON	JEFF MORTENSEN & ASSOCIATES	2/1/1996
4004	015C	4006	71	PEOPLE'S FLOWER SHOP	SUBHAS K. SHAH	11/30/1977
4008	040	4010	158	MONTGOMERY WEST OFFICE BUILDING	BLACKWELL ENGR.	5/15/1985
4063	023	4065	1	PHILLIPS PETROLEUM	TOM MANN & ASSOCIATES INC.	6/10/1986
4065	001	4067	2	ACADEMY SHOPPING CENTER	FLATOW-MOORE-BRYANT-FAIRBURN/BOHANNAN HUSTON	12/1/1986

FID	NUMBER	HYDRO_	HYDRO_ID	PROJECT	ENGINEER	RECEIVED
4066	017	4068	3	ACADEMY SHOPPING CENTER TARGET DEVEOPMENT	BOHANNAN HUSTON INC.	12/1/1986
4068	004A	4070	4	FHP MEDICAL CLINIC	BPLW ENGINEERS & ARCHITECTS	12/17/1990
4071	004B	4073	5	EL PINTO RESTAURANT	BRASHER & LORENZ ENGINEERING	12/5/1996
4072	030	4074	6	PLAZA NATIONAL BANK		
4073	033	4075	7	BLAKE'S LOTA BURGER	LEE ENGINEERING	4/13/1992
4074	032	4076	1	SHONEY'S ON MONTGOMERY	D. MARK GOODWIN & ASSOCIATES, PA	10/18/1991
4075	011	4077	8	ANDY'S RESTAURANT	BURK-BURK ARCH.	3/30/1982
4076	007	4078	2	GALLERIA MALL	ENCHANTMENT ENGINEERING	
4077	031	4079	3	FURROW'S	FRANK LOVELADY	10/15/1991
4078	013	4080	4	SAN GABRIEL VILLAGE #4	JOHN G. LEVERTON	
4079	013	4081	5	SAN GABRIEL VILLAGE #4	JOHN G. LEVERTON	
4080	022	4082	9	KING DENTAL	TOM MANN & ASSOCIATES INC.	5/28/1986
4081	027	4083	10	DR. ROMERO'S OFFICE	TOM MANN & ASSOCIATES INC	2/3/1988
4082	024	4084	11	OFFICE ARTHUR MAULDIN		11/1/1979
4083	002D	4085	12	TACO BELL	TOM MANN & ASSOCIATES	9/14/1984
4085	002	4087	13	SIERRA VISTA SHOPPING CENTER	GOLDBERG-MANN	
4087	013	4089	6	SAN GABRIEL VILLAGE #4	JOHN G. LEVERTON	
4119	015	4121	9	TOLTEZ PARK	C.C.I.C.	
4126	014	4128	10	TOLTEZ SUBD.	RALPH HICKS	
4140	014	4142	11	TOLTEZ SUBD.	RALPH HICKS	
4162	008	4164	12	MISSING FILE		
4170	020	4172	14	LOS ALTOS THEATRE	CHAVEZ-GRIEVES	11/7/1985
4178	014	4180	13	TOLTEZ SUBD.	RALPH HICKS	
4186	002C	4188	15	TRACT A OFFICE	TOM MANN	3/22/1984
4187	002A	4189	16	SIERRA VISTA TOWNHOUSE	TOM MANN & ASSOCIATES	
4193	003	4195	17	EUBANK OFFICE PLAZA (SEE ALSO 002B)	TOM MANN & ASSOCIATES INC.	5/15/1986
4196	036	4198	18	SHEPHARD LUTHERN CHURCH	MARK HOLSTEAD	11/9/1992
4214	014	4216	14	TOLTEZ SUBD.	RALPH HICKS	
4219	007	4221	19	ROYAL HEIGHTS UNIT 5	MCINTIRE-QUIROS	
4227	021	4229	20	WILLIAM WILSON SUBDIVISION	HALL ENGINEERING	3/19/1986
4240	007	4242	21	ROYAL HEIGHTS UNIT 5	MCINTIRE-QUIROS	
4244	013	4246	15	SAN GABRIEL VILLAGE #4	JOHN G. LEVERTON	
4260	006	4262	22	ROYAL HEIGHTS UNIT 2	RALPH HICKS	
4262	006	4264	23	ROYAL HEIGHTS UNIT 2	RALPH HICKS	
4264	010	4266	24	EUBANK OFFICE COMPLEX	TOM MANN	
4272	029	4274	19	BEREAN BAPTIST CHURCH ADDITION	LOGAN/GROSS & ASSOCIATES	4/19/1988
4286	006	4288	25	ROYAL HEIGHTS UNIT 2	RALPH HICKS	
4287	006	4289	26	ROYAL HEIGHTS UNIT 2	RALPH HICKS	

MONTGOMERY/EUBANK - DRAINAGE STUDY INDEX MAP

EXHIBIT 2.2

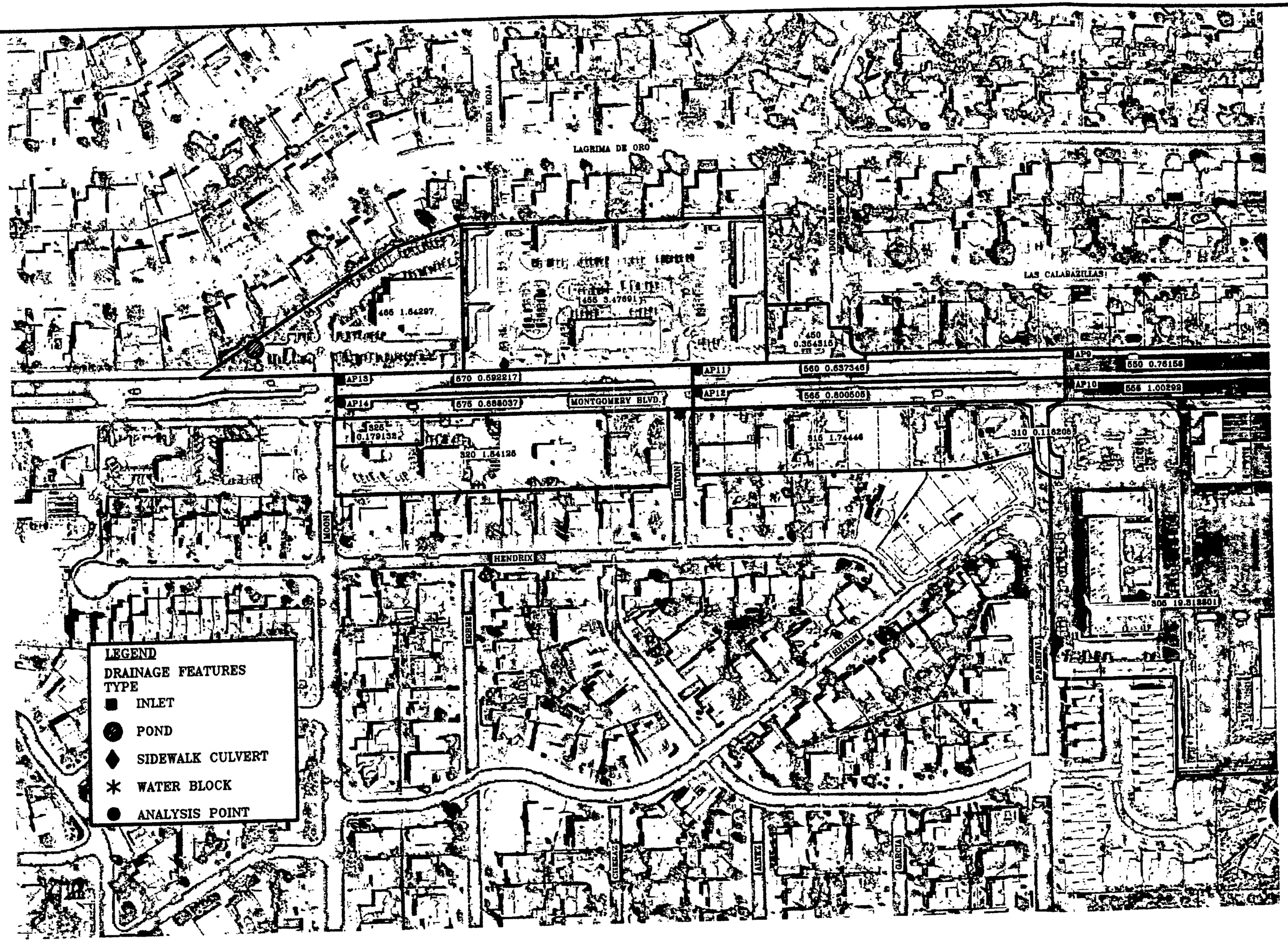
Gannett Fleming West, Inc.



MONTGOMERY & EUBANK DRAINAGE BASINS

EXHIBIT 2.3A

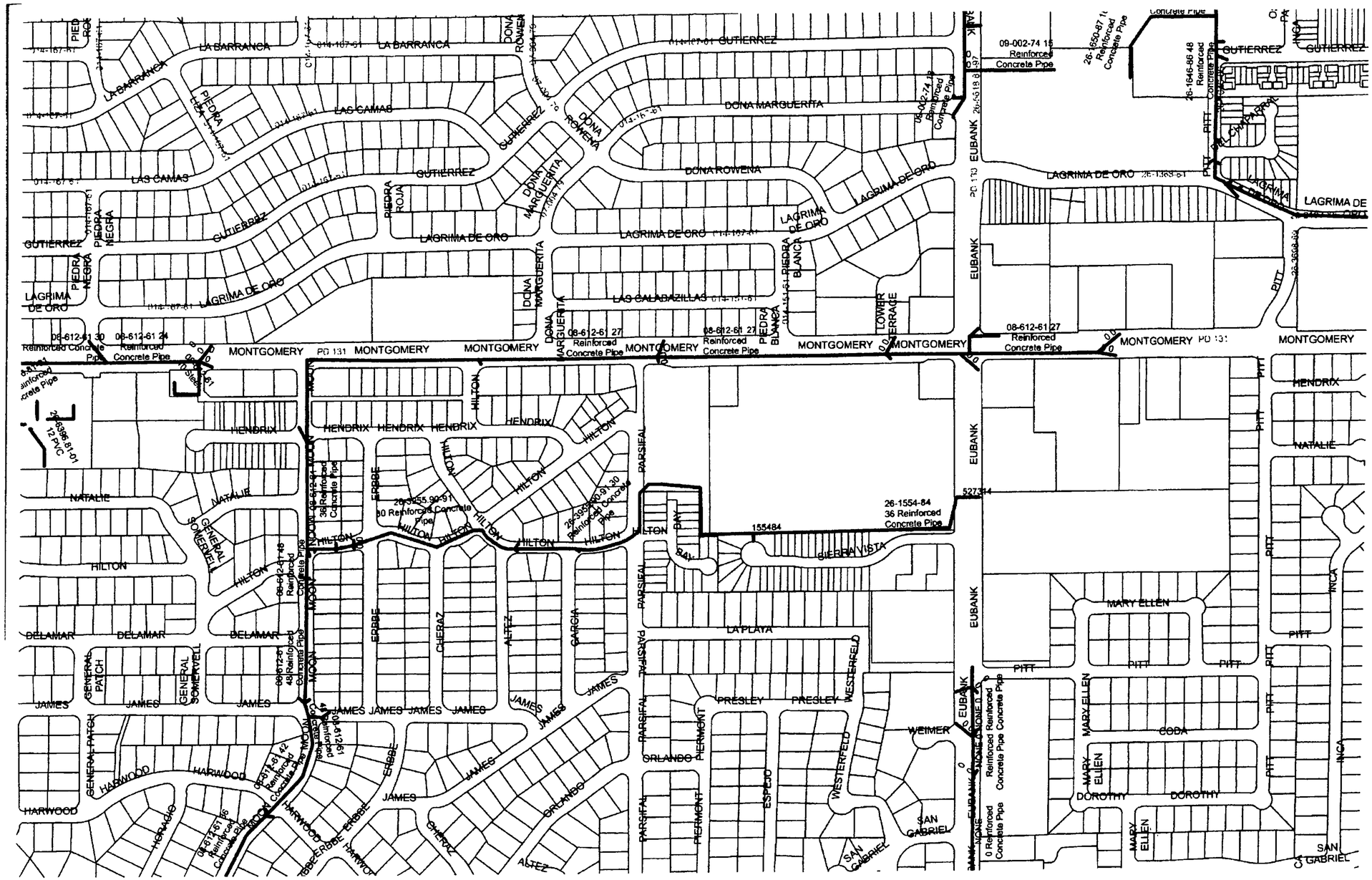
Gannett Fleming West, Inc.



MONTGOMERY & EUBANK DRAINAGE BASINS

EXHIBIT 2.3B

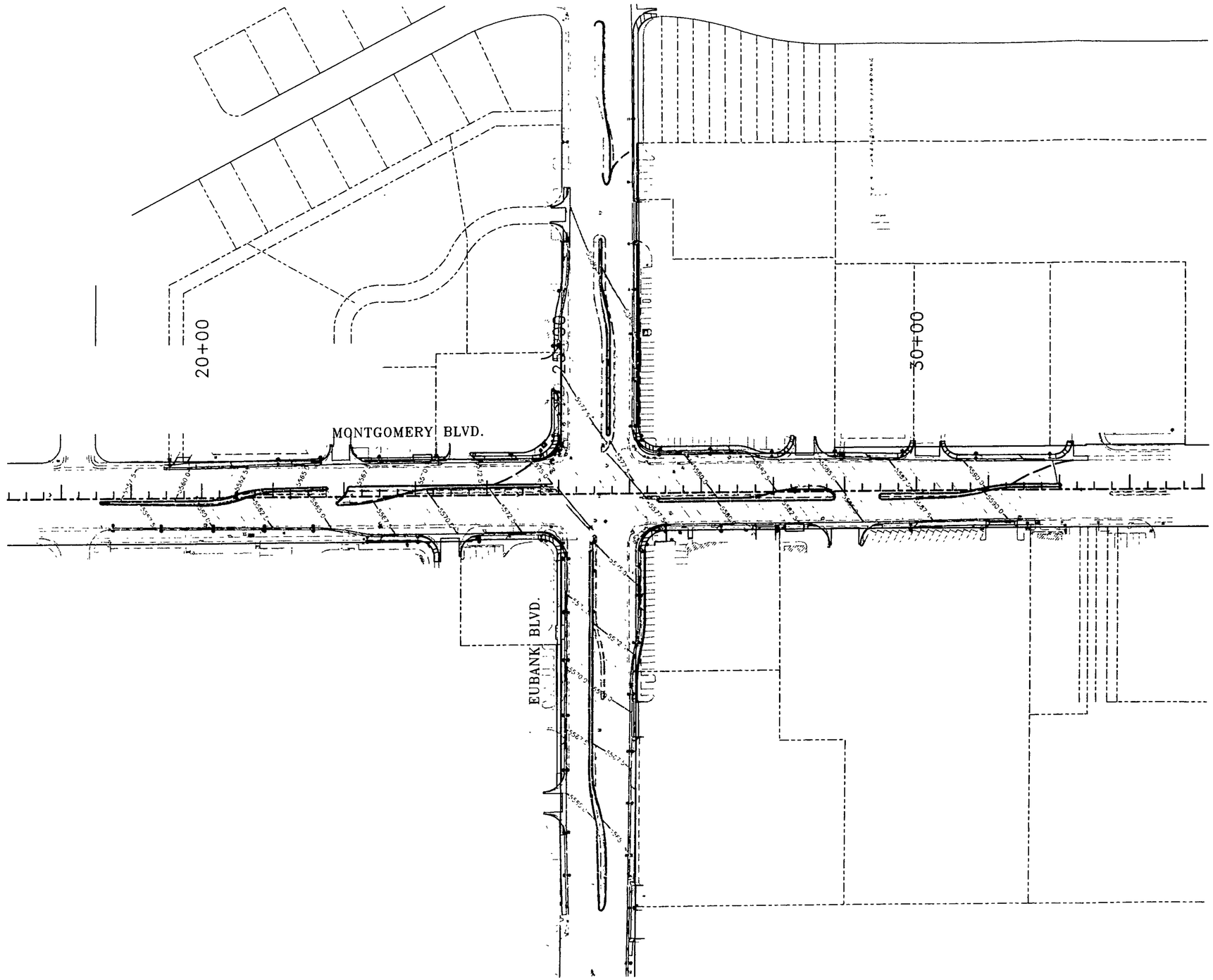
Gannett Fleming West, Inc.



MONTGOMERY/EUBANK - EXISTING DRAINAGE SYSTEM

Gannett Fleming West, Inc.

EXHIBIT 2.4



PLAN VIEW OF MONTGOMERY/EUBANK INTERSECTION IMPROVEMENTS

Gannett Fleming West, Inc.

EXHIBIT 3

* * * * *
* * * * *

APPENDIX A

APPENDIX A

PROPOSAL LETTER & SCOPE OF SERVICES
AND
MEETING MINUTES

Gannett Fleming

GANNETT FLEMING WEST, INC.
Suite 7000
2155 Louisiana Boulevard, N.E.
Albuquerque, NM 87110-5429

Office: (505) 265-8468
Fax: (505) 881-2513
www.gannettfleming.com

2nd Revision
March 17, 2009

Mr. Moby Mirza, P.E.
Project Manager
City of Albuquerque
Department of Municipal Development
P.O. Box 1293
Albuquerque, New Mexico 87103

Via email to mmirza@cabq.gov

RE: Additional Services Request #1
Montgomery & Eubank Intersection Improvements (COA Project #7546.91)
Proposal for Drainage Design Analysis Report and Construction Plans

Dear Mr. Mirza:

Gannett Fleming West, Inc. is pleased to submit our man-hour estimate and fee proposal for the above referenced additional service. This fee proposal is for the preparation of a design analysis report to study the drainage requirements for Montgomery Boulevard from the intersection of Eubank Boulevard to Moon Street. This proposal also includes the additional design drawings, which will be included in the intersection plans based on the results of the study.

The limits of the study on Montgomery Boulevard are; the high point on Montgomery Boulevard just east of Pitt Street (in front of the Bear Canyon Professional Center) to the intersection of Moon Street. The limits of the study on Eubank are; the high point approximately 100' north of the intersection at Montgomery (in front of the MVD Express) and the low point approximately 200' south of the intersection (in front of the Papa Johns). The additional design drawings for the storm drain improvements will be limited to the extents of the intersection improvements project.

According to the Albuquerque Master Drainage Study, Volume III, the existing storm drain system in Montgomery Boulevard begins approximately 640 feet east of Eubank Boulevard. It extends west to the intersection of Moon Street. This system then turns south on Moon Street to Comanche Road, where it turns west and extends to Pennsylvania Street. The system ends near there and discharges into the Hahn Arroyo.

We will perform this study in accordance with the requirements of the City of Albuquerque Development Process Manual, Chapter 22. The intent of this study is to analyze the drainage requirements for the stretch of Montgomery Boulevard from the top of the storm drain system, just east of Eubank Boulevard, to the intersection of Moon Street. In addition to storm drain improvements, this study will examine the potential for low cost surface mitigation measures and provide recommendations.

It will become apparent during the study whether the storm drain size is inadequate immediately downstream of the intersection of Montgomery Boulevard and Moon Street. However, a detailed analysis of the storm drain system downstream of the intersection is not required. The study will assume free discharge at this point in order to accurately size the upstream system. This scope could be expanded to include a detailed analysis of the system to the downstream end and additional fees would apply.

This study will be comprised of the following analyses:

- A detailed hydrologic modeling of the contributing drainage basins both off the street and on.

- A detailed hydraulic analysis to determine:
  - Street capacity
  - The need for, type and spacing of storm drain inlets
  - The sizing of connector pipes
  - The sizing of the main storm drain pipe that is required to replace the one that currently exists.

Our scope of work is detailed as follows:

- Review of Existing Drainage Studies – GFW will research and compile known existing drainage studies and information available, and review it for hydrologic and hydraulic information that may relate to the project area.

- Meet with City Hydrologist – GFW personnel will schedule and attend a meeting with Brad Bingham, PE, CFM and other City personnel, to discuss the project area.

- Create Basin Mapping – GFW will utilize Bernalillo County GIS mapping to create basin mapping in order to delineate drainage basins which are contributing to the runoff in the project area. This basin mapping will be compared to basins which were developed for existing drainage studies to verify accuracy.

- Create Hydrologic Modeling - GFW will utilize the basin mapping to create a hydrologic model using the AHYMO (v.1997.02) computer program.

- Determine Street Flow Capacities – We will analyze the existing street section to determine the street runoff capacity based on the City's criteria, as detailed in the Development Process Manual.

- Determine Inlet Placement and Spacing – Based on the street flow capacity, GFW will determine the required spacing and placement of inlets. Again, this will be based on the COA DPM requirements.

- Sizing of Main Storm Drain – GFW will perform a hydraulic analysis to determine the size of the storm drain required for the reach of the existing system as described above. This analysis will utilize Bentley's StormCAD v.8 program.

- Preliminary Design Drawings – GFW will prepare, as part of this study, conceptual 30% design drawings showing the plan & profile design for the storm drain system within the limits of the intersection improvements project. We anticipate that the final storm drain design for the intersection improvements will be incorporated into the intersection plans.

- Preliminary DAR Study – Upon completion of our analysis, we will prepare a draft Design Analysis Report and submit it to the City for review and comment.

- DAR Review Meeting – GFW project personnel will attend one (1) review meeting with City staff to discuss review comments.

- Final DAR Study – After receipt of review comments, we will amend the study based on comments received and submit a final Design Analysis Report.

- Incorporation of Drawings into Intersection Plans – GFW will incorporate the conceptual (30%) plan and profile sheets and detail sheets into the construction drawings for the Montgomery Boulevard & Eubank Boulevard Intersection Improvements project. These will then be included in the Preliminary (65%) DRC plan submittal.

This proposal does not include additional survey services or SUE services, as it is assumed that the additional design drawings will be limited to the extents of the current intersection improvements project. Also, we have assumed that the storm drain plans can be incorporated into the schedule for the intersection improvements, thus we have also assumed that additional time for GFW to develop revised construction phasing should not be necessary.

We have developed a milestone schedule for the study, which should fit into the schedule for the intersection improvements project. It is our intention that the conceptual (30%) design drawings from the study could be further developed and incorporated into the intersection project and submitted with the final DRC (95%) plans. The current schedule for the intersection improvements includes utility coordination and we intend to include the storm drain design in those future coordination meetings. Therefore, this proposal does not include additional utility coordination. The following is our proposed schedule for completion of the study:

Receive COA Notice to Proceed	March 23, 2009
Meet with COA Hydrologist	March 30, 2009
Submit Preliminary (65%) DRC Plans	May 7, 2009 *
Submit Preliminary DAR	May 8, 2009
Review by COA (1 week)	May 15, 2009
Second Utility Coordination Meeting	May 22, 2009 **
Submit Final DAR	June 5, 2009
Submit Final (95%) DRC Plans	July 13, 2009 *

*Existing Project Schedule
**Proposed Change to Project Schedule

Our original scope of work for the intersection improvements included a memo format drainage report. As part of that effort we have already completed the following work:

- Met with Jame Eisenberg, P.E. in the field to examine the existing drainage patterns.
- Obtained the Albuquerque Master Drainage Study
- Calculated the existing and proposed impervious areas at the intersection.

This work will be incorporated into our effort to complete the Design Analysis Report. The authorized amount for the memo format drainage report was **$4,258.98**. To date we have completed **$791.95**. We therefore propose to credit the City **$3,467.03** towards the DAR as shown on the following page. Our scope of work for the memo format drainage report as shown in our existing engineering services agreement would be considered cancelled.

Additional Services #1	
Task	**Amount**
Design Analysis Report Including Preliminary (30%) Plans	**$38,499.15**
Final Storm Drain Plans	**$22,849.34**
Subtotal	**$61,348.49**
Credit for Drainage Memo	**-$3,467.03**
Total (Exclusive of NMGRT)	**$57,881.46**

We are requesting additional authorization in the lump sum amount of **$57,881.46** (exclusive of NMGRT), for the services described herein. The attached spreadsheets detail our man-hour estimate for these services. This request is made in accordance with items 27 and 29 of the additional services clause of our existing contract. This proposal does not include work related to the Montgomery & Wyoming intersection.

Please do not hesitate to call myself or Ray Smith, PE, at 265-8468 if you have any questions or would like to discuss this proposal. Thank you again for this opportunity to work with the City of Albuquerque.

Sincerely,
Gannett Fleming West, Inc.

David H. Wilson, P.E.
Principal/Project Manager

RJS

Attachments: Man-hour Estimate Spreadsheets (2)

Cc: 50393

GANNETT FLEMING WEST, INC.

PROJECT: Montgomery/Eubank Intersection

JOB NO: 50393
COA Project #7546.91

PAGE: 1 OF 1

MEETING RECORD

Attendees:	Brad Bingham, P.E., C.F.M - COA		
	Jame Eisenberg, P.E. - COA	Location:	Plaza Del Sol
	Ray Smith, P.E. - GFW	Time:	3:00 pm
		Date:	4/22/09
Subject	Drainage DAR Discussion		

We reviewed the project area and agreed to the limits of the contributing drainage basin.

The project intersection is essentially at the top of a basin. The limits are just east of Pitt Street on Montgomery and the back of the adjacent commercial properties on the north side of Montgomery.

The shopping center and apartments on the southeast quadrant drain to the low point in Eubank.

There is a high point in Eubank on the north side of Montgomery.

Brad indicated that there is a low point in Montgomery farther to the east. We determined that it is at the intersection with Inca. That intersection has no drainage, as there is no storm drain and there is a water block on the south leg of the intersection.

Brad would like GFW's study to include a determination of the feasibility of extending the storm drain system that far east in order to drain the intersection.

If it is physically possible, then we will look at the possibility of expanding the scope of the study to include the additional area. However, at the very least, the intersection improvements could include a pipe stub out to the east that could potentially be used in the future.

Ray Smith explained the proposed drainage patterns at the intersection. GFW is proposing a cattle guard inlet on the north side of Montgomery. This would collect runoff before the super elevation transition that would carry water across the street. Brad indicated that this would be acceptable. He would also be ok with a median inlet in Montgomery, as long as it only had a curb opening and not a grate. The grate in a median inlet sticks out to far and would affect the ride of the inside lane.

Brad said that he would prefer increased storm drain facilities in Montgomery rather than diverting the runoff to the back of Sierra Vista shopping center.

The procedure for checking out drainage studies is that GFW will provide a list of studies and then a printing company (ABQ Repro) will come and pick them up and make copies of what we need. GFW will need to come to his office and research which studies will be needed. The studies are in microfiche format.

Action Required: GFW will need to make an appointment to come and research drainage studies to arrange to have copies made.

DRC SESSION MINUTES

Project: Montgomery & Eubank Intersection Improvements

Project No.: 754691

Date: 08/04/2009 Time: 2.30 pm

Consultant: David Wilson Engineering Firm: Gannett Fleming West, Inc.

Signed	Delegate sign to DRC Chair	Comments via Memo	Markups	Need next set of plans	
☐	☐	☐	☒	☒	Utility Development: Jeremy Hoover Cost Estimate submit to Anthony Montoya; FH ~~[illegible]~~ Salvage; cover over WL; Cross conflict; Note to contact ABCWUA to shut off valve; Add to profile; Call out [illegible] Details; Additional ~~[illegible]~~ Minor Comments
☐	☐	☐	☒	☒	Trans. Development: Nilo Salgado - Out Provide markups
☐	☐	☐	☐	☒	Hydrology: Brad Bingham Out to provide markups - Comment at a later date (Provided to GFW 8/6/09 MAN
☐	☐	☐	☒	☒	Construction Coord.: Paul Olson / Anthony Lopez: Pressure at dead end FH hard to get Type II DI. Comments on general Notes;
☐	☐	☒	☒	☒	Risk: Don Bartlett Ramp Detail Comments, Grates 2220 Detail.
☐	☐	☐	☐	☒	Project Manager: Moby Mirza Out (Juan Carlos to submit markup ~~[illegible]~~ Later date
☐	☐	☐	☒	☒	DRC Chair: - Stephen Woodall GU on FH Lay. Provide R/W; TCE. Minor Additional Comments
☐	☐	☐	☒	☒	Traffic Operations: Andrew Gallegoes Comment on Striping / Sign Details; Drainage Flow at Median Noses; Traffic Signal Comments + General Notes; Mast Arms -40', Drainage + Labeling; Use Redflex special Detail; ~~[illegible]~~
☐	☐	☐	☐	☐	Bryan Wolfe ons start up, street light Comments, ownership; lighting analysis, Load-Voltage Drop calc; (work directly with Bryan) Type 3 Luminaire
☐	☐	☐	☐	☐	6 circuit meter in cabinet.

☒ Consultant to make corrections. ☒ Submit markups and 9 sets of paper plans ☐ Mylars
for: ☐ Prelim Plan Review ☒ Final Plan Review ☐ Signature Session ☐ other: _____

☐ Forms required: ☐ Figure 7 ☐ Figure 8 including UPC# w/ exhibit ☐ Figure 21 (w/ exhibits if requesting pro-rata)
☐ Fire marshal's approval of fire hydrant locations ☐ other: _____

☐ Other signatures required on mylars prior to DRC chair signature.
☐ AMAFCA ☐ County ☐ MRGCD ☐ NMDOT ☐ NMUI ☐ VDLR
☐ City Architect ☐ Other: _____

☒ Documents required:

	DRC chair signature	work order	closeout	other
☒ public road/sidewalk ~~easement~~ R/W	☒	☐	☐	☐
☐ public water & sewer easement	☐	☐	☐	☐
☐ public drainage easement	☐	☐	☐	☐
☐ slope maintenance easement	☐	☐	☐	☐
☐ agreement & covenant	☐	☐	☐	☐
☐ license agreement	☐	☐	☐	☐
☒ other: Temp Construction Easement	☒	☐	☐	☐

☐ SIA req: ☐ A ☐ B ☐ B-mod-non WO ☐ C ☐ C-mod ☐ Sidewalk deferral ☐ other: _____

Other Notes. **DMD-CIP** Extra set for Anthony Montoya

Montgomery/Eubank Intersection Improvements Project, 7546.91
Preliminary Drainage Design Analysis Report dated 7/17/09
Comments by Jame Eisenberg

Sheet 1
Piedra Blanca, Dona Marguerita, Pitt, Moon, and Inca are referenced in the text, but not indicated on the vicinity map.

Sheet 3
How do studies described in Sections 2.2.1-2.2.4 relate to studies listed on Exhibit 2.2? Options: list FID #'s on Sheet 3? Asterisk the studies on Exhibit 2.2 which are described in the text and included in Appendix B? Etc.

Section "2.3.4" should be "2.2.4"

Section 2.3.4 says entire Sierra Vista shopping center drains to the south. Report later says that Basin 310 (Firestone) drains north. Delineation of Basin 310 shown on Exhibit 2.3B is smaller than indicated on "Update to Master Drainage Plan" in Appendix B.

