CITY OF ALBUQUERQUE

Hydrology Section Planning Department
David S. Campbell, Director

Timothy M. Keller, Mayor

September 24, 2018

Sara Lavy, P.E.
Parametrix, LLC
9600 San Mateo Blvd. NE
Albuquerque, NM, 87113

RE: Paradise Blvd Improvements Golf Course to Eagle Ranch
Drainage Memo
Engineer's Stamp Missing
Hydrology File: C12D057

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

Based upon the information provided in your resubmittal received 09/06/2018 and a review of the construction plans we find that no further submittal is required for work order approval. We appreciate the information provided in the memo. Due to the limited nature of the improvements in the Work Order plans drainage design and analysis is not needed. There is not any reasonable opportunity to add inlets or change storm drain sizes without a major change in scope to the project. However, the analysis is in need of revision if it is to be used as the basis for any other project. The following comments should be addressed before using this analysis memo as the basis for design of any other project.

1. The hydrology analysis for offsite basins is missing.
2. Time of concentration calculations are missing for on-site basins and the times used are too long.
3. The precipitation values are from NOAA Atlas 2 and must be changed to Atlas 14 for use with AHYMO S4.
4. Street flow depth and energy depth calculations are needed to verify street surface drainage meets DPM without any additional inlets.
5. Inlet interception calculations per DPM are needed to verify that 100 year flow is removed from the street and diverted north in the Eagle Ranch storm drain.

6. The EGL is missing from the HGL calculations and must be included. Calculations can't be evaluated without EGL. Missing EGL is indicative of HLG calculations that don't use equations required by the DPM.
7. An index to sheets and title page with Engineer's stamp and signature is required.

If you have any questions, please contact me at 924-3986 or e-mail jhughes@cabq.gov.

Sincerely,

James D. Hughes, P.E.
Principal Engineer, Planning Dept.
Development and Review Services

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 6/2018)

Project Title: Paradise Blvd. Building Permit #:________ Hydrology File #: ________

DRB#: ________ EPC#: ________ Work Order#: 648092

Legal Description: ________

City Address: Paradise Blvd between Eagle Ranch Rd. and Golf Course Rd.

Applicant: City of Albuquerque DMD Contact: Savannah Torres

Address: City of Albuquerque, Engineering Division, Department of Municipal Development

Phone#: 768-3861 Fax#: ________ E-mail: smtorres@cabq.gov

Other Contact: Parametrix Contact: Sara Lavy

Address: 9600 San Mateo Blvd. NE

Phone#: 998-5581 Fax#: ________ E-mail: slavy@parametrix.com

TYPE OF DEVELOPMENT: ______ PLAT (# of lots) _____ RESIDENCE ______ DRB SITE ___ ADMIN SITE

IS THIS A RESUBMITTAL? ________ Yes __X__ No

DEPARTMENT _____ TRANSPORTATION __X__ HYDROLOGY/DRAINAGE

Check all that Apply:

TYPE OF SUBMITTAL:

- ____ ENGINEER/ARCHITECT CERTIFICATION
- ____ PAD CERTIFICATION
- ____ CONCEPTUAL G & D PLAN
- ____ GRADING PLAN
- __X__ DRAINAGE REPORT
- ____ DRAINAGE MASTER PLAN
- ____ FLOODPLAIN DEVELOPMENT PERMIT APPLIC
- ____ ELEVATION CERTIFICATE
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ TRAFFIC IMPACT STUDY (TIS)
- ____ STREET LIGHT LAYOUT
- ____ OTHER (SPECIFY) ________
- ____ PRE-DESIGN MEETING?

TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY
- ____ PRELIMINARY PLAT APPROVAL
- ____ SITE PLAN FOR SUB'D APPROVAL
- ____ SITE PLAN FOR BLDG. PERMIT APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ SIA/ RELEASE OF FINANCIAL GUARANTEE
- ____ FOUNDATION PERMIT APPROVAL
- ____ GRADING PERMIT APPROVAL
- ____ SO-19 APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ GRADING/ PAD CERTIFICATION
- __X__ WORK ORDER APPROVAL
- ____ CLOMR/LOMR
- ____ FLOODPLAIN DEVELOPMENT PERMIT
- ____ OTHER (SPECIFY) ________

DATE SUBMITTED: 9-6-2018 By: Sara Lavy, PE

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED:________

FEE PAID:________

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

8801 JEFFERSON NE, BUILDING B | ALBUQUERQUE, NM 87113 | P 505.821.4700

MEMORANDUM

DATE: May 12, 2016

TO: Savannah Holguin, E.I.

FROM: Sara Lavy, PE

SUBJECT: Paradise Boulevard - Existing Drainage Analysis

CC:

PROJECT NUMBER: 648092

Paradise Boulevard is an east-west Minor Arterial in Northwest Albuquerque. The project scope includes planning and design of complete street improvements along Paradise Boulevard from Golf Course Road to Eagle Ranch Road. Improvements will include on-street bike lanes, a shared use trail, a sidewalk, storm drain improvements, and driving lanes and turn lanes. This memo summarizes the evaluations of the existing drainage conditions in the project corridor and provides recommendations for necessary improvements.

Figure 1. Project Location – Paradise Blvd. between Golf Course Rd. and Eagle Ranch Rd.

Existing Drainage Reports

Existing drainage reports for the project corridor that were reviewed are listed below.

- Fountain Hills Drainage Management Plan (FHDMP)
  This drainage management plan is for an existing development project located south of Paradise Boulevard and north of Paseo del Norte. It is bordered to the west by Education Place and to the east by Eagle Ranch Road. The drainage management plan was completed in 2007. Currently several parcels have been developed or are being developed, but the majority of the site is still undeveloped. A portion of the Fountain Hills development drains to a detention pond located south of Paradise which has an outlet (55 cfs) to the existing storm drain in Paradise Boulevard. The remainder of Fountain Hills drains east to Eagle Ranch Road.
- Final Design Report for Proposed AMAFCA Detention Pond (Tract 2-B)
  The report was for the design of a proposed detention pond on Tract 2-B located at the northeast corner of Paseo del Norte and Coors Boulevard. The analysis included drainage basins as far west as Paradise Boulevard and Golf Course Road. All the drainage basins adjacent to Paradise Boulevard are shown in the

report. The report used AHYMO to calculate the basin flows and route the flows to Tract 2-B. The existing storm drain in Paradise Boulevard was included in the routing calculations.

FIRM Map and Soil Conditions

The site is located on FIRM Map 35001C0108G and 35001C0116G as shown in the appendix. The maps shows that the corridor does not lie within any 100-year flood plains.

