CD Pocket

Contains:

AHYMO_97 Models
Input files
Summary Tables
Output files

D17

I, Patrick Stovall, being duly registered as a Professional Engineer under the laws of the State of New Mexico, do hereby certify that this document was prepared under my direction and is true and correct to the best of my knowledge and belief.

Patrick Stovall

Patrick Stovall, NM PE # 13830

DRAINAGE REPORT and CONCEPTUAL DESIGN
For
PROPOSED STORM DRAINAGE IMPROVEMENTS
NEAR
EL PUEBLO ROAD AND PASEO DEL NORTE
AT THE NORTH DIVERSION CHANNEL

ALBUQUERQUE, NM

Existing 30" CMP that outfalls to the North Diversion Channel
Between El Pueblo Road and the Railroad Tracks

Prepared for:
Albuquerque Metropolitan Arroyo Flood Control Authority

Prepared by:
Smith Engineering Company

January, 2007
SEC Project No. 103115C

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January 31, 2007

Mr. Bradley L. Bingham, P.E., C.F.M.
City of Albuquerque Planning Dept.
Development & Building Services Division
600 2nd Street NW
Albuquerque, NM 87102

Re: Drainage Report for El Pueblo Road at the North Diversion Channel

Dear Mr. Bingham:

I am sending you a copy of the referenced report for you files. As you are aware, AMAFCA contracted Smith Engineering Company to study the area in response to flooding from the 2006 storms. Smith has also been authorized to proceed with design plans on the Phase 1 drainage facilities from the North Diversion Channel to approximately 200 feet east to help alleviate some of the flooding.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E., C.F.M.
Project Manager

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Rainfall Data and
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AHYMO_97 Full Future Development Conditions
100-yr. 24-hour Storm

2 models included as described here :

1st. Model *WITH proposed drainage improvement P1*)

Note – Only 2 changes were implemented in this model compared to the 2nd model.
1.Assume the 42-inch cmp under Paseo Del Norte is blocked - AP 12.91
2. Assume no flow passes across the N. Div. Channel on El Pueblo Rd. - AP 1.92
AHYMO_97 Summary Table
File name P1100-24.txt

2nd. Model *WITHOUT proposed drainage improvements*)
AHYMO_97 Summary Table and Input File
File name EI100-24.txt

APPENDIX C

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Proposed Improvement P3A
Proposed Improvement P3B
Proposed Improvement P4
Proposed Improvement P5
Proposed Improvement P6
Proposed Improvement P7
Proposed Improvement P8
Proposed Improvement P9

CD CONTAINING :

AHYMO_97 Models, Summary Tables and Full Output File
Included in a pocket at the back of this report

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EXECUTIVE SUMMARY

This executive summary presents the results from the Drainage Analyses and Conceptual Design completed for AMAFCA by Smith Engineering Company for El Pueblo Road and Paseo Del Norte between Jefferson St. and the North Diversion Channel. Please see Figures 1A and 1B located in the text for the schematic locations of drainage improvements labeled as Phases 1 through 9 as described here.

Problem Description

Severe rainfall events last summer caused significant flooding of El Pueblo Rd. between Jefferson St. and the North Diversion Channel, more specifically from the eastern most railroad crossing of El Pueblo Rd. to the North Diversion Channel. Due to undersized existing drainage structures and lack of structures, significant flow passed over the North Diversion Channel west on El Pueblo Rd. into the valley. Smaller flows also crossed the North Diversion Channel on the east and west bound lanes of Paseo Del Norte and north frontage road of Paseo Del Norte. The most severe drainage and flooding problem occurred in and along El Pueblo Rd. between the eastern most railroad crossing and the North Diversion Channel.

PROPOSED IMPROVEMENTS

Improvements were developed in phases to provide for possible funding issues and at logical break points based on the location of flooding and existing features. All improvements are based on the 100-yr. 24-hour peak discharge for full basin development (most basins are fully developed at this time).

Proposed Improvement Phase 1 (P1) (See Figure 1 A)

84" RCP and Overflow Channel at the Existing 30" CMP at the North Diversion Channel between El Pueblo Road and the Railroad Tracks

Problem -

The existing 30" CMP is deteriorating due to rust at the outfall end in the North Diversion Channel. Furthermore is has limited capacity and does not have an overflow section in case it should plug or its capacity exceeded. During many floods, flows spill into El Pueblo Rd. due to lack of culvert capacity.

Solution -

Phase 1 will consist of replacing the existing 30" CMP that outfalls to the North Diversion Channel with an 84" RCP. A culvert must remain at this location in order to collect flows from the existing 21" RCP that outfalls at this location from the existing PNM detention pond. In addition, the existing rail road tie retaining walls will be replaced with reinforced concrete walls, and the outfall from El Pueblo Rd. to the pipe inlet will be concrete lined as there is significant flow and existing erosion from El Pueblo Rd. to the pipe inlet. The emergency overflow section from the pipe headwall to the North Diversion Channel will be constructed with base course. This project will be constructed by AMAFCA is spring 2007.

In addition, please note that considerable flow now and in the future may pass across the North Diversion Channel on El Pueblo Rd. assuming none of the other proposed improvements upstream of this outfall location are built. The condition of the asphalt is very poor on El Pueblo Rd. between the railroad tracks and the North Diversion Channel and there is basically no crown to the road. The improvements will include: an asphalt overlay to provide a crowned section (between the North Diversion Channel and the rail road tracks), four catch basins and a short segment of storm drain to collect the flows in El Pueblo Rd. just east of the North Diversion Channel to outfall in front of the proposed 84" culvert. Re-design of El Pueblo Rd. may be at the discretion and decisions of the NMDOT.

The construction cost estimate of all Phase 1 improvements based on conceptual design is $192,000 and the cost of El Pueblo Rd. pavement improvements, catch basins and storm drain (conceptual design) is about $48,000 of the total $192,000.

Proposed Improvement Phase 2 (P2A) (See Figure 1A)

Concrete Channel from Existing 42" CMP Under Paseo Del Norte to the Proposed 84" RCP at the North Diversion Channel

Problem -

The existing 42" CMP under Paseo Del Norte does not have the capacity to pass the 100-yr. flow and the excess spills west between El Pueblo Road and Paseo Del Norte and floods El Pueblo Road and the railroad crossing located between the 42" CMP and the North Diversion Channel.

Solution -

P2A - a concrete channel with a 5-foot bottom width, 4 feet deep with 1V:2H side slopes is recommended in this location. Install a concrete channel from the inlet of the existing 42" CMP under Paseo Del Norte to the Inlet of the proposed 84" RCP at the North Diversion Channel. The advantage of this solution is that a channel will capture all the pipe and surface flow. The disadvantage is that it will limit future roadway development options.

Proposed Alternative Improvement Phase 2 (P2B) (See Figure 1A)

New 66-in. Storm Drain from Existing 42" CMP Under Paseo Del Norte to the Proposed 84" RCP at the North Diversion Channel

Problem -

The existing 42" CMP under Paseo Del Norte does not have the capacity to pass the 100-yr. flow and the excess spills west between El Pueblo Road and Paseo Del Norte and floods El Pueblo Road and the railroad crossing located between the 42" CMP and the North Diversion Channel.

Solution -

Install a 66" RCP from the inlet of the existing 42" CMP under Paseo Del Norte to the Inlet of the proposed 84" RCP at the North Diversion Channel. The advantage of this alternative is that all flow is underground and will not impede surface improvements. The disadvantage is that in current condition, it will not capture remnant surface flows. A surface swale over the pipe be required.

Additional Recommendation - Future Plug of the Existing 42-inch Culvert Under Paseo Del Norte

The existing 42-inch culvert under Paseo Del Norte (the inlet is located between El Pueblo Rd. and the rail road tracks) has very low capacity should be plugged *after proposed improvements P1 and either P2A or P2B are constructed*. This will allow for additional capacity of this culvert as it continues on the north side of the north Paseo Del Norte frontage road. This is based on the recommendation that some existing flows and culvert outfalls from the north Paseo Del Norte frontage road (that now outfall into private property) be re-directed into the 48-inch culvert.

Proposed Improvement Phase 3 (P3A) (See Figure 1A)

Concrete Channel from El Pueblo Road At Eastern Most Railroad Track Crossing to Existing 42" CMP under Paseo Del Norte

Problem -

There is an existing asphalt channel in the referenced reach and this channel is failing. The erosion in this channel is within 1-foot of the concrete traffic barrier on the east bound lanes of Paseo Del Norte. This barrier and Paseo Del Norte are in need of protection because further erosion will occur at this location.

Solution -

P3A – a concrete channel with a 5-foot bottom width, 4 feet deep with 1V:2H side slopes is recommended in this location. The advantage of this solution is that a channel will capture all the pipe and surface flow. The disadvantage is that it will limit future roadway development options.

Proposed Alternative Improvement Phase 3 (P3B) (See Figure 1A)
New 66-inch RCP from El Pueblo Road At Eastern Most Railroad Track Crossing to Existing 42" CMP under Paseo Del Norte

Problem -

There is an existing asphalt channel in the referenced reach and this channel is failing and the erosion in this channel is within 1 foot of the concrete traffic barrier on the east bound lanes of Paseo Del Norte. This barrier and Paseo Del Norte are in need of protection because further erosion will occur at this location.

Solution -

P3B - a 66" RCP could be considered at this location.
The advantage of this alternative is that all flow is underground and will not impede surface improvements. The disadvantage is that in current condition, it will not capture remnant surface flows. A surface swale over the pipe be required.

Proposed Improvement Phase 4 (P4) (See Figure 1A)
El Pueblo Road At Eastern Most Railroad Track Crossing

Problem -

At present there is no outfall for the flow from the basins contributing to this location and consequently El Pueblo Road experiences frequent flooding.

Solution -

The recommended solution is to build a concrete headwall and a 66" RCP culvert under El Pueblo Road to convey the flow to the existing road side ditch between El Pueblo Road and Paseo Del Norte.

Proposed Improvement Phase 5 (P5) (See Figure 1B)
East Bound Paseo Del Norte near the North Diversion Channel

Problem -

At present there is only 1 median type inlet at this location that outfalls to a 24-inch CMP into the North Diversion Channel. Some flow escapes this inlet and passes west across the North Diversion Channel.

Solution -

The recommended solution is to add one additional inlet about 20 feet east of the existing inlet and join this basin to the existing basin with a 24-inch CMP. This will collect most of the 100-yr. flow.

Proposed Improvement Phase 6 (P6) (See Figure 1B)
North Paseo Del Norte Frontage Road at Rail Road Tracks

Problem -

At present there is only 1 curb inlet in the frontage road located just east of the rail road tracks . This inlet and one inlet in west bound Paseo Del Norte and one median type inlet located in the soil north of the roadway all outfall to a 24-inch CMP that outfalls into private property. Note that due to lack of curb at the rail road track crossing that flow in excess of the road flow spills north into private property.

Solution -

The recommended solution is to add two additional inlets about 20 feet east of the existing inlet in the frontage road and join these to the existing basin with a 24-inch CMP. The connection of the 24-inch pipe from the existing basin to the median inlet basin may remain, but then the existing 24-inch CMP from the median inlet basin into private property should be abandoned. A new 24-inch CMP should be installed from the median inlet to join the manhole that is located about 200 feet west of the rail road tracks. This manhole is the junction of the 42-inch CMP under Paseo Del Norte and the 33"R x 49" S CMP that continues west just north of the frontage road. This new 24-inch CMP will eliminate nearly all runoff from draining into private property.

This report recommends plugging the 42-inch CMP on the south side of Paseo Del Norte after proposed improvements P1 and P2 are built. This will allow plenty of capacity in the 33" R x 49" S CMP that continues past the referenced manhole.

Proposed Improvement Phase 7 (P7) (See Figure 1B)
North Paseo Del Norte Frontage Road at Turn Lane into Private Property
Problem -
At present, approximately 80 percent of the storm runoff in the north bound frontage road at this private driveway (located about 500 feet east of the N. Div. Channel) drains into the private driveway.
Solution -
The recommended solution is to add three additional curb inlets about 20 feet east of the driveway. These inlets could be joined to the existing 33" R x 49" S CMP located just north of the north frontage road.

Proposed Improvement Phase 8 (P8) (See Figure 1B)
North Paseo Del Norte Frontage Road just east of N. Diversion Channel
Problem -
At present there is only 1 curb inlet at this location that outfalls to a 24-inch CMP into the North Diversion Channel. Some flow escapes this inlet and passes west across the North Diversion Channel.
Solution -
The recommended solution is to add one additional curb inlet about 20 feet east of the existing inlet. This include could outfall into a 24-inch CMP that would outfall to the existing drainage ditch that is the outfall for the existing 33"R x 49"R CMP. This will collect most of the 100-yr. flow.

Proposed Improvement Phase 9 (P9) (See Figure 1B)
West Bound Paseo Del Norte Frontage Road just east of N. Diversion Channel
Problem -
At present there is only 1 median type inlet at this location that outfalls to a 24-inch CMP into the North Diversion Channel. Some flow escapes this inlet and passes west across the North Diversion Channel.
Solution -
The recommended solution is to add one additional inlet about 20 feet east of the existing inlet and join this basin to the existing basin with a 24-inch CMP. This will collect most of the 100-yr. flow.

PROPOSED IMPROVEMENTS COST SUMMARY AND RECOMMENDATIONS

El Pueblo Road Improvements

Proposed Improvement P1 (84" RCP and overflow channel spillway section)- $192,000
(about $48,000 are improvements within El Pueblo Rd.)
will prevent flooding of El Pueblo Rd. at the North Diversion Channel.

Proposed Improvement P2A (reinforced concrete channel) - $583,000
will prevent flooding of El Pueblo Rd. at the western most railroad crossing.

Proposed Improvement P3A (reinforced concrete channel) -$220,000
will prevent failure of the Paseo Del Norte traffic barrier wall and asphalt.

Proposed Improvement P4 (66" RCP) – $328,000
will eliminate flooding of El Pueblo Rd. near the. eastern most railroad crossing.

Total Cost of Phase 1 through 4 Improvements for El Pueblo Road = $1,323,000

Paseo Del Norte and North Frontage Road Improvements

Proposed Improvement P5 (1 inlet and 24" CMP) – $20,000
will eliminate most 100-yr. flow from crossing the N. Diversion Channel.

Proposed Improvement P6 (2 inlets and 24" CMP) – $85,000
will eliminate most 100-yr. flow from draining into private property near railroad tracks.

Proposed Improvement P7 (3 inlets and 24" CMP) – $48,000
will eliminate most 100-yr. flow from draining into private property 500 ft. east of N. Div. Channel

Proposed Improvement P8 (1 inlet and 24" CMP) – $17,000
will eliminate most 100-yr. flow from crossing the N. Diversion Channel.

Proposed Improvement P9 (1 inlet and 24" CMP) – $20,000
will eliminate most 100-yr. flow from crossing the N. Diversion Channel.

Total Cost of Phase 5 through 9 Improvements for Paseo Del Norte and North Frontage Road = $190,000

Total Cost of Phase 1 through 9 Improvements = $1,513,000

SECTION 1

INTRODUCTION

1.1 PURPOSE

The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) requested that Smith Engineering Company (SEC) conduct a drainage analysis, prepare a drainage report and develop conceptual design(s) to improve the existing drainage infrastructure located near El Pueblo Road and Paseo Del Norte (PDN) at the North Diversion Channel in Albuquerque, NM.

This document will summarize the hydrologic and hydraulic analyses conducted for the drainage options considered and to present conceptual plans to improve the existing storm drain system.

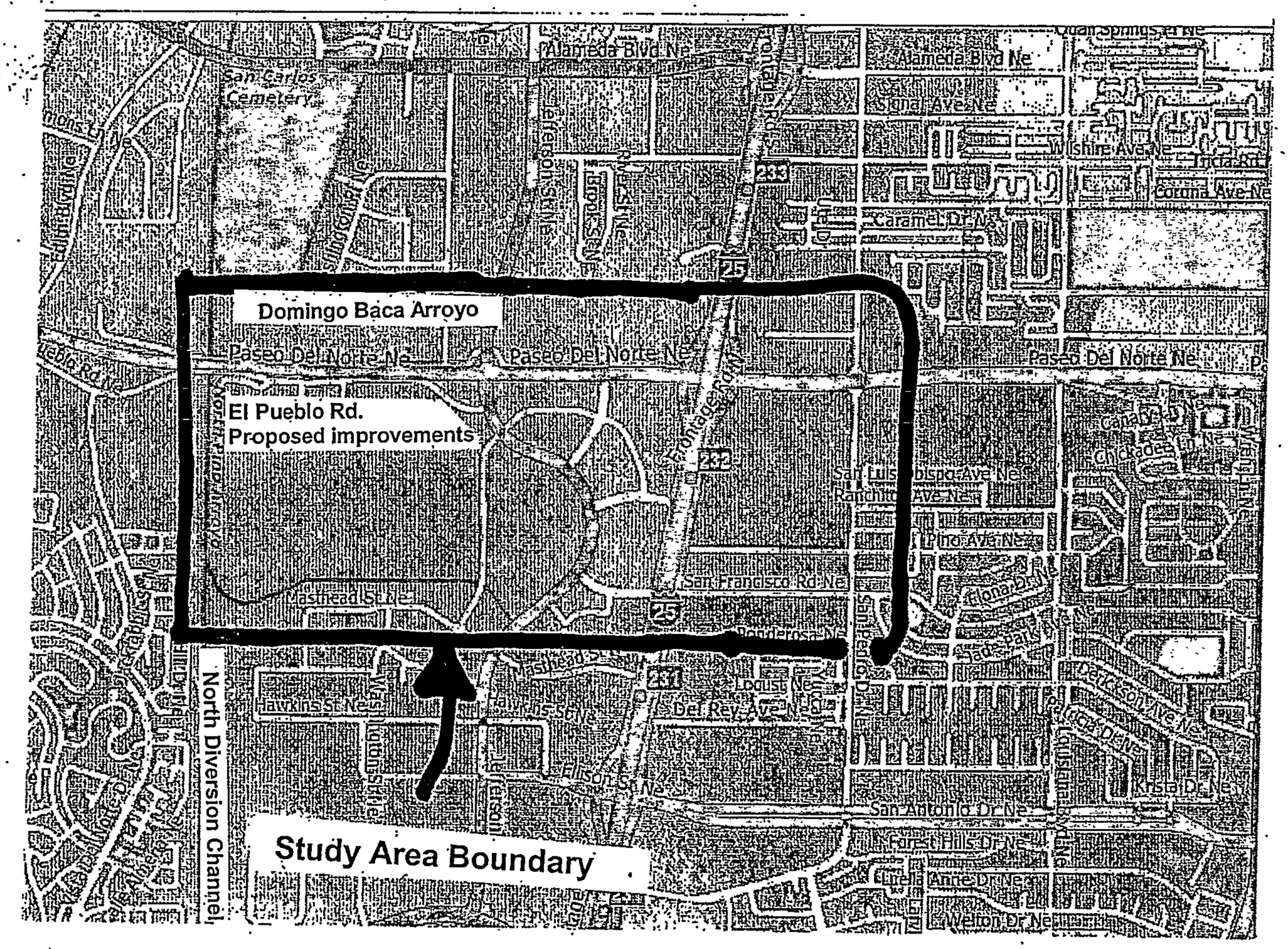
1.2 SCOPE

The scope of the drainage analysis and design plans are listed here:

- Meetings with AMAFCA
- Compile and review master drainage reports
- Compile any remaining available As-built record drawing information and identify locations for required field surveys to pick up required inverts, pipe size and slopes.
- Coordinate any field surveys investigation and topographic surveying
- Prepare a detailed drainage basin map
- Hydrologic analyses for existing, full build out and drainage options using the AHYMO_97 program
- Hydraulic analyses of storm drains and open channels
- Prepare Preliminary Hydrology and Hydraulics drainage report, submit to AMAFCA, City of Albuquerque and the New Mexico Department of Transportation (NMDOT) for review.
- Prepare Final H&H Report
- Prepare conceptual drainage options and associated quantity and cost estimates, summarize in final Report

1.3 PROJECT LOCATION

The project drainage basin area is generally between the Domingo Baca Arroyo on the north, the North Pino Arroyo on the south, the North Diversion Channel on the west and San Pedro Blvd. on the east. **Figure A** presents the generally drainage basin area and also the proposed general proposed project location that is located at El Pueblo Rd. at the North Diversion Channel.



North

Not to scale

VICINITY MAP

FIGURE A

1.4 PROBLEM DESCRIPTION AND EXISTING STORM DRAIN INFRASTRUCTURE

Problem Description

During the summer of 2006, extensive flooding occurred on El Pueblo Road at several locations just east of its crossing the North Diversion Channel. In addition, a significant quantity of storm water continued past the North Diversion Channel on El Pueblo Road. Note also that some significant erosion has occurred on the south side of Paseo Del Norte that is now a threat to the concrete barrier on the east bound lanes. Therefore, this report will provide conceptual drainage options and present recommendations to improve the drainage system along El Pueblo Road between approximately Jefferson St. and the North Diversion Channel.

Existing Storm Drain System

The existing storm drain system is presented on **Figure 1** (located in map pocket) that is the Drainage Basin Map. The storm drain systems for Paseo Del Norte were obtained from as-built drawings listed in the next section. The storm drains locations and sizes for the remainder of the study area were obtained from either the City of Albuquerque GIS system or from Drainage Plan drawings also provided by the City of Albuquerque.

SECTION 2

GENERAL BACKGROUND

2.1 PREVIOUS PLANS AND DRAINAGE REPORT INFORMATION

Storm Drain As-Built Drawings for Paseo Del Norte

New Mexico State Highway Department Construction Plans Paseo Del Norte, Section C. SP-(M)-4054(204) AMAFCA Channel to I-25. Bernalillo County. URS Corporation. (8-3-87 is Highway Dept. signature date)

Drainage Reports and Drainage Plans

Drainage Report - Paseo Del Norte Highway Project Section "C" (formerly El Pueblo River Crossing). Prepared for New Mexico Highway Department. URS Engineers.1985

A brief summary of this report follows:

Design Criteria –
- inlets - 10-yr. with one lane open in each direction
- storm sewer – 25-yr.
- depressed areas = 50-yr
- culverts – 50-yr. or greatest flood of record
- retention / detention = 100-yr.

Hydrologic Methods – rural section – USDA SCS National Engineering Handbook, Sect. 4 Hydrology
- urban section – Rational Method
- minimum Tc = 10 min.

Storm Sewers – NMSH&TD, min. velocity = 2.5 fps, flowing full with no surcharge for 10-yr. storm and with surcharge to top of grate or cover for 25-yr. storm.

Summary of Report Text –
The text description is brief and does not discuss flow divides through PDN walls, curb locations or intersection locations. There was brief discussion that storm flows could be carried directly to the North Diversion Channel within storm drains, but this option was not considered further and was not built. The 42-inch CMP under Paseo Del Norte at the railroad track crossing was described as handling the off-site flows for existing conditions, and that if the area develops, that consideration should be given that developers be required to incorporate detention ponds.

Master Drainage Plan - Paseo Del Norte Industrial Park, prepared by Jeff Mortensen, 1/1999

Revised Drainage Management - Journal Center, prepared by Bohannan Huston, 12/1992

Street & Storm Drain Profile - City of Albuquerque, prepared by Bohannan Huston, 1994

Drainage Plan, Journal Center Tract 3A-1, Bohannan Huston, 8/4/94

Grading & Drainage Plan - Market Place at Journal Center Tract 3A-1C, Tierra West Development Management Services, R. Bohannan 12/17/96

Final Drainage/Grading Plan for Phase 4 - Fanning Bard Tatum, Sun Healthcare Group, Inc., Bohannan Huston, 9/1998

Final Drainage/Grading Plan for Phase 3 - Fanning Bard Tatum, Sun Healthcare Group, Inc., Bohannan Huston, 5/1997

Purposed Conditions Basin Map - Journal Center, Tract 3A-1A, Fanning Bard Tatum, Sun Healthcare Group, Inc., Bohannan Huston, 12/21/96

Final Drainage/Grading Plan for Tracts 3A-1A - Journal Center, Tract 3A-1A, Fanning Bard Tatum, Sun Healthcare Group, Inc., Bohannan Huston, 1/95

Journal Center, Phase II, Bohannan Huston, 2000

2.2 PROPOSED PROJECTS

AMAFCA

This report summarizes AMAFCA's efforts to eliminate flooding problems along El Pueblo Rd. and Paseo Del Norte generally located between the North Diversion Channel and Jefferson St. Subsequent sections of this report present conceptual level proposed drainage improvement options.

NMDOT

The NMDOT is in the very preliminary planning stages to improve Paseo Del Norte and/or provide alternate or additional roadways. This Drainage Report and the proposed recommendations may be usefull

SECTION 3

HYDROLOGIC AND HYDRAULIC ANALYSES FOR EXISTING CONDITIONS AND PROPOSED IMPROVEMENTS

3.1 HYDROLOGIC DATA AND ASSUMPTIONS

Design Criteria

The 100-yr.- 24-hr. storm was selected for the design return period. Rainfall data was obtained from NOAA Atlas 14 on the internet and that data is included in **Appendix A**. **Table 1** presents a summary of the rainfall data.

Future Basin Development Conditions

Please see the Drainage Basin Map **Figure 1** (map pocket) and note that the aerial photograph used as the base does not represent additional development that has occurred since the date of the photograph. Most of the basin is developed at this time and therefore the analysis will only be conducted for full future basin development conditions. Please see the footnotes on the bottom of **Table 2** for those basins that have mostly undeveloped conditions for existing conditions.

Basin Delineations

The watershed was divided into drainage basins as shown on **Figure 1**. All storm drain locations, storm drain inlets, culverts, drainage divides and land use types were verified with field observation.

Land Treatment Assumptions

The land treatment type assumptions were based on field observations and mostly the aerial photograph (**Figure 1**). For those basins with some undeveloped land, the assumption was that the land would be developed as the current development which is all commercial or industrial. **Table 2** presents a summary of all land treatment type assumptions for all basins.

Time of Concentration (Tc) and Time to Peak (Tp)

The longest flow path in each basin was delineated and measured on **Figure 1**. The Upland Method was applied as all basins have a total flow length of less than 4000 feet. The conveyance factors were selected based on recommendations in the COA DPM and referenced in **Table 2** which presents a summary of all Tc and Tp data, formulas and unit hydrograph Tp results required for the AHYMO model.

Flow Divide Assumptions

Surface Flow Divide Assumptions - There are many locations particularly along Paseo Del Norte and El Pueblo Road that storm runoff spills in or out of a basin due to breaks in the Paseo Del Norte traffic barrier walls and curb cuts due to the railroad track crossings. Flow divide assumptions were developed based on experience and visual observation.

Storm Drain Inlet Divide Assumptions – The location of storm drain inlets and storm drains were used to determine analysis point locations for flow divides.

Hydrograph Routing

Due to the relatively short routing reaches, and due to the assumptions developed to simulate the drainage basin and its complex series of flow divides and hydrograph combinations, hydrograph routing was determined to be unnecessary. This is also based on experience with short routing reaches because these result in very small attenuation of hydrograph peaks and time delay.

3.2 AHYMO MODEL DEVELOPMENT

Surface Flow Divide Assumptions

There are many street intersections and other locations such as breaks in the concrete traffic barrier walls along Paseo Del Norte where flow will divide into 2 directions. All such locations were observed in the field and the percentage flow split was estimated based on field conditions and experience. **Table 3** presents a summary of all flow divide assumptions.

Storm Drain Inlet Combination

A group or location of one or more inlets were combined into one Analysis Point to represent a location where the combined capacity of those inlets could be modeled. **Figure 2** (located in map pocket) presents a graphical annotation of the inlet types and combinations of inlets combined for a given analysis point.

Existing Structure Hydraulics

Storm Drain Inlets - The Flow Master output and the other hydraulic computations to determine the capacities of the storm drain inlet and storm drain pipes are included in **Appendix A**. **Table A1** located in **Appendix A** presents a summary of the discharges computed for all Analysis Points which represent storm drain inlets.

Storm Drain Pipes – The non-pressure full pipe flow capacity of all existing storm drains was computed with the Flow Master program and the output is also included in **Appendix A**. **Table A2** locate in **Appendix A** includes a summary of the storm drain capacities.

Inlet Capacity Versus Storm Drain Non-Pressure Full Pipe Flow Capacity

The smallest value of either the inlet capacities at a given Analysis Point or the non-pressure full pipe flow capacity was assumed for the value to be applied to divide the hydrograph. Hydrographs were divided at Analysis Point to differentiate pipe flow from street or surface flow. **Table 3** presents a summary of all flow divide values.

Culvert Hydraulics - The existing culverts that were modeled are the following:

One 42" CMP under Paseo Del Norte at the railroad track crossing collects some flow from the south side of Paseo Del Norte. This culvert joins a 33" rise by 49" span on the north side of Paseo Del Norte and then outfalls just east of the North Diversion Channel.

One 30" CMP between El Pueblo Rd. and the railroad track crossing the North Diversion Channel. This pipe outfalls to the North Diversion Channel.

One 21" RCP that begins in the PNM detention pond and outfalls at the inlet to the 30" CMP as describe above.

The culvert hydraulics were modeled with the Culvert Master program and the input assumptions, data and program output are included in **Appendix A**. The maximum culvert capacities were applied at the corresponding analysis points to represent the hydrograph volume that would be divided by the culvert capacity. The culvert discharge capacities are summarized in **Table 3.**

AHYMO Modeling Schematic

The order of basin hydrograph computation, flow divide locations and assumptions, hydrograph combination locations are summarized in the AHYMO_97 modeling schematic as shown in **Figure 3** (located in map pocket). This schematic is crucial to understanding the model development, hydrograph and analysis point locations and flow divide locations and assumptions. **Table 3** presents a summary of all flow divide assumptions and discharge values for the "divide hydrograph" analysis point locations.

3.3 AHYMO_97 FULL DEVELOPMENT CONDITIONS WITHOUT and WITH PROPOSED IMPROVEMENT P1 OUTPUT AND SUMMARY

AHYMO_97 Model Without Proposed Improvements

Due to the complexity of the AHYMO_97 model and numerous locations where a hydrograph will leave the watershed, a continuity check is crucial to ensure that a modeling error has not occurred. **Table 4** presents a summary of that continuity check that proves the model has accounted for all basins through a comparison of areas of individual basins.

Table 5 presents a summary of the AHYMO_97 Model Output for the full development conditions 100-yr. 24-hour return period storm only for the problem locations evaluated for the purpose of this analysis. Please see **Appendix B** for a full AHYMO_97 model summary table for all analysis point locations and for the input file. The digital AHYMO_97 model input file, summary table and output file are included on a CD in a map pocket.

AHYMO_97 Model With Proposed Improvement P1 (Replacement of the existing 30-inch CMP at N. Diversion Channel with an 84-inch RCP

A model was developed to simulate proposed improvement P1 for the following reason. Improvement P1 assumes that the 42-inch CMP under Paseo Del Norte will be plugged in the future, and that all flow from El Pueblo Rd. will be collected so that none will pass over the North Diversion Channel. The result of this change at the location of the 30" CMP follows: existing conditions Qp 100yr. = 277 cfs, and with Proposed Improvement P1 assumptions as described, Qp 100yr. = 364 cfs.

Table 5 presents a summary of the AHYMO_97 Model Output for the full development conditions 100-yr. 24-hour return period storm only for the problem locations evaluated for the purpose of this analysis. Please see **Appendix B** for a full AHYMO_97 model summary table for all analysis point locations and for the input file. The digital AHYMO_97 model input file, summary table and output file are included on a CD in a map pocket.

3.4 PROPOSED IMPROVEMENTS CONCEPTUAL DESIGN

Improvements were developed in phases to provide for possible funding issues and at logical break points based on the location of flooding and existing features. All improvements are based on the 100-yr. 24-hour peak discharge for full basin development (most basins are fully developed at this time).

Appendix C includes the quantity and cost estimates, assumptions, hydraulic data and results for the proposed drainage improvements as described in this section. Please see **Figure 1A** for a schematic view of the El Pueblo Road Phase 1 through 4 existing conditions and proposed improvements. Please see **Figure 1B** for a schematic view of the Paseo Del Norte and north frontage road Phase 5 through 9 existing conditions and proposed improvements. The actual locations of the proposed drainage

improvements are illustrated on **Figure 4** (located in map pocket) and descriptions of those improvements are described here.

PROPOSED IMPROVEMENT PHASE 1 (P1)

84" RCP and Overflow Channel at the Existing 30" CMP at the North Diversion Channel between El Pueblo Road and the Railroad Tracks

Problem

The existing 30" CMP is deteriorating due to rust at the outfall end in the North Diversion Channel. Furthermore is has limited capacity and does not have an overflow section in case it should plug or its capacity exceeded. During many floods, flows spill into El Pueblo Rd. due to lack of culvert capacity.

Solution

Phase 1 will consist of replacing the existing 30" CMP that outfalls to the North Diversion Channel with an 84" RCP. A culvert must remain at this location in order to collect flows from the existing 21" RCP that outfalls at this location from the existing PNM detention pond. In addition, the existing rail road tie retaining walls will be replaced with reinforced concrete walls, and the outfall from El Pueblo Rd. to the pipe inlet will be concrete lined as there is significant flow and existing erosion from El Pueblo Rd. to the pipe inlet. The emergency overflow section from the pipe headwall to the North Diversion Channel will be constructed with base course. This project will be constructed by AMAFCA in spring 2007.

In addition, please note that considerable flow now and in the future may pass across the North Diversion Channel on El Pueblo Rd. assuming none of the other proposed improvements upstream of this outfall location are built. The condition of the asphalt is very poor on El Pueblo Rd. between the railroad tracks and the North Diversion Channel and there is basically no crown to the road. The improvements will include: an asphalt overlay to provide a crowned section (between the North Diversion Channel and the rail road tracks), four catch basins and a short segment of storm drain to collect the flows in El Pueblo Rd. just east of the North Diversion Channel to outfall in front of the proposed 84" culvert. Re-design of El Pueblo Rd. may be at the discretion and decisions of the NMDOT.

The construction cost estimate of all Phase 1 improvements based on conceptual design is $192,000 and the cost of El Pueblo Rd. pavement improvements, catch basins and storm drain (conceptual design) is about $48,000 of the total $192,000.

Figure 4 illustrates the proposed locations and conceptual level plan view. Due to an existing sanitary sewer line near the location of the proposed 84" CMP, SEC opened the manhole to take a depth measurement, and also measured basic horizontal and vertical dimensions of the surrounding features. That information is presented in **Figure 5** and was used as the basis for conceptual design of the proposed solution as described. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 6**.

PROPOSED IMPROVEMENT PHASE 2 (P2A)

Concrete Channel from Existing 42" CMP Under Paseo Del Norte to the Proposed 84" RCP at the North Diversion Channel

Problem

The existing 42" CMP under Paseo Del Norte does not have the capacity to pass the 100-yr. flow and the excess spills west between El Pueblo Road and Paseo Del Norte and floods El Pueblo Road and the railroad crossing located between the 42" CMP and the North Diversion Channel.

Solution
P2A - a concrete channel with a 5-foot bottom width, 4 feet deep with 1V:2H side slopes is recommended in this location. Install a concrete channel from the inlet of the existing 42" CMP under Paseo Del Norte to the Inlet of the proposed 84" RCP at the North Diversion Channel. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 7**.

The advantage of this solution is that a channel will capture all the pipe and surface flow. The disadvantage is that it will limit future roadway development options.

PROPOSED ALTERNATE IMPROVEMENT PHASE 2 (P2B)
New 66-in. Storm Drain from Existing 42" CMP Under Paseo Del Norte to the Proposed 84" RCP at the North Diversion Channel

Problem
The existing 42" CMP under Paseo Del Norte does not have the capacity to pass the 100-yr. flow and the excess spills west between El Pueblo Road and Paseo Del Norte and floods El Pueblo Road and the railroad crossing located between the 42" CMP and the North Diversion Channel.

Solution

Install a 66" RCP from the inlet of the existing 42" CMP under Paseo Del Norte to the Inlet of the proposed 84" RCP at the North Diversion Channel. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 7**.

The advantage of this alternative is that all flow is underground and will not impede surface improvements. The disadvantage is that in current condition, it will not capture remnant surface flows. A surface swale over the pipe be required.

Additional Recommendation - Future Plug of the Existing 42-inch Culvert Under Paseo Del Norte
The existing 42-inch culvert under Paseo Del Norte (the inlet is located between El Pueblo Rd. and the rail road tracks) has very low capacity should be plugged *after proposed improvements P1 and either P2A or P2B are constructed*. This will allow for additional capacity of this culvert as it continues on the north side of the north Paseo Del Norte frontage road. This is based on the recommendation that some existing flows and culvert outfalls from the north Paseo Del Norte frontage road (that now outfall into private property) be re-directed into the 48-inch culvert.

PROPOSED IMPROVEMENT PHASE 3 (P3A)
Concrete Channel from El Pueblo Road At Eastern Most Railroad Track Crossing to Existing 42" CMP under Paseo Del Norte

Problem
There is an existing asphalt channel in the referenced reach and this channel is failing. The erosion in this channel is within 1 foot of the concrete traffic barrier on the east bound lanes of Paseo Del Norte. This barrier and Paseo Del Norte are in need of protection because further erosion will occur at this location.

Solution
P3A – a concrete channel with a 5-foot bottom width, 4 feet deep with 1V:2H side slopes is recommended in this location. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table8**.

The advantage of this solution is that a channel will capture all the pipe and surface flow. The disadvantage is that it will limit future roadway development options.

PROPOSED ALTERNATE IMPROVEMENT PHASE 3 (P3B)
New 66-inch RCP from El Pueblo Road At Eastern Most Railroad Track Crossing to Existing 42" CMP under Paseo Del Norte

Problem
There is an existing asphalt channel in the referenced reach and this channel is failing and the erosion in this channel is within 1 foot of the concrete traffic barrier on the east bound lanes of Paseo Del Norte. This barrier and Paseo Del Norte are in need of protection because further erosion will occur at this location.

Solution
P3B - a 66" RCP could be considered at this location. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 8**.

The advantage of this alternative is that all flow is underground and will not impede surface improvements. The disadvantage is that in current condition, it will not capture remnant surface flows. A surface swale over the pipe be required.

PROPOSED IMPROVEMENT PHASE 4 (P4)
El Pueblo Road At Eastern Most Railroad Track Crossing

Problem
At present there is no outfall for the flow from the basins contributing to this location and consequently El Pueblo Road experiences frequent flooding.

Solution
The recommended solution is to build a concrete headwall and a 66" RCP culvert under El Pueblo Road to convey the flow to the existing road side ditch between El Pueblo Road and Paseo Del Norte. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 9**.

Proposed Improvement Phase 5 (P5) (See Figure 1B)
East Bound Paseo Del Norte near the North Diversion Channel
Problem -
At present there is only 1 median type inlet at this location that outfalls to a 24-inch CMP into the North Diversion Channel. Some flow escapes this inlet and passes west across the North Diversion Channel.

Solution -

The recommended solution is to add one additional inlet about 20 feet east of the existing inlet and join this basin to the existing basin with a 24-inch CMP. This will collect most of the 100-yr. flow. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 10**.

Proposed Improvement Phase 6 (P6) (See Figure 1B)

North Paseo Del Norte Frontage Road at Rail Road Tracks

Problem -

At present there is only 1 curb inlet in the frontage road located just east of the rail road tracks . This inlet and one inlet in west bound Paseo Del Norte and one median type inlet located in the soil north of the roadway all outfall to a 24-inch CMP that outfalls into private property. Note that due to lack of curb at the rail road track crossing that flow in excess of the road flow spills north into private property.

Solution -

The recommended solution is to add two additional inlets about 20 feet east of the existing inlet in the frontage road and join these to the existing basin with a 24-inch CMP. The connection of the 24-inch pipe from the existing basin to the median inlet basin may remain, but then the existing 24-inch CMP from the median inlet basin into private property should be abandoned. A new 24-inch CMP should be installed from the median inlet to join the manhole that is located about 200 feet west of the rail road tracks. This manhole is the junction of the 42-inch CMP under Paseo Del Norte and the 33"R x 49" S CMP that continues west just north of the frontage road. This new 24-inch CMP will eliminate nearly all runoff from draining into private property.

This report recommends plugging the 42-inch CMP on the south side of Paseo Del Norte after proposed improvements P1 and P2 are built. This will allow plenty of capacity in the 33" R x 49" S CMP that continues past the referenced manhole.

Figure 4 illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 11**.

Proposed Improvement Phase 7 (P7) (See Figure 1B)

North Paseo Del Norte Frontage Road at Turn Lane into Private Property

Problem -

At present, approximately 80 percent of the storm runoff in the north bound frontage road at this private driveway (located about 500 feet east of the N. Div. Channel) drains into the private driveway.

Solution -

The recommended solution is to add three additional curb inlets about 20 feet east of the driveway. These inlets could be joined to the existing 33" R x 49" S CMP located just north of the north frontage road. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 12**.

Proposed Improvement Phase 8 (P8) (See Figure 1B)

North Paseo Del Norte Frontage Road just east of N. Diversion Channel

Problem -

At present there is only 1 curb inlet at this location that outfalls to a 24-inch CMP into the North Diversion Channel. Some flow escapes this inlet and passes west across the North Diversion Channel.

Solution -

The recommended solution is to add one additional curb inlet about 20 feet east of the existing inlet. This include could outfall into a 24-inch CMP that would outfall to the existing drainage ditch that is the outfall for the existing 33"R x 49"R CMP. This will collect most of the 100-yr. flow. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 13**.

Proposed Improvement Phase 9 (P9) (See Figure 1B)

West Bound Paseo Del Norte Frontage Road just east of N. Diversion Channel

Problem -

At present there is only 1 median type inlet at this location that outfalls to a 24-inch CMP into the North Diversion Channel. Some flow escapes this inlet and passes west across the North Diversion Channel.

Solution -

The recommended solution is to add one additional inlet about 20 feet east of the existing inlet and join this basin to the existing basin with a 24-inch CMP. This will collect most of the 100-yr. flow. **Figure 4** illustrates the proposed locations and conceptual level plan view. **Table 5** presents a summary description of the existing problem and proposed solution(s), 100-yr. peak discharge and the conceptual level cost estimate. The quantity and cost estimates and hydraulic data and results are included in **Appendix C** and the cost total is summarized in **Table 14**.

SECTION 4

RECOMMENDATIONS

4.1 PROPOSED IMPROVEMENTS COST SUMMARY AND RECOMMENDATIONS

Table 5 presents a summary of the existing drainage problems and proposed drainage improvements and cost estimates based on conceptual design. Please see **Figures 1A and 1B** for a schematic representation of the existing conditions and proposed improvements.

PROPOSED IMPROVEMENTS COST SUMMARY AND RECOMMENDATIONS

Proposed Improvement P1 (84" RCP and overflow channel spillway section)- $192,000
(about $48,000 are improvements within El Pueblo Rd.)
will prevent flooding of El Pueblo Rd. at the North Diversion Channel.

Proposed Improvement P2A (reinforced concrete channel) - $583,000
will prevent flooding of El Pueblo Rd. at the western most railroad crossing.

Proposed Improvement P3A (reinforced concrete channel) -$220,000
will prevent failure of the Paseo Del Norte traffic barrier wall and asphalt.

Proposed Improvement P4 (66" RCP) – $328,000
will eliminate flooding of El Pueblo Rd. near the. eastern most railroad crossing.

Total Cost of Phase 1 through 4 Improvements for El Pueblo Road = $1,323,000

Paseo Del Norte and North Frontage Road Improvements

Proposed Improvement P5 (1 inlet and 24" CMP) – $20,000
will eliminate most 100-yr. flow from crossing the N. Diversion Channel.

Proposed Improvement P6 (2 inlets and 24" CMP) – $85,000
will eliminate most 100-yr. flow from draining into private property near railroad tracks.

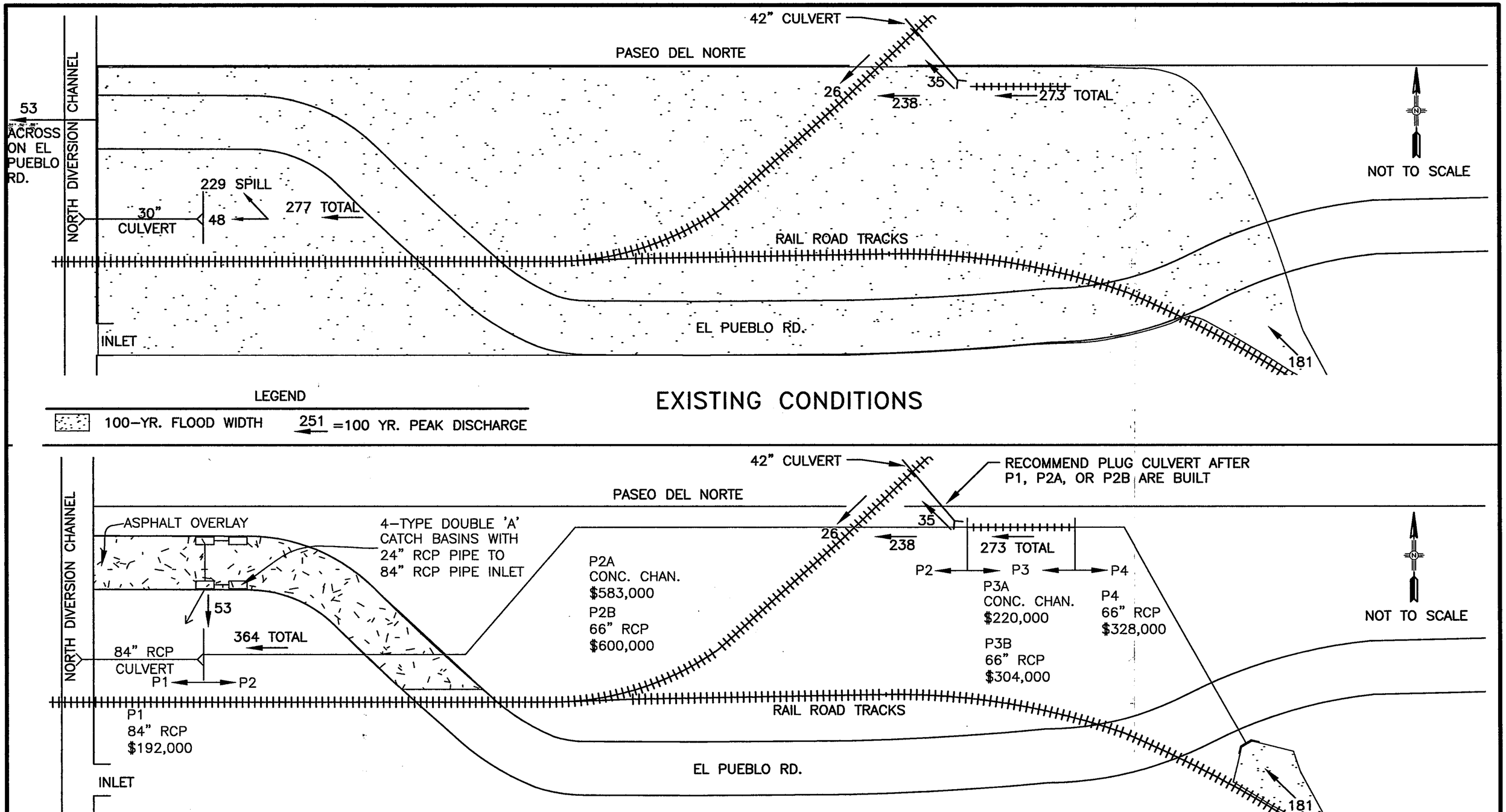
Proposed Improvement P7 (3 inlets and 24" CMP) – $48,000
will eliminate most 100-yr. flow from draining into private property 500 ft. east of N. Div. Channel

Proposed Improvement P8 (1 inlet and 24" CMP) – $17,000
will eliminate most 100-yr. flow from crossing the N. Diversion Channel.

Proposed Improvement P9 (1 inlet and 24" CMP) – $20,000
will eliminate most 100-yr. flow from crossing the N. Diversion Channel.