Sheet 12
Basin 510 has an area of 0.00221 mi^2 in the table, but 0.00147 in the AHYMO model

Does AHYMO use existing or proposed basins? Is there a significant difference between existing and proposed runoff?

Sheet 13
The flow diagram for AP2 does not include Basin 130 which WAS included in the model and not listed as "excluded" in Section 4.3

The flow diagram for AP9 does not include Basin 445 which WAS included in the model and not listed as "excluded" in Section 4.3

Add a note explaining that Basin 105 adds flow directly to the storm drain, so it is not included in Tables 4.3B and 4.4. Explain somewhere in the text that it was included in the Haestad model at 105A and 105B.

Table 4.3B has an incorrect value for AP1

Exhibit 2.3A
Please show the east boundary of Basin 515
Please label Lower Terrace Circle

Appendix D
Include DPM Plates 22.3 D-3, D-5, and D-6 in the appendix.

Include calculations for throat capacities.

@ CO5: 22.6 from CO4 + 18.5 from single A inlet + 18.1 from double C inlet + 3.22 from AP3 = 62.42 cfs ≠ 43.92 - Clarify

@ CO34: 4 from 105A + 5.1 from AP4 = 9.1 cfs ≠ 5.1 - Clarify

@ CO35: 9.1 from CO34 + 3.9 from CO36 = 13 cfs ≠ 9.0 - Clarify

@ CO11: 13 from CO35 + 62.42 from CO5 = 75.42 cfs ≠ 52.92 - Clarify

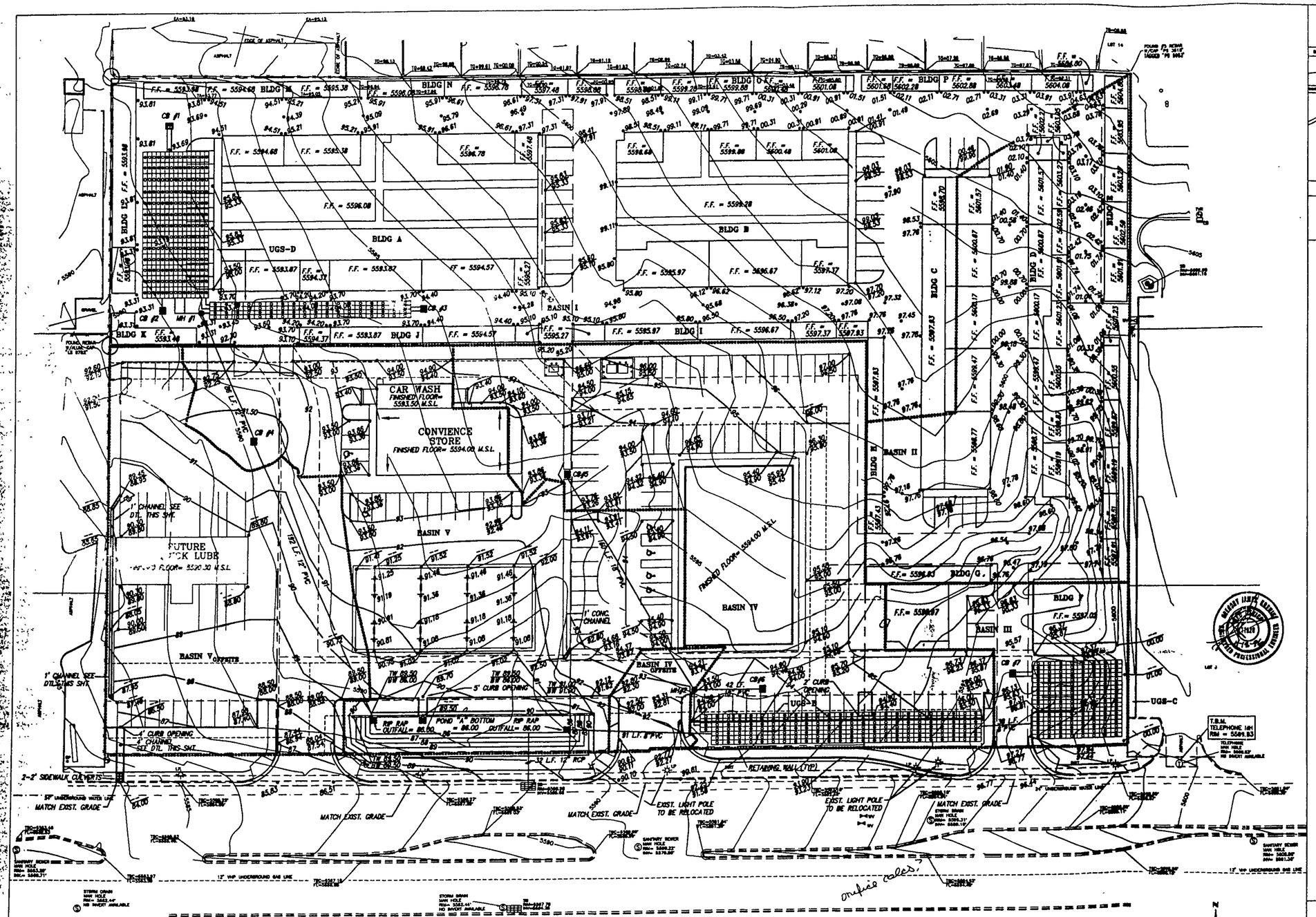
ETC.

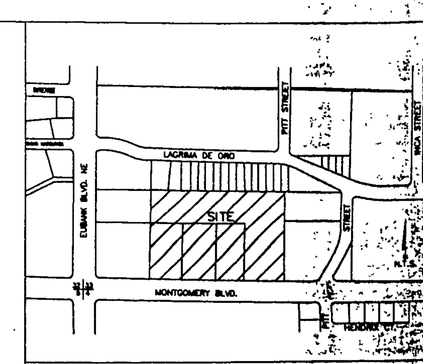
* * * * *

APPENDIX B

APPENDIX B

GRADING AND DRAINAGE PLANS FROM PREVIOUS STUDIES





VICINITY MAP ZONE MAP: F-21-Z

TBM (TEMPORARY BENCHMARK)

TELEPHONE MANHOLE RIM AT THE SOUTHEAST CORNER OF PROPERTY.
ELEV. = 5599.83

ACS BENCHMARK

ASC MONUMENT "12-F20A" AND SANDIA SOUTH MAST BEARS: N 42°24'14" E
ELEV. = 5576.113'

LEGAL DESCRIPTION

LOTS LETTERED A1-A, A1-B, A2, A3 OF MONTGOMERY PARTNERS

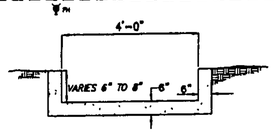
NOTES

1) A FOUR FOOT SAFETY BARRIER (FENCE OR RAILING) IS REQUIRED AROUND THE PERIMETER OF POND "A".
2) SEE SHEET C-1.3 FOR ALL UNDERGROUND STORGE DETAILS.
3) UGS-C HAS A 5" ORIFICE PLATE OVER THE 6" EXIT PIPE.
4) UGS-B HAS A 5" ORIFICE PLATE OVER THE 6" EXIT PIPE.
5) UGS-D HAS A 12" ORIFICE PLATE OVER THE 6" EXIT PIPE.
6) POND "A" HAS AN 8" ORIFICE PLATE OVER THE 12" EXIT PIPE.

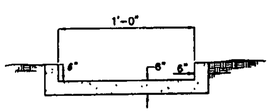
RECEIVED MAR 1 9 96 HYDROLOGY DIV.

LEGEND

	DRAINAGE BASIN BOUNDARY
BASIN III	DRAINAGE BASIN
UGS-C	UNDERGROUND STORAGE
• 89.24	NEW SPOT ELEVATION
95.30 TC / 94.80 FL	NEW SPOT ELEVATION
F.F. = 94.50	FINISHED FLOOR ELEVATION
	ROOF DRAIN
95	NEW CONTOUR
	EXTENDED SIDEWALL
	RETAINING WALL
	SWALE
	EXIST. GUARD POST (GP)
	EXIST. CABLE TV RISER (TVR)
	EXIST. LIGHT POLE (LP)
	EXIST. ELECTRIC BOX (EB)
	EXIST. STORM DRAIN (SD)
	EXIST. SEWER MAN HOLE
	EXIST. TELEPHONE MAN HOLE
	EXIST. FIRE HYDRANT (FH)
	EXIST. WATER VALVE (WV)



4'-0" CONCRETE CHANNEL DETAIL
N.T.S.



1'-0" CONCRETE CHANNEL DETAIL
N.T.S.

STORMDRAIN STRUCTURES

STRUCTURE	INVERT	GRATE/RIM	TYPE
CB#1	90.48	93.48	DBL 'D'
CB#2	89.95	92.95	DBL 'D'
CB#3	90.58	93.58	DBL 'D'
CB#4	87.83	91.00	DBL 'D'
CB#5	85.48	92.98	DBL 'D'
CB#6	88.75	93.50	DBL 'D'
CB#7	92.35	95.35	DBL 'D'
MH#1	88.35	93.15	4' DIA.
MH#2	88.00	93.40	4' DIA.

N

30' 15' 0 30' 60'
SCALE: 1" = 30'

MSU\GD300\11-18

MONTGOMERY STORAGE UNITS

GRADING & DRAINAGE PLAN

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505) 345-2010

Designed: GJK	Drawn: STAFF	Checked: DMG	Sheet C-1.2
Scale: 1" = 30'	Date: 01/96	Job: 96015	

CURVE TABLE						
CURVE	RADIUS	LENGTH	TANGENT	CHORD	BEARING	DELTA
1	25.00	39.28	25.01	35.36	S45°02'49"E	90°01'23"

LINE TABLE		
LINE	LENGTH	BEARING
1	50.00	N89°56'00"E
2	85.00	S00°02'00"E
3	50.00	S89°56'00"W
4	85.00	N00°02'00"W

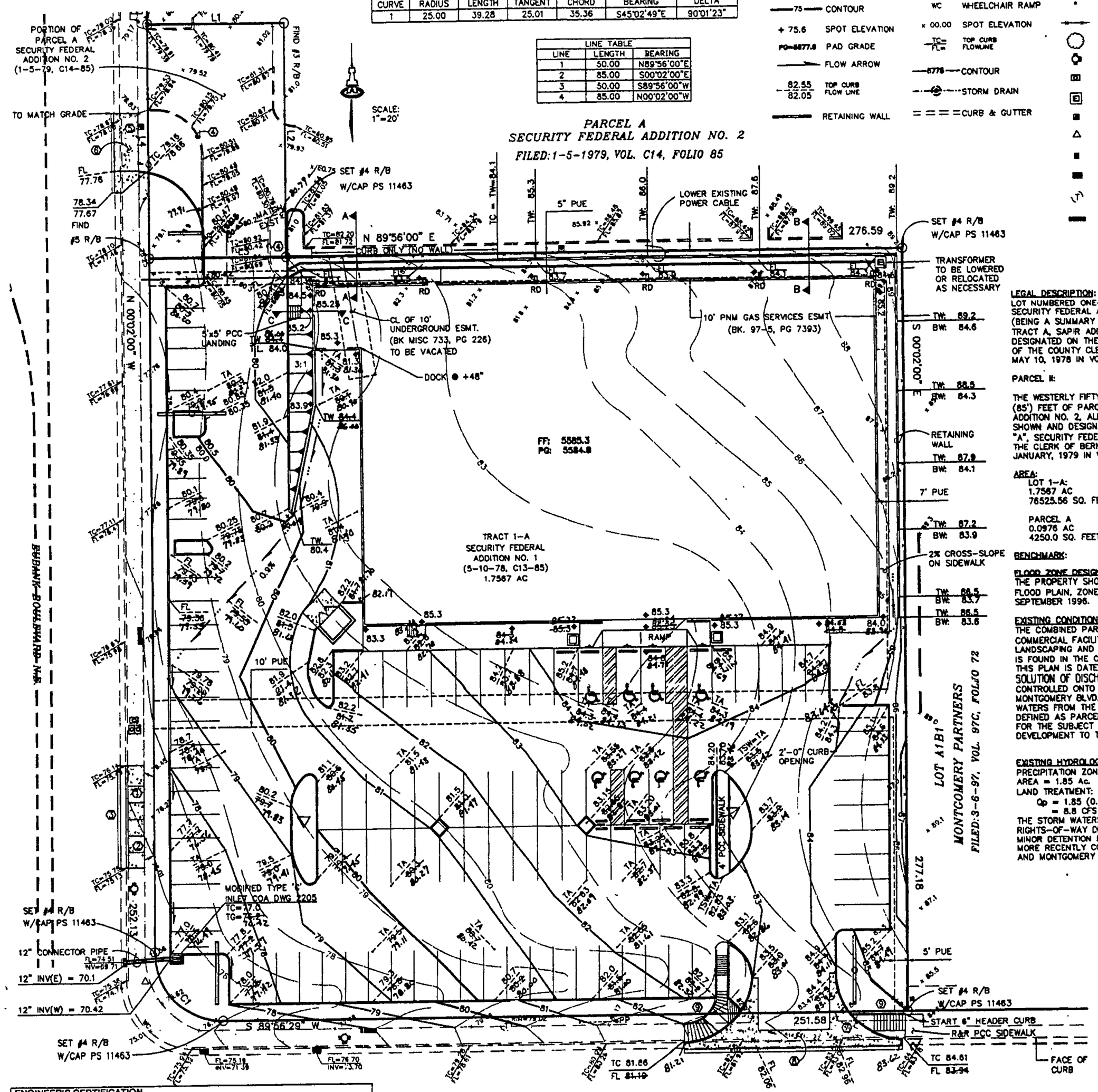
LEGEND

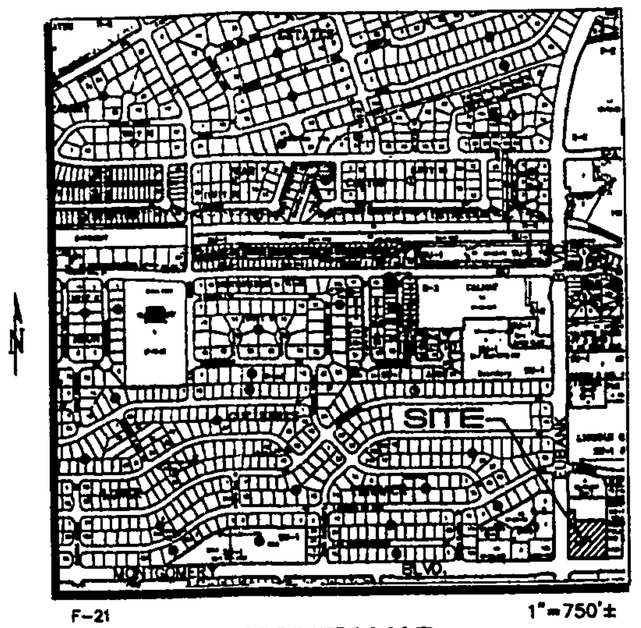
PROPOSED

- 75 — CONTOUR
- + 75.6 — SPOT ELEVATION
- PG=5877.8 — PAD GRADE
- FLOW ARROW
- 82.55 / 82.05 — TOP CURB / FLOW LINE
- RETAINING WALL

EXISTING

- WC — WHEELCHAIR RAMP
- x 00.00 — SPOT ELEVATION
- TC= / FL= — TOP CURB / FLOWLINE
- 5776 — CONTOUR
- STORM DRAIN
- CURB & GUTTER
- BOLLARD/POST
- FENCE
- TREE
- FIRE HYDRANT
- WATER METER
- ELECTRIC TRANSFORMER PAD
- LOT LIGHT
- TRAFFIC LIGHT
- TELEPHONE PEDESTAL
- DROP INLET
- TELEPHONE MANHOLE
- BENCH





VICINITY MAP

LEGAL DESCRIPTION:
LOT NUMBERED ONE-A (1-A) OF THE PLAT OF TRACT 1-A, SECURITY FEDERAL ADDITION NO. 1 ALBUQUERQUE, NEW MEXICO, (BEING A SUMMARY PLAT OF TRACT 1, BLAKEY ADDITION, AND TRACT A, SAPIR ADDITION). AS THE SAME IS SHOWN AND DESIGNATED ON THE PLAT OF SAID ADDITION, FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO ON MAY 10, 1978 IN VOLUME C13, FOLIO 85.

PARCEL B:

THE WESTERLY FIFTY (50') FEET OF THE SOUTHERLY EIGHTY-FIVE (85') FEET OF PARCEL LETTERED "A" OF SECURITY FEDERAL ADDITION NO. 2, ALBUQUERQUE, NEW MEXICO AS THE SAME IS SHOWN AND DESIGNATED ON THE SUMMARY PLAT SHOWING PARCEL "A", SECURITY FEDERAL ADDITION NO. 2, FILED IN THE OFFICE OF THE CLERK OF BERNALILLO COUNTY, NEW MEXICO ON 5TH DAY OF JANUARY, 1979 IN VOLUME C14, FOLIO 85.

AREA:
LOT 1-A:
1.7567 AC
76525.56 SQ. FEET

PARCEL A
0.0976 AC
4250.0 SQ. FEET

TOTAL SITE: 1.8543 AC.
80,733 SQ. FT..

BENCHMARK:

FLOOD ZONE DESIGNATION:
THE PROPERTY SHOWN HEREON IS NOT WITHIN THE 100 YEAR FLOOD PLAIN, ZONE "C". FIRM PANELS 143 AND 144 DATED SEPTEMBER 1996.

EXISTING CONDITIONS:
THE COMBINED PARCELS CURRENTLY EXIST OF AN VACANT COMMERCIAL FACILITY (BANK BUILDING) AND SURROUNDING LANDSCAPING AND SUPPORT PARKING AREAS. THE ORIGINAL PLAN IS FOUND IN THE CITY HYDROLOGY DIVISION FILES AS F21/D12(1). THIS PLAN IS DATED APRIL 6, 1979 AND CALL FOR A DRAINAGE SOLUTION OF DISCHARGING STORM WATERS DIRECTLY AND CONTROLLED ONTO THE DRIVING SURFACES OF EUBANK AND MONTGOMERY BLVD.. THE SITE DOES NOT ACCEPT ANY STORM WATERS FROM THE ADJACENT SITES, EXCEPTING THAT AREA DEFINED AS PARCEL A. THIS PARCEL IS USED AS A COMMON AREA FOR THE SUBJECT PROPERTY AND THE EXISTING OFFICE DEVELOPMENT TO THE NORTH.

EXISTING HYDROLOGY:
PRECIPITATION ZONE: 4 (TABLE A-1)
AREA = 1.85 Ac.
LAND TREATMENT: B(5%), C(25%), D(70%)
Qp = 1.85 (0.70(5.25)+0.25(3.73)+0.05(2.92))
= 8.8 CFS
THE STORM WATERS ARE DISCHARGED ON TO THE PUBLIC RIGHTS-OF-WAY DIRECTLY OR AFTER BEING ROUTED THROUGH THE MINOR DETENTION PONDS, AND THEN ARE ACCEPTED INTO THE MORE RECENTLY CONSTRUCTED STORM DRAIN SYSTEMS IN EUBANK AND MONTGOMERY BLVD.

PROPOSED CONDITION:
THE EXISTING ONSITE IMPROVEMENTS ARE SCHEDULED TO BE "RAZE AND REBUILT" AS A 24,000 SQ. FT. RETAIL OPERATION WITH SUPPORT PARKING AND LANDSCAPING. A PRE CONFERENCE WITH THE CITY YIELDED THE FOLLOWING IN HANDLING THE STORM WATER RUNOFF.

A QUALITATIVE APPROACH MAY BE APPROPRIATE TO JUSTIFY FREE DISCHARGE FOR THIS INFALL (REDEVELOPMENT) SITE. THE FOLLOWING ITEMS SHOULD BE ADDRESSED IN YOUR DRAINAGE PLAIN TO JUSTIFY FREE DISCHARGE:

1. THE SIGNIFICANCE OF THE INCREASED FLOWS FROM THIS DEVELOPMENT ON THE DOWNSTREAM SYSTEM.
2. ANY EXISTING DRAINAGE PROBLEMS?
3. ANY POTENTIAL PROBLEMS THAT MAY RESULT FROM THIS DEVELOPMENT.
4. THE SIZE OF THIS DEVELOPMENT TO THE OVERALL BASIN.
5. THE IMPACT ON DOWNSTREAM FLOOD PLAINS.

THE RESPONSE TO THE ABOVE FIVE ITEMS ARE FOUND IN A SUPPLEMENTAL SUBMITTAL TO THE DRAINAGE FILE.

THE SITE SHALL DIRECT ALL OF THE STORM WATER FLOWS TO THE SOUTHWEST CORNER (LOW POINT AT THE NE QUADRANT OF EUBANK AND MONTGOMERY BLVD.). THE STORM WATERS THEN ENTER INTO A PRIVATE CATCH BASIN IN A SUMP CONDITION WITH A 12" CONNECTOR PIPE TO THE BACK OF THE EXISTING CATCH BASIN AT THE CURB RETURN IN EUBANK BLVD. THIS SOLUTION SHALL HANDLE THE MINOR (NUISANCE) FLOWS AS WELL AS THE STORM WATERS GENERATED BY THE 100 YEAR STORM EVENT.

PROPOSED HYDROLOGY:
LAND TREATMENT: B(5%), C(5%), D(90%)
Qp = 1.85(0.90(5.25)+0.05(3.73)+0.05(2.92))
= 9.4 CFS (INCREASE OF 0.6 CFS OVER THE PREVIOUS DEVELOPMENT)
THE HYDRAULIC CALCULATIONS FOR DETERMINING THE CAPACITY OF THE SINGLE "C" INLET IN A SUMP CONDITION AND THE CAPACITY OF THE 12" CONNECTOR PIPE IS FOUND IN THE SUPPLEMENTAL HYDROLOGICAL INFORMATION SUPPLIED AS PART OF THIS SUBMITTAL.

GENERAL NOTES

1. SEE SHEET #191 FOR DETAILS & SECTIONS

KEYED CONSTRUCTION NOTES

1. REMOVE & DISPOSE EXISTING PCC DRIVE PAD, 35 SY.
2. BUILD 6' PCC SIDEWALK, 25 SY.
3. CONSTRUCT 38 FT. OF COA STD C&G, COA DWG #2415.
4. REMOVE & DISPOSE 92 FT. PCC CURBING.
5. REMOVE & DISPOSE 31 LF STD C&G AND 27 SY PCC SIDEWALK.
6. CONSTRUCT REPLACEMENT PCC DRIVE PAD TO MATCH EXISTING DRIVE PAD TO THE NORTH.
7. REMOVE & DISPOSE 80 LF C&G AND 65 SY PCC SIDEWALK AND DRIVE PAD.
8. CONSTRUCT PCC FILLETS AND VALLEY GUTTER.
9. CONSTRUCT WHEELCHAIR RAMP(S) PER PLAN.

PUBLIC R.O.W. CONSTRUCTION NOTES

1. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED UNDER THIS CONTRACT SHALL, EXCEPT AS OTHERWISE STATED OR PROVIDED FOR HEREIN, BE CONSTRUCTED IN ACCORDANCE WITH "CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS PUBLIC WORKS CONSTRUCTION 1988."
2. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CONTACT LINE LOCATING SERVICE, 260-1990, FOR LOCATION OF EXISTING LINES.
3. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OR SURVEYOR SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM OF DELAY.
4. BACKFILL COMPACTION SHALL BE ACCORDING TO SPECIFIED STREET USE (RESIDENTIAL).
5. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.
6. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY. AN APPROVED COPY OF THESE PLANS MUST BE SUBMITTED AT THE TIME OF APPLICATION FOR THIS PERMIT.

ENGINEER'S CERTIFICATION
I, Fred C. Arfman, licensed under the laws of the State of New Mexico, do hereby certify that this project was constructed in substantial compliance with the approved Grading & Drainage Plan, dated 02/21/00 for the Staples Office Products project, on file with the Hydrology Division, P.W.D., City of Albuquerque (F21/D12). As-built information was field verified by Star Construction on July 6, 2000 in accordance with the "New Mexico Engineering and Surveying Act" Sections 61-23-1 through 61-23-32 NMSD (1978).

FRED C ARFMAN, NMPE NO. 7322 — DATE 07-10-00

APPROVALS	NAME	DATE
HYDROLOGY		
INSPECTOR		
A.C.E./FIELD		
PERMIT NO.	MAP NO. F-21	

7/06/00

architecture interiors planning engineering
Dekker Perich Sabatini
6801 Jefferson NE
Suite 100
Albuquerque, NM 87109
505 761-9700
fax 761-4222
dps@dpsabq.com

architect

engineer

project

9701 MONTGOMERY N.E.
TRACT A-1
SECURITY FEDERAL ADDITION NO.1
ALBUQUERQUE, NEW MEXICO

revisions

plotted

drawn by

reviewed by

date 12/08/99

project no. 99046

drawing name
GRADING & DRAINAGE PLAN
"ISSUED FOR CONSTRUCTION"

sheet no. C101

LEGEND

TC=06.48 / FL=05.97	TOP OF CURB ELEVATION / FLOWLINE
C8.8 x	EXISTING SPOT ELEVATION
+10.75	PROPOSED SPOT ELEVATION
FF=10.80	FINISH FLOOR ELEVATION
	PROPOSED DRAINAGE SWALE
	PROPOSED FLOW ARROW
5515	EXISTING CONTOUR
	EXISTING CURB & GUTTER
	PROPOSED CURB & GUTTER
(2)	BASIN BOUNDARY No.
1	BASIN BOUNDARY LINE
	RETAINING WALL
TRW 13.00 / BW 11.90 (N)	TOP OF RET WALL / BOTTOM OF WALL ELEVATION
TC 13.50 / FL 13.00	TOP OF CURB / FLOW LINE ELEVATION
TA 11.12	TOP OF ASPHALT ELEVATION
	CONCRETE RUNDOWN
RD	ROOF DRAIN
RD	RIP-RAP AT ROOF DRAIN
	SIDEWALK CULVERT

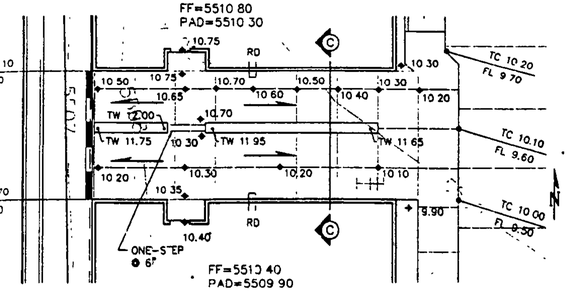
DRAINAGE CERTIFICATION - BUILDING 5 *

I, Fred C. Arfman, P.E., NMPE 7322, of the firm Isaacson & Arfman, P.A., hereby certify that this project has been graded and will drain in substantial compliance with and in accordance with the design intent of the approved plan dated ~~05/26/00~~ 02/14/00. The record information edited onto the original design document has been obtained by me or under my direct supervision and is true and correct to the best of my knowledge and belief. This certification is submitted in support of a request for Certificate of Occupancy.

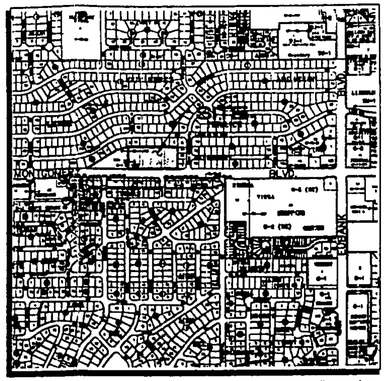
The record information presented hereon is not necessarily complete and intended only to verify substantial compliance of the grading and drainage aspects of this project. Those relying on this record document are advised to obtain independent verification of its accuracy before using it for any other purpose.