There are two soil types along this corridor – a Bluepoint-Kokan association and a Madurez-Wink association. They range from well-drained to excessively well-drained and are in Hydrologic Soil Group A (see soil survey in the Appendix).

Drainage Calculations and Criteria

The drainage calculations are based on the requirements of Chapter 22 of the City of Albuquerque Development Process Manual, Volume II. The site lies within precipitation Zone 1 of Bernalillo County and AHYMO was used to calculate the existing runoff rates for Paradise Boulevard for a 100-year, 6-hour storm. The AHYMO input and output files are located in the Appendix.

The existing drainage basins (see Exhibit 1) are based on the FHDMP's Existing Basin Map and the Tract 2-B Drainage Basin Map (copy included in Appendix) with some minor modifications based on observed field conditions. Paradise Boulevard has been divided into four basins to calculate street capacities at various locations. Paradise Boulevard is assumed to have land treatments of 90% D, 5% C and 5% B. This is consistent with the Tract 2-B AMAFCA report basin calculations.

Table 1. Paradise Drainage Basins

Basin	Area (SF)	Area (acres)	Q_{100} (cfs)	Q_{10} (cfs)
A	179,229	4.11	13.88	10.99
B	123,699	2.84	9.58	7.59
C	44,995	1.03	3.50	2.77
D	62,492	1.44	4.86	3.84

Storm Drain

There is existing storm drain located in Paradise Boulevard from Prickly Pear Street/Nunzio Avenue extending east to Eagle Ranch Road. The storm drain conveys drainage from an existing detention pond located at the northwest corner of Paradise Boulevard and Prickly Pear Street/Nunzio Avenue. This pond collects flows from Basins 202 and 401 and discharges them to the existing storm drain system in Paradise Boulevard. A 36" pipe in Paradise Boulevard extends east approximately 415 feet where a 30" pipe extending north from the Fountain Hills development connects to the Paradise Boulevard storm drain. At this point, the storm drain turns north and enters the West Park development (see Exhibit 2 for storm drain layout). The storm drain eventually connects to Eagle Ranch Road and outfalls to the Calabacillas Arroyo. A complete storm drain analysis to the outfall at the Calabacillas Arroyo is outside the scope of this project but an analysis of the pipes in Paradise Boulevard using Hydraflow Storm Sewers was performed.

The analysis shows that portions of the existing storm drain in Paradise Boulevard do not have capacity for all the existing drainage flows. There are several places where the hydraulic grade line (HGL) is above the roadway. There does not seem to be any reported issues with the existing storm drain and one reason for the discrepancy may be that this analysis assumes the detention pond in Fountain Hills is discharging the full allowed discharge of

55 cfs. This may not be the case as the development is not completely developed at this time. The Hydraflow output is located in the Appendix.

Street Capacity

The DPM states that arterials need to have one driving lane remain free of flowing or standing water in each traffic direction during the 10-year storm. Paradise Boulevard is classified as a Minor Arterial and therefore should meet this criteria. The analysis points for the street capacity analysis are shown on the attached Exhibit 1. The analysis points show the 100-year and 10-year flows for the street. The street capacity was analyzed at four locations along the corridor. Street flows for the north and south sides of the street are shown separately on the exhibit. The street has capacity for the 100-year flows as shown in Table 2 below. However, the one-lane dry requirement is not met at Analysis Point 1 for either side of the street and is not met on the north side of the street at Analysis Point 2.

There is a discrepancy between these calculations and the FHDMP report which showed the street met the one-lane dry requirement. The FHDMP report only analyzed the street flows and did not include off-site flows that entered the street from Basins 301 and 302. The AMAFCA report showed these flows entering the street and field observations by Parametrix conclude that offsite flows enter Paradise Boulevard from both those basins. The flows from Basins 301 and 302 are included in this street capacity analysis.

Table 2. Street Capacity Analysis

	AP-1	AP-2	AP-3	AP-4
Contributing Basins	301, 302, A	301,302, A, B*	301, 302, A, B, C **	301, 302, A, B, C, D
Q_{100} (cfs) North	40.0	44.79	5.04	7.47
Depth (ft) North	0.54	0.54	0.27	0.32
Meets Depth Reqs (0.67')?	Yes	Yes	Yes	Yes
Q_{100} (cfs) South	17.57	10.36	12.11	14.54
Depth (ft) South	0.42	0.35	0.35	0.38
Meets Depth Reqs (0.67')?	Yes	Yes	Yes	Yes
Q_{10} (cfs) North	27.65	32.44	0***	1.92
Depth (ft) North	0.48	0.49	0	0.21
Meets Reqs of 1-lane Dry (0.37)?	No	No	Yes	Yes

	AP-1	AP-2	AP-3	AP-4
Q_{10} (cfs) South	12.62	5.41	6.80	9.23
Depth (ft) South	0.38	0.29	0.30	0.32
Meets Reqs of 1-lane Dry (0.37')?	No	Yes	Yes	Yes

*Storm drain in Paradise Boulevard picks up approximately 12 cfs from the south side at Nunzio Ave. (17.57+9.58/2-12 = 10.36).

**Storm drain in Paradise Boulevard picks up approximately 41.50 from the north side of the street (44.79+3.50/2-41.50 = 5.04).

***All flows on the north side of Paradise Boulevard are collected in the existing storm drain inlets at AP-3.

Conclusion

Two existing drainage reports were used to analyze the existing off-site basins. As-builts for Paradise Boulevard were used for the existing storm drain analysis. The existing storm drain analysis shows the storm drain does not have capacity for the existing flows. One reason there does not seem to be any reported drainage issues with the existing storm drain is that this storm drain analysis assumes that the detention pond in Fountain Hills discharges the full allowed discharge of 55 cfs, which may not be the case at this time as the development is only partially developed. The street capacity analysis shows that Paradise Boulevard has capacity for the 100-year flows. However, locations west of Prickly Pear Street/Nunzio Avenue do not meet the one-lane dry requirement during the 10-year storm. It is not anticipated that the proposed street improvements will change this analysis as the land treatments and basin areas will not change. The flow rates for the Paradise Boulevard basins will not be impacted by the proposed new trail on the south side of Paradise Boulevard as it does not substantially increase the percentage of impervious area in those basins.

In discussions with the City Engineer, the City is not receiving complaints regarding drainage issues on Paradise Boulevard in this location. However, when Fountain Hills is fully developed, the storm drain will not have capacity for the anticipated flows. Based on this project level analysis, the storm drain may need to be upsized to accommodate all developed flows and allow Paradise Boulevard to comply with the City's one-lane dry requirement for arterial streets. As scoped, this storm drain analysis only analyzed a small portion of a much larger storm drain system. Before making any improvements to the existing storm drain system in Paradise Boulevard, which will add more flows to the downstream system, a storm drain analysis of the entire Eagle Ranch Road storm drain system may need to be completed.