Total Cost of Phase 5 through 9 Improvements for Paseo Del Norte and North Frontage Road = $190,000

Total Cost of Phase 1 through 9 Improvements = $1,513,000



EXISTING & PROPOSED IMPROVEMENTS SCHEMATIC P1–P4	
EL PUEBLO ROAD DRAINAGE ANALYSIS	
1–2007	FIGURE 1A

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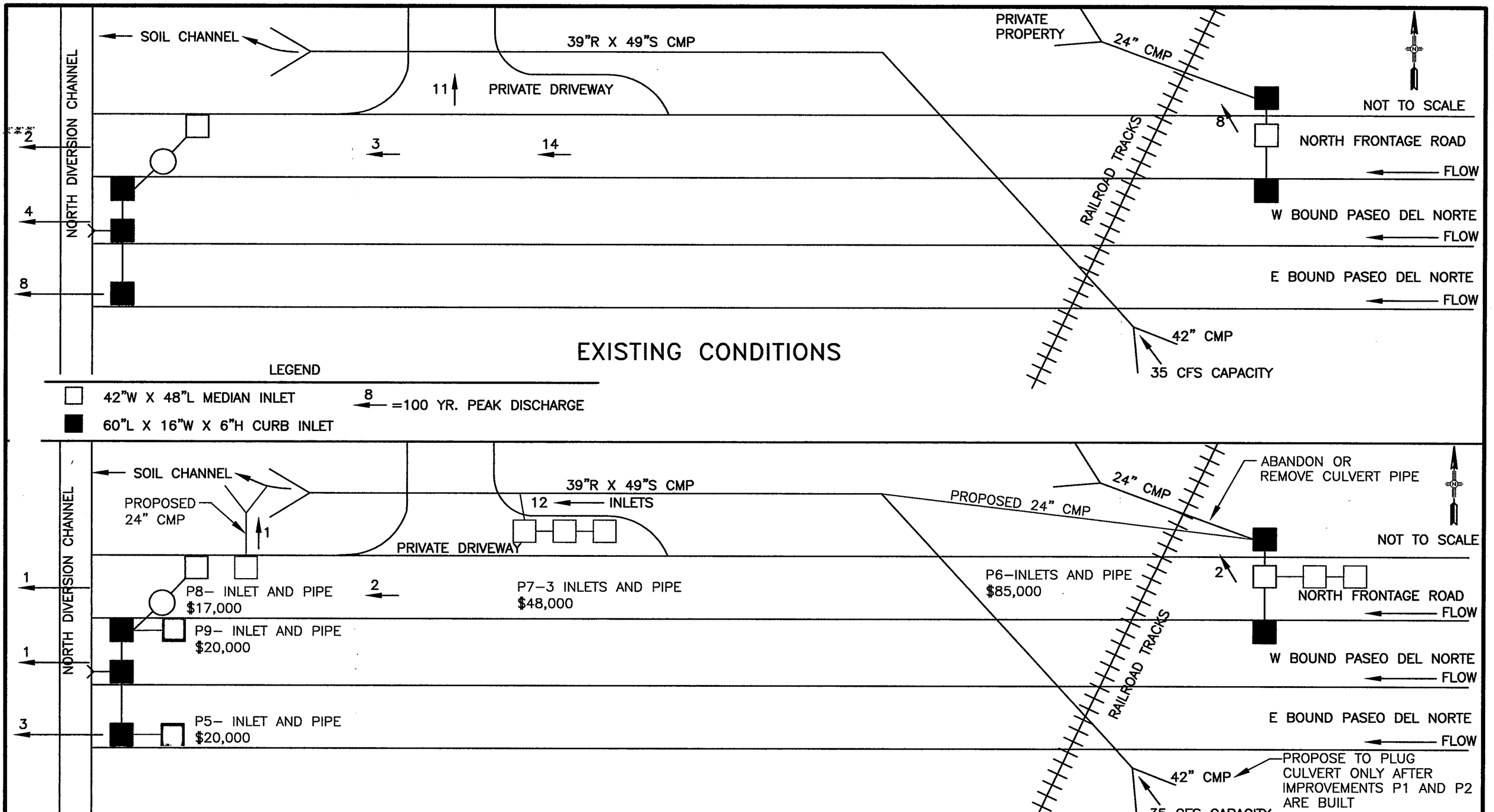
SOIL CHANNEL
39"R X 49"S CMP
PRIVATE PROPERTY
24" CMP
11
PRIVATE DRIVEWAY
NOT TO SCALE
NORTH DIVERSION CHANNEL
2
3
14
8
NORTH FRONTAGE ROAD
FLOW
RAILROAD TRACKS
4
W BOUND PASEO DEL NORTE
FLOW
8
E BOUND PASEO DEL NORTE
FLOW
42" CMP
35 CFS CAPACITY
EXISTING CONDITIONS
LEGEND
42"W X 48"L MEDIAN INLET
60"L X 16"W X 6"H CURB INLET
8 =100 YR. PEAK DISCHARGE
SOIL CHANNEL
PROPOSED 24" CMP
1
39"R X 49"S CMP
12 INLETS
PROPOSED 24" CMP
24" CMP
ABANDON OR REMOVE CULVERT PIPE
NOT TO SCALE
PRIVATE DRIVEWAY
NORTH DIVERSION CHANNEL
1
P8– INLET AND PIPE
$17,000
2
P7–3 INLETS AND PIPE
$48,000
P6–INLETS AND PIPE
$85,000
2
NORTH FRONTAGE ROAD
FLOW
P9– INLET AND PIPE
$20,000
1
RAILROAD TRACKS
W BOUND PASEO DEL NORTE
FLOW
3
P5– INLET AND PIPE
$20,000
E BOUND PASEO DEL NORTE
FLOW
42" CMP
PROPOSE TO PLUG CULVERT ONLY AFTER IMPROVEMENTS P1 AND P2 ARE BUILT
35 CFS CAPACITY
LEGEND
42"W X 48"L MEDIAN INLET AND 24" CMP
60"L X 16"W X 6"H CURB INLET AND 24" CMP
8 =100 YR. PEAK DISCHARGE
PROPOSED IMPROVEMENTS
PHASES – P5, P6, P7, P8 & P9
EXISTING & PROPOSED IMPROVEMENTS SCHEMATIC P5–P9
EL PUEBLO ROAD DRAINAGE ANALYSIS
1–2007
FIGURE 1B
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TABLE 1

RAINFALL DATA
El Pueblo Road Drainage Analysis

Return Period	Rainfall Areal Reduction Factor	1-Hour Rainfall	**1-hour Rainfall with Areal Adjustment**	Rainfall Areal Reduction Factor	6-Hour Rainfall	**6-Hour Rainfall with Areal Adjustment**	Rainfall Areal Reduction Factor	24-Hour Rainfall	**24-Hour Rainfall with Areal Adjustment**
(year)		(inches)	**(inches)**		(inches)	**(inches)**		(inches)	**(inches)**
	(b)	(a)		(b)	(a)		(b)	(a)	
2.00	1.00	0.69	**0.69**	1.00	1.01	**1.01**	1.00	1.24	**1.24**
10.00	1.00	1.11	**1.11**	1.00	1.54	**1.54**	1.00	1.81	**1.81**
50.00	1.00	1.56	**1.56**	1.00	2.11	**2.11**	1.00	2.42	**2.42**
100.00	1.00	1.77	**1.77**	1.00	2.38	**2.38**	1.00	2.69	**2.69**
200.00	1.00	2.00	**2.00**	1.00	2.65	**2.65**	1.00	2.97	**2.97**
500.00	1.00	2.30	**2.30**	1.00	3.03	**3.03**	1.00	3.35	**3.35**

(a) (NOAA Atlas 14 - See Appendix A for printouts from internet
(b) No areal reduction factor applied to very small drainage basin size

TABLE 3

SUMMARY OF DIVIDE HYDROGRAPH VALUES

FOR: EXISTING - STORM DRAIN CAPACITY, STORM DRAIN INLET CAPACITY, CULVERT CAPACITY AND INTERSECTION FLOW DIVIDE ASSUMPTIONS

El Pueblo Road Drainage Analysis.

AHYMO Model Analysis Point	Street or Intersection Divide Assumption	Cuvlert Size	Culvert Capacity	Storm Drain Capacity (non-pressure full pipe flow) (Table A2	Total Inet Capacity (Table A1)	Storm Drain Discharge to Use for Divide Hyd (smaller of pipe capacity or inlet capacity)	**FINAL Divide Hyd Value used in AHYMO Model**
	(%)		(cfs)	(cfs)	(cfs)	(cfs)	(cfs) or (%)
(a)	(a)	(a)	(b)	(c)	(c)	(d)	
4.91		ex.. 21" RCP PNM pond	17				17
1.96		ex. 30" CMP @ N. Div. Chan.	48				48

(a) See AHYMO modeling schematic and Drainage Basin Map
(b) Computed with Cuvlert Master Program - See Appendix for printed output
(c) Computed with Flow Master Program - See Appendix for printed output
(d) Assume the lessor of the combined inlet capacities at an analysis point or the non-pressure full pipe flow capacity

TABLE 4

CONTINUITY VERIFICATION OF AHYMO MODEL OUTPUT

(El Pueblo Road Drainage Analysis)

AHYMO Analysis Point Number	Analysis Point Description	Drainage Area	Runoff Volume	Peak Discharge
		(sq mi)	(ac-ft)	(cfs)
(a)	(a)	(b)	(b)	(b)
35.91	to existing retention pond in basin 35	0.07331	8.702	173
27.96	total in Jefferson St. storm drain that outfalls to Domingo Baca Arroyo	0.15362	18.432	265
18.92	excess flow that will flow W. on W. bound PDN that will pass the N. Div. Channel	0.00022	0.028	4
24.97	total Q in 24" SD that leaves basin at Frontage Rd. just west of RR tracks	0.00420	0.535	18
24.93	assume 50% of Frontage Rd. Q spills out of basin at RR tracks	0.00031	0.040	4
23.91	assum 80% spills from Frontage Rd. to private driveway	0.00127	0.164	11
22.93	assum 75% spills out of Frontage Rd. due to curb opening	0.00008	0.010	1
16.92	excess Q that will flow W. on E. bound PDN across the N. Div. Channel	0.00033	0.042	8
16.94	total Q in PDN SD that oufalls to the N. Div. Channel under PDN median	0.00535	0.691	19
12.91	is the Q that will pass through the 42" SD under PDN at RR tracks	0.06354	6.880	35
1.92	excess El Pueblo Rd. Q that will flow across the N. Div. Channel	0.01361	1.468	53
1.96	total Q to the ex. 30" CMP that outfalls to N. Div. Channel between El Pueblo Rd. and the RR tracks	0.05379	5.280	48
1.97	Q in excess of ex. 30" CMP that outfals to N. Div. Channel - will spill over top of channel	0.06165	6.051	229
4.92	assume flow in excess of 21" RCP capacity from existing PNM pond remains in pond	0.03314	2.385	80
3.97	total Q to N. Div. Chanenl inlet just south of RR tracks	0.05791	3.635	93
	TOTAL AREA	**0.52233**		

NOTE - This is the total area of all analysis points that either represent flow that leaves the basin, or flow that remains within a closed basin. The sum of all basin areas as shown in Table 2 is 0.51373 sq mi.

(0.52233 sq mi - 0.51373 sq mi) (640 ac/sq mi) = 5.5 acres
0.51313 sq mi (640 ac/sq mi) = 329 acres
(5.5 acres / 329 acres) (100) = approx. 1% error

CONCLUSION - The AHYMO model has accounted for all basin area.

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
Total flow at existing 30" CMP that outfalls to N. Div. Chan. between El Pueblo Rd. and railroad tracks	NA	1.98	364 (assumes 42" culvert under PDN is plugged - and collect all flow from El Pueblo Rd.)	**NA** (This is *TOTAL FLOW* at proposed improvement 1 as described below)	NOTE - Existing Conditions Peak Discharge = 277 cfs. Some flow passes through existing 30" CMP culvert to N. Div. Chan. and excess spills over soil top to N. Div. Chan. and El Pueblo Rd.	------
Total Capacity of either the existing 30" CMP at N. Div. Chan. or Proposed 84" RCP replacement pipe	E	1.96 (flow to cuvlert)	48	NA	Existing 30" CMP is very rusted and should be replaced and enlarged to increase capacity	
	P	1.96 (flow to cuvlert)	364	**P1** - Replace rusted 30" CMP at N. Div. Chan. with an 84" RCP	Proposed Improvement 1 - 84" RCP will provide 100-yr. capacity	
Total Capacity of the existing soil overflow section at N. Div. Chan. or reinforced concrete overflow section	E	1.97 (overflow section)	228	NA	Existing soil overflow section at existing 30" CMP N. Div. Chan. and runoff from El Pueblo Rd. east of culvert headwall is causing severe erosion	

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
	P	1.97 (overflow section)	98	**P1** - Replace soil overflow section above proposed 84" RCP at N. Div. Chan. with an emergency overflow section (lined with base course) - also includes reinforced concrete channel lining just east of culvert headwall to provide rundown for El Pueblo Rd. flow to proposed 84" RCP pipe inlet and emergency overflow section	Proposed Improvement 1 - reinforced concrete channel section will eliminate erosion from El Pueblo Rd. flows just east of cuvlert headwall and provide emergency overflow spill capacity above 84" RCP to the N. Div. Chan.	$192,000

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
Flow in El Pueblo Rd. at the east side of the N. Div. Chan. that will pass west past the N. Div. Chan. in El Pueblo Rd.	E	1.92 (excess flow in El Pueblo Rd. that passes west past N. Div. Chan.)	53	NA	Signicant flows pass west across the N. Div. Chan. in El Pueblo Rd.	
	P	1.92 (excess flow in El Pueblo Rd. that passes west past N. Div. Chan.)	53	**P1** - Asphalt is very poor in El Pueblo Rd. from N. Div. Chan. east to rail road tracks and the road has no crown. Therefore, build an asphalt overlay to provide a crowned section (between the N. Div. Chan. and rail road tracks), four catch basins and a short segment of storm drain to collect flows and outfall in front of the proposed 84" cuvlert.	**P1** will provide 100-yr. collection of flows and will prevent flows from spilling west across the N. Div. Chan. in El Pueblo Rd.	

TABLE 3

SUMMARY OF DIVIDE HYDROGRAPH VALUES

FOR: EXISTING - STORM DRAIN CAPACITY, STORM DRAIN INLET CAPACITY, CULVERT CAPACITY AND INTERSECTION FLOW DIVIDE ASSUMPTIONS

El Pueblo Road Drainage Analysis.

AHYMO Model Analysis Point	Street or Intersection Divide Assumption	Cuvlert Size	Culvert Capacity	Storm Drain Capacity (non-pressure full pipe flow) (Table A2	Total Inet Capacity (Table A1)	Storm Drain Discharge to Use for Divide Hyd (smaller of pipe capacity or inlet capacity)	**FINAL Divide Hyd Value used in AHYMO Model**
	(%)		(cfs)	(cfs)	(cfs)	(cfs)	(cfs) or (%)
(a)	(a)	(a)	(b)	(c)	(c)	(d)	
35.91	100						100
30.91				71	58	58	58
31.91				146	37	37	37
32.91				230	40	40	40
28.91				9	9	9	9
27.91				33	10	10	10
26.91				33	34	33	33
28.71	25						25
21.91				17	14	14	14
19.91				13	13	13	13
19.93	50						50
18.91				13	9	9	9
25.91				17	24	17	17
24.91				13	5	5	5
24.93	50						50
23.91	80						80
22.91				13	2	2	2
22.93	75						75
20.91				17	30	17	17
17.91				13	18	13	13
17.93	70						70
16.91				13	8	8	8
15.91	25						25
14.91				16	20	16	16
9.92	100						100
14.81	80						80
7.91				22	6	6	6
6.91				22	22	22	22
12.91		ex. 42" CMP joins with 33" R x 49" S arch pipe @ PDN	35				35
11.91	30						30
11.93	60						60
2.91				26	47	26	26
1.91	80						80

TABLE 14

PROPOSED IMPROVEMENT P9

1 Curb Inlet and Pipe W. Bound Paseo Del Norte Near N. Div. Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	0.0	1,000	0
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	0.0	10	0
6		Excavation and disposal of soil	CY	4.0	10	40
7		42-in. x 48-in. median inlet, materials and installation c.i.p.	EA	1.0	6,000	6,000
8		24" CMP (including installation and trenching < 6')	LF	20.0	200	4,000
9		Asphalt cut (20 ft. length, disposal and repaving)	LS	1.0	2,500	2,500
		subtotal				**15,540**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	1,088	1,088
		SUB TOTAL				**16,628**
		Contingency	%	20.0	3,326	3,326
		TOTAL				**19,953**

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
Total flow in excess of the 42" CMP under PDN (just east of railroad track crossing PDN El Pueblo Rd.) that will spill west between PDN concrete traffic barrier and El Pueblo Rd.	E	12.92	238	NA	flows in excess of 42" CMP capacity under PDN flood railroad tracks and spill into El Pueblo Rd.	------
	P	12.92	238	**P2A** - build a small reinforced concrete trapezoidal shaped channel to convey flow in excess of existing 42"CMP under PDN to Proposed Improvement P4 - 84" RCP at N. Div. Chan. (assume 66" RCP under rr tracks and El Pueblo Rd.)	Proposed Improvement 2A will eliminate the flooding across the railroad tracks and prevent spill into El Pueblo Rd.	$583,000
Total flow in excess of the 42" CMP under PDN (just east of railroad track crossing PDN El Pueblo Rd.) that will spill west between PDN concrete traffic barrier and El Pueblo Rd.	E	12.92	238	NA	Flows in excess of 42" CMP capacity under PDN flood railroad tracks and spill into El Pueblo Rd.	------
	P	12.92	238	**P2B** - Build a 66" RCP storm drain pipe to convey water under railroad tracks and El Pueblo Rd. and outfall in the open channel just east of the N. Div. Chan. (between El Pueblo Rd. and railroad tracks)	Proposed Improvement 2B will eliminate the flooding across the railroad tracks and prevent spill into El Pueblo Rd.	$600,000
Total flow to the existing asphalt channel located east of the 42" CMP under Paseo Del Norte	E	12.99	273	NA	Significant erosion will cause failure of PDN concrete traffic barrier and shoulder asphalt along this existing open channel	------

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
	P	12.99	273	**P3A** - build a small reinforced concrete trapezoidal shaped channel to replace existing asphalt channel that is failing	Proposed Improvement 3A will ensure the PDN concrete traffic barrier and asphalt will remain	$220,000
Total flow to the existing asphalt channel located east of the 42" CMP under Paseo Del Norte	E	12.99	273	NA	Significant erosion will cause failure of PDN concrete traffic barrier and shoulder asphalt along this existing open channel	------
	P	12.99	273	**P3B** - build a 66" RCP storm drain to replace existing asphalt channel that is failing	Proposed Improvement 3B will ensure the PDN concrete traffic barrier and asphalt will remain	$304,180
Total flow that approaches the s. side El Pueblo Rd.at east side of railroad tracks (eastern most railroad crossing of El Pueblo Rd.)	E	8.99	181	NA	Storm water floods over the top of El Pueblo Rd. as no provisions were built to pass flow under road	------
	P	8.99	181	**P4** - build concrete headwall and 60" RCP storm drain pipe under El Pueblo Rd.	Proposed Improvement 4 will eliminate the flooding across El Pueblo Rd. at this location	$328,000
Total flow on E. bound Paseo Del Norte that flows west past N. Div. Channel	E	16.92	8	NA	Some water flows past N. Div. Channel	------
	P	16.92	3	**P5** - build 1 new median type inlet 20 ft. e. of existing median inlet, connect with 24-in. cmp	Proposed Improvement 5 will reduce flow past the N. Div. Channel	$20,000

TABLE 2

SUMMARY OF BASIN HYDROLOGIC DATA
APPLIED WITHIN THE AHYMO_97 MODEL
El Pueblo Road Drainage Analysis

Basin Data (a)				Land Treatment Types (c) Future Development Conditions					Time of Concentration Data *Upland Method (a)																			Time to Peak
										Upper Reach						Middle Reach					Bottom Reach							
Basin No.	Basin Area	Basin Area	Basin Area	A	B	C	D	Total	Length of Longest Water-course	Top Elevation at beginning of water-course	Bottom Elevation	Length (L_1)	Slope	K_1	V_1	Elevation at lower end of water-course	Length (L_2)	Slope	K_2	V_2	Elevation at lower end of water-course	Length (L_3)	Slope	K_3	V_3	Actual T_C	Final T_C	T_P
	(sq ft)	(acres)	(sq mi)	(%)	(%)	(%)	(%)	(%)	(ft)	(ft)	(ft)	(ft)	(ft/ft)		(ft/sec)	(ft)	(ft)	(ft/ft)		(ft/sec)	(ft)	(ft)	(ft/ft)		(ft/sec)	(hours)	(hours)	(hours)
(a)			(a)	(c)	(c)	(c)	(c)							(b)	(e)				(b)	(e)				(b)	(e)	(f)	(g)	(h)
1	60,762	1.39	0.00218			60	40	100	640	5077	5075	400	0.0050	1.0	0.71	5070	240	0.0208	2.0	2.89	0	0	0	0	0.00	0.18	0.20	0.13
2	49,095	1.13	0.00176			5	95	100	520	5083	5078	400	0.0125	1.0	1.12	5077	120	0.0083	2.0	1.83	0	0	0	0	0.00	0.12	0.20	0.13
3	144,847	3.33	0.00520			75	25	100	1,090	5084	5079	400	0.0125	1.0	1.12	5070	690	0.0130	2.0	2.28	0	0	0	0	0.00	0.18	0.20	0.13
4	1,799,955	41.32	0.06456		5	70	25	100	2,570	5108	5098	400	0.0250	1.0	1.58	5081	1600	0.0106	2.0	2.06	5074	570	0.0123	3.0	3.32	0.33	0.33	0.22
5	1,469,397	33.73	0.05271			95	5	100	2,070	5108	5097	400	0.0275	1.0	1.66	5077	1600	0.0125	2.0	2.24	5072	70	0.0714	3.0	8.02	0.27	0.27	0.18
6	237,815	5.46	0.00853			5	95	100	710	5094	5086	400	0.0200	1.0	1.41	5084	310	0.0065	2.0	1.61	0	0	0	0	0.00	0.13	0.20	0.13
7	163,249	3.75	0.00586			5	95	100	780	5100	5094	400	0.0150	1.0	1.22	5091	380	0.0079	2.0	1.78	0	0	0	0	0.00	0.15	0.20	0.13
8	2,203,457	50.58	0.07904			70	30	100	2,800	5138	5128	400	0.0250	1.0	1.58	5101	1600	0.0169	2.0	2.60	5093	800	0.0100	3.0	3.00	0.32	0.32	0.21
9	499,643	11.47	0.01792			20	80	100	2,190	5138	5128	400	0.0250	1.0	1.58	5108	1600	0.0125	2.0	2.24	5107	190	0.0053	3.0	2.18	0.29	0.29	0.20
10	192,268	4.41	0.00690			95	5	100	900	5130	5115	400	0.0375	1.0	1.94	5106	500	0.0180	2.0	2.68	0	0	0	0	0.00	0.11	0.20	0.13
11	14,886	0.34	0.00053				100	100	540	5085	5080	400	0.0125	1.0	1.12	5077	140	0.0214	2.0	2.93	0	0	0	0	0.00	0.11	0.20	0.13
12	35,788	0.82	0.00128			95	5	100	440	5088	5084	400	0.0100	1.0	1.00	5082	40	0.0500	2.0	4.47	0	0	0	0	0.00	0.11	0.20	0.13
13	12,015	0.28	0.00043				100	100	440	5091	5085	400	0.0150	1.0	1.22	5085	40	0.0125	2.0	2.24	0	0	0	0	0.00	0.10	0.20	0.13
14	45,041	1.03	0.00162			10	90	100	1,050	5107	5100	400	0.0175	1.0	1.32	5091	650	0.0138	2.0	2.35	0	0	0	0	0.00	0.16	0.20	0.13
15	26,295	0.60	0.00094				100	100	820	5130	5116	400	0.0350	1.0	1.87	5107	420	0.0214	2.0	2.93	0	0	0	0	0.00	0.10	0.20	0.13
16	50,997	1.17	0.00183				100	100	1,020	5081	5078	400	0.0075	1.0	0.87	5070	620	0.0129	2.0	2.27	0	0	0	0	0.00	0.20	0.20	0.14
17	55,697	1.28	0.00200				100	100	1,090	5098	5090	400	0.0200	1.0	1.41	5081	690	0.0130	2.0	2.28	0	0	0	0	0.00	0.16	0.20	0.13
18	62,866	1.44	0.00226				100	100	1,200	5082	5079	400	0.0075	1.0	0.87	5070	800	0.0113	2.0	2.12	0	0	0	0	0.00	0.23	0.23	0.16
19	53,404	1.23	0.00192				100	100	900	5098	5090	400	0.0200	1.0	1.41	5082	500	0.0080	2.0	1.79	0	0	0	0	0.00	0.16	0.20	0.13
20	91,097	2.09	0.00327				100	100	1,400	5124	5116	400	0.0200	1.0	1.41	5098	1000	0.0180	2.0	2.68	0	0	0	0	0.00	0.18	0.20	0.13
21	83,079	1.91	0.00298				100	100	1,400	5124	5116	400	0.0200	1.0	1.41	5098	1000	0.1800	2.0	8.49	0	0	0	0	0.00	0.11	0.20	0.13
22	12,372	0.28	0.00044				100	100	500	5077	5075	400	0.0063	1.0	0.79	5070	100	0.0090	2.0	1.90	0	0	0	0	0.00	0.16	0.20	0.13
23	22,894	0.53	0.00082				100	100	900	5084	5079	400	0.0125	1.0	1.12	5077	500	0.0065	2.0	1.61	0	0	0	0	0.00	0.19	0.20	0.13
24	18,345	0.42	0.00066				100	100	710	5097	5090	400	0.0175	1.0	1.32	5084	310	0.0059	2.0	1.54	0	0	0	0	0.00	0.14	0.20	0.13
25	325,642	7.48	0.01168			5	95	100	1,410	5122	5116	400	0.0150	1.0	1.22	5098	1010	0.0113	2.0	2.12	0	0	0	0	0.00	0.22	0.22	0.15
26	717,553	16.47	0.02574			10	90	100	2,140	5165	5153	400	0.0300	1.0	1.73	5123	1600	0.0188	2.0	2.74	5122	140	0.0071	3.0	2.54	0.24	0.24	0.16
27	178,838	4.11	0.00641				100	100	2,830	5190	5183	400	0.0175	1.0	1.32	5140	1600	0.0269	2.0	3.28	5124	830	0.0193	3.0	4.17	0.27	0.27	0.18
28	173,827	3.99	0.00624				100	100	2,820	5190	5183	400	0.0175	1.0	1.32	5141	1600	0.0263	2.0	3.24	5124	820	0.0207	3.0	4.32	0.27	0.27	0.18
29	1,155,145	26.52	0.04144		15	35	50	100	2,800	5167	5156	400	0.0275	1.0	1.66	5136	1600	0.0125	2.0	2.24	5130	800	0.0075	3.0	2.60	0.35	0.35	0.23
30	1,046,141	24.02	0.03753		5	25	70	100	1,680	5190	5182	400	0.0200	1.0	1.41	5155	1280	0.0211	2.0	2.90	0	0	0	0	0.00	0.20	0.20	0.13
31	630,630	14.48	0.02262		10		90	100	1,340	5158	5146	400	0.0300	1.0	1.73	5135	940	0.0117	2.0	2.16	0	0	0	0	0.00	0.18	0.20	0.13
32	644,954	14.81	0.02313			10	90	100	2,050	5159	5150	400	0.0225	1.0	1.50	5124	1600	0.0163	2.0	2.55	5123	50	0	0	0.00	0.25	0.25	0.17
33	240,891	5.53	0.00864			10	90	100	530	5200	5199	400	0.0025	1.0	0.50	5198	130	0.0077	2.0	1.75	0	0	0	0	0.00	0.24	0.24	0.16
34	597,669	13.72	0.02144		5	15	80	100	1,450	5221	5214	400	0.0175	1.0	1.32	5199	1050	0.0143	2.0	2.39	0	0	0	0	0.00	0.21	0.21	0.14
35	1,205,301	27.67	0.04323		5	50	45	100	1,930	5194	5180	400	0.0350	1.0	1.87	5156	1530	0.0157	2.0	2.50	0	0	0	0	0.00	0.23	0.23	0.15
Total	14,321,855	328.78	0.51373																									

(a) All measurements were obtained from the Drainage Basin Map
(b) Obtained from Table B-1 in the City of Albuquerque DPM, Chapter 22, pg. 22-22.
(c) See Table A-4 in the City of Albuquerque DPM, Chapter 22, page 22-10.
(e) V= 10*K*s^0.5 DPM formula
(f) Tc= (L1/V1 + L2/V2 + L3/V3)3600 sec/hour DPM formula
(g) Tc= if Tc is computed to be less than 0.2 hours, then use 0.2 hours per DPM
(h) Tp= Tp=(2/3)*Tc per DPM

NOTE ABOUT EXISTING LAND TREATMENTS - Most basins are developd under existing conditions. However, a few basins have the following existing land treatements shown here for comparision to the full development condition assumption for those basins

Basin	A	B	C	D
3			75	25
8			70	30
26			10	90
29		15	35	50
30		5	25	70
32			10	90
35		5	50	45

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
Total flow that spills into private property from N. Paseo Del Norte frontage road at rail road tracks and from 24-inch CMP that outfalls to private property	E	24.92	8	NA	Significant flow enters private property from frontage road	------
	P	24.92	2	**P6** - build 2 new curb inlets 20 ft. e. of existing curb inlet, connect with 24-in. cmp, also redirect ex. 24-in. CMP to join 33"R x 49"S CMP	Proposed Improvement 6 will nearly eliminate flow into private property	$85,000
Total flow that spills into private driveway from N. Paseo Del Norte frontage road (500 ft. e. of N. Div. Chan.)	E	23.99	14	NA	Significant flow enters private property from frontage road	------
	P	23.99	2	**P7** - build 3 new curb inlets 20 ft. e. of ex. private driveway, connect with 24-in. CMP to join 33"R x 49"S CMP	Proposed Improvement 7 will nearly eliminate flow into private property	$48,000
Total flow on N. Paseo Del Norte frontage road that flows west past N. Div. Channel	E	22.92	2	NA	Some water flows past N. Div. Channel	------

TABLE 7

PROPOSED IMPROVEMENT P2A

Reinforced Concrete Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		Reseeding	LS	1.0	2,000	2,000
3		NPDES	LS	1.0	2,000	2,000
4		Grading <2'	SY	2,217.0	8	17,736
5		Excavation and disposal of soil for channels	CY	1830.0	6	10,980
6		Excavation backfill & compaction for channels	CY	1478.0	8	11,824
7		Concrete Channel Lining 8" thick with reinforcement	SF	19,950.0	15	299,250
8		Structural Concrete, Headwall and Railroad Crossing	CY	26.0	600	15,600
9		Bore Under Railroad	LF	20.0	400	8,000
10	a	66" RCP (including installation and trenching < 6')	LF	190.0	400	76,000
11		Sawcut, Remove, Dispose & Replace Asphalt Pavement, 6" thick, includes C&G	SY	62.0	36	2,232
12		Gabion Aprons	CY	25.0	250	6,250
		subtotal				**453,872**
13		Mobilization/Demobilization (assume % of all bid items)	%	7.0	31,771	31,771
		SUB TOTAL				**485,643**
		Contingency	%	20.0	97,129	97,129
		TOTAL				**582,772**

a- assume that a 66" RCP will convey channel flow under railroad tracks and El Pueblo Rd.

PROPOSED IMPROVEMENT P2B

66-in. RCP Storm drain Pipe
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	3,166.0	8	25,328
5		Excavation and disposal of soil	CY	844.0	6	5,064
6		Structural Concrete, Headwall & Railroad Crossing	CY	35.0	600	21,000
7		Bore Under Railroad	LF	20.0	400	8,000
8		66" RCP (including installation and trenching < 6')	LF	940.0	400	376,000
9		Manhole Type C-8' diameter, 0' to 6' deep	EA	2.0	10,000	20,000
10		Gabion Aprons	CY	25.0	250	6,250
		subtotal				**467,642**
11		Mobilization/Demobilization (assume % of all bid items)	%	7.0	32,735	32,735
		SUB TOTAL				**500,377**
		Contingency	%	20.0	100,075	100,075
		TOTAL				**600,452**

TABLE 6

PROPOSED IMPROVEMENT P1

84" RCP at the North Diversion Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading < 2'	SY	410.0	8	3,280
5	a	Section "A" Structural Reinforced Concrete Headwall, Retaining walls and conc. Rundown from El Puebo Rd.	CY	82.0	600	49,200
6	a	Section "B" Concrete Channel Lining 8" thick with reinforcement (this item was removed and replaced with only base course)	SF	0.0	15	0
7		Base course as overflow weir	SY	248.0	10	2,480
8		Structural Concrete Water Quality Weir	CY	12.0	600	7,200
9		84" RCP Class IV (furnish & place in open trench, cip)	LF	58.0	475	27,550
10		Trenching backfill & compaction, over 60" sewer pipe, over 8' to 12' in depth, pipe not incl., compl.	LF	58.0	150	8,700
11		Sawcut, Remove & Dispose Concrete Channel	CY	4.0	100	400
12		Remove & Dispose Concrete Headwall & RxR Ties	LS	1.0	2,000	2,000
13		Remove & Dispose 30" CMP includes trenching	LF	58.0	40	2,320
14	b	Cold milling asphalt cement pavement overlay, 2.5' thickness(includes disposal of millings comp.) From N. Div. Channel to railroad tracks)	SY	1,413.0	5	7,065
15	b	Type Double A catch basin, cip.	EA	4.0	5,000	20,000
16	b	18" RCP Class IV (furnish & place in open trench, cip)	LF	60.0	36	2,160
17	b	Trenching backfill & compaction for 18" RCP, 18-36' sewer pipe up to 8 ft. depth, pipe not incl., compl.	LF	60.0	25	1,500
18	b	24" RCP Class IV (furnish & place in open trench, cip)	LF	50.0	40	2,000
19	b	Trenching backfill & compaction for 24" RCP, 18-36' sewer pipe up to 8 ft. depth, pipe not incl., compl.	LF	50.0	25	1,250
20	b	Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
21	b	Misc. items (striping, concrete cutting and disposal (for new inlets, etc.)	LS	1.0	3,000	3,000
		Sub-Total				**149,105**
22		Mobilization/Demobilization (assume % of all bid items)	%	7.0	10,437	10,437
		Sub-Total				**159,542**
		Contingency and soft costs	%	20.0	31,908	31,908
		TOTAL				**191,451**
	a	See Figure 5 in map pocket for locations of Sections A and B				
	b	**Cost Items for Construction in El Pueblo Rd.**				**39,975**

TABLE 5
SUMMARY OF EXISTING PROBLEMS AND PROPOSED IMPROVEMENTS - 100-YR. PEAK DISCHARGE AND COST SUMMARY
AHYMO_97 Model Output for future full basin development conditions
El Pueblo Rd. Drainage Analysis

Description of Analysis Point Location	E - Existing Conditions Infrastructure or P - Proposed Conditions Infrastructure	Analysis Point Number	Peak Discharge (100-yr. 24-hr.)	**Proposed Improvement Number and Description**	Comment on Existing Problems and Proposed Solutions	Conceptual Level Design Cost Estimate
			(cfs)			($)
(a)		(b)	(c)	(d)		(e)
	P	22.92	1	**P8** - build 1 new curb inlet 20 ft. e. ex. Curb inlet, outfall with 24-in. CMP to ex. Soil channel that is at outfall of 33"R x 49"S CMP	Proposed Improvement 8 will reduce flow past the N. Div. Channel	$17,000
Total flow on W. bound Paseo Del Norte that flows west past N. Div. Channel	E	18.92	4	NA	Some water flows past N. Div. Channel	------
	P	18.92	1	**P9** - build 1 new median type inlet 20 ft. e. of existing median inlet, connect with 24-in. cmp	Proposed Improvement 9 will reduce flow past the N. Div. Channel	$20,000

(a) See Figures 1 and 4 for existing locations and proposed improvemets
(b) See Figure 3 for Analysis Point locations
(c) See Appenix B for AHYMO_97 model output
(d) See Figure 4 for Proposed Improvement locations and Figure 5 for Conceptual Level Design Details of Proposed Improvement 4
(e) See Appendix C for quantity and cost calcs and hydraulic analyses

TABLE 9

PROPOSED IMPROVEMENT P4

66-in. RCP Storm drain Pipe
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	3020.0	8	24,160
5		Excavation and disposal of soil	CY	1324.0	6	7,944
6	a	Remove and Dispose 24" CMP, includes Trenching	LF	200.0	50	10,000
7	a	Remove and Dispose Manhole, all diameters	EA	1.0	600	600
8		66" RCP (including installation and trenching < 6')	LF	230.0	400	92,000
9		Structural Concrete, Headwall	CY	15.0	600	9,000
10		Manhole Type C-8' diameter, 0' to 6' deep	EA	1.0	10,000	10,000
11		Gabion Aprons	CY	182.0	250	45,500
12	b	Purchase of 0.5 acres of ROW	AC	0.5	100,000	50,000
		subtotal				**255,204**
11		Mobilization/Demobilization (assume % of all bid items)	%	7.0	17,864	17,864
		SUB TOTAL				**273,068**
		Contingency	%	20.0	54,614	54,614
		TOTAL				**327,682**

a - Final design may lead to removal of existing 24" CMP and manhole to ex. Asphalt channel.

b - Triangular piece of ground need to build and maintain inlet to proposed culvert

TABLE 10

PROPOSED IMPROVEMENT P5

New Median Type Inlet and Pipe in East Bound Paseo Del Norte at N. Div. Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	0	0
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	3020.0	0	0
6		Excavation and disposal of soil	CY	5.0	10	50
7		42-in. x 48-in. median inlet, materials and installation c.i.p.	EA	1.0	6,000	6,000
8		24" CMP (including installation and trenching < 6')	LF	20.0	200	4,000
9		Asphalt cut (20 ft. length, disposal and repaving)	LS	1.0	2,500	2,500
		subtotal				**15,550**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	1,089	1,089
		SUB TOTAL				**16,639**
		Contingency	%	20.0	3,328	3,328
		TOTAL				**19,966**

TABLE 8

PROPOSED IMPROVEMENT P3A

Reinforced Concrete Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost ($/unit)	Cost ($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	1,100.0	8	8,800
5		Excavation and disposal of soil for channels	CY	0.0	6	0
6		Excavation backfill & compaction for channels	CY	700.0	8	5,600
7		Concrete Channel Lining 8" thick with reinforcement	SF	9,450.0	15	141,750
8	a	Structural Concrete, Headwall	CY	15.0	600	9,000
		subtotal				**171,150**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	11,981	11,981
		SUB TOTAL				**183,131**
		Contingency	%	20.0	36,626	36,626
		TOTAL				**219,757**

a- assume headwall required at beg. & end of channel - assume voume from P1 = 15 cy for 1 headwall

PROPOSED IMPROVEMENT P3B

66-in. RCP Storm drain Pipe
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost ($/unit)	Cost ($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	1,100.0	8	8,800
5		Backfill select material over pipe	CY	1925.0	12	23,100
6		66" RCP (including installation and trenching < 6')	LF	450.0	400	180,000
7	a	Structural Concrete, Headwall	CY	15.0	600	9,000
8		Manhole Type C-8' diameter, 0' to 6' deep	EA	1.0	10,000	10,000
		subtotal				**236,900**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	16,583	16,583
		SUB TOTAL				**253,483**
		Contingency	%	20.0	50,697	50,697
		TOTAL				**304,180**

a- assume headwall required at beg. & end of channel - assume voume from P1 = 15 cy for 1 headwall

TABLE 11

PROPOSED IMPROVEMENT P6

2 Curb Inlets and Pipe N. Paseo Del Norte Frontage Road at Railroad Tracks
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	1,000	1,000
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	30.0	10	300
6		Excavation and disposal of soil	CY	10.0	10	100
7		Curb Inlet - 60 in. L, 16 in. W x 6" H (c.i.p.)	EA	2.0	6,000	12,000
8		24" CMP (including installation and trenching < 6')	LF	230.0	200	46,000
9		Asphalt cut (40 ft. length, disposal and repaving)	LS	1.0	3,500	3,500
		subtotal				**65,900**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	4,613	4,613
		SUB TOTAL				**70,513**
		Contingency	%	20.0	14,103	14,103
		TOTAL				**84,616**

TABLE 12

PROPOSED IMPROVEMENT P7

3 Curb Inlets and Pipe N. Paseo Del Norte Frontage Private Turn Lane
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	1,000	1,000
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	0.0	10	0
6		Excavation and disposal of soil	CY	7.0	10	70
7		Curb Inlet - 60 in. L, 16 in. W x 6" H (c.i.p.)	EA	3.0	6,000	18,000
8		24" CMP (including installation and trenching < 6')	LF	60.0	200	12,000
9		Asphalt cut (40 ft. length, disposal and repaving)	LS	1.0	3,500	3,500
		subtotal				**37,570**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	2,630	2,630
		SUB TOTAL				**40,200**
		Contingency	%	20.0	8,040	8,040
		TOTAL				**48,240**

TABLE 13

PROPOSED IMPROVEMENT P8

1 Curb Inlets and Pipe N. Paseo Del Norte Frontage Rd. Near N. Div. Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	0.0	1,000	0
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	0.0	10	0
6		Excavation and disposal of soil	CY	4.0	10	40
7		Curb Inlet - 60 in. L, 16 in. W x 6" H (c.i.p.)	EA	1.0	6,000	6,000
8		24" CMP (including installation and trenching < 6')	LF	20.0	200	4,000
9		Asphalt cut (40 ft. length, disposal and repaving)	LS	1.0	400	400
		subtotal				**13,440**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	941	941
		SUB TOTAL				**14,381**
		Contingency	%	20.0	2,876	2,876
		TOTAL				**17,257**

APPENDIX A

APPENDIX A

Rainfall Data and
Hydraulic Data and Results
for
Existing Inlets, Storm Drains and Culverts -

Flow Master and Culvert Master Model Output

RAINFALL DATA

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Mexico 35.17166 N 106.59219 W 5144 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: Tue Nov 7 2006

Confidence Limits | Seasonality | Location Maps | Other Info | GIS data | Maps | Help | Docs | U.S. Map

LOCATION

AL BUQUERQUE:

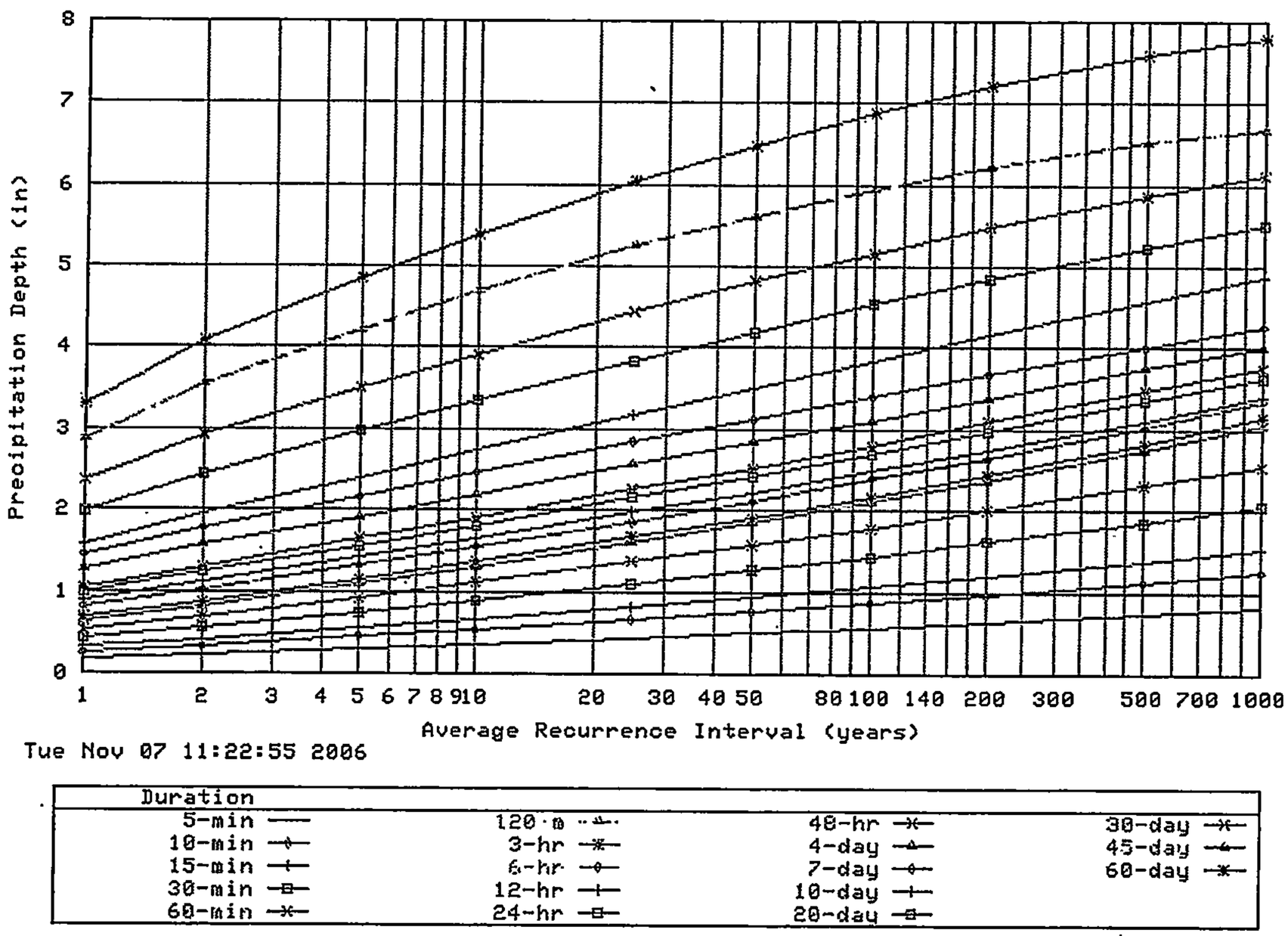
JUST SOUTH OF PASEO DEL NORTE AND JUST WEST OF JEFFERSON ST.

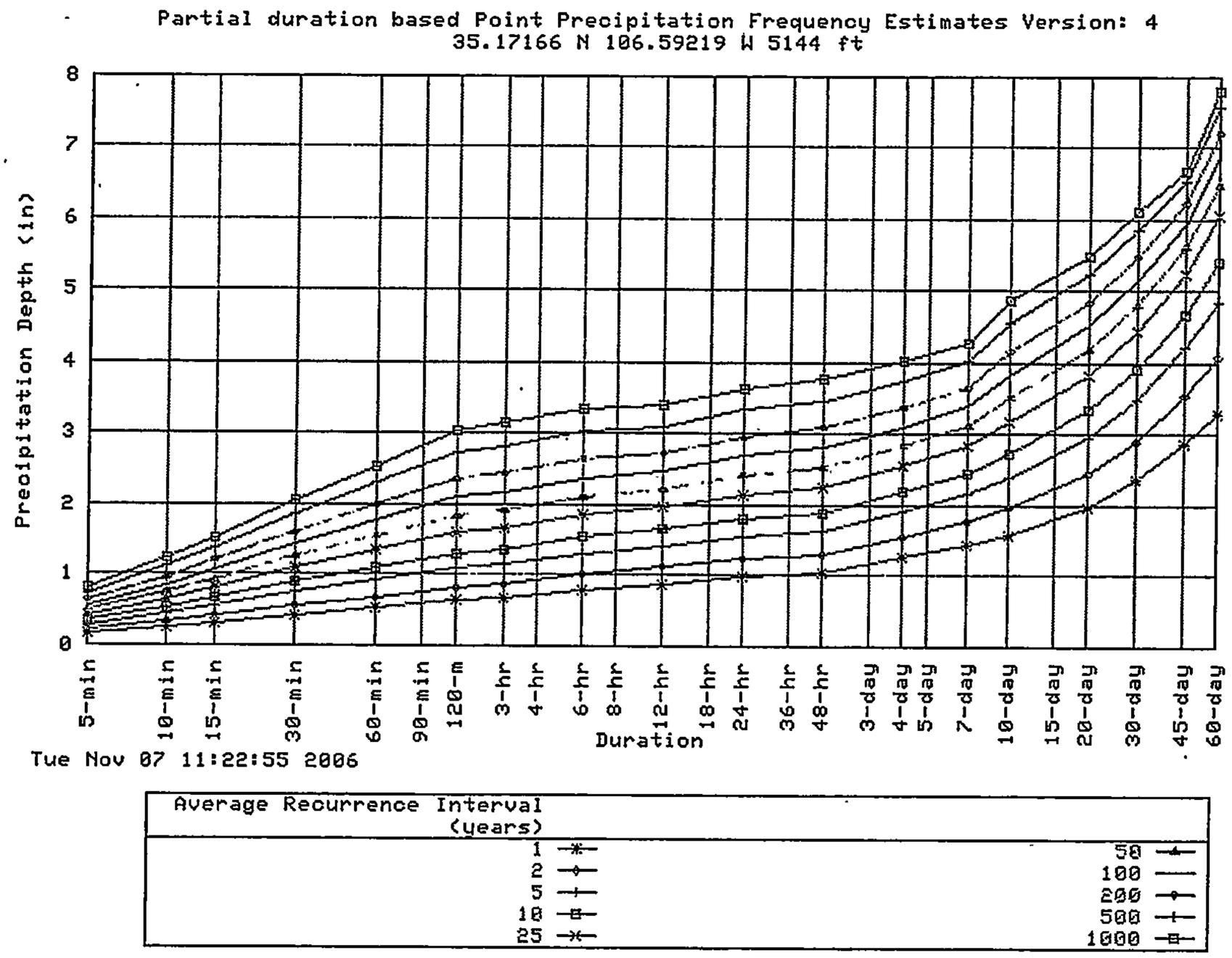
Precipitation Frequency Estimates (inches)

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	0.17	0.26	0.32	0.43	0.53	0.64	0.69	0.80	0.88	0.99	1.04	1.26	1.44	1.59	1.98	2.35	2.87	3.31
2	0.22	0.33	0.41	0.56	0.69	0.82	0.87	1.01	1.12	1.24	1.30	1.56	1.78	1.97	2.45	2.91	3.55	4.08
5	0.29	0.45	0.56	0.75	0.93	1.09	1.15	1.31	1.42	1.56	1.64	1.91	2.16	2.40	2.97	3.49	4.22	4.85
10	0.35	0.54	0.67	0.90	1.11	1.30	1.36	1.54	1.65	1.81	1.90	2.19	2.46	2.74	3.35	3.92	4.69	5.40
25	0.43	0.66	0.82	1.10	1.36	1.60	1.66	1.86	1.97	2.15	2.25	2.55	2.84	3.18	3.85	4.45	5.25	6.05
50	0.50	0.76	0.94	1.26	1.56	1.84	1.91	2.11	2.22	2.42	2.52	2.83	3.13	3.51	4.20	4.82	5.62	6.48
100	0.56	0.86	1.06	1.43	1.77	2.10	2.17	2.38	2.48	2.69	2.80	3.11	3.41	3.84	4.54	5.16	5.96	6.88
200	0.64	0.97	1.20	1.61	2.00	2.37	2.45	2.65	2.75	2.97	3.09	3.39	3.68	4.16	4.85	5.48	6.23	7.21
500	0.73	1.11	1.38	1.86	2.30	2.75	2.83	3.03	3.11	3.35	3.47	3.75	4.02	4.57	5.24	5.86	6.53	7.58
1000	0.81	1.23	1.53	2.06	2.54	3.05	3.15	3.34	3.41	3.64	3.77	4.02	4.27	4.87	5.51	6.11	6.69	7.79

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.