Fred C. Arfman — NMPE 7322
04-25-05
Date

FRED C. ARFMAN — STATE OF NEW MEXICO — 7322 — REGISTERED PROFESSIONAL ENGINEER

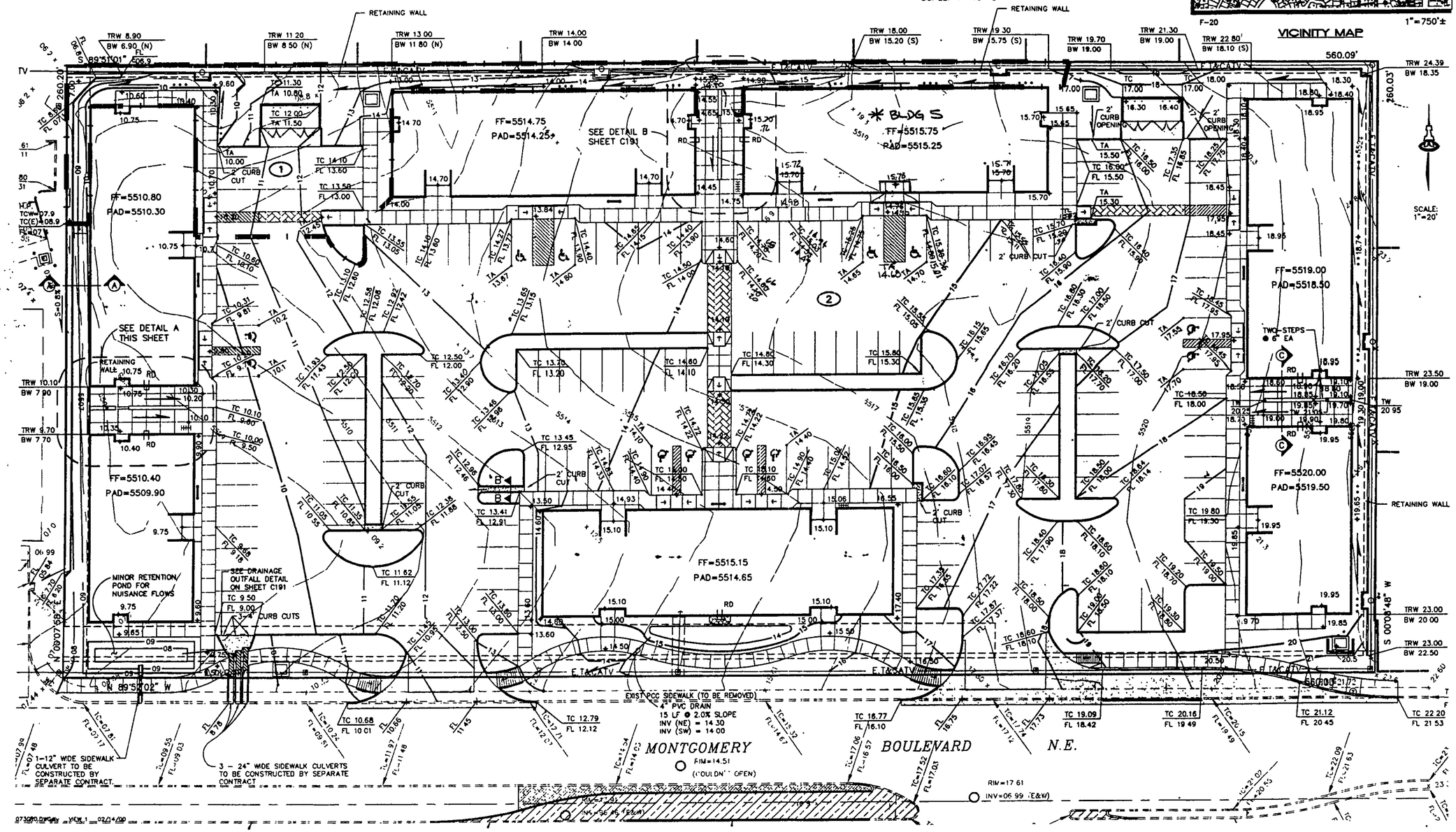


DETAIL 'A'
SCALE: 1"=10'-0"



F-20 1"=750'±

VICINITY MAP



Montgomery/Eubank Drainage Plans

architecture interiors planning engineering

Dekker Perich Sabatini

6801 Jefferson NE
Suite 100
Albuquerque, NM 87109
505 761-9700
fax 761-4222
dps@dpsabq.com

architect

engineer

FRED C. ARFMAN — STATE OF NEW MEXICO — 7322 — REGISTERED PROFESSIONAL ENGINEER — 02-14-00

project

PINNACLE COMMON
9101 MONTGOMERY BLVD.
ALBUQUERQUE, NEW MEXICO

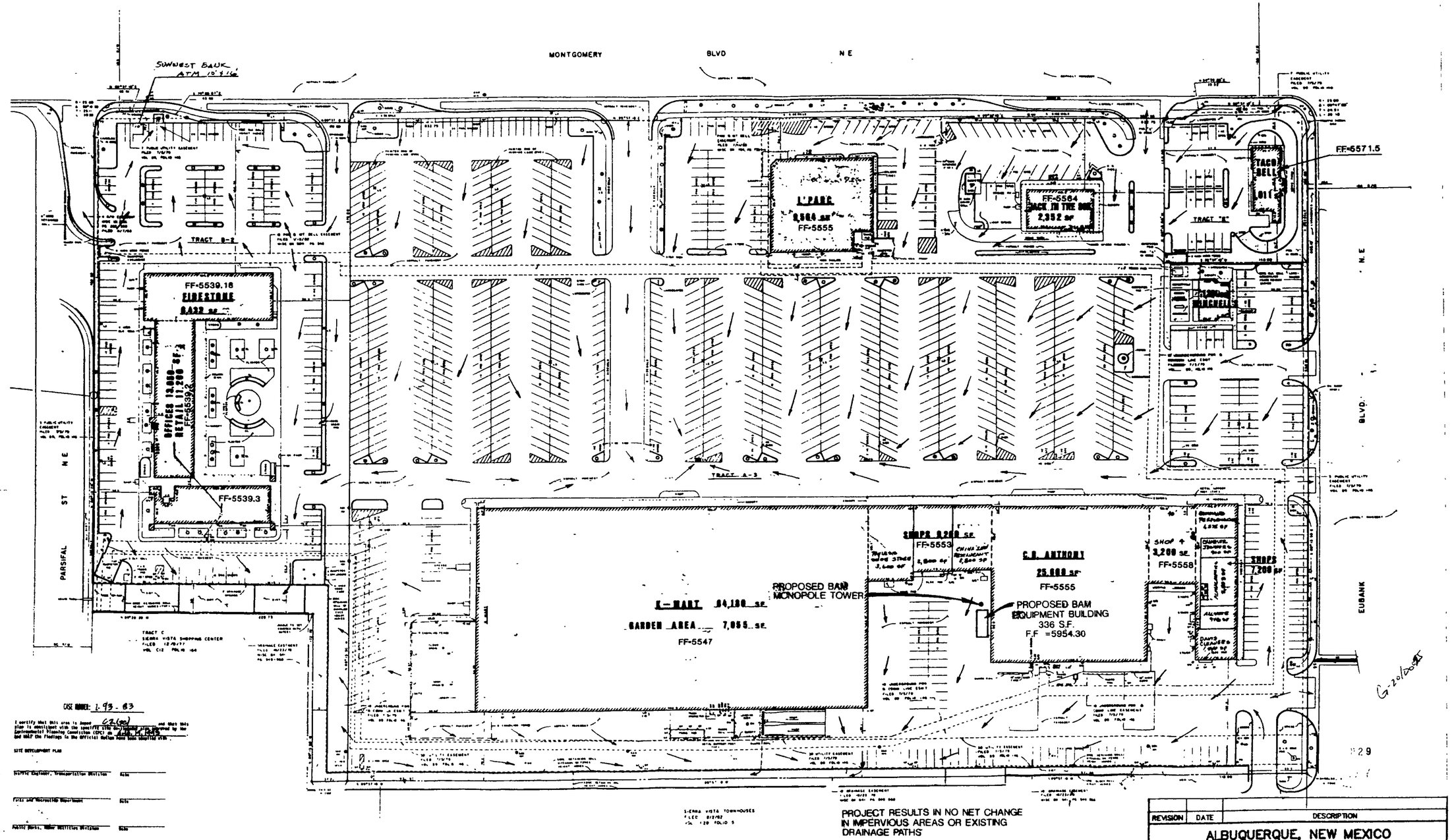
revisions
△
△
△
△

plotted:
drawn by:
reviewed by:
date: 7/30/99
project no.: 99072
drawing name:

GRADING & DRAINAGE PLAN

sheet no.

RECEIVED — MAY 02 2005 — HYDROLOGY SECTION



CASE NUMBER: 1-93-83

I certify that this area is known (G2/00) and that this plan is consistent with the specific site development plan approved by the Environmental Planning Commission (EPC) on 7-28-93 and that the findings in the Official Notice have been complied with.

SITE DEVELOPMENT PLAN

Traffic Engineer, Transportation Division — Date

Parks and Recreation Department — Date

Public Works, Water Utilities Division — Date

City Engineer, Engineering Division/AMAFCA — Date

APPROVAL AND CONDITIONAL ACCEPTANCE as specified by the Development Process Manual.

City Planner, Transportation/Recreation County Planning Division — Date

PLAN (1/93)

PROJECT RESULTS IN NO NET CHANGE IN IMPERVIOUS AREAS OR EXISTING DRAINAGE PATHS

SIERRA VISTA SHOPPING CENTER

EXISTING DRAINAGE FLOW ROUTING

SUSAN M. ALVAREZ NEW MEXICO 15521 REGISTERED PROFESSIONAL ENGINEER

September 21, 1993

REVISION	DATE	DESCRIPTION

ALBUQUERQUE, NEW MEXICO

BELL ATLANTIC METRO MOBILE

UPDATE TO DRAINAGE MASTER PLAN

BASED UPON DRAINAGE MASTER PLAN DEV'D BY GORDON ENGEL / FOM

LEEDSHILL – HERKENHOFF, INC.
ENGINEERS ARCHITECTS
ALBUQUERQUE SANTA FE SAN DIEGO

QA RELEASE	—
DESIGN BY	N/A
CHECKED BY	SMA
DRAWN BY	
SCALE	APPROX. 1"=50'
DATE	9/27/93
SEQUENCE NO	—
LH PROJECT MANAGER	
SHEET	1 OF 1

APPENDIX C

APPENDIX C

HYDROLOGIC DATA
AND
AHYMO OUTPUT FILES

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Mexico 35.1305 N 106.5183 W 5731 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Wed May 20 2009

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Docs | Return to State

Precipitation Frequency Estimates (inches)

ARI* years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.18	0.27	0.34	0.46	0.56	0.68	0.73	0.85	0.96	1.11	1.19	1.48	1.71	1.92	2.50	3.03	3.71	4.27
2	0.23	0.35	0.44	0.59	0.73	0.87	0.93	1.08	1.22	1.39	1.50	1.84	2.13	2.39	3.11	3.77	4.60	5.30
5	0.31	0.47	0.59	0.79	0.98	1.16	1.21	1.39	1.54	1.75	1.89	2.27	2.62	2.95	3.80	4.57	5.52	6.37
10	0.37	0.57	0.70	0.95	1.17	1.38	1.44	1.63	1.80	2.03	2.20	2.62	3.00	3.39	4.32	5.17	6.19	7.13
25	0.46	0.69	0.86	1.16	1.44	1.69	1.76	1.96	2.14	2.42	2.63	3.09	3.51	3.98	4.99	5.93	7.01	8.06
50	0.52	0.79	0.98	1.33	1.64	1.95	2.01	2.22	2.41	2.72	2.95	3.45	3.90	4.42	5.49	6.48	7.60	8.72
100	0.59	0.90	1.12	1.50	1.86	2.21	2.29	2.50	2.69	3.03	3.29	3.81	4.29	4.88	5.97	7.01	8.15	9.34
200	0.66	1.01	1.25	1.69	2.09	2.49	2.57	2.79	2.98	3.35	3.64	4.18	4.67	5.33	6.45	7.52	8.67	9.91
500	0.76	1.16	1.44	1.94	2.40	2.88	2.97	3.18	3.37	3.77	4.12	4.67	5.18	5.93	7.05	8.15	9.30	10.61
1000	0.84	1.28	1.59	2.14	2.64	3.19	3.29	3.49	3.68	4.11	4.49	5.05	5.57	6.39	7.49	8.61	9.75	11.09

'hese precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
:ase refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

RI** ears)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.21	0.32	0.40	0.54	0.67	0.85	0.90	1.05	1.14	1.30	1.37	1.62	1.86	2.08	2.72	3.29	4.01	4.63
2	0.28	0.42	0.52	0.70	0.87	1.09	1.15	1.32	1.44	1.62	1.73	2.01	2.32	2.60	3.39	4.09	4.98	5.75
5	0.37	0.56	0.70	0.94	1.16	1.44	1.50	1.70	1.82	2.04	2.18	2.49	2.86	3.21	4.13	4.96	5.97	6.90
10	0.44	0.67	0.83	1.12	1.39	1.71	1.77	1.99	2.12	2.37	2.53	2.86	3.27	3.68	4.70	5.61	6.70	7.73
25	0.54	0.82	1.02	1.37	1.70	2.09	2.16	2.39	2.52	2.82	3.02	3.38	3.82	4.32	5.43	6.42	7.60	8.74
50	0.62	0.94	1.17	1.57	1.94	2.40	2.47	2.71	2.84	3.16	3.39	3.77	4.24	4.80	5.97	7.02	8.23	9.46
100	0.70	1.06	1.32	1.78	2.20	2.72	2.79	3.04	3.17	3.52	3.78	4.17	4.66	5.30	6.49	7.60	8.83	10.13
200	0.78	1.19	1.48	1.99	2.46	3.05	3.15	3.38	3.50	3.88	4.19	4.57	5.08	5.79	7.00	8.15	9.40	10.77
500	0.90	1.37	1.70	2.29	2.83	3.53	3.62	3.85	3.97	4.38	4.74	5.12	5.65	6.46	7.67	8.85	10.11	11.55
000	0.99	1.51	1.87	2.52	3.12	3.92	4.02	4.24	4.34	4.78	5.18	5.54	6.08	6.97	8.17	9.37	10.61	12.09

* upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.
** hese precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval
Pl e refer to NOAA Atlas 14 Document for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

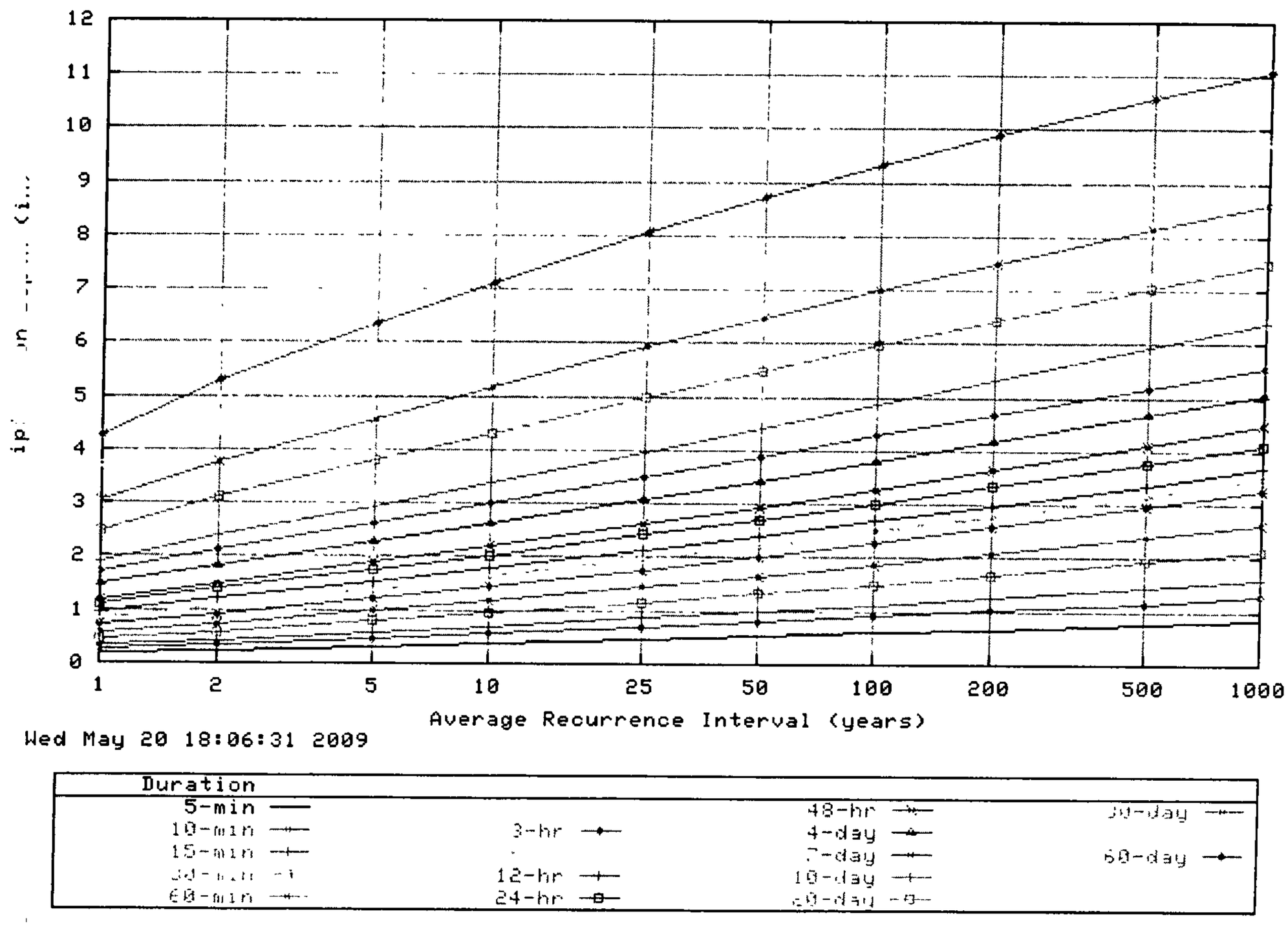
I** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.15	0.23	0.29	0.39	0.48	0.56	0.60	0.71	0.82	0.96	1.04	1.35	1.57	1.76	2.29	2.78	3.41	3.94
2	0.20	0.30	0.37	0.50	0.61	0.72	0.77	0.90	1.03	1.21	1.31	1.68	1.95	2.20	2.85	3.46	4.24	4.89

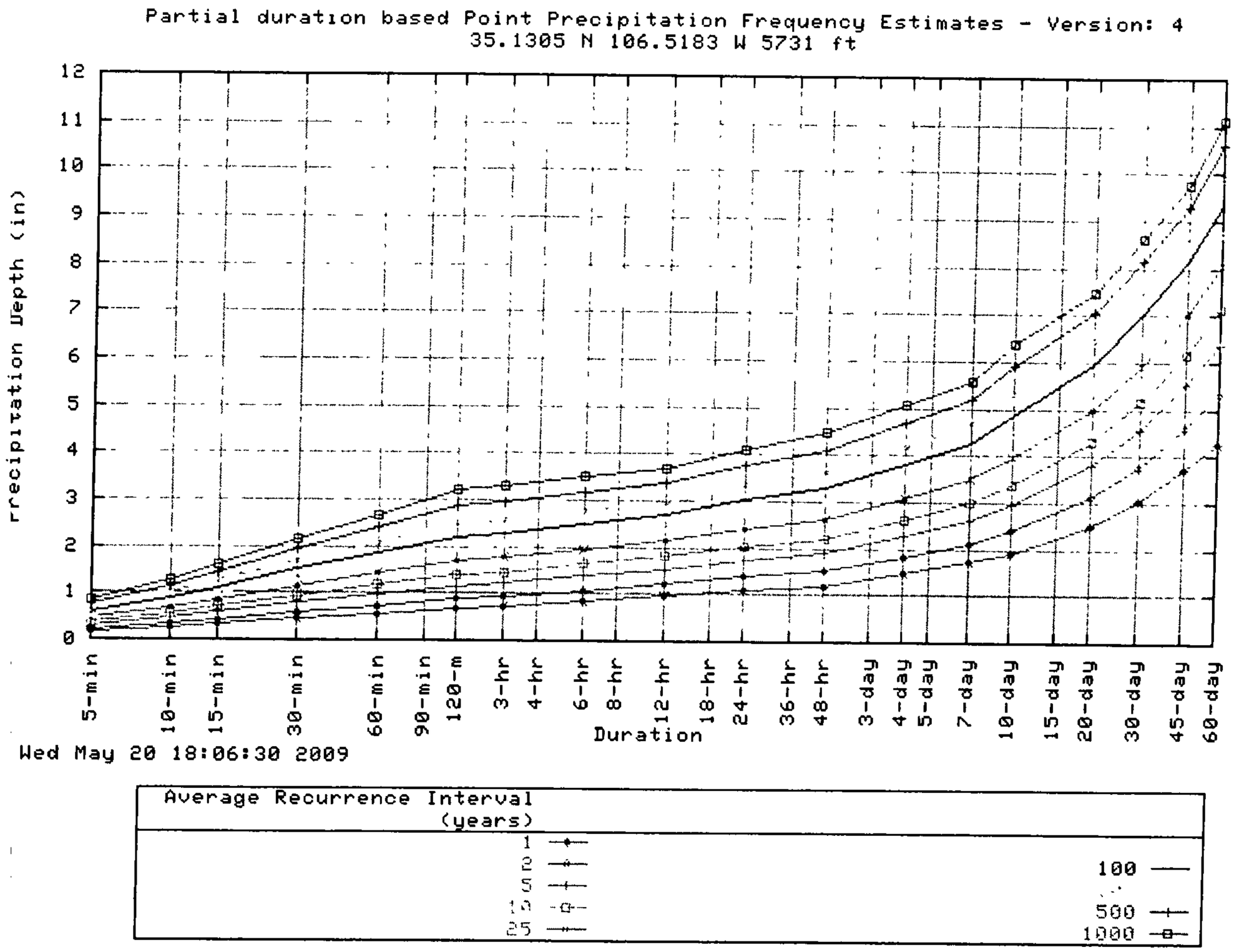
5	0.26	0.40	0.49	0.67	0.82	0.95	1.00	1.16	1.31	1.51	1.65	2.08	2.40	2.71	3.49	4.19	5.08	5.87
10	0.31	0.47	0.59	0.79	0.98	1.13	1.19	1.36	1.52	1.76	1.91	2.39	2.75	3.11	3.96	4.73	5.69	6.57
25	0.38	0.58	0.72	0.97	1.20	1.38	1.44	1.63	1.81	2.08	2.27	2.81	3.20	3.64	4.57	5.42	6.44	7.42
50	0.43	0.66	0.82	1.10	1.36	1.57	1.64	1.83	2.02	2.33	2.54	3.13	3.55	4.04	5.01	5.91	6.96	8.02
100	0.49	0.74	0.92	1.24	1.53	1.77	1.85	2.05	2.25	2.58	2.82	3.44	3.89	4.44	5.44	6.38	7.46	8.57
200	0.54	0.83	1.03	1.38	1.71	1.98	2.06	2.27	2.47	2.84	3.10	3.76	4.23	4.84	5.86	6.83	7.92	9.09
500	0.62	0.94	1.17	1.57	1.95	2.27	2.36	2.57	2.77	3.18	3.48	4.18	4.67	5.35	6.38	7.38	8.46	9.70
1000	0.68	1.03	1.28	1.73	2.14	2.50	2.60	2.81	3.00	3.44	3.78	4.50	4.99	5.74	6.76	7.78	8.85	10.13

The **lower** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **less** than.
These precipitation frequency estimates are based on a partial duration maxima series. **ARI** is the Average Recurrence Interval.

Please refer to NOAA Atlas 14 Document for more information NOTE: Formatting prevents estimates near zero to appear as zero.

Text version of tables





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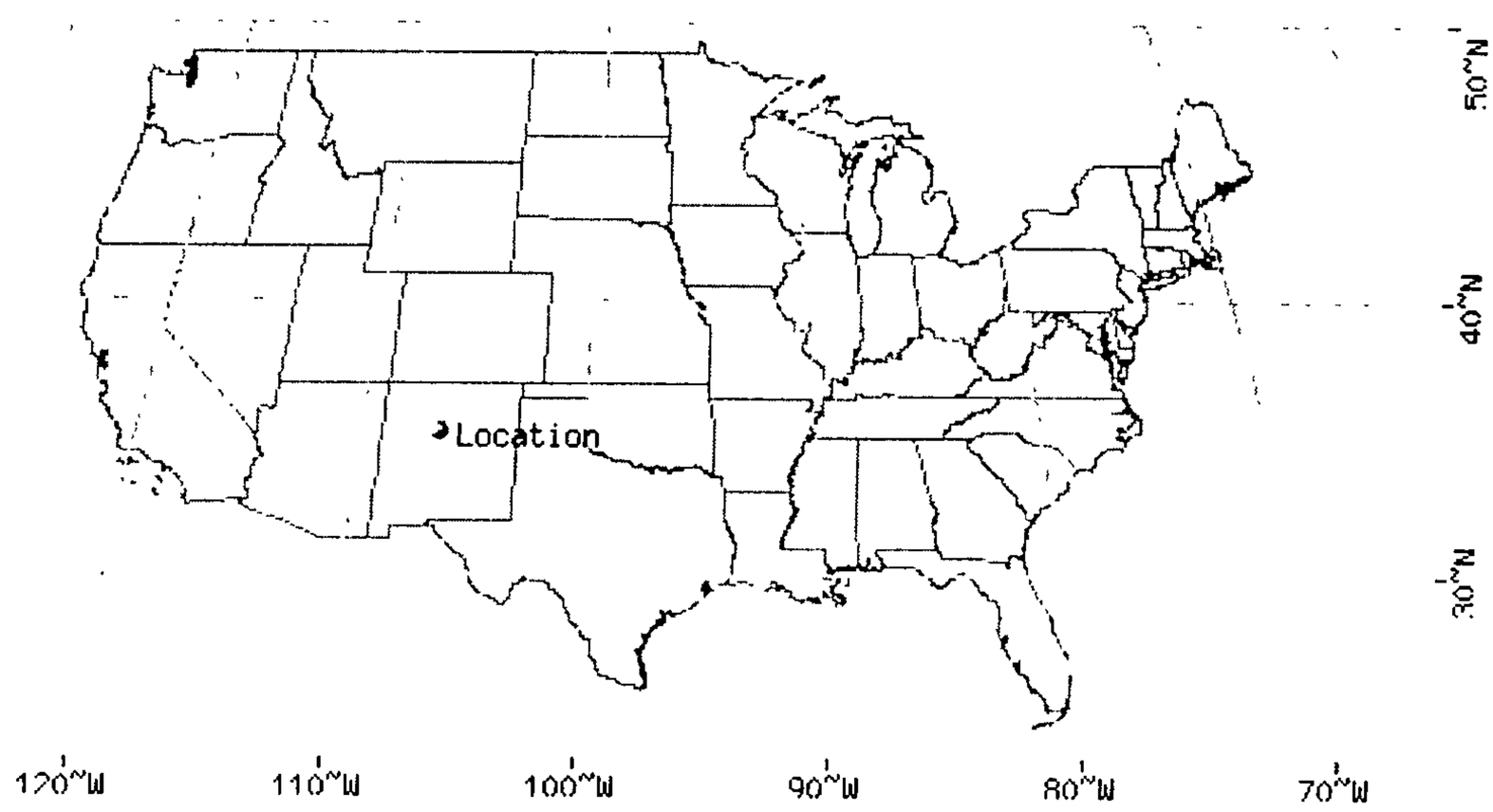
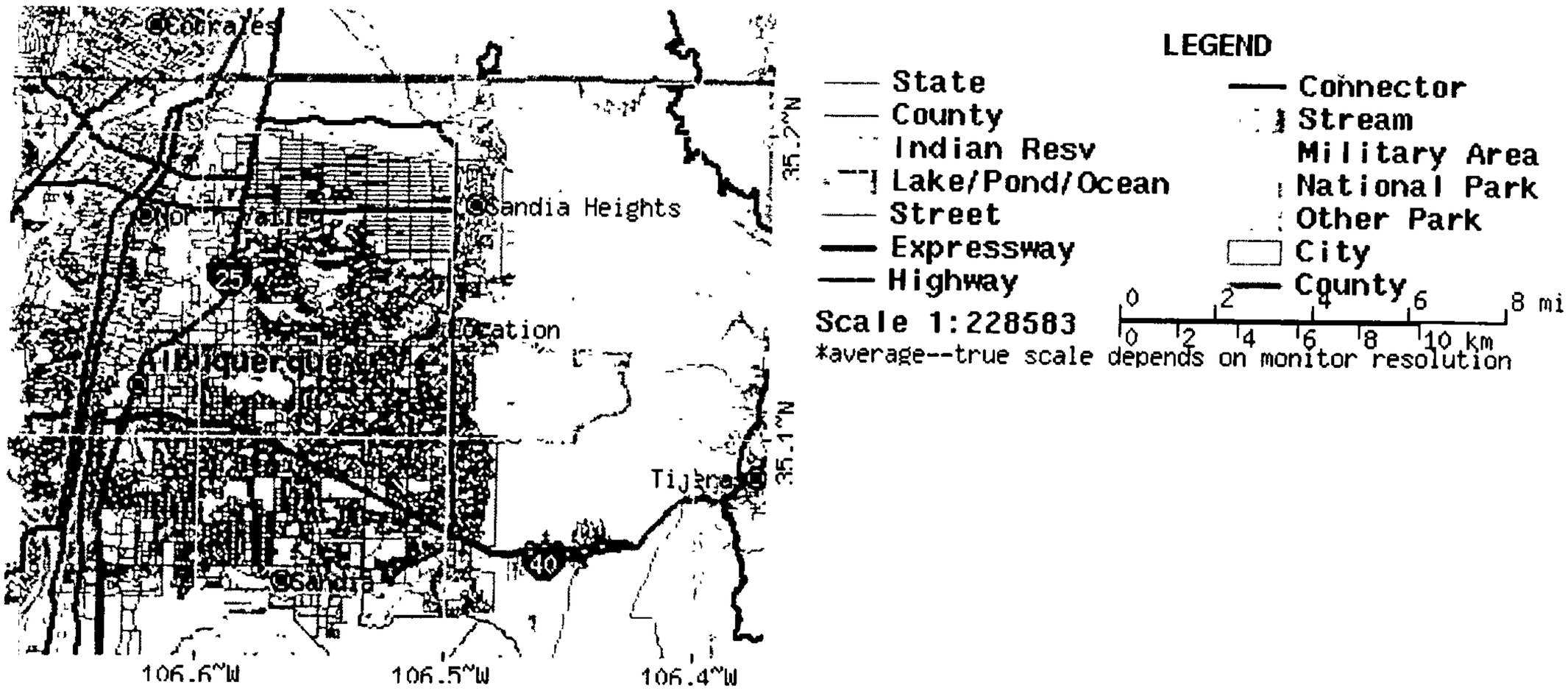


These maps were produced using a direct map request from the
U S Census Bureau Mapping and Cartographic Resources
Tiger Map Server

Please read disclaimer for more information.



ther Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available m this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera s has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

atershed/Stream Flow Information -

d the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

cipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to NOAA Atlas 14 Document.

ng the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (35.1305/-106.5183). Digital ASCII data can be obtained directly from DC.

d Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the **stern Regional Climate Center's state-specific SNOTEL station maps.**

---

rometeorological Design Studies Center
/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(3 713-1669
Q tions?: HDSC.Questions@noaa.gov

Disclaimer

MONTGOMERY/EUBANK
FINAL DRAINAGE DESIGN ANALYSIS REPORT
AHYMO OUTPUT SUMMARY 100-YR, 6 HR STORM EVENT

```
_{s16.67h8.5v0T_&18D
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                                FROM  TO                      PEAK        RUNOFF                    TIME TO    CFS       PAGE =   1
                   HYDROGRAPH    ID   ID        AREA      DISCHARGE      VOLUME       RUNOFF         PEAK     PER
  COMMAND        IDENTIFICATION  NO   NO.      (SQ MI)      (CFS)       (AC-FT)     (INCHES)      (HOURS)   ACRE      NOTATION

  START
  LOCATION                       ALBUQUERQUE                                                                          TIME=       .00
  *S
  *S    MONTGOMERY/EUBANK DRAINAGE
  *S                  100-YEAR 6 HOUR EVENT
  *S
  *S    FN:Montgomery-Eubank 100-YR 6-HR DAT  -  HYMO PER JAN 1997 DPM REVISIONS
  *S
  RAINFALL  TYPE= 1                                                                                                      RAIN6=    2.500
  *S-----------------------------------------------------------------
  *S DEVELOPED SEDIMENT BULKING FACTOR = 5.0%
  SEDIMENT BULK                                                                                                          PK BF =    1.05
  *S-----------------------------------------------------------------
  *S-----------------------------------------------------------------
  *S MONTGOMERY/EUBANK DEVELOPED CONDITIONS
  *S-----------------------------------------------------------------
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 105
  COMPUTE NM HYD       SD(105)   -    1        .00277        7.90        .330      2.23264    1.500    4.457 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 110
  COMPUTE NM HYD        110.00   -    2        .00062        1.78        .074      2.23264    1.500    4.493 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 120
  COMPUTE NM HYD        120.00   -    3        .00183        5.23        .218      2.23264    1.500    4.463 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 125
  COMPUTE NM HYD        125.00   -    4        .00093        2.64        .110      2.21442    1.500    4.437 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 130
  COMPUTE NM HYD       SD(130)   -    5        .00154        4.36        .182      2.21441    1.500    4.426 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 150
  COMPUTE NM HYD        150.00   -    6        .00053        1.56        .066      2.35211    1.500    4.609 PER IMP= 100.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 155
  COMPUTE NM HYD        155.00   -    7        .00296        8.37        .350      2.21441    1.500    4.417 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 160
  COMPUTE NM HYD        160.00   -    8        .00297        8.47        .354      2.23264    1.500    4.457 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 205
  COMPUTE NM HYD        205.00   -    9        .01178       33.55       1.403      2.23264    1.500    4.449 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 210
  COMPUTE NM HYD        210.00   -   10        .00568       16.18        .676      2.23264    1.500    4.452 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 215
  COMPUTE NM HYD        215.00   -   11        .01201       30.86       1.231      1.92250    1.500    4.015 PER IMP=  70.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 220
  COMPUTE NM HYD        220.00   -   12        .00249        7.11        .296      2.23264    1.500    4.458 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 310
  COMPUTE NM HYD        310.00   -   13        .00018         .54        .023      2.35211    1.500    4.654 PER IMP= 100.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 315
  COMPUTE NM HYD        315.00   -   14        .00273        7.79        .325      2.23264    1.500    4.457 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 325
  COMPUTE NM HYD        325.00   -   15        .00028         .81        .033      2.23264    1.500    4.537 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 410
  COMPUTE NM HYD        410.00   -   16        .00013         .34        .012      1.71630    1.500    4.029 PER IMP=  50.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 415
  COMPUTE NM HYD        415.00   -   17        .00046        1.33        .055      2.23264    1.500    4.511 PER IMP=  90.00
  *S-----------------------------------------------------------------
  *S COMPUTE DEVELOPED BASIN 420
```