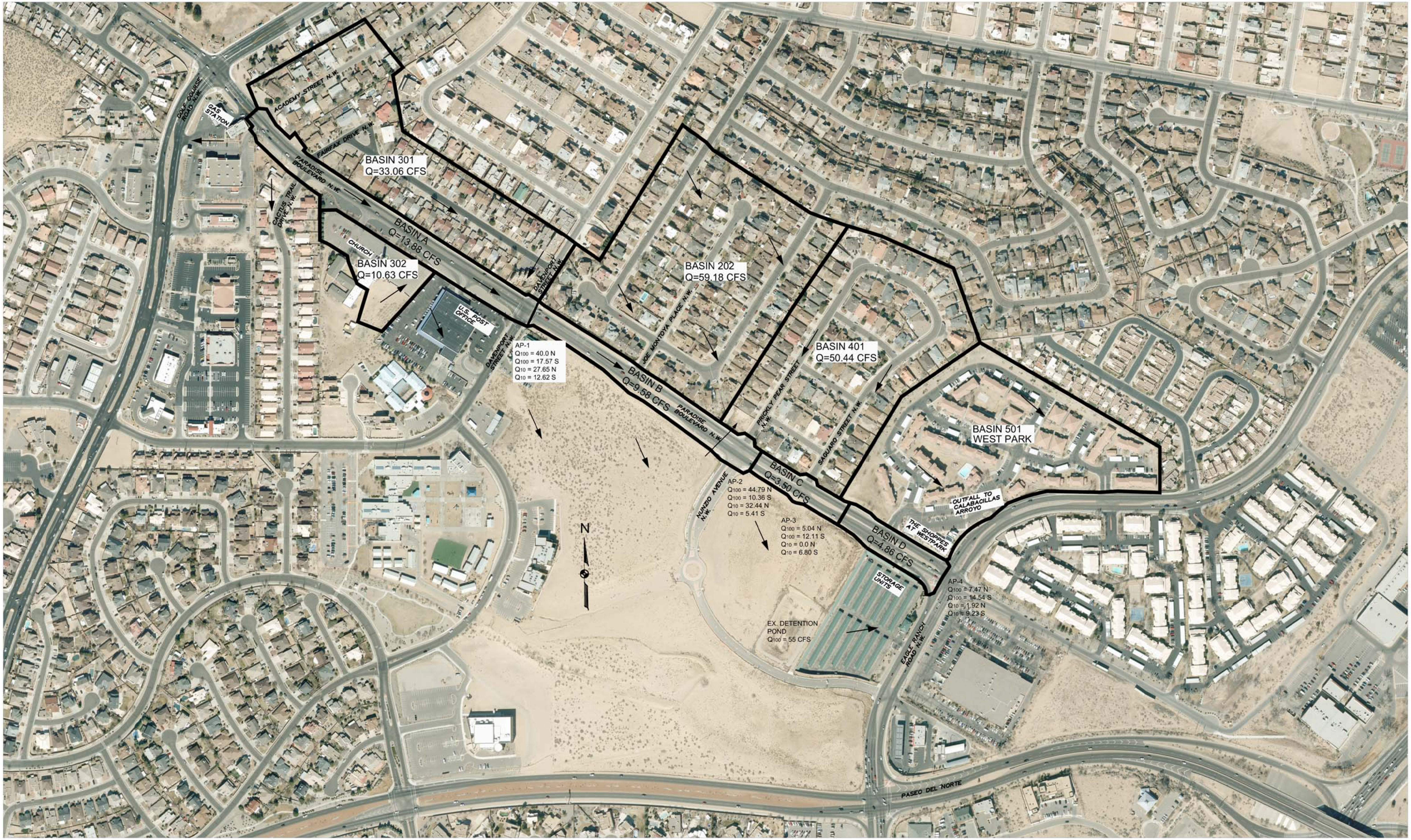

EXHIBIT 1 BASIN MAP

EXHIBIT 2 STORM DRAIN LAYOUT

Appendix

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Paradise Blvd, Golf Course to Eagle Ranch

February 15, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:7,160 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 300, 600, 1200, 1800

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico
Survey Area Data: Version 11, Sep 26, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 23, 2011—May 17, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico (NM600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BKD	Bluepoint-Kokan association, hilly	21.0	53.3%
MWA	Madurez-Wink associatin, gently sloping	18.5	46.7%
Totals for Area of Interest		**39.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

BKD—Bluepoint-Kokan association, hilly

Map Unit Setting

National map unit symbol: 1vwd
Elevation: 4,850 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 170 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Bluepoint and similar soils: 50 percent
Kokan and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluepoint

Setting

Landform: Flood plains, alluvial flats
Landform position (three-dimensional): Talf, rise
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Sandy alluvium and/or eolian sands

Typical profile

H1 - 0 to 8 inches: loamy fine sand
H2 - 8 to 60 inches: stratified fine sand to gravelly loamy fine sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XA054NM)

Description of Kokan

Setting

Landform: Hillslopes, fan piedmonts
Landform position (two-dimensional): Footslope, backslope, shoulder
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 4 inches: gravelly sand
H2 - 4 to 60 inches: stratified very gravelly sand to extremely gravelly loamy coarse sand

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Gravelly Sand (R042XA053NM)

MWA—Madurez-Wink associatin, gently sloping

Map Unit Setting

National map unit symbol: 1vxn
Elevation: 4,850 to 6,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 170 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Madurez and similar soils: 55 percent
Wink and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Madurez

Setting

Landform: Alluvial fans, fan piedmonts
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 4 inches: fine sandy loam
H2 - 4 to 21 inches: fine sandy loam
H3 - 21 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 7 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Loamy (R042XA052NM)

Description of Wink

Setting

Landform: Fan piedmonts, alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 4 inches: fine sandy loam
H2 - 4 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Loamy (R042XA052NM)

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MAP SCALE 1" = 500'

0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0116G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 116 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0116	G
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0116	G
LOS RANCHOS DE ALBUQUERQUE, VILLAGE OF	350123	0116	G

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

MAP NUMBER
35001C0116G

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0108G

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO

AND INCORPORATED AREAS

PANEL 108 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0108	G
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0108	G
RIO RANCHO, CITY OF	350146	0108	G