Confidence Limits -

*** Upper bound of the 90% confidence interval 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	0.20	0.30	0.38	0.51	0.63	0.79	0.84	0.98	1.04	1.16	1.19	1.38	1.56	1.72	2.15	2.54	3.10	3.57
2	0.26	0.39	0.49	0.66	0.81	1.02	1.07	1.24	1.31	1.44	1.50	1.70	1.93	2.13	2.66	3.14	3.83	4.41
5	0.35	0.53	0.66	0.89	1.10	1.34	1.40	1.59	1.67	1.81	1.88	2.08	2.34	2.59	3.21	3.76	4.53	5.22
10	0.42	0.63	0.79	1.06	1.31	1.60	1.66	1.86	1.94	2.10	2.17	2.38	2.65	2.95	3.63	4.21	5.03	5.80
25	0.51	0.78	0.97	1.30	1.61	1.96	2.03	2.25	2.31	2.50	2.58	2.77	3.06	3.42	4.16	4.77	5.63	6.49
50	0.59	0.89	1.11	1.49	1.85	2.26	2.32	2.55	2.60	2.80	2.89	3.08	3.37	3.78	4.53	5.16	6.02	6.96
100	0.67	1.01	1.26	1.69	2.09	2.56	2.63	2.87	2.91	3.11	3.21	3.38	3.67	4.13	4.89	5.53	6.37	7.38
200	0.75	1.14	1.41	1.90	2.36	2.88	2.97	3.19	3.22	3.43	3.54	3.67	3.96	4.48	5.23	5.87	6.66	7.74
500	0.86	1.31	1.63	2.19	2.72	3.35	3.43	3.65	3.65	3.87	3.98	4.07	4.33	4.93	5.65	6.28	6.96	8.13
1000	0.95	1.45	1.80	2.42	3.00	3.72	3.82	4.03	4.07	4.22	4.33	4.37	4.60	5.26	5.94	6.55	7.12	8.35

* The 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.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

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

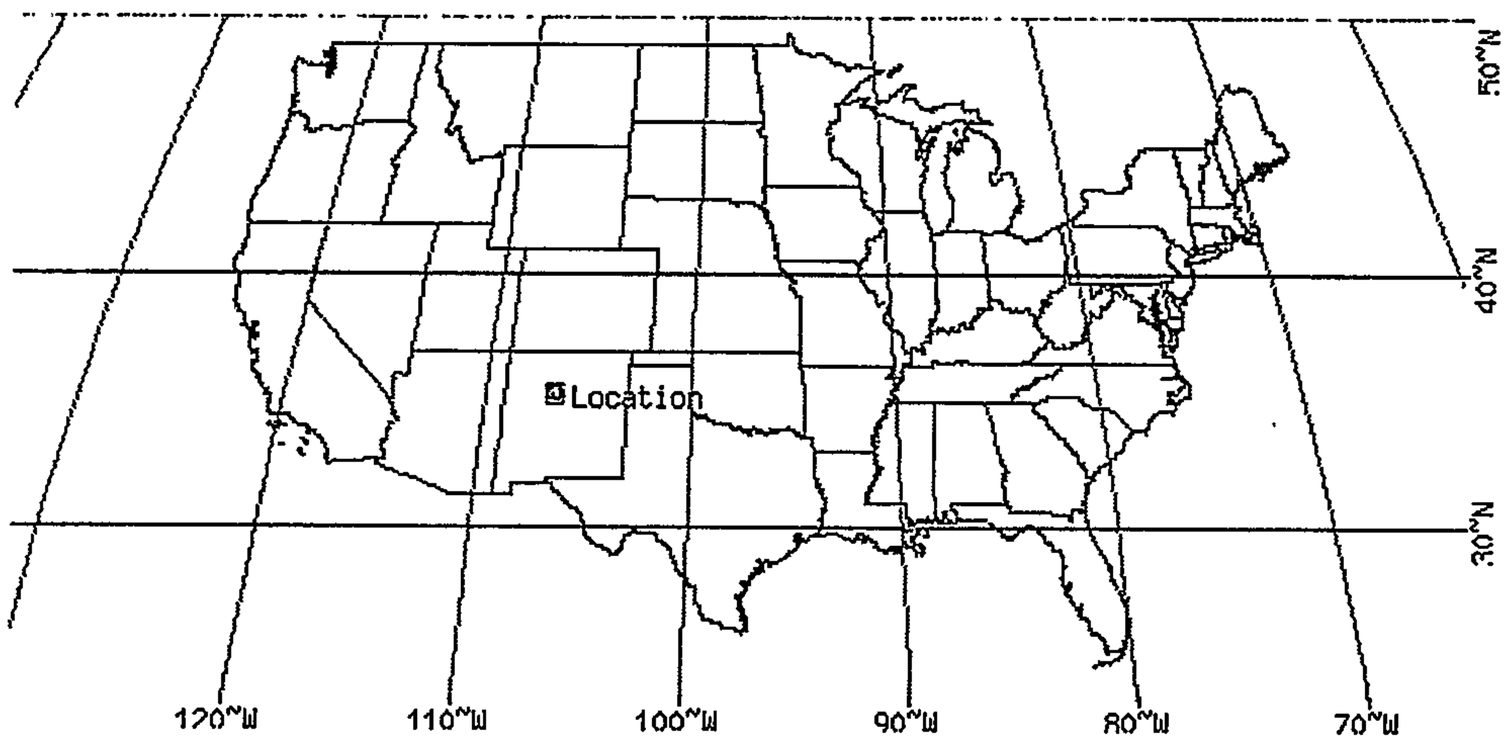
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.22	0.27	0.36	0.45	0.53	0.57	0.68	0.76	0.86	0.90	1.16	1.32	1.46	1.82	2.17	2.66	3.06
2	0.18	0.28	0.35	0.47	0.58	0.68	0.72	0.85	0.95	1.08	1.14	1.43	1.64	1.81	2.26	2.68	3.29	3.79
5	0.25	0.38	0.47	0.63	0.78	0.90	0.95	1.10	1.21	1.35	1.42	1.75	2.00	2.21	2.74	3.22	3.91	4.51
10	0.30	0.45	0.56	0.75	0.93	1.07	1.13	1.29	1.41	1.57	1.65	2.00	2.27	2.53	3.10	3.62	4.34	5.01
25	0.36	0.55	0.68	0.92	1.14	1.31	1.37	1.55	1.67	1.85	1.94	2.33	2.62	2.93	3.55	4.10	4.87	5.62

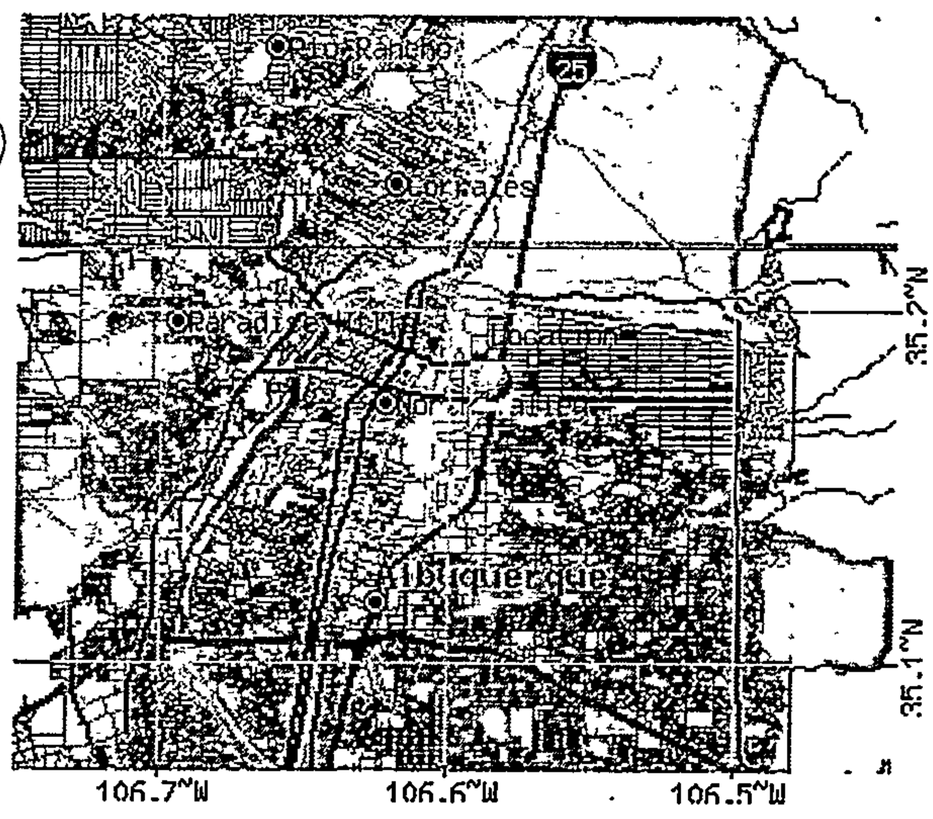
50	0.41	0.63	0.78	1.05	1.30	1.50	1.56	1.75	1.87	2.07	2.17	2.59	2.88	3.23	3.87	4.44	5.22	6.03
100	0.47	0.71	0.88	1.18	1.46	1.69	1.76	1.96	2.08	2.30	2.40	2.83	3.13	3.53	4.17	4.76	5.54	6.40
200	0.52	0.79	0.98	1.32	1.64	1.90	1.97	2.17	2.29	2.52	2.63	3.07	3.38	3.82	4.46	5.05	5.80	6.73
500	0.59	0.91	1.12	1.51	1.87	2.18	2.26	2.46	2.56	2.82	2.94	3.39	3.69	4.18	4.81	5.39	6.09	7.09
1000	0.65	0.99	1.23	1.66	2.06	2.40	2.49	2.69	2.79	3.05	3.17	3.62	3.91	4.44	5.06	5.62	6.27	7.31

* 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 the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Maps -





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.

LEGEND

- State
- County
- Indian Resv
- Lake/Pond/Ocean
- Street
- Expressway
- Highway
- Connector
- Stream
- Military Area
- National Park
- Other Park
- City
- County

Scale 1:228583 (0 2 4 6 8 mi; 0 2 4 6 8 10 km)
*average—true scale depends on monitor resolution

Other Maps/Photographs -

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

Watershed/Stream Flow Information -

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

Climate Data Sources -

Precipitation 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 our documentation.

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

+/-30 minutes ...OR... +/-1 degree of this location (35.17166/-106.59219). Digital ASCII data can be obtained directly from NCDC.

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

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

EXISTING STORM DRAIN INLET CAPACITY SUMMARY

AND

FLOW MASTER OUTPUT

Worksheet for AP 30.91- 3 type B inlets on head. rd. at jefferson

Project Description

Solve For	Efficiency

Input Data

Discharge	15.00	ft³/s	TOTAL Q100 YR
Slope	0.01429	ft/ft	
Gutter Width	5.00	ft	BASIN 30 = 90 CFS
Gutter Cross Slope	0.02	ft/ft	
Road Cross Slope	0.02	ft/ft	APPROX. ½ TO
Roughness Coefficient	0.013		
Local Depression	2.75	in	HEADLINE RD. = 45 CFS
Local Depression Width	3.00	ft	
Grate Width	5.00	ft	ASSUME 45 CFS / 3 INLETS
Grate Length	3.00	ft	
Grate Type	P-50 mm (P-1-7/8")		
Clogging	15.00	%	= 15 CFS TO EACH INLET
Curb Opening Length	3.00	ft	

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	63.48	%	
Intercepted Flow	9.52	ft³/s	ASSUME 10 CFS PER INLET
Bypass Flow	5.48	ft³/s	
Spread	17.22	ft	
Depth	0.34	ft	
Flow Area	2.96	ft²	
Gutter Depression	0.00	ft	
Total Depression	0.23	ft	
Velocity	5.06	ft/s	
Splash Over Velocity	9.20	ft/s	
Frontal Flow Factor	1.00		
Side Flow Factor	0.06		
Grate Flow Ratio	0.60		
Equivalent Cross Slope	0.06579	ft/ft	
Active Grate Length	2.55	ft	
Length Factor	0.01		
Total Interception Length	36.25	ft	

Worksheet for AP 30.91 - 2 type B inlets on jeff. at head rd.

Project Description

Solve For	Efficiency

Input Data

Discharge	23.00	ft³/s	100-YR TOTAL Q BASIN 30
Slope	0.02500	ft/ft	
Gutter Width	5.00	ft	=90 CFS
Gutter Cross Slope	0.02	ft/ft	
Road Cross Slope	0.02	ft/ft	APPROX. ½ TO
Roughness Coefficient	0.013		JEFFERSON = 45 CFS
Local Depression	2.75	in	
Local Depression Width	3.00	ft	ASSUME 45CFS / 2 INLETS
Grate Width	5.00	ft	
Grate Length	3.00	ft	= 23 CFS TO EACH INLET
Grate Type	P-50 mm (P-1-7/8")		
Clogging	15.00	%	
Curb Opening Length	3.00	ft	

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	59.86	%	
Intercepted Flow	13.77	ft³/s	14 CFS PER INLET
Bypass Flow	9.23	ft³/s	
Spread	18.20	ft	
Depth	0.36	ft	
Flow Area	3.31	ft²	
Gutter Depression	0.00	ft	
Total Depression	0.23	ft	
Velocity	6.94	ft/s	
Splash Over Velocity	9.20	ft/s	
Frontal Flow Factor	1.00		
Side Flow Factor	0.03		
Grate Flow Ratio	0.58		
Equivalent Cross Slope	0.06395	ft/ft	
Active Grate Length	2.55	ft	
Length Factor	0.01		
Total Interception Length	52.19	ft	

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 7.91	3 inlets in Lorraine Ct.	40" L x 24" W x 6" H	3	5094	5092	135	0.01481	7.00	15, 15/3 inlets =5/inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	3.33	47	2	6		7.91
																						TOTAL	**6**	**7.91**
AP 6.91	1 inlet south of El Pueblo in sump	17" diameter grate in sump	1	5088	5086	200	0.01000	6.00	22, 22*(0.3) = 7/inlet	-----	-----	------	-----	0.01	1.5	1.5	1.5	25	-----	-----	7	7		6.91
AP 6.91	1 inlet further south of El Pueblo in sump	10' curb opening 39" L x 25" W x 6" H in sump	1	5084	5082	80	0.02500	6.00	22, 22*(0.7) = 15/inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	10	----	15	15		6.91
																						TOTAL	**22**	**6.91**
AP 2.91	2 inlets in of El Pueblo Rd	52" L x 16" W x 6" H	2	5078	5076	205	0.00976	2.99	271, 271/3 inlets =90/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	4.33	15	4.33	18	16	32		2.91
AP 2.91	1 sump north of El Pueblo	42"W x 48"L Median Inlet	1	-	-	-	-	2.99	271, 271/3 inlets =90/inlet	-----	-----	------	-----	0.01	3.5	3.5	4	25	-----	-----	15	15		2.91
																						TOTAL	**47**	**2.91**

(a) See Figure 1 for Drainage Basin Map and Figure 2 for Analysis Point Locations and Inlet locations. See AHYMO modeling schematic Figure 3 for DIVIDE HYD locations,
(b) All inlet locations, types and dimensions determined by field measurements
(c) Elevation and length data to compute slope approaching inlet determined from Drainage Basin Map contours
(d) See AHYMO_97 model summary table for peak discharge results.
(e) Computed with the Flow Master Program - see Appendix for output with results

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 20.91	2 inlets on eastbound Paseo	42"W x 48"L Median Inlet	2	5098	5096	50	0.04000	20.99	61, 61/3 inlets =20/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	51	10	20		20.91
AP 20.91	1 inlet on eastbound Paseo	42"W x 48"L Median Inlet	1	5094	5092	100	0.02000	20.99	61, 61/3 inlets =20/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	51	10	10		20.91
																						TOTAL	**30**	**20.91**
AP 17.91	1 inlet on eastbound Paseo	42"W x 48"L Median Inlet	1	5084	5082	140	0.01429	17.99	49, 49/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	37	18	18		
																						TOTAL	**18**	**17.91**
AP 16.91	1 inlet on eastbound PDN near N. Div. Chan.	42"W x 48"L Median Inlet	1	5076	5074	170	0.01176	16.99	16, 16/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	53	8	8		16.91
																						TOTAL	**8**	**16.91**
AP 14.91	1 sump on El Pueblo Rd. south of Paseo	42"W x 48"L Median Inlet	1	-	-	-	-	14.98	37, 37/3 inlets =12/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	25	-----	-----	12	12		14.91
AP 14.91	1 inlet on El Pueblo, south of Paseo	60" L x 16" W x 6" H Curb Inlet	1	5098	5096	85	0.02353	14.98	37, 37/3 inlets =12/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	37	4	4		14.91
AP 14.91	1 inlet on El Pueblo, south of Paseo, NE of rail tracks	60" L x 16" W x 6" H Curb Inlet	1	5094	5092	90	0.02222	14.98	37, 37/3 inlets =12/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	37	4	4		14.91
																						TOTAL	**20**	**14.91**

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 27.91	1 inlet on westbound Paseo across from Headline Rd.	42"W x 48"L Median Inlet	1	5154	5152	40	0.05000	27.00	15, 15/2 inlets = 7.5/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	68	5	5		27.91
AP 27.91	1 inlet on westbound Paseo and Jefferson	42"W x 48"L Median Inlet	1	5128	5126	75	0.02667	27.00	15, 15/2 inlets = 7.5 per inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	65	5	5		27.91
																						TOTAL	**10**	**27.91**
AP 26.91	1 inlet on the road north off westbound Paseo	60" L x 16" W x 6" H Curb Inlet	1	5146	5144	110	0.01818	26.00	58, 58/5 inlets = 11/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	38	4	4		26.91
AP 26.91	1 inlet on the road north off westbound Paseo	60" L x 16" W x 6" H Curb Inlet	1	5138	5136	70	0.02857	26.00	58, 58/5 inlets = 11/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	4	4		26.91
AP 26.91	1 inlet on the road north off westbound Paseo	60" L x 16" W x 6" H Curb Inlet	1	5132	5130	30	0.06667	26.00	58, 58/5 inlets = 11 per inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	4	4		26.91
AP 26.91	2 sumps north of Paseo on east and west sides of Jefferson	60" L x 16" W x 6" H Curb Inlet in sump	2	-	-	-	-	26.00	58, 58/5 inlets = 11/ inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	25	5	-----	11	22		26.91
																						TOTAL	**34**	**26.91**
AP 21.91	1 inlet on westbound Paseo	42"W x 48"L Median Inlet	1	5098	5096	45	0.04444	21.98	37, 37/ inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	39	14	14		21.91
																						TOTAL	**14**	**21.91**

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 7.91	3 inlets in Lorraine Ct.	40" L x 24" W x 6" H	3	5094	5092	135	0.01481	7.00	15, 15/3 inlets =5/inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	3.33	47	2	6		7.91
																						TOTAL	**6**	**7.91**
AP 6.91	1 inlet south of El Pueblo in sump	17" diameter grate in sump	1	5088	5086	200	0.01000	6.00	22, 22*(0.3) = 7/inlet	-----	-----	------	-----	0.01	1.5	1.5	1.5	25	-----	-----	7	7		6.91
AP 6.91	1 inlet further south of El Pueblo in sump	10' curb opening 39" L x 25" W x 6" H in sump	1	5084	5082	80	0.02500	6.00	22, 22*(0.7) = 15/inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	10	----	15	15		6.91
																						TOTAL	**22**	**6.91**
AP 2.91	2 inlets in of El Pueblo Rd	52" L x 16" W x 6" H	2	5078	5076	205	0.00976	2.99	271, 271/3 inlets =90/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	4.33	15	4.33	18	16	32		2.91
AP 2.91	1 sump north of El Pueblo	42"W x 48"L Median Inlet	1	-	-	-	-	2.99	271, 271/3 inlets =90/inlet	-----	-----	------	-----	0.01	3.5	3.5	4	25	-----	-----	15	15		2.91
																						TOTAL	**47**	**2.91**

(a) See Figure 1 for Drainage Basin Map and Figure 2 for Analysis Point Locations and Inlet locations. See AHYMO modeling schematic Figure 3 for DIVIDE HYD locations,
(b) All inlet locations, types and dimensions determined by field measurements
(c) Elevation and length data to compute slope approaching inlet determined from Drainage Basin Map contours
(d) See AHYMO_97 model summary table for peak discharge results.
(e) Computed with the Flow Master Program - see Appendix for output with results

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 32.91	2 sumps south of Paseo Del Norte, west of Headline Rd.	40" L x 24" W x 6" H	2	-	-	-	-	32.00	51, 57*(.25)=13, 13/7 sump inlets = 2/inlet	----	----	----	----	0.01	2	2	3.33	15	3.33	----	2	4		32.91
AP 32.91	3 inlets on Paeo and Jefferson, East off Jefferson	Type B curb inlet 35"L x 60"W x 6"H	3	5126	5124	115	0.01739	32.00	51, 57*(.75)=38, 38/5 remain. inlets = 8/ inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	59	5	15		32.91
AP 32.91	1 inlet on Jefferson at El Pueblo Rd, E side on Jefferson	Type B curb inlet 35"L x 60"W x 6"H	1	5130	5128	80	0.02500	32.00	51, 57*(.75)=38, 38/5 remain. inlets = 8/ inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	59	5	5		32.91
AP 32.91	1 inlet on Paseo and Jefferson, SW corner	10' L x 16" W x 6" H	1	5126	5124	145	0.01379	32.00	51, 57*(.75)=38, 38/5 remain. inlets = 8 per inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	10	15	10	72	6	6		32.91
																						TOTAL	**40**	**32.91**
AP 28.91	1 inlet on eastbound Paseo and Headline Rd	42"W x 48"L Median Inlet	1	5156	5154	110	0.01818	28.00	14, 14/3 inlets = 4/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	----	74	3	3		28.91
AP 28.91	1 inlet on eastbound Paseo	42"W x 48"L Median Inlet	1	5136	5134	140	0.01429	28.00	14, 14/3 inlets = 4/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	74	3	3		28.91
AP 28.91	1 inlet on eastbound Paseo and Jefferson	42"W x 48"L Median Inlet	1	5128	5126	100	0.02000	28.00	14, 14/3 inlets = 4/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	74	3	3		28.91
																						TOTAL	**9**	**28.91**

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 30.91	3 inlets on Headline Rd. at Jefferson	Type B curb inlet 35"L x 60"W x 6"T	3	5156	5154	140	0.01429	30.00	90, 90/2=45 45/3=15 /inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	63	10	30		30.91
AP 30.91	2 inlets on Jefferson at Headline Rd.	Type B curb inlet 35"L x 60"W x 6"H	2	5156	5154	80	0.02500	30.00	90, 90/2=45 45/2=23/inlet	5	0.02	0.02	0.013	2.75	3	5	3	15	3	60	14	28		30.91
																						TOTAL	**58**	**30.91**
AP 31.91	2 inlets on Lang Ave. N-S	40" L x 24" W x 6" H grate with another 40" curb opening 6" high	2	5140	5138	180	0.01111	31.00	57, 57/7 inlets at AP 31.91= 8/ inlet	2	0.02	0.02	0.013	2.75	2	2	3.33	15	6.66	57	3	6		31.91
AP 31.91	2 inlets on Lang Ave. N-S	80" L x 24" W x 6" H	2	5138	5136	160	0.01250	31.00	57, 57/7 inlets at AP 31.91= 8/inlet	2	0.02	0.02	0.013	2.75	2	2	6.66	15	6.66	61	5	10		31.91
AP 31.91	1 inlet on Lang Ave. NW corner	80" L x 24" W x 6" H	1	5136	5134	100	0.02000	31.00	57, 57/7 inlets at AP 31.91= 8/inlet	2	0.02	0.02	0.013	2.75	2	2	6.66	15	6.66	58	5	5		31.91
AP 31.91	2 sumps on the south side of Lang Ave.	Type D median inlet 80" x 24" (no curb)	2	-	-	-	-	31.91	57, 57/7 inlets at AP 31.91= 8/ inlet	------	------	------	------	0.01	2	2	6.66	25	------	------	8	16		31.91
																						TOTAL	**37**	**31.91**
AP 32.91	5 sumps south of Paseo Del Norte and west of Headline Rd.	24" W x 40" L Median Inlet	5	-	-	-	-	32.00	51, 57*(.25)=13, 13/7 sump inlets = 2/inlet	----	----	----	----	0.01	2	2	3.33	25	----	----	2	10		32.91

TABLE A1
STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of Street or Location of Inlets	Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	DIVIDE HYD Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No. to Divide for Inlet Capacity
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 19.91	1 inlet on westbound Paseo	42"W x 48"L Median Inlet	1	5086	5084	90	0.02222	19.99	28, 28/ inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	45	13	13		19.91
																						TOTAL	**13**	**19.91**
AP 18.91	2 inlets on westbound PDN near N. Div. Chan.	42"W x 48"L Median Inlet	2	5076	5074	165	0.01212	18.99	13, 13/2 inlets =6.5/inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	66	4	8		18.91
																						TOTAL	**8**	**18.91**
AP 25.91	1 sump north of Paseo / frontage Rd.	42"W x 48"L Median Inlet	1	-	-	-	-	25.00	29, 29*(0.7) to this inlet =20	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	-----	20	20		25.91
AP 25.91	1 inlet in frontage Rd. north of PDN	60" L x 16" W x 6" H Curb Inlet	1	5098	5096	75	0.02667	25.00	29, 29*(0.3) to this inlet =9	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	40	4	4		25.91
																						TOTAL	**24**	**25.91**
AP 24.91	1 inlet north of Paseo / frontage Rd.	60" L x 16" W x 6" H Curb Inlet	1	5084	5083.6	20	0.02000	24.99	13, 13/ inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	25	5	37	5	5		24.91
																						TOTAL	**5**	**24.91**
AP 22.91	1 inlet in Frontage Rd. near N. Div. Chan.	60" L x 16" W x 6" H Curb Inlet	1	5076	5074	85	0.02353	22.97	4, 4/ inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	25	5	52	2	2		22.91
																						TOTAL	**2**	**22.91**

Worksheet for AP 31.91 - 2 inlets on lang at jeff.

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s	TOTAL 100-YR
Slope	0.01111	ft/ft	Qp BASIN 31 = 57 CFS
Gutter Width	2.00	ft	
Gutter Cross Slope	0.02	ft/ft	
Road Cross Slope	0.02	ft/ft	7 INLETS AT
Roughness Coefficient	0.013		
Local Depression	2.75	in	AP 31.91
Local Depression Width	2.00	ft	∴ ASSUME 57 CFS
Grate Width	2.00	ft	7 INLETS
Grate Length	3.33	ft	
Grate Type	P-50 mm (P-1-7/8")		= 8 CFS TO EACH
Clogging	15.00	%	INLET
Curb Opening Length	6.66	ft	

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	57.10	%	
Intercepted Flow	4.57	ft³/s	
Bypass Flow	3.43	ft³/s	ASSUME 3 CFS/INLET
Spread	14.26	ft	
Depth	0.29	ft	
Flow Area	2.03	ft²	
Gutter Depression	0.00	ft	
Total Depression	0.23	ft	
Velocity	3.93	ft/s	
Splash Over Velocity	9.69	ft/s	
Frontal Flow Factor	1.00		
Side Flow Factor	0.11		
Grate Flow Ratio	0.33		
Equivalent Cross Slope	0.05801	ft/ft	
Active Grate Length	2.83	ft	
Length Factor	0.14		
Total Interception Length	27.84	ft	

Worksheet for AP 31.91 - 1inlet on lang at jeff

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.02000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	2.00	ft
Grate Width	2.00	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	6.66	ft

SEE NOTE ON 1ST PAGE AP 31-91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.26	%
Intercepted Flow	4.66	ft³/s
Bypass Flow	3.34	ft³/s
Spread	12.77	ft
Depth	0.26	ft
Flow Area	1.63	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.90	ft/s
Splash Over Velocity	14.32	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.29	
Grate Flow Ratio	0.37	
Equivalent Cross Slope	0.06183	ft/ft
Active Grate Length	5.66	ft
Length Factor	0.03	
Total Interception Length	31.97	ft

ASSUME 5 CFS INLET

Worksheet for AP 31.91 - 2inlets on lang at jeff

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.01250	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	2.00	ft
Grate Width	2.00	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	6.66	ft

SEE NOTE ON 1ST PAGE AP 31.91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	61.14	%
Intercepted Flow	4.89	ft³/s
Bypass Flow	3.11	ft³/s
Spread	13.95	ft
Depth	0.28	ft
Flow Area	1.95	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.11	ft/s
Splash Over Velocity	14.32	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.36	
Grate Flow Ratio	0.34	
Equivalent Cross Slope	0.05875	ft/ft
Active Grate Length	5.66	ft
Length Factor	0.03	
Total Interception Length	28.63	ft

ASSUME 5 CFS/INLET

Worksheet for AP 31.91 - 2 type D inlets lang at jeff

Project Description

Solve For	Spread

Input Data

Discharge	8.00	ft³/s	ASSUME
Left Side Slope	50.00	ft/ft (H:V)	
Right Side Slope	50.00	ft/ft (H:V)	8 CAS
Bottom Width	2.00	ft	
Grate Width	2.00	ft	INLET
Grate Length	6.66	ft	
Local Depression	0.01	in	SEE NOTE 1 AT
Local Depression Width	2.00	ft	PAGE AP 31.91
Grate Type	P-50 mm (P-1-7/8")		
Clogging	25.00	%	

Results

Spread	31.80	ft
Depth	0.30	ft
Wetted Perimeter	31.81	ft
Top Width	31.80	ft
Open Grate Area	8.99	ft²
Active Grate Weir Length	16.32	ft

Worksheet for AP 32.91 - 5 med. inlets in bas 32

Project Description	5 CSUMP INLETS

Solve For	Spread

Input Data

Discharge		2.00 ft³/s	TOTAL 100YR QP
Left Side Slope		50.00 ft/ft (H:V)	BASIN 32 = 51 CFS
Right Side Slope		50.00 ft/ft (H:V)	
Bottom Width		2.00 ft	ASSUME 25% OF 51 cfs
Grate Width		2.00 ft	
Grate Length		3.33 ft	= 13 cfs DIVIDE BY
Local Depression		0.01 in	
Local Depression Width		2.00 ft	7 SUMP INLETS
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00 %	$\frac{13}{7}$ = 2 CFS/INLET

Results

Spread	18.74	ft
Depth	0.17	ft
Wetted Perimeter	18.74	ft
Top Width	18.74	ft
Open Grate Area	4.50	ft²
Active Grate Weir Length	9.66	ft

Worksheet for AP 32.91- 2 inlets in bas 32

Project Description

2 (SUMP INLETS)

Solve For	Spread

Input Data

Discharge		2.00	ft³/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Grate Width		2.00	ft
Grate Length		3.33	ft
Local Depression		0.01	in
Local Depression Width		2.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%

SEE NOTE 1ST PAGE OF AP 32.91

Results

Spread	12.18	ft
Depth	0.24	ft
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Open Grate Area	5.09	ft²
Active Grate Weir Length	6.73	ft

Worksheet for AP 32.91 - 3 type B inlets jeff nr PDN

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s	TOTAL 100-YR QP
Slope	0.01739	ft/ft	BASIN 32 = 51 cfs
Gutter Width	2.00	ft	
Gutter Cross Slope	0.02	ft/ft	
Road Cross Slope	0.02	ft/ft	ASSUME 75% OF 51 cfs
Roughness Coefficient	0.013		
Local Depression	2.75	in	= 38 CFS TO 5 INLETS
Local Depression Width	3.00	ft	
Grate Width	5.00	ft	IN JEFFERSON JUST
Grate Length	3.00	ft	SOUTH OF PDN
Grate Type	P-50 mm (P-1-7/8")		
Clogging	15.00	%	
Curb Opening Length	3.00	ft	

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.56	%	ASSUME
Intercepted Flow	4.68	ft³/s	5 CFS/INLET
Bypass Flow	3.32	ft³/s	
Spread	13.11	ft	
Depth	0.26	ft	
Flow Area	1.72	ft²	
Gutter Depression	0.00	ft	
Total Depression	0.23	ft	
Velocity	4.65	ft/s	
Splash Over Velocity	14.32	ft/s	
Frontal Flow Factor	1.00		
Side Flow Factor	0.31		
Grate Flow Ratio	0.36		
Equivalent Cross Slope	0.04726	ft/ft	
Active Grate Length	5.66	ft	
Length Factor	0.03		
Total Interception Length	36.01	ft	

Worksheet for AP 32.91 - 1 type B inlet jeff nr PDN

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s	SEE NOTE FOR
Slope	0.02500	ft/ft	
Gutter Width	2.00	ft	3 TYPE B INLETS
Gutter Cross Slope	0.02	ft/ft	
Road Cross Slope	0.02	ft/ft	AT AP 32.91
Roughness Coefficient	0.013		
Local Depression	2.75	in	
Local Depression Width	3.00	ft	
Grate Width	5.00	ft	
Grate Length	3.00	ft	
Grate Type	P-50 mm (P-1-7/8")		
Clogging	15.00	%	
Curb Opening Length	3.00	ft	

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	58.56	%	
Intercepted Flow	4.68	ft³/s	ASSUME
Bypass Flow	3.32	ft³/s	
Spread	13.11	ft	5 CFS/INLET
Depth	0.26	ft	
Flow Area	1.72	ft²	
Gutter Depression	0.00	ft	
Total Depression	0.23	ft	
Velocity	4.65	ft/s	
Splash Over Velocity	14.32	ft/s	
Frontal Flow Factor	1.00		
Side Flow Factor	0.31		
Grate Flow Ratio	0.00		
Equivalent Cross Slope	0.04726	ft/ft	
Active Grate Length	5.66	ft	
Length Factor	0.03		
Total Interception Length	36.01	ft	

Worksheet for AP 32.91 - 1 very long inlet jeff nr PDN

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.01379	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	10.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	10.00	ft

SEE NOTE FOR 3 TYPE B INLETS AT AP 32.91

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	71.53	%
Intercepted Flow	5.72	ft³/s
Bypass Flow	2.28	ft³/s
Spread	13.69	ft
Depth	0.27	ft
Flow Area	1.88	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.27	ft/s
Splash Over Velocity	23.72	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.57	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.06110	ft/ft
Active Grate Length	8.50	ft
Length Factor	0.05	
Total Interception Length	28.80	ft

ASSUME 6 CFS/INLET

Worksheet for AP 28.91 med.1- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s	TOTAL 100-YR QP
Slope	0.01818	ft/ft	
Gutter Width	3.50	ft	BASIN 28 = 14 CFS
Gutter Cross Slope	0.02	ft/ft	
Road Cross Slope	0.02	ft/ft	14/3 INLETS
Roughness Coefficient	0.015		
Grate Width	3.50	ft	= 4 CFS TO EACH INLET
Grate Length	4.00	ft	
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")		
Clogging	0.00	%	

Options

Grate Flow Option	Exclude None

Results

Efficiency	74.21	%
Intercepted Flow	2.97	ft³/s
Bypass Flow	1.03	ft³/s
Spread	10.58	ft
Depth	0.21	ft
Flow Area	1.12	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.57	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.25	
Grate Flow Ratio	0.66	
Active Grate Length	4.00	ft

ASSUME 3 CFS/inlet

Worksheet for AP 28.91 med.2- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s
Slope	0.01429	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

SEE NOTE FOR AP 28-91 "med.2-inlet on grade"

Options

Grate Flow Option	Exclude None

Results

Efficiency	73.82	%
Intercepted Flow	2.95	ft³/s
Bypass Flow	1.05	ft³/s
Spread	11.07	ft
Depth	0.22	ft
Flow Area	1.22	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.27	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.28	
Grate Flow Ratio	0.64	
Active Grate Length	4.00	ft

ASSUME 3 CFS/inlet

Worksheet for AP 28.91 med.3- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s
Slope	0.02000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

SEE NOTE FOR AP 28-91 "med. 1-inlet on grade"

Options

Grate Flow Option	Exclude None

Results

Efficiency	74.43	%
Intercepted Flow	2.98	ft³/s
Bypass Flow	1.02	ft³/s
Spread	10.39	ft
Depth	0.21	ft
Flow Area	1.08	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.70	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.23	
Grate Flow Ratio	0.67	
Active Grate Length	4.00	ft

ASSUME 3 CFS/inlet

Worksheet for AP 27.91 med.1- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	7.50	ft³/s
Slope	0.05000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

TOTAL 100-YR. QP

BASIN 27 = 15 CFS

$\frac{15}{2 \text{ INLETS}} = \frac{7.5 \text{ cfs}}{\text{INLET}}$

Options

Grate Flow Option	Exclude None

Results

Efficiency	67.73	%
Intercepted Flow	5.08	ft³/s
Bypass Flow	2.42	ft³/s
Spread	11.08	ft
Depth	0.22	ft
Flow Area	1.23	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	6.11	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.64	
Active Grate Length	4.00	ft

ASSUME 5 cfs/inlet

Worksheet for AP 27.91 med.2- inlet on grade

Project Description

Solve For	Efficiency

Input Data

Discharge	7.50	ft³/s
Slope	0.02667	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

TOTAL 100-YR Q.
BASIN 27 = 15 CFS
15 / 2 INLETS = 7.5 CFS / INLET

Options

Grate Flow Option	Exclude None

Results

Efficiency	65.15	%
Intercepted Flow	4.89	ft³/s
Bypass Flow	2.61	ft³/s
Spread	12.46	ft
Depth	0.25	ft
Flow Area	1.55	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	4.83	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.59	
Active Grate Length	4.00	ft

ASSUME
5 cfs / inlet

Worksheet for AP 26.91 curb inlet 1

Project Description

Solve For	Efficiency

Input Data

Discharge	11.00	ft³/s
Slope	0.01818	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

TOTAL 100-YR QP

BASIN 26 = 58 CFS

$\frac{58}{5 \text{ inlets}}$ = 11 cfs/INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	37.92	%
Intercepted Flow	4.17	ft³/s
Bypass Flow	6.83	ft³/s
Spread	14.65	ft
Depth	0.29	ft
Flow Area	2.15	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.12	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.05862	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	36.66	ft

ASSUME 4 CFS/INLET

Worksheet for AP 26.91 curb inlet 2

Project Description

Solve For	Efficiency

Input Data

Discharge	11.00	ft³/s
Slope	0.02857	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

SEE NOTE FOR AP 26.91 "curb inlet 1"

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.34	%
Intercepted Flow	4.00	ft³/s
Bypass Flow	7.00	ft³/s
Spread	13.46	ft
Depth	0.27	ft
Flow Area	1.81	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.07	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.13	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.06175	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	40.70	ft

ASSUME 4 cfs/inlet

Worksheet for AP 26.91 curb inlet 3

Project Description

Solve For	Efficiency

Input Data

Discharge	11.00	ft³/s
Slope	0.06667	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

SEE NOTE FOR AP 26-91 "curb inlet 1"

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	35.52	%
Intercepted Flow	3.91	ft³/s
Bypass Flow	7.09	ft³/s
Spread	11.48	ft
Depth	0.23	ft
Flow Area	1.32	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	8.34	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.28	
Equivalent Cross Slope	0.06822	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	49.43	ft

ASSUME 4 cfs / inlet

Worksheet for AP 26.91 2 sag curb inlets jeff

Project Description

Solve For	Spread	2 SAG INLETS

Input Data

Discharge		11.00	ft³/s
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		5.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%
Curb Opening Length		5.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

SEE NOTE FOR AP 26-91 "curb inlet 1"

Options

Calculation Option	Use Both

Results

Spread	24.61	ft
Depth	0.49	ft
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Open Grate Area	4.49	ft²
Active Grate Weir Length	7.00	ft

ASSUME EACH SAG INLET CAPACITY = 11 cfs

AP 21.91 1 med- inlet on grade bas 21

Project Description

Solve For	Efficiency

Input Data

Discharge	37.00	ft³/s
Slope	0.04444	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 21.98

Q100-YR = 37 cfs

only 1 inlet

50% 37 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	38.99	%
Intercepted Flow	14.43	ft³/s
Bypass Flow	22.57	ft³/s
Spread	20.60	ft
Depth	0.41	ft
Flow Area	4.24	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	8.72	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	0.90	
Side Flow Factor	0.06	
Grate Flow Ratio	0.39	
Active Grate Length	4.00	ft

14 cfs

AP 19.91 1 med- inlet bas. 19

Project Description

Solve For	Efficiency

Input Data

Discharge	28.00	ft³/s
Slope	0.02220	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 19.99
Q_{100} = 28 cfs
only 1 inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	44.88	%
Intercepted Flow	12.57	ft³/s
Bypass Flow	15.43	ft³/s
Spread	21.14	ft
Depth	0.42	ft
Flow Area	4.47	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	6.27	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.38	
Active Grate Length	4.00	ft

13 cfs

AP 18.91 2 med inlets bas.18

Project Description

Solve For	Efficiency

Input Data

Discharge	6.50	ft³/s
Slope	0.01212	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 18.99
Q_{100} = 13 cfs
$\frac{13}{2}$ inlets
= 6.5 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	66.19	%
Intercepted Flow	4.30	ft³/s
Bypass Flow	2.20	ft³/s
Spread	13.69	ft
Depth	0.27	ft
Flow Area	1.88	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.47	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.26	
Grate Flow Ratio	0.55	
Active Grate Length	4.00	ft

4 cfs

Worksheet for AP 25.91 sump inlet bas 25

Project Description

Solve For	Spread

Input Data

Discharge	20.00	ft³/s	TOTAL 100-YR.
Left Side Slope	10.00	ft/ft (H:V)	
Right Side Slope	10.00	ft/ft (H:V)	BASIN 25 Q P
Bottom Width	3.50	ft	
Grate Width	3.50	ft	= 29 cfs
Grate Length	4.00	ft	
Local Depression	0.01	in	ASSUME 70% (29) cfs
Local Depression Width	3.50	ft	
Grate Type	P-50 mm (P-1-7/8")		= 20 cfs TO THIS
Clogging	15.00	%	INLET

Results

Spread	15.71	ft
Depth	0.61	ft
Wetted Perimeter	15.77	ft
Top Width	15.71	ft
Open Grate Area	10.71	ft²
Active Grate Weir Length	13.95	ft

Worksheet for AP 25.91pdn inlet

Project Description

Solve For	Efficiency

Input Data

Discharge		9.00	ft³/s
Slope		0.02667	ft/ft
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.015	
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		5.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		5.00	ft

TOTAL 100-YR BASIN 25 QP = 29 cfs
ASSUME 30% (29) = 9 cfs TO THIS INLET

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	40.05	%
Intercepted Flow	3.60	ft³/s
Bypass Flow	5.40	ft³/s
Spread	13.34	ft
Depth	0.27	ft
Flow Area	1.78	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.05	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.24	
Equivalent Cross Slope	0.06208	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	33.52	ft

ASSUME 4 cfs

AP 24.91 bas 24

Project Description

Solve For	Efficiency

Input Data

Discharge	13.00	ft³/s
Slope	0.02000	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP 24.99
Q100 = 13 cfs
1 inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.78	%
Intercepted Flow	4.78	ft³/s
Bypass Flow	8.22	ft³/s
Spread	16.17	ft
Depth	0.32	ft
Flow Area	2.61	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.97	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.20	
Equivalent Cross Slope	0.05526	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	38.48	ft

AP 22.91 bas 22

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s
Slope	0.02353	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP22.97

$Q_{100} = 4$ cfs

1 inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	52.08	%
Intercepted Flow	2.08	ft³/s
Bypass Flow	1.92	ft³/s
Spread	10.08	ft
Depth	0.20	ft
Flow Area	1.02	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	3.94	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.24	
Grate Flow Ratio	0.31	
Equivalent Cross Slope	0.07416	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.04	
Total Interception Length	20.64	ft

AP 20.91 2 med inlets bas 20

Project Description

Solve For	Efficiency

Input Data

Discharge	20.00	ft³/s
Slope	0.04000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 20.99

$Q_{100} = 61$ cfs

$\frac{61}{3}$ inlets

= 20 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	51.20	%
Intercepted Flow	10.24	ft³/s
Bypass Flow	9.76	ft³/s
Spread	16.68	ft
Depth	0.33	ft
Flow Area	2.78	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	7.18	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.09	
Grate Flow Ratio	0.47	
Active Grate Length	4.00	ft

AP 20.91 1 med inlets assume in bas 20

Project Description

Solve For	Efficiency

Input Data

Discharge	20.00	ft³/s
Slope	0.04000	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 20.99
Q100 = 61 cfs
3 inlets
= 20 cfs/inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	51.20	%
Intercepted Flow	10.24	ft³/s
Bypass Flow	9.76	ft³/s
Spread	16.68	ft
Depth	0.33	ft
Flow Area	2.78	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	7.18	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.09	
Grate Flow Ratio	0.47	
Active Grate Length	4.00	ft

10

AP 17.91 1 med inlet bas 17

Project Description

Solve For	Efficiency

Input Data

Discharge	49.00	ft³/s
Slope	0.01429	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 17.99

Q100 = 49 cfs

1 inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	37.47	%
Intercepted Flow	18.36	ft³/s
Bypass Flow	30.64	ft³/s
Spread	28.32	ft
Depth	0.57	ft
Flow Area	8.02	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	6.11	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.30	
Active Grate Length	4.00	ft

AP 16.91 1 med inlet bas 16

Project Description

Solve For	Efficiency

Input Data

Discharge	16.00	ft³/s
Slope	0.01176	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

AP 16.99

Q_{100} = 16 cfs

1 inlet

Options

Grate Flow Option	Exclude None

Results

Efficiency	52.53	%
Intercepted Flow	8.40	ft³/s
Bypass Flow	7.60	ft³/s
Spread	19.30	ft
Depth	0.39	ft
Flow Area	3.73	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	4.29	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.19	
Grate Flow Ratio	0.41	
Active Grate Length	4.00	ft

AP 14.91 curb inlet 2- bas 14

Project Description

Solve For	Efficiency

Input Data

Discharge	12.00	ft³/s
Slope	0.02222	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP 14.98
100-YR - Qp = 37 cfs
$\frac{37}{3}$ inlets
= 12 cfs / inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	37.23	%
Intercepted Flow	4.47	ft³/s
Bypass Flow	7.53	ft³/s
Spread	15.38	ft
Depth	0.31	ft
Flow Area	2.37	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.07	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.17	
Grate Flow Ratio	0.21	
Equivalent Cross Slope	0.05692	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	37.72	ft

AP 14.91 sump inlet bas 14

Project Description

Solve For	Spread

Input Data

Discharge		12.00	ft³/s
Left Side Slope		10.00	ft/ft (H:V)
Right Side Slope		10.00	ft/ft (H:V)
Bottom Width		3.50	ft
Grate Width		3.50	ft
Grate Length		4.00	ft
Local Depression		0.01	in
Local Depression Width		3.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		25.00	%

AP 14.98

100-YR Qp = 37 cfs

$\frac{37}{3}$ inlets

= 12 cfs/inlet

Results

Spread	12.48	ft
Depth	0.45	ft
Wetted Perimeter	12.53	ft
Top Width	12.48	ft
Open Grate Area	9.45	ft²
Active Grate Weir Length	13.25	ft

ASSUME INLET CAPACITY = 12 cfs

AP 14.91 curb inlet 1- bas 14

Project Description

Solve For	Efficiency

Input Data

Discharge	12.00	ft³/s
Slope	0.02353	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

AP 14.98
100-YR Qp = 37 CFS
37/3 inlets
= 12 cfs/inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.97	%
Intercepted Flow	4.44	ft³/s
Bypass Flow	7.56	ft³/s
Spread	15.22	ft
Depth	0.30	ft
Flow Area	2.32	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.18	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.16	
Grate Flow Ratio	0.22	
Equivalent Cross Slope	0.05729	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	38.23	ft

AP 7.91 - 3 inlets on lorraine ct.

Project Description

Solve For	Efficiency

Input Data

Discharge	5.00	ft³/s
Slope	0.01481	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	2.00	ft
Grate Width	2.00	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	3.33	ft

AP 7.00
100-YR Qp=15 cfs
15/3 inlets
=5 cfs/inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	49.69	%
Intercepted Flow	2.48	ft³/s
Bypass Flow	2.52	ft³/s
Spread	11.33	ft
Depth	0.23	ft
Flow Area	1.28	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	3.90	ft/s
Splash Over Velocity	9.69	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.40	
Equivalent Cross Slope	0.06633	ft/ft
Active Grate Length	2.83	ft
Length Factor	0.02	
Total Interception Length	22.99	ft

AP 6.91 1-17" dia. sump grate

Project Description

Solve For	Spread

Input Data

Discharge	7.00	ft³/s	AP 6-00
Left Side Slope	10.00	ft/ft (H:V)	
Right Side Slope	10.00	ft/ft (H:V)	100-YR Q P = 22 cfs
Bottom Width	1.50	ft	
Grate Width	1.50	ft	ASSUME 30% OF
Grate Length	1.50	ft	BASIN DRAIN TO THIS
Local Depression	0.01	in	INLET
Local Depression Width	1.50	ft	
Grate Type	P-50 mm (P-1-7/8")		
Clogging	25.00	%	= 22 (0.3) = 7 cfs

Results

Spread	16.19	ft
Depth	0.73	ft
Wetted Perimeter	16.27	ft
Top Width	16.19	ft
Open Grate Area	1.52	ft²
Active Grate Weir Length	5.25	ft

AP 6.91 bas 6 large sump inlet

Project Description

Solve For	Spread

Input Data

Discharge		15.00	ft³/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.00	ft/ft
Local Depression		2.75	in
Local Depression Width		2.00	ft
Grate Width		2.00	ft
Grate Length		3.33	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		10.00	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

AP 6-00
100-YR Q P = 22 cfs
ASSUME 70% OF BASIN DRAIN TO THIS INLET
22(0.7) = 15 cfs

Options

Calculation Option	Use Both

Results

Spread	0.00	ft
Depth	0.00	ft
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Open Grate Area	0.00	ft²
Active Grate Weir Length	0.00	ft

AP2.91 2 inlets in El Pueblo Rd

Project Description

Solve For	Efficiency

Input Data

Discharge		90.00	ft³/s
Slope		0.00976	ft/ft
Gutter Width		1.33	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.75	in
Local Depression Width		1.33	ft
Grate Width		1.33	ft
Grate Length		4.33	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%
Curb Opening Length		4.33	ft

AP 2.99

100-YR QP = 271 cfs

271 / 3 inlets =

90 cfs/inlet

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	17.52	%
Intercepted Flow	15.77	ft³/s
Bypass Flow	74.23	ft³/s
Spread	36.21	ft
Depth	0.72	ft
Flow Area	13.11	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.86	ft/s
Splash Over Velocity	11.03	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.10	
Equivalent Cross Slope	0.03636	ft/ft
Active Grate Length	3.68	ft
Length Factor	0.01	
Total Interception Length	97.95	ft

AP 2.91 1 sump inlet

Project Description

Solve For	Spread

Input Data

Discharge	90.00	ft³/s	AP 2.99
Left Side Slope	10.00	ft/ft (H:V)	
Right Side Slope	10.00	ft/ft (H:V)	Q_{100} = 271 cfs
Bottom Width	3.50	ft	
Grate Width	3.50	ft	
Grate Length	4.00	ft	271 / 3 inlets =
Local Depression	0.01	in	
Local Depression Width	3.50	ft	
Grate Type	P-50 mm (P-1-7/8")		90 cfs / inlet
Clogging	25.00	%	

Results

Spread	66.28	ft
Depth	3.14	ft
Wetted Perimeter	66.60	ft
Top Width	66.28	ft
Open Grate Area	9.45	ft²
Active Grate Weir Length	13.25	ft

NOTE:

SINCE THIS IS A SUMP INLET FLOWMASTER ASSUMES ENTIRE Q CAN ENTER INLET.