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
COMPUTE NM HYD	420.00	-	18	.00049	1 45	.061	2.35211	1.500	4.613	PER IMP= 100.00
*S----------										
*S COMPUTE DEVELOPED BASIN 425										
COMPUTE NM HYD	425.00	-	19	.00138	3 95	.164	2.23264	1.500	4.467	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 435										
COMPUTE NM HYD	435 00	-	20	.00003	.10	.004	2.35211	1.500	5.046	PER IMP= 100 00
*S----------										
*S COMPUTE DEVELOPED BASIN 445										
COMPUTE NM HYD	445.00	-	21	00244	6.96	.291	2.23264	1.500	4 458	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 450										
COMPUTE NM HYD	450.00	-	22	.00055	1.51	.061	2.07671	1.500	4.278	PER IMP= 80 00
*S----------										
*S COMPUTE DEVELOPED BASIN 455										
COMPUTE NM HYD	455.00	-	23	.00543	15.47	.647	2.23264	1 500	4.452	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 510										
COMPUTE NM HYD	510.00	-	24	.00147	4.20	.175	2.23264	1.500	4.466	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 515										
COMPUTE NM HYD	515.00	-	25	.00174	4.97	.207	2.23264	1.500	4.463	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 520										
COMPUTE NM HYD	520.00	-	26	.00050	1.44	.060	2 23264	1.500	4.503	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 525										
COMPUTE NM HYD	525.00	-	27	.00023	.67	.027	2.23264	1.500	4.544	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 530										
COMPUTE NM HYD	AP.4(530)	-	28	.00050	1.44	.060	2.23264	1.500	4.503	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 535										
COMPUTE NM HYD	AP.8(535)	-	29	.00064	1.84	.076	2.23264	1.500	4.493	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 540										
COMPUTE NM HYD	AP.6(540)	-	30	.00116	3.32	.138	2.23264	1.500	4.471	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 545										
COMPUTE NM HYD	AP.16(545)	-	31	.00160	4.57	.191	2.23264	1.500	4.465	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 550										
COMPUTE NM HYD	550.00	-	32	.00119	3.41	.142	2.23264	1.500	4.471	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 555										
COMPUTE NM HYD	AP.10(555)	-	33	.00157	4.49	.187	2.23264	1.500	4.465	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 560										
COMPUTE NM HYD	560.00	-	34	.00100	2.86	.119	2.23264	1.500	4.476	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 565										
COMPUTE NM HYD	565.00	-	35	.00125	3.57	.149	2.23264	1.500	4.468	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 570										
COMPUTE NM HYD	570.00	-	36	.00093	2.66	.111	2.23264	1.500	4.476	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 575										
COMPUTE NM HYD	575.00	-	37	.00108	3.09	.129	2.23264	1.500	4.473	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 580										
COMPUTE NM HYD	580.00	-	38	.00122	3.49	.145	2.23264	1.500	4.470	PER IMP= 90.00
*S----------										
*S COMPUTE DEVELOPED BASIN 585										
COMPUTE NM HYD	585.00	-	39	.00047	1.36	.056	2.23264	1.500	4.511	PER IMP= 90.00
*S----------										
*S ADD 160 TO 150										
ADD HYD	150.10	8& 6	40	.00350	10.03	.420	2.25060	1.500	4.480	
*S----------										
*S ADD 150.1 TO 155										
ADD HYD	150.20	40& 7	42	.00646	18.40	.770	2.23398	1.500	4.451	
*S----------										
*S ADD 150.2 TO 510										

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
ADD HYD	AP.1	42&24	44	.00793	22.60	945	2.23370	1 500	4.454	
*S----------										
*S ADD 220 TO 210										
ADD HYD	210.10	12&10	46	.00817	23.29	.973	2.23258	1 500	4.454	
*S----------										
*S ADD 210.1 TO 515										
ADD HYD	AP.2	46&25	48	.00991	28.26	1.180	2.23257	1 500	4.455	
*S----------										
*S ADD 125 TO 585										
ADD HYD	AP.17	4&39	50	.00140	4.00	.166	2.22019	1.500	4.462	
*S----------										
*S ADD 520 TO 110										
ADD HYD	AP.3	26& 2	54	.00112	3.22	.133	2.23222	1.500	4.498	
*S----------										
*S ADD 120 TO 580										
ADD HYD	AP.15	3&38	56	00305	8.72	.363	2.23247	1.500	4.466	
*S----------										
*S ADD 205 TO 215										
ADD HYD	AP.5	9&11	58	.02379	64.41	2.634	2.07605	1.500	4.230	
*S----------										
*S ADD 525 TO 410										
ADD HYD	525.10	27&16	62	.00036	1.00	.039	2.04510	1.500	4.358	
*S----------										
*S ADD 525.1 TO 415										
ADD HYD	525 20	62&17	64	.00082	2.33	.094	2.15001	1.500	4.444	
*S----------										
*S ADD 425 TO 435										
ADD HYD	425.10	19&20	66	.00141	4.04	.168	2.23491	1.500	4.480	
*S----------										
*S ADD 425.1 TO 420										
ADD HYD	420.10	66&18	67	.00190	5.49	.230	2.26501	1.500	4.514	
*S----------										
*S ADD 525.2 TO 420.1										
ADD HYD	AP.7	64&67	68	.00272	7.82	.324	2.23034	1.500	4.493	
*S----------										
*S ADD 445 TO 550										
ADD HYD	AP.9	21&32	70	.00363	10.37	.432	2.23251	1.500	4.463	
*S----------										
*S ADD 450 TO 560										
ADD HYD	AP.11	22&34	72	.00155	4.37	.180	2.17698	1.500	4.406	
*S----------										
*S ADD 310 TO 315										
ADD HYD	315.10	13&14	74	.00291	8 32	.348	2.23987	1.500	4.469	
*S----------										
*S ADD 315.1 TO 565										
ADD HYD	AP.12	74&35	76	.00416	11.90	.496	2.23765	1.500	4.469	
*S----------										
*S ADD 455 TO 570										
ADD HYD	AP.13	23&36	78	.00636	18.14	.757	2.23257	1.500	4.456	
*S----------										
*S ADD 325 TO 575										
ADD HYD	AP.14	15&37	80	.00136	3.90	.162	2.23230	1.500	4.486	
*S----------										
FINISH										

_(s0p10h4099T_&16D__

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_(s16.67h8 5v0T_&18D

        AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997 02d
             RUN DATE (MON/DAY/YR) = 09/04/2009
             START TIME (HR:MIN·SEC) = 14.29 13      USER NO.= AHYMO-I-9702dGanFlemingW
             INPUT FILE = K \PROJECTS\50393\PROJEC-1\FINALD-1\DRAINA-1\MONTGO-2 DAT

    START                  TIME=0 0 CODE 0 LINES -6
    LOCATION               ALBUQUERQUE
         City of Albuquerque soil infiltration values (LAND FACTORS) used for computations.
         Land Treatment      Initial Abstr.(in)     Unif. Infilt.(in/hour)
              A              0.65                   1.67
              B              0 50                   1.25
              C              0.35                   0.83
              D              0.10                   0 04

    *S
    *S    MONTGOMERY/EUBANK DRAINAGE
    *S                   100-YEAR 6 HOUR EVENT
    *S
    *S    FN:Montgomery-Eubank 100-YR 6-HR DAT  -  HYMO PER JAN 1997 DPM REVISIONS
    *S
    RAINFALL               TYPE=1 RAIN QUAR=1 12 RAIN ONE=1.86
                                      RAIN SIX=2.50 RAIN DAY=3.03 DT=0.033333

                   COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                   DT =     .033333 HOURS        END TIME =     5.999940 HOURS
                      .0000   .0059   .0119   .0181   .0244   .0307   .0373
                      .0440   .0508   .0577   .0649   .0722   .0797   .0874
                      .0953   .1034   .1117   .1203   .1291   .1382   .1477
                      .1574   .1675   .1779   .1888   .2001   .2118   .2241
                      .2370   .2506   .2648   .2700   .2755   .2814   .2940
                      .3223   .3658   .4282   .5135   .6255   .7683   .9461
                     1.1632  1.3639  1.4479  1.5189  1.5820  1.6394  1.6922
                     1.7413  1.7872  1.8301  1.8706  1.9088  1.9448  1.9789
                     2.0113  2.0419  2.0710  2.0986  2.1248  2.1315  2.1379
                     2.1441  2.1501  2.1558  2.1615  2.1669  2.1722  2.1774
                     2.1825  2.1874  2.1923  2.1970  2.2017  2.2062  2.2107
                     2.2151  2.2194  2.2236  2.2278  2.2319  2.2360  2.2399
                     2.2439  2.2478  2.2516  2.2553  2.2591  2.2627  2.2664
                     2.2700  2.2735  2.2770  2.2805  2.2839  2.2873  2.2907
                     2.2940  2.2973  2.3005  2.3038  2.3070  2.3101  2.3133
                     2.3164  2.3194  2.3225  2.3255  2.3285  2.3315  2.3345
                     2.3374  2.3403  2.3432  2.3460  2.3489  2.3517  2.3545
                     2.3573  2.3600  2.3628  2.3655  2.3682  2.3709  2.3736
                     2.3762  2.3788  2.3815  2.3841  2.3866  2.3892  2.3918
                     2.3943  2.3968  2 3993  2.4018  2.4043  2.4068  2.4092
                     2.4116  2.4141  2.4165  2.4189  2.4213  2.4236  2.4260
                     2.4283  2.4307  2.4330  2.4353  2.4376  2.4399  2.4422
                     2.4444  2.4467  2.4489  2.4512  2.4534  2.4556  2.4578
                     2.4600  2.4622  2.4644  2.4665  2.4687  2.4708  2.4730
                     2.4751  2.4772  2.4793  2.4814  2.4835  2.4856  2.4877
                     2.4898  2.4918  2.4939  2.4959  2.4980  2.5000

    *S-----------------------------------------------------------------
    *S DEVELOPED SEDIMENT BULKING FACTOR = 5.0%
    SEDIMENT BULK          CODE=1      BULK FACTOR = 1.05
    *S-----------------------------------------------------------------
    *S-----------------------------------------------------------------
    *S MONTGOMERY/EUBANK DEVELOPED CONDITIONS
    *S-----------------------------------------------------------------
    *S-----------------------------------------------------------------
    *S COMPUTE DEVELOPED BASIN 105
    COMPUTE NM HYD          ID=1 HYD=SD(105) AREA=0.00277 SQ MI
                            %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                            MASS RAINFALL=-1

        K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
        UNIT PEAK =    9.8401     CFS    UNIT VOLUME =     .9982        B =    526.28       P60 = 1.8600
        AREA =       .002493 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

        K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
        UNIT PEAK =    .80706     CFS    UNIT VOLUME =     .9841        B =    388.48       P60 = 1.8600
        AREA =       .000277 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

       BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW

     PRINT HYD              ID=1 CODE=10

                                          HYDROGRAPH FROM AREA SD(105)

        TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
         HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
          000       .0          1.667       4.0          3.333        1          5.000        1          6.667       .0
         .333        0          2.000       1.9          3.667       .1          5 333       .1
          667       .2          2.333         4          4.000        1          5 667       .1
        1.000       .5          2.667         2          4.333       .1          6 000        1
        1 333      2 5          3.000        .1          4.667       .1          6.333       .0

       RUNOFF VOLUME =      2 23264 INCHES      =          3298 ACRE-FEET
       PEAK DISCHARGE RATE =        7.90 CFS  AT   1 500 HOURS   BASIN AREA =    0028 SQ. MI.


    *S---------------------------- ---  ----  ------- --------------------
    *S COMPUTE DEVELOPED BASIN 110
    COMPUTE NM HYD          ID=2 HYD=110 AREA=0 00062 SQ MI
                            %A=0 %B=0 %C=10 %D=90 TP=-0 133333 HR
                            MASS RAINFALL= 1
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K =    072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   2.2025    CFS   UNIT VOLUME =     9941       B =   526.28      P60 = 1.8600
AREA =       .000558 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333


K =   .105780HR    TP =    133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
UNIT PEAK =   .18064    CFS   UNIT VOLUME =    .9295       B =   388.48      P60 = 1.8600
AREA =       .000062 SQ MI    IA =     35000 INCHES    INF =     83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=2 CODE=10

                                PARTIAL HYDROGRAPH   110 00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.333       .6          2.667       .0          4 000       .0          5.333       .0
       333       .0          1.667       .9          3.000       .0          4 333       .0          5.667       .0
      .667       .1          2.000       .4          3 333       .0          4.667       .0          6.000       .0
     1.000       .1          2.333       .1          3.667       .0          5.000       .0          6.333       .0

RUNOFF VOLUME =     2.23264 INCHES     =        .0738 ACRE-FEET
PEAK DISCHARGE RATE =       1.78 CFS  AT   1.500 HOURS   BASIN AREA =   .0006 SQ  MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 120
COMPUTE NM HYD        ID=3 HYD=120 AREA=0.00183 SQ MI
                      %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                      MASS RAINFALL=-1

K =   .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   6.5008    CFS   UNIT VOLUME =    .9976       B =   526.28      P60 = 1.8600
AREA =       .001647 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =   .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
UNIT PEAK =   .53319    CFS   UNIT VOLUME =    .9756       B =   388.48      P60 = 1.8600
AREA =       .000183 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=3 CODE=10

                                PARTIAL HYDROGRAPH   120.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667       2.6          3.333       .1          5.000       .1          6.667       .0
      .333       .0          2.000       1.2          3.667       .1          5.333       .1
      .667       .2          2.333        .3          4.000       .1          5.667       .1
     1.000       .3          2.667        .1          4.333       .1          6.000       .1
     1.333      1.6          3.000        .1          4.667       .1          6.333       .0

RUNOFF VOLUME =     2.23264 INCHES     =        .2179 ACRE-FEET
PEAK DISCHARGE RATE =       5.23 CFS  AT   1.500 HOURS   BASIN AREA =   .0018 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 125
COMPUTE NM HYD        ID=4 HYD=125 AREA=0.00093 SQ MI
                      %A=0 %B=5 %C=5 %D=90 TP=-0.133333 HR
                      MASS RAINFALL=-1

K =   .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   3.3037    CFS   UNIT VOLUME =    .9960       B =   526.28      P60 = 1.8600
AREA =       .000837 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =   .118490HR    TP =    .133333HR    K/TP RATIO =    .888679     SHAPE CONSTANT, N =  3.991343
UNIT PEAK =   .24733    CFS   UNIT VOLUME =    .9470       B =   354.59      P60 = 1.8600
AREA =       000093 SQ MI    IA =    .42500 INCHES    INF = . 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD             ID=4 CODE=10

                                PARTIAL HYDROGRAPH   125.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
       000       0          1.333        .8          2.667        .1          4.000       .0          5.333       .0
      .333       0          1 667       1.3          3.000        .0          4 333       0           5.667       0
      .667       1          2.000        .6          3.333        0           4.667       .0          6.000       0
     1.000       .2         2 333         1          3 667        .0          5 000       0           6.333       .0

RUNOFF VOLUME =     2.21442 INCHES     =        .1098 ACRE-FEET
PEAK DISCHARGE RATE =       2.64 CFS  AT   1.500 HOURS   BASIN AREA =   .0009 SQ  MI


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 130
COMPUTE NM HYD        ID=5 HYD=SD(130) AREA=0.00154 SQ MI
                      %A=0 %B=5 %C=5 %D=90 TP=-0.133333 HR
```

```
                    MASS RAINFALL=-1

     K =   .072666HR    TP =    133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7 106420
     UNIT PEAK =   5.4706    CFS   UNIT VOLUME =     9973       B =   526 28      P60 = 1.8600
     AREA =       .001386 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .118490HR    TP =   .133333HR    K/TP RATIO =    888679     SHAPE CONSTANT, N =  3.991343
     UNIT PEAK =    40956    CFS   UNIT VOLUME =    .9670       B =   354.59      P60 = 1 8600
     AREA =       000154 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD             ID=5 CODE=10

                                   HYDROGRAPH FROM AREA SD(130)

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      2.2          3.333       .1          5.000       .1          6.667       .0
      .333       .0          2.000      1.0          3 667       .1          5.333       .1
      .667       .1          2 333       .2          4.000       .1          5.667       .1
     1.000       .3          2.667        1          4.333       .1          6.000       .1
     1.333      1 4          3.000       .1          4.667       .1          6.333       .0

    RUNOFF VOLUME =     2.21441 INCHES     =        .1819 ACRE-FEET
    PEAK DISCHARGE RATE =       4.36 CFS  AT   1.500 HOURS   BASIN AREA =   .0015 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 150
COMPUTE NM HYD        ID=6 HYD=150 AREA=0.00053 SQ MI
                      %A=0 %B=0 %C=0 %D=100 TP=-0.133333 HR
                      MASS RAINFALL=-1

     K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   2.0919    CFS   UNIT VOLUME =    .9941       B =   526.28      P60 = 1.8600
     AREA =       .000530 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=6 CODE=10

                                   PARTIAL HYDROGRAPH   150.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.333       .5          2.667       .0          4.000       .0          5.333       .0
      .333       .0          1.667       .8          3.000       .0          4.333       .0          5.667       .0
      .667       .1          2.000       .4          3.333       .0          4.667       .0          6.000       .0
     1.000       .1          2.333       .1          3.667       .0          5.000       .0          6.333       .0

    RUNOFF VOLUME =     2.35211 INCHES     =        .0665 ACRE-FEET
    PEAK DISCHARGE RATE =       1.56 CFS  AT   1.500 HOURS   BASIN AREA =   .0005 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 155
COMPUTE NM HYD        ID=7 HYD=155 AREA=0.00296 SQ MI
                      %A=0 %B=5 %C=5 %D=90 TP=-0.133333 HR
                      MASS RAINFALL=-1

     K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   10.515    CFS   UNIT VOLUME =    .9982       B =   526.28      P60 = 1.8600
     AREA =       .002664 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .118490HR    TP =   .133333HR    K/TP RATIO =   .888679     SHAPE CONSTANT, N =  3.991343
     UNIT PEAK =   .78720    CFS   UNIT VOLUME =    .9831       B =   354.59      P60 = 1.8600
     AREA =       .000296 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD             ID=7 CODE=10

                                   PARTIAL HYDROGRAPH   155.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
       000        0          1.667       4.2          3.333       .1          5.000        1          6.667        0
      .333       .0          2.000       2.0          3.667       .1          5 333       .1
      .667        3          2 333         5          4 000        1          5 667       .1
     1.000        5          2.667        .2          4.333       .1          6 000        1
     1.333      2.6          3.000       .1          4.667        1          6.333        0

    RUNOFF VOLUME =     2.21441 INCHES     =         3496 ACRE-FEET
    PEAK DISCHARGE RATE =       8.37 CFS  AT   1.500 HOURS   BASIN AREA =   .0030 SQ. MI.


*S--------- --------- --- -- ----------------------------------------
*S COMPUTE DEVELOPED BASIN 160
COMPUTE NM HYD        ID=8 HYD=160 AREA=0.00297 SQ MI
                      %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                      MASS RAINFALL=-1

     K =    072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7 106420
     UNIT PEAK =   10.551    CFS   UNIT VOLUME =     9982       B =   526 28      P60 = 1 8600
```

```
AREA =        002673 SQ MI     IA =      10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =     86533    CFS   UNIT VOLUME =     .9858        B =   388.48       P60 = 1.8600
AREA =        000297 SQ MI     IA =      35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW

PRINT HYD              ID=8 CODE=10

                                PARTIAL HYDROGRAPH   160.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      4.3          3 333       .1          5 000       .1          6 667       .0
      .333       .0          2.000      2 0          3.667       .1          5.333       .1
      .667       .3          2.333       .5          4.000        1          5.667       .1
     1.000       .5          2.667       .2          4.333        1          6.000       .1
     1.333      2.7          3.000        1          4.667       .1          6.333       .0

RUNOFF VOLUME =      2.23264 INCHES      =        .3536 ACRE-FEET
PEAK DISCHARGE RATE =        8.47 CFS  AT   1.500 HOURS   BASIN AREA =   .0030 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 205
COMPUTE NM HYD         ID=9 HYD=205 AREA=0.01178 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    41.847    CFS   UNIT VOLUME =     .9991        B =   526.28       P60 = 1.8600
AREA =        .010602 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    3.4322    CFS   UNIT VOLUME =     .9967        B =   388.48       P60 = 1.8600
AREA =        .001178 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=9 CODE=10

                                PARTIAL HYDROGRAPH   205.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667     16.9          3.333       .5          5.000       .4          6.667       .0
      .333       .0          2.000      8.0          3.667       .4          5.333       .4          7.000       .0
      .667      1.0          2.333      1.9          4.000       .4          5.667       .4
     1.000      2.1          2.667       .9          4.333       .4          6.000       .4
     1.333     10.5          3.000       .6          4.667       .4          6.333       .0

RUNOFF VOLUME =      2.23264 INCHES      =       1.4027 ACRE-FEET
PEAK DISCHARGE RATE =       33.55 CFS  AT   1.500 HOURS   BASIN AREA =   .0118 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 210
COMPUTE NM HYD         ID=10 HYD=210 AREA=0.00568 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    20.177    CFS   UNIT VOLUME =     .9988        B =   526.28       P60 = 1.8600
AREA =        .005112 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    1.6549    CFS   UNIT VOLUME =     .9926        B =   388.48       P60 = 1.8600
AREA =        .000568 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=10 CODE=10

                                PARTIAL HYDROGRAPH   210.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       0           1 667      8.2          3.333       .2          5.000       2          6.667       0
      .333       0           2.000      3 9          3.667        2          5 333       .2
       667      .5           2.333       .9          4.000        2          5 667       .2
     1 000      1.0          2 667       .4          4.333       .2          6 000       .2
     1.333      5.1          3.000       .3          4.667        2          6.333       .0

RUNOFF VOLUME =      2 23264 INCHES      =        6763 ACRE-FEET
PEAK DISCHARGE RATE =       16.18 CFS  AT   1.500 HOURS   BASIN AREA =   .0057 SQ  MI


*S-----------------------  ---- --------------- -------- -----------
*S COMPUTE DEVELOPED BASIN 215
COMPUTE NM HYD         ID=11 HYD=215 AREA=0 01201 SQ MI
                       %A=0 %B=20 %C=10 %D=70 TP=-0 133333 HR
                       MASS RAINFALL=-1
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```
K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7 106420
UNIT PEAK =    33.183     CFS    UNIT VOLUME =      9990        B =    526 28       P60 = 1.8600
AREA =        .008407 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


K =    .122727HR     TP =    .133333HR     K/TP RATIO =    .920454      SHAPE CONSTANT, N =  3 845371
UNIT PEAK =    9 3154     CFS    UNIT VOLUME =     .9990        B =    344 73       P60 = 1.8600
AREA =        003603 SQ MI     IA =     .45000 INCHES     INF =    1.11000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD              ID=11 CODE=10

                                PARTIAL HYDROGRAPH   215.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667     15.6          3.333       .4          5 000       .3          6.667       .0
      .333        0          2.000      6.7          3.667       .3          5.333       .3          7.000       .0
      .667       .8          2.333      1.6          4.000       .3          5.667       .3
     1.000      1.7          2.667       .8          4 333       .3          6.000       .3
     1.333      8 8          3.000       .5          4 667       .3          6.333       .0

    RUNOFF VOLUME =      1.92250 INCHES      =        1.2314 ACRE-FEET
    PEAK DISCHARGE RATE =       30.86 CFS  AT   1.500 HOURS   BASIN AREA =    .0120 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 220
COMPUTE NM HYD         ID=12 HYD=220 AREA=0.00249 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    8.8454     CFS    UNIT VOLUME =     .9980        B =    526.28       P60 = 1.8600
AREA =        .002241 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    .72548     CFS    UNIT VOLUME =     .9823        B =    388.48       P60 = 1.8600
AREA =        .000249 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=12 CODE=10

                                PARTIAL HYDROGRAPH   220.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      3.6          3.333       .1          5.000       .1          6.667       .0
      .333       .0          2.000      1.7          3.667       .1          5.333       .1
      .667       .2          2.333       .4          4.000       .1          5.667       .1
     1.000       .5          2.667       .2          4.333       .1          6.000       .1
     1.333      2.2          3.000       .1          4.667       .1          6.333       .0

    RUNOFF VOLUME =      2.23264 INCHES      =         .2965 ACRE-FEET
    PEAK DISCHARGE RATE =        7.11 CFS  AT   1.500 HOURS   BASIN AREA =    .0025 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 310
COMPUTE NM HYD         ID=13 HYD=310 AREA=0.00018 SQ MI
                       %A=0 %B=0 %C=0 %D=100 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    .71047     CFS    UNIT VOLUME =     .9840        B =    526.28       P60 = 1.8600
AREA =        .000180 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=13 CODE=10

                                HYDROGRAPH FROM AREA   310 00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.333        2          2.667       .0          4.000        0          5.333       .0
      .333        0          1.667       .3          3 000        0          4 333       .0          5 667       .0
      .667        0          2 000        1          3.333       .0          4 667       .0          6.000        0
     1 000       .0          2.333       .0          3.667       .0          5.000       .0

    RUNOFF VOLUME =      2.35211 INCHES      =         .0226 ACRE-FEET
    PEAK DISCHARGE RATE =         .54 CFS  AT   1.500 HOURS   BASIN AREA =    .0002 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 315
COMPUTE NM HYD         ID=14 HYD=315 AREA=0.00273 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    9 6980     CFS    UNIT VOLUME =     .9982        B =    526.28       P60 = 1.8600
AREA =        002457 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
```

```
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .105780HR    TP =   .133333HR    K/TP RATIO =   .793353     SHAPE CONSTANT, N =  4.520258
UNIT PEAK =   .79541    CFS   UNIT VOLUME =     9841       B =   388 48      P60 = 1 8600
AREA =       000273 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD            ID=14 CODE=10

                                   HYDROGRAPH FROM AREA   315.00

 TIME    FLOW        TIME    FLOW        TIME    FLOW        TIME    FLOW        TIME    FLOW
 HRS     CFS         HRS     CFS         HRS     CFS         HRS     CFS         HRS     CFS
 .000      0         1 667    3.9        3 333     .1        5.000     .1        6.667     .0
 .333     .0         2.000    1.9        3.667     .1        5.333     .1
 .667     .2         2 333      4        4.000     .1        5.667     .1
1.000      5         2.667     .2        4.333     .1        6.000     .1
1.333    2.4         3.000     .1        4.667     .1        6.333     .0

RUNOFF VOLUME =     2.23264 INCHES     =        .3251 ACRE-FEET
PEAK DISCHARGE RATE =       7.79 CFS  AT   1.500 HOURS   BASIN AREA =   .0027 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 325
COMPUTE NM HYD        ID=15 HYD=325 AREA=0.00028 SQ MI
                      %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                      MASS RAINFALL=-1

K =   .072666HR    TP =   .133333HR    K/TP RATIO =    545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   .99466    CFS   UNIT VOLUME =    .9881       B =   526.28      P60 = 1.8600
AREA =      .000252 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .105780HR    TP =   .133333HR    K/TP RATIO =   .793353     SHAPE CONSTANT, N =  4.520258
UNIT PEAK =   .81580E-01CFS   UNIT VOLUME =    .8805       B =   388.48      P60 = 1.8600
AREA =      .000028 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD            ID=15 CODE=10

                                   HYDROGRAPH FROM AREA   325.00

 TIME    FLOW        TIME    FLOW        TIME    FLOW        TIME    FLOW        TIME    FLOW
 HRS     CFS         HRS     CFS         HRS     CFS         HRS     CFS         HRS     CFS
 .000      .0        1.333     .3        2.667      .0       4.000     .0        5.333     .0
 .333       0        1.667     .4        3.000      .0       4.333     .0        5.667     .0
 .667      .0        2.000     .2        3.333      .0       4.667     .0        6.000     .0
1.000       1        2.333     .0        3.667      .0       5.000     .0        6.333     .0

RUNOFF VOLUME =     2.23264 INCHES     =        .0333 ACRE-FEET
PEAK DISCHARGE RATE =        .81 CFS  AT   1.500 HOURS   BASIN AREA =   .0003 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 410
COMPUTE NM HYD        ID=16 HYD=410 AREA=0.00013 SQ MI
                      %A=0 %B=10 %C=40 %D=50 TP=-0.133333 HR
                      MASS RAINFALL=-1

K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   .25656    CFS   UNIT VOLUME =    .9546       B =   526.28      P60 = 1.8600
AREA =      .000065 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

K =   .110864HR    TP =   .133333HR    K/TP RATIO =   .831484     SHAPE CONSTANT, N =  4.290111
UNIT PEAK =   .18236    CFS   UNIT VOLUME =    .9308       B =   374.07      P60 = 1.8600
AREA =      .000065 SQ MI    IA =    .38000 INCHES    INF =    .91400 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD            ID=16 CODE=10

                                   HYDROGRAPH FROM AREA   410.00

 TIME    FLOW        TIME    FLOW        TIME    FLOW        TIME    FLOW        TIME    FLOW
 HRS     CFS         HRS     CFS         HRS     CFS         HRS     CFS         HRS     CFS
 .000      .0        1 333     .1        2 667       0       4.000     .0        5.333     .0
  333      .0        1.667     .2        3.000       0       4.333     .0        5 667     .0
  667       0        2.000     .1        3.333      .0       4 667      0        6.000     .0
1.000       0        2 333     .0        3.667       0       5.000     .0

RUNOFF VOLUME =     1 71630 INCHES     =        .0119 ACRE-FEET
PEAK DISCHARGE RATE =        .34 CFS  AT   1.500 HOURS   BASIN AREA =   .0001 SQ  MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 415
COMPUTE NM HYD        ID=17 HYD=415 AREA=0 00046 SQ MI
                      %A=0 %B=0 %C=10 %D=90 TP=-0 133333 HR
                      MASS RAINFALL=-1

K =   .072666HR    TP =   .133333HR    K/TP RATIO =    545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   1 6341    CFS   UNIT VOLUME =    .9922       B =   526.28      P60 = 1.8600
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AREA =       .000414 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =     033333