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

MAP NUMBER
35001C0108G

MAP REVISED
SEPTEMBER 26, 2008

Federal Emergency Management Agency

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MyReport

Line No.	Flow Rate (cfs)	Line Size (in)	Line Length (ft)	Line Slope (%)	Line Type	Invert Dn (ft)	Invert Up (ft)	HGL Dn (ft)	HGL Up (ft)	Gnd/Rim El Up (ft)	DnStm Ln No	Junct Type
1	161.40	42	100.000	3.00	Cir	5077.29	5080.29	5082.75	5085.33	5094.29	Outfall	MH
2	88.40	36	158.910	12.42	Cir	5080.29	5100.03	5093.42	5102.87	5106.45	1	MH
3	7.65	24	45.760	2.03	Cir	5100.03	5100.96	5108.05	5108.11	5106.96	2	Curb
4	5.10	18	39.490	2.68	Cir	5100.96	5102.02	5108.15	5108.25	5107.67	3	Curb
5	2.55	18	55.000	1.91	Cir	5102.02	5103.07	5108.31	5108.34	5108.53	4	Curb
6	73.10	36	259.120	3.62	Cir	5100.30	5109.67	5108.05	5112.37	5120.70	2	MH
7	56.50	36	70.000	2.16	Cir	5109.67	5111.18	5115.84	5116.35	5123.00	6	MH
8	6.00	18	44.300	15.01	Cir	5111.18	5117.83	5117.34	5118.78 j	5124.03	7	Curb
9	38.50	36	64.000	0.50	Cir	5111.18	5111.50	5117.34	5117.55	5125.50	7	Dp-Grate
10	16.60	24	10.850	52.17	Cir	5109.67	5115.33	5115.84	5116.80	5121.33	6	Curb
11	8.30	18	20.000	6.90	Cir	5115.33	5116.71	5117.89	5117.86	5122.71	10	Curb
12	7.65	24	103.080	2.95	Cir	5100.03	5103.07	5108.05	5108.17	5109.07	2	Curb
13	55.00	30	445.000	2.00	Cir	5080.29	5089.19	5093.42	5101.43	5092.00	1	Dp-Grate
14	12.00	18	109.090	12.30	Cir	5111.18	5124.60	5117.34	5125.91 j	5131.00	7	Curb
15	18.00	18	15.000	10.47	Cir	5080.29	5081.86	5093.42	5093.86	5096.08	1	Curb
16	12.00	18	20.000	47.70	Cir	5081.86	5091.40	5095.69	5095.95	5097.40	15	Curb
17	6.00	18	20.000	6.80	Cir	5091.40	5092.76	5096.31	5096.37	5098.76	16	Curb

Paradise Blvd | Number of lines: 17 | Date: 2/24/2016

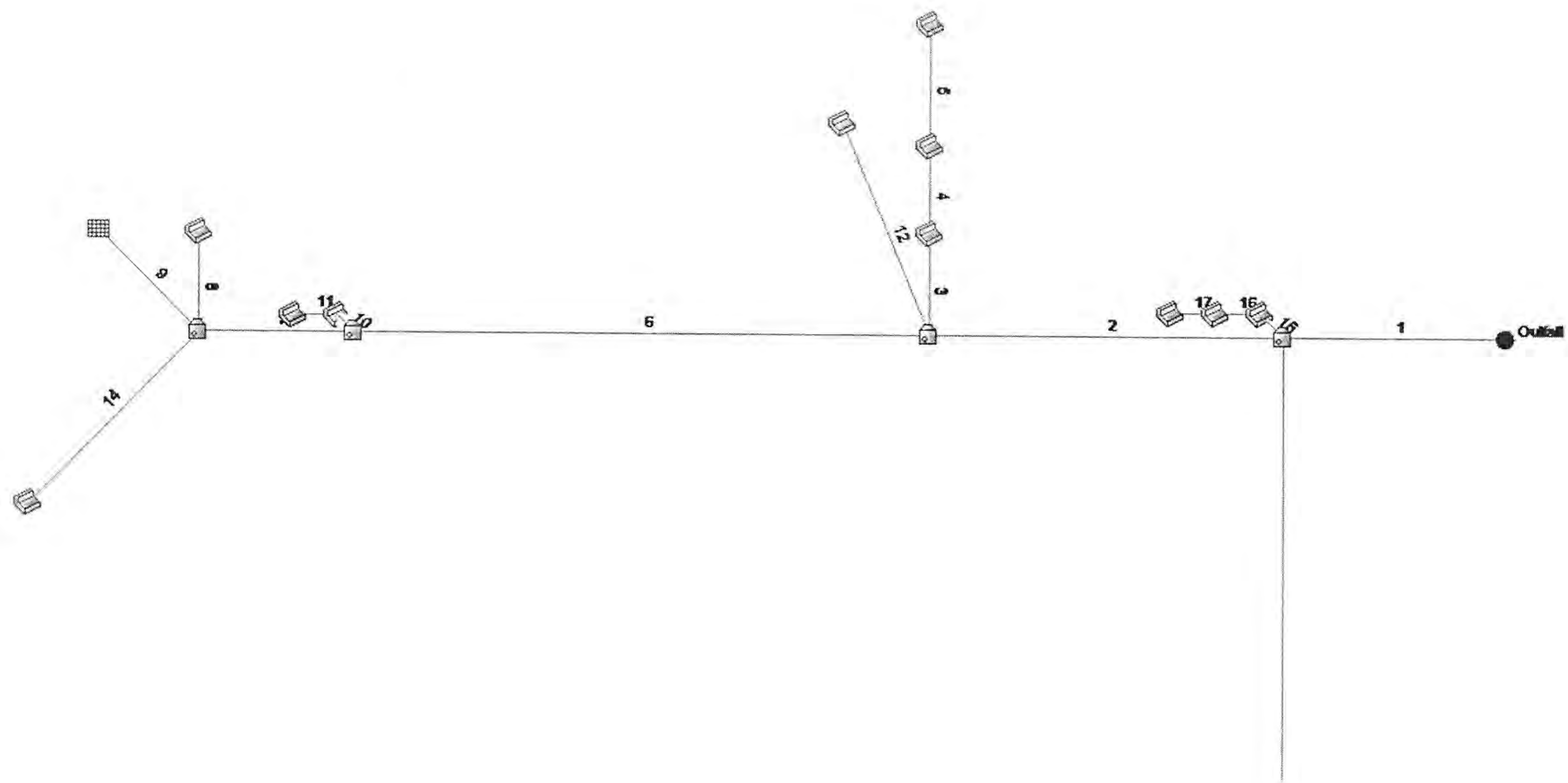
NOTES: i Inlet control; ** Critical depth