THAT IS NOT POSSIBLE, DEPTH OVER ABOUT 1 FT. WILL SPILL WEST ON EL PUEBLO RD.

THEREFORE, ASSUME INLET CAPACITY =

15 cfs (currently inlet could not be found IT IS COVERED WITH SEDIMENT AND BUSHES

APPEARS NO MAINTENANCE

EXISTING STORM DRAIN CAPACITY SUMMARY

AND

FLOW MASTER OUTPUT

TABLE A2

EXISTING- STORM DRAIN CAPACITY (Non-Pressure full pipe flow)

El Pueblo Road Drainage Analysis.

AHYMO Model Analysis Point	Storm Drain Pipe Data and Capacity Summary (non-pressure full pipe flow)							
	Pipe Diameter - or Street Inter-section	Approx. beggining Pipe elevation	Approx. end pipe elevation	Approx. Pipe Length	Comptued Pipe Slope (approx.)	Pipe Slope from Plans or As-builts	Manning's "n"	**Full pipe Capacity** (non-pressure flow)
	(in.)	(ft)	(ft)	(ft)	(ft/ft)	(ft/ft)		(cfs)
(a)	(b)	(b)	(b)	(b)				(c)
30.91	30	----	----	----	----	0.0298	0.013	71
31.91	54	----	----	----	----	0.0055	0.013	146
32.91	66	----	----	----	----	0.0047	0.013	230
28.91	30	5116	5116	65	0.0015	0.0015	0.023	9
27.91	30	----	----	----	----	0.0200	0.023	33
26.91	30	----	----	----	----	0.0200	0.023	33
21.91	24	----	----	----	----	0.0167	0.023	17
19.91	24	----	----	----	----	0.01 (n)	0.023	13
18.91	24	----	----	----	----	0.01 (n)	0.023	13
25.91	24	----	----	----	----	0.0167	0.023	17
24.91	24	----	----	----	----	0.01 (n)	0.023	13
22.91	24	----	----	----	----	0.01 (n)	0.023	13
20.91	24	----	----	----	----	0.0167	0.023	17
17.91	24	----	----	----	----	0.0100	0.023	13
16.91	24	----	----	----	----	0.01 (n)	0.023	13
14.91	24	----	----	----	----	0.0154	0.023	16
7.91	24	----	----	----	----	0.0289	0.023	22
6.91	24	----	----	----	----	0.0289	0.023	22
2.91	30	5076	5073	247	0.0121	----	0.023	26

(a) See AHYMO modeling schematic and Drainage Basin Map

(b) Measurements based on Drainage Basin Map combined with available plan or as-built information

(c) Computed with Flow Master Program - See Appendix for printed output

(n) Not found in plans or as-builts - diameter measured in field, slope assumed at 1%

AP 30.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02980	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	70.80	ft^3/s

Results

Discharge	70.80	ft^3/s
Normal Depth	2.50	ft
Flow Area	4.91	ft^2
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	2.44	ft
Percent Full	100.0	%
Critical Slope	0.02654	ft/ft
Velocity	14.42	ft/s
Velocity Head	3.23	ft
Specific Energy	5.73	ft
Froude Number	0.00	
Maximum Discharge	76.16	ft^3/s
Discharge Full	70.80	ft^3/s
Slope Full	0.02980	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 31.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00550	ft/ft
Normal Depth	4.50	ft
Diameter	4.50	ft
Discharge	145.83	ft^3/s

Results

Discharge	145.83	ft^3/s
Normal Depth	4.50	ft
Flow Area	15.90	ft^2
Wetted Perimeter	14.14	ft
Top Width	0.00	ft
Critical Depth	3.55	ft
Percent Full	100.0	%
Critical Slope	0.00593	ft/ft
Velocity	9.17	ft/s
Velocity Head	1.31	ft
Specific Energy	5.81	ft
Froude Number	0.00	
Maximum Discharge	156.87	ft^3/s
Discharge Full	145.83	ft^3/s
Slope Full	0.00550	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 32.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00470	ft/ft
Normal Depth	5.50	ft
Diameter	5.50	ft
Discharge	230.21	ft^3/s

Results

Discharge	230.21	ft^3/s
Normal Depth	5.50	ft
Flow Area	23.76	ft^2
Wetted Perimeter	17.28	ft
Top Width	0.00	ft
Critical Depth	4.24	ft
Percent Full	100.0	%
Critical Slope	0.00530	ft/ft
Velocity	9.69	ft/s
Velocity Head	1.46	ft
Specific Energy	6.96	ft
Froude Number	0.00	
Maximum Discharge	247.63	ft^3/s
Discharge Full	230.21	ft^3/s
Slope Full	0.00470	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 28.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.00150	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	8.98	ft^3/s

Results

Discharge	8.98	ft^3/s
Normal Depth	2.50	ft
Flow Area	4.91	ft^2
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	1.00	ft
Percent Full	100.0	%
Critical Slope	0.01327	ft/ft
Velocity	1.83	ft/s
Velocity Head	0.05	ft
Specific Energy	2.55	ft
Froude Number	0.00	
Maximum Discharge	9.66	ft^3/s
Discharge Full	8.98	ft^3/s
Slope Full	0.00150	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 27.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02000	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	32.78	ft^3/s

Results

Discharge	32.78	ft^3/s
Normal Depth	2.50	ft
Flow Area	4.91	ft^2
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	1.95	ft
Percent Full	100.0	%
Critical Slope	0.02206	ft/ft
Velocity	6.68	ft/s
Velocity Head	0.69	ft
Specific Energy	3.19	ft
Froude Number	0.00	
Maximum Discharge	35.27	ft^3/s
Discharge Full	32.78	ft^3/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 26.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02000	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	32.78	ft³/s

Results

Discharge	32.78	ft³/s
Normal Depth	2.50	ft
Flow Area	4.91	ft²
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	1.95	ft
Percent Full	100.0	%
Critical Slope	0.02206	ft/ft
Velocity	6.68	ft/s
Velocity Head	0.69	ft
Specific Energy	3.19	ft
Froude Number	0.00	
Maximum Discharge	35.27	ft³/s
Discharge Full	32.78	ft³/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 21.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01670	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.52	ft^3/s

Results

Discharge	16.52	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.02122	ft/ft
Velocity	5.26	ft/s
Velocity Head	0.43	ft
Specific Energy	2.43	ft
Froude Number	0.00	
Maximum Discharge	17.77	ft^3/s
Discharge Full	16.52	ft^3/s
Slope Full	0.01670	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 19.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 18.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 25.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01670	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.52	ft^3/s

Results

Discharge	16.52	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.02122	ft/ft
Velocity	5.26	ft/s
Velocity Head	0.43	ft
Specific Energy	2.43	ft
Froude Number	0.00	
Maximum Discharge	17.77	ft^3/s
Discharge Full	16.52	ft^3/s
Slope Full	0.01670	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 24.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 22.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 20.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01670	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	16.52	ft^3/s

Results

Discharge	16.52	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.02122	ft/ft
Velocity	5.26	ft/s
Velocity Head	0.43	ft
Specific Energy	2.43	ft
Froude Number	0.00	
Maximum Discharge	17.77	ft^3/s
Discharge Full	16.52	ft^3/s
Slope Full	0.01670	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 17.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 16.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01000	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	12.79	ft^3/s

Results

Discharge	12.79	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.29	ft
Percent Full	100.0	%
Critical Slope	0.01802	ft/ft
Velocity	4.07	ft/s
Velocity Head	0.26	ft
Specific Energy	2.26	ft
Froude Number	0.00	
Maximum Discharge	13.75	ft^3/s
Discharge Full	12.79	ft^3/s
Slope Full	0.01000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 14.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01540	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	15.87	ft^3/s

Results

Discharge	15.87	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	0.02057	ft/ft
Velocity	5.05	ft/s
Velocity Head	0.40	ft
Specific Energy	2.40	ft
Froude Number	0.00	
Maximum Discharge	17.07	ft^3/s
Discharge Full	15.87	ft^3/s
Slope Full	0.01540	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 7.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02890	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	21.74	ft^3/s

Results

Discharge	21.74	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.67	ft
Percent Full	100.0	%
Critical Slope	0.02808	ft/ft
Velocity	6.92	ft/s
Velocity Head	0.74	ft
Specific Energy	2.74	ft
Froude Number	0.00	
Maximum Discharge	23.38	ft^3/s
Discharge Full	21.74	ft^3/s
Slope Full	0.02890	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 6.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.02890	ft/ft
Normal Depth	2.00	ft
Diameter	2.00	ft
Discharge	21.74	ft^3/s

Results

Discharge	21.74	ft^3/s
Normal Depth	2.00	ft
Flow Area	3.14	ft^2
Wetted Perimeter	6.28	ft
Top Width	0.00	ft
Critical Depth	1.67	ft
Percent Full	100.0	%
Critical Slope	0.02808	ft/ft
Velocity	6.92	ft/s
Velocity Head	0.74	ft
Specific Energy	2.74	ft
Froude Number	0.00	
Maximum Discharge	23.38	ft^3/s
Discharge Full	21.74	ft^3/s
Slope Full	0.02890	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

AP 2.91 non-press full pipe flow

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.023	
Channel Slope	0.01210	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft
Discharge	25.50	ft^3/s

Results

Discharge	25.50	ft^3/s
Normal Depth	2.50	ft
Flow Area	4.91	ft^2
Wetted Perimeter	7.85	ft
Top Width	0.00	ft
Critical Depth	1.72	ft
Percent Full	100.0	%
Critical Slope	0.01804	ft/ft
Velocity	5.19	ft/s
Velocity Head	0.42	ft
Specific Energy	2.92	ft
Froude Number	0.00	
Maximum Discharge	27.43	ft^3/s
Discharge Full	25.50	ft^3/s
Slope Full	0.01210	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

EXISTING CULVERT CAPACITY

COMPUTED WITH

CULVERT MASTER

Culvert Calculator Report

Ex. 21" RCP from PND Pond

AP 4.91

DIVIDE 17 CFS

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,076.00	ft	Headwater Depth/Height	6.29	
Computed Headwater Elev	5,076.00	ft	Discharge	16.91	cfs
Inlet Control HW Elev.	5,070.75	ft	Tailwater Elevation	5,070.75	ft
Outlet Control HW Elev.	5,076.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,065.00	ft	Downstream Invert	5,064.25	ft
Length	380.00	ft	Constructed Slope	0.001974	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	6.50	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	1.51	ft
Velocity Downstream	7.03	ft/s	Critical Slope	0.010513	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.75	ft
Section Size	21 inch		Rise	1.75	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,076.00	ft	Upstream Velocity Head	0.77	ft
Ke	0.20		Entrance Loss	0.15	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,070.75	ft	Flow Control	Submerged	
Inlet Type	Groove end w/headwall		Area Full	2.4	ft^2
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Calculator Report
Ex. 30" CMP at N. Div. Chan.

AP 1.96

DIVIDE 48 CFS

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	5,071.50 ft	Headwater Depth/Height	2.60
Computed Headwater Elev	5,071.50 ft	Discharge	47.54 cfs
Inlet Control HW Elev.	5,070.26 ft	Tailwater Elevation	5,066.75 ft
Outlet Control HW Elev.	5,071.50 ft	Control Type	Outlet Control

Grades

Upstream Invert	5,065.00 ft	Downstream Invert	5,064.25 ft
Length	56.00 ft	Constructed Slope	0.013393 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	2.50 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.27 ft
Velocity Downstream	9.68 ft/s	Critical Slope	0.040089 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	2.50 ft
Section Size	30 inch	Rise	2.50 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,071.50 ft	Upstream Velocity Head	1.46 ft
Ke	0.50	Entrance Loss	0.73 ft

Inlet Control Properties

Inlet Control HW Elev.	5,070.26 ft	Flow Control	Submerged
Inlet Type	Headwall	Area Full	4.9 ft²
K	0.00780	HDS 5 Chart	2
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		

Culvert Calculator Report
Ex. 49" x 33" arch pipe - outfall of ex. 42" CMP under PDN

Solve For: Discharge

AP 12.91

Culvert Summary			
Allowable HW Elevation	5,077.72 ft	Headwater Depth/Height	1.33
Computed Headwater Elev	5,077.72 ft	Discharge	35.19 cfs
Inlet Control HW Elev.	5,076.64 ft	Tailwater Elevation	5,072.70 ft
Outlet Control HW Elev.	5,077.72 ft	Control Type	Outlet Control

ASSUME 35 CFS

Grades			
Upstream Invert	5,074.22 ft	Downstream Invert	5,069.95 ft
Length	840.00 ft	Constructed Slope	0.005083 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	2.75 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	1.59 ft
Velocity Downstream	4.14 ft/s	Critical Slope	0.012524 ft/ft

Section			
Section Shape	Horizontal Ellipse	Mannings Coefficient	0.024
Section Material	Concrete	Span	4.13 ft
Section Size	32x50 inch	Rise	2.63 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	5,077.72 ft	Upstream Velocity Head	0.27 ft
Ke	0.50	Entrance Loss	0.13 ft

Inlet Control Properties			
Inlet Control HW Elev.	5,076.64 ft	Flow Control	Unsubmerged
Inlet Type	Square edge with headwall (horizontal ellipse)	Area Full	8.5 ft²
K	0.01000	HDS 5 Chart	29
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
Ex. 42" CMP under Paseo Del Norte

Solve For: Discharge

AP 12.91

Culvert Summary

Allowable HW Elevation	5,082.00 ft	Headwater Depth/Height	1.86
Computed Headwater Elev	5,082.00 ft	Discharge	100.66 cfs
Inlet Control HW Elev.	5,082.00 ft	Tailwater Elevation	5,077.22 ft
Outlet Control HW Elev.	5,081.52 ft	Control Type	Inlet Control

ASSUME THE 49" x 33" ARCH PIPE CONTROLS

Grades

Upstream Invert	5,075.50 ft	Downstream Invert	5,074.22 ft
Length	96.00 ft	Constructed Slope	0.036458 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	2.77 ft
Slope Type	Steep	Normal Depth	2.77 ft
Flow Regime	Supercritical	Critical Depth	3.08 ft
Velocity Downstream	12.32 ft/s	Critical Slope	0.030745 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	3.50 ft
Section Size	42 inch	Rise	3.50 ft
Number Sections	1		

ASSUME 35 CFS FOR AP12.91

Outlet Control Properties

Outlet Control HW Elev.	5,081.52 ft	Upstream Velocity Head	1.96 ft
Ke	0.50	Entrance Loss	0.98 ft

Inlet Control Properties

Inlet Control HW Elev.	5,082.00 ft	Flow Control	Submerged
Inlet Type	Headwall	Area Full	9.6 ft²
K	0.00780	HDS 5 Chart	2
M	2.00000	HDS 5 Scale	1
C	0.03790	Equation Form	1
Y	0.69000		

PROJECT EL PUEBLO RD SHEET NO. 1 OF 2

SUBJECT EXISTING CULVERT HYDRAULICS PROJECT NO. 5

BY PS DATE 12/1/06 CHECKED BY _____ DATE / /

PURPOSE – BASED ON FIELD MEASUREMENTS WITH A TAPE MEASURE FOR MAX. HEADWATER DEPTH ON CULVERTS, COMPUTE MAX. CULVERT CAPACITIES WITH FOLLOWING ASSUMPTIONS.

ASSUMPTIONS –

1. ASSUME ELEV.'S FROM CONTOUR MAP
2. ASSUME TAILWATER DEPTH IS AT SOFFIT
3. CMP "n" = 0.024
4. RCP "n" = 0.013
5. MEASURE LENGTHS FROM DRAINAGE BASIN MAP

CULVERTS AND ANALYSIS POINTS AND DATA

AP 18.91 = EX. 48" CMP UNDER PDN

SEE PAGE 2

S = 0.0133 PDN PLANS

96

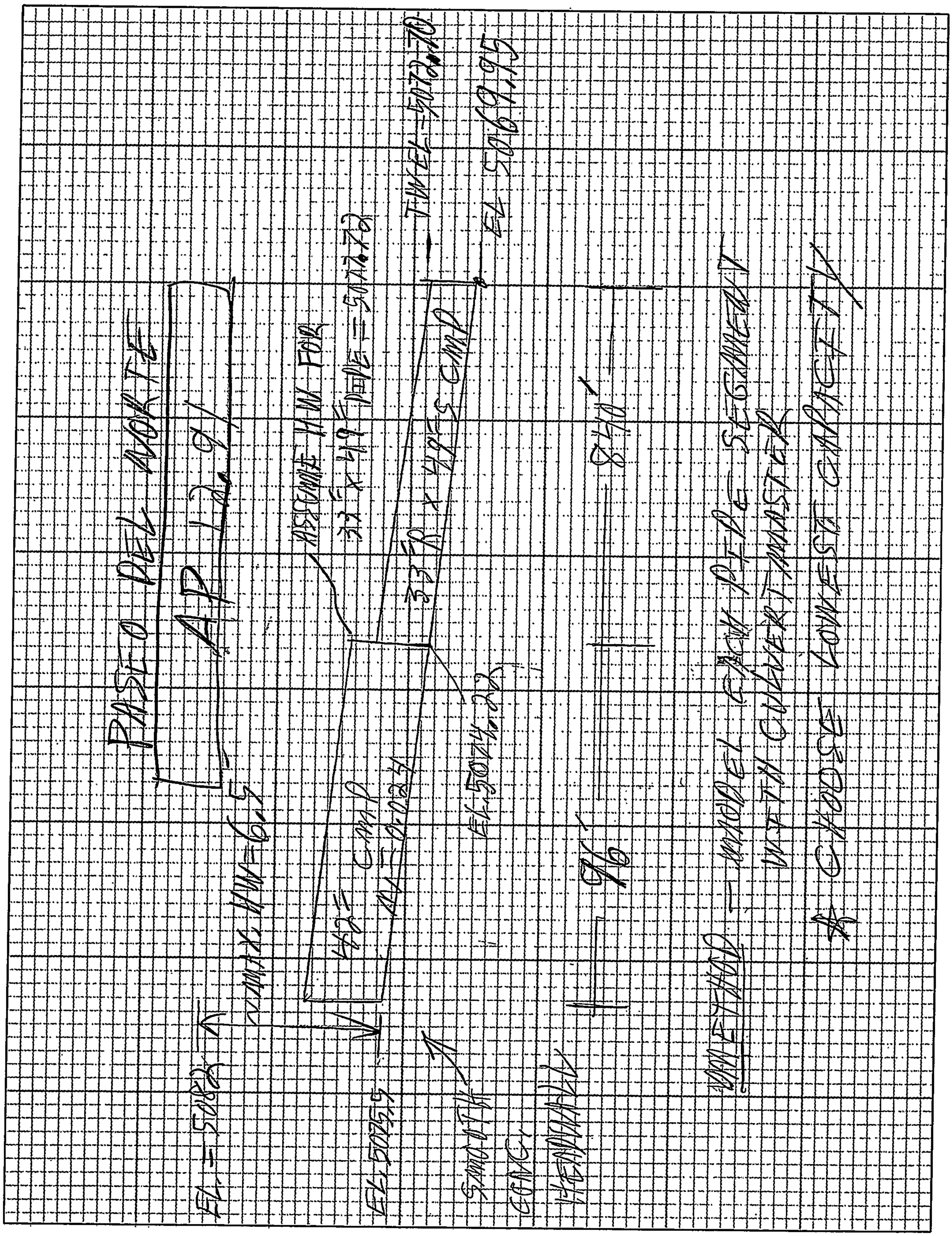
Smith Engineering Company
2201 San Pedro NE Bldg. #4, Suite 200 Albuquerque, New Mexico 87110 505/884-0700

1840 49"S x 33"R and 1.8% S = 0.0051

PROJECT EL PUEBLO RD SHEET NO. 2 OF 2

SUBJECT EXIST. CULVER HYDRAULICS PROJECT NO.

BY DATE / / CHECKED BY DATE / /

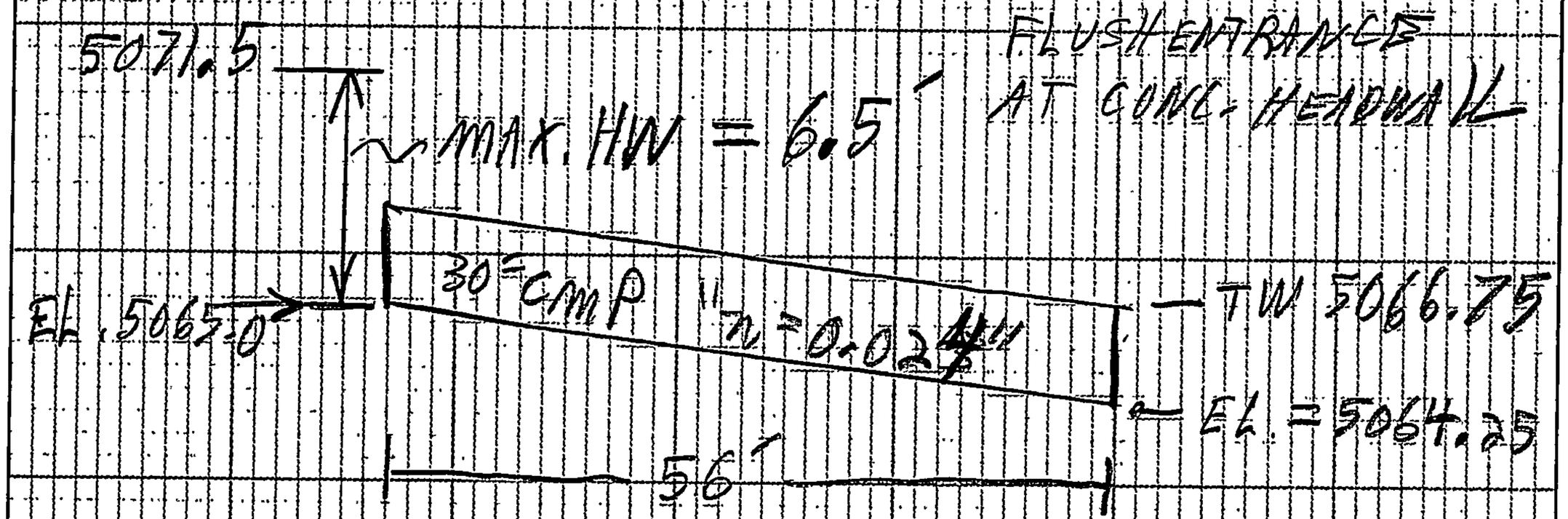

DEL NORTE
PASEO
HW=6.5
ASSUME HW FOR
EL=5087.5
EL=5084.7
EL=5077.2
EL=5074.2
EL=5055
EL=5044.2
EL=5044.2
TWO 48" CMP
EL=5044.2
EL=5044.2
EL=5044.2

PROJECT _____ SHEET NO. 2 OF _____

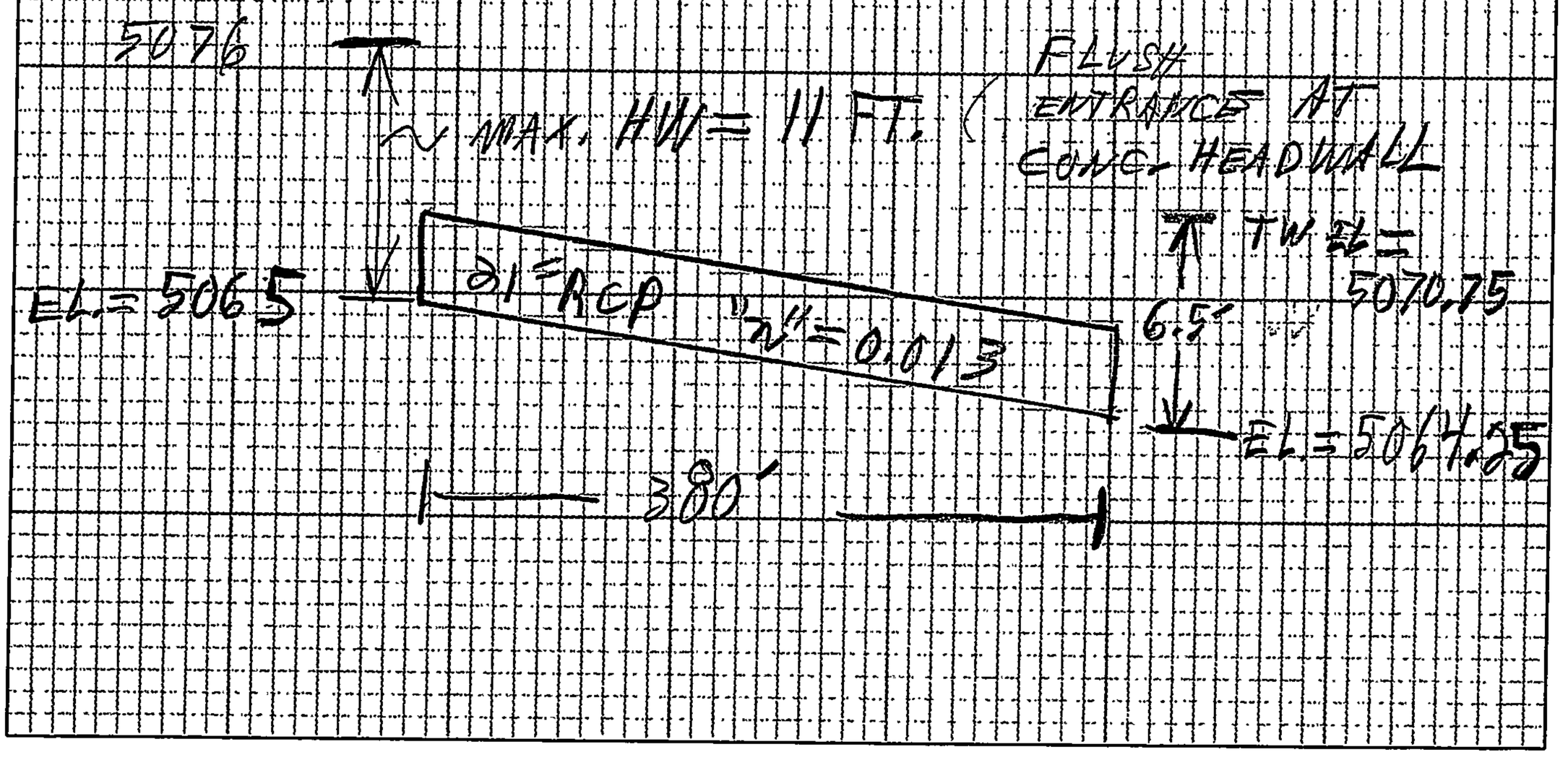
SUBJECT EXISTING CULVERT HYDRAULICS PROJECT NO. _____

BY PS DATE 12/1/06 CHECKED BY _____ DATE / /

AP 1.96 = EX 30" CMP AT N. DIV. CHAN.



AP 4.91 = PMM 21" RCP (POND TO 30" CMP AT N. DIV. CHAN.)



Smith Engineering Company

2201 San Pedro NE Bldg. #4, Suite 200 Albuquerque, New Mexico 87110 505/884-0700

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APPENDIX B

APPENDIX B

AHYMO_97 Full Future Development Conditions
100-yr. 24-hour Storm

2 models included as described here :

1st. Model ***WITH proposed drainage improvements P1)***

Note – Only 2 changes were implemented in this model compared to the 2nd model.

1.Assume the 42-inch cmp under Paseo Del Norte is blocked - AP 12.91

2. Assume no flow passes across the N. Div. Channel on El Pueblo Rd. - AP 1.92

AHYMO_97 Summary Table

File name P1100-24.txt

2nd. Model ***WITHOUT proposed drainage improvements)***

AHYMO_97 Summary Table and Input File

File name El100-24.txt

The CD included includes the full output file,

input file and summary table

1st. Model *WITH proposed drainage improvements P1*)

Note – Only 2 changes were implemented in this model compared to the 2nd model.

1.Assume the 42-inch cmp under Paseo Del Norte is blocked - AP 12.91

2. Assume no flow passes across the N. Div. Channel on El Pueblo Rd. - AP 1.92

AHYMO_97 Summary Table

File name P1100-24.txt

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                          - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =01/28/2007
  INPUT FILE = Z:\Projects\2003PR~1\103115~3\ahymo\p1100-24.TXT                              USER NO.= AHYMO-S-9702c01SEC01A-AH

                                FROM  TO                                                                                  PAGE =   1
  COMMAND        HYDROGRAPH     ID    ID      AREA     PEAK DISCHARGE  RUNOFF VOLUME  RUNOFF  TIME TO PEAK  CFS PER
                IDENTIFICATION  NO.   NO.    (SQ MI)       (CFS)        (AC-FT)      (INCHES)   (HOURS)     ACRE      NOTATION
*S FILE NAME      P1100-24.TXT
 *S
 *S TITLE 1 - EL PUEBLO ROAD DRAINAGE STUDY TO NORTH DIVERSION CHANNEL
 *S TITLE 2 - FUTURE DEVELOPMENT CONDITIONS-
 *S
 *S PROPOSED IMPROVEMENT P1 -
 *S
 *S   ASSUME 42-INCH CMP UNDER PDN IS BLOCKED  - AP 12.91
 *S   AND ASSUME NO FLOW PASSES THE N. DIV. CHAN. ON EL PUEBLO RD.  - AP 1.92
 *S   AP 1.98 = TOTAL Q THAT WILL BE AT INLET OF EX. 30-IN. CMP AT N. DIV. CHANNEL
 *S   OR PROPOSED OUTFALL AT SAME LOCATION
*S
*S          100-YR. 24-HOUR STORM
*S     THIS IS AN AHYMO_97 HYDROLOGIC MODEL FOR:
*S          THE EL PUEBLO ROAD DRAINAGE STUDY
*S          (Study of Drainage to the North Diversion Channel from
*S          Paseo Del Norte and North Frontage Road, El Pueblo Rd.
*S          and Basins south of El Pueblo Rd. to N. Div. Channel inlet
*S          located approx. 100 ft. south of El Pueblo Rd.)
*S             PREPARED FOR AMAFCA
*S             PREPARED BY SMITH ENGINEERING COMPANY (PLS, FC)
*S
*S        MODEL DESCRIPTION -
*S
*S   1.   THIS MODEL IS FOR FUTURE DEVELOPMENT CONDITIONS
*S        NOTE THAT MOST BASINS ARE FULLY DEVELOPED NOW OR WILL BE
*S        VERY SOON. LAND USE TREATMENT %'S WERE DETERMINED FROM
*S        AERIAL PHOTOGRAPHS, FIELD OBSERVATION AND COMMERCIAL INDUSTRIAL
*S        NATURE OF ALL OF THE DRAINAGE BASINS.
*S   2.   100-YEAR 24-HOUR RAINFALL EVENT (RAINFALL DATA OBTAINED FROM
*S        NOAA ATALS 14 - INTERNET DATA
*S   3.   STORM DRAINS ARE MODELED AS THE LESSOR OF THE COMBINBED
*S        INLET CAPACITIES OR THE NON-PRESSURE FULL PIPE FLOW (WHICHEVER
*S        IS LESS AS THE DIVIDE HYDRROGRAPH DISCHARGE,
*S   4.   NO SEDIMENT BULKING APPLIED DUE TO
*S              A.  ALL BASINS ARE OR WILL VERY SOON BE DEVELOPED
*S   5.   USE PROCEDURES FROM COA DPM SECTION 22
*S
START
LOCATION                          BERNALILLO COUNTY                                                          TIME=       .00
```

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
*S
RAINFALL  TYPE= 2                                                                                    RAIN24=   2.690
*S

COMPUTE NM HYD        34.00   -     1        .02144        51.12       2.437      2.13086    1.500    3.726 PER IMP=  80.00
*S
COMPUTE NM HYD        33.00   -     2        .00864        19.92       1.056      2.29091    1.500    3.603 PER IMP=  90.00
*S
ADD HYD               33.98  1& 2   5        .03008        71.04       3.492      2.17681    1.500    3.690
*S
*S HYD 33.98 IS TOTAL Q TO 30" RCP FROM EAST OF I-25 AND I-25 MEDIAN DICHTES
*S
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 2 NOTATION
COMPUTE NM HYD	35.00	-	1	.04323	101.74	5.210	2.25982	1.500	3.677	PER IMP= 90.00
*S										
ADD HYD	35.99	1& 5	5	.07331	172.79	8.702	2.22576	1.500	3.683	
*S										
*S HYD 35.99 IS TOTAL Q EXISTING RETENTION POND IN BASIN 35.00										
*S										
DIVIDE HYD	35.91	5	50	.07331	172.79	8.702	2.22576	1.500	3.683	
	35.92	and	51	.00000	.00	.000	.00000	-.050	.000	
*S HYD 35.91 IS TOTAL FLOW TO EXISTING RETENTION POND IN BASIN 29.00										
*S										
*S HYD 35.92 IS EXCESS FLOW (NONE IN EXISTING CONDITIONS)										
*S										
COMPUTE NM HYD	30.00	-	1	.03753	94.09	4.523	2.25982	1.500	3.917	PER IMP= 90.00
*S										
DIVIDE HYD	30.91	1	10	.03437	58.00	4.143	2.25982	1.400	2.636	
	30.92	and	11	.00316	36.09	.380	2.25982	1.500	17.873	
*S HYD 30.91 IS SUM OF EXISTING INLET CAPACITIES										
*S										
*S HYD 30.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.										
*S										
COMPUTE NM HYD	31.00	-	1	.02262	56.72	2.726	2.25982	1.500	3.918	PER IMP= 90.00
*S										
DIVIDE HYD	31.91	1	12	.02105	37.00	2.537	2.25981	1.450	2.746	
	31.92	and	13	.00157	19.72	.189	2.25981	1.500	19.658	
*S HYD 31.91 IS SUM OF EXISTING INLET CAPACITIES										
*S										
*S HYD 31.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.										
*S										
COMPUTE NM HYD	29.00	-	1	.04144	77.66	4.803	2.17330	1.600	2.928	PER IMP= 85.00
*S										
ADD HYD	31.93	10&12	5	.05543	95.00	6.680	2.25981	1.450	2.678	
*S										

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
*S HYD 31.93 IS Q IN JEFFERSON STORM DRAIN BEFORE ADDING BASIN 29.00
*S
*S
ADD HYD              31.94  1& 5   5        .09687       172.66      11.484      2.22280    1.600    2.785
*S
*S HYD 31.94 IS Q IN JEFFERSON STORM DRAIN AFTER ADDING BASIN 29.00
*S
*S

ADD HYD              31.95 11&13   6        .00472        55.81        .569      2.25981    1.500   18.465
*S
*S HYD 31.95 IS Q IN JEFERSON STREET
*S
*S
COMPUTE NM HYD       32.00   -     1        .02313        51.27       2.788      2.25982    1.550    3.463 PER IMP=  90.00
*S
DIVIDE HYD           32.91    1   14        .02225        40.00       2.682      2.25980    1.500    2.809
                     32.92  and   15        .00088        11.27        .106      2.25980    1.550   19.996
*S HYD 32.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 32.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
```


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

```
*S
ADD HYD              32.95   5&14   7        .11912       212.66      14.165      2.22971    1.600    2.790
*S
*S HYD 32.95 IS Q IN JEFF. ST. SD BEFORE ADDING E. BOUND PDN SD Q
*S
*S
ADD HYD              32.99   6&15  30        .00560        65.57        .675      2.25981    1.500   18.283
*S
*S HYD 32.99 IS TOTAL JEFF. ST. FLOW THAT WILL FLOW WEST ON EAST BOUND PDN
*S
*S
COMPUTE NM HYD       28.00   -     1        .00624        14.39        .810      2.43285    1.550    3.603 PER IMP= 100.00
*S
DIVIDE HYD           28.91    1   16        .00570         9.00        .740      2.43279    1.450    2.467
                     28.92  and   17        .00054         5.39        .070      2.43279    1.550   15.620
*S HYD 28.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 28.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON E. BOUND PDN.
*S
ADD HYD              32.96   7&16  31        .12482       221.66      14.905      2.23899    1.600    2.775
*S
*S HYD 32.96 IS TOTAL Q IN JEFF. ST. AT E. BOUND PDN
*S
*S
```

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
COMPUTE NM HYD          27.00   -     1        .00641        14.78        .832      2.43285    1.550    3.603 PER IMP= 100.00
*S
DIVIDE HYD              27.91    1   18        .00598        10.00        .775      2.43279    1.450    2.614
                        27.92  and   19        .00043         4.78        .056      2.43279    1.550   17.230
*S HYD 27.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 27.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD          26.00   -     1        .02574        58.13       3.102      2.25982    1.500    3.529 PER IMP=  90.00
*S
DIVIDE HYD              26.91    1   20        .02283        33.00       2.752      2.25981    1.450    2.258
                        26.92  and   21        .00291        25.13        .351      2.25981    1.500   13.495
*S HYD 26.91 IS SUM OF EXISTING INLET CAPACITIES


*S
*S HYD 26.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
ADD HYD                 27.95 31&18  32        .13079       231.66      15.680      2.24784    1.600    2.767
*S
*S HYD 27.95 IS Q IN JEFF. ST. STORM DRAIN AT W. BOUND PDN
*S
*S
ADD HYD                 27.96 20&32  33        .15362       264.66      18.432      2.24962    1.600    2.692
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 27.96 IS TOTAL Q IN JEFF. ST. STORM DRAIN AT W. BOUND PDN
*S           TO DOM. BACA ARROYO
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 4 NOTATION
ADD HYD	28.95	30&17	60	.00614	70.04	.745	2.27499	1.500	17.818	
*S										
*S HYD 28.95 IS TOTAL Q IN E. BOUND PDN AT JEFFERSON ST.										
*S										
*S										
DIVIDE HYD	28.71	60	85	.00154	17.51	.186	2.27499	1.500	17.818	
	28.72	and	86	.00461	52.53	.559	2.27499	1.500	17.818	
*S HYD 28.71 IS FLOW ASSUMED TO SPILL FROM PDN INTO BASIN 10 (NO CONC. WALL)										
*S										
*S HYD 28.72 IS THE FLOW THAT WILL CONTINUE W. ON E. BOUND PDN.										
*S										
ADD HYD	27.97	19&21	5	.00334	29.34	.407	2.28224	1.550	13.713	
*S										
*S HYD 27.97 IS TOTAL Q IN W. BOUND PDN AT JEFFERSON ST.										
*S										
*S										

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
COMPUTE NM HYD          21.00   -     1        .00298         7.86        .387      2.43286    1.500    4.119 PER IMP= 100.00
*S
ADD HYD                 21.98  1& 5   5        .00632        36.83        .794      2.35318    1.500    9.101
*S
*S HYD 21.98 IS Q IN W. BOUND PDN
*S
*S
DIVIDE HYD              21.91    5   61        .00426        14.00        .535      2.35318    1.450    5.129
                        21.92  and   11        .00206        22.83        .258      2.35318    1.500   17.329
*S HYD 21.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 21.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD          19.00   -     1        .00192         5.06        .249      2.43285    1.500    4.121 PER IMP= 100.00
*S
ADD HYD                 19.99  1&11   5        .00398        27.89        .507      2.39156    1.500   10.955
*S
*S HYD 19.99 IS Q IN W. BOUND PDN


*S
*S
DIVIDE HYD              19.91    5   62        .00306        13.00        .390      2.39156    1.500    6.645
                        19.92  and   11        .00092        14.89        .118      2.39156    1.500   25.252
*S HYD 19.91 IS SUM OF EXISTING INLET CAPACITIES(to 24" SD in Front. Rd)
*S
*S HYD 19.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
DIVIDE HYD              19.93   11   63        .00046         7.45        .059      2.39156    1.500   25.252
                        19.94  and   12        .00046         7.45        .059      2.39156    1.500   25.252
*S HYD 19.93 ASSUME 50% SPILLS THRU CONC. WALL OPENING(RR TRACKS)TO FRONT. ROAD
*S
*S HYD 19.94 EXCESS THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD          18.00   -     1        .00226         5.39        .293      2.43285    1.500    3.727 PER IMP= 100.00
*S
ADD HYD                 18.99  1&12   5        .00272        12.84        .352      2.42573    1.500    7.372
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 5 NOTATION

```
*S HYD 18.99 IS Q IN W. BOUND PDN
*S
*S
DIVIDE HYD              18.91    5   64        .00250         9.00        .324      2.42573    1.500    5.621
                        18.92  and   11        .00022         3.84        .028      2.42573    1.500   27.367
*S HYD 18.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S *    *    *    *    *    *    *    *    *    *    *    *
```

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
*S HYD 18.92 EXCESS THAT WILL FLOW W. ON W. BOUND PDN.
*S           THAT WILL PASS THE NORTH DIVERSION CHANNEL
*S *    *    *    *    *    *    *    *    *    *    *    *
*S
COMPUTE NM HYD         25.00   -     1        .01168        28.51       1.471      2.36188    1.500    3.815 PER IMP=  95.00
*S
DIVIDE HYD             25.91    1    65        .01058        17.00       1.332      2.36186    1.450    2.511
                       25.92  and    11        .00110        11.51        .139      2.36186    1.500   16.311
*S HYD 25.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 25.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
COMPUTE NM HYD         24.00   -     1        .00066         1.74        .086      2.43285    1.500    4.130 PER IMP= 100.00
*S
ADD HYD                24.99  1&11    5        .00176        13.26        .225      2.38829    1.500   11.751
*S
*S HYD 24.99 IS Q W. BOUND IN FRONTAGE RD. JUST EAST OF RR TRACKS
*S
*S
DIVIDE HYD             24.91    5    15        .00114         5.00        .145      2.38829    1.450    6.852
                       24.92  and    11        .00062         8.26        .079      2.38829    1.500   20.717
*S HYD 24.91 IS SUM OF EXISTING INLET CAPACITIES TO 24" CMP OUT OF BASIN
*S

*S HYD 24.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
ADD HYD                24.97 62&15   66        .00420        18.00        .535      2.39067    1.500    6.701
*S     *     *     *     *     *     *     *     *     *
*S HYD 24.97 IS TOTAL Q IN 24" SD THAT LEAVES BASIN JUST WEST OF RR TRACKS
*S     *     *     *     *     *     *     *     *     *
*S
*S
DIVIDE HYD             24.93   11    67        .00031         4.13        .040      2.38829    1.500   20.717
                       24.94  and    11        .00031         4.13        .040      2.38829    1.500   20.717
*S     *     *     *     *     *     *     *     *     *
*S HYD 24.93 ASSUME 50% OF FRONT. RD. Q SPILLS OUT OF BASIN AT RR TRACKS
*S     *     *     *     *     *     *     *     *     *
*S
*S HYD 24.94 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
ADD HYD                24.95 11&63    5        .00077        11.58        .098      2.39024    1.500   23.423
*S
*S HYD 24.95 IS Q IN FRONT. RD. INCLUDING SPILL FROM W.BOUND PDN AT RR TRACKS
*S
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 6 NOTATION

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
COMPUTE NM HYD          23.00   -     1        .00082        2.17        .106      2.43285    1.500    4.130 PER IMP= 100.00
*S
ADD HYD                 23.99  1& 5   5        .00159       13.74        .205      2.41198    1.500   13.487
*S
*S HYD 23.99 IS Q W. BOUND IN FRONTAGE RD. AT PRIVATE DRIVEWAY
*S
*S
DIVIDE HYD              23.91    5   68        .00127       10.99        .164      2.41198    1.500   13.487
                        23.92  and   11        .00032        2.75        .041      2.41198    1.500   13.487
*S     *     *      *      *      *      *      *      *      *
*S HYD 23.91 ASSUME 80% SPILLS FROM FRONTAGE RD. TO PRIVATE DRIVEWAY
*S           (out of basin)
*S     *     *      *      *      *      *      *      *      *
*S
*S HYD 23.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
COMPUTE NM HYD          22.00   -     1        .00044        1.17        .057      2.43285    1.500    4.139 PER IMP= 100.00
*S
ADD HYD                 22.97  1&11   5        .00076        3.91        .098      2.42362    1.500    8.064
*S
*S HYD 22.97 IS Q IN W. BOUND IN FRONTAGE RD.
*S
*S
DIVIDE HYD              22.91    5   69        .00065        2.00        .085      2.42362    1.500    4.779
                        22.92  and   11        .00010        1.91        .014      2.42362    1.500   28.627
*S HYD 22.91 SUM OF INLET CAPACITIES
*S
*S HYD 22.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.