K =     105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    .13402     CFS    UNIT VOLUME =      9032        B =    388 48       P60 = 1.8600
AREA =       .000046 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH    FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD              ID=17 CODE=10

                                    HYDROGRAPH FROM AREA   415.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      000       .0           1.333       .4           2.667       .0           4.000       .0           5 333       .0
     .333       .0           1.667       .7           3.000       .0           4.333       .0           5 667       .0
     .667       .0           2 000       .3           3.333       .0           4.667       .0           6.000       .0
    1.000       .1           2.333       .1           3.667       .0           5.000       .0           6.333       .0

RUNOFF VOLUME =      2 23264 INCHES      =          0548 ACRE-FEET
PEAK DISCHARGE RATE =        1.33 CFS  AT   1 500 HOURS   BASIN AREA =    .0005 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 420
COMPUTE NM HYD          ID=18 HYD=420 AREA=0 00049 SQ MI
                        %A=0 %B=0 %C=0 %D=100 TP=-0.133333 HR
                        MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    1.9341     CFS    UNIT VOLUME =      9932        B =    526.28       P60 = 1.8600
AREA =       .000490 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.   FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=18 CODE=10

                                    HYDROGRAPH FROM AREA   420.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000      .0           1.333       .5           2.667       .0           4.000       .0           5.333       .0
      .333      .0           1.667       .7           3.000       .0           4.333       .0           5.667       .0
       667      .0           2.000       .4           3.333       .0           4.667       .0           6.000       .0
     1.000      .1           2.333       .1           3.667       .0           5.000       .0           6.333       .0

RUNOFF VOLUME =      2.35211 INCHES      =          .0615 ACRE-FEET
PEAK DISCHARGE RATE =        1.45 CFS  AT   1.500 HOURS   BASIN AREA =    .0005 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 425
COMPUTE NM HYD          ID=19 HYD=425 AREA=0.00138 SQ MI
                        %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                        MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    4.9023     CFS    UNIT VOLUME =      .9969        B =    526.28       P60 = 1.8600
AREA =       .001242 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    .40207     CFS    UNIT VOLUME =      .9698        B =    388.48       P60 = 1.8600
AREA =       .000138 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.   FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=19 CODE=10

                                    HYDROGRAPH FROM AREA   425.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000      .0           1.667       2.0          3.333       .1           5.000       .0           6 667       .0
      .333       0           2 000        .9          3.667       .1           5.333       .0
       667      .1           2.333        .2          4.000        0           5.667       .0
     1.000      .3           2.667        .1          4.333       .0           6.000        1
     1 333     1.2           3 000         1          4 667        0           6.333        0

RUNOFF VOLUME =      2 23264 INCHES      =          1643 ACRE-FEET
PEAK DISCHARGE RATE =        3 95 CFS  AT   1.500 HOURS   BASIN AREA =    0014 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 435
COMPUTE NM HYD          ID=20 HYD=435 AREA=0.00003 SQ MI
                        %A=0 %B=0 %C=0 %D=100 TP=-0 133333 HR
                        MASS RAINFALL=-1

K =    .072666HR     TP =    133333HR     K/TP RATIO =    545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    .11841     CFS    UNIT VOLUME =      9032        B =    526.28       P60 = 1.8600
AREA =       .000030 SQ MI     IA =     .10000 INCHES     INF =     04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.   FACTOR =  1 05000 AT PEAK FLOW
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PRINT HYD              ID=20 CODE=10

                                   HYDROGRAPH FROM AREA   435.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000        0           1.333       0           2.667      .0           4 000      .0           5 333      .0
     .333        0           1.667      .0           3.000      .0           4.333      .0           5.667      .0
     .667        0           2.000       0           3 333      .0           4 667       0           6.000       0
    1.000        0           2.333      .0           3.667      .0           5 000      .0

   RUNOFF VOLUME =      2.35211 INCHES      =        .0038 ACRE-FEET
   PEAK DISCHARGE RATE =        .10 CFS  AT   1.500 HOURS   BASIN AREA =   .0000 SQ. MI


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 445
COMPUTE NM HYD         ID=21 HYD=445 AREA=0.00244 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7 106420
    UNIT PEAK =   8.6678    CFS   UNIT VOLUME =     9980       B =   526.28      P60 = 1.8600
    AREA =      .002196 SQ MI    IA =    .10000 INCHES    INF =     04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .105780HR    TP =   .133333HR    K/TP RATIO =   .793353     SHAPE CONSTANT, N =  4.520258
    UNIT PEAK =   .71091    CFS   UNIT VOLUME =    .9823       B =   388.48      P60 = 1 8600
    AREA =      .000244 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=21 CODE=10

                                   HYDROGRAPH FROM AREA   445.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000        .0          1.667      3.5          3.333       .1           5.000       .1           6.667       .0
     .333        .0          2.000      1.7          3.667       .1           5.333       .1
     .667        .2          2.333       .4          4.000       .1           5.667       .1
    1.000        .4          2.667       .2          4.333       .1           6.000       .1
    1.333       2.2          3.000       .1          4.667       .1           6.333       .0

   RUNOFF VOLUME =      2.23264 INCHES      =        .2905 ACRE-FEET
   PEAK DISCHARGE RATE =       6.96 CFS  AT   1.500 HOURS   BASIN AREA =   .0024 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 450
COMPUTE NM HYD         ID=22 HYD=450 AREA=0.00055 SQ MI
                       %A=0 %B=10 %C=10 %D=80 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   1.7367    CFS   UNIT VOLUME =    .9932       B =   526.28      P60 = 1.8600
    AREA =      .000440 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .118490HR    TP =   .133333HR    K/TP RATIO =   .888679     SHAPE CONSTANT, N =  3.991343
    UNIT PEAK =   .29254    CFS   UNIT VOLUME =    .9561       B =   354.59      P60 = 1.8600
    AREA =      .000110 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=22 CODE=10

                                   HYDROGRAPH FROM AREA   450.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000        .0          1.333       .5          2.667       .0           4.000       .0           5.333       .0
     .333        .0          1.667       .8          3.000       .0           4.333       .0           5.667       .0
     .667        .0          2.000        3          3.333       .0           4.667       .0           6.000       .0
    1.000        .1          2.333       .1          3.667       .0           5.000       .0           6.333       .0

   RUNOFF VOLUME =      2.07671 INCHES      =         0609 ACRE-FEET
   PEAK DISCHARGE RATE =       1.51 CFS  AT   1 500 HOURS   BASIN AREA =   .0006 SQ  MI.


*S---------- ---------- ----------------------------------------
*S COMPUTE DEVELOPED BASIN 455
COMPUTE NM HYD         ID=23 HYD=455 AREA=0.00543 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP= 0 133333 HR
                       MASS RAINFALL=-1

    K =   .072666HR    TP =   .133333HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   19.289    CFS   UNIT VOLUME =     9988       B =   526.28      P60 = 1 8600
    AREA =      .004887 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .105780HR    TP =   .133333HR    K/TP RATIO =    793353     SHAPE CONSTANT, N =  4 520258
    UNIT PEAK =   1.5821    CFS   UNIT VOLUME =     9926       B =   388 48      P60 = 1.8600
    AREA =       000543 SQ MI    IA =     35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.
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```
PRINT HYD              ID=23 CODE=10

                                   HYDROGRAPH FROM AREA   455.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      7.8          3.333        2          5.000       .2          6.667       .0
      .333       .0          2 000      3.7          3.667       .2          5 333        2
      .667       .5          2 333        9          4 000       .2          5.667       .2
     1.000      1 0          2.667       .4          4.333       .2          6 000       .2
     1.333      4.8          3.000       .3          4.667        2          6.333        0

    RUNOFF VOLUME =      2.23264 INCHES      =         6466 ACRE-FEET
    PEAK DISCHARGE RATE =       15 47 CFS  AT   1.500 HOURS   BASIN AREA =   .0054 SQ  MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 510
COMPUTE NM HYD         ID=24 HYD=510 AREA=0.00147 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

     K =    .072666HR     TP =     133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =    5.2220     CFS   UNIT VOLUME =     .9973        B =    526.28       P60 = 1.8600
     AREA =       .001323 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


     K =    .105780HR     TP =    .133333HR     K/TP RATIO =     793353      SHAPE CONSTANT, N =  4.520258
     UNIT PEAK =    .42830     CFS   UNIT VOLUME =     .9698        B =    388.48       P60 = 1.8600
     AREA =       .000147 SQ MI     IA =      35000 INCHES     INF =     .83000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

     BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

 PRINT HYD              ID=24 CODE=10

                                   OUTFLOW HYDROGRAPH RESERVOIR   510.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      2.1          3.333       .1          5.000       .0          6.667       .0
      .333       .0          2.000      1.0          3.667       .1          5.333       .1
      .667       .1          2.333       .2          4.000       .1          5.667       .1
     1.000       .3          2.667       .1          4.333       .1          6.000       .1
     1.333      1.3          3 000       .1          4.667       .0          6.333       .0

    RUNOFF VOLUME =      2.23264 INCHES      =        .1750 ACRE-FEET
    PEAK DISCHARGE RATE =        4.20 CFS  AT   1.500 HOURS   BASIN AREA =   .0015 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 515
COMPUTE NM HYD         ID=25 HYD=515 AREA=0.00174 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

     K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =    6.1811     CFS   UNIT VOLUME =     .9976        B =    526.28       P60 = 1.8600
     AREA =       .001566 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


     K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
     UNIT PEAK =    .50696     CFS   UNIT VOLUME =     .9756        B =    388.48       P60 = 1.8600
     AREA =       .000174 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=25 CODE=10

                                   OUTFLOW HYDROGRAPH RESERVOIR   515.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      2.5          3 333       .1          5.000       .1          6.667       .0
      .333       .0          2 000      1.2          3.667       .1          5.333       .1
      .667       .2          2.333       .3          4.000       .1          5.667       .1
     1.000       .3          2.667        1          4 333        1          6.000       .1
     1.333      1 6          3.000       .1          4 667       .1          6.333       .0

    RUNOFF VOLUME =      2.23264 INCHES      =         2072 ACRE-FEET
    PEAK DISCHARGE RATE =        4 97 CFS  AT   1 500 HOURS   BASIN AREA =    0017 SQ. MI


*S---------  - ------------------------- -- -- ---- ---------------
*S COMPUTE DEVELOPED BASIN 520
COMPUTE NM HYD         ID=26 HYD=520 AREA=0.00050 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

     K =    .072666HR     TP =    .133333HR     K/TP RATIO =     545000      SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =    1.7762     CFS   UNIT VOLUME =      9932        B =    526.28       P60 = 1.8600
     AREA =        000450 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


     K =     105780HR     TP =     133333HR     K/TP RATIO =     793353      SHAPE CONSTANT, N =  4.520258
     UNIT PEAK =    .14568     CFS   UNIT VOLUME =      9129        B =    388.48       P60 = 1.8600
     AREA =       .000050 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
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```
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=26 CODE=10

                         OUTFLOW HYDROGRAPH RESERVOIR   520.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000        0           1.333       .5           2.667       0           4.000       .0           5.333       0
     .333       .0           1 667       .7           3.000      .0           4.333       .0           5.667      .0
     .667       .0           2.000       .3           3 333      .0           4.667       .0           6 000      .0
    1.000       .1           2.333       .1           3.667      .0           5 000        0           6.333      .0

   RUNOFF VOLUME =     2 23264 INCHES     =        .0595 ACRE-FEET
   PEAK DISCHARGE RATE =       1.44 CFS  AT   1 500 HOURS   BASIN AREA =   .0005 SQ. MI


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 525
COMPUTE NM HYD         ID=27 HYD=525 AREA=0.00023 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    .81704    CFS   UNIT VOLUME =     .9862       B =   526.28      P60 = 1.8600
    AREA =       .000207 SQ MI    IA =     10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


    K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
    UNIT PEAK =    .67012E-01CFS   UNIT VOLUME =     .8805       B =   388.48      P60 = 1.8600
    AREA =       .000023 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=27 CODE=10

                         OUTFLOW HYDROGRAPH RESERVOIR   525.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0           1.333       .2           2.667       .0           4.000       .0           5.333       .0
     .333       .0           1.667       .3           3.000       .0           4.333       .0           5.667       .0
     .667       .0           2.000       .2           3.333       .0           4.667       .0           6.000       .0
    1.000       .0           2.333       .0           3.667       .0           5.000       .0

   RUNOFF VOLUME =     2.23264 INCHES     =        .0274 ACRE-FEET
   PEAK DISCHARGE RATE =        .67 CFS  AT   1.500 HOURS   BASIN AREA =   .0002 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 530
COMPUTE NM HYD         ID=28 HYD=AP.4(530) AREA=0.00050 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    1.7762    CFS   UNIT VOLUME =     .9932       B =   526.28      P60 = 1.8600
    AREA =       .000450 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


    K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
    UNIT PEAK =    .14568    CFS   UNIT VOLUME =     .9129       B =   388.48      P60 = 1.8600
    AREA =       .000050 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=28 CODE=10

                         HYDROGRAPH FROM AREA AP.4(530)

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0           1 333       .5           2 667       .0           4.000       .0           5.333       .0
     .333       .0           1.667       .7           3.000       .0           4.333       .0           5 667       .0
      667        0           2.000       .3           3 333       .0           4.667       .0           6 000        0
    1.000       .1           2.333        1           3.667       .0           5 000       .0           6.333        0

   RUNOFF VOLUME =     2 23264 INCHES     =        .0595 ACRE-FEET
   PEAK DISCHARGE RATE =       1.44 CFS  AT   1.500 HOURS   BASIN AREA =   .0005 SQ. MI.


*S- - ---------------------------------- - ---------------------------
*S COMPUTE DEVELOPED BASIN 535
COMPUTE NM HYD         ID=29 HYD=AP.8(535) AREA=0 00064 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    2.2735    CFS   UNIT VOLUME =      9941       B =   526.28      P60 = 1.8600
    AREA =       .000576 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


    K =    105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
    UNIT PEAK =    18647    CFS   UNIT VOLUME =     .9295       B =   388.48      P60 = 1 8600
    AREA =       .000064 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
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RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD              ID=29 CODE=10

                                   HYDROGRAPH FROM AREA AP 8(535)

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0           1.333       .6           2.667       .0           4.000       .0           5.333       .0
     .333       .0           1.667        9           3.000       .0           4 333       .0           5 667        0
      667       .1           2.000       .4           3.333       .0           4 667       .0           6.000       .0
    1.000       .1           2.333        1           3 667       .0           5.000       .0           6.333       .0

   RUNOFF VOLUME =      2.23264 INCHES      =        .0762 ACRE-FEET
   PEAK DISCHARGE RATE =       1.84 CFS  AT   1.500 HOURS   BASIN AREA =    0006 SQ. MI


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 540
COMPUTE NM HYD         ID=30 HYD=AP.6(540) AREA=0 00116 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    4.1207    CFS   UNIT VOLUME =     .9965       B =   526.28      P60 = 1 8600
    AREA =       .001044 SQ MI    IA =     .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
    UNIT PEAK =    .33798    CFS   UNIT VOLUME =     .9627       B =   388.48      P60 = 1.8600
    AREA =       .000116 SQ MI    IA =     .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=30 CODE=10

                                   HYDROGRAPH FROM AREA AP.6(540)

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0           1.333      1.0           2.667       .1           4.000       .0           5.333       .0
     .333       .0           1.667      1.7           3.000       .1           4.333       .0           5.667       .0
     .667       .1           2.000       .8           3.333       .0           4.667       .0           6.000       .0
    1.000       .2           2.333       .2           3.667       .0           5.000       .0           6.333       .0

   RUNOFF VOLUME =      2.23264 INCHES      =        .1381 ACRE-FEET
   PEAK DISCHARGE RATE =       3.32 CFS  AT   1.500 HOURS   BASIN AREA =    .0012 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 545
COMPUTE NM HYD         ID=31 HYD=AP.16(545) AREA=0.00160 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    5.6838    CFS   UNIT VOLUME =     .9973       B =   526.28      P60 = 1.8600
    AREA =       .001440 SQ MI    IA =     .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
    UNIT PEAK =    .46617    CFS   UNIT VOLUME =     .9729       B =   388.48      P60 = 1.8600
    AREA =       .000160 SQ MI    IA =     .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=31 CODE=10

                                   HYDROGRAPH FROM AREA AP.16(545)

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0           1.667      2.3           3 333       .1           5.000       .1           6 667       .0
      333       .0           2.000      1.1           3.667       .1           5.333       .1
     .667        1           2 333       .2           4.000       .1           5.667       .1
   1 000       .3           2.667       .1           4.333       .1           6 000       .1
   1.333      1.4           3.000       .1           4.667       .1           6.333       .0

   RUNOFF VOLUME =      2 23264 INCHES      =        1905 ACRE-FEET
   PEAK DISCHARGE RATE =       4 57 CFS  AT   1.500 HOURS   BASIN AREA =    .0016 SQ  MI


*S-      -------- -----------------------------------------------------
*S COMPUTE DEVELOPED BASIN 550
COMPUTE NM HYD         ID=32 HYD=550 AREA=0.00119 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

    K =    072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    4.2273    CFS   UNIT VOLUME =     .9965       B =   526.28      P60 = 1 8600
    AREA =       .001071 SQ MI    IA =     10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =    .105780HR    TP =    133333HR    K/TP RATIO =    793353     SHAPE CONSTANT, N =  4 520258
    UNIT PEAK =    .34672    CFS   UNIT VOLUME =     9627       B =   388.48      P60 = 1.8600
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AREA =       .000119 SQ MI     IA =      35000 INCHES     INF =      83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=32 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   550 00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.333      1.1          2 667        1          4.000       .0          5.333       .0
      .333       .0          1.667      1.7          3 000        1          4.333       .0          5 667       .0
       667        1          2.000       .8          3 333       .0          4.667       .0          6.000        0
     1 000       .2          2.333       .2          3.667       .0          5 000       .0          6 333       .0

RUNOFF VOLUME =      2.23264 INCHES      =        .1417 ACRE-FEET
PEAK DISCHARGE RATE =       3.41 CFS  AT   1.500 HOURS   BASIN AREA =    .0012 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 555
COMPUTE NM HYD         ID=33 HYD=AP 10(555) AREA=0.00157 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    5.5772     CFS   UNIT VOLUME =      9973        B =    526.28       P60 = 1.8600
AREA =       .001413 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    .45743     CFS   UNIT VOLUME =     .9729        B =    388.48       P60 = 1.8600
AREA =       .000157 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=33 CODE=10

                          HYDROGRAPH FROM AREA AP.10(555)

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1.667      2.3          3.333       .1          5.000       .1          6.667       .0
      .333       .0          2.000      1.1          3.667       .1          5.333       .1
      .667       .1          2.333       .2          4.000       .1          5.667       .1
     1.000       .3          2.667       .1          4.333       .1          6.000       .1
     1.333      1.4          3.000       .1          4.667       .1          6.333       .0

RUNOFF VOLUME =      2.23264 INCHES      =        .1869 ACRE-FEET
PEAK DISCHARGE RATE =       4.49 CFS  AT   1.500 HOURS   BASIN AREA =    .0016 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 560
COMPUTE NM HYD         ID=34 HYD=560 AREA=0.00100 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

K =    .072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    3.5524     CFS   UNIT VOLUME =     .9960        B =    526.28       P60 = 1.8600
AREA =       .000900 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

K =    .105780HR     TP =    .133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    .29136     CFS   UNIT VOLUME =     .9538        B =    388.48       P60 = 1.8600
AREA =       .000100 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=34 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   560.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          1 333       .9          2 667        1          4.000       .0          5.333        0
      .333       .0          1.667      1.4          3.000        0          4 333       .0          5.667        0
       667       .1          2.000        7          3 333       .0          4.667        0          6 000        0
     1.000        2          2.333       .2          3.667       .0          5.000        0          6.333       .0

RUNOFF VOLUME =      2 23264 INCHES      =         1191 ACRE-FEET
PEAK DISCHARGE RATE =       2 86 CFS  AT   1 500 HOURS   BASIN AREA =    .0010 SQ. MI


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 565
COMPUTE NM HYD         ID=35 HYD=565 AREA=0 00125 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0 133333 HR
                       MASS RAINFALL=-1

K =    072666HR     TP =    .133333HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7 106420
UNIT PEAK =    4 4405     CFS   UNIT VOLUME =     .9969        B =    526.28       P60 = 1 8600
AREA =       001125 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333

K =    .105780HR     TP =    133333HR     K/TP RATIO =    .793353      SHAPE CONSTANT, N =  4 520258
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UNIT PEAK =    .36420    CFS   UNIT VOLUME =     9664        B =   388.48       P60 = 1 8600
AREA =        000125 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1 05000 AT PEAK FLOW.

PRINT HYD              ID=35 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   565.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
     HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      000        0          1.667       1.8          3 333       .1          5.000       .0          6 667       .0
     .333       .0          2.000         9          3.667       .0          5.333       .0
     .667       .1          2.333         2          4.000       .0          5 667       .0
    1.000       .2          2.667        .1          4 333       .0          6.000       .0
    1.333      1 1          3.000         1          4.667       .0          6 333       .0

   RUNOFF VOLUME =      2.23264 INCHES      =        .1488 ACRE-FEET
   PEAK DISCHARGE RATE =       3.57 CFS  AT   1.500 HOURS   BASIN AREA =    .0013 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 570
COMPUTE NM HYD         ID=36 HYD=570 AREA=0.00093 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

   K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =   3.3037    CFS   UNIT VOLUME =    .9960        B =   526.28       P60 = 1.8600
   AREA =       .000837 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
   UNIT PEAK =    27096    CFS   UNIT VOLUME =    .9538        B =   388.48       P60 = 1.8600
   AREA =       .000093 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=36 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   570.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
     HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
     .000       .0          1.333        .8          2.667       .1          4.000       .0          5.333       .0
     .333       .0          1.667       1.3          3.000       .0          4.333       .0          5.667       .0
     .667       .1          2.000        .6          3.333       .0          4 667       .0          6.000       .0
    1.000       .2          2.333        .1          3.667       .0          5.000       .0          6.333       .0

   RUNOFF VOLUME =      2.23264 INCHES      =        .1107 ACRE-FEET
   PEAK DISCHARGE RATE =       2.66 CFS  AT   1.500 HOURS   BASIN AREA =    .0009 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 575
COMPUTE NM HYD         ID=37 HYD=575 AREA=0.00108 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

   K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =   3.8366    CFS   UNIT VOLUME =    .9965        B =   526.28       P60 = 1.8600
   AREA =       .000972 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
   UNIT PEAK =    .31467    CFS   UNIT VOLUME =    .9585        B =   388.48       P60 = 1.8600
   AREA =       .000108 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=37 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   575.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
     HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS
      000       .0          1.333       1.0          2.667       .1          4.000         0         5.333       .0
      333        0          1.667       1.6          3.000         1         4.333       .0          5.667       .0
      667       .1          2.000        .7          3.333       .0          4 667       .0          6.000       .0
    1 000       .2          2.333         2          3 667       .0          5.000       .0          6.333       .0

   RUNOFF VOLUME =      2.23264 INCHES      =        1286 ACRE-FEET
   PEAK DISCHARGE RATE =       3 09 CFS  AT   1.500 HOURS   BASIN AREA =    0011 SQ. MI


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 580
COMPUTE NM HYD         ID=38 HYD=580 AREA=0 00122 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0 133333 HR
                       MASS RAINFALL=-1

   K =    072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =   4 3339    CFS   UNIT VOLUME =     9969        B =   526.28       P60 = 1.8600
   AREA =       .001098 SQ MI    IA =     10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333
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K =    105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
UNIT PEAK =    .35546    CFS   UNIT VOLUME =     9627       B =   388.48      P60 = 1.8600
AREA =        000122 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    033333

BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=38 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   580 00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000        0          1.333      1 1          2 667       .1'         4 000       .0          5.333       .0
      333       .0          1 667      1 8          3.000       .1          4 333       .0          5.667       .0
      667        1          2.000       .8          3 333        0          4.667        0          6 000       .0
    1.000       .2          2.333        2          3.667       .0          5.000       .0          6.333       .0

   RUNOFF VOLUME =     2.23264 INCHES     =        .1453 ACRE-FEET
   PEAK DISCHARGE RATE =       3.49 CFS  AT   1.500 HOURS   BASIN AREA =    0012 SQ. MI.


*S-----------------------------------------------------------------
*S COMPUTE DEVELOPED BASIN 585
COMPUTE NM HYD         ID=39 HYD=585 AREA=0.00047 SQ MI
                       %A=0 %B=0 %C=10 %D=90 TP=-0.133333 HR
                       MASS RAINFALL=-1

   K =    .072666HR    TP =    .133333HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7 106420
   UNIT PEAK =    1.6696    CFS   UNIT VOLUME =     .9922       B =   526.28      P60 = 1.8600
   AREA =       .000423 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   K =    .105780HR    TP =    .133333HR    K/TP RATIO =    .793353     SHAPE CONSTANT, N =  4.520258
   UNIT PEAK =    .13694    CFS   UNIT VOLUME =     .9032       B =   388.48      P60 = 1.8600
   AREA =       .000047 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

   BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

PRINT HYD              ID=39 CODE=10

                          OUTFLOW HYDROGRAPH RESERVOIR   585.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0          1.333       .4          2.667       .0          4.000       .0          5.333       .0
     .333       .0          1.667       .7          3.000       .0          4.333       .0          5.667       .0
     .667       .0          2.000       .3          3.333       .0          4.667       .0          6.000       .0
    1.000       .1          2.333       .1          3.667       .0          5.000       .0          6.333       .0

   RUNOFF VOLUME =     2.23264 INCHES     =        .0560 ACRE-FEET
   PEAK DISCHARGE RATE =       1.36 CFS  AT   1.500 HOURS   BASIN AREA =    .0005 SQ. MI.


*S-----------------------------------------------------------------
*S ADD 160 TO 150
ADD HYD                ID=40 HYD=150.1 IDi=8 IDii=6
PRINT HYD              ID=40 CODE=10

                          PARTIAL HYDROGRAPH   150.10

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
     .000       .0          1.667       5.1          3.333       .1          5.000       .1          6.667       .0
     .333       .0          2.000       2.4          3.667       .1          5.333       .1
     .667       .3          2.333        .6          4.000       .1          5.667       .1
    1.000       .6          2.667        .3          4.333       .1          6.000       .1
    1.333      3.2          3.000        .2          4.667       .1          6.333       .0

   RUNOFF VOLUME =     2.25060 INCHES     =        .4201 ACRE-FEET
   PEAK DISCHARGE RATE =      10.03 CFS  AT   1.500 HOURS   BASIN AREA =    .0035 SQ. MI.


*S-----------------------------------------------------------------
*S ADD 150.1 TO 155
ADD HYD                ID=42 HYD=150 2 IDi=40 IDii=7
PRINT HYD              ID=42 CODE=10

                          PARTIAL HYDROGRAPH   150.20

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      000        0          1.667       9 3          3.333        3          5.000        2          6.667        0
      333        0          2 000       4 4          3.667       .2          5.333        2
      667       .6          2.333       1.0          4 000       .2          5 667        2
    1 000      1 2          2.667         5          4 333        2          6 000        2
    1 333      5.8          3 000        .3          4 667       .2          6.333       .0

   RUNOFF VOLUME =     2.23398 INCHES     =        .7697 ACRE-FEET
   PEAK DISCHARGE RATE =      18 40 CFS  AT   1.500 HOURS   BASIN AREA =    .0065 SQ. MI.


*S-----------------------------------------------------------------
*S ADD 150 2 TO 510
ADD HYD                ID=44 HYD=AP.1 IDi=42 IDii=24
PRINT HYD              ID=44 CODE=10

                          HYDROGRAPH FROM AREA AP.1
```

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
000	0	1 667	11 4	3 333	.3	5 000	.3	6.667	.0
.333	.0	2.000	5.4	3 667	3	5 333	.3		
667	.7	2.333	1.2	4.000	3	5.667	.3		
1.000	1.4	2.667	6	4 333	3	6 000	.3		
1.333	7.1	3 000	.4	4 667	.3	6.333	.0		

RUNOFF VOLUME = 2.23370 INCHES = .9447 ACRE-FEET
PEAK DISCHARGE RATE = 22.60 CFS AT 1.500 HOURS BASIN AREA = .0079 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 220 TO 210
ADD HYD              ID=46 HYD=210.1 IDi=12 IDii=10
PRINT HYD            ID=46 CODE=10
```

PARTIAL HYDROGRAPH 210.10

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	0	1.667	11.7	3 333	3	5.000	.3	6.667	.0
.333	0	2 000	5.6	3.667	.3	5 333	.3		
.667	.7	2.333	1 3	4.000	3	5 667	.3		
1.000	1 5	2.667	.6	4.333	.3	6.000	.3		
1.333	7.3	3 000	.4	4.667	.3	6.333	.0		

RUNOFF VOLUME = 2.23258 INCHES = .9728 ACRE-FEET
PEAK DISCHARGE RATE = 23.29 CFS AT 1.500 HOURS BASIN AREA = .0082 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 210.1 TO 515
ADD HYD              ID=48 HYD=AP.2 IDi=46 IDii=25
PRINT HYD            ID=48 CODE=10
```

HYDROGRAPH FROM AREA AP.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	14.2	3.333	.4	5.000	.3	6.667	.0
.333	.0	2.000	6.7	3.667	.4	5.333	.3		
.667	.9	2.333	1.6	4.000	.3	5.667	.4		
1.000	1.8	2.667	.7	4.333	.3	6.000	.4		
1.333	8.8	3.000	.5	4.667	.3	6.333	.0		

RUNOFF VOLUME = 2.23257 INCHES = 1.1800 ACRE-FEET
PEAK DISCHARGE RATE = 28.26 CFS AT 1.500 HOURS BASIN AREA = .0099 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 125 TO 585
ADD HYD              ID=50 HYD=AP.17 IDi=4 IDii=39
PRINT HYD            ID=50 CODE=10
```

HYDROGRAPH FROM AREA AP.17

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	1.2	2.667	.1	4.000	.0	5.333	.0
.333	.0	1.667	2.0	3.000	.1	4.333	.0	5.667	.0
.667	.1	2.000	.9	3.333	.1	4.667	.0	6.000	.1
1.000	.3	2.333	.2	3.667	.1	5.000	.0	6.333	.0

RUNOFF VOLUME = 2.22019 INCHES = .1658 ACRE-FEET
PEAK DISCHARGE RATE = 4.00 CFS AT 1.500 HOURS BASIN AREA = .0014 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 520 TO 110
ADD HYD              ID=54 HYD=AP.3 IDi=26 IDii=2
PRINT HYD            ID=54 CODE=10
```

HYDROGRAPH FROM AREA AP.3

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	1.0	2.667	.1	4.000	.0	5.333	.0
.333	.0	1.667	1.6	3 000	.1	4.333	.0	5.667	.0
.667	.1	2.000	8	3.333	.0	4 667	.0	6.000	0
1.000	.2	2.333	.2	3.667	.0	5.000	.0	6.333	.0

RUNOFF VOLUME = 2.23222 INCHES = 1333 ACRE-FEET
PEAK DISCHARGE RATE = 3.22 CFS AT 1 500 HOURS BASIN AREA = 0011 SQ MI.