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	161.4	36	Cir	100.000	5077.29	5080.29	3.000	5082.75*	5088.61*	n/a	5102.88 i	End	Manhole
2	2	88.40	36	Cir	158.910	5080.29	5100.03	12.422	5102.88*	5105.67*	n/a	5107.86 i	1	Manhole
3	3	7.65	24	Cir	45.760	5100.03	5100.96	2.033	5107.86*	5107.91*	0.05	5107.95	2	Curb-Horiz
4	4	5.10	18	Cir	39.490	5100.96	5102.02	2.684	5107.95*	5108.05*	0.06	5108.11	3	Curb-Horiz
5	5	2.55	18	Cir	55.000	5102.02	5103.07	1.909	5108.11*	5108.14*	0.03	5108.18	4	Curb-Horiz
6	6	73.10	36	Cir	259.120	5100.30	5109.67	3.616	5107.86	5112.37	n/a	5115.84 i	2	Manhole
7	7	56.50	36	Cir	70.000	5109.67	5111.18	2.158	5115.84*	5116.35*	0.99	5117.34	6	Manhole
8	8	6.00	18	Cir	44.300	5111.18	5117.83	15.011	5117.34	5118.78	n/a	5119.36 i	7	Curb-Horiz
9	9	38.50	36	Cir	64.000	5111.18	5111.50	0.500	5117.34*	5117.55*	0.46	5118.01	7	DropGrate
10	10	16.60	24	Cir	10.850	5109.67	5115.33	52.167	5115.84	5116.80	n/a	5117.89 i	6	Curb-Horiz
11	11	8.30	18	Cir	20.000	5115.33	5116.71	6.899	5117.89	5117.86	n/a	5118.60 i	10	Curb-Horiz
12	12	7.65	24	Cir	103.080	5100.03	5103.07	2.949	5107.86*	5107.97*	0.09	5108.07	2	Curb-Horiz
13	13	55.00	30	Cir	445.000	5080.29	5087.25	1.564	5102.88*	5110.88*	1.95	5112.84	1	DropGrate
14	14	12.00	18	Cir	109.090	5111.18	5124.60	12.302	5117.34	5125.91	n/a	5127.42 i	7	Curb-Horiz
15	15	18.00	18	Cir	15.000	5080.29	5081.86	10.465	5102.88*	5103.32*	1.82	5105.14	1	Curb-Horiz
16	16	12.00	18	Cir	20.000	5081.86	5091.40	47.700	5105.14*	5105.40*	0.36	5105.76	15	Curb-Horiz
17	17	6.00	18	Cir	20.000	5091.40	5092.76	6.799	5105.76*	5105.83*	0.18	5106.01	16	Curb-Horiz

Paradise Blvd	Number of lines: 17	Run Date: 2/24/2016

NOTES: Known Qs only ; *Surcharged (HGL above crown). ; i - Inlet control.