*S
DIVIDE HYD              22.93   11   70        .00008        1.44        .010      2.42362    1.500   28.627
                        22.94  and   71        .00003         .48        .003      2.42362    1.500   28.627
*S     *     *      *      *      *      *      *      *      *
*S HYD 22.93 ASSUME 75% SPILLS OUT OF FRONTAGE RD DUE TO CURB OPENING
*S           (out of drainage basin)
*S     *     *      *      *      *      *      *      *      *
*S
*S    *    *     *     *     *     *     *     *     *
*S HYD 22.94 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S           PAST THE NORTH DIVERSION CHANNEL
*S
COMPUTE NM HYD          20.00   -     1        .00327        8.62        .424      2.43286    1.500    4.119 PER IMP= 100.00
*S
ADD HYD                 20.99  1&86   5        .00788       61.15        .983      2.34049    1.500   12.131
*S
*S HYD 20.99 IS Q IN E. BOUND PDN
*S
*S
DIVIDE HYD              20.91    5   72        .00473       17.00        .590      2.34049    1.450    5.618
                        20.92  and   11        .00315       44.15        .393      2.34049    1.500   21.910
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AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
*S HYD 20.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 20.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN

                                FROM  TO                    PEAK        RUNOFF                TIME TO   CFS      PAGE =    7
                   HYDROGRAPH   ID    ID        AREA      DISCHARGE     VOLUME      RUNOFF     PEAK     PER
COMMAND          IDENTIFICATION NO.   NO.     (SQ MI)     (CFS)       (AC-FT)    (INCHES)   (HOURS)   ACRE      NOTATION

*S
COMPUTE NM HYD         17.00    -     1       .00200       5.28        .260      2.43286    1.500    4.121 PER IMP= 100.00
*S
ADD HYD                17.99  1&11    5       .00515      49.43        .653      2.37631    1.500   15.000
*S
*S HYD 17.99 IS Q IN E. BOUND PDN
*S
*S
DIVIDE HYD             17.91    5    73       .00284      13.00        .361      2.37631    1.450    7.140
                       17.92  and    11       .00230      36.43        .292      2.37631    1.500   24.706
*S HYD 17.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 17.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
DIVIDE HYD             17.93   11    74       .00161      25.50        .204      2.37631    1.500   24.706
                       17.94  and    12       .00069      10.93        .088      2.37631    1.500   24.706
*S HYD 17.93 ASSUME 70% SPILLS THRU OPENING IN CONC. WALL BARRIER (RR TRACKS)
*S
*S HYD 17.94 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
COMPUTE NM HYD         16.00    -     1       .00183       4.71        .237      2.43286    1.500    4.020 PER IMP= 100.00
*S
ADD HYD                16.99  1&12    5       .00252      15.64        .325      2.41721    1.500    9.691
*S
*S HYD 16.99 IS Q IN E. BOUND PDN


*S
*S
DIVIDE HYD             16.91    5    75       .00219       8.00        .283      2.41722    1.450    5.699
                       16.92  and    76       .00033       7.64        .042      2.41722    1.500   36.411
*S HYD 16.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 16.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S           ACROSS THE NORTH DIVERSION CHANNEL
*S    *     *     *     *     *     *     *     *     *
*S
ADD HYD                16.93 64&75   77       .00470      17.00        .606      2.42176    1.500    5.657
*S
*S HYD 16.93 IS INTERMEDIATE Q IN PDN SHORT STORM DRAIN THAT OUTFALLS
*S              UNDER PDN MEDIAN TO THE N. DIV. CHANNEL
*S
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```
*S
ADD HYD                16.94 77&69  78        .00535        19.00        .691      2.42198    1.500    5.550
*S     *     *     *     *     *     *     *     *     *
*S
*S HYD 16.94 IS TOTAL Q IN PDN SHORT STORM DRAIN THAT OUTFALLS
*S              UNDER PDN MEDIAN TO THE N. DIV. CHANNEL
*S     *     *     *     *     *     *     *     *     *
*S
*S
COMPUTE NM HYD         15.00   -     1        .00094         2.48        .122      2.43285    1.500    4.127 PER IMP= 100.00
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 8 NOTATION
DIVIDE HYD	15.91	1	10	.00024	.62	.030	2.43255	1.500	4.127	
	15.92	and	11	.00071	1.86	.091	2.43255	1.500	4.127	

```
*S HYD 15.91 ASSUME 25% SPILLS THROUGH CURB OPENING TOWARDS EX. INLET
*S
*S     *     *     *     *     *     *     *     *     *     *     *
*S HYD 15.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
COMPUTE NM HYD         10.00   -     1        .00690        13.01        .399      1.08438    1.500    2.945 PER IMP=   5.00
*S
ADD HYD                10.97 1&85   4        .00844        30.52        .585      1.30110    1.500    5.653
*S
*S HYD 10.97 IS SPILL FROM PDN PLUS BASIN 10
*S
*S
ADD HYD                10.98 4&10   6        .00867        31.14        .616      1.33175    1.500    5.611
*S
*S HYD 10.98 IS SPILL FROM BASIN 10 AND PART OF BASIN 15 INTO EL PUEBLO RD
*S
*S
ADD HYD                15.99 11& 6  5        .00938        33.00        .707      1.41452    1.500    5.500
*S
*S HYD 15.99 IS FLOW IN EL PUEBLO RD. AT W.END BASIN 15


*S
*S
COMPUTE NM HYD         14.00   -     1        .00162         4.15        .198      2.29091    1.500    4.006 PER IMP=  90.00
*S
ADD HYD                14.98 5& 1  15        .01100        37.15        .905      1.54361    1.500    5.280
*S
*S HYD 14.98 IS TOTAL FLOW IN EL PUEBLO RD. IN BASIN 14
*S
*S
DIVIDE HYD             14.91  15   11        .00861        16.00        .709      1.54361    1.450    2.903
                       14.92 and   12        .00238        21.15        .196      1.54361    1.500   13.860
```

```
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 14.91 SUM OF EX. INLET CAPACITIES IN BASIN 14 EL PUEBLO RD.
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 14.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD                25.93 61&65   5        .01484        31.00       1.868      2.35936    1.450    3.264
*S
*S HYD 25.93 IS ADDITIONAL Q FROM FRONT. RD. AND W. BOUND PDN INLETS
*S           TO 24" CMP ALONG N. SIDE OF EL PUEBLO RD.
*S
*S
ADD HYD                20.95  5&72   6        .01957        48.00       2.458      2.35480    1.450    3.832
*S
*S HYD 20.95 IS ADD Q FROM E. BOUND PDN INLETS TO 24" CMP
*S           ALONG N. SIDE OF EL PUEBLO RD.
*S
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 9 NOTATION
ADD HYD	14.94	6&11	17	.02818	64.00	3.167	2.10693	1.450	3.549	

```
*S
*S HYD 14.94 IS TOTAL Q TO 24" CMP ALONG N. SIDE OF EL PUEBLO RD. AND OUTFALLS
*S           TO ASPHALT CHANNEL
*S
*S
COMPUTE NM HYD         9.00    -     1        .01792        36.49       2.054      2.14897    1.550    3.181 PER IMP=  80.00
*S
DIVIDE HYD             9.92    1    11        .01792        36.49       2.054      2.14894    1.550    3.181
                       9.91  and    52        .00000          .00        .000       .00000    -.050     .000
*S HYD 9.92 ASSUME 100% BY PASSES EXISTING RETENTION POND INTO BASIN 8
*S
*S HYD 9.91 Q THAT COULD FLOW TO EXISTING RETENTION POND
*S
COMPUTE NM HYD         8.00    -     1        .07904       145.35       8.311      1.97152    1.550    2.873 PER IMP=  70.00
*S
ADD HYD                8.99  1&11    5        .09696       181.84      10.365      2.00431    1.550    2.930
*S    *     *     *     *     *     *     *     *     *     *
*S
*S HYD 8.99 IS TOTAL Q THAT WILL SPILL INTO EL PUEBLO RD. FROM BASINS

*S          EAST OF RR TRACKS
*S
*S    *     *     *     *     *     *     *     *     *
ADD HYD               14.99  5&15   6        .10796       211.64      11.270      1.95738    1.550    3.063
*S
*S HYD 14.99 IS TOTAL Q IN EL PUEBLO RD AT RR TRACKS
```

```
*S
*S
DIVIDE HYD              14.81    6   18        .08636       169.32       9.016      1.95738    1.550    3.063
                        14.82  and   11        .02159        42.33       2.254      1.95738    1.550    3.063
*S HYD 14.81 ASSUME 80% SPILLS FROM EL PUEBLO RD. AT RR TRACKS
*S           TO ASPHALT CHANNEL
*S
*S HYD 14.82 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD                 14.95 17&18   5        .11454       233.32      12.183      1.99418    1.550    3.183
*S
*S HYD 14.95 IS TOTAL Q AT EAST END OF ASPHALT CHANNEL (N. OF EL PUEBLO RD)
*S
*S
COMPUTE NM HYD          12.00    -    1        .00128         2.42        .074      1.08439    1.500    2.959 PER IMP=   5.00
*S
ADD HYD                 12.97  1& 5   6        .11582       235.44      12.256      1.98397    1.550    3.176
*S
*S HYD 12.97 PARTIAL Q IN ASPHALT CHANNEL BEFORE ADDING PRIVATE STORM DRAIN
*S
*S
COMPUTE NM HYD           7.00    -    1        .00586        15.22        .738      2.36188    1.500    4.058 PER IMP=  95.00
*S
DIVIDE HYD               7.91    1   13        .00472         6.00        .594      2.36182    1.350    1.988
                         7.92  and   12        .00114         9.22        .144      2.36183    1.500   12.592
*S HYD 7.91 SUM OF INLET CAPACITIES (TO 42" SD UNDER EL PUEBLO RD)
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 10 NOTATION

```
*S HYD 7.92 EXCESS Q THAT SPILL INTO EL PUEBLO RD
*S
ADD HYD                  7.95 11&12  79        .02273        49.35       2.398      1.97771    1.550    3.392
*S
*S HYD 7.95 Q IN EL PUEBLO RD
*S
*S
COMPUTE NM HYD           6.00    -    1        .00853        22.14       1.074      2.36188    1.500    4.056 PER IMP=  95.00
*S
DIVIDE HYD               6.91    1   11        .00853        22.00       1.074      2.36185    1.500    4.032
                         6.92  and   80        .00000          .14        .001      2.36170    1.500   47.628
*S HYD 6.91 SUM OF INLET CAPACITIES (TO 42" SD UNDER EL PUEBLO RD)
*S
*S HYD 6.92 EXCESS Q THAT WILL SPILL INTO BASIN 4 IF INLET CAPACITY EXCEEDED
*S
ADD HYD                  6.95 11&13   5        .01324        28.00       1.668      2.36184    1.500    3.304

*S
```

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
*S HYD 6.95 Q IN EL PUEBLO RD
*S
*S
ADD HYD                12.98  5& 6   7        .12907       260.39      13.924      2.02274    1.550    3.152
*S
*S HYD 12.98 PARTIAL Q IN ASPHALT CHANNEL AFTER ADDING 42" PRIVITE SD
*S           (UNDER EL PUEBLO RD)
*S
*S
ADD HYD                12.99  7&73   5        .13191       273.39      14.284      2.03036    1.550    3.238
*S
*S    *      *      *      *      *      *      *      *      *      *
*S HYD 12.99 TOTAL Q IN ASPHALT CHANNEL TO 42" UNDER PDN
*S    *      *      *      *      *      *      *      *      *      *
*S
*S
*S    *      *      *      *      *      *      *      *      *      *
*S NOTE 42-INCH CUVLERT HAS 35 CFS CAPACITY - ASSUME O FOR THIS MODEL
DIVIDE HYD             12.91    5   81        .01690         1.00       1.830      2.03036     .600     .092
                       12.92  and   11        .11501       272.39      12.454      2.03036    1.550    3.701
*S HYD 12.91 IS THE CAPACITY OF THE 42" SD UNDER PASEO DEL NORTE
*S
*S HYD 12.92 EXCESS Q THAT WILL SPILL INTO BASIN 2 IF 42" SD CAP. EXCEEDED
*S
ADD HYD                12.93 11&74   5        .11662       286.98      12.658      2.03515    1.500    3.845
*S
*S HYD 12.93 IS FLOW ALONG RR TRACKS JUST S. OF PDN IN BASIN 2
*S
*S
COMPUTE NM HYD          2.00    -    1        .00176         4.58        .222      2.36188    1.500    4.066 PER IMP=  95.00
*S
ADD HYD                 2.98  1& 5   10        .11838       291.56      12.880      2.04000    1.500    3.848
*S
*S HYD 2.98 IS FLOW ALONG RR TRACKS JUST E. OF EL PUEBLO RD. CROSSING RR TRACKS
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 11 NOTATION
*S										
COMPUTE NM HYD	13.00	-	1	.00043	1.14	.056	2.43286	1.500	4.139	PER IMP= 100.00
*S										
ADD HYD	13.99	1&79	5	.02316	50.32	2.454	1.98615	1.550	3.394	
*S										
*S HYD 13.99 IS FLOW IN EL PUEBLO RD.										
*S										
*S										
COMPUTE NM HYD	11.00	-	1	.00053	1.40	.069	2.43285	1.500	4.134	PER IMP= 100.00
*S										
ADD HYD	11.99	1& 5	6	.02369	51.52	2.523	1.99613	1.550	3.398	

```
*S
*S HYD 11.99 IS FLOW IN EL PUEBLO RD.


*S
*S
DIVIDE HYD            11.91    6   11        .00711        15.46        .757      1.99613    1.550    3.398
                      11.92  and   12        .01659        36.07       1.766      1.99613    1.550    3.398
*S HYD 11.91 ASSUME 30% OF EL PUEBLO RD. FLOW SPILLS N. INTO BASIN 2 AT
*S           RR TRACK INTERSECTION WITH EL PUEBLO RD.
*S
*S HYD 11.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
DIVIDE HYD            11.93   12   15        .00995        21.64       1.059      1.99613    1.550    3.398
                      11.94  and   14        .00663        14.43        .706      1.99613    1.550    3.398
*S HYD 11.93 ASSUME 60% OF EL PUEBLO RD. FLOW SPILLS OUT S. OF EL PUEBLO RD.
*S           AT RR TRACK INTERSECTION WITH EL PUEBLO RD. (WILL FLOW TOWARDS
*S           30" CMP OUTFALL TO N. DIV. CHAN.
*S
*S HYD 11.94 ASSUME EXCESS WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD                2.99 11&10    5        .12549       306.72      13.637      2.03751    1.500    3.819
*S
*S HYD 2.99 IS TOTAL FLOW TO INLETS AT THE RR TRACK INTERSECTION WITH
*S          EL PUEBLO RD.
*S
*S
DIVIDE HYD             2.91    5   10        .04306        26.00       4.679      2.03751    1.300     .944
                       2.92  and   11        .08243       280.72       8.958      2.03751    1.500    5.321
*S HYD 2.91 SUM OF ALL INLET CAPACITIES
*S
*S HYD 2.92 EXCESS Q THAT WILL SPILL INTO BASIN 1 (EL PUEBLO RD.)
*S
COMPUTE NM HYD         1.00    -    1        .00218         4.72        .184      1.58119    1.500    3.384 PER IMP=  40.00
*S
ADD HYD                1.98  1&11    5        .08461       285.44       9.142      2.02576    1.500    5.271
*S
*S HYD 1.98 IS FLOW IN EL PUEBLO RD.
*S
*S
ADD HYD                1.99  5&14    6        .09125       299.59       9.848      2.02360    1.500    5.130
*S
*S HYD 1.99 IS TOTAL FLOW IN EL PUEBLO RD. AT THE S. SIDE CURB CUT
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 12 NOTATION

```
*S          JUST EAST OF THE N. DIV. CHANNEL (OUTFALLS TO 30" CMP
*S          UNDER N. DIV. CHAN.
*S
```

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

```
*S
*S ASSUME FOR THIS MODEL THAT 100% OF FLOW SPILLS TO EX. 30-IN.CMP
*S AT N. DIV. CHANNEL
DIVIDE HYD                1.91    6   82        .09125       299.59       9.848      2.02360    1.500    5.130
                          1.92  and   83        .00000          .00        .000       .00000    -.050     .000
*S HYD 1.91 ASSUME 100% OF EL PUEBLO RD. FLOW WILL SPILL THROUGH
*S          S. SIDE CURB CUT JUST EAST OF THE N. DIV. CHANNEL


*S          (OUTFALLS TO 30" CMP UNDER N. DIV. CHAN.
*S
*S    *      *      *      *      *     *      *      *      *      *
*S HYD 1.92 EXCESS EL PUEBLO RD. Q THAT WILL FLOW ACROSS
*S          THE NORTH DIVERSION CHANNEL
*S    *      *      *      *      *     *      *      *      *      *
*S
ADD HYD                  11.95 10&15   5        .05301        47.64       5.738      2.02974    1.550    1.404
*S
*S HYD 11.95 IS PARTIAL Q TO THE 30" CMP UNDER N. DIV. CHAN.
*S
*S
ADD HYD                   1.95  5&82  84        .14426       346.81      15.586      2.02585    1.500    3.756
*S    *      *      *      *      *     *      *      *      *      *
*S HYD 1.95 IS PARTIAL Q TO THE 30" CMP UNDER N. DIV. CHAN.
*S          (EXCLUDES Q FROM EXISTING PNM 21" CMP THAT OUTFALLS
*S          AT THE INLET TO THE 30" CMP)
*S    *      *      *      *      *     *      *      *      *      *
*S
*S
COMPUTE NM HYD            4.00    -    1        .06456        96.52       4.646      1.34940    1.600    2.336 PER IMP=  25.00
*S
ADD HYD                   4.99  1&80    5        .06456        96.52       4.647      1.34947    1.600    2.336
*S
*S HYD 4.99 IS BASIN 4 COMBINED WITH ANY SPILL FROM BASIN 6
*S
*S
*S DIVIDE BY CAPACITY OF 21" CMP IN PNM POND
*S
DIVIDE HYD                4.91    5   10        .03143        17.00       2.262      1.34947    1.400     .845
                          4.92  and   11        .03314        79.52       2.385      1.34947    1.600    3.749
*S HYD 4.91 IS MAX, CAPACITY OF 21" RCP (with 11 ft. head)
*S          FROM THE PNM POND THAT OUTFALLS AT THE 30"CMP AT N. DIV. CHAN.
*S
*S    *      *      *      *      *     *      *      *      *      *
*S HYD 4.92 FLOW IN EXCESS OF 21" RCP CAPACITY THAT WILL REMAIN IN PND POND
*S    *      *      *      *      *     *      *      *      *      *
*S
*S ADD PNM 21" CMP Q TO Q AT INLET TO 30" CMP AT N. DIV. CHAN.
*S         THIS IS TOTAL Q AT 30" CMP
*S
```

AHYMO_97 MODEL FOR IMPROVEMENT P1 - only 2 AP divides were changed as compared to existing conditions model – see description on page 1 this summary

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	1.98	84&10	87	.17568	363.81	17.848	1.90486	1.500	3.236	
*S										
*S HYD 1.98 IS TOTAL Q AT 30" CMP AT N. DIV. CHAN.										
*S										
*S										
DIVIDE HYD	1.96	87	90	.07814	48.00	7.939	1.90486	1.300	.960	
	1.97	and	91	.09754	315.81	9.910	1.90486	1.500	5.059	
*S * * * * * * * * * *										
*S										
*S HYD 1.96 IS THE CAPACITY OF THE EX. 30" CMP TO N. DIV. CHAN.										
*S										
*S * * * * * * * * * *										
*S HYD 1.97 FLOW IN EXCESS OF 30" CMP THAT WILL SPILL TO N. DIV. CHANNEL										
*S										
*S * * * * * * * * * *										
*S										
COMPUTE NM HYD	5.00	-	1	.05271	82.37	3.048	1.08438	1.550	2.442	PER IMP= 5.00
*S										
COMPUTE NM HYD	3.00	-	2	.00520	12.64	.587	2.11494	1.500	3.797	PER IMP= 80.00
*S										
ADD HYD	3.97	1& 2	6	.05791	93.23	3.635	1.17691	1.550	2.515	
*S * * * * * * * * * *										
*S										
*S HYD 3.97 IS Q TO N. DIV. CHANNEL INLET (JUST SOUTH OF RR TRACKS)										
*S * * * * * * * * * *										
*S										
*S										
FINISH										

2nd. Model ***WITHOUT proposed drainage improvements***)

AHYMO_97 Summary Table and Input File

File name EI100-24.txt

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                                  - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =12/10/2006
INPUT FILE = Z:\Projects\2003PR-1\103115-3\ahymo\EI100-24.TXT                                      USER NO.= AHYMO-S-9702c01SEC01A-AH

                                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
*S FILE NAME     EI100-24.TXT
*S
*S TITLE 1 - EL PUEBLO ROAD DRAINAGE STUDY TO NORTH DIVERSION CHANNEL
*S TITLE 2 - FUTURE DEVELOPMENT CONDITIONS- EXISTING INFRASTRUCTURE
*S           100-YR. 24-HOUR STORM
*S      THIS IS AN AHYMO_97 HYDROLOGIC MODEL FOR:
*S           THE EL PUEBLO ROAD DRAINAGE STUDY
*S           (Study of Drainage to the North Diversion Channel from
*S           Paseo Del Norte and North Frontage Road, El Pueblo Rd.
*S           and Basins south of El Pueblo Rd. to N. Div. Channel inlet
*S           located approx. 100 ft. south of El Pueblo Rd.)
*S              PREPARED FOR AMAFCA
*S              PREPARED BY SMITH ENGINEERING COMPANY (PLS, FC)
*S
*S         MODEL DESCRIPTION -
*S
*S   1.    THIS MODEL IS FOR FUTURE DEVELOPMENT CONDITIONS
*S         NOTE THAT MOST BASINS ARE FULLY DEVELOPED NOW OR WILL BE
*S         VERY SOON. LAND USE TREATMENT %'S WERE DETERMINED FROM
*S         AERIAL PHOTOGRAPHS, FIELD OBSERVATION AND COMMERCIAL INDUSTRIAL
*S         NATURE OF ALL OF THE DRAINAGE BASINS.
*S   2.    100-YEAR 24-HOUR RAINFALL EVENT (RAINFALL DATA OBTAINED FROM
*S         NOAA ATALS 14 - INTERNET DATA
*S   3.    STORM DRAINS ARE MODELED AS THE LESSOR OF THE COMBINBED
*S         INLET CAPACITIES OR THE NON-PRESSURE FULL PIPE FLOW (WHICHEVER
*S         IS LESS AS THE DIVIDE HYDRROGRAPH DISCHARGE,
*S   4.    NO SEDIMENT BULKING APPLIED DUE TO
*S                A.  ALL BASINS ARE OR WILL VERY SOON BE DEVELOPED
*S   5.    USE PROCEDURES FROM COA DPM SECTION 22
*S
START
LOCATION                          BERNALILLO COUNTY                                                                   TIME=        .00
*S
RAINFALL  TYPE= 2
*S                                                                                                                     RAIN24=    2.690
COMPUTE NM HYD          34.00   -     1        .02144        51.12       2.437      2.13086     1.500     3.726 PER IMP=  80.00
*S
COMPUTE NM HYD          33.00   -     2        .00864        19.92       1.056      2.29091     1.500     3.603 PER IMP=  90.00
*S
ADD HYD                 33.98  1& 2   5        .03008        71.04       3.492      2.17681     1.500     3.690
*S
*S HYD 33.98 IS TOTAL Q TO 30" RCP FROM EAST OF I-25 AND I-25 MEDIAN DICHTES
*S
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```
*S
COMPUTE NM HYD          35.00   -     1        .04323       101.74       5.210      2.25982    1.500    3.677 PER IMP=  90.00
*S
ADD HYD                 35.99  1& 5   5        .07331       172.79       8.702      2.22576    1.500    3.683
*S
*S HYD 35.99 IS TOTAL Q EXISTING RETENTION POND IN BASIN 35.00
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 2 NOTATION
DIVIDE HYD	35.91	5	50	.07331	172.79	8.702	2.22576	1.500	3.683	
	35.92	and	51	.00000	.00	.000	.00000	-.050	.000	

```
*S HYD 35.91 IS TOTAL FLOW TO EXISTING RETENTION POND IN BASIN 29.00
*S
*S HYD 35.92 IS EXCESS FLOW (NONE IN EXISTING CONDITIONS)
*S
COMPUTE NM HYD          30.00   -     1        .03753        94.09       4.523      2.25982    1.500    3.917 PER IMP=  90.00
*S
DIVIDE HYD              30.91    1    10        .03437        58.00       4.143      2.25982    1.400    2.636
                        30.92  and    11        .00316        36.09        .380      2.25982    1.500   17.873
*S HYD 30.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 30.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
*S
COMPUTE NM HYD          31.00   -     1        .02262        56.72       2.726      2.25982    1.500    3.918 PER IMP=  90.00
*S
DIVIDE HYD              31.91    1    12        .02105        37.00       2.537      2.25981    1.450    2.746
                        31.92  and    13        .00157        19.72        .189      2.25981    1.500   19.658
*S HYD 31.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 31.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
*S
COMPUTE NM HYD          29.00   -     1        .04144        77.66       4.803      2.17330    1.600    2.928 PER IMP=  85.00
*S
ADD HYD                 31.93 10&12   5        .05543        95.00       6.680      2.25981    1.450    2.678
*S
*S HYD 31.93 IS Q IN JEFFERSON STORM DRAIN BEFORE ADDING BASIN 29.00
*S
*S
ADD HYD                 31.94  1& 5   5        .09687       172.66      11.484      2.22280    1.600    2.785
*S
*S HYD 31.94 IS Q IN JEFFERSON STORM DRAIN AFTER ADDING BASIN 29.00
*S
*S
ADD HYD                 31.95 11&13   6        .00472        55.81        .569      2.25981    1.500   18.465
*S
*S HYD 31.95 IS Q IN JEFERSON STREET
*S
*S
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COMPUTE NM HYD          32.00   -     1        .02313        51.27       2.788      2.25982    1.550    3.463 PER IMP=  90.00
*S
DIVIDE HYD              32.91   1    14        .02225        40.00       2.682      2.25980    1.500    2.809
                        32.92 and    15        .00088        11.27        .106      2.25980    1.550   19.996
*S HYD 32.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 32.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
*S
ADD HYD                 32.95 5&14    7        .11912       212.66      14.165      2.22971    1.600    2.790
*S
*S HYD 32.95 IS Q IN JEFF. ST. SD BEFORE ADDING E. BOUND PDN SD Q
*S
*S
```


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	32.99	6&15	30	.00560	65.57	.675	2.25981	1.500	18.283	
*S										
*S HYD 32.99 IS TOTAL JEFF. ST. FLOW THAT WILL FLOW WEST ON EAST BOUND PDN										
*S										
*S										
COMPUTE NM HYD	28.00	-	1	.00624	14.39	.810	2.43285	1.550	3.603	PER IMP= 100.00
*S										
DIVIDE HYD	28.91	1	16	.00570	9.00	.740	2.43279	1.450	2.467	
	28.92	and	17	.00054	5.39	.070	2.43279	1.550	15.620	
*S HYD 28.91 IS SUM OF EXISTING INLET CAPACITIES										
*S										
*S HYD 28.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON E. BOUND PDN.										
*S										
ADD HYD	32.96	7&16	31	.12482	221.66	14.905	2.23899	1.600	2.775	
*S										
*S HYD 32.96 IS TOTAL Q IN JEFF. ST. AT E. BOUND PDN										
*S										
*S										
COMPUTE NM HYD	27.00	-	1	.00641	14.78	.832	2.43285	1.550	3.603	PER IMP= 100.00
*S										
DIVIDE HYD	27.91	1	18	.00598	10.00	.775	2.43279	1.450	2.614	
	27.92	and	19	.00043	4.78	.056	2.43279	1.550	17.230	
*S HYD 27.91 IS SUM OF EXISTING INLET CAPACITIES										
*S										
*S HYD 27.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.										
*S										
COMPUTE NM HYD	26.00	-	1	.02574	58.13	3.102	2.25982	1.500	3.529	PER IMP= 90.00
*S										
DIVIDE HYD	26.91	1	20	.02283	33.00	2.752	2.25981	1.450	2.258	
	26.92	and	21	.00291	25.13	.351	2.25981	1.500	13.495	
*S HYD 26.91 IS SUM OF EXISTING INLET CAPACITIES										

```
*S
*S HYD 26.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
ADD HYD                27.95 31&18  32        .13079       231.66       15.680      2.24784    1.600    2.767
*S
*S HYD 27.95 IS Q IN JEFF. ST. STORM DRAIN AT W. BOUND PDN
*S
*S
ADD HYD                27.96 20&32  33        .15362       264.66       18.432      2.24962    1.600    2.692
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 27.96 IS TOTAL Q IN JEFF. ST. STORM DRAIN AT W. BOUND PDN
*S           TO DOM. BACA ARROYO
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S
ADD HYD                28.95 30&17  60        .00614        70.04         .745      2.27499    1.500   17.818
*S
*S HYD 28.95 IS TOTAL Q IN E. BOUND PDN AT JEFFERSON ST.
*S
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 4 NOTATION
DIVIDE HYD	28.71	60	85	.00154	17.51	.186	2.27499	1.500	17.818	
	28.72	and	86	.00461	52.53	.559	2.27499	1.500	17.818	

```
*S HYD 28.71 IS FLOW ASSUMED TO SPILL FROM PDN INTO BASIN 10 (NO CONC. WALL)
*S
*S HYD 28.72 IS THE FLOW THAT WILL CONTINUE W. ON E. BOUND PDN.
*S
ADD HYD                27.97 19&21   5        .00334        29.34         .407      2.28224    1.550   13.713
*S
*S HYD 27.97 IS TOTAL Q IN W. BOUND PDN AT JEFFERSON ST.
*S
*S
COMPUTE NM HYD         21.00    -    1        .00298         7.86         .387      2.43286    1.500    4.119 PER IMP= 100.00
*S
ADD HYD                21.98  1& 5   5        .00632        36.83         .794      2.35318    1.500    9.101
*S
*S HYD 21.98 IS Q IN W. BOUND PDN
*S
*S
DIVIDE HYD             21.91    5   61        .00426        14.00         .535      2.35318    1.450    5.129
                       21.92  and   11        .00206        22.83         .258      2.35318    1.500   17.329
*S HYD 21.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 21.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD         19.00    -    1        .00192         5.06         .249      2.43285    1.500    4.121 PER IMP= 100.00
*S
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```
ADD HYD                 19.99  1&11   5        .00398        27.89        .507      2.39156    1.500    10.955
*S
*S HYD 19.99 IS Q IN W. BOUND PDN
*S
*S
DIVIDE HYD              19.91    5   62        .00306        13.00        .390      2.39156    1.500     6.645
                        19.92  and   11        .00092        14.89        .118      2.39156    1.500    25.252
*S HYD 19.91 IS SUM OF EXISTING INLET CAPACITIES(to 24" SD in Front. Rd)
*S
*S HYD 19.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
DIVIDE HYD              19.93   11   63        .00046         7.45        .059      2.39156    1.500    25.252
                        19.94  and   12        .00046         7.45        .059      2.39156    1.500    25.252
*S HYD 19.93 ASSUME 50% SPILLS THRU CONC. WALL OPENING(RR TRACKS)TO FRONT. ROAD
*S
*S HYD 19.94 EXCESS THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD          18.00    -    1        .00226         5.39        .293      2.43285    1.500     3.727 PER IMP= 100.00
*S
ADD HYD                 18.99  1&12   5        .00272        12.84        .352      2.42573    1.500     7.372
*S
*S HYD 18.99 IS Q IN W. BOUND PDN
*S
*S
DIVIDE HYD              18.91    5   64        .00250         9.00        .324      2.42573    1.500     5.621
                        18.92  and   11        .00022         3.84        .028      2.42573    1.500    27.367
*S HYD 18.91 IS SUM OF EXISTING INLET CAPACITIES
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 5 NOTATION

```
*S
*S *    *    *    *    *    *    *    *    *    *    *    *
*S HYD 18.92 EXCESS THAT WILL FLOW W. ON W. BOUND PDN.
*S           THAT WILL PASS THE NORTH DIVERSION CHANNEL
*S *    *    *    *    *    *    *    *    *    *    *    *
*S
COMPUTE NM HYD          25.00    -    1        .01168        28.51       1.471      2.36188    1.500     3.815 PER IMP=  95.00
*S
DIVIDE HYD              25.91    1   65        .01058        17.00       1.332      2.36186    1.450     2.511
                        25.92  and   11        .00110        11.51        .139      2.36186    1.500    16.311
*S HYD 25.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 25.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
COMPUTE NM HYD          24.00    -    1        .00066         1.74        .086      2.43285    1.500     4.130 PER IMP= 100.00
*S
ADD HYD                 24.99  1&11   5        .00176        13.26        .225      2.38829    1.500    11.751
*S
*S HYD 24.99 IS Q W. BOUND IN FRONTAGE RD. JUST EAST OF RR TRACKS
*S
```

```
*S
DIVIDE HYD              24.91    5   15        .00114        5.00        .145      2.38829    1.450    6.852
                        24.92  and   11        .00062        8.26        .079      2.38829    1.500   20.717
*S HYD 24.91 IS SUM OF EXISTING INLET CAPACITIES TO 24" CMP OUT OF BASIN
*S
*S HYD 24.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
ADD HYD                 24.97 62&15  66        .00420       18.00        .535      2.39067    1.500    6.701
*S     *     *     *     *     *     *     *     *     *
*S HYD 24.97 IS TOTAL Q IN 24" SD THAT LEAVES BASIN JUST WEST OF RR TRACKS
*S     *     *     *     *     *     *     *     *     *
*S
*S
DIVIDE HYD              24.93   11   67        .00031        4.13        .040      2.38829    1.500   20.717
                        24.94  and   11        .00031        4.13        .040      2.38829    1.500   20.717
*S     *     *     *     *     *     *     *     *     *
*S HYD 24.93 ASSUME 50% OF FRONT. RD. Q SPILLS OUT OF BASIN AT RR TRACKS
*S     *     *     *     *     *     *     *     *     *
*S
*S HYD 24.94 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
ADD HYD                 24.95 11&63   5        .00077       11.58        .098      2.39024    1.500   23.423
*S
*S HYD 24.95 IS Q IN FRONT. RD. INCLUDING SPILL FROM W.BOUND PDN AT RR TRACKS
*S
*S
COMPUTE NM HYD          23.00    -    1        .00082        2.17        .106      2.43285    1.500    4.130 PER IMP= 100.00
*S
ADD HYD                 23.99  1& 5   5        .00159       13.74        .205      2.41198    1.500   13.487
*S
*S HYD 23.99 IS Q W. BOUND IN FRONTAGE RD. AT PRIVATE DRIVEWAY
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 6 NOTATION
*S										
DIVIDE HYD	23.91	5	68	.00127	10.99	.164	2.41198	1.500	13.487	
	23.92	and	11	.00032	2.75	.041	2.41198	1.500	13.487	
*S * * * * * * * * *										
*S HYD 23.91 ASSUME 80% SPILLS FROM FRONTAGE RD. TO PRIVATE DRIVEWAY										
*S (out of basin)										
*S * * * * * * * * *										
*S										
*S HYD 23.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.										
*S										
COMPUTE NM HYD	22.00	-	1	.00044	1.17	.057	2.43285	1.500	4.139	PER IMP= 100.00
*S										
ADD HYD	22.97	1&11	5	.00076	3.91	.098	2.42362	1.500	8.064	
*S										
*S HYD 22.97 IS Q IN W. BOUND IN FRONTAGE RD.										

```
*S
*S
DIVIDE HYD              22.91    5   69        .00065         2.00        .085      2.42362    1.500    4.779
                        22.92  and   11        .00010         1.91        .014      2.42362    1.500   28.627
*S HYD 22.91 SUM OF INLET CAPACITIES
*S
*S HYD 22.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
DIVIDE HYD              22.93   11   70        .00008         1.44        .010      2.42362    1.500   28.627
                        22.94  and   71        .00003          .48        .003      2.42362    1.500   28.627
*S     *     *     *     *     *     *     *     *     *
*S HYD 22.93 ASSUME 75% SPILLS OUT OF FRONTAGE RD DUE TO CURB OPENING
*S           (out of drainage basin)
*S     *     *     *     *     *     *     *     *     *
*S
*S    *    *     *     *     *     *     *     *     *     *
*S HYD 22.94 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S           PAST THE NORTH DIVERSION CHANNEL
*S
COMPUTE NM HYD          20.00    -    1        .00327         8.62        .424      2.43286    1.500    4.119 PER IMP= 100.00
*S
ADD HYD                 20.99  1&86    5        .00788        61.15        .983      2.34049    1.500   12.131
*S
*S HYD 20.99 IS Q IN E. BOUND PDN
*S
*S
DIVIDE HYD              20.91    5   72        .00473        17.00        .590      2.34049    1.450    5.618
                        20.92  and   11        .00315        44.15        .393      2.34049    1.500   21.910
*S HYD 20.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S HYD 20.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
COMPUTE NM HYD          17.00    -    1        .00200         5.28        .260      2.43286    1.500    4.121 PER IMP= 100.00
*S
ADD HYD                 17.99  1&11    5        .00515        49.43        .653      2.37631    1.500   15.000
*S
*S HYD 17.99 IS Q IN E. BOUND PDN
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 7 NOTATION
*S										
*S										
DIVIDE HYD	17.91	5	73	.00284	13.00	.361	2.37631	1.450	7.140	
	17.92	and	11	.00230	36.43	.292	2.37631	1.500	24.706	
*S HYD 17.91 IS SUM OF EXISTING INLET CAPACITIES										
*S										
*S HYD 17.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN										

```
*S
DIVIDE HYD              17.93   11   74        .00161        25.50        .204      2.37631    1.500   24.706
                        17.94  and   12        .00069        10.93        .088      2.37631    1.500   24.706
*S HYD 17.93 ASSUME 70% SPILLS THRU OPENING IN CONC. WALL BARRIER (RR TRACKS)
*S
*S HYD 17.94 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
COMPUTE NM HYD          16.00    -    1        .00183         4.71        .237      2.43286    1.500    4.020 PER IMP= 100.00
*S
ADD HYD                 16.99  1&12   5        .00252        15.64        .325      2.41721    1.500    9.691
*S
*S HYD 16.99 IS Q IN E. BOUND PDN
*S
*S
DIVIDE HYD              16.91    5   75        .00219         8.00        .283      2.41722    1.450    5.699
                        16.92  and   76        .00033         7.64        .042      2.41722    1.500   36.411
*S HYD 16.91 IS SUM OF EXISTING INLET CAPACITIES
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 16.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S           ACROSS THE NORTH DIVERSION CHANNEL
*S    *     *     *     *     *     *     *     *     *
*S
ADD HYD                 16.93 64&75  77        .00470        17.00        .606      2.42176    1.500    5.657
*S
*S HYD 16.93 IS INTERMEDIATE Q IN PDN SHORT STORM DRAIN THAT OUTFALLS
*S              UNDER PDN MEDIAN TO THE N. DIV. CHANNEL
*S
ADD HYD                 16.94 77&69  78        .00535        19.00        .691      2.42198    1.500    5.550
*S    *     *     *     *     *     *     *     *     *
*S
*S HYD 16.94 IS TOTAL Q IN PDN SHORT STORM DRAIN THAT OUTFALLS
*S              UNDER PDN MEDIAN TO THE N. DIV. CHANNEL
*S    *     *     *     *     *     *     *     *     *
*S
*S
COMPUTE NM HYD          15.00    -    1        .00094         2.48        .122      2.43285    1.500    4.127 PER IMP= 100.00
*S
DIVIDE HYD              15.91    1   10        .00024          .62        .030      2.43255    1.500    4.127
                        15.92  and   11        .00071         1.86        .091      2.43255    1.500    4.127
*S HYD 15.91 ASSUME 25% SPILLS THROUGH CURB OPENING TOWARDS EX. INLET
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 15.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 8 NOTATION

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                                FROM  TO                    PEAK        RUNOFF                    TIME TO   CFS
                  HYDROGRAPH    ID    ID        AREA      DISCHARGE   VOLUME      RUNOFF        PEAK      PER
COMMAND           IDENTIFICATION NO.  NO.      (SQ MI)    (CFS)       (AC-FT)     (INCHES)      (HOURS)   ACRE      NOTATION
*S
COMPUTE NM HYD          10.00    -     1       .00690      13.01        .399       1.08438       1.500    2.945  PER IMP=   5.00
*S
ADD HYD                 10.97  1&85    4       .00844      30.52        .585       1.30110       1.500    5.653
*S
*S HYD 10.97 IS SPILL FROM PDN PLUS BASIN 10
*S
*S
ADD HYD                 10.98  4&10    6       .00867      31.14        .616       1.33175       1.500    5.611
*S
*S HYD 10.98 IS SPILL FROM BASIN 10 AND PART OF BASIN 15 INTO EL PUEBLO RD
*S
*S
ADD HYD                 15.99 11& 6    5       .00938      33.00        .707       1.41452       1.500    5.500
*S
*S HYD 15.99 IS FLOW IN EL PUEBLO RD. AT W.END BASIN 15
*S
*S
COMPUTE NM HYD          14.00    -     1       .00162       4.15        .198       2.29091       1.500    4.006  PER IMP=  90.00
*S
ADD HYD                 14.98  5& 1   15       .01100      37.15        .905       1.54361       1.500    5.280
*S
*S HYD 14.98 IS TOTAL FLOW IN EL PUEBLO RD. IN BASIN 14
*S
*S
DIVIDE HYD              14.91   15    11       .00861      16.00        .709       1.54361       1.450    2.903
                        14.92  and    12       .00238      21.15        .196       1.54361       1.500   13.860
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 14.91 SUM OF EX. INLET CAPACITIES IN BASIN 14 EL PUEBLO RD.
*S
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 14.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD                 25.93 61&65    5       .01484      31.00       1.868       2.35936       1.450    3.264
*S
*S HYD 25.93 IS ADDITIONAL Q FROM FRONT. RD. AND W. BOUND PDN INLETS
*S           TO 24" CMP ALONG N. SIDE OF EL PUEBLO RD.
*S
*S
ADD HYD                 20.95  5&72    6       .01957      48.00       2.458       2.35480       1.450    3.832
*S
*S HYD 20.95 IS ADD Q FROM E. BOUND PDN INLETS TO 24" CMP
*S           ALONG N. SIDE OF EL PUEBLO RD.
*S
*S
ADD HYD                 14.94  6&11   17       .02818      64.00       3.167       2.10693       1.450    3.549
*S
*S HYD 14.94 IS TOTAL Q TO 24" CMP ALONG N. SIDE OF EL PUEBLO RD. AND OUTFALLS
*S           TO ASPHALT CHANNEL
```

```
*S
*S

                                FROM  TO                    PEAK        RUNOFF                    TIME TO   CFS
                   HYDROGRAPH   ID    ID        AREA     DISCHARGE     VOLUME      RUNOFF         PEAK     PER
COMMAND          IDENTIFICATION NO.  NO.      (SQ MI)     (CFS)       (AC-FT)    (INCHES)       (HOURS)   ACRE      NOTATION

COMPUTE NM HYD          9.00    -    1        .01792       36.49       2.054      2.14897       1.550    3.181 PER IMP=  80.00
*S
DIVIDE HYD              9.92    1   11        .01792       36.49       2.054      2.14894       1.550    3.181
                        9.91  and   52        .00000         .00        .000       .00000       -.050     .000
*S HYD 9.92 ASSUME 100% BY PASSES EXISTING RETENTION POND INTO BASIN 8
*S
*S HYD 9.91 Q THAT COULD FLOW TO EXISTING RETENTION POND
*S
COMPUTE NM HYD          8.00    -    1        .07904      145.35       8.311      1.97152       1.550    2.873 PER IMP=  70.00
*S
ADD HYD                 8.99  1&11    5        .09696      181.84      10.365      2.00431       1.550    2.930
*S    *      *      *      *      *      *      *      *      *      *
*S
*S HYD 8.99 IS TOTAL Q THAT WILL SPILL INTO EL PUEBLO RD. FROM BASINS
*S          EAST OF RR TRACKS
*S
*S    *      *      *      *      *      *      *      *      *
ADD HYD                14.99  5&15    6        .10796      211.64      11.270      1.95738       1.550    3.063
*S
*S HYD 14.99 IS TOTAL Q IN EL PUEBLO RD AT RR TRACKS
*S
*S
DIVIDE HYD             14.81    6   18        .08636      169.32       9.016      1.95738       1.550    3.063
                       14.82  and   11        .02159       42.33       2.254      1.95738       1.550    3.063
*S HYD 14.81 ASSUME 80% SPILLS FROM EL PUEBLO RD. AT RR TRACKS
*S           TO ASPHALT CHANNEL
*S
*S HYD 14.82 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD                14.95 17&18    5        .11454      233.32      12.183      1.99418       1.550    3.183
*S
*S HYD 14.95 IS TOTAL Q AT EAST END OF ASPHALT CHANNEL (N. OF EL PUEBLO RD)
*S
*S
COMPUTE NM HYD         12.00    -    1        .00128        2.42        .074      1.08439       1.500    2.959 PER IMP=   5.00
*S
ADD HYD                12.97  1& 5    6        .11582      235.44      12.256      1.98397       1.550    3.176
*S
*S HYD 12.97 PARTIAL Q IN ASPHALT CHANNEL BEFORE ADDING PRIVATE STORM DRAIN
*S
*S
COMPUTE NM HYD          7.00    -    1        .00586       15.22        .738      2.36188       1.500    4.058 PER IMP=  95.00
*S
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DIVIDE HYD              7.91    1   13        .00472        6.00        .594      2.36182    1.350    1.988
                        7.92  and   12        .00114        9.22        .144      2.36183    1.500   12.592
*S HYD 7.91 SUM OF INLET CAPACITIES (TO 42" SD UNDER EL PUEBLO RD)
*S
*S HYD 7.92 EXCESS Q THAT SPILL INTO EL PUEBLO RD
*S
ADD HYD                 7.95 11&12  79        .02273       49.35       2.398      1.97771    1.550    3.392
*S
*S HYD 7.95 Q IN EL PUEBLO RD
*S
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 10 NOTATION
*S										
COMPUTE NM HYD	6.00	-	1	.00853	22.14	1.074	2.36188	1.500	4.056	PER IMP= 95.00
*S										
DIVIDE HYD	6.91	1	11	.00853	22.00	1.074	2.36185	1.500	4.032	
	6.92	and	80	.00000	.14	.001	2.36170	1.500	47.628	
*S HYD 6.91 SUM OF INLET CAPACITIES (TO 42" SD UNDER EL PUEBLO RD)										
*S										
*S HYD 6.92 EXCESS Q THAT WILL SPILL INTO BASIN 4 IF INLET CAPACITY EXCEEDED										
*S										
ADD HYD	6.95	11&13	5	.01324	28.00	1.668	2.36184	1.500	3.304	
*S										
*S HYD 6.95 Q IN EL PUEBLO RD										
*S										
*S										
ADD HYD	12.98	5& 6	7	.12907	260.39	13.924	2.02274	1.550	3.152	
*S										
*S HYD 12.98 PARTIAL Q IN ASPHALT CHANNEL AFTER ADDING 42" PRIVITE SD										
*S (UNDER EL PUEBLO RD)										
*S										
*S										
ADD HYD	12.99	7&73	5	.13191	273.39	14.284	2.03036	1.550	3.238	
*S										
*S * * * * * * * * * *										
*S HYD 12.99 TOTAL Q IN ASPHALT CHANNEL TO 42" UNDER PDN										
*S * * * * * * * * * *										
*S										
*S										
*S * * * * * * * * * *										
DIVIDE HYD	12.91	5	81	.06354	35.00	6.880	2.03036	1.300	.861	
	12.92	and	11	.06837	238.39	7.404	2.03036	1.550	5.448	
*S HYD 12.91 IS THE CAPACITY OF THE 42" SD UNDER PASEO DEL NORTE										
*S										
*S HYD 12.92 EXCESS Q THAT WILL SPILL INTO BASIN 2 IF 42" SD CAP. EXCEEDED										

```
*S
ADD HYD                12.93 11&74   5        .06999       252.98       7.608      2.03834    1.500    5.648
*S
*S HYD 12.93 IS FLOW ALONG RR TRACKS JUST S. OF PDN IN BASIN 2
*S
*S
COMPUTE NM HYD          2.00   -     1        .00176         4.58        .222      2.36188    1.500    4.066 PER IMP=  95.00
*S
ADD HYD                 2.98  1& 5  10        .07175       257.56       7.830      2.04627    1.500    5.609
*S
*S HYD 2.98 IS FLOW ALONG RR TRACKS JUST E. OF EL PUEBLO RD. CROSSING RR TRACKS
*S
*S
COMPUTE NM HYD         13.00   -     1        .00043         1.14        .056      2.43286    1.500    4.139 PER IMP= 100.00
*S
ADD HYD                13.99  1&79   5        .02316        50.32       2.454      1.98615    1.550    3.394
*S
*S HYD 13.99 IS FLOW IN EL PUEBLO RD.
*S
```


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

```
*S
COMPUTE NM HYD         11.00   -     1        .00053         1.40        .069      2.43285    1.500    4.134 PER IMP= 100.00
*S
ADD HYD                11.99  1& 5   6        .02369        51.52       2.523      1.99613    1.550    3.398
*S
*S HYD 11.99 IS FLOW IN EL PUEBLO RD.
*S
*S
DIVIDE HYD             11.91    6   11        .00711        15.46        .757      1.99613    1.550    3.398
                       11.92  and   12        .01659        36.07       1.766      1.99613    1.550    3.398
*S HYD 11.91 ASSUME 30% OF EL PUEBLO RD. FLOW SPILLS N. INTO BASIN 2 AT
*S           RR TRACK INTERSECTION WITH EL PUEBLO RD.
*S
*S HYD 11.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
DIVIDE HYD             11.93   12   15        .00995        21.64       1.059      1.99613    1.550    3.398
                       11.94  and   14        .00663        14.43        .706      1.99613    1.550    3.398
*S HYD 11.93 ASSUME 60% OF EL PUEBLO RD. FLOW SPILLS OUT S. OF EL PUEBLO RD.
*S           AT RR TRACK INTERSECTION WITH EL PUEBLO RD. (WILL FLOW TOWARDS
*S           30" CMP OUTFALL TO N. DIV. CHAN.
*S
*S HYD 11.94 ASSUME EXCESS WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD                 2.99 11&10   5        .07886       272.72       8.587      2.04175    1.500    5.404
*S
*S HYD 2.99 IS TOTAL FLOW TO INLETS AT THE RR TRACK INTERSECTION WITH
*S          EL PUEBLO RD.
*S
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*S
DIVIDE HYD              2.91    5   10        .01963        26.00       2.138      2.04174    1.350    2.069
                        2.92  and   11        .05922       246.72       6.449      2.04174    1.500    6.509
*S HYD 2.91 SUM OF ALL INLET CAPACITIES
*S
*S HYD 2.92 EXCESS Q THAT WILL SPILL INTO BASIN 1 (EL PUEBLO RD.)
*S
COMPUTE NM HYD          1.00    -    1        .00218         4.72        .184      1.58119    1.500    3.384 PER IMP=  40.00
*S
ADD HYD                 1.98  1&11    5        .06140       251.44       6.633      2.02539    1.500    6.398
*S
*S HYD 1.98 IS FLOW IN EL PUEBLO RD.
*S
*S
ADD HYD                 1.99  5&14    6        .06804       265.59       7.339      2.02253    1.500    6.099
*S
*S HYD 1.99 IS TOTAL FLOW IN EL PUEBLO RD. AT THE S. SIDE CURB CUT
*S          JUST EAST OF THE N. DIV. CHANNEL (OUTFALLS TO 30" CMP
*S          UNDER N. DIV. CHAN.
*S
*S
DIVIDE HYD              1.91    6   82        .05443       212.47       5.871      2.02253    1.500    6.099
                        1.92  and   83        .01361        53.12       1.468      2.02253    1.500    6.099
*S HYD 1.91 ASSUME 80% OF EL PUEBLO RD. FLOW WILL SPILL THROUGH
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 12 NOTATION