```
*S-----------------------------------------------------------------
*S ADD 120 TO 580
ADD HYD              ID=56 HYD=AP.15 IDi=3 IDii=38
PRINT HYD            ID=56 CODE=10
```

HYDROGRAPH FROM AREA AP.15

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
000	0	1 667	4 4	3.333	1	5.000	1	6 667	0
333	0	2 000	2.1	3 667	1	5.333	1		
667	3	2.333	.5	4.000	.1	5 667	.1		
1.000	6	2 667	.2	4.333	1	6.000	.1		
1 333	2.7	3.000	.1	4.667	.1	6 333	.0		

RUNOFF VOLUME = 2.23247 INCHES = .3631 ACRE-FEET
PEAK DISCHARGE RATE = 8.72 CFS AT 1 500 HOURS BASIN AREA = 0031 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 205 TO 215
ADD HYD              ID=58 HYD=AP 5 ID1=9 IDii=11
PRINT HYD            ID=58 CODE=10
```

HYDROGRAPH FROM AREA AP.5

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	0	1.667	32.6	3.333	.9	5 000	.7	6.667	.0
.333	.0	2.000	14.7	3.667	.8	5 333	.7	7.000	.0
.667	1.8	2.333	3.5	4.000	7	5.667	.7		
1.000	3.8	2.667	1.7	4 333	.7	6 000	.8		
1.333	19.3	3 000	1.1	4 667	7	6 333	.1		

RUNOFF VOLUME = 2.07605 INCHES = 2.6341 ACRE-FEET
PEAK DISCHARGE RATE = 64.41 CFS AT 1.500 HOURS BASIN AREA = .0238 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 525 TO 410
ADD HYD              ID=62 HYD=525.1 IDi=27 IDii=16
PRINT HYD            ID=62 CODE=10
```

OUTFLOW HYDROGRAPH RESERVOIR 525.10

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	.3	2.667	.0	4.000	.0	5.333	.0
.333	.0	1.667	.5	3.000	.0	4.333	.0	5.667	.0
.667	.0	2.000	.2	3.333	.0	4.667	.0	6.000	.0
1.000	.1	2.333	0	3.667	.0	5.000	.0		

RUNOFF VOLUME = 2.04510 INCHES = .0393 ACRE-FEET
PEAK DISCHARGE RATE = 1.00 CFS AT 1.500 HOURS BASIN AREA = .0004 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 525.1 TO 415
ADD HYD              ID=64 HYD=525.2 IDi=62 IDii=17
PRINT HYD            ID=64 CODE=10
```

OUTFLOW HYDROGRAPH RESERVOIR 525.20

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	.7	2.667	.0	4.000	.0	5.333	.0
333	.0	1.667	1.2	3.000	.0	4.333	.0	5.667	.0
.667	.1	2.000	.5	3.333	.0	4.667	.0	6.000	.0
1.000	.1	2.333	.1	3.667	.0	5.000	.0	6.333	.0

RUNOFF VOLUME = 2.15001 INCHES = .0940 ACRE-FEET
PEAK DISCHARGE RATE = 2.33 CFS AT 1.500 HOURS BASIN AREA = .0008 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 425 TO 435
ADD HYD              ID=66 HYD=425.1 IDi=19 IDii=20
PRINT HYD            ID=66 CODE=10
```

HYDROGRAPH FROM AREA 425.10

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	2.0	3.333	.1	5.000	.0	6 667	.0
.333	.0	2.000	1.0	3.667	.1	5.333	.0		
.667	.1	2.333	.2	4.000	.0	5.667	.1		
1.000	.3	2.667	.1	4.333	.0	6.000	.1		
1.333	1.3	3.000	.1	4.667	.0	6.333	.0		

RUNOFF VOLUME = 2.23491 INCHES = .1681 ACRE-FEET
PEAK DISCHARGE RATE = 4.04 CFS AT 1.500 HOURS BASIN AREA = .0014 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 425.1 TO 420
ADD HYD              ID=67 HYD=420.1 ID1=66 ID11=18
PRINT HYD            ID=67 CODE=10
```

HYDROGRAPH FROM AREA 420 10

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1 667	2.8	3.333	.1	5 000	.1	6 667	.0
.333	.0	2 000	1.3	3 667	1	5 333	.1		
.667	2	2.333	.3	4.000	.1	5.667	.1		
1 000	.4	2.667	1	4 333	.1	6.000	.1		
1.333	1.7	3 000	1	4 667	1	6 333	0		

RUNOFF VOLUME = 2 26501 INCHES = 2295 ACRE-FEET
PEAK DISCHARGE RATE = 5 49 CFS AT 1 500 HOURS BASIN AREA = 0019 SQ. MI.

```
*S-----------------------------------------------------------------
```

```
*S ADD 525.2 TO 420.1
ADD HYD              ID=68 HYD=AP.7 ID1=64 ID11=67
PRINT HYD            ID=68 CODE=10
```

HYDROGRAPH FROM AREA AP 7

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
000	.0	1.667	3 9	3.333	1	5.000	1	6 667	.0
333	.0	2 000	1 8	3.667	.1	5.333	1		
.667	2	2.333	4	4 000	1	5.667	.1		
1.000	5	2.667	2	4.333	1	6 000	.1		
1.333	2.4	3.000	1	4 667	.1	6.333	0		

RUNOFF VOLUME = 2.23034 INCHES = .3235 ACRE-FEET
PEAK DISCHARGE RATE = 7.82 CFS AT 1 500 HOURS BASIN AREA = .0027 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 445 TO 550
ADD HYD              ID=70 HYD=AP.9 ID1=21 ID11=32
PRINT HYD            ID=70 CODE=10
```

HYDROGRAPH FROM AREA AP.9

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
000	.0	1.667	5 2	3.333	.1	5.000	.1	6.667	.0
.333	.0	2.000	2.5	3.667	.1	5.333	.1		
.667	3	2.333	6	4.000	.1	5.667	.1		
1 000	.7	2.667	.3	4.333	.1	6.000	.1		
1.333	3.2	3.000	.2	4.667	.1	6.333	.0		

RUNOFF VOLUME = 2.23251 INCHES = .4322 ACRE-FEET
PEAK DISCHARGE RATE = 10.37 CFS AT 1.500 HOURS BASIN AREA = .0036 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 450 TO 560
ADD HYD              ID=72 HYD=AP.11 ID1=22 ID11=34
PRINT HYD            ID=72 CODE=10
```

HYDROGRAPH FROM AREA AP.11

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	1.3	2.667	.1	4.000	.1	5.333	.1
.333	0	1.667	2.2	3.000	.1	4.333	.1	5.667	.1
.667	.1	2.000	1.0	3.333	.1	4.667	.1	6.000	.1
1.000	.3	2.333	.2	3.667	.1	5.000	.1	6.333	.0

RUNOFF VOLUME = 2.17698 INCHES = .1800 ACRE-FEET
PEAK DISCHARGE RATE = 4.37 CFS AT 1.500 HOURS BASIN AREA = .0016 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 310 TO 315
ADD HYD              ID=74 HYD=315.1 ID1=13 ID11=14
PRINT HYD            ID=74 CODE=10
```

HYDROGRAPH FROM AREA 315.10

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	4.2	3.333	.1	5.000	.1	6.667	.0
.333	.0	2.000	2.0	3.667	.1	5.333	.1		
.667	.3	2.333	.5	4.000	.1	5.667	.1		
1.000	.5	2.667	.2	4.333	.1	6.000	.1		
1.333	2.6	3.000	.1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 2.23987 INCHES = .3476 ACRE-FEET
PEAK DISCHARGE RATE = 8.32 CFS AT 1.500 HOURS BASIN AREA = .0029 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 315 1 TO 565
ADD HYD              ID=76 HYD=AP.12 ID1=74 ID11=35
PRINT HYD            ID=76 CODE=10
```

HYDROGRAPH FROM AREA AP 12

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	6 0	3.333	.2	5.000	.1	6 667	0
333	0	2 000	2 8	3 667	.2	5.333	.1		
667	4	2.333	.6	4.000	.1	5 667	1		
1.000	8	2.667	3	4.333	.1	6 000	2		
1 333	3.7	3 000	.2	4 667	1	6 333	0		

RUNOFF VOLUME = 2.23765 INCHES = .4965 ACRE-FEET
PEAK DISCHARGE RATE = 11.90 CFS AT 1 500 HOURS BASIN AREA = .0042 SQ MI

```
*S-----------------------------------------------------------------
*S ADD 455 TO 570
ADD HYD              ID=78 HYD=AP.13 ID1=23 ID11=36
PRINT HYD            ID=78 CODE=10
```

HYDROGRAPH FROM AREA AP.13

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	9 1	3 333	3	5 000	.2	6 667	.0
333	0	2 000	4.3	3 667	2	5.333	.2		
.667	6	2 333	1.0	4.000	.2	5 667	.2		
1.000	1 2	2.667	.5	4 333	2	6.000	2		
1.333	5.7	3 000	.3	4.667	.2	6.333	.0		

RUNOFF VOLUME = 2.23257 INCHES = .7573 ACRE-FEET
PEAK DISCHARGE RATE = 18.14 CFS AT 1.500 HOURS BASIN AREA = .0064 SQ. MI.

```
*S-----------------------------------------------------------------
*S ADD 325 TO 575
ADD HYD              ID=80 HYD=AP.14 ID1=15 ID11=37
PRINT HYD            ID=80 CODE=10
```

HYDROGRAPH FROM AREA AP.14

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.333	1 2	2.667	.1	4.000	.0	5.333	.0
.333	.0	1.667	2 0	3.000	.1	4.333	.0	5.667	.0
.667	.1	2 000	.9	3.333	.1	4.667	.0	6.000	.0
1 000	.2	2.333	.2	3.667	.0	5.000	.0	6.333	.0

RUNOFF VOLUME = 2.23230 INCHES = .1619 ACRE-FEET
PEAK DISCHARGE RATE = 3.90 CFS AT 1.500 HOURS BASIN AREA = .0014 SQ. MI.

```
*S-----------------------------------------------------------------
FINISH
        NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 14:29:13
_(s0p10h4099T_&16D__
```

APPENDIX D

APPENDIX D

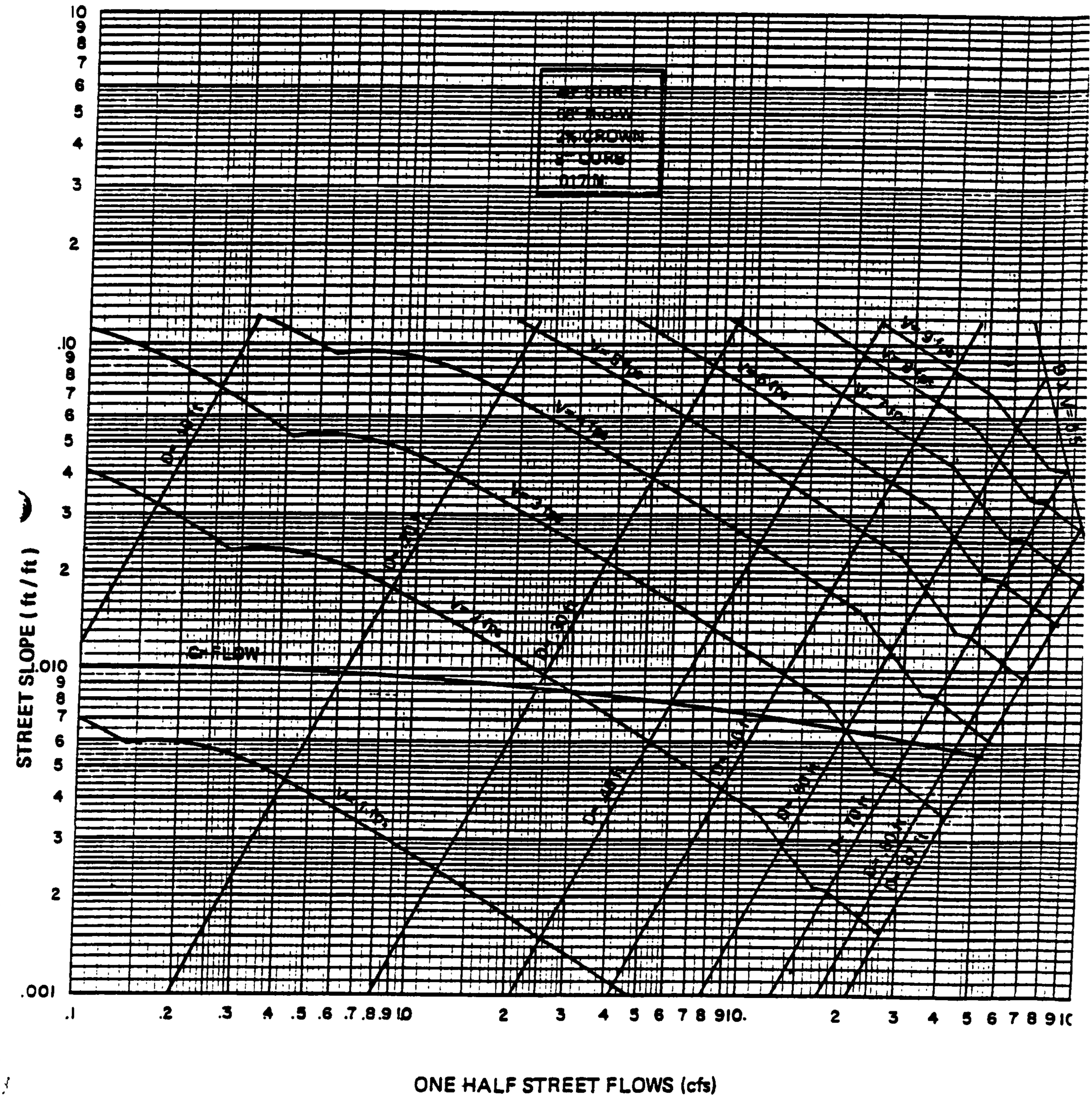
STREET CAPACITY & INLET CALCULATIONS
AND
STORMCAD OUTPUT

Street Capacity and Inlet Calculations

					Inlet 1								Inlet 2						
Analysis Point	Q (cfs)	Q (Carry Over)	Q Total (cfs)	Road Slope	Depth (ft)	Velocity (ft/s)	D*V	Inlet Type	Throat Capacity (cfs)	Grate Capacity (cfs)	Total Capacity (cfs)	Bypass (cfs)	Inlet Type	Depth (ft)	Throat Capacity (cfs)	Grate Capacity (cfs)	Total Capacity (cfs)	Bypass (cfs)	Notes
AP-1	22.60	0.0	22.60	0.03	0.48	5.1	2.45	Trpl D	0.0	28.5	28.5	0.00	None	0.0	0.0	0.0	0.0	0.0	Triple D Cattle Guard Inlet
AP-2	28.26	0.76	29.02	0.03	0.56	6.0	3.36	A	8.5	10.0	18.5	10.55	A	0.5	7.4	9.0	16.4	-5.8	Battery of Sngl A and Sngle A Inlets
AP-3	3.22	0.0	3.22	0.03	0.28	3.3	0.92	Median	3.2	0.0	3.2	-0.02	None	0.0	0.0	0.0	0.0	0.0	6.5' Median Inlet/ No Grate
AP-4	1.44	0.0	1.44	0.015	0.38	3.0	1.14	Median	5.1	0.0	5.1	-3.69	None	0.0	0.0	0.0	0.0	0.0	6.5' Median Inlet/ No Grate, No Bypass
AP-5	64.41	0.0	64.41	Sump	0.75	6.5	4.88	Exist D's	0.0	87.5	87.5	NA	None	0.0	0.0	0.0	0.0	0.0	Existing Cattle Guard Inlet in Sump
AP-6	3.32	0.0	3.32	Sump	0.33	2.8	0.92	Exist A	3.8	7.0	10.8	NA	None	0.0	0.0	0.0	0.0	0.0	Existing Type A Inlet in Sump
AP-7	7.82	1.04	8.86	0.03	0.37	4.4	1.63	A	4.5	6.0	10.5	-1.69	None	0.0	0.0	0.0	0.0	0.0	Sngl A Inlet, No Bypass
AP-8	1.84	0.0	1.84	0.03	0.24	3.0	0.72	None	0.0	0.0	0.0	1.84	None	0.0	0.0	0.0	0.0	0.0	No Inlet, Bypass to AP-10
AP-9	10.37	0.0	10.37	0.03	0.39	4.5	1.76	A	4.9	6.0	10.9	-0.55	None	0.0	0.0	0.0	0.0	0.0	Replace Exist C with an A, No Bypass
AP-10	4.49	1.84	6.33	0.03	0.33	3.8	1.25	A	3.8	4.3	8.1	-1.75	None	0.0	0.0	0.0	0.0	0.0	Replace Exist C with an A, No Bypass
AP-11	4.37	0.0	4.37	0.03	0.33	3.8	1.25	None	0.0	0.0	0.0	4.37	None	0.0	0.0	0.0	0.0	0.0	No Exist Inlet, Bypass to AP-13
AP-12	11.90	0.0	11.90	0.03	0.40	4.5	1.80	A	5.1	6.5	11.6	0.29	None	0.0	0.0	0.0	0.0	0.0	Replace Exist Dbl C Inlet with an A, Bypass to AP-14
AP-13	18.14	4.37	22.51	0.03	0.50	5.4	2.70	A	7.1	9.0	16.1	6.37	C	0.4	3.1	5.3	8.4	-2.0	Battery of Sngl A and Sngl C Inlets, No Bypass
AP-14	3.90	0.29	4.19	0.03	0.29	3.5	1.02	None	0.0	0.0	0.0	4.19	None	0.0	0.0	0.0	0.0	0.0	No Exist Inlet, Bypass Out of Study Area
AP-15	8.72	0.0	8.72	0.015	0.35	5.0	1.75	A	4.2	3.5	7.7	1.04	None	0.0	0.0	0.0	0.0	0.0	Single A Inlet, Bypass to AP-7
AP-16	4.57	0.0	4.57	0.005	0.39	1.8	0.70	Median	5.3	0.0	5.3	-0.76	None	0.0	0.0	0.0	0.0	0.0	6.5' Median Inlet, No Bypass
AP-17	4.00	0.0	4.00	0.03	0.28	3.40	0.95	Median	3.24	0.0	3.24	0.76	None	0.0	0.0	0.0	0.0	0.0	6.5' Median Inlet, Bypass to AP-2

Street Flow Depths and Velocities taken from COA DPM Plate 22.3 D-3
Grate Capacities Taken from COA DPM Plates 22.3 D-5 & D-6
Throat Capacities calculated using Wier Equation
Inlet Capacities include throat and grate per discussions with City Hydrologist

STREET CAPACITY

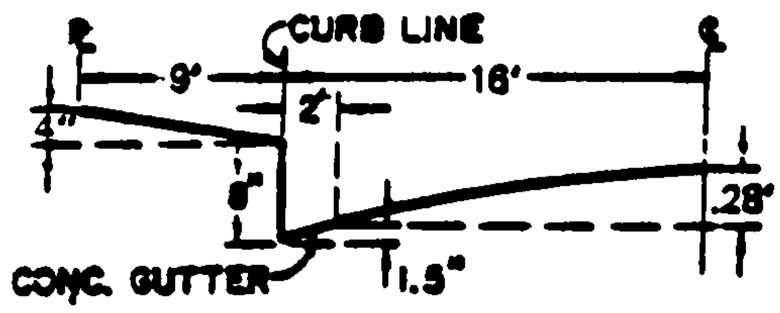


REV. 3-83

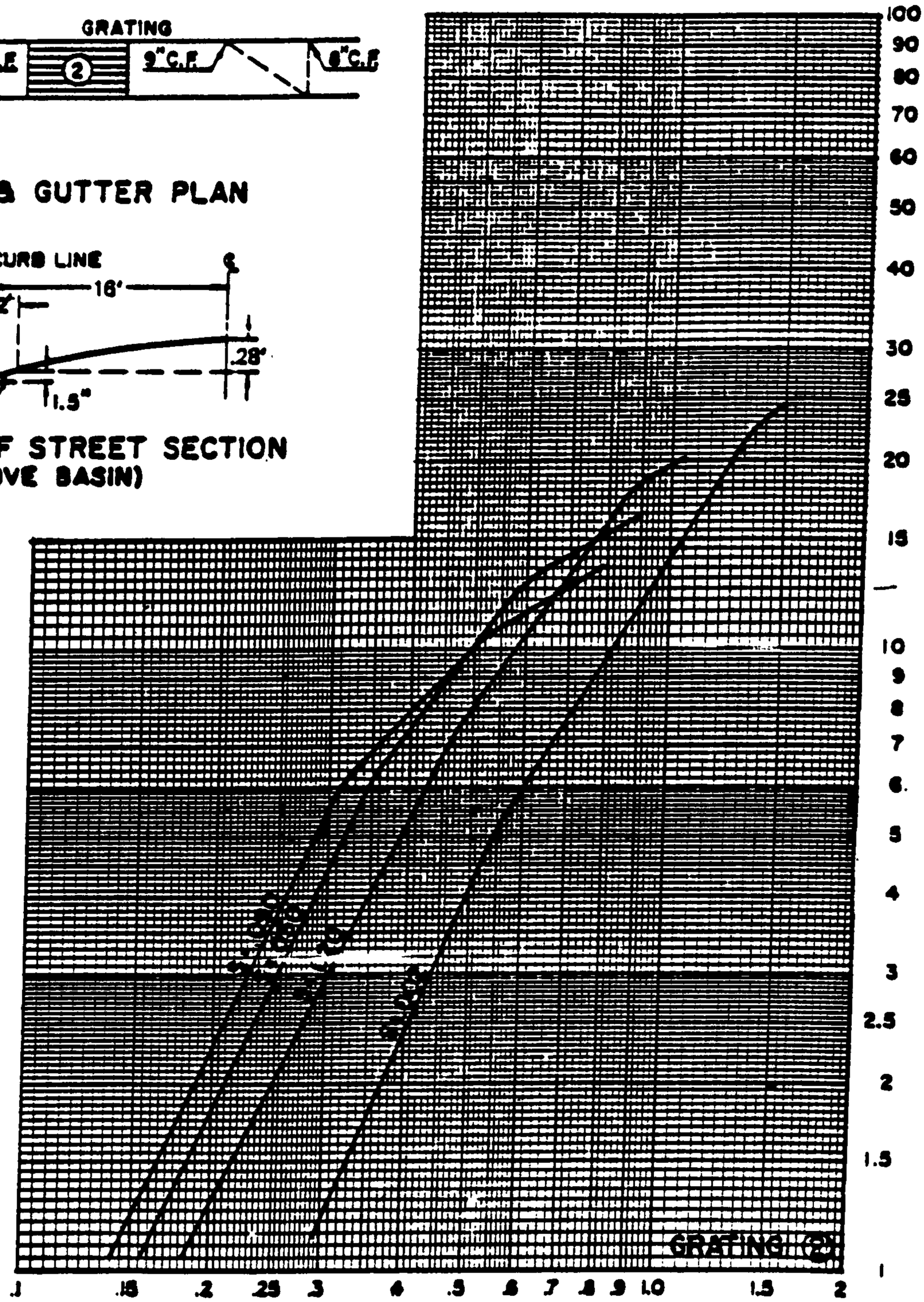
PLATE 22.3 D-3

GRATING CAPACITIES FOR TYPE "A", "C" and "D"

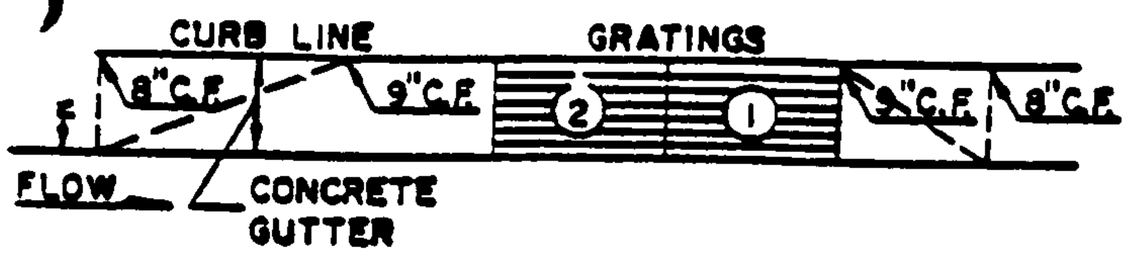
GRATING & GUTTER PLAN



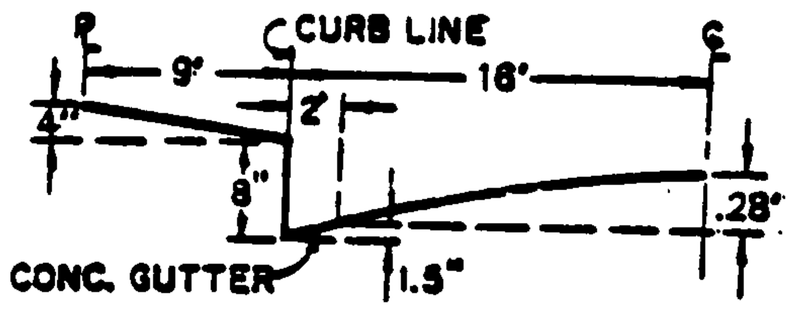
TYPICAL HALF STREET SECTION
(ABOVE BASIN)



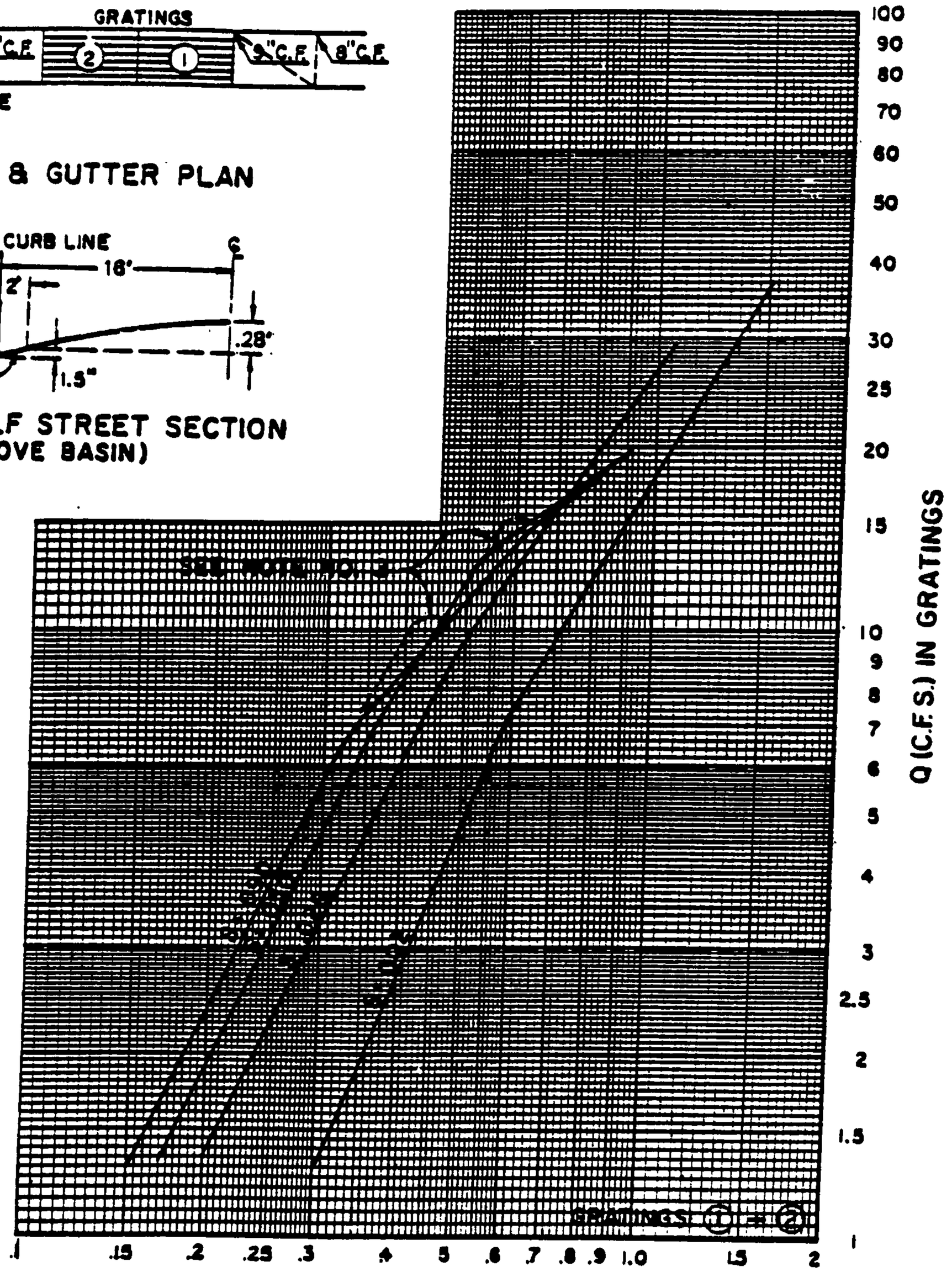
GRATING CAPACITIES FOR TYPE DOUBLE "C," AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