Outfall
1
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17

Drainage Basins Runoff Results

Existing Basins

BASIN	AREA SF	AREA ACRE	AREA MI^2	Q_{100} CFS	Q_{10} CFS	V_{100} AC-FT	V_{10} AC-FT
Paradise - Basin A	179228.9	4.1145	0.006429	13.88	10.99	0.6358	0.5409
Paradise - Basin B	123699.3	2.8397	0.004437	9.58	7.59	0.4388	0.3733
Paradise - Basin C	44994.5	1.0329	0.001614	3.50	2.77	0.1596	0.1358
Paradise - Basin D	62491.6	1.4346	0.002242	4.86	3.84	0.2217	0.1886
Total	410414.3	9.4218	0.014722	31.82	21.35	1.4559	1.2386

```
      AHYMO PROGRAM (AHYMO-S4)                       - Version: S4.01a - Rel: 01a
            RUN DATE (MON/DAY/YR) = 02/24/2016
            START TIME (HR:MIN:SEC) = 07:56:48      USER NO.=
ParametNMSingleA36720783
            INPUT FILE = -012 ParadiseBlvdImprv\02WBS\StudyAnalysis\Drainage
Analysis\Existing basins.txt

   *****************************************************************
   *                       PARADISE BOULEVARD                       *
   *****************************************************************
   *      100-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)         *
   *****************************************************************
   *
   START                TIME=0.0
   LOCATION                        ALBUQUERQUE

        Soil infiltration values (LAND FACTORS) for this location are not
available.
        The following default values were used.
        Land Treatment      Initial Abstr.(in)      Unif. Infilt.(in/hour)
              A             0.65                    1.67
              B             0.50                    1.25
              C             0.35                    0.83
              D             0.10                    0.04

   *
   RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                        RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                        RAIN DAY=2.66 IN DT=0.0333 HR

                  6-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE
AREAS (NM & AZ) - D1
                  DT =    0.033300 HOURS        END TIME =     5.994000 HOURS
                   0.0000  0.0015  0.0029  0.0045  0.0061  0.0077  0.0096
                   0.0114  0.0133  0.0154  0.0175  0.0219  0.0264  0.0311
                   0.0361  0.0411  0.0466  0.0520  0.0577  0.0634  0.0692
                   0.0752  0.0813  0.0877  0.0944  0.1012  0.1089  0.1166
                   0.1292  0.1472  0.1652  0.1891  0.2133  0.2419  0.2757
                   0.3095  0.3596  0.4103  0.4780  0.5655  0.6531  0.8804
                   1.1136  1.2992  1.4285  1.5577  1.6255  1.6905  1.7446
                   1.7855  1.8264  1.8554  1.8837  1.9087  1.9294  1.9502
                   1.9662  1.9819  1.9939  2.0011  2.0083  2.0147  2.0211
                   2.0270  2.0323  2.0375  2.0423  2.0471  2.0518  2.0565
                   2.0611  2.0635  2.0657  2.0679  2.0701  2.0722  2.0743
                   2.0763  2.0782  2.0802  2.0821  2.0840  2.0859  2.0877
                   2.0895  2.0913  2.0930  2.0947  2.0964  2.0981  2.0997
                   2.1013  2.1029  2.1045  2.1060  2.1076  2.1091  2.1106
                   2.1121  2.1135  2.1149  2.1163  2.1177  2.1191  2.1205
                   2.1218  2.1232  2.1245  2.1258  2.1272  2.1285  2.1297
                   2.1310  2.1323  2.1336  2.1348  2.1360  2.1373  2.1385
                   2.1397  2.1409  2.1421  2.1433  2.1444  2.1456  2.1468
                   2.1479  2.1490  2.1502  2.1513  2.1524  2.1535  2.1546
                   2.1557  2.1568  2.1579  2.1589  2.1600  2.1610  2.1621
                   2.1631  2.1642  2.1652  2.1662  2.1672  2.1682  2.1692
                   2.1702  2.1712  2.1722  2.1731  2.1741  2.1751  2.1760
                   2.1770  2.1779  2.1789  2.1798  2.1807  2.1816  2.1826
                   2.1835  2.1844  2.1853  2.1862  2.1871  2.1879  2.1888
                   2.1897  2.1906  2.1914  2.1923  2.1932  2.1940  2.1949
                   2.1957  2.1965  2.1974  2.1982  2.1990  2.2000

   *
   * PARADISE - STREET A
```

```
*
COMPUTE NM HYD        ID=1 HYD NO=100.1 AREA=0.006429 SQ MI
                      PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                      TP=-0.24 HR MASS RAINFALL=-1

      K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
      UNIT PEAK =   12.688     CFS   UNIT VOLUME =   0.9989       B =   526.28
 P60 = 1.8700
      AREA =     0.005786 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300

      K =  0.213226HR    TP =  0.240000HR    K/TP RATIO =  0.888442     SHAPE
CONSTANT, N =  3.992344
      UNIT PEAK =  0.95006    CFS   UNIT VOLUME =   0.9856       B =   354.66
 P60 = 1.8700
      AREA =     0.000643 SQ MI    IA =   0.42500 INCHES    INF =   1.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300

PRINT HYD             ID=1 CODE=1

                                    PARTIAL HYDROGRAPH   100.10

     RUNOFF VOLUME =      1.85439 INCHES     =        0.6358 ACRE-FEET
     PEAK DISCHARGE RATE =      13.88 CFS   AT   1.632 HOURS   BASIN AREA =
0.0064 SQ. MI.


*
* PARADISE - STREET B
*
COMPUTE NM HYD        ID=2 HYD NO=100.2 AREA=0.004437 SQ MI
                      PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                      TP=-0.24 HR MASS RAINFALL=-1

      K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
      UNIT PEAK =   8.7566     CFS   UNIT VOLUME =   0.9985       B =   526.28
 P60 = 1.8700
      AREA =     0.003993 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300

      K =  0.213226HR    TP =  0.240000HR    K/TP RATIO =  0.888442     SHAPE
CONSTANT, N =  3.992344
      UNIT PEAK =  0.65568    CFS   UNIT VOLUME =   0.9793       B =   354.66
 P60 = 1.8700
      AREA =     0.000444 SQ MI    IA =   0.42500 INCHES    INF =   1.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300

PRINT HYD             ID=2 CODE=1
```

```
                    PARTIAL HYDROGRAPH   100.20

      RUNOFF VOLUME =      1.85439 INCHES     =       0.4388 ACRE-FEET
      PEAK DISCHARGE RATE =       9.58 CFS  AT   1.632 HOURS   BASIN AREA =
0.0044 SQ. MI.


   *
   * PARADISE - STREET C
   *
   COMPUTE NM HYD       ID=3 HYD NO=100.3 AREA=0.001614 SQ MI
                        PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                        TP=-0.24 HR MASS RAINFALL=-1

       K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
       UNIT PEAK =   3.1853    CFS   UNIT VOLUME =   0.9960        B =   526.28
 P60 = 1.8700
       AREA =     0.001453 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300


       K =  0.213226HR    TP =  0.240000HR    K/TP RATIO =  0.888442     SHAPE
CONSTANT, N =  3.992344
       UNIT PEAK =  0.23851    CFS   UNIT VOLUME =   0.9412        B =   354.66
 P60 = 1.8700
       AREA =     0.000161 SQ MI    IA =   0.42500 INCHES    INF =   1.04000
INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300

   PRINT HYD            ID=3 CODE=1

                    PARTIAL HYDROGRAPH   100.30

      RUNOFF VOLUME =      1.85439 INCHES     =       0.1596 ACRE-FEET
      PEAK DISCHARGE RATE =       3.50 CFS  AT   1.632 HOURS   BASIN AREA =
0.0016 SQ. MI.


   *
   * PARADISE - STREET D
   *
   COMPUTE NM HYD       ID=4 HYD NO=100.4 AREA=0.002242 SQ MI
                        PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                        TP=-0.24 HR MASS RAINFALL=-1

       K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
       UNIT PEAK =   4.4247    CFS   UNIT VOLUME =   0.9972        B =   526.28
 P60 = 1.8700
       AREA =     0.002018 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300
```

```
        K =  0.213226HR     TP =  0.240000HR     K/TP RATIO =  0.888442     SHAPE
CONSTANT, N =  3.992344
        UNIT PEAK =  0.33132    CFS   UNIT VOLUME =   0.9570       B =   354.66
 P60 = 1.8700
        AREA =      0.000224 SQ MI    IA =   0.42500 INCHES    INF =   1.04000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033300

    PRINT HYD          ID=4 CODE=1

                                     PARTIAL HYDROGRAPH   100.40

       RUNOFF VOLUME =      1.85439 INCHES      =        0.2217 ACRE-FEET
       PEAK DISCHARGE RATE =       4.86 CFS  AT   1.632 HOURS   BASIN AREA =
0.0022 SQ. MI.


    **
    *
    *******************************************************************
    *        10-YEAR, 6-HR STORM  (UNDER EXISTING CONDITIONS)        *
    *******************************************************************
    *
    START              TIME=0.0
    *
    RAINFALL           TYPE=1 RAIN QUARTER=0.0 IN
                       RAIN ONE=1.49 IN RAIN SIX=1.93 IN
                       RAIN DAY=2.43 IN DT=0.03333 HR

                  6-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE
AREAS (NM & AZ) - D1
                  DT =   0.033330 HOURS        END TIME =     5.999400 HOURS
                    0.0000  0.0020  0.0039  0.0060  0.0081  0.0103  0.0127
                    0.0151  0.0176  0.0204  0.0231  0.0292  0.0353  0.0417
                    0.0485  0.0553  0.0626  0.0700  0.0775  0.0852  0.0929
                    0.1009  0.1090  0.1175  0.1264  0.1353  0.1454  0.1554
                    0.1676  0.1820  0.1963  0.2155  0.2348  0.2579  0.2848
                    0.3117  0.3521  0.3925  0.4476  0.5174  0.5872  0.7727
                    0.9586  1.1035  1.2066  1.3096  1.3617  1.4135  1.4558
                    1.4884  1.5210  1.5437  1.5663  1.5859  1.6025  1.6190
                    1.6316  1.6441  1.6551  1.6646  1.6740  1.6825  1.6909
                    1.6987  1.7058  1.7128  1.7194  1.7259  1.7323  1.7386
                    1.7449  1.7479  1.7508  1.7537  1.7565  1.7593  1.7620
                    1.7646  1.7672  1.7698  1.7723  1.7748  1.7773  1.7797
                    1.7820  1.7843  1.7866  1.7889  1.7911  1.7933  1.7956
                    1.7977  1.7998  1.8018  1.8039  1.8059  1.8079  1.8099
                    1.8119  1.8138  1.8157  1.8175  1.8194  1.8213  1.8231
                    1.8249  1.8267  1.8285  1.8302  1.8320  1.8337  1.8355
                    1.8372  1.8389  1.8405  1.8422  1.8439  1.8455  1.8472
                    1.8488  1.8504  1.8520  1.8536  1.8551  1.8567  1.8583
                    1.8598  1.8613  1.8628  1.8643  1.8658  1.8673  1.8688
                    1.8703  1.8717  1.8732  1.8746  1.8760  1.8774  1.8788
                    1.8803  1.8816  1.8830  1.8844  1.8858  1.8871  1.8885
                    1.8898  1.8911  1.8925  1.8938  1.8951  1.8964  1.8977
                    1.8990  1.9002  1.9015  1.9028  1.9040  1.9053  1.9065
                    1.9077  1.9090  1.9102  1.9114  1.9126  1.9138  1.9150
                    1.9162  1.9174  1.9186  1.9197  1.9209  1.9220  1.9232
                    1.9243  1.9255  1.9266  1.9277  1.9289  1.9300

    *
```

```
* PARADISE - STREET A
*
COMPUTE NM HYD        ID=1 HYD NO=110.1 AREA=0.006429 SQ MI
                      PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                      TP=-0.24 HR MASS RAINFALL=-1

      K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
      UNIT PEAK =   12.688    CFS   UNIT VOLUME =   0.9990       B =   526.28
 P60 = 1.4900
      AREA =     0.005786 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

      K =  0.219023HR    TP =  0.240000HR    K/TP RATIO =  0.912597     SHAPE
CONSTANT, N =  3.880137
      UNIT PEAK =  0.92980    CFS   UNIT VOLUME =   0.9851       B =   347.10
 P60 = 1.4900
      AREA =     0.000643 SQ MI    IA =   0.42500 INCHES    INF =   1.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

PRINT HYD           ID=1 CODE=1

                                   PARTIAL HYDROGRAPH   110.10

     RUNOFF VOLUME =      1.57767 INCHES     =       0.5409 ACRE-FEET
     PEAK DISCHARGE RATE =       10.99 CFS   AT   1.633 HOURS   BASIN AREA =
0.0064 SQ. MI.


*
* PARADISE - STREET B
*
COMPUTE NM HYD        ID=2 HYD NO=110.2 AREA=0.004437 SQ MI
                      PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                      TP=-0.24 HR MASS RAINFALL=-1

      K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
      UNIT PEAK =   8.7566    CFS   UNIT VOLUME =   0.9986       B =   526.28
 P60 = 1.4900
      AREA =     0.003993 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

      K =  0.219023HR    TP =  0.240000HR    K/TP RATIO =  0.912597     SHAPE
CONSTANT, N =  3.880137
      UNIT PEAK =  0.64171    CFS   UNIT VOLUME =   0.9788       B =   347.10
 P60 = 1.4900
      AREA =     0.000444 SQ MI    IA =   0.42500 INCHES    INF =   1.04000
INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

PRINT HYD           ID=2 CODE=1
```