```
*S          S. SIDE CURB CUT JUST EAST OF THE N. DIV. CHANNEL
*S          (OUTFALLS TO 30" CMP UNDER N. DIV. CHAN.
*S
*S    *      *      *      *      *      *      *      *      *      *
*S HYD 1.92 EXCESS EL PUEBLO RD. Q THAT WILL FLOW ACROSS
*S          THE NORTH DIVERSION CHANNEL
*S    *      *      *      *      *      *      *      *      *      *
*S
ADD HYD                11.95 10&15    5        .02958        47.64       3.197      2.02639    1.550    2.516
*S
*S HYD 11.95 IS PARTIAL Q TO THE 30" CMP UNDER N. DIV. CHAN.
*S
*S
ADD HYD                 1.95  5&82   84        .08401       259.69       9.069      2.02389    1.500    4.830
*S    *      *      *      *      *      *      *      *      *
*S HYD 1.95 IS PARTIAL Q TO THE 30" CMP UNDER N. DIV. CHAN.
*S          (EXCLUDES Q FROM EXISTING PNM 21" CMP THAT OUTFALLS
*S          AT THE INLET TO THE 30" CMP)
*S    *      *      *      *      *      *      *      *      *      *
*S
*S
COMPUTE NM HYD          4.00    -    1        .06456        96.52       4.646      1.34940    1.600    2.336 PER IMP=  25.00
*S
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ADD HYD                 4.99  1&80   5        .06456        96.52       4.647      1.34947    1.600     2.336
*S
*S HYD 4.99 IS BASIN 4 COMBINED WITH ANY SPILL FROM BASIN 6
*S
*S
*S DIVIDE BY CAPACITY OF 21" CMP IN PNM POND
*S
DIVIDE HYD              4.91    5   10        .03143        17.00       2.262      1.34947    1.400      .845
                        4.92  and   11        .03314        79.52       2.385      1.34947    1.600    3.749
*S HYD 4.91 IS MAX. CAPACITY OF 21" RCP (with 11 ft. head)
*S          FROM THE PNM POND THAT OUTFALLS AT THE 30"CMP AT N. DIV. CHAN.
*S
*S    *      *      *      *       *     *       *      *       *      *
*S HYD 4.92 FLOW IN EXCESS OF 21" RCP CAPACITY THAT WILL REMAIN IN PND POND
*S    *      *      *      *       *     *       *      *       *      *
*S
*S ADD PNM 21" CMP Q TO Q AT INLET TO 30" CMP AT N. DIV. CHAN.
*S         THIS IS TOTAL Q AT 30" CMP
*S
ADD HYD                 1.98 84&10  87        .11544       276.69      11.330      1.84029    1.500     3.745
*S
*S HYD 1.98 IS TOTAL Q AT 30" CMP AT N. DIV. CHAN.
*S
*S
DIVIDE HYD              1.96   87   90        .05379        48.00       5.280      1.84029    1.350     1.394
                        1.97  and   91        .06165       228.69       6.051      1.84029    1.500     5.796
*S    *      *      *      *       *     *       *      *       *      *
*S
*S HYD 1.96 IS THE CAPACITY OF THE EX. 30" CMP TO N. DIV. CHAN.
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 13 NOTATION
*S										
*S * * * * * * * * * *										
*S HYD 1.97 FLOW IN EXCESS OF 30" CMP THAT WILL SPILL TO N. DIV. CHANNEL										
*S										
*S * * * * * * * * * *										
*S										
COMPUTE NM HYD	5.00	-	1	.05271	82.37	3.048	1.08438	1.550	2.442	PER IMP= 5.00
*S										
COMPUTE NM HYD	3.00	-	2	.00520	12.64	.587	2.11494	1.500	3.797	PER IMP= 80.00
ADD HYD	3.97	1& 2	6	.05791	93.23	3.635	1.17691	1.550	2.515	
*S * * * * * * * * * *										
*S										
*S HYD 3.97 IS Q TO N. DIV. CHANNEL INLET (JUST SOUTH OF RR TRACKS)										
*S * * * * * * * * * *										
*S										
*S										
FINISH										

AHYMO_97 MODEL

INPUT FILE

```
*S FILE NAME     EI100-24.TXT
*S
*S TITLE 1 - EL PUEBLO ROAD DRAINAGE STUDY TO NORTH DIVERSION CHANNEL
*S TITLE 2 - FUTURE DEVELOPMENT CONDITIONS- EXISTING INFRASTRUCTURE
*S           100-YR. 24-HOUR STORM
*RP 100-yr / 24-hr
*DC
*S     THIS IS AN AHYMO_97 HYDROLOGIC MODEL FOR:
*S          THE EL PUEBLO ROAD DRAINAGE STUDY
*S          (Study of Drainage to the North Diversion Channel from
*S          Paseo Del Norte and North Frontage Road, El Pueblo Rd.
*S          and Basins south of El Pueblo Rd. to N. Div. Channel inlet
*S          located approx. 100 ft. south of El Pueblo Rd.)
*S             PREPARED FOR AMAFCA
*S             PREPARED BY SMITH ENGINEERING COMPANY (PLS, FC)
*S
*S        MODEL DESCRIPTION -
*S
*S   1.   THIS MODEL IS FOR FUTURE DEVELOPMENT CONDITIONS
*S        NOTE THAT MOST BASINS ARE FULLY DEVELOPED NOW OR WILL BE
*S        VERY SOON. LAND USE TREATMENT %'S WERE DETERMINED FROM
*S        AERIAL PHOTOGRAPHS, FIELD OBSERVATION AND COMMERCIAL INDUSTRIAL
*S        NATURE OF ALL OF THE DRAINAGE BASINS.
*S   2.   100-YEAR 24-HOUR RAINFALL EVENT (RAINFALL DATA OBTAINED FROM
*S        NOAA ATALS 14 - INTERNET DATA
*S   3.   STORM DRAINS ARE MODELED AS THE LESSOR OF THE COMBINBED
*S        INLET CAPACITIES OR THE NON-PRESSURE FULL PIPE FLOW (WHICHEVER
*S        IS LESS AS THE DIVIDE HYDRROGRAPH DISCHARGE,
*S   4.   NO SEDIMENT BULKING APPLIED DUE TO
*S              A.  ALL BASINS ARE OR WILL VERY SOON BE DEVELOPED
*S   5.   USE PROCEDURES FROM COA DPM SECTION 22
*S
START                TIME=0.0  PUNCH CODE=0 PRINT CODE=0
LOCATION             BERNALILLO COUNTY
*S
RAINFALL             TYPE=2
                     QUARTER=0.0     ONE= 1.77 IN
                     SIX= 2.38 IN    DAY= 2.69 IN   DT = 0.05 HR
*S
COMPUTE NM HYD       ID=1   HYD NO=34.00     DA=0.02144 SQ MI
                     PER A=0   PER B=5   PER C=15  PER D=80
                     TP=0.14  MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
COMPUTE NM HYD       ID=2   HYD NO=33.00     DA=0.00864 SQ MI
                     PER A=0   PER B=0   PER C=10  PER D=90
                     TP=0.16  MASSRAIN=-1
PRINT HYD            ID=2   CODE=1
*S
ADD HYD              ID=5   HYD=33.98     ID I=1   ID II=2
*S
*S HYD 33.98 IS TOTAL Q TO 30" RCP FROM EAST OF I-25 AND I-25 MEDIAN DICHTES
*S
PRINT HYD            ID=5   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=35.00     DA=0.04323 SQ MI
                     PER A=0   PER B=10   PER C=0   PER D=90
                     TP=0.15   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=5   HYD=35.99     ID I=1   ID II=5
*S
*S HYD 35.99 IS TOTAL Q EXISTING RETENTION POND IN BASIN 35.00
*S
DIVIDE HYD           ID=5  PER=-100       ID  I=50   HYD NO=35.91
                                          ID II=51   HYD NO=35.92
PRINT HYD            ID=50    CODE=1
*S HYD 35.91 IS TOTAL FLOW TO EXISTING RETENTION POND IN BASIN 29.00
*S
PRINT HYD            ID=51    CODE=1
*S HYD 35.92 IS EXCESS FLOW (NONE IN EXISTING CONDITIONS)
*S
COMPUTE NM HYD       ID=1   HYD NO=30.00     DA=0.03753 SQ MI
                     PER A=0   PER B=10   PER C=0   PER D=90
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
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DIVIDE HYD            ID=1  Q=58          ID  I=10   HYD NO=30.91
                                        ID II=11   HYD NO=30.92
PRINT HYD             ID=10    CODE=1
*S HYD 30.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD             ID=11    CODE=1
*S HYD 30.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
*S
COMPUTE NM HYD       ID=1   HYD NO=31.00     DA=0.02262 SQ MI
                     PER A=0   PER B=10   PER C=0   PER D=90
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  Q=37          ID  I=12   HYD NO=31.91
                                          ID II=13   HYD NO=31.92
PRINT HYD             ID=12    CODE=1
*S HYD 31.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD             ID=13    CODE=1
*S HYD 31.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
*S
COMPUTE NM HYD       ID=1      HYD NO=29.00  DA=0.04144 SQ MI
                     PER A=0   PER B=15   PER C=0   PER D=85
                     TP=0.23   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=5   HYD=31.93     ID I=10   ID II=12
*S
*S HYD 31.93 IS Q IN JEFFERSON STORM DRAIN BEFORE ADDING BASIN 29.00
*S
PRINT HYD            ID=5   CODE=1
*S
ADD HYD              ID=5   HYD=31.94     ID I=1   ID II=5
*S
*S HYD 31.94 IS Q IN JEFFERSON STORM DRAIN AFTER ADDING BASIN 29.00
*S
PRINT HYD            ID=5   CODE=1
*S
ADD HYD              ID=6   HYD=31.95     ID I=11   ID II=13
*S
*S HYD 31.95 IS Q IN JEFERSON STREET
*S
PRINT HYD            ID=6   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=32.00     DA=0.02313 SQ MI
                     PER A=0   PER B=10   PER C=0   PER D=90
                     TP=0.17   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  Q=40          ID  I=14   HYD NO=32.91
                                        ID II=15   HYD NO=32.92
PRINT HYD             ID=14    CODE=1
*S HYD 32.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD             ID=15    CODE=1
*S HYD 32.92 IS FLOW IN EXCESS OF INLET CAPACITIES TO JEFFERSON ST.
*S
ADD HYD              ID=7   HYD=32.95     ID I=5   ID II=14
*S
*S HYD 32.95 IS Q IN JEFF. ST. SD BEFORE ADDING E. BOUND PDN SD Q
*S
PRINT HYD            ID=7   CODE=1
*S
ADD HYD              ID=30   HYD=32.99     ID I=6   ID II=15
*S
*S HYD 32.99 IS TOTAL JEFF. ST. FLOW THAT WILL FLOW WEST ON EAST BOUND PDN
*S
PRINT HYD            ID=30   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=28.00     DA=0.00624 SQ MI
                     PER A=0   PER B=0   PER C=0   PER D=100
                     TP=0.18   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  Q=9          ID  I=16   HYD NO=28.91
                                        ID II=17   HYD NO=28.92
PRINT HYD             ID=16    CODE=1
```

```
*S HYD 28.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD            ID=17    CODE=1
*S HYD 28.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON E. BOUND PDN.
*S
ADD HYD             ID=31   HYD=32.96     ID I=7  ID II=16
*S
*S HYD 32.96 IS TOTAL Q IN JEFF. ST. AT E. BOUND PDN
*S
PRINT HYD           ID=31   CODE=1
*S
COMPUTE NM HYD      ID=1   HYD NO=27.00     DA=0.00641 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.18   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
DIVIDE HYD           ID=1  Q=10         ID  I=18   HYD NO=27.91
                                     ID II=19   HYD NO=27.92
PRINT HYD            ID=18    CODE=1
*S HYD 27.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD            ID=19    CODE=1
*S HYD 27.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD      ID=1   HYD NO=26.00     DA=0.02574 SQ MI
                    PER A=0   PER B=10   PER C=0   PER D=90
                    TP=0.16   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
DIVIDE HYD           ID=1  Q=33         ID  I=20   HYD NO=26.91
                                     ID II=21   HYD NO=26.92
PRINT HYD            ID=20    CODE=1
*S HYD 26.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD            ID=21    CODE=1
*S HYD 26.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
ADD HYD             ID=32   HYD=27.95     ID I=31  ID II=18
*S
*S HYD 27.95 IS Q IN JEFF. ST. STORM DRAIN AT W. BOUND PDN
*S
PRINT HYD           ID=32   CODE=1
*S
ADD HYD             ID=33   HYD=27.96     ID I=20  ID II=32
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 27.96 IS TOTAL Q IN JEFF. ST. STORM DRAIN AT W. BOUND PDN
*S           TO DOM. BACA ARROYO
*S
PRINT HYD           ID=33   CODE=1
*S    *     *     *     *     *     *     *     *     *     *     *
*S
ADD HYD             ID=60   HYD=28.95     ID I=30  ID II=17
*S
*S HYD 28.95 IS TOTAL Q IN E. BOUND PDN AT JEFFERSON ST.
*S
PRINT HYD           ID=60   CODE=1
*S
DIVIDE HYD           ID=60  PER=-25         ID  I=85   HYD NO=28.71
                                            ID II=86   HYD NO=28.72
PRINT HYD            ID=85    CODE=1
*S HYD 28.71 IS FLOW ASSUMED TO SPILL FROM PDN INTO BASIN 10 (NO CONC. WALL)
*S
PRINT HYD            ID=86    CODE=1
*S HYD 28.72 IS THE FLOW THAT WILL CONTINUE W. ON E. BOUND PDN.
*S
ADD HYD             ID=5   HYD=27.97     ID I=19  ID II=21
*S
*S HYD 27.97 IS TOTAL Q IN W. BOUND PDN AT JEFFERSON ST.
*S
PRINT HYD           ID=5   CODE=1
*S
COMPUTE NM HYD      ID=1   HYD NO=21.00     DA=0.00298 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=21.98     ID I=1  ID II=5
```

```
*S
*S HYD 21.98 IS Q IN W. BOUND PDN
*S
PRINT HYD            ID=5   CODE=1
*S
DIVIDE HYD            ID=5  Q=14          ID  I=61   HYD NO=21.91
                                        ID II=11   HYD NO=21.92
PRINT HYD             ID=61    CODE=1
*S HYD 21.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD             ID=11    CODE=1
*S HYD 21.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD       ID=1   HYD NO=19.00     DA=0.00192 SQ MI
                     PER A=0   PER B=0   PER C=0   PER D=100
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=5   HYD=19.99     ID I=1  ID II=11
*S
*S HYD 19.99 IS Q IN W. BOUND PDN
*S
PRINT HYD            ID=5   CODE=1
*S
DIVIDE HYD            ID=5  Q=13          ID  I=62   HYD NO=19.91
                                        ID II=11.  HYD NO=19.92
PRINT HYD             ID=62    CODE=1
*S HYD 19.91 IS SUM OF EXISTING INLET CAPACITIES(to 24" SD in Front. Rd)
*S
PRINT HYD             ID=11    CODE=1
*S HYD 19.92 IS FLOW IN EXCESS OF INLET CAP. THAT WILL FLOW W. ON W. BOUND PDN.
*S
DIVIDE HYD            ID=11  PER=-50      . ID  I=63   HYD NO=19.93
                                        ID II=12   HYD NO=19.94
PRINT HYD             ID=63    CODE=1
*S HYD 19.93 ASSUME 50% SPILLS THRU CONC. WALL OPENING(RR TRACKS)TO FRONT. ROAD
*S
PRINT HYD             ID=12    CODE=1
*S HYD 19.94 EXCESS THAT WILL FLOW W. ON W. BOUND PDN.
*S
COMPUTE NM HYD       ID=1   HYD NO=18.00     DA=0.00226 SQ MI
                     PER A=0   PER B=0   PER C=0   PER D=100
                     TP=0.16   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=5   HYD=18.99     ID I=1  ID II=12
*S
*S HYD 18.99 IS Q IN W. BOUND PDN
*S
PRINT HYD            ID=5   CODE=1
*S
DIVIDE HYD            ID=5  Q=9          ID  I=64   HYD NO=18.91
                                        ID II=11   HYD NO=18.92
PRINT HYD             ID=64    CODE=1
*S HYD 18.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD             ID=11    CODE=1
*S *    *    *    *    *    *    *    *    *    *    *    *
*S HYD 18.92 EXCESS THAT WILL FLOW W. ON W. BOUND PDN.
*S           THAT WILL PASS THE NORTH DIVERSION CHANNEL
*S *    *    *    *    *    *    *    *    *    *    *    *
*S
COMPUTE NM HYD       ID=1   HYD NO=25.00     DA=0.01168 SQ MI
                     PER A=0   PER B=0   PER C=5   PER D=95
                     TP=0.15   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  Q=17          ID  I=65   HYD NO=25.91
                                        ID II=11   HYD NO=25.92
PRINT HYD             ID=65    CODE=1
*S HYD 25.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD             ID=11    CODE=1
*S HYD 25.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
COMPUTE NM HYD       ID=1   HYD NO=24.00     DA=0.00066 SQ MI
                     PER A=0   PER B=0   PER C=0   PER D=100
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```
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=24.99     ID I=1  ID II=11
*S
*S HYD 24.99 IS Q W. BOUND IN FRONTAGE RD. JUST EAST OF RR TRACKS
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  Q=5          ID  I=15   HYD NO=24.91
                                       ID II=11   HYD NO=24.92
PRINT HYD            ID=15    CODE=1
*S HYD 24.91 IS SUM OF EXISTING INLET CAPACITIES TO 24" CMP OUT OF BASIN
*S
PRINT HYD            ID=11    CODE=1
*S HYD 24.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
ADD HYD             ID=66   HYD=24.97     ID I=62  ID II=15
*S     *     *      *      *      *       *       *       *       *
*S HYD 24.97 IS TOTAL Q IN 24" SD THAT LEAVES BASIN JUST WEST OF RR TRACKS
*S     *     *      *      *      *       *       *       *       *
*S
PRINT HYD           ID=66   CODE=1
*S
DIVIDE HYD           ID=11  PER=-50         ID  I=67   HYD NO=24.93
                                          ID II=11   HYD NO=24.94
PRINT HYD            ID=67    CODE=1
*S     *     *      *      *      *       *       *       *       *
*S HYD 24.93 ASSUME 50% OF FRONT. RD. Q SPILLS OUT OF BASIN AT RR TRACKS
*S     *     *      *      *      *       *       *       *       *
*S
PRINT HYD            ID=11    CODE=1
*S HYD 24.94 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
ADD HYD             ID=5   HYD=24.95     ID I=11  ID II=63
*S
*S HYD 24.95 IS Q IN FRONT. RD. INCLUDING SPILL FROM W.BOUND PDN AT RR TRACKS
*S
PRINT HYD           ID=5   CODE=1
*S
COMPUTE NM HYD      ID=1   HYD NO=23.00     DA=0.00082 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=23.99     ID I=1  ID II=5
*S
*S HYD 23.99 IS Q W. BOUND IN FRONTAGE RD. AT PRIVATE DRIVEWAY
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  PER=-80        ID  I=68   HYD NO=23.91
                                         ID II=11   HYD NO=23.92
PRINT HYD            ID=68    CODE=1
*S     *     *      *      *      *       *       *       *       *
*S HYD 23.91 ASSUME 80% SPILLS FROM FRONTAGE RD. TO PRIVATE DRIVEWAY
*S           (out of basin)
*S     *     *      *      *      *       *       *       *       *
*S
PRINT HYD            ID=11    CODE=1
*S HYD 23.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
COMPUTE NM HYD      ID=1   HYD NO=22.00     DA=0.00044 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=22.97     ID I=1  ID II=11
*S
*S HYD 22.97 IS Q IN W. BOUND IN FRONTAGE RD.
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  Q=2            ID  I=69   HYD NO=22.91
                                         ID II=11   HYD NO=22.92
PRINT HYD            ID=69    CODE=1
*S HYD 22.91 SUM OF INLET CAPACITIES
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```
*S
PRINT HYD            ID=11    CODE=1
*S HYD 22.92 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S
DIVIDE HYD           ID=11  PER=-75          ID  I=70   HYD NO=22.93
                                            ID II=71   HYD NO=22.94
PRINT HYD            ID=70    CODE=1
*S     *     *      *      *      *       *       *       *       *
*S HYD 22.93 ASSUME 75% SPILLS OUT OF FRONTAGE RD DUE TO CURB OPENING
*S           (out of drainage basin)
*S     *     *      *      *      *       *       *       *       *
*S
PRINT HYD            ID=71    CODE=1
*S    *    *     *     *      *     *      *      *      *      *
*S HYD 22.94 EXCESS Q THAT WILL FLOW W. ON FRONTAGE RD.
*S           PAST THE NORTH DIVERSION CHANNEL
*S
COMPUTE NM HYD      ID=1   HYD NO=20.00     DA=0.00327 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=20.99     ID I=1  ID II=86
*S
*S HYD 20.99 IS Q IN E. BOUND PDN
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  Q=17         ID  I=72   HYD NO=20.91
                                      ID II=11   HYD NO=20.92
PRINT HYD            ID=72    CODE=1
*S HYD 20.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD            ID=11    CODE=1
*S HYD 20.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
COMPUTE NM HYD      ID=1   HYD NO=17.00     DA=0.00200 SQ MI
                    PER A=0   PER B=0  PER C=0   PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=17.99     ID I=1  ID II=11
*S
*S HYD 17.99 IS Q IN E. BOUND PDN
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  Q=13         ID  I=73   HYD NO=17.91
                                      ID II=11   HYD NO=17.92
PRINT HYD            ID=73    CODE=1
*S HYD 17.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD            ID=11    CODE=1
*S HYD 17.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
DIVIDE HYD           ID=11  PER=-70         ID  I=74   HYD NO=17.93
                                      ID II=12   HYD NO=17.94
PRINT HYD            ID=74    CODE=1
*S HYD 17.93 ASSUME 70% SPILLS THRU OPENING IN CONC. WALL BARRIER (RR TRACKS)
*S
PRINT HYD            ID=12    CODE=1
*S HYD 17.94 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S
COMPUTE NM HYD      ID=1   HYD NO=16.00     DA=0.00183 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.14   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=16.99     ID I=1  ID II=12
*S
*S HYD 16.99 IS Q IN E. BOUND PDN
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  Q=8          ID  I=75   HYD NO=16.91
                                      ID II=76   HYD NO=16.92
PRINT HYD            ID=75    CODE=1
```

```
*S HYD 16.91 IS SUM OF EXISTING INLET CAPACITIES
*S
PRINT HYD            ID=76    CODE=1
*S    *     *     *      *      *     *      *      *      *       *       *
*S HYD 16.92 EXCESS Q THAT WILL FLOW W. ON E. BOUND PDN
*S           ACROSS THE NORTH DIVERSION CHANNEL
*S     *     *      *      *      *       *       *       *
*S
ADD HYD              ID=77   HYD=16.93     ID I=64  ID II=75
*S
*S HYD 16.93 IS INTERMEDIATE Q IN PDN SHORT STORM DRAIN THAT OUTFALLS
*S               UNDER PDN MEDIAN TO THE N. DIV. CHANNEL
*S
PRINT HYD            ID=77   CODE=1
*S
ADD HYD              ID=78   HYD=16.94     ID I=77  ID II=69
*S     *     *      *      *      *       *       *       *
*S
*S HYD 16.94 IS TOTAL Q IN PDN SHORT STORM DRAIN THAT OUTFALLS
*S               UNDER PDN MEDIAN TO THE N. DIV. CHANNEL
*S     *     *      *      *      *       *       *       *
*S
PRINT HYD            ID=78   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=15.00     DA=0.00094 SQ MI
                     PER A=0   PER B=0   PER C=0   PER D=100
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  PER=-25         ID  I=10   HYD NO=15.91
                                        ID II=11   HYD NO=15.92
PRINT HYD             ID=10    CODE=1
*S HYD 15.91 ASSUME 25% SPILLS THROUGH CURB OPENING TOWARDS EX. INLET
*S
PRINT HYD             ID=11    CODE=1
*S    *     *     *      *      *     *      *      *      *       *       *
*S HYD 15.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
COMPUTE NM HYD       ID=1   HYD NO=10.00     DA=0.00690 SQ MI
                     PER A=0   PER B=0   PER C=95   PER D=5
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=4   HYD=10.97     ID I=1  ID II=85
*S
*S HYD 10.97 IS SPILL FROM PDN PLUS BASIN 10
*S
PRINT HYD            ID=4   CODE=1
*S
ADD HYD              ID=6   HYD=10.98     ID I=4  ID II=10
*S
*S HYD 10.98 IS SPILL FROM BASIN 10 AND PART OF BASIN 15 INTO EL PUEBLO RD
*S
PRINT HYD            ID=6   CODE=1
*S
ADD HYD              ID=5   HYD=15.99     ID I=11  ID II=6
*S
*S HYD 15.99 IS FLOW IN EL PUEBLO RD. AT W.END BASIN 15
*S
PRINT HYD            ID=5   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=14.00     DA=0.00162 SQ MI
                     PER A=0   PER B=0   PER C=10   PER D=90
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=15   HYD=14.98     ID I=5  ID II=1
*S
*S HYD 14.98 IS TOTAL FLOW IN EL PUEBLO RD. IN BASIN 14
*S
PRINT HYD            ID=15   CODE=1
*S
DIVIDE HYD            ID=15  Q=16          ID  I=11   HYD NO=14.91
                                        ID II=12   HYD NO=14.92
PRINT HYD             ID=11    CODE=1
*S    *     *     *      *      *     *      *      *      *       *       *
*S HYD 14.91 SUM OF EX. INLET CAPACITIES IN BASIN 14 EL PUEBLO RD.
```

```
*S
PRINT HYD            ID=12    CODE=1
*S    *     *     *     *     *     *     *     *     *     *     *
*S HYD 14.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD              ID=5   HYD=25.93     ID I=61  ID II=65
*S
*S HYD 25.93 IS ADDITIONAL Q FROM FRONT. RD. AND W. BOUND PDN INLETS
*S           TO 24" CMP ALONG N. SIDE OF EL PUEBLO RD.
*S
PRINT HYD            ID=5   CODE=1
*S
ADD HYD              ID=6   HYD=20.95     ID I=5  ID II=72
*S
*S HYD 20.95 IS ADD Q FROM E. BOUND PDN INLETS TO 24" CMP
*S           ALONG N. SIDE OF EL PUEBLO RD.
*S
PRINT HYD            ID=6   CODE=1
*S
ADD HYD              ID=17   HYD=14.94     ID I=6  ID II=11
*S
*S HYD 14.94 IS TOTAL Q TO 24" CMP ALONG N. SIDE OF EL PUEBLO RD. AND OUTFALLS
*S           TO ASPHALT CHANNEL
*S
PRINT HYD            ID=17   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=9.00     DA=0.01792 SQ MI
                     PER A=0   PER B=0   PER C=20   PER D=80
                     TP=0.20   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  PER=-100         ID  I=11   HYD NO=9.92
                                             ID II=52   HYD NO=9.91
PRINT HYD             ID=11    CODE=1
*S HYD 9.92 ASSUME 100% BY PASSES EXISTING RETENTION POND INTO BASIN 8
*S
PRINT HYD             ID=52    CODE=1
*S HYD 9.91 Q THAT COULD FLOW TO EXISTING RETENTION POND
*S
COMPUTE NM HYD       ID=1   HYD NO=8.00     DA=0.07904 SQ MI
                     PER A=0   PER B=10   PER C=20   PER D=70
                     TP=0.21   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=5   HYD=8.99     ID I=1  ID II=11
*S    *     *     *     *     *     *     *     *     *     *
*S
*S HYD 8.99 IS TOTAL Q THAT WILL SPILL INTO EL PUEBLO RD. FROM BASINS
*S          EAST OF RR TRACKS
*S
PRINT HYD            ID=5   CODE=1
*S    *     *     *     *     *     *     *     *     *
ADD HYD              ID=6   HYD=14.99     ID I=5  ID II=15
*S
*S HYD 14.99 IS TOTAL Q IN EL PUEBLO RD AT RR TRACKS
*S
PRINT HYD            ID=6   CODE=1
*S
DIVIDE HYD            ID=6  PER=-80         ID  I=18   HYD NO=14.81
                                         ID II=11   HYD NO=14.82
PRINT HYD             ID=18    CODE=1
*S HYD 14.81 ASSUME 80% SPILLS FROM EL PUEBLO RD. AT RR TRACKS
*S           TO ASPHALT CHANNEL
*S
PRINT HYD             ID=11    CODE=1
*S HYD 14.82 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD              ID=5   HYD=14.95     ID I=17  ID II=18
*S
*S HYD 14.95 IS TOTAL Q AT EAST END OF ASPHALT CHANNEL (N. OF EL PUEBLO RD)
*S
PRINT HYD            ID=5   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=12.00     DA=0.00128 SQ MI
                     PER A=0   PER B=0   PER C=95   PER D=5
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
```

```
*S
ADD HYD              ID=6   HYD=12.97     ID I=1  ID II=5
*S
*S HYD 12.97 PARTIAL Q IN ASPHALT CHANNEL BEFORE ADDING PRIVATE STORM DRAIN
*S
PRINT HYD            ID=6   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=7.00     DA=0.00586 SQ MI
                     PER A=0   PER B=0   PER C=5   PER D=95
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  Q=6         ID  I=13   HYD NO=7.91
                                        ID II=12   HYD NO=7.92
PRINT HYD             ID=13    CODE=1
*S HYD 7.91 SUM OF INLET CAPACITIES (TO 42" SD UNDER EL PUEBLO RD)
*S
PRINT HYD             ID=12    CODE=1
*S HYD 7.92 EXCESS Q THAT SPILL INTO EL PUEBLO RD
*S
ADD HYD              ID=79   HYD=7.95     ID I=11  ID II=12
*S
*S HYD 7.95 Q IN EL PUEBLO RD
*S
PRINT HYD            ID=79   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=6.00     DA=0.00853 SQ MI
                     PER A=0   PER B=0   PER C=5   PER D=95
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
DIVIDE HYD            ID=1  Q=22        ID  I=11   HYD NO=6.91
                                       ID II=80   HYD NO=6.92
PRINT HYD             ID=11    CODE=1
*S HYD 6.91 SUM OF INLET CAPACITIES (TO 42" SD UNDER EL PUEBLO RD)
*S
PRINT HYD             ID=80    CODE=1
*S HYD 6.92 EXCESS Q THAT WILL SPILL INTO BASIN 4 IF INLET CAPACITY EXCEEDED
*S
ADD HYD              ID=5   HYD=6.95     ID I=11  ID II=13
*S
*S HYD 6.95 Q IN EL PUEBLO RD
*S
PRINT HYD            ID=5   CODE=1
*S
ADD HYD              ID=7   HYD=12.98     ID I=5  ID II=6
*S
*S HYD 12.98 PARTIAL Q IN ASPHALT CHANNEL AFTER ADDING 42" PRIVITE SD
*S           (UNDER EL PUEBLO RD)
*S
PRINT HYD            ID=7   CODE=1
*S
ADD HYD              ID=5   HYD=12.99     ID I=7  ID II=73
*S
*S    *      *      *      *      *      *      *      *      *      *
*S HYD 12.99 TOTAL Q IN ASPHALT CHANNEL TO 42" UNDER PDN
*S    *      *      *      *      *      *      *      *      *      *
*S
PRINT HYD            ID=5   CODE=1
*S
*S    *      *      *      *      *      *      *      *      *      *
DIVIDE HYD            ID=5  Q=35        ID  I=81   HYD NO=12.91
                                       ID II=11   HYD NO=12.92
PRINT HYD             ID=81    CODE=1
*S HYD 12.91 IS THE CAPACITY OF THE 42" SD UNDER PASEO DEL NORTE
*S
PRINT HYD             ID=11    CODE=1
*S HYD 12.92 EXCESS Q THAT WILL SPILL INTO BASIN 2 IF 42" SD CAP. EXCEEDED
*S
ADD HYD              ID=5   HYD=12.93     ID I=11  ID II=74
*S
*S HYD 12.93 IS FLOW ALONG RR TRACKS JUST S. OF PDN IN BASIN 2
*S
PRINT HYD            ID=5   CODE=1
*S
COMPUTE NM HYD       ID=1   HYD NO=2.00     DA=0.00176 SQ MI
                     PER A=0   PER B=0   PER C=5   PER D=95
```

```
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=10   HYD=2.98     ID I=1  ID II=5
*S
*S HYD 2.98 IS FLOW ALONG RR TRACKS JUST E. OF EL PUEBLO RD. CROSSING RR TRACKS
*S
PRINT HYD           ID=10   CODE=1
*S
COMPUTE NM HYD      ID=1   HYD NO=13.00     DA=0.00043 SQ MI
                    PER A=0   PER B=0   PER C=0   PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=13.99     ID I=1  ID II=79
*S
*S HYD 13.99 IS FLOW IN EL PUEBLO RD.
*S
PRINT HYD           ID=5   CODE=1
*S
COMPUTE NM HYD      ID=1   HYD NO=11.00     DA=0.00053 SQ MI
                    PER A=0   PER B=0   PER C=0  PER D=100
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=6   HYD=11.99     ID I=1  ID II=5
*S
*S HYD 11.99 IS FLOW IN EL PUEBLO RD.
*S
PRINT HYD           ID=6   CODE=1
*S
DIVIDE HYD           ID=6  PER=-30         ID  I=11   HYD NO=11.91
                                        ID II=12   HYD NO=11.92
PRINT HYD            ID=11    CODE=1
*S HYD 11.91 ASSUME 30% OF EL PUEBLO RD. FLOW SPILLS N. INTO BASIN 2 AT
*S           RR TRACK INTERSECTION WITH EL PUEBLO RD.
*S
PRINT HYD            ID=12    CODE=1
*S HYD 11.92 EXCESS Q THAT WILL FLOW W. ON EL PUEBLO RD.
*S
DIVIDE HYD           ID=12  PER=-60         ID  I=15   HYD NO=11.93
                                       ID II=14   HYD NO=11.94
PRINT HYD            ID=15    CODE=1
*S HYD 11.93 ASSUME 60% OF EL PUEBLO RD. FLOW SPILLS OUT S. OF EL PUEBLO RD.
*S           AT RR TRACK INTERSECTION WITH EL PUEBLO RD. (WILL FLOW TOWARDS
*S           30" CMP OUTFALL TO N. DIV. CHAN.
*S
PRINT HYD            ID=14    CODE=1
*S HYD 11.94 ASSUME EXCESS WILL FLOW W. ON EL PUEBLO RD.
*S
ADD HYD             ID=5   HYD=2.99     ID I=11  ID II=10
*S
*S HYD 2.99 IS TOTAL FLOW TO INLETS AT THE RR TRACK INTERSECTION WITH
*S          EL PUEBLO RD.
*S
PRINT HYD           ID=5   CODE=1
*S
DIVIDE HYD           ID=5  Q=26         ID  I=10   HYD NO=2.91
                                      ID II=11   HYD NO=2.92
PRINT HYD            ID=10    CODE=1
*S HYD 2.91 SUM OF ALL INLET CAPACITIES
*S
PRINT HYD            ID=11    CODE=1
*S HYD 2.92 EXCESS Q THAT WILL SPILL INTO BASIN 1 (EL PUEBLO RD.)
*S
COMPUTE NM HYD      ID=1   HYD NO=1.00     DA=0.00218 SQ MI
                    PER A=0   PER B=0   PER C=60   PER D=40
                    TP=0.13   MASSRAIN=-1
PRINT HYD           ID=1   CODE=1
*S
ADD HYD             ID=5   HYD=1.98     ID I=1  ID II=11
*S
*S HYD 1.98 IS FLOW IN EL PUEBLO RD.
*S
PRINT HYD           ID=5   CODE=1
*S
ADD HYD             ID=6   HYD=1.99     ID I=5  ID II=14
```

```
*S
*S HYD 1.99 IS TOTAL FLOW IN EL PUEBLO RD. AT THE S. SIDE CURB CUT
*S          JUST EAST OF THE N. DIV. CHANNEL (OUTFALLS TO 30" CMP
*S          UNDER N. DIV. CHAN.
*S
PRINT HYD            ID=6   CODE=1
*S
DIVIDE HYD            ID=6  PER=-80          ID  I=82   HYD NO=1.91
                                          ID II=83   HYD NO=1.92
PRINT HYD             ID=82    CODE=1
*S HYD 1.91 ASSUME 80% OF EL PUEBLO RD. FLOW WILL SPILL THROUGH
*S          S. SIDE CURB CUT JUST EAST OF THE N. DIV. CHANNEL
*S          (OUTFALLS TO 30" CMP UNDER N. DIV. CHAN.
*S
PRINT HYD             ID=83    CODE=1
*S    *      *      *      *      *      *      *      *      *      *
*S HYD 1.92 EXCESS EL PUEBLO RD. Q THAT WILL FLOW ACROSS
*S          THE NORTH DIVERSION CHANNEL
*S    *      *      *      *      *      *      *      *      *      *
*S
ADD HYD              ID=5   HYD=11.95     ID I=10  ID II=15
*S
*S HYD 11.95 IS PARTIAL Q TO THE 30" CMP UNDER N. DIV. CHAN.
*S
PRINT HYD            ID=5   CODE=1
*S
ADD HYD              ID=84   HYD=1.95     ID I=5  ID II=82
*S    *      *      *      *      *      *      *      *      *
*S HYD 1.95 IS PARTIAL Q TO THE 30" CMP UNDER N. DIV. CHAN.
*S          (EXCLUDES Q FROM EXISTING PNM 21" CMP THAT OUTFALLS
*S          AT THE INLET TO THE 30" CMP)
*S    *      *      *      *      *      *      *      *      *      *
PRINT HYD            ID=84   CODE=1
*S
*S
COMPUTE NM HYD       ID=1   HYD NO=4.00     DA=0.06456 SQ MI
                     PER A=0   PER B=5   PER C=70  PER D=25
                     TP=0.22   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
ADD HYD              ID=5   HYD=4.99     ID I=1  ID II=80
*S
*S HYD 4.99 IS BASIN 4 COMBINED WITH ANY SPILL FROM BASIN 6
*S
PRINT HYD            ID=5   CODE=1
*S
*S DIVIDE BY CAPACITY OF 21" CMP IN PNM POND
*S
DIVIDE HYD            ID=5  Q=17       ID  I=10   HYD NO=4.91
                                       ID II=11   HYD NO=4.92
PRINT HYD             ID=10    CODE=1
*S HYD 4.91 IS MAX. CAPACITY OF 21" RCP (with 11 ft. head)
*S          FROM THE PNM POND THAT OUTFALLS AT THE 30"CMP AT N. DIV. CHAN.
*S
PRINT HYD             ID=11    CODE=1
*S    *      *      *      *      *      *      *      *      *      *
*S HYD 4.92 FLOW IN EXCESS OF 21" RCP CAPACITY THAT WILL REMAIN IN PND POND
*S    *      *      *      *      *      *      *      *      *      *
*S
*S ADD PNM 21" CMP Q TO Q AT INLET TO 30" CMP AT N. DIV. CHAN.
*S         THIS IS TOTAL Q AT 30" CMP
*S
ADD HYD              ID=87   HYD=1.98     ID I=84  ID II=10
*S
*S HYD 1.98 IS TOTAL Q AT 30" CMP AT N. DIV. CHAN.
*S
PRINT HYD            ID=87   CODE=1
*S
DIVIDE HYD            ID=87  Q=48         ID  I=90   HYD NO=1.96
                                          ID II=91   HYD NO=1.97
PRINT HYD             ID=90    CODE=1
*S    *      *      *      *      *      *      *      *      *      *
*S
*S HYD 1.96 IS THE CAPACITY OF THE EX. 30" CMP TO N. DIV. CHAN.
*S
*S    *      *      *      *      *      *      *      *      *      *
PRINT HYD             ID=91    CODE=1
```

```
*S HYD 1.97 FLOW IN EXCESS OF 30" CMP THAT WILL SPILL TO N. DIV. CHANNEL
*S
*S    *      *      *      *      *      *      *      *      *      *
*S
COMPUTE NM HYD       ID=1   HYD NO=5.00     DA=0.05271 SQ MI
                     PER A=0   PER B=0   PER C=95   PER D=5
                     TP=0.18   MASSRAIN=-1
PRINT HYD            ID=1   CODE=1
*S
COMPUTE NM HYD       ID=2   HYD NO=3.00     DA=0.00520 SQ MI
                     PER A=0   PER B=10   PER C=10   PER D=80
                     TP=0.13   MASSRAIN=-1
PRINT HYD            ID=2   CODE=1
*S
ADD HYD              ID=6   HYD=3.97     ID I=1  ID II=2
*S    *      *      *      *      *      *      *      *      *      *
*S
*S HYD 3.97 IS Q TO N. DIV. CHANNEL INLET (JUST SOUTH OF RR TRACKS)
*S    *      *      *      *      *      *      *      *      *      *
*S
PRINT HYD            ID=6   CODE=1
*S
FINISH
```

TABLE C1
PROPOSED STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of PROPOSED Street or Location of Inlets	PROPOSED - Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No.
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
PROPOSED IMPROVEMENT P1																								
AP 1.92	1 inlet on El Pueblo Rd. at east side of N. Div. Chan.	60" L x 16" W x 6" H Curb Inlet	1	5074	5072	102	0.01961	1.92	27cfs on 1 side of road, 27 at 1st inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	28	7.46	7.46		
AP 1.92	1 inlet on El Pueblo Rd. at east side of N. Div. Chan.	60" L x 16" W x 6" H Curb Inlet	1	5074	5072	102	0.01961	1.92	19.54 cfs bypass flow from 1st inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	6.05	6.05		
AP 1.92	1 inlet on El Pueblo Rd. at east side of N. Div. Chan.	60" L x 16" W x 6" H Curb Inlet	1	5074	5072	102	0.01961	1.92	13.49 cfs bypass flow from 2nd inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	4.74	4.74		
Failed attempt - even with 3 inlets would still have 8.75 cfs bypas flow - Therefore - to divert all water from road, assume 1 curb cut and depressed ditch inlet on N. side of El Pueblo Rd. and 1 40 ft. curb cut on south side to open ditch																						**TOTAL**	**18.25**	**1.92**
AP 1.92	1 median inlet between El Pueblo Rd.n. side and PDN traffic barrier wall	42"W x 48"L Median Inlet	1	---	---	---	---	1.92	27 cfs to depresssed median inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	15	----	85	27	27		
Conclustion - Divert all water from road, assume 1- 40 ft. curb cut and depressed ditch inlet on N. side of El Pueblo Rd. and 1 - 40 ft. curb cut on south side to open ditch																						**TOTAL**	**27**	**1.92**
PROPOSED IMPROVEMENT P5																								
AP 16.92	E. bound PDN 1 Inlet just east of N. Div. Chan.)	42"W x 48"L Median Inlet	1	5076	5074	170	0.01176	16.92	8, 8/1 inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	-----	68	5	5		
Conclustion - Build 1 median type inlet 20 ft. upstream of existing median inlet, join new basin to existing basin with a 24-inch cmp																						**TOTAL**	**5**	**16.92**

TABLE C1
PROPOSED STORM INLET DATA AND CAPACITY
El Pueblo Road Drainage Analysis

AHYMO Analysis Point Number	Description of PROPOSED Street or Location of Inlets	PROPOSED - Inlet Type - All grate bar openings are : (Grate Types = P 1-7/8" W x 4 "L) EXCEPT for 42" W x 48" L grates which have bar openings 5-1/2" W x 3-3/4"L bar opening	Number of Inlets	Street Top Elev.	Street Bot. Elev.	Dis-tance	Street Slope at inlet	AHYMO _97 Hydro-graph Number (BEFORE DIVIDE HYD)	100-yr. Peak Discharge (BEFORE DIVIDE HYD) and assumption of Q per inlet	Gutter Width	Gutter Cross Slope	Road Cross Slope	"n"	Local Depres sion Depth	Local Depres sion Width	Grate Width	Grate Length	Grate Clogging Factor	Curb Opening Length	Effi-ciency (Flow Master Result)	Inlet Capacity per inlet (Flow Master Result)	Total Capacity per Inlet Type	Peak Discharge = Total Capacity all inlets at Analysis Point	AHYMO Analysis Point No.
		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
PROPOSED IMPROVEMENT P6																								
AP24.92	N. PDN frontage rd. 1 Inlet just east of rail road track crossing, add near existing inlet	60" L x 16" W x 6" H Curb Inlet	1	5084	5082	100	0.02000	24.92	8, 8/1 inlet = 8/inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	38	3.33	3.33		
AP24.92	N. PDN frontage rd. 1 Inlet just east of rail road track crossing, add near existing inlet	60" L x 16" W x 6" H Curb Inlet	1	5084	5082	100	0.02000	24.92	4.67 to 2nd inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	38	2.3	2.3		
Conclusion - Build 2 curb inlets just upstream of existing inlet and join these basins together and then to existing basin. Assume 2.37 cfs of bypass flow is acceptable (0.21 ft depth). Also, relocate or abandoned existing 24-inch CMP from its outfall to private property, and join existing median type inlet basin (just east of rail road tracks to existing manhole where 33"S x 49"R cuvlert begins on the N. side of the N. PDN frontage road.																						**TOTAL**	**5.63**	**24.92**
PROPOSED IMPROVEMENT P7																								
AP 23.99	N. PDN frontage rd. 1 Inlet just east of driveway at curb of turn bay	60" L x 16" W x 6" H Curb Inlet	1	5078	5077	80	0.01250	23.99	14 to 1st inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	5.17	5.17		
AP 23.99	N. PDN frontage rd. 1 Inlet just east of driveway at curb of turn bay	60" L x 16" W x 6" H Curb Inlet	1	5078	5077	80	0.01250	23.99	8.3 to 2nd inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	3.78	3.78		

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PROPOSED STORM INLET DATA AND CAPACITY
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		W is perpendicular to flow, L is with flow direction		(ft)	(ft)	(ft)	(ft/ft)		(cfs)	(ft)	(ft/ft)	(ft/ft)		(in.)	(ft)	(ft)	(ft)	(%)	(ft)	(%)	(cfs)	(cfs)	(cfs)	
(a)	(a)	(a) (b)	(a) (b)	(c)	(c)	(c)		(d)	(d)												(e)	(e)		(a)
AP 23.99	N. PDN frontage rd. 1 Inlet just east of driveway at curb of turn bay	60" L x 16" W x 6" H Curb Inlet	1	5078	5077	80	0.01250	23.99	5.05 to 3rd inlet	1.33	0.02	0.02	0.013	2.75	1.33	1.33	5	15	5	36	3.78	3.78		
Conclusion - Build 3 curb inlets just upstream of existing private drive way 600 ft. east of N. Div. Chan and join these basins together and connect to existing 33" R x 49" S culvert along N. side of N. PDN frontage road. Assume 2.49 cfs of bypass flow is acceptable (0.23 ft depth)																						**TOTAL**	**12.73**	
PROPOSED IMPROVEMENT P8																								**23.99**
AP 22.92	N. PDN frontage rd.1 Inlet just east of driveway to pump station (just east of N. Div. Chan.)	24" W x 40" L Median Inlet	1	5076	5074	260	0.00769	22.92	2 to 1 inlet	----	----	----	----	0.01	2	2	3.33	25	----	----	1.37	1.37		
Conclusion - Build 1 median inlet upstream of existing concrete drive way to pump station on N PDN frontage road and oufall via a 24" CMP to ditch at same outfall location as existing 33"S x 49" R culvert on N. side of N. PDN frontage road.																						**TOTAL**	**1.37**	**22.92**
PROPOSED IMPROVEMENT P9																								
AP 18.92	W. bound PDN 1-Inlet just east of N. Div. Chan.)	42"W x 48"L Median Inlet	1	5076	5074	170	0.01176	18.92	4 to 1 inlet	3.5	0.02	0.02	0.015	0.01	3.5	3.5	4	0	----	74	2.95	2.95		
Conclustion - Build 1 median type inlet 20 ft. upstream of existing median inlet, join new basin to existing basin with a 24-inch cmp																						**TOTAL**	**2.95**	**18.92**

(a) See Figure 1 for Drainage Basin Map and Figure 2 for Analysis Point Locations and Inlet locations. See AHYMO modeling schematic Figure 3 for DIVIDE HYD locations,
(b) All inlet locations, types and dimensions assumed for this conceptual design analysis
(c) Elevation and length data to compute slope approaching inlet determined from Drainage Basin Map contours
(d) See AHYMO_97 model summary table for peak discharge results.
(e) Computed with the Flow Master Program - see Appendix for output with results

APPENDIX C

APPENDIX C

Quantity and Cost Estimates -

Hydraulic Data and Results for Proposed Culverts and Channels – Flow Master and Culvert Master Model Output

Proposed Improvement P1
Proposed Improvement P2A
Proposed Improvement P2B
Proposed Improvement P3A
Proposed Improvement P3B
Proposed Improvement P4
Proposed Improvement P5
Proposed Improvement P6
Proposed Improvement P7
Proposed Improvement P8
Proposed Improvement P9

Proposed Improvement P1

TABLE 6

PROPOSED IMPROVEMENT P1

84" RCP at the North Diversion Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading < 2'	SY	410.0	8	3,280
5	a	Section "A" Structural Reinforced Concrete Headwall, Retaining walls and conc. Rundown from El Puebo Rd.	CY	82.0	600	49,200
6	a	Section "B" Concrete Channel Lining 8" thick with reinforcement (this item was removed and replaced with only base course)	SF	0.0	15	0
7		Base course as overflow weir	SY	248.0	10	2,480
8		Structural Concrete Water Quality Weir	CY	12.0	600	7,200
9		84" RCP Class IV (furnish & place in open trench, cip)	LF	58.0	475	27,550
10		Trenching backfill & compaction, over 60" sewer pipe, over 8' to 12' in depth, pipe not incl., compl.	LF	58.0	150	8,700
11		Sawcut, Remove & Dispose Concrete Channel	CY	4.0	100	400
12		Remove & Dispose Concrete Headwall & RxR Ties	LS	1.0	2,000	2,000
13		Remove & Dispose 30" CMP includes trenching	LF	58.0	40	2,320
14	b	Cold milling asphalt cement pavement overlay, 2.5' thickness(includes disposal of millings comp.) From N. Div. Channel to railroad tracks)	SY	1,413.0	5	7,065
15	b	Type Double A catch basin, cip.	EA	4.0	5,000	20,000
16	b	18" RCP Class IV (furnish & place in open trench, cip)	LF	60.0	36	2,160
17	b	Trenching backfill & compaction for 18" RCP, 18-36' sewer pipe up to 8 ft. depth, pipe not incl., compl.	LF	60.0	25	1,500
18	b	24" RCP Class IV (furnish & place in open trench, cip)	LF	50.0	40	2,000
19	b	Trenching backfill & compaction for 24" RCP, 18-36' sewer pipe up to 8 ft. depth, pipe not incl., compl.	LF	50.0	25	1,250
20	b	Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
21	b	Misc. items (striping, concrete cutting and disposal (for new inlets, etc.)	LS	1.0	3,000	3,000
		Sub-Total				**149,105**
22		Mobilization/Demobilization (assume % of all bid items)	%	7.0	10,437	10,437
		Sub-Total				**159,542**
		Contingency and soft costs	%	20.0	31,908	31,908
		TOTAL				**191,451**
	a	See Figure 5 in map pocket for locations of Sections A and B				
	b	**Cost Items for Construction in El Pueblo Rd.**				39,975

PROJECT EL PUEBLO RD. DRAINAGE ANALYSIS SHEET NO. ____ OF ____

SUBJECT P/ - PROPOSED IMPROVEMENTS PROJECT NO. ____

BY PS DATE 12/1/06 CHECKED BY ____ DATE / /

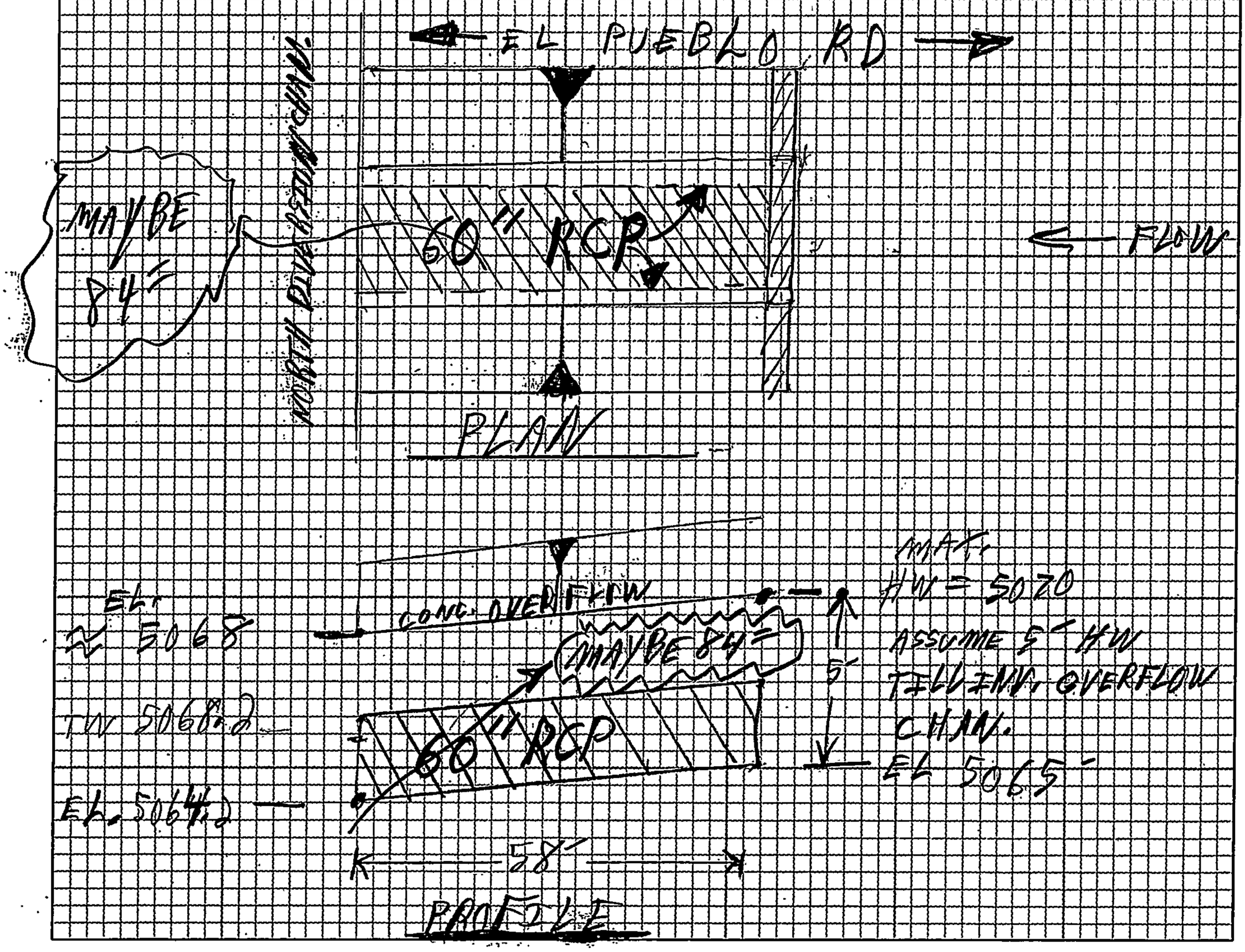
PURPOSE - CONCEPTUAL DESIGN HYDRAULIC ANALYSIS OF OUTFALL TO N. DIV. CHANNEL AT EXISTING 30" CMP (between railroad tracks and El Pueblo Rd)

AP 1.98 IS TOTAL Q TO THIS LOCATION - 9p100-YR = 251 cfs

PLAN - DUE TO LIMITED CAPACITY OF EX. 30" CMP COMPARED TO 251 cfs

REPLACE 30" CMP WITH LARGER RCP

THEN SIZE REINFORCED CONCRETE OVERFLOW SPILLWAY TO TAKE EXCESS FLOW



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48"

PROJECT EL PUEBLO RD SHEET NO. ____ OF ____

SUBJECT QUANTITY ESTIMATES P1 PROJECT NO. ____

BY PS DATE 12/11/06 CHECKED BY ____ DATE / /

PURPOSE - COMPUTE QUANTITY OF EMERGENCY SPILLWAY OVERFLOW ABOVE PROPOSED 60" RCP AT N. DEV. CHANNEL

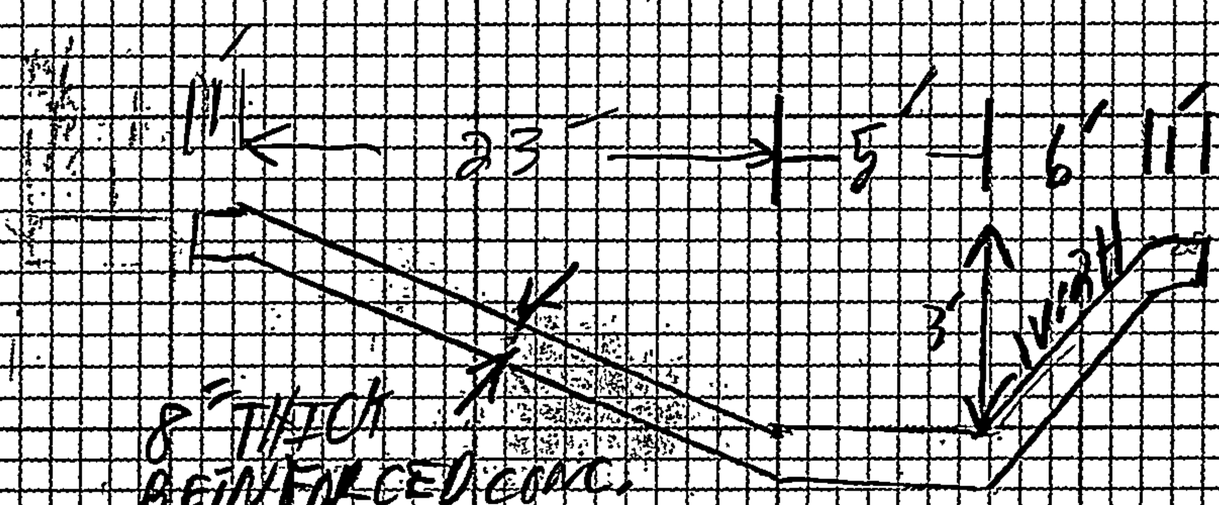
MAY BE 84"

PROPOSED IMPROVEMENT P1

NOTE - THIS CALCULATION ONLY FOR NEW CHANNEL SECTION BETEEN N. DEV. CHAN. AND NEW HEADWALL AT INLET TO NEW 60" RCP

SEE FIGURE 5 (MAP POCKET)

MAYBE 84"



SECTION B-B AS SHOWN ON FIGURE 5 (MAP POCKET)

CHANNEL WIDTH = 1 + 23 + 5 + 6 + 1

= 36'

ASSUME 40'

CHANNEL LENGTH = 52 APPROX.