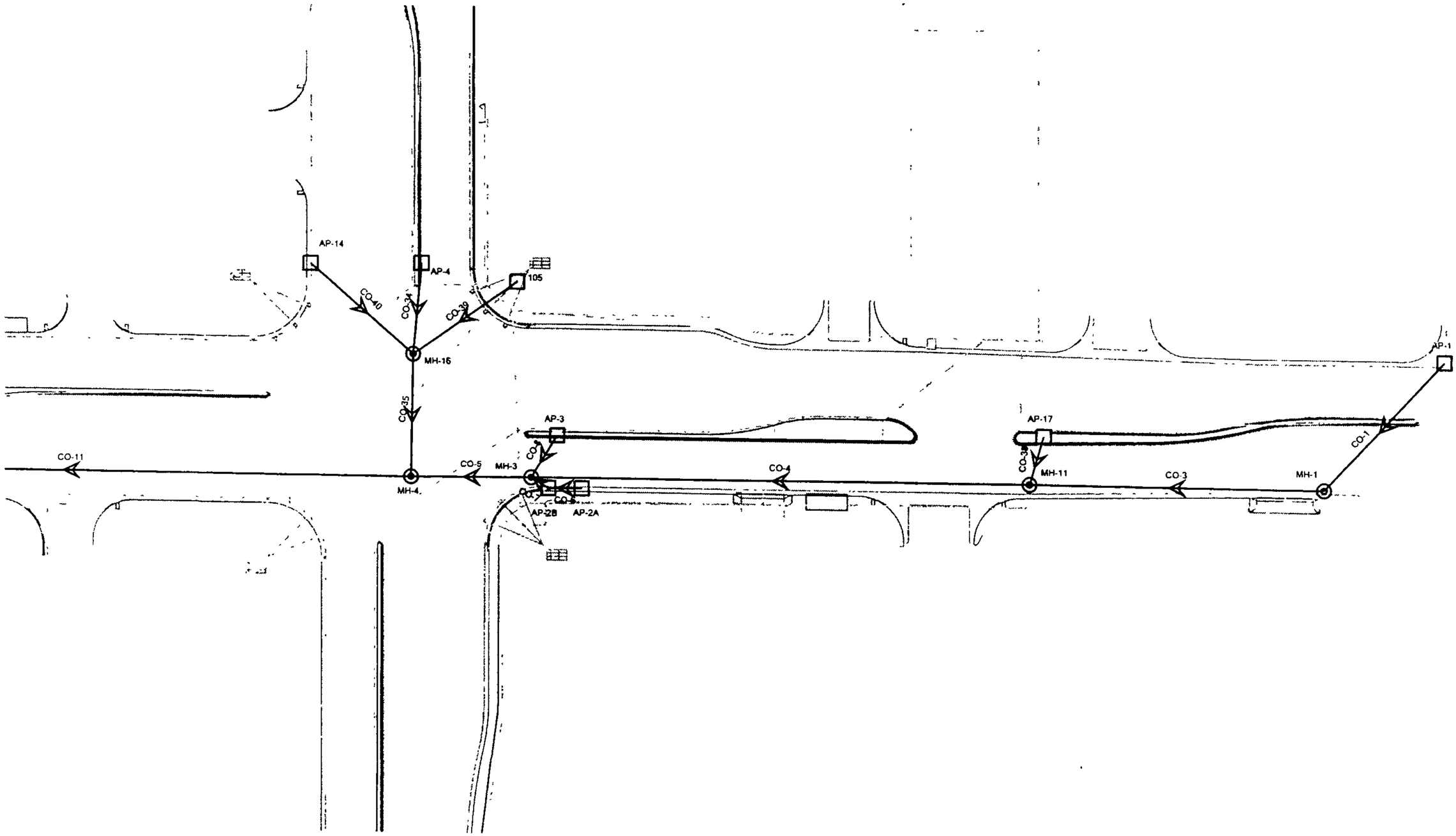


D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

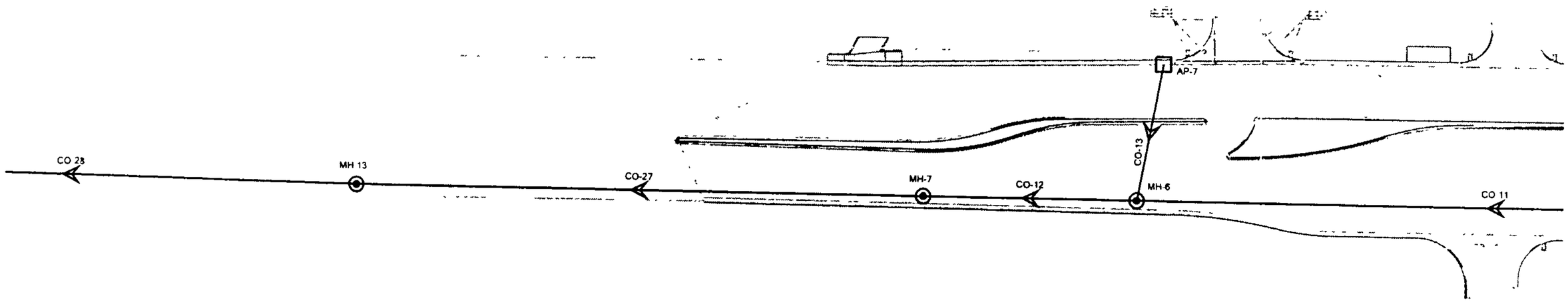
FlexTable: Conduit Table (Montgomery SD.stc)

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Manning 's n	Conduit Description	Flow (ft³/s)	Length (Scaled) (ft)	Slope (ft/ft)	Capacity (Full Flow) (ft³/s)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Velocity (Average) (ft/s)
CO-1	AP-1	5,587.07	MH-1	5,581.25	0.013	Circular Pipe - 24.0 in	22.60	111.4	0.052	51.80	5,593.03	5,588.76	5,590.42	5,583.01	3.96	7.17	15.92
CO-3	MH-1	5,581.12	MH-11	5,577.18	0.013	Circular Pipe - 36.0 in	22.60	185.2	0.021	97.33	5,590.42	5,582.65	5,585.95	5,579.06	6.30	5.77	11.21
CO-4	MH-11	5,577.09	MH-3	5,568.25	0.013	Circular Pipe - 36.0 in	25.84	316.0	0.028	111.55	5,585.95	5,578.73	5,577.37	5,571.61	5.86	6.12	12.84
CO-5	MH-3	5,568.06	MH-4	5,565.85	0.013	Circular Pipe - 36.0 in	58.06	76.5	0.029	113.73	5,577.37	5,570.53	5,575.65	5,569.85	6.31	6.80	16.17
CO-6	AP-2A	5,570.43	AP-2B	5,569.08	0.013	Circular Pipe - 24.0 in	18.50	21.3	0.064	57.36	5,578.07	5,571.98	5,577.48	5,571.82	5.64	6.40	16.28
CO-7	AP-2B	5,568.89	MH-3	5,568.25	0.013	Circular Pipe - 24.0 in	29.00	12.8	0.049	50.19	5,577.48	5,571.82	5,577.37	5,571.61	6.59	7.12	9.23
CO-8	AP-3	5,569.84	MH-3	5,568.25	0.013	Circular Pipe - 24.0 in	3.22	32.1	0.050	50.42	5,578.34	5,571.61	5,577.37	5,571.61	6.50	7.12	9.00
CO-11	MH-4	5,565.74	MH-6	5,554.34	0.013	Circular Pipe - 36.0 in	71.40	431.3	0.026	108.47	5,575.65	5,568.42	5,563.68	5,559.14	6.91	6.34	16.38
CO-12	MH-6	5,554.22	MH-7	5,550.47	0.013	Circular Pipe - 36.0 in	80.26	129.5	0.029	113.71	5,563.68	5,556.99	5,559.76	5,554.22	6.46	6.29	17.44
CO-13	AP-7	5,562.52	MH-6	5,554.28	0.013	Circular Pipe - 24.0 in	8.86	84.5	0.097	70.43	5,564.99	5,563.58	5,563.68	5,559.14	0.47	7.40	15.33
CO-16	AP-9	5,535.50	MH-8	5,533.29	0.013	Circular Pipe - 24.0 in	9.30	68.4	0.033	40.78	5,538.00	5,537.89	5,538.29	5,537.78	0.50	3.00	2.96
CO-17	AP-10	5,533.50	MH-8	5,533.29	0.013	Circular Pipe - 18.0 in	6.33	12.4	0.018	13.90	5,538.00	5,537.82	5,538.29	5,537.78	3.00	3.50	3.58
CO-20	AP-12	5,512.50	MH-9	5,511.40	0.013	Circular Pipe - 24.0 in	11.90	15.7	0.069	59.31	5,516.40	5,515.87	5,516.40	5,515.83	1.90	3.00	3.79
CO-22	AP-13B	5,492.80	MH-10	5,490.80	0.013	Circular Pipe - 30.0 in	23.60	55.9	0.036	77.51	5,495.80	5,495.99	5,495.80	5,495.80	0.50	2.50	4.81
CO-24	MH-10	5,490.80	OF-1	5,489.90	0.013	Circular Pipe - 48.0 in	131.39	29.9	0.030	248.78	5,495.80	5,494.23	5,494.90	5,492.58	1.00	1.00	20.07
CO-27	MH-7	5,550.37	MH-13	5,543.70	0.013	Circular Pipe - 36.0 in	80.26	344.8	0.019	92.74	5,559.76	5,553.14	5,548.70	5,547.55	6.39	2.00	14.77
CO-28	MH-13	5,543.70	MH-8	5,533.29	0.013	Circular Pipe - 36.0 in	80.26	347.4	0.030	115.52	5,548.70	5,546.47	5,538.29	5,537.78	2.00	2.00	17.65
CO-29	MH-8	5,533.29	MH-14	5,522.40	0.013	Circular Pipe - 42.0 in	95.89	363.9	0.030	174.01	5,538.29	5,536.31	5,527.40	5,526.34	1.50	1.50	18.53
CO-30	MH-14	5,522.40	MH-9	5,511.40	0.013	Circular Pipe - 42.0 in	95.89	365.9	0.030	174.41	5,527.40	5,525.42	5,516.40	5,515.83	1.50	1.50	18.56
CO-31	MH-9	5,511.40	MH-15	5,501.00	0.013	Circular Pipe - 48.0 in	107.79	344.9	0.030	249.38	5,516.40	5,514.54	5,506.05	5,504.95	1.00	1.05	19.12
CO-32	MH-15	5,501.00	MH-10	5,490.80	0.013	Circular Pipe - 48.0 in	107.79	342.2	0.030	248.06	5,506.05	5,504.14	5,495.80	5,495.80	1.05	1.00	19.05
CO-34	AP-4	5,571.04	MH-16	5,567.80	0.013	Circular Pipe - 24.0 in	1.44	57.7	0.056	53.47	5,577.80	5,571.45	5,577.06	5,570.26	4.76	7.26	7.37
CO-35	MH-16	5,567.70	MH-4	5,565.80	0.013	Circular Pipe - 24.0 in	13.34	78.6	0.024	35.08	5,577.06	5,570.12	5,575.65	5,569.85	7.36	7.85	4.25
CO-37	AP-13A	5,493.85	AP-13B	5,492.90	0.013	Circular Pipe - 24.0 in	17.10	35.3	0.027	37.27	5,496.85	5,496.00	5,495.80	5,495.80	1.00	0.90	5.44
CO-38	AP-17	5,579.00	MH-11	5,577.09	0.013	Circular Pipe - 24.0 in	3.24	32.3	0.060	55.27	5,586.70	5,579.63	5,585.95	5,579.06	5.70	6.86	9.61
CO-39	105	5,574.88	MH-16	5,567.70	0.013	Circular Pipe - 24.0 in	8.00	80.9	0.089	67.35	5,579.93	5,575.89	5,577.06	5,570.26	3.05	7.36	14.41
CO-40	AP-14	5,572.50	MH-16	5,567.70	0.013	Circular Pipe - 24.0 in	3.90	86.4	0.056	53.44	5,576.50	5,573.19	5,577.06	5,570.26	2.00	7.36	9.92

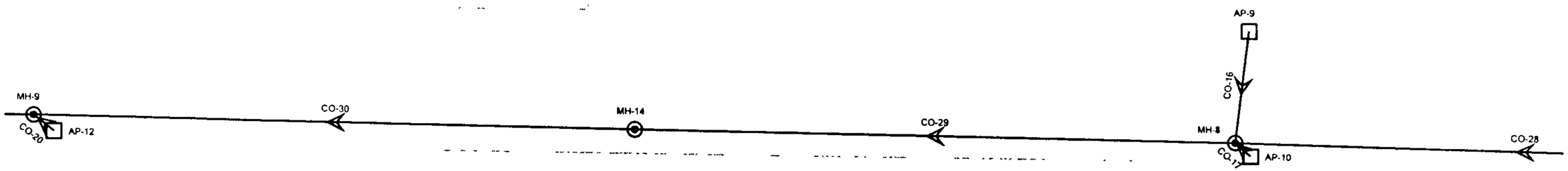
Scenario: Proposed Storm Drain



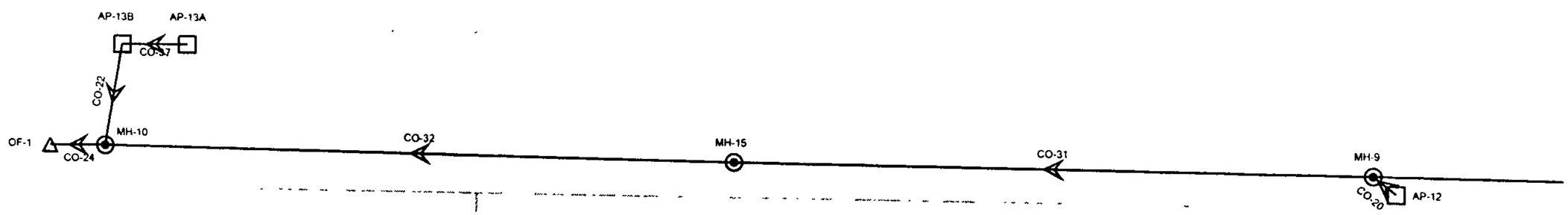
Scenario: Proposed Storm Drain



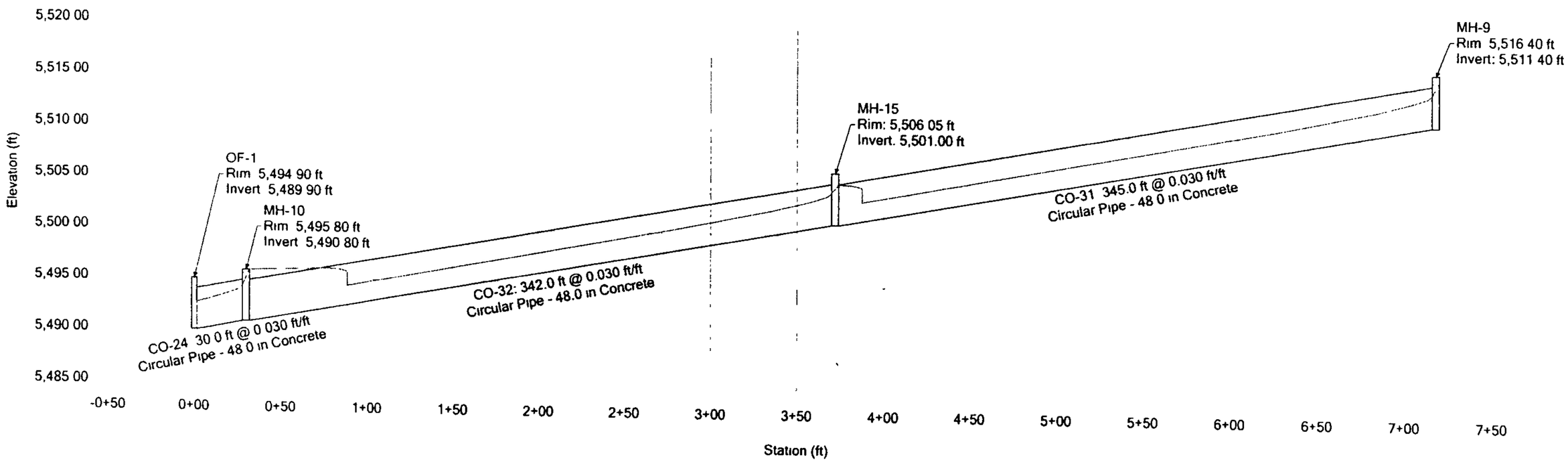
Scenario: Proposed Storm Drain



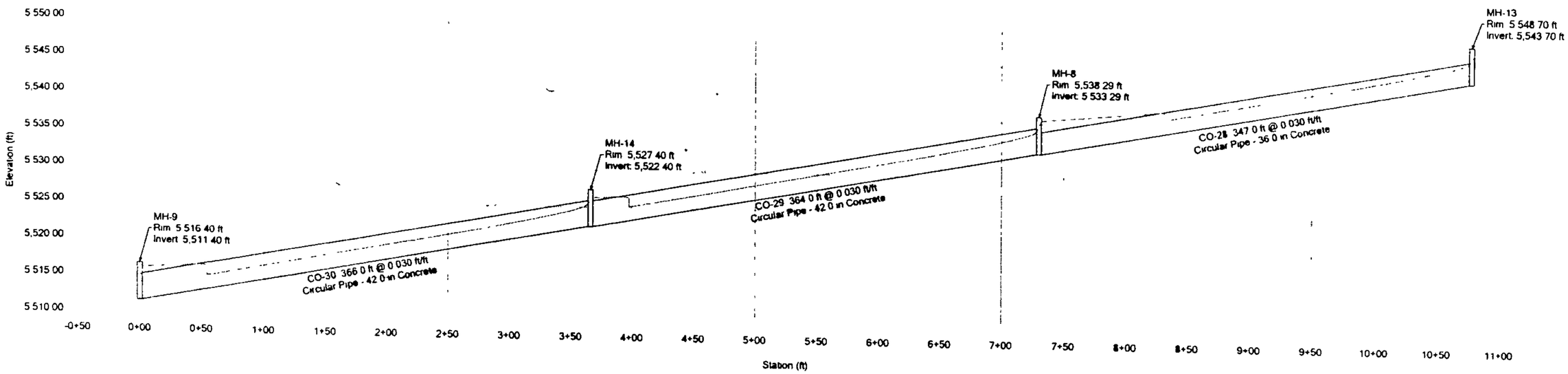
Scenario: Proposed Storm Drain



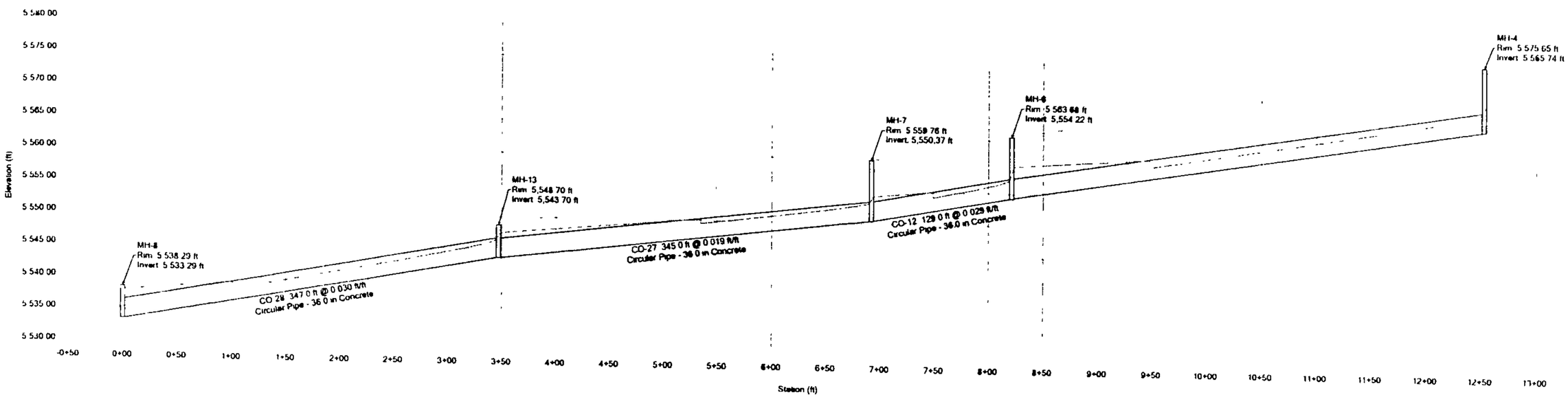
Profile Report
Engineering Profile - Main 1 (Montgomery SD.stc)



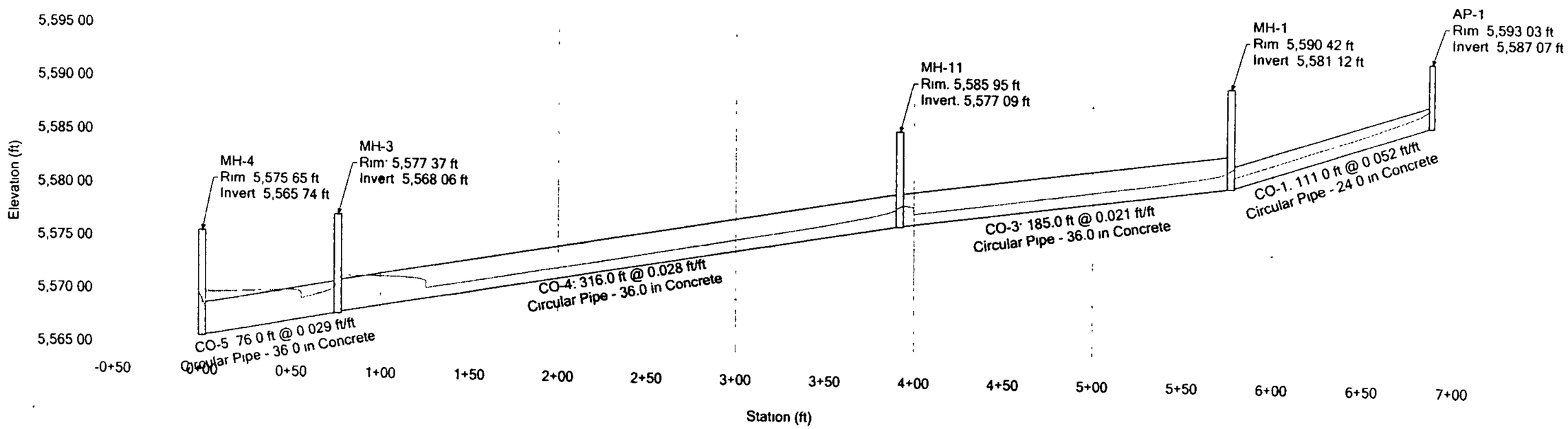
Profile Report
Engineering Profile - Main 2 (Montgomery SD.stc)



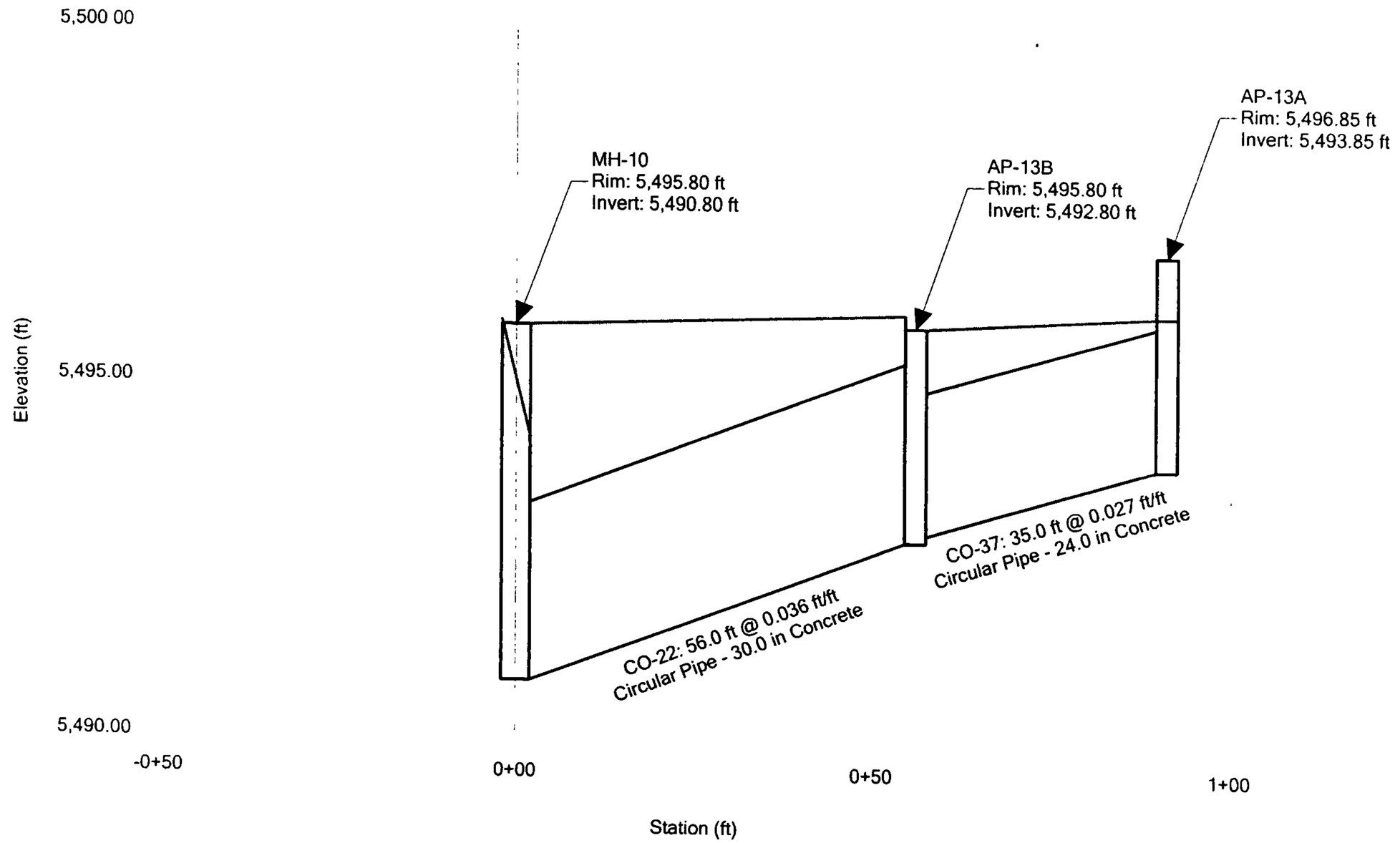
Profile Report
Engineering Profile - Main 3 (Montgomery SD.stc)



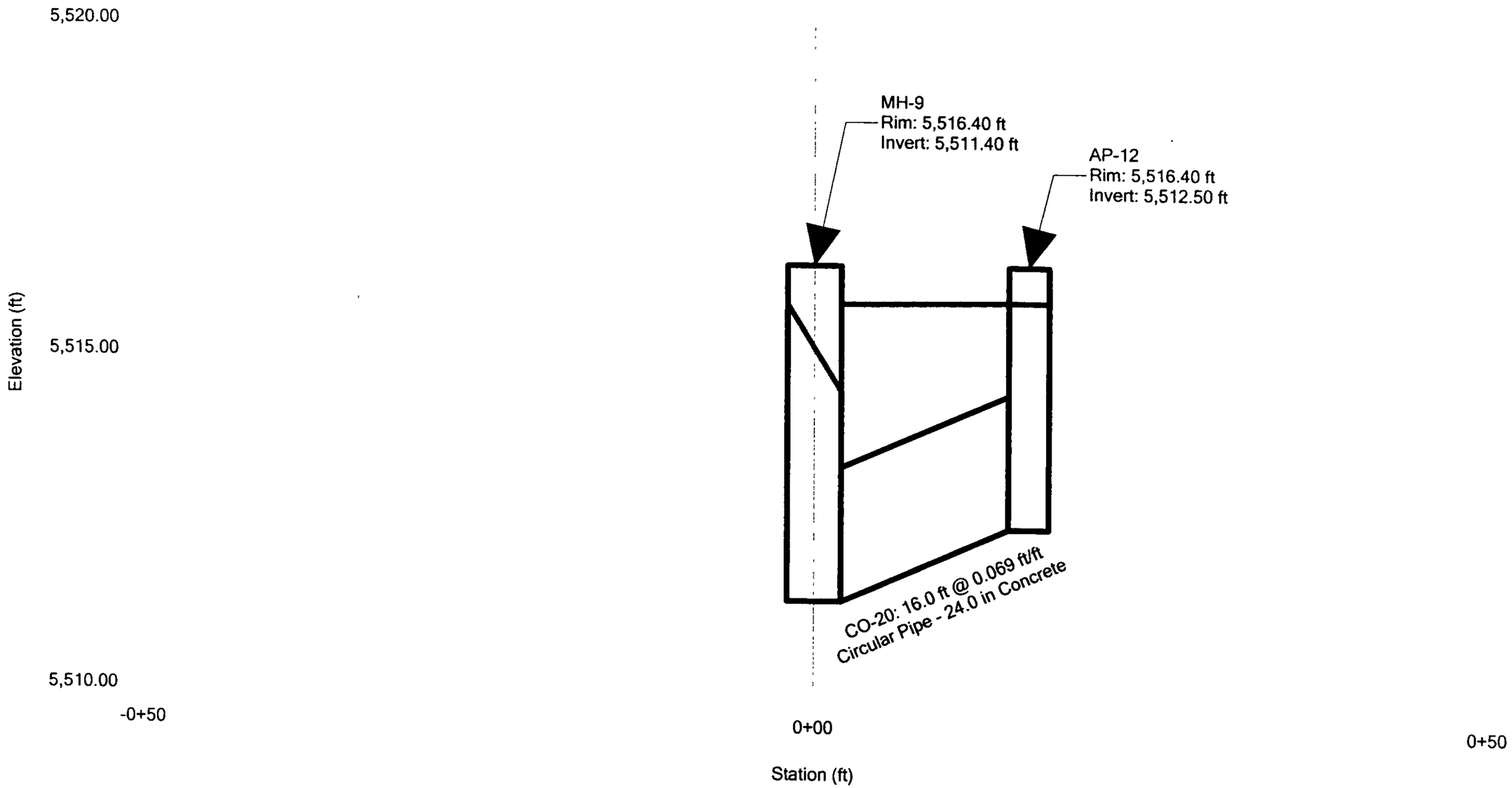
Profile Report
Engineering Profile - Main 4 (Montgomery SD.stc)



Profile Report
Engineering Profile - Lateral 1 (Montgomery SD.stc)

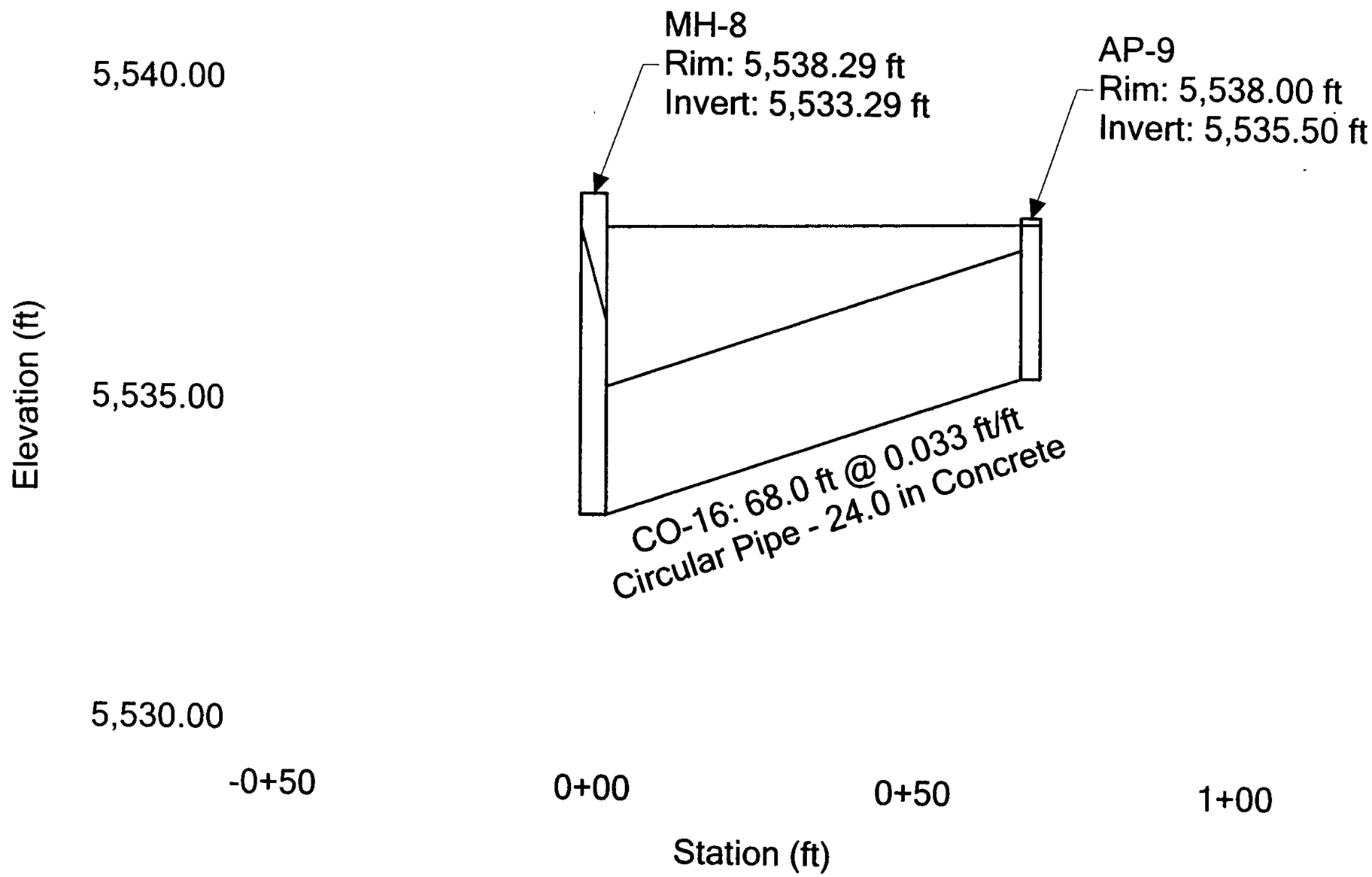


Profile Report
Engineering Profile - Lateral 2 (Montgomery SD.stc)