PARTIAL HYDROGRAPH 110.20

```
        RUNOFF VOLUME =       1.57767 INCHES     =        0.3733 ACRE-FEET
        PEAK DISCHARGE RATE =        7.59 CFS  AT   1.633 HOURS   BASIN AREA =
0.0044 SQ. MI.
```

```
    *
    * PARADISE - STREET C
    *
    COMPUTE NM HYD       ID=3 HYD NO=110.3 AREA=0.001614 SQ MI
                         PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                         TP=-0.24 HR MASS RAINFALL=-1

         K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
         UNIT PEAK =   3.1853     CFS   UNIT VOLUME =    0.9961        B =    526.28
 P60 = 1.4900
         AREA =       0.001453 SQ MI     IA =    0.10000 INCHES     INF =    0.04000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

         K =  0.219023HR    TP =  0.240000HR    K/TP RATIO =  0.912597     SHAPE
CONSTANT, N =  3.880137
         UNIT PEAK =  0.23343     CFS   UNIT VOLUME =    0.9413        B =    347.10
 P60 = 1.4900
         AREA =       0.000161 SQ MI     IA =    0.42500 INCHES     INF =    1.04000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

    PRINT HYD            ID=3 CODE=1
```

PARTIAL HYDROGRAPH 110.30

```
        RUNOFF VOLUME =       1.57767 INCHES     =        0.1358 ACRE-FEET
        PEAK DISCHARGE RATE =        2.77 CFS  AT   1.633 HOURS   BASIN AREA =
0.0016 SQ. MI.
```

```
    *
    * PARADISE - STREET D
    *
    COMPUTE NM HYD       ID=4 HYD NO=110.4 AREA=0.002242 SQ MI
                         PER A=0.00 PER B=5.00 PER C=5.00 PER D=90.00
                         TP=-0.24 HR MASS RAINFALL=-1

         K =  0.130800HR    TP =  0.240000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
         UNIT PEAK =   4.4247     CFS   UNIT VOLUME =    0.9972        B =    526.28
 P60 = 1.4900
         AREA =       0.002018 SQ MI     IA =    0.10000 INCHES     INF =    0.04000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330
```

```
        K =  0.219023HR     TP =  0.240000HR     K/TP RATIO =  0.912597     SHAPE
CONSTANT, N =  3.880137
        UNIT PEAK =  0.32425     CFS    UNIT VOLUME =    0.9567        B =   347.10
 P60 = 1.4900
        AREA =      0.000224 SQ MI     IA =    0.42500 INCHES     INF =    1.04000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033330

    PRINT HYD            ID=4 CODE=1

                                              PARTIAL HYDROGRAPH   110.40

        RUNOFF VOLUME =      1.57767 INCHES     =       0.1886 ACRE-FEET
        PEAK DISCHARGE RATE =       3.84 CFS  AT   1.633 HOURS   BASIN AREA =
0.0022 SQ. MI.


    **
    FINISH

        NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 07:56:48
```

Worksheet for AP-1 One Lane Dry 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04000	ft/ft
Discharge	27.65	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.48	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	4.82	ft²
Wetted Perimeter	25.66	ft
Hydraulic Radius	0.19	ft
Top Width	24.20	ft
Normal Depth	0.48	ft
Critical Depth	0.63	ft

Worksheet for AP-1 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.00680	ft/ft
Velocity		5.73	ft/s
Velocity Head		0.51	ft
Specific Energy		0.99	ft
Froude Number		2.26	
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	0.48	ft
Critical Depth	0.63	ft
Channel Slope	0.04000	ft/ft
Critical Slope	0.00680	ft/ft