CHANNEL AREA = 52' x 40' = 2,080 SF

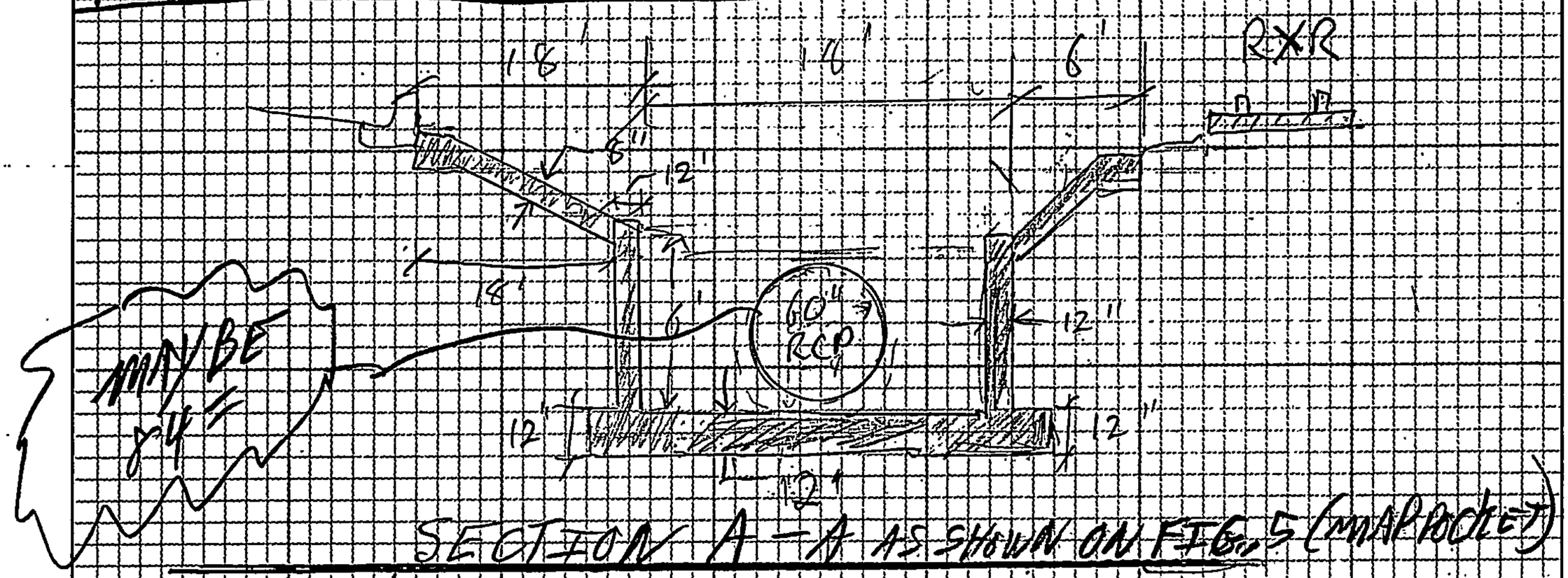
SECTION "B"

PROJECT EL PUEBLO RD SHEET NO. 4 OF 4

SUBJECT QUANTITY ESTIMATES FOR P1 PROJECT NO. 105115C

BY JAB DATE 12/6/06 CHECKED BY _____ DATE 1/1

PROPOSED IMPROVEMENT P1



SECTION A-A AS SHOWN ON FIG. 5 (MAP POCKET)

16' x .83 x 40' = 598 CF

6' x .83 x 40' = 200 CF

6' x 1' x 47' = = 282 CF

6 x 1 x 47' = 282 CF

16 x 1 x 47' = = 840 CF

* 2202 CF ≈ 82 CY STRUCT. CONC. REMOVAL

* saw cut & remove concrete

36' x 2' x 1' = 72 CF ≈ 2 CY (a)

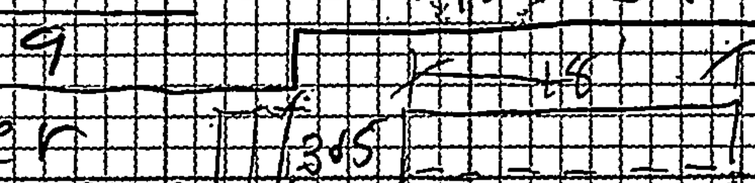
* remove 30" CMP = 58 LF

* remove Ex head wall (6' + 6' + 10') x 3.5 x .67 =

(a) TOTAL STRUCT. CONC. REMOVAL = 4 CY 51 CF ≈ 2 CY (a)

* Grading & 2' = (42' x 88') / 9 = 410 SY

* water Quality water



(3.5' x 48' x .67) x 2 =

⇒ 327 CF ≈ 12 CY → ASSUME STRUCT. CONC

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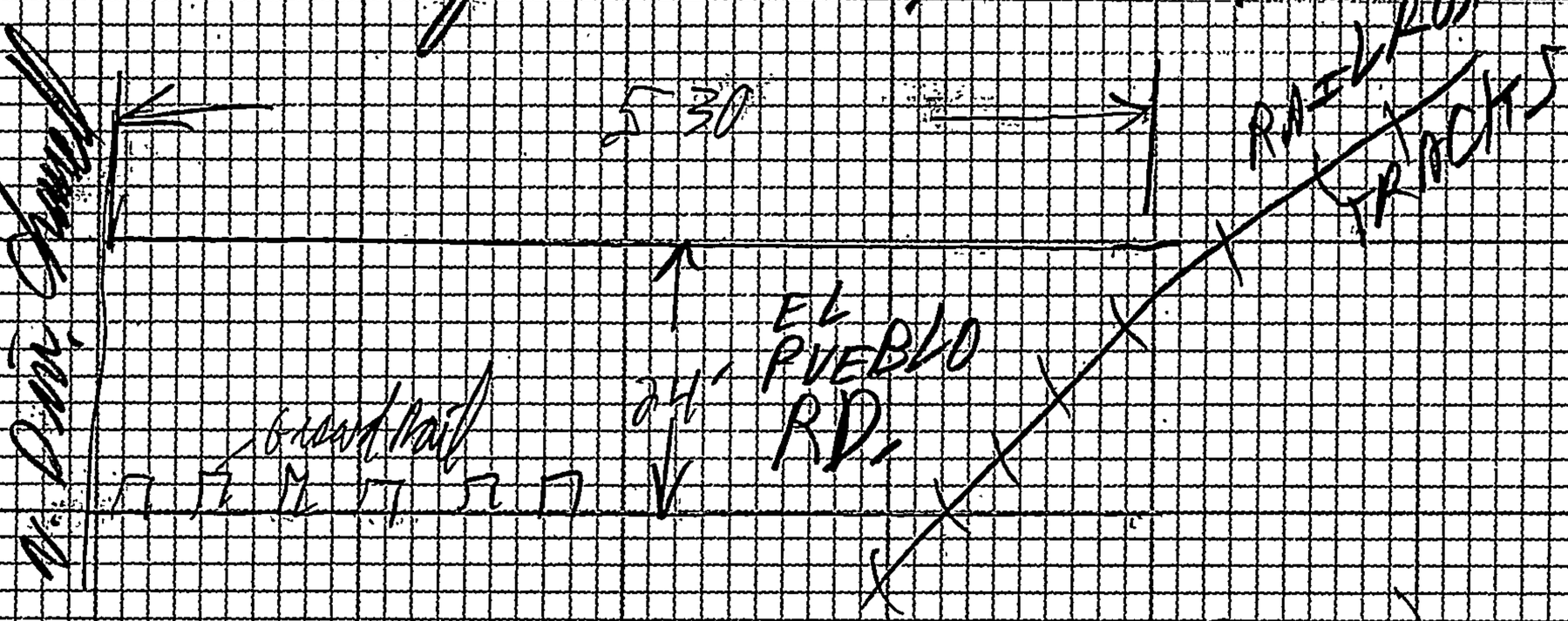
PROJECT El Pueblo Rd SHEET NO. ____ OF ____

SUBJECT P1 Cost Estimate PROJECT NO. ____

BY PS DATE 1/8/07 CHECKED BY ____ DATE / /

QUANTITY FOR El Pueblo Rd

mill & overlay 2.5" asphalt



530(24) = 12,720 SY

ASPHALT overlay = 1,414 SY

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Culvert Calculator Report

P1 - Prop Improv 1 - 1- 84" RCP at N. Div. Chan.-solve for ~~Q~~ HEADWATER

Solve For: Headwater Elevation

THIS IS QP IF 42" CMP UNDER PASEO DEL NORTE IS BLOCKED AND ALL FLOW FROM EL PUEBLO RD. THAT NOW SPILLS ACROSS N. DIV. CHANNEL IS COLLECTED AT EX. 30" CMP AT N. DIV. CHANNEL.

Culvert Summary

Allowable HW Elevation	5,072.00 ft	Headwater Depth/Height	1.22
Computed Headwater Elev.	5,073.56 ft	Discharge	364.00 cfs
Inlet Control HW Elev.	5,073.23 ft	Tailwater Elevation	5,069.20 ft
Outlet Control HW Elev.	5,073.56 ft	Control Type	Entrance Control

Grades

Upstream Invert	5,065.00 ft	Downstream Invert	5,064.20 ft
Length	58.00 ft	Constructed Slope	0.013793 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	4.13 ft
Slope Type	Steep	Normal Depth	3.44 ft
Flow Regime	Supercritical	Critical Depth	5.03 ft
Velocity Downstream	15.38 ft/s	Critical Slope	0.004332 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	7.00 ft
Section Size	84 inch	Rise	7.00 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,073.56 ft	Upstream Velocity Head	2.35 ft
Ke	0.50	Entrance Loss	1.18 ft

Inlet Control Properties

Inlet Control HW Elev.	5,073.23 ft	Flow Control	Transition
Inlet Type	Square edge w/headwall	Area Full	38.5 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report
P1 - Prop Improv 1 - 1- 84" RCP at N. Div. Chan.-solve for Q

Solve For: Discharge

NOTE — Q100 AT THIS CULVERT WILL BE ~~286~~ 364 CFS IN FUTURE IF THE EXISTING 42" CULVERT UNDER PASEO DEL NORTE IS BLOCKED AND ALL FLOW FROM EL PUEBLO RD

Culvert Summary

Allowable HW Elevation	5,072.00 ft	Headwater Depth/Height	1.00
Computed Headwater Elev	5,072.00 ft	Discharge	266.47 cfs
Inlet Control HW Elev.	5,071.52 ft	Tailwater Elevation	5,069.20 ft
Outlet Control HW Elev.	5,072.00 ft	Control Type	Entrance Control

Grades

Upstream Invert	5,065.00 ft	Downstream Invert	5,064.20 ft
Length	58.00 ft	Constructed Slope	0.013793 ft/ft

Hydraulic Profile

Profile	CompositeS1S2	Depth, Downstream	5.00 ft
Slope Type	Steep	Normal Depth	2.88 ft
Flow Regime	N/A	Critical Depth	4.29 ft
Velocity Downstream	9.06 ft/s	Critical Slope	0.003627 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	7.00 ft
Section Size	84 inch	Rise	7.00 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,072.00 ft	Upstream Velocity Head	1.81 ft
Ke	0.50	Entrance Loss	0.90 ft

Inlet Control Properties

Inlet Control HW Elev.	5,071.52 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	38.5 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

THERE — ASSUME THAT AN 84" CMP WILL TAKE 100-YR. Q FOR FINAL DESIGN WITH POSSIBLY ~~286~~ 364 - 266 = 98

~~266~~
~~20~~ CFS SPILL OVER TOP
98

Culvert Calculator Report

P1 - Prop Improv 1 - 60" RCP at N. Div. Chan.-solve for Q to conc. chan. inv.

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	5,071.00	ft	Headwater Depth/Height	1.20	
Computed Headwater Elev	5,071.00	ft	Discharge	152.75	cfs
Inlet Control HW Elev.	5,070.74	ft	Tailwater Elevation	5,068.20	ft
Outlet Control HW Elev.	5,071.00	ft	Control Type	Entrance Control	

(a)

Grades

Upstream Invert	5,065.00	ft	Downstream Invert	5,064.20	ft
Length	58.00	ft	Constructed Slope	0.013793	ft/ft

Hydraulic Profile

Profile	CompositeS1S2		Depth, Downstream	4.00	ft
Slope Type	Steep		Normal Depth	2.50	ft
Flow Regime	N/A		Critical Depth	3.54	ft
Velocity Downstream	9.07	ft/s	Critical Slope	0.004752	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	5,071.00	ft	Upstream Velocity Head	1.64	ft
Ke	0.50		Entrance Loss	0.82	ft

Inlet Control Properties

Inlet Control HW Elev.	5,070.74	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	19.6	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

(a) SOLVE FOR Q IN EXCESS OF CULVERT CAPACITY THAT WILL SPILL OVER CONC. EMERGENCY OVERFLOW SECTION

$Q_{100} = 238$ CFS
$- 153$ CFS
85 SEE NEXT PAGES

Culvert Calculator Report

P1 - Prop Improv 1 - 48" RCP at N. Div. Chan.-solve for Q to conc. chan. inv.

48" = PIPE TOO SMALL

ASSUME NOT ENOUGH

Q

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	5,070.00 ft	Headwater Depth/Height	1.25
Computed Headwater Elev	5,070.00 ft	Discharge	92.87 cfs
Inlet Control HW Elev.	5,069.84 ft	Tailwater Elevation	5,068.20 ft
Outlet Control HW Elev.	5,070.00 ft	Control Type	Entrance Control

Grades

Upstream Invert	5,065.00 ft	Downstream Invert	5,064.20 ft
Length	58.00 ft	Constructed Slope	0.013793 ft/ft

Hydraulic Profile

Profile	CompositeS1S2	Depth, Downstream	4.00 ft
Slope Type	Steep	Normal Depth	2.12 ft
Flow Regime	N/A	Critical Depth	2.92 ft
Velocity Downstream	7.39 ft/s	Critical Slope	0.005354 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,070.00 ft	Upstream Velocity Head	1.39 ft
Ke	0.50	Entrance Loss	0.69 ft

Inlet Control Properties

Inlet Control HW Elev.	5,069.84 ft	Flow Control	Transition
Inlet Type	Square edge w/headwall	Area Full	12.6 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

P1

P# — **AP 1.98 conc. weir overflow at N. Div. Chan.**

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	85.00	ft³/s
Crest Elevation	5070.00	ft
Tailwater Elevation	5068.00	ft
Crest Surface Type	Paved	
Crest Breadth	58.00	ft
Crest Length	5.00	ft

Results

Headwater Elevation	5073.15	ft
Headwater Height Above Crest	3.15	ft
Tailwater Height Above Crest	-2.00	ft
Weir Coefficient	3.04	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	3.04	US
Flow Area	15.75	ft²
Velocity	5.40	ft/s
Wetted Perimeter	11.30	ft
Top Width	5.00	ft

= APPROX. EL. OF EL PUEBLO RD

THEREFORE – ASSUME 60" RCP IS SMALLEST PIPE ACCEPTABLE TO AVOID FLOODING EL PUEBLO RD.

Proposed Improvement P1

IF

Upstream Improvements are not built

AP 1.92 Qp100 = 53 cfs

= estimated Qp in El Pueblo Rd. that will flow west across the North Diversion Channel

FOR N-SIDE OF EL PUEBLO RD

prop AP 1.92 1st. inlet 1/2 rd try ditch inlet-el pueblor rd @ ndivchan

Project Description

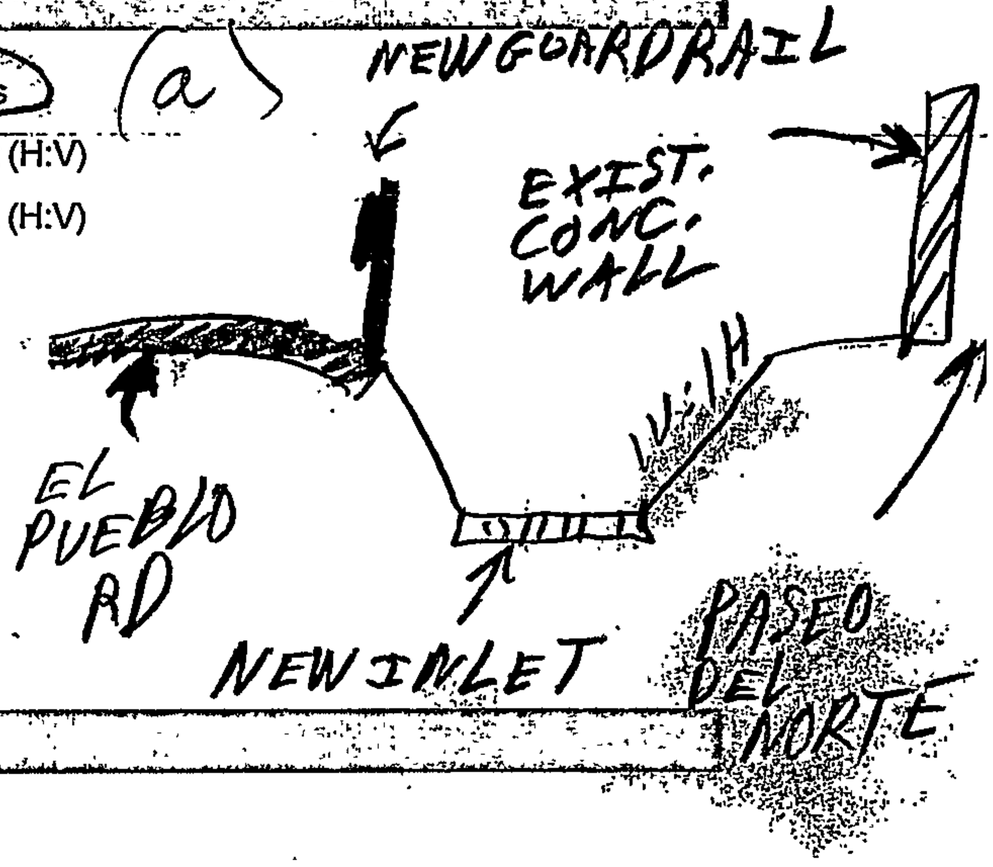
Solve For	Spread	

JUST EAST OF N. DIV. CHAN.

Input Data

Discharge		27.00	ft³/s
Left Side Slope		1.00	ft/ft (H:V)
Right Side Slope		1.00	ft/ft (H:V)
Bottom Width		4.00	ft
Grate Width		3.50	ft
Grate Length		4.00	ft
Local Depression		2.00	in
Local Depression Width		3.50	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		15.00	%

(a)



Results

Spread	5.16	ft
Depth	0.58	ft
Wetted Perimeter	5.64	ft
Top Width	5.16	ft
Open Grate Area	10.71	ft²
Active Grate Weir Length	13.95	ft

Q100 @ AP 1.92 = 53 CFS THIS IS TOTAL IN EL PUEBLO RD JUST EAST OF N. DIV. CHAN. ASSUME 1/2 FLOW IS = 27 CFS. THIS REQUIRES MANY INLETS TO ATTAIN 100% COLLECTION OF 27 CFS (SEE NEXT PAGES) THEREFORE - NEW CURB CUT, GUARDRAIL AND 1 MEDIAN INLET COULD COLLECT ALL 27 CFS FOR N. SIDE OF EL PUEBLO RD. 27 CFS ASSUMES UPSTREAM PROPOSED IMPROVEMENTS P2, P3 and P4 ARE NOT BUILT

AP 1.92 1st curb inlet 1/2 st. Q @el pue rd at ndivchan

Project Description

Solve For	Efficiency

Input Data

Discharge	27.00	ft³/s
Slope	0.01960	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	27.65	%
Intercepted Flow	7.46	ft³/s
Bypass Flow	19.54	ft³/s
Spread	20.23	ft
Depth	0.40	ft
Flow Area	4.09	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.60	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.11	
Grate Flow Ratio	0.17	
Equivalent Cross Slope	0.04858	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.01	
Total Interception Length	61.20	ft

see next page

AP 1.92 2nd. curb inlet 1/2 street Q at el pue rd at ndivchan

Project Description

Solve For	Efficiency

Input Data

Discharge	19.54	ft³/s
Slope	0.01960	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	30.95	%
Intercepted Flow	6.05	ft³/s
Bypass Flow	13.49	ft³/s
Spread	17.92	ft
Depth	0.36	ft
Flow Area	3.21	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	6.09	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.13	
Grate Flow Ratio	0.19	
Equivalent Cross Slope	0.05203	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.01	
Total Interception Length	51.27	ft

SEE NEXT PAGE

AP 1.92 3rd. curb inlet 1/2 street Q at el pue rd at ndivchan

Project Description

Solve For	Efficiency

Input Data

Discharge	13.49	ft³/s
Slope	0.01960	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	35.12	%
Intercepted Flow	4.74	ft³/s
Bypass Flow	8.75	ft³/s
Spread	15.59	ft
Depth	0.31	ft
Flow Area	2.43	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	5.55	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.15	
Grate Flow Ratio	0.21	
Equivalent Cross Slope	0.05646	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	41.79	ft

CONCLUSION — EVEN WITH 3 INLETS IN SERIES, MORE INLETS WOULD BE REQUIRED FOR 100% CUT-OFF.

AP 1.92 check gutter spread for 1/2 Q at el pue rd at ndivchan

Project Description

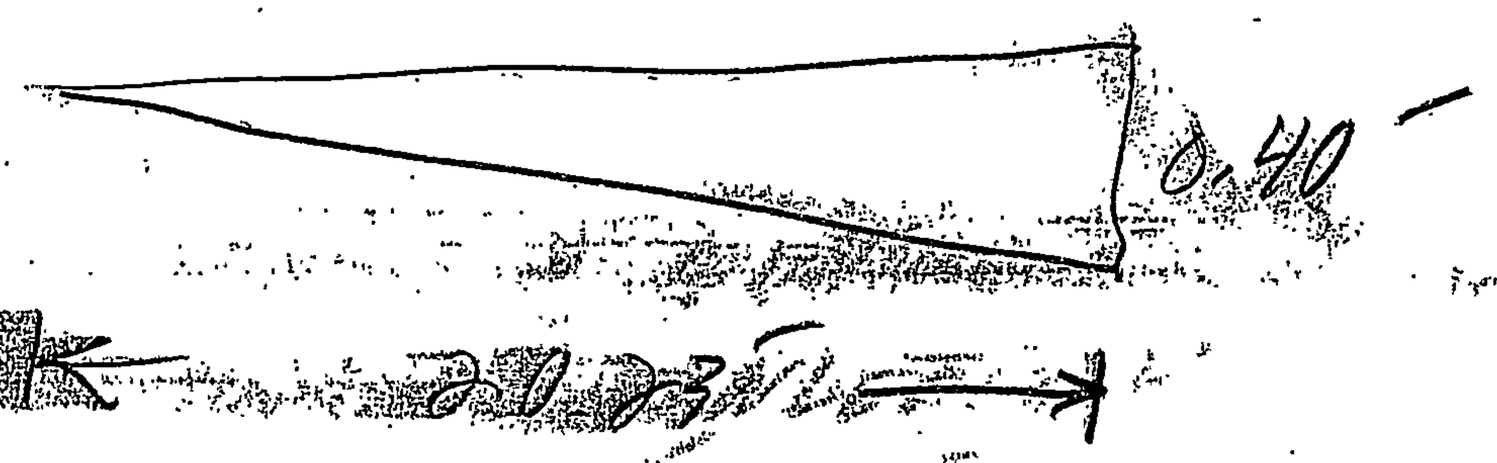
Solve For	Spread

Input Data

Channel Slope	0.01960	ft/ft
Discharge	27.00	ft³/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	

Results

Spread	20.23	ft
Flow Area	4.09	ft²
Depth	0.40	ft
Gutter Depression	0.00	ft
Velocity	6.60	ft/s



Proposed Improvement P2A

&

Proposed Improvement P2B

TABLE 7

PROPOSED IMPROVEMENT P2A

Reinforced Concrete Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		Reseeding	LS	1.0	2,000	2,000
3		NPDES	LS	1.0	2,000	2,000
4		Grading <2'	SY	2,217.0	8	17,736
5		Excavation and disposal of soil for channels	CY	1830.0	6	10,980
6		Excavation backfill & compaction for channels	CY	1478.0	8	11,824
7		Concrete Channel Lining 8" thick with reinforcement	SF	19,950.0	15	299,250
8		Structural Concrete, Headwall and Railroad Crossing	CY	26.0	600	15,600
9		Bore Under Railroad	LF	20.0	400	8,000
10	a	66" RCP (including installation and trenching < 6')	LF	190.0	400	76,000
11		Sawcut, Remove, Dispose & Replace Asphalt Pavement, 6" thick, includes C&G	SY	62.0	36	2,232
12		Gabion Aprons	CY	25.0	250	6,250
		subtotal				**453,872**
13		Mobilization/Demobilization (assume % of all bid items)	%	7.0	31,771	31,771
		SUB TOTAL				**485,643**
		Contingency	%	20.0	97,129	97,129
		TOTAL				**582,772**

a- assume that a 66" RCP will convey channel flow under railroad tracks and El Pueblo Rd.

PROPOSED IMPROVEMENT P2B

66-in. RCP Storm drain Pipe
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	3,166.0	8	25,328
5		Excavation and disposal of soil	CY	844.0	6	5,064
6		Structural Concrete, Headwall & Railroad Crossing	CY	35.0	600	21,000
7		Bore Under Railroad	LF	20.0	400	8,000
8		66" RCP (including installation and trenching < 6')	LF	940.0	400	376,000
9		Manhole Type C-8' diameter, 0' to 6' deep	EA	2.0	10,000	20,000
10		Gabion Aprons	CY	25.0	250	6,250
		subtotal				**467,642**
11		Mobilization/Demobilization (assume % of all bid items)	%	7.0	32,735	32,735
		SUB TOTAL				**500,377**
		Contingency	%	20.0	100,075	100,075
		TOTAL				**600,452**

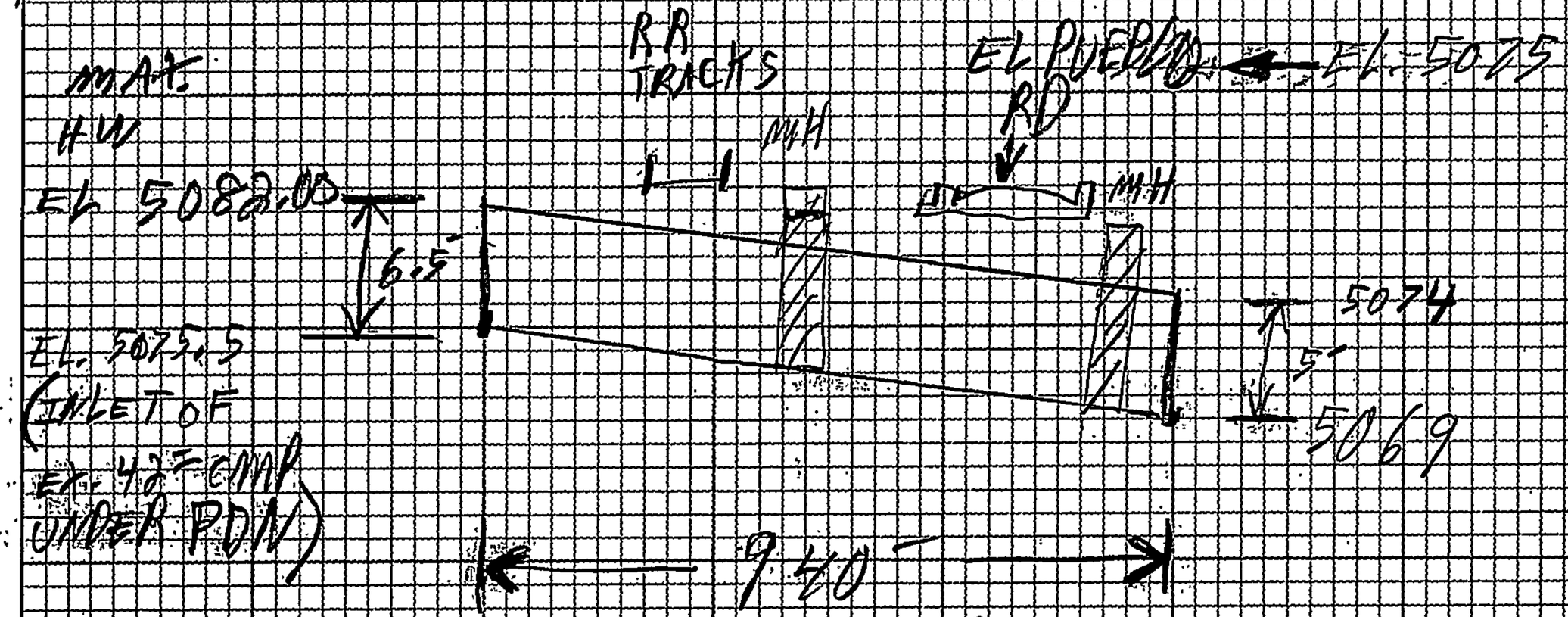
PROJECT EL PUEBLO RD DRAINAGE ANALYSIS SHEET NO. ____ OF ____

SUBJECT P2 - PROPOSED STORM DRAIN PROJECT NO. ____

BY PS DATE 12/1/06 CHECKED BY ____ DATE / /

PURPOSE - CONCEPTUAL DESIGN HYDRAULIC ANALYSIS USING CULVERT MASTER FOR PROPOSED IMPROVEMENT P2 AT AP 12-92 (EXISTING 42" CMP AT PDN to REMAIN - BUILD NEW CULVERT FROM THIS LOCATION SOUTH AND PARALLEL TO PDN TRAFFIC BARRIER WALL TO OUTFALL SOUTH OF EL PUEBLO RD NEAR INLET OF EXISTING 30" CMP THAT OUTFALLS TO THE NORTH DIV. CHANNEL.

AP 12-92 100-YR Qp = 238 cfs



S = 0.0069 '/FT

LOOK AT 2 OPTIONS -

P2A - OPEN CONC. CHANNEL (WITH CULVERTS UNDER RR TRACKS & EL PUEBLO RD)

P2B - BOX CULVERT 4'R x 2' SPAN

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2201 San Pedro NE Bldg. #4, Suite 200 Albuquerque, New Mexico 87110 505/884-0700

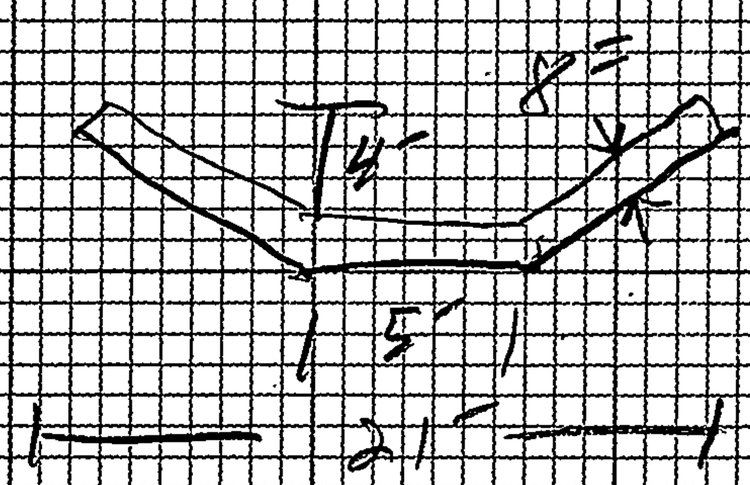
PROJECT EL PUEBLO RD SHEET NO. ____ OF ____

SUBJECT QUANTITY ESTIMATE P2A PROJECT NO. ____

BY PS DATE 12/11/06 CHECKED BY ____ DATE / /

PROPOSED IMPROVEMENT P2A

OPEN CONCRETE CHANNEL



CHANN. LENGTH = 950 LF

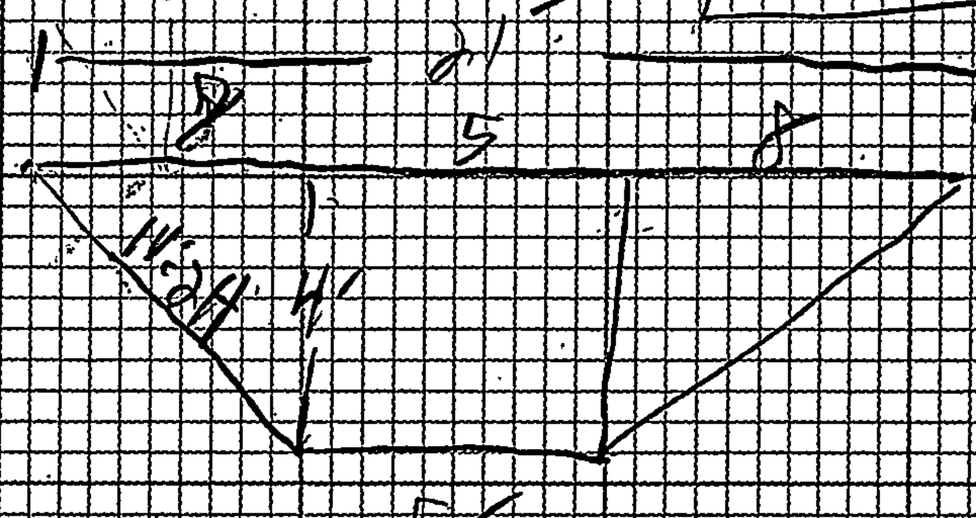
CHANNEL AREA = 21'(950) = 19,950 SF

GRADING – ASSUME 19,950 SF $\left(\frac{1\ SY}{9\ SF}\right)$ = 2,217 SY

SOIL EXCAVATION AND DISPOSAL FOR CHANNEL.

EXCAV. BACK-COMPACTION FOR CHANNEL = 21'(8')(950')/27 = 1,478 CY

=



VOL. = $\frac{\left[\frac{1}{2}(5+21)\,4'\right]\,950'\ \text{length}}{27\ FT^3/CY}$ = 1,830 CY

SOIL EXCAV. & DISPOSAL VOLUME = 1,830 CY

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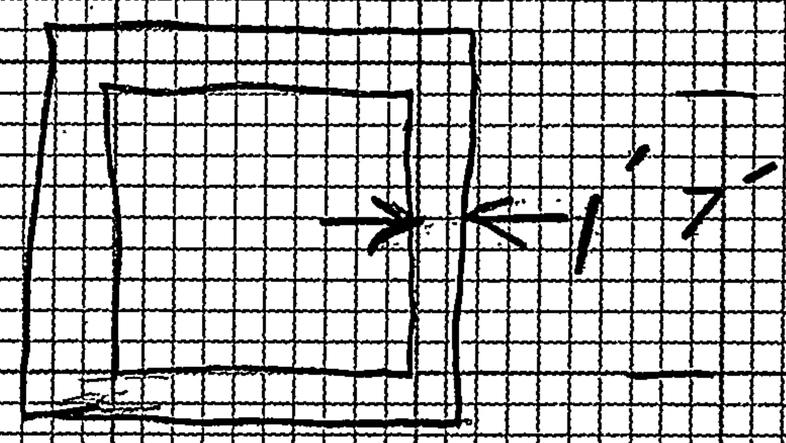
PROJECT EL PUEBLO RD. DRAINAGE SHEET NO. ____ OF ____

SUBJECT QUANTITIES IMPROVEMENT P2A & P2B PROJECT NO. ____

BY PS DATE 12/12/06 CHECKED BY ____ DATE / /

FOR P2A & P2B

ASSUME REINFORCED CONCRETE BOX WILL BE REQUIRED BY RAILROAD IN ADDITION TO BORE UNDER R.R.

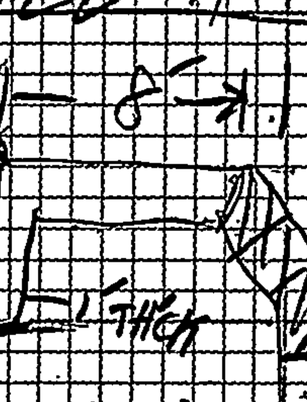


VOL. $= \left(\frac{4(7)1}{27}\right) 20' \text{ LONG}$ (LENGTH WOULD PROBABLY ONLY NEED TO BE 15')

$= 20$ CY

P2B CONC. HEADWALL AT 48" CMP PIPE

ASSUME 7' TALL



AT 48" CMP

ASSUME THIS HEADWALL REMAINS

REIN. CONC. VOL. $= \frac{(.3)(7)(1)}{27 \text{ ft}^3/\text{cy}} = 6$ CY

ASSUME 1 HEAD & INLET & 1 AT OUTLET

$= 12$ CY → ASSUME 15 CY

P2B REINFORCED CONC. VOL. FOR HEADWALL = 15 CY

PROJECT EL PUEBLO RD DRAINAGE SHEET NO. ____ OF ____

SUBJECT QUANTITY ESTIMATES IMP. P2A & P2B PROJECT NO. ____

BY PS DATE 12/12/06 CHECKED BY ____ DATE / /

P2A ASSUME NEW HEADWALL WORK WILL BE REQUIRED AT 40 TEMP TO BUILD CONCRETE CHANNEL

ASSUME 6 CY (see drainage path)

TOTAL STRUCTURAL CONCRETE VOLUME

FOR P2A = 6 + 20 = 26 CY

FOR P2B = 15 + 20 = 35 CY

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PROJECT EL PUEBLO RD SHEET NO. 3 OF 4

SUBJECT QUANTITY ESTIMATES PROPOSED P2B PROJECT NO. 103115C

BY JAB DATE 12/6/00 CHECKED BY _____ DATE / /

PROPOSED IMPROVEMENT P2B → 950 LF

~~RCP = 600 LF~~

MH = 6' dia - 26' Depth = 2 ea

USA

reseed = LS

Grading 2' 30' × ~~800~~ 950' / 9 CY/SY = 3,166 SY → ≈ 2,670 SY

Gabion Apron

30' × 15' × 1.5' high = 675 CF = 25 CY

Bore under RxR tracks - Assume 20' Bore

ASSUME $400/LF

Asphalt remove & Replace men

70 LF × 8' / 9 = 62 SY

PROJECT EL PUEBLO RD SHEET NO. ____ OF ____

SUBJECT QUANTITY ESTIMATE IMPROVEMENT PLAN PROJECT NO. P&B

BY PS DATE 12/12/06 CHECKED BY ____ DATE / /

P&B 66 = RCP

SOIL EXCAV. & REMOVAL

ASSUME VOL. = PIPE MUST BE DISPOSED

$= \pi (2.75)^2 (950' \text{ Length})$

$= \frac{24 ft^2 (950')}{27 ft^3/cy}$

SOIL EXCAV. AND DISPOSAL = 844 CY

2 TRAPEZOIDAL CONC. CHANNEL

P3A - AP 12.92- 5' b, 4'd, 1V:2H

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00690	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	238.00	ft^3/s

Results

Normal Depth	2.17	ft
Flow Area	20.25	ft^2
Wetted Perimeter	14.70	ft
Top Width	13.67	ft
Critical Depth	2.86	ft
Critical Slope	0.00222	ft/ft
Velocity	11.75	ft/s
Velocity Head	2.15	ft
Specific Energy	4.32	ft
Froude Number	1.70	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.17	ft
Critical Depth	2.86	ft
Channel Slope	0.00690	ft/ft
Critical Slope	0.00222	ft/ft

P~~3~~2B

Culvert Calculator Report
P~~3~~2 - Prop Improv 3 - 66-in. RCP rr tracks & El Pueblo Rd

Solve For: Headwater Elevation

ASSUME THIS IS OK WITH CONSTRUCTION OF A HEADWALL

Culvert Summary

Allowable HW Elevation	5,082.00 ft	Headwater Depth/Height	1.39
Computed Headwater Elev	5,083.16 ft	Discharge	238.00 cfs
Inlet Control HW Elev.	5,083.16 ft	Tailwater Elevation	5,074.00 ft
Outlet Control HW Elev.	5,083.12 ft	Control Type	Inlet Control

Grades

Upstream Invert	5,075.50 ft	Downstream Invert	5,069.00 ft
Length	940.00 ft	Constructed Slope	0.006915 ft/ft

Hydraulic Profile

Profile	CompositeS1S2	Depth, Downstream	3.90 ft
Slope Type	Steep	Normal Depth	3.90 ft
Flow Regime	N/A	Critical Depth	4.31 ft
Velocity Downstream	13.20 ft/s	Critical Slope	0.005481 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	5.50 ft
Section Size	66 inch	Rise	5.50 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,083.12 ft	Upstream Velocity Head	2.21 ft
Ke	0.50	Entrance Loss	1.10 ft

Inlet Control Properties

Inlet Control HW Elev.	5,083.16 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	23.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

P2B 2

Culvert Calculator Report

P2 - Prop Improv 3 - 4'r x 7's box cul rr tracks & El Pueblo Rd

Solve For: Headwater Elevation

THIS OPTION BEST TO KEEP HW BELOW ALLOWABLE (SEE NEXT CULVERT OPTION)

Culvert Summary

Allowable HW Elevation	5,082.00	ft	Headwater Depth/Height	1.38	
Computed Headwater Elev	5,081.03	ft	Discharge	238.00	cfs
Inlet Control HW Elev.	5,081.03	ft	Tailwater Elevation	5,074.00	ft
Outlet Control HW Elev.	5,080.78	ft	Control Type	Inlet Control	

Grades

Upstream Invert	5,075.50	ft	Downstream Invert	5,069.00	ft
Length	940.00	ft	Constructed Slope	0.006915	ft/ft

Hydraulic Profile

Profile	CompositePressureProfileS1S2		Depth, Downstream	2.70	ft
Slope Type	N/A		Normal Depth	2.70	ft
Flow Regime	N/A		Critical Depth	3.30	ft
Velocity Downstream	12.59	ft/s	Critical Slope	0.004010	ft/ft

Section

Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	7.00	ft
Section Size	7 x 4 ft		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	5,080.78	ft	Upstream Velocity Head	1.65	ft
Ke	0.20		Entrance Loss	0.33	ft

Inlet Control Properties

Inlet Control HW Elev.	5,081.03	ft	Flow Control	Submerged	
Inlet Type	90° headwall w 45° bevels		Area Full	28.0	ft²
K	0.49500		HDS 5 Chart	10	
M	0.66700		HDS 5 Scale	2	
C	0.03140		Equation Form	2	
Y	0.82000				

Proposed Improvement P3A

&

Proposed Improvement P3B

TABLE 8

PROPOSED IMPROVEMENT P3A

Reinforced Concrete Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost ($/unit)	Cost ($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	1,100.0	8	8,800
5		Excavation and disposal of soil for channels	CY	0.0	6	0
6		Excavation backfill & compaction for channels	CY	700.0	8	5,600
7		Concrete Channel Lining 8" thick with reinforcement	SF	9,450.0	15	141,750
8	a	Structural Concrete, Headwall	CY	15.0	600	9,000
		subtotal				**171,150**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	11,981	11,981
		SUB TOTAL				**183,131**
		Contingency	%	20.0	36,626	36,626
		TOTAL				**219,757**

a- assume headwall required at beg. & end of channel - assume voume from P1 = 15 cy for 1 headwall

PROPOSED IMPROVEMENT P3B

66-in. RCP Storm drain Pipe
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost ($/unit)	Cost ($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	1,100.0	8	8,800
5		Backfill select material over pipe	CY	1925.0	12	23,100
6		66" RCP (including installation and trenching < 6')	LF	450.0	400	180,000
7	a	Structural Concrete, Headwall	CY	15.0	600	9,000
8		Manhole Type C-8' diameter, 0' to 6' deep	EA	1.0	10,000	10,000
		subtotal				**236,900**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	16,583	16,583
		SUB TOTAL				**253,483**
		Contingency	%	20.0	50,697	50,697
		TOTAL				**304,180**

a- assume headwall required at beg. & end of channel - assume voume from P1 = 15 cy for 1 headwall

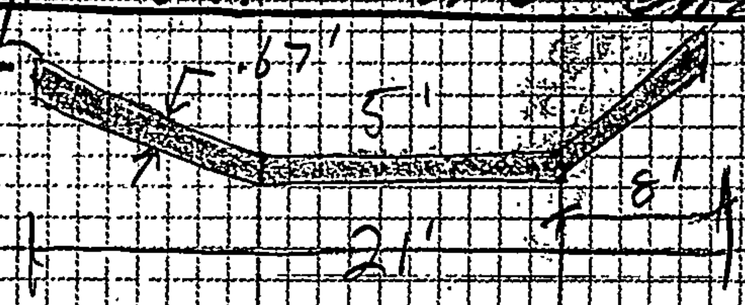
PROJECT El Pueblo #3 SHEET NO. 2 OF 4

SUBJECT PROJECT NO. 103115C

BY JAB DATE 12/16/06 CHECKED BY DATE / /

PROPOSED IMPROVEMENT 3A - CONC. CHANNEL

Concrete channel



21 * .67 = 14.07 SF

* 14.07 SF × 450 LF = 6,332 CF ≈ 234 CY

21 FT (450 FT) = 9,450 SF = ~~563 SY~~ = 704 SY

* Grading: Assume 2' over entire surface

21' × ~~360~~ 450' × 2' = 18,900 CF

21' (450') 1 SY / 9 SF = 1050 SY

Pipe instead of channel

~~360~~ 450 LF

ASSUME 1,100 SY GRADING < 2'

EXCAVATION & DISPOSAL OF SOIL FOR CHANNEL

ASSUME 0 CY AS THERE IS AN EXIST. CHANNEL

P3A

EXCAV. BACK. & COMPACTION FOR CHAN.