Profile Report

Engineering Profile - Lateral 3 (Montgomery SD.stc)



Profile Report
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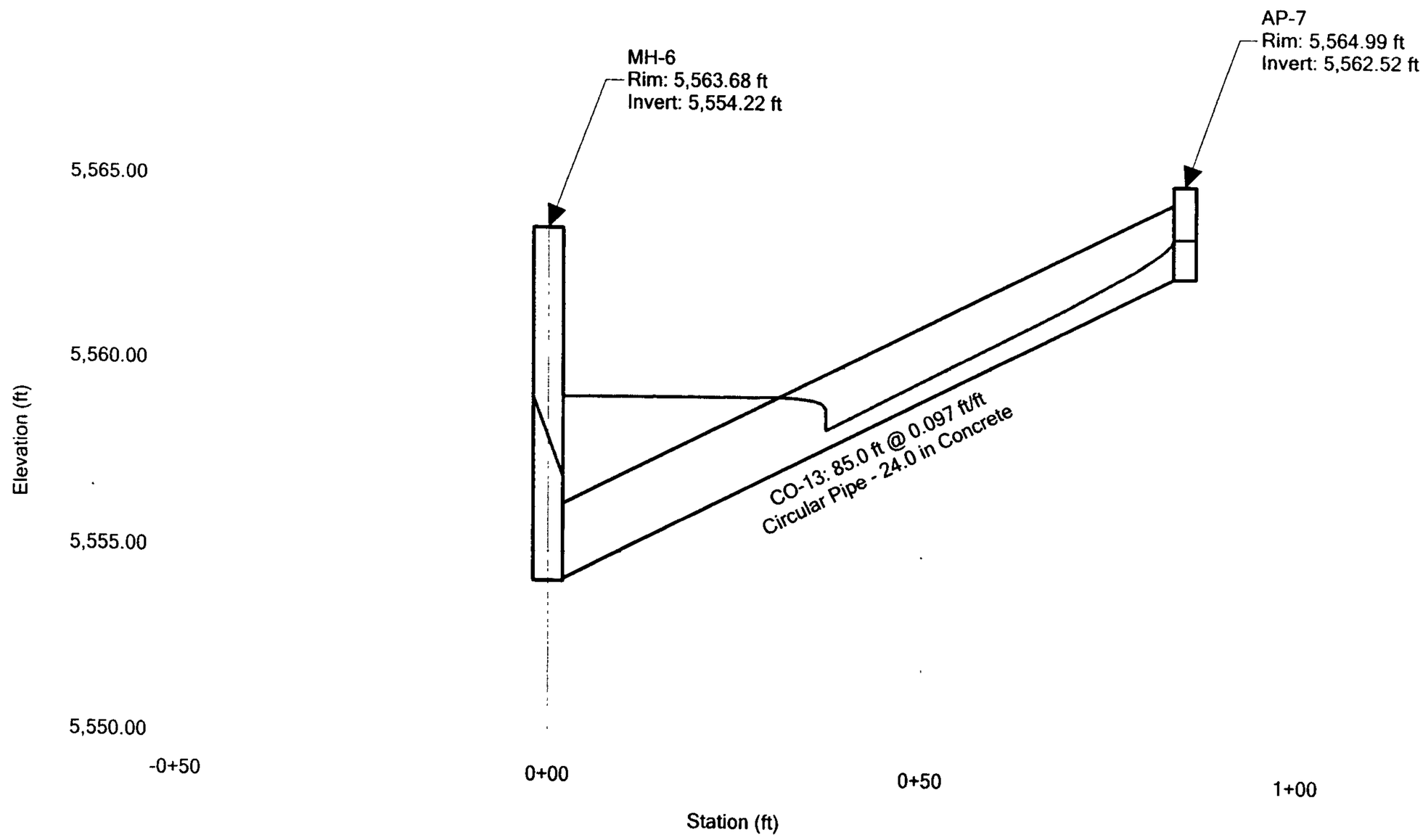

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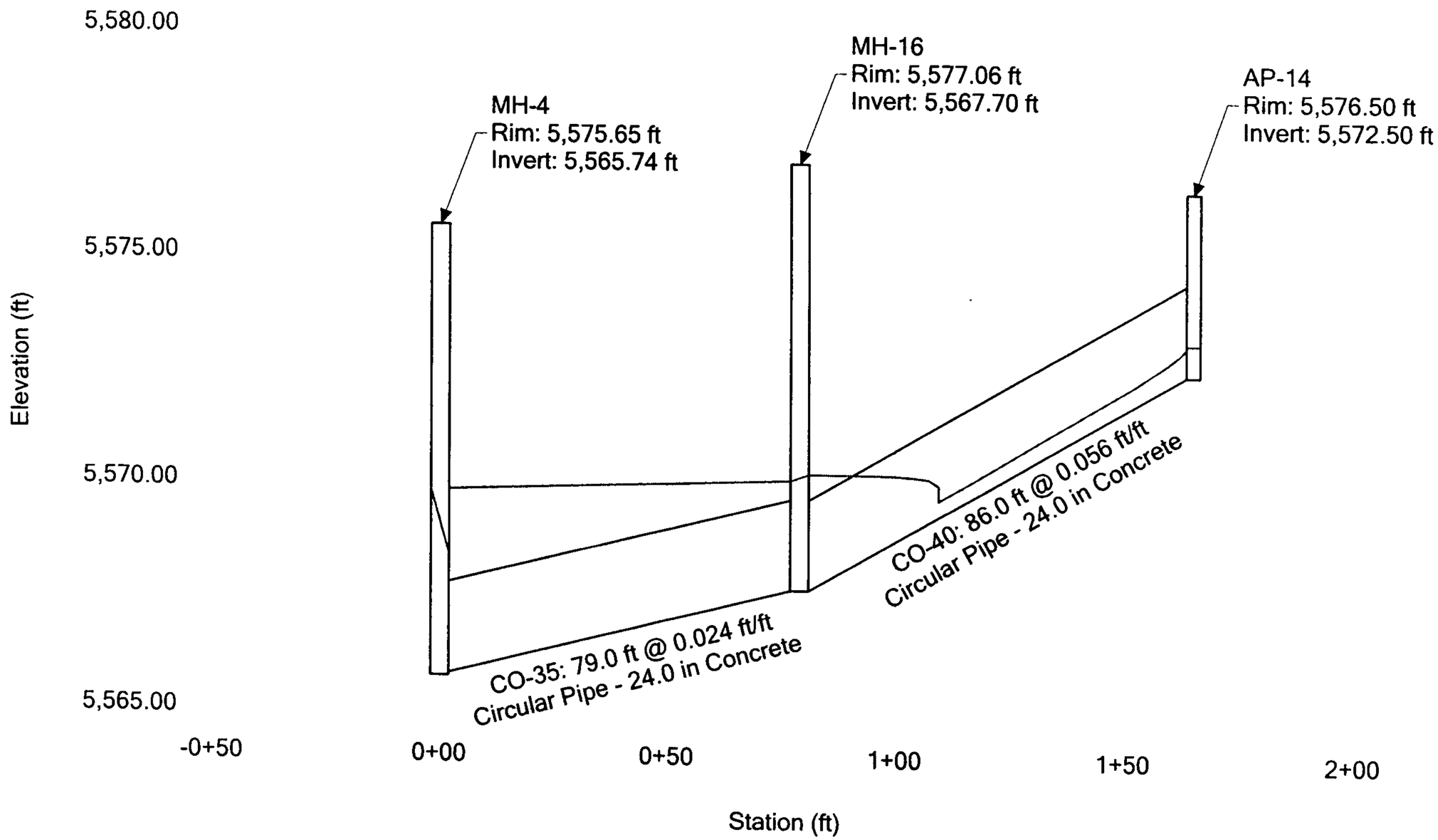
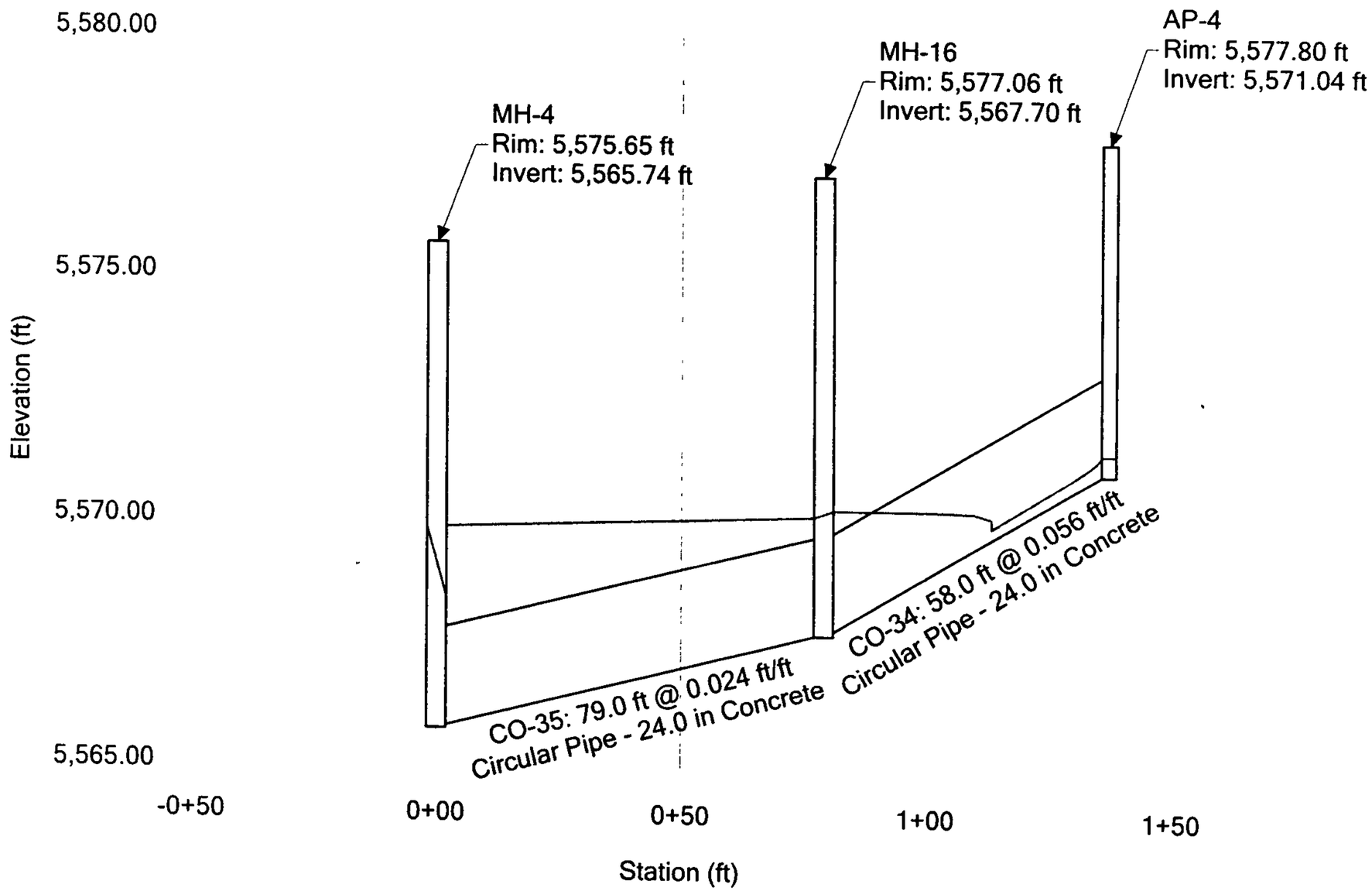
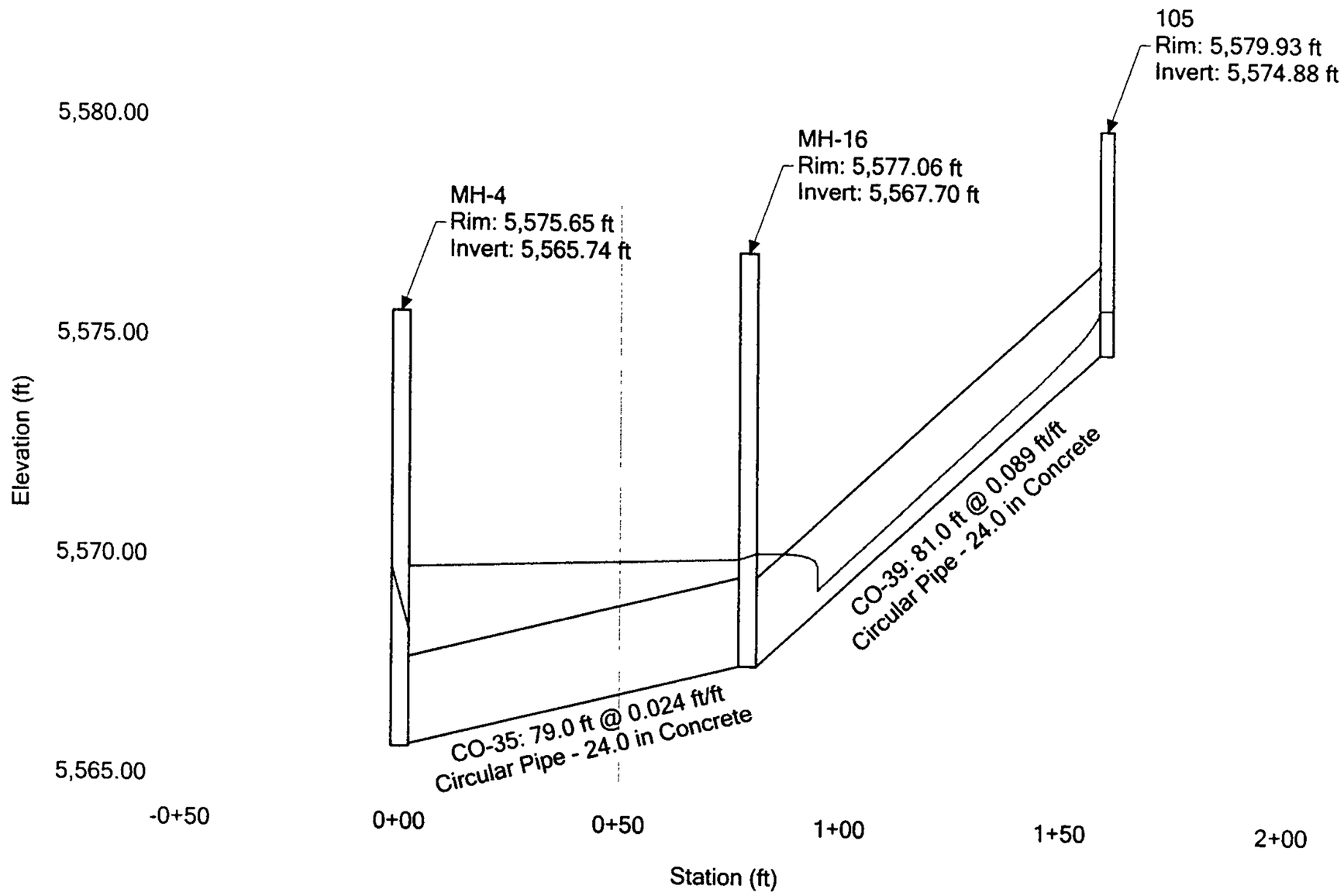
Engineering Profile - Lateral 5 (Montgomery SD.stc)



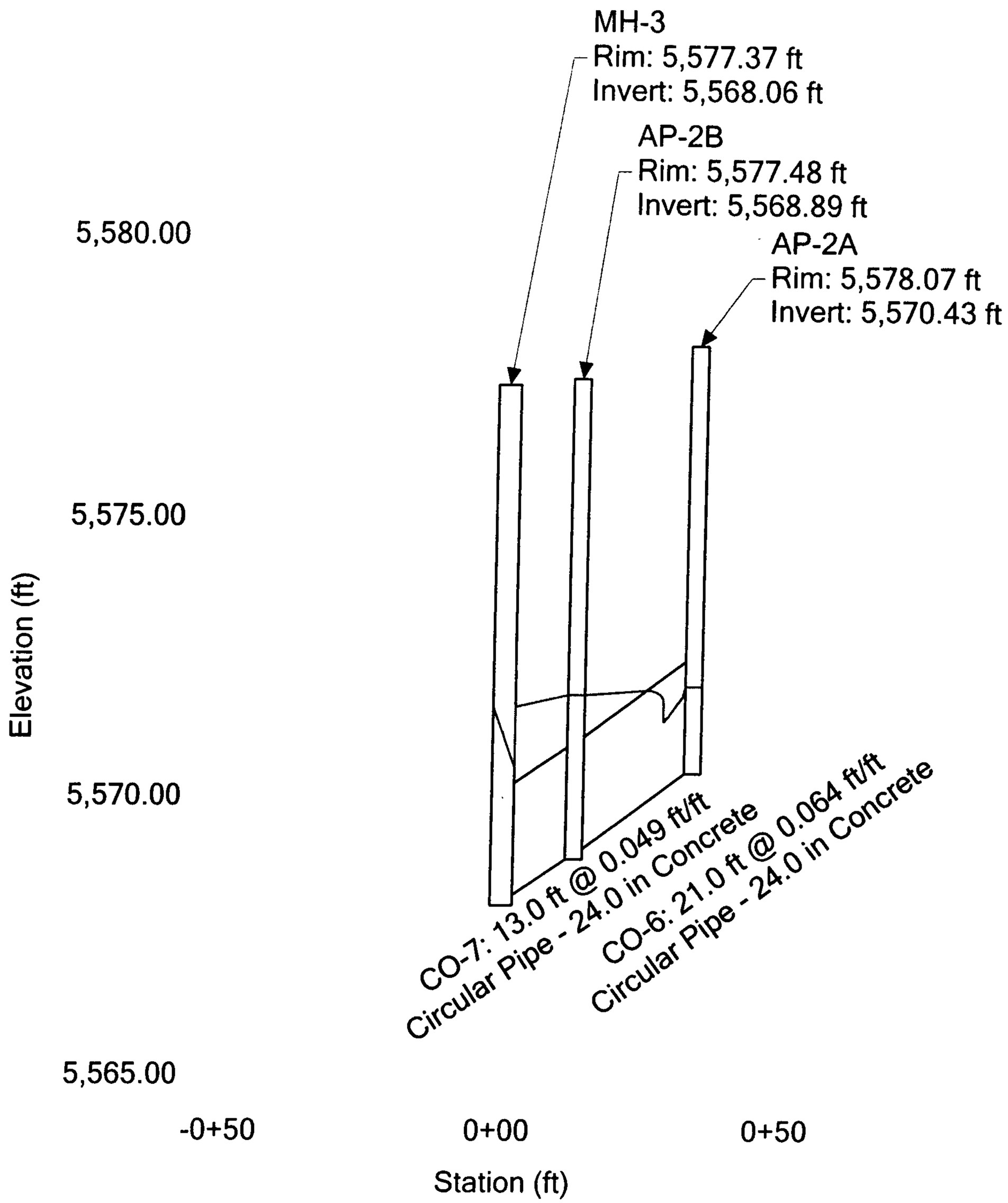
Profile Report
Engineering Profile - Lateral 6 (Montgomery SD.stc)



Profile Report
Engineering Profile - Lateral 7 (Montgomery SD.stc)

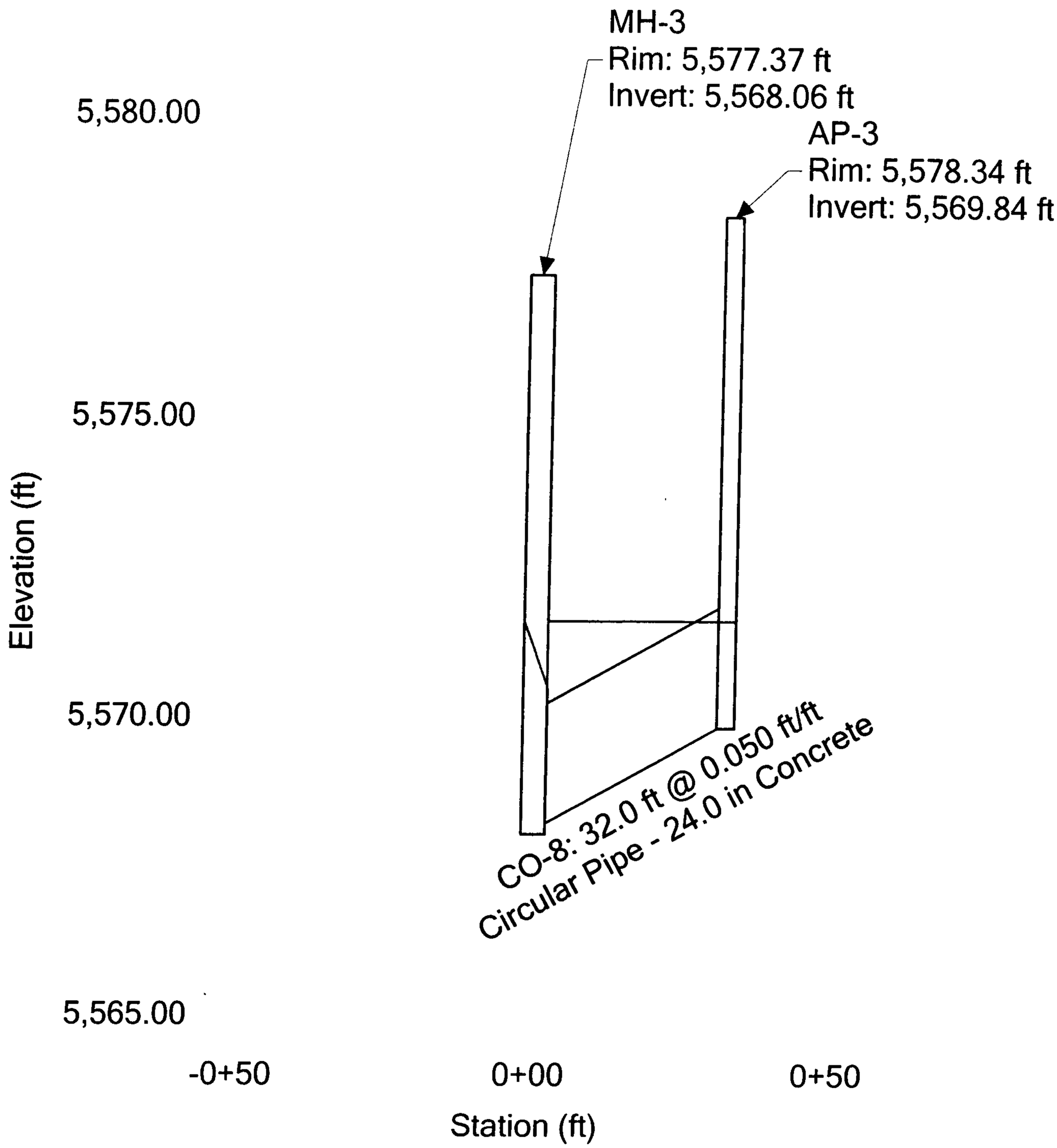


Profile Report
Engineering Profile - Lateral 8 (Montgomery SD.stc)



Profile Report

Engineering Profile - Lateral 9 (Montgomery SD.stc)



APPENDIX E

APPENDIX E

PRELIMINARY STORM DRAIN PLAN & PROFILE SHEETS

APPENDIX F

APPENDIX F

PRELIMINARY ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

PRELIMINARY ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF ALBUQUERQUE
Project Name:
Montgomery Eubank Intersection Improvements
Study Area Estimate

					ENGINEERS ESTIMATE GANNETT FLEMING WEST, INC.	
BID ITEM #	**ITEM ID NO.**	**ITEM DESCRIPTION**	**UNIT**	**ESTIMATED QUANTITY**	**UNIT PRICE**	**AMOUNT**
1	701 100	TRENCHING, BACKFILLING, & COMPACTION FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCLUDED, COMPL.	LF	4250	$24 02	$102,085.00
2	910 009	24" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	750	$48.19	$36,142 50
3	910 013	30" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	60	$49 72	$2,983 20
4	910 017	36" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	1850	$76 79	$142,061 50
5	910 019	42" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	750	$86 78	$65,085 00
6	910 021	48" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	725	$111 70	$80,982 50
7	910 104	DRAINLINE REMOVAL, 21" TO 48" EXCLUDING TRENCHING, COMPLETE	LF	3500	$17 28	$60,480.00
8	915 010	CATCH BASIN, TYPE 'A', SINGLE GRATE, CIP	EA	5	$4,329 49	$21,647.45
9	915 030	CATCH BASIN, TYPE 'C', SINGLE GRATE, CIP	EA	1	$3,855 76	$3,855 76
10	915.040	CATCH BASIN, TYPE 'C', DOUBLE GRATE, CIP	EA	0	$4,774 10	$0.00
11	915 050	CATCH BASIN, TYPE 'D', SINGLE GRATE, CIP	EA	1	$2,475 23	$2,475.23
12	915 06X	CATCH BASIN, TYPE 'D', TRIPLE GRATE, CIP	EA	1	$6,508.14	$6,508.14
13	915 070	CATCH BASIN, EXISTING, REMOVE & DISPOSE, ANY TYPE, INCL CLEANUP, COMPLETE	EA	8	$1,103 47	$8,827.76
14	915 1X	MEDIAN DROP INLET, 6 5' LONG, NO GRATE, CIP	EA	4	$3,892 24	$15,568 96
15	920 070	MANHOLE, 4' DIA., TYPE 'C' OR 'E', 6' TO 10' DEEP, CIP	EA	8	$2,797.04	$22,376 32
16	920.420	EXISTING MANHOLE FRAME & COVER, ADJUST TO PAVEMENT GRADE WHERE ADJUSTMENT OF CONCRETE OR BLOCK BARREL IS REQUIRED, CIP	EA	3	$721 98	$2,165 94
17	920 52x	PENETRATE EXISTING MANHOLE W/ NEW RCP, 4' DIA., 6' OR MORE IN DEPTH, COMPL	EA	3	$1,500 00	$4,500 00
18	920.570	EXISTING MANHOLE, REMOVE & DISPOSE, ALL DEPTHS, 4' TO 6' DIA, CIP	EA	3	$722.69	$2,168.07
		Subtotal				$577,745.26
		30% CONTINGENCIES				$173,323.58
		New Mexico Gross Receipts Tax (NMGRT) at 6 75%			*	$50,697.15
		TOTAL				**$801,765.98**

PRELIMINARY ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF ALBUQUERQUE
Project Name:
Montgomery Eubank Intersection Improvements
Intersection Improvements Area Estimate

					ENGINEERS ESTIMATE GANNETT FLEMING WEST, INC.	
BID ITEM #	**ITEM ID NO.**	**ITEM DESCRIPTION**	**UNIT**	**ESTIMATED QUANTITY**	**UNIT PRICE**	**AMOUNT**
1	701 100	TRENCHING, BACKFILLING, & COMPACTION FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCLUDED, COMPL	LF	1950	$24 02	$46,839 00
2	910.009	24" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	620	$48.19	$29,877 80
3	910 013	30" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	0	$49 72	$0 00
4	910 017	36" REINFORCED CONCRETE PIPE, CLASS III, FURNISH & PLACE IN OPEN TRENCH, CIP	LF	1300	$76 79	$99,827 00
5	910 104	DRAINLINE REMOVAL, 21" TO 48" EXCLUDING TRENCHING, COMPLETE	LF	1470	$17 28	$25,401 60
6	915 010	CATCH BASIN, TYPE 'A', SINGLE GRATE, CIP	EA	4	$4,329 49	$17,317 96
7	915.030	CATCH BASIN, TYPE 'C', SINGLE GRATE, CIP	EA	0	$3,855 76	$0.00
8	915.040	CATCH BASIN, TYPE 'C', DOUBLE GRATE, CIP	EA	0	$4,774.10	$0.00
9	915.050	CATCH BASIN, TYPE 'D', SINGLE GRATE, CIP	EA	1	$2,475.23	$2,475.23
10	915.06X	CATCH BASIN, TYPE 'D', TRIPLE GRATE, CIP	EA	1	$6,508.14	$6,508.14
11	915.070	CATCH BASIN, EXISTING, REMOVE & DISPOSE, ANY TYPE, INCL CLEANUP, COMPLETE	EA	8	$1,103 47	$8,827.76
12	915 1X	MEDIAN DROP INLET, 6 5' LONG, NO GRATE, CIP	EA	4	$3,892.24	$15,568.96
13	920 070	MANHOLE, 4' DIA , TYPE 'C' OR 'E', 6' TO 10' DEEP, CIP	EA	5	$2,797 04	$13,985.20
14	920 420	EXISTING MANHOLE FRAME & COVER, ADJUST TO PAVEMENT GRADE WHERE ADJUSTMENT OF CONCRETE OR BLOCK BARREL IS REQUIRED, CIP	EA	3	$721.98	$2,165.94
15	920.52X	PENETRATE EXISTING MANHOLE W/ NEW RCP, 4' DIA., 6' OR MORE IN DEPTH, COMPL	EA	3	$1,500.00	$4,500.00
16	920 570	EXISTING MANHOLE, REMOVE & DISPOSE, ALL DEPTHS, 4' TO 6' DIA, CIP	EA	3	$722 69	$2,168.07
		Subtotal				$273,294.59
		30% CONTINGENCIES				$81,988.38
		New Mexico Gross Receipts Tax (NMGRT) at 6 75%				$23,981.60
		TOTAL				**$379,264.57**