= 21' × 2' × 450' / 27 ft³/cy = 700 CY

P3B BACKFILL SELECT MATERIAL (COVER PIPE - NOW AN OPEN CHANNEL

VOLUME = ((1/2)(1+26)7) 450 / 27 = 4,925 CY

26

EX. CHAN.

PROP. PIPE

171

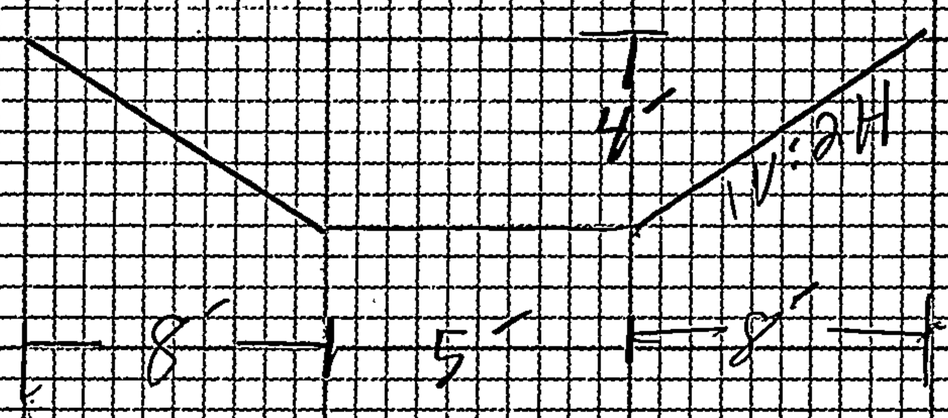
PROJECT EL PUEBLO RD DRAINAGE ANALYSIS SHEET NO. OF

SUBJECT P3A - PROPOSED REINFORCED CONC. CHANNEL PROJECT NO.

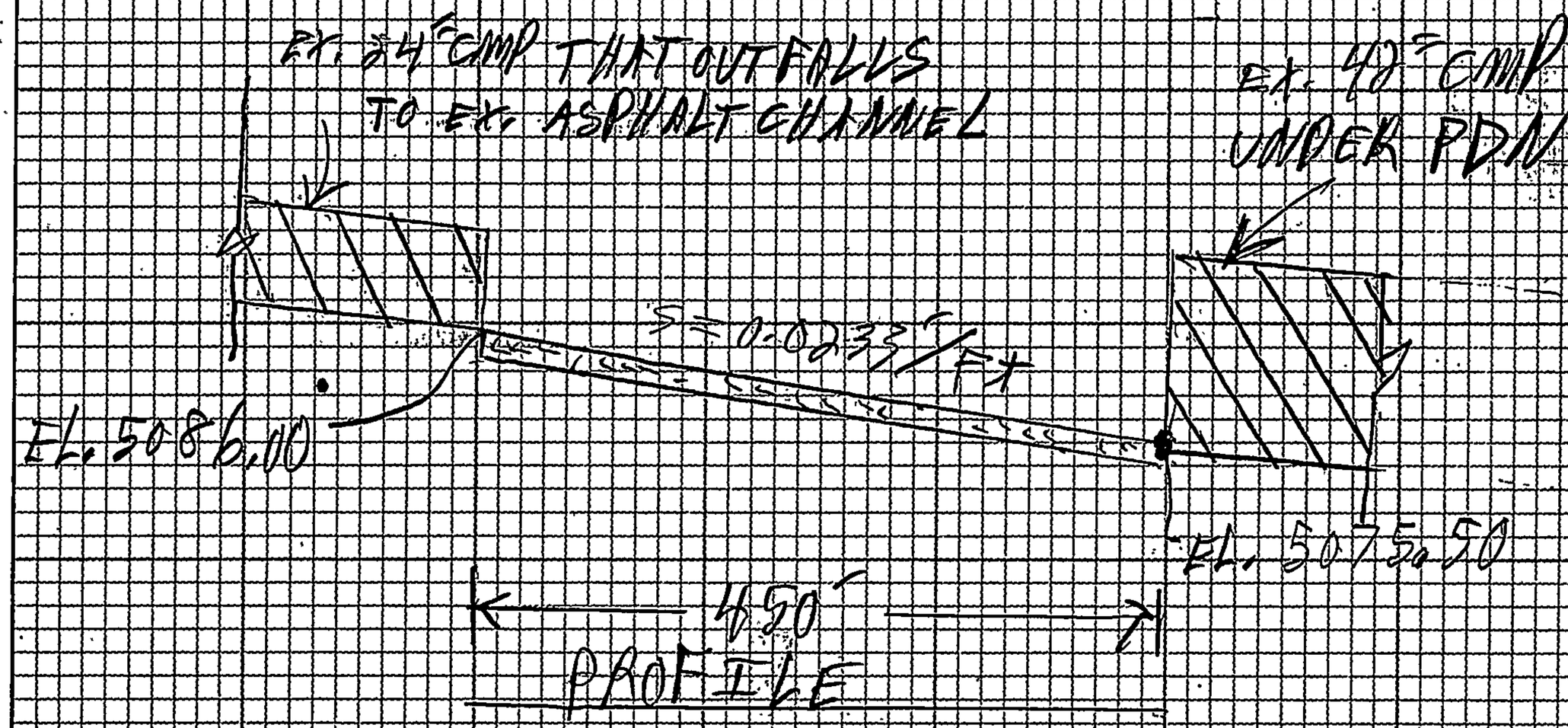
BY PS DATE 12/11/06 CHECKED BY DATE / /

PURPOSE - CONCEPTUAL DESIGN HYDRAULIC ANALYSIS USING FLOW MASTER FOR PROPOSED IMPROVEMENT P3A - AT AP 12.99 (REPLACE FAILING ASPHALT CHANNEL

DATA - Qp100 = 273 cfs



CROSS-SECTION



PROFILE

3

P2A - AP 12.99- 5' b, 4'd, 1V:2H

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

AP 12.99
100-YR. QP = 273 cfs

Roughness Coefficient	0.013	
Channel Slope	0.02330	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	273.00	ft³/s

Results

Normal Depth	1.71	ft
Flow Area	14.37	ft²
Wetted Perimeter	12.64	ft
Top Width	11.83	ft
Critical Depth	3.07	ft
Critical Slope	0.00218	ft/ft
Velocity	19.00	ft/s
Velocity Head	5.61	ft
Specific Energy	7.32	ft
Froude Number	3.04	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.71	ft
Critical Depth	3.07	ft
Channel Slope	0.02330	ft/ft
Critical Slope	0.00218	ft/ft

Proposed Improvement P4

TABLE 9

PROPOSED IMPROVEMENT P4

66-in. RCP Storm drain Pipe
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	2,000	2,000
2		NPDES	LS	1.0	2,000	2,000
3		Reseeding	LS	1.0	2,000	2,000
4		Grading <2'	SY	3020.0	8	24,160
5		Excavation and disposal of soil	CY	1324.0	6	7,944
6	a	Remove and Dispose 24" CMP, includes Trenching	LF	200.0	50	10,000
7	a	Remove and Dispose Manhole, all diameters	EA	1.0	600	600
8		66" RCP (including installation and trenching < 6')	LF	230.0	400	92,000
9		Structural Concrete, Headwall	CY	15.0	600	9,000
10		Manhole Type C-8' diameter, 0' to 6' deep	EA	1.0	10,000	10,000
11		Gabion Aprons	CY	182.0	250	45,500
12	b	Purchase of 0.5 acres of ROW	AC	0.5	100,000	50,000
		subtotal				**255,204**
11		Mobilization/Demobilization (assume % of all bid items)	%	7.0	17,864	17,864
		SUB TOTAL				**273,068**
		Contingency	%	20.0	54,614	54,614
		TOTAL				**327,682**

a - Final design may lead to removal of existing 24" CMP and manhole to ex. Asphalt channel.

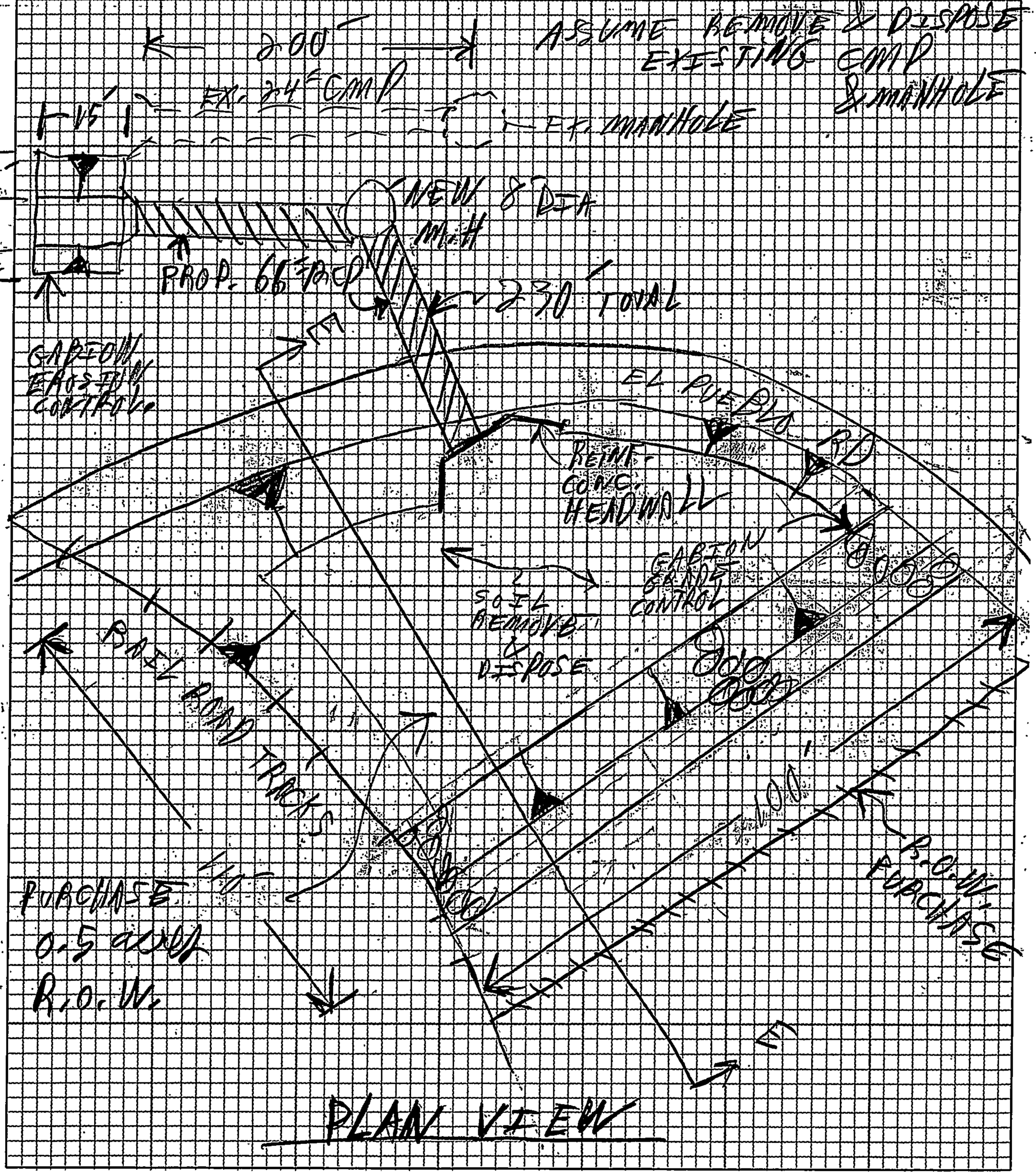
b - Triangular piece of ground need to build and maintain inlet to proposed culvert

PROJECT EL PUEBLO RD. SHEET NO. ____ OF ____

SUBJECT PROPOSED IMPROVEMENT P4 PROJECT NO. QUANTITY ESTIMATE

BY PS DATE 12/12/06 CHECKED BY ____ DATE / /

SEE FIGURE 4 FOR FULL SIZE TO SCALE
PLAN VIEW OF PROPOSED IMPROVEMENT P4



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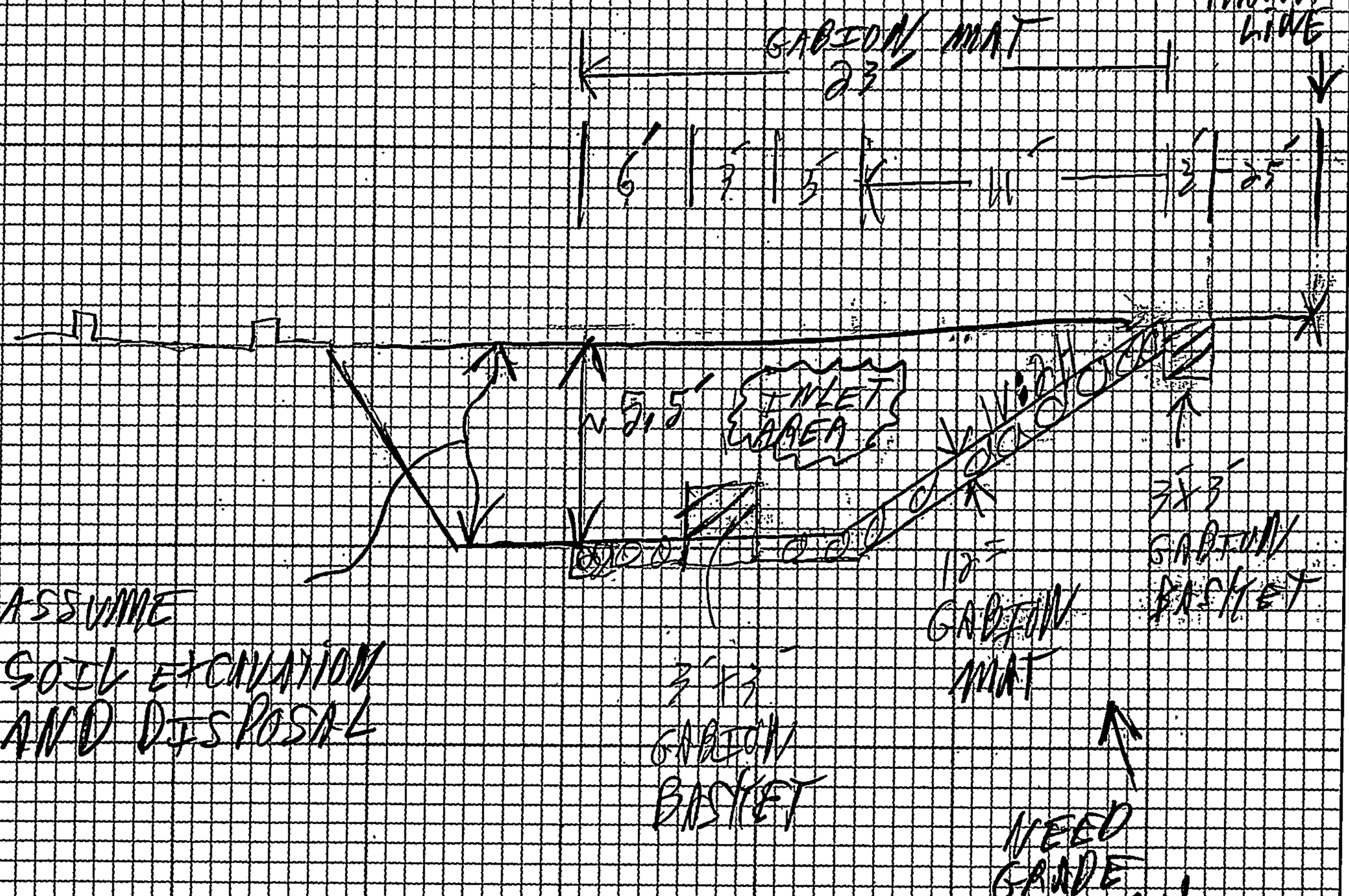
PROJECT _____ SHEET NO. _____ OF _____

SUBJECT P4 PROJECT NO. _____

BY _____ DATE / / CHECKED BY _____ DATE / /



ASSUME SOIL EXCAVATION AND DISPOSAL

SECTION E-E

SOIL EXCAVATION & DISPOSAL FOR INLET =
= 5.5' x ½ (110' x 100') → SEE PLAN VIEW & FIGURE 4
= 30,250 ft³ = 1,120 cy

SOIL EXCAV. & DISP. FOR PIPE = ASSUME VOL. OF PIPE
66" RCP = 5.5' AREA = π (2.75²)
= 24 ft² x 230' Length
= 204 cy

TOTAL SOIL EXCAV. & DISPOSE = 1,324 cy

Smith Engineering Company
6400 Uptown Boulevard, N.E. Suite 500E Albuquerque, New Mexico 87110 505/884-0700

PROJECT P4 SHEET NO. ____ OF ____

SUBJECT ____ PROJECT NO. ____

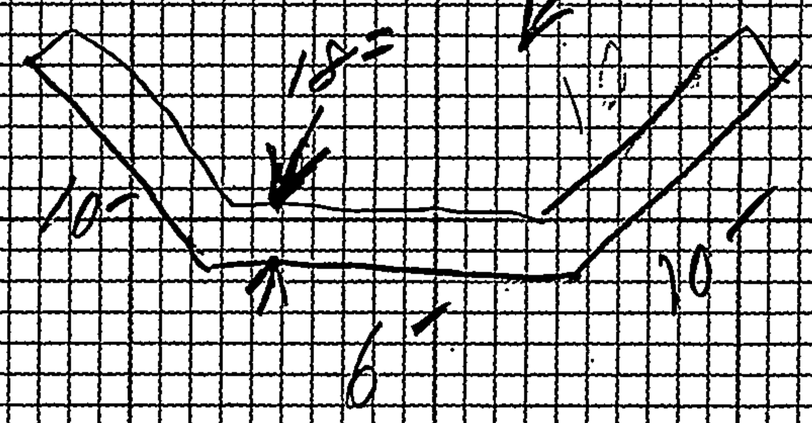
BY ____ DATE / / CHECKED BY ____ DATE / /

GABION VOLUME

1' THICK MAT (INLET) $= \frac{1' \times 100' \times 22'}{27\ ft^3/cy} = 85\ cy$

2 - 3' x 3' GABION BASKETS (INLET) $= 2\left(\frac{3' \times 3' \times 100'}{27\ ft^3/cy}\right) = 67\ cy$

PIPE OUTFALL CROSS SECTION



PIPE OUTFALL GABION VOL. $= \frac{36' \times 15' \text{ LONG} \times 1.5' \text{ THICK}}{27\ ft^3/cy} = 30\ cy$

TOTAL GABION VOLUME = 182 cy

PROJECT EL PUEBLO RD DRAINAGE ANALYSIS SHEET NO. ____ OF ____

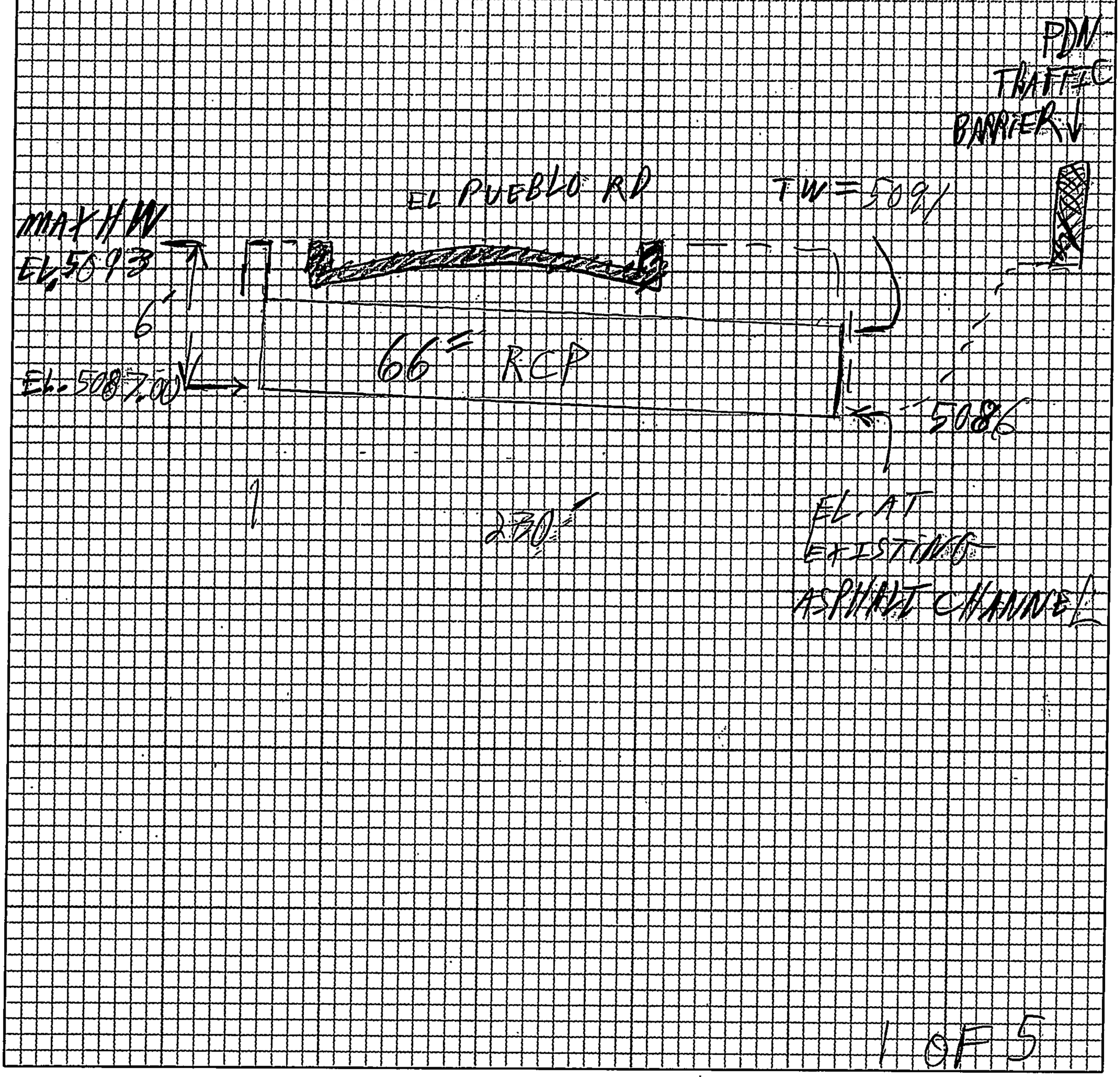
SUBJECT P4 - PROPOSED CULVERT AT AP 8.99 PROJECT NO. ____

BY PS DATE 12/11/06 CHECKED BY ____ DATE 12/11/06

PURPOSE - CONCEPTUAL DESIGN HYDRAULIC ANALYSIS USING CULVERT MASTER FOR PROPOSED IMPROVEMENT P2 AT AP 8.99

DATA - Q_{100} = 181 cfs

ELEV.'S ARE ESTIMATED FROM FIGURE 4



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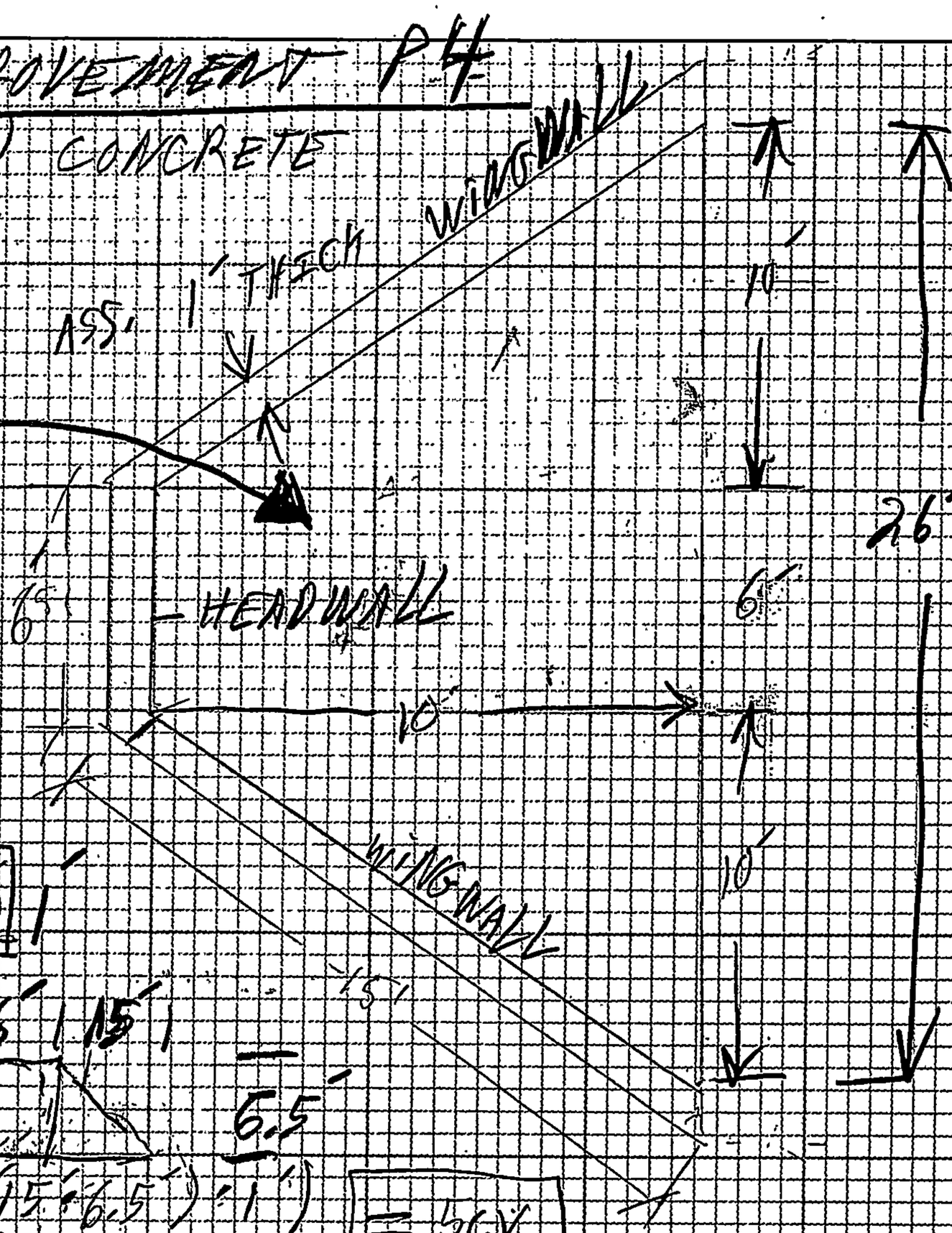
PROJECT El Pueblo P4 SHEET NO. 2 OF 4

SUBJECT QUANTITIES PROPOSED P4 PROJECT NO. 10311S

BY JAB DATE 12/16/06 CHECKED BY _____ DATE / /

PROPOSED IMPROVEMENT P4

REINFORCED CONCRETE Headwall



ASSUME 1' THICK REINF. CONCRETE FLOOR TO ACCOUNT FOR HEADWALL FOOTINGS ETC.

FLOOR = $\left[\frac{1}{2}(6+26)10\right]1'$ / 27 ft³/cy

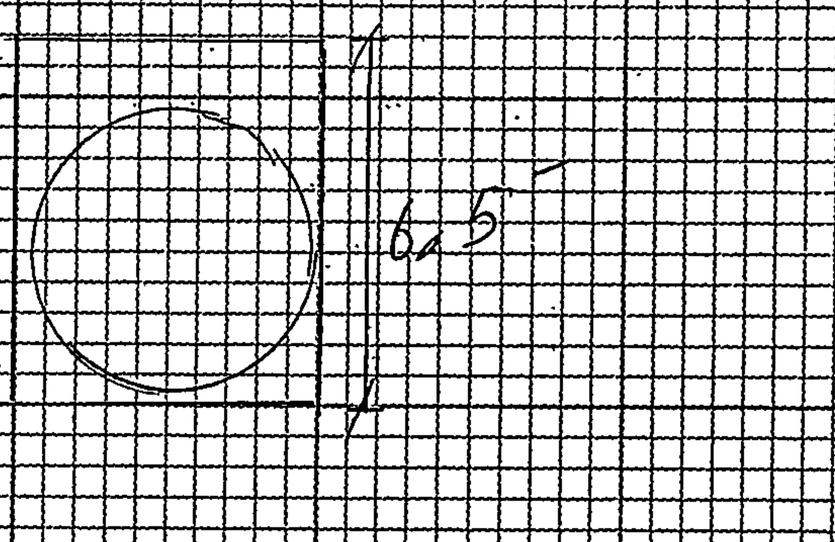
FLOOR = 6 cy

HEAD & WING WALLS → 6' 15' 6.5'

WALL VOL. = $((6 \cdot 6.5) + (15 \cdot 6.5) \cdot 1')$ / 27 ft³/cy = 26 cy

TOTAL VOL = 11 cy ASSUME 15

REINFORCED CONC. VOL. = 15 cy



24" CMP

remove EX PIPE 200LF

remove MH 1 each

new 66" RCP PIPE 200LF

Grading 200 LF × 30 = 6000 SF ≈ 670 SY

+ 0.5 ac area = 0.5 (43560 ft²/ac) = 21,780 SF ≈ 2420 SY

≈ 3020 SY

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Culvert Calculator Report

P4 ~~P1~~ - Prop Improv 1 - 66-in. RCP under El Pueblo Rd. P4

Solve For: Headwater Elevation

CONCLUSION — FOR CONCEPTUAL DESIGN

ASSUME 66" RCP WILL CONVEY AP 8.99 100-YR QP OF 181 cfs.

Culvert Summary

Allowable HW Elevation	5,093.00 ft	Headwater Depth/Height	1.13
Computed Headwater Elev	5,093.22 ft	Discharge	181.00 cfs
Inlet Control HW Elev.	5,093.01 ft	Tailwater Elevation	5,091.00 ft
Outlet Control HW Elev.	5,093.22 ft	Control Type	Outlet Control

Grades

Upstream Invert	5,087.00 ft	Downstream Invert	5,086.00 ft
Length	200.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile

Profile	S1	Depth, Downstream	5.00 ft
Slope Type	Steep	Normal Depth	3.59 ft
Flow Regime	Subcritical	Critical Depth	3.76 ft
Velocity Downstream	7.98 ft/s	Critical Slope	0.004399 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	5.50 ft
Section Size	66 inch	Rise	5.50 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,093.22 ft	Upstream Velocity Head	1.32 ft
Ke	0.50	Entrance Loss	0.66 ft

Inlet Control Properties

Inlet Control HW Elev.	5,093.01 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	23.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

2 of 5

Culvert Calculator Report

P4 ~~P1~~- Prop Improv.1- 53"r x 83"s elip rcp culvert <duplicate> P4

Solve For: Headwater Elevation

THIS WOULD WORK IF COVER IS A PROBLEM ON 66" RCP

Culvert Summary

Allowable HW Elevation	5,093.00 ft	Headwater Depth/Height	1.24	
Computed Headwater Elev	5,092.47 ft	Discharge	181.00 cfs	
Inlet Control HW Elev.	5,091.77 ft	Tailwater Elevation	5,091.00 ft	
Outlet Control HW Elev.	5,092.47 ft	Control Type	Outlet Control	

Grades

Upstream Invert	5,087.00 ft	Downstream Invert	5,086.00 ft
Length	200.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	5.00 ft
Slope Type	N/A	Normal Depth	2.69 ft
Flow Regime	N/A	Critical Depth	3.08 ft
Velocity Downstream	7.30 ft/s	Critical Slope	0.003446 ft/ft

Section

Section Shape	Horizontal Ellipse	Mannings Coefficient	0.013
Section Material	Concrete	Span	6.92 ft
Section Size	53x83 inch	Rise	4.42 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,092.47 ft	Upstream Velocity Head	0.83 ft
Ke	0.20	Entrance Loss	0.17 ft

Inlet Control Properties

Inlet Control HW Elev.	5,091.77 ft	Flow Control	Unsubmerged
Inlet Type	projecting (horizontal ellipse)	Area Full	24.8 ft²
K	0.00450	HDS 5 Chart	29
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

3 of ~~4~~ 5

Culvert Calculator Report

P4 ~~P1~~- Prop Improv.1- 48"r x 76"s elip rcp culvert

P4

Solve For: Headwater Elevation

VERY CLOSE THIS COULD BE USED INSTEAD OF 66" IF COVER IS A PROBLEM

Culvert Summary

Allowable HW Elevation	5,093.00 ft	Headwater Depth/Height	1.55	
Computed Headwater Elev	5,093.25 ft	Discharge	181.00	cfs
Inlet Control HW Elev.	5,092.24 ft	Tailwater Elevation	5,091.00	ft
Outlet Control HW Elev.	5,093.25 ft	Control Type	Outlet Control	

Grades

Upstream Invert	5,087.00 ft	Downstream Invert	5,086.00 ft
Length	200.00 ft	Constructed Slope	0.005000 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	5.00 ft
Slope Type	N/A	Normal Depth	2.97 ft
Flow Regime	N/A	Critical Depth	3.16 ft
Velocity Downstream	8.83 ft/s	Critical Slope	0.004401 ft/ft

Section

Section Shape	Horizontal Ellipse	Mannings Coefficient	0.013
Section Material	Concrete	Span	6.29 ft
Section Size	48x76 inch	Rise	4.02 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev.	5,093.25 ft	Upstream Velocity Head	1.21 ft
Ke	0.20	Entrance Loss	0.24 ft

Inlet Control Properties

Inlet Control HW Elev.	5,092.24 ft	Flow Control	Submerged
Inlet Type	Groove end projecting (horizontal ellipse)	Area Full	20.5 ft²
K	0.00450	HDS 5 Chart	29
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

~~5 OF 5~~

Culvert Calculator Report

P4 ~~P1~~ - Proposed Improvement 1 - 60-in. RCP under El Pueblo Rd.

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	5,093.00	ft	Headwater Depth/Height	1.38	
Computed Headwater Elev	5,093.90	ft	Discharge	181.00	cfs
Inlet Control HW Elev.	5,093.72	ft	Tailwater Elevation	5,091.00	ft
Outlet Control HW Elev.	5,093.90	ft	Control Type	Outlet Control	

HW TO LARGE

DON'T USE

Grades					
Upstream Invert	5,087.00	ft	Downstream Invert	5,086.00	ft
Length	200.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile					
Profile	M1		Depth, Downstream	5.00	ft
Slope Type	Mild		Normal Depth	4.02	ft
Flow Regime	Subcritical		Critical Depth	3.85	ft
Velocity Downstream	9.22	ft/s	Critical Slope	0.005463	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,093.90	ft	Upstream Velocity Head	1.33	ft
Ke	0.50		Entrance Loss	0.67	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,093.72	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	19.6	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

~~4 OF 5~~

Proposed Improvement P5

In east bound Paseo Del Norte Just east of the N. Div. Channel

Add 1 NMDOT median type inlet just east of existing median inlet located just east of N. Diversion Channel and join to the existing inlet

AP 16.92 Qp100= 8cfs

TABLE 10

PROPOSED IMPROVEMENT P5

New Median Type Inlet and Pipe in East Bound Paseo Del Norte at N. Div. Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	0	0
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	3020.0	0	0
6		Excavation and disposal of soil	CY	5.0	10	50
7		42-in. x 48-in. median inlet, materials and installation c.i.p.	EA	1.0	6,000	6,000
8		24" CMP (including installation and trenching < 6')	LF	20.0	200	4,000
9		Asphalt cut (20 ft. length, disposal and repaving)	LS	1.0	2,500	2,500
		subtotal				**15,550**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	1,089	1,089
		SUB TOTAL				**16,639**
		Contingency	%	20.0	3,328	3,328
		TOTAL				**19,966**

Worksheet for prop AP 16.92- PDN e bnd at ndivchan

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.01176	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

Options

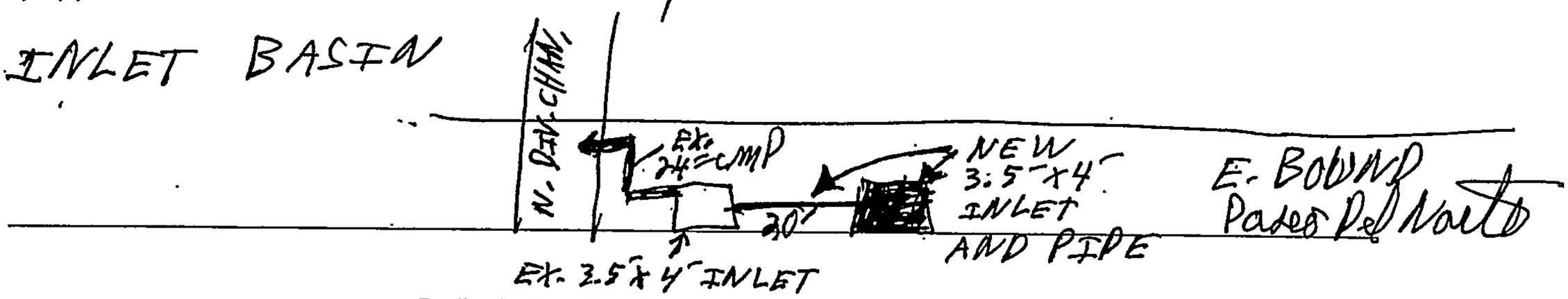
Grate Flow Option	Exclude None

Results

Efficiency	62.98	%
Intercepted Flow	5.04	ft³/s
Bypass Flow	2.96	ft³/s
Spread	14.89	ft
Depth	0.30	ft
Flow Area	2.22	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.61	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.24	
Grate Flow Ratio	0.51	
Active Grate Length	4.00	ft

THIS IS AN EXCEPTABLE BYPASS FLOW

∴ ADD 1 NMDOT MEDIAN INLET GRATE - JUST EAST OF EXIST. GRATE, AND CONNECT TO EXIST. INLET BASIN



Proposed Improvement P6

In north Paseo Del Norte frontage road at rail road track crossing

Add 2 NMDOT curb type inlets just east of existing curb inlet east side of rail road tracks and join to that inlet. Also redirect existing 24-inch CMP from private property to join manhole that joins the 42-inch CMP under Paseo Del Norte to 33"R x 49"S CMP on north side of frontage road

AP 24.92 Qp100= 8cfs

TABLE 11

PROPOSED IMPROVEMENT P6

2 Curb Inlets and Pipe N. Paseo Del Norte Frontage Road at Railroad Tracks
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	1,000	1,000
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	30.0	10	300
6		Excavation and disposal of soil	CY	10.0	10	100
7		Curb Inlet - 60 in. L, 16 in. W x 6" H (c.i.p.)	EA	2.0	6,000	12,000
8		24" CMP (including installation and trenching < 6')	LF	230.0	200	46,000
9		Asphalt cut (40 ft. length, disposal and repaving)	LS	1.0	3,500	3,500
		subtotal				**65,900**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	4,613	4,613
		SUB TOTAL				**70,513**
		Contingency	%	20.0	14,103	14,103
		TOTAL				**84,616**

AP 24.92 n. bound front. rd at rr tracks

Project Description

Solve For	Efficiency

Input Data

Discharge	8.00	ft³/s
Slope	0.02000	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	41.61	%
Intercepted Flow	3.33	ft³/s
Bypass Flow	4.67	ft³/s
Spread	12.77	ft
Depth	0.26	ft
Flow Area	1.63	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.90	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.18	
Grate Flow Ratio	0.25	
Equivalent Cross Slope	0.06380	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	31.37	ft

all NB + T Pave

AP 24.92 2nd inlet n. bound front. rd at rr tracks

Project Description

Solve For	Efficiency

Input Data

Discharge	4.67	ft³/s
Slope	0.02000	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	49.17	%
Intercepted Flow	2.30	ft³/s
Bypass Flow	2.37	ft³/s
Spread	10.44	ft
Depth	0.21	ft
Flow Area	1.09	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.29	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.21	
Grate Flow Ratio	0.31	
Equivalent Cross Slope	0.07251	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.03	
Total Interception Length	23.17	ft

ASSUME THIS IS ACCEPTABLE BYPASS FLOW

Proposed Improvement P7

In north Paseo Del Norte frontage road near private driveway

Build 3 NMDOT curb type inlets just east of existing private driveway (about 500 ft. east of N. Div. Channel) and join to the existing 33"S x 49" R CMP On north side of frontage road

AP 23.99 Qp100= 14cfs

TABLE 12

PROPOSED IMPROVEMENT P7

3 Curb Inlets and Pipe N. Paseo Del Norte Frontage Private Turn Lane
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	1.0	1,000	1,000
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	0.0	10	0
6		Excavation and disposal of soil	CY	7.0	10	70
7		Curb Inlet - 60 in. L, 16 in. W x 6" H (c.i.p.)	EA	3.0	6,000	18,000
8		24" CMP (including installation and trenching < 6')	LF	60.0	200	12,000
9		Asphalt cut (40 ft. length, disposal and repaving)	LS	1.0	3,500	3,500
		subtotal				**37,570**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	2,630	2,630
		SUB TOTAL				**40,200**
		Contingency	%	20.0	8,040	8,040
		TOTAL				**48,240**

1st INLET

AP 23.99 n bnd PDN front rd just e. of priv driveway

Project Description

Solve For	Efficiency

Input Data

Discharge	14.00	ft³/s
Slope	0.01250	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	36.90	%
Intercepted Flow	5.17	ft³/s
Bypass Flow	8.83	ft³/s
Spread	17.20	ft
Depth	0.34	ft
Flow Area	2.96	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.73	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.18	
Grate Flow Ratio	0.19	
Equivalent Cross Slope	0.05327	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.02	
Total Interception Length	38.40	ft

SEE NEXT Sheet

AP 23.99 2nd inlet n bnd PDN front rd just e. of priv driveway

Project Description

Solve For	Efficiency

Input Data

Discharge	8.83	ft³/s
Slope	0.01250	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	42.78	%
Intercepted Flow	3.78	ft³/s
Bypass Flow	5.05	ft³/s
Spread	14.47	ft
Depth	0.29	ft
Flow Area	2.09	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	4.22	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.22	
Grate Flow Ratio	0.23	
Equivalent Cross Slope	0.05906	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.03	
Total Interception Length	29.74	ft

AP 23.99 3rd inlet n bnd PDN front rd just e. of priv driveway

Project Description

Solve For	Efficiency

Input Data

Discharge	5.05	ft³/s
Slope	0.01250	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	50.65	%
Intercepted Flow	2.56	ft³/s
Bypass Flow	2.49	ft³/s
Spread	11.74	ft
Depth	0.23	ft
Flow Area	1.38	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	3.67	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.26	
Grate Flow Ratio	0.27	
Equivalent Cross Slope	0.06727	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.03	
Total Interception Length	21.75	ft

ASSUME ACCEPTABLE BYPASS FLOW FOR 100-YR STORM

Proposed Improvement P8

In north Paseo Del Norte frontage road just east of N. Div. Channel

Build 1 NMDOT curb type inlet just east of existing inlet just east of N. Div. Channel and outfall with a 24" CMP to existing soil channel on the north side of the frontage road at the same outfall location as the existing 33"S x 49" R CMP
On north side of frontage road

AP 22.92 Qp100= 2cfs

TABLE 13

PROPOSED IMPROVEMENT P8

1. Curb Inlets and Pipe N. Paseo Del Norte Frontage Rd. Near N. Div. Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	0.0	1,000	0
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	0.0	10	0
6		Excavation and disposal of soil	CY	4.0	10	40
7		Curb Inlet - 60 in. L, 16 in. W x 6" H (c.i.p.)	EA	1.0	6,000	6,000
8		24" CMP (including installation and trenching < 6')	LF	20.0	200	4,000
9		Asphalt cut (40 ft. length, disposal and repaving)	LS	1.0	400	400
		subtotal				**13,440**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	941	941
		SUB TOTAL				**14,381**
		Contingency	%	20.0	2,876	2,876
		TOTAL				**17,257**

AP 22.92 n PDN front rd just east of n div chan

Project Description

Solve For	Efficiency

Input Data

Discharge	2.00	ft³/s
Slope	0.00760	ft/ft
Gutter Width	1.33	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.75	in
Local Depression Width	1.33	ft
Grate Width	1.33	ft
Grate Length	5.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	15.00	%
Curb Opening Length	5.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	68.46	%
Intercepted Flow	1.37	ft³/s
Bypass Flow	0.63	ft³/s
Spread	9.10	ft
Depth	0.18	ft
Flow Area	0.83	ft²
Gutter Depression	0.00	ft
Total Depression	0.23	ft
Velocity	2.41	ft/s
Splash Over Velocity	11.89	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.43	
Grate Flow Ratio	0.34	
Equivalent Cross Slope	0.07922	ft/ft
Active Grate Length	4.25	ft
Length Factor	0.07	
Total Interception Length	11.51	ft

ASSUME ACCEPTABLE BYPASS FLOW

AP 22. 92 spread for 2 cfs, n. PDN front rd just east of ndivchan

Project Description

Solve For	Spread

Input Data

Channel Slope	0.00760	ft/ft
Discharge	2.00	ft^3/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	

Results

Spread	9.10	ft
Flow Area	0.83	ft^2
Depth	0.18	ft
Gutter Depression	0.00	ft
Velocity	2.41	ft/s

Proposed Improvement P9

In west bound Paseo Del Norte
Just east of N. Div. Channel

Add 1 NMDOT median type inlet just east of existing median inlet located just east of N. Diversion Channel and join to the existing inlet

AP 18.92 Qp100= 4cfs

TABLE 14

PROPOSED IMPROVEMENT P9

1 Curb Inlet and Pipe W. Bound Paseo Del Norte Near N. Div. Channel
Conceptual Level Cost Estimate
El Pueblo Road Drainage Analysis

No.		Item	Unit	Quantity	Unit Cost	Cost
					($/unit)	($)
1		Construction Staking	LS	0.0	1,000	0
2		Traffic Control (includes, signs, flagman, maintenance, etc.)	LS	1.0	3,000	3,000
3		NPDES	LS	1.0	0	0
4		Reseeding	LS	1.0	0	0
5		Grading <2'	SY	0.0	10	0
6		Excavation and disposal of soil	CY	4.0	10	40
7		42-in. x 48-in. median inlet, materials and installation c.i.p.	EA	1.0	6,000	6,000
8		24" CMP (including installation and trenching < 6')	LF	20.0	200	4,000
9		Asphalt cut (20 ft. length, disposal and repaving)	LS	1.0	2,500	2,500
		subtotal				**15,540**
9		Mobilization/Demobilization (assume % of all bid items)	%	7.0	1,088	1,088
		SUB TOTAL				**16,628**
		Contingency	%	20.0	3,326	3,326
		TOTAL				**19,953**

prop AP 18.92- PDN w bnd at ndivchan

Project Description

Solve For	Efficiency

Input Data

Discharge	4.00	ft³/s
Slope	0.01176	ft/ft
Gutter Width	3.50	ft
Gutter Cross Slope	0.02	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.015	
Grate Width	3.50	ft
Grate Length	4.00	ft
Grate Type	P-50 mm x 100 mm (P-1-7/8"-4")	
Clogging	0.00	%

Options

Grate Flow Option	Exclude None

Results

Efficiency	73.67	%
Intercepted Flow	2.95	ft³/s
Bypass Flow	1.05	ft³/s
Spread	11.48	ft
Depth	0.23	ft
Flow Area	1.32	ft²
Gutter Depression	0.00	ft
Total Depression	0.00	ft
Velocity	3.04	ft/s
Splash Over Velocity	7.60	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.30	
Grate Flow Ratio	0.62	
Active Grate Length	4.00	ft

ASSUME ACCEPTABLE BYPASS FLOW