Worksheet for AP-1 Full 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04000	ft/ft
Discharge	40.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.54	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	6.22	ft²
Wetted Perimeter	27.94	ft
Hydraulic Radius	0.22	ft
Top Width	27.39	ft
Normal Depth	0.54	ft
Critical Depth	0.73	ft

Worksheet for AP-1 Full 30' Half Street Section

Results

Critical Slope		0.00606	ft/ft
Velocity		6.43	ft/s
Velocity Head		0.64	ft
Specific Energy		1.18	ft
Froude Number		2.38	
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	0.54	ft
Critical Depth	0.73	ft
Channel Slope	0.04000	ft/ft
Critical Slope	0.00606	ft/ft

Worksheet for AP-1 Full 30' Half Street Section (3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04000	ft/ft
Discharge	17.57	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.42	ft
Elevation Range	0.00 to 0.79 ft		
Flow Area		3.35	ft^2
Wetted Perimeter		20.39	ft
Hydraulic Radius		0.16	ft
Top Width		19.97	ft
Normal Depth		0.42	ft
Critical Depth		0.55	ft

Worksheet for AP-1 Full 30' Half Street Section

Results

Critical Slope		0.00704	ft/ft
Velocity		5.24	ft/s
Velocity Head		0.43	ft
Specific Energy		0.85	ft
Froude Number		2.26	
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	0.42	ft
Critical Depth	0.55	ft
Channel Slope	0.04000	ft/ft
Critical Slope	0.00704	ft/ft

Worksheet for AP-1 One Lane Dry 30' Half Street Section

(3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04000	ft/ft
Discharge	12.62	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.38	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	2.67	ft²
Wetted Perimeter	19.02	ft
Hydraulic Radius	0.14	ft
Top Width	17.87	ft
Normal Depth	0.38	ft
Critical Depth	0.49	ft

Worksheet for AP-1 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.00776	ft/ft
Velocity		4.72	ft/s
Velocity Head		0.35	ft
Specific Energy		0.73	ft
Froude Number		2.15	
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	0.38	ft
Critical Depth	0.49	ft
Channel Slope	0.04000	ft/ft
Critical Slope	0.00776	ft/ft

Worksheet for AP-2 Full 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05000	ft/ft
Discharge	44.79	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.54	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	6.23	ft^2
Wetted Perimeter	27.95	ft
Hydraulic Radius	0.22	ft
Top Width	27.41	ft
Normal Depth	0.54	ft
Critical Depth	0.76	ft

Worksheet for AP-2 Full 30' Half Street Section

Results

Critical Slope		0.00598	ft/ft
Velocity		7.19	ft/s
Velocity Head		0.80	ft
Specific Energy		1.34	ft
Froude Number		2.66	
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	0.54	ft
Critical Depth	0.76	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00598	ft/ft

Worksheet for AP-2 One Lane Dry 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05000	ft/ft
Discharge	32.44	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.49	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	4.99	ft²
Wetted Perimeter	26.11	ft
Hydraulic Radius	0.19	ft
Top Width	24.63	ft
Normal Depth	0.49	ft
Critical Depth	0.66	ft

Worksheet for AP-2 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.00660	ft/ft
Velocity		6.50	ft/s
Velocity Head		0.66	ft
Specific Energy		1.15	ft
Froude Number		2.54	
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	0.49	ft
Critical Depth	0.66	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00660	ft/ft

Worksheet for AP-2 Full 30' Half Street Section (5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05000	ft/ft
Discharge	10.36	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.35	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	2.07	ft²
Wetted Perimeter	15.90	ft
Hydraulic Radius	0.13	ft
Top Width	15.55	ft
Normal Depth	0.35	ft
Critical Depth	0.46	ft

Worksheet for AP-2 Full 30' Half Street Section

Results

Critical Slope		0.00756	ft/ft
Velocity		5.01	ft/s
Velocity Head		0.39	ft
Specific Energy		0.74	ft
Froude Number		2.42	
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	0.35	ft
Critical Depth	0.46	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00756	ft/ft

Worksheet for AP-2 One Lane Dry 30' Half Street Section (S)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05000	ft/ft
Discharge	5.41	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.29	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	1.29	ft²
Wetted Perimeter	13.05	ft
Hydraulic Radius	0.10	ft
Top Width	12.18	ft
Normal Depth	0.29	ft
Critical Depth	0.37	ft

Worksheet for AP-2 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.00872	ft/ft
Velocity		4.19	ft/s
Velocity Head		0.27	ft
Specific Energy		0.56	ft
Froude Number		2.27	
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	0.29	ft
Critical Depth	0.37	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00872	ft/ft

Worksheet for AP-3 Full 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.06500	ft/ft
Discharge	5.04	ft^3/s
Section Definitions		

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.27	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	1.08	ft^2
Wetted Perimeter	11.28	ft
Hydraulic Radius	0.10	ft
Top Width	11.00	ft
Normal Depth	0.27	ft
Critical Depth	0.36	ft

Worksheet for AP-3 Full 30' Half Street Section

Results

Critical Slope		0.00832	ft/ft
Velocity		4.66	ft/s
Velocity Head		0.34	ft
Specific Energy		0.61	ft
Froude Number		2.62	
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	0.27	ft
Critical Depth	0.36	ft
Channel Slope	0.06500	ft/ft
Critical Slope	0.00832	ft/ft

Worksheet for AP-3 Full 30' Half Street Section (5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.06500	ft/ft
Discharge	12.11	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.35	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	2.11	ft²
Wetted Perimeter	16.06	ft
Hydraulic Radius	0.13	ft
Top Width	15.71	ft
Normal Depth	0.35	ft
Critical Depth	0.48	ft

Worksheet for AP-3 Full 30' Half Street Section

Results

Critical Slope		0.00740	ft/ft
Velocity		5.74	ft/s
Velocity Head		0.51	ft
Specific Energy		0.86	ft
Froude Number		2.76	
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	0.35	ft
Critical Depth	0.48	ft
Channel Slope	0.06500	ft/ft
Critical Slope	0.00740	ft/ft

Worksheet for AP-3 One Lane Dry 30' Half Street Section (5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.06500	ft/ft
Discharge	6.80	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.30	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	1.39	ft²
Wetted Perimeter	13.57	ft
Hydraulic Radius	0.10	ft
Top Width	12.68	ft
Normal Depth	0.30	ft
Critical Depth	0.40	ft

Worksheet for AP-3 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.00845	ft/ft
Velocity		4.89	ft/s
Velocity Head		0.37	ft
Specific Energy		0.67	ft
Froude Number		2.60	
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	0.30	ft
Critical Depth	0.40	ft
Channel Slope	0.06500	ft/ft
Critical Slope	0.00845	ft/ft

Worksheet for AP-4 Full 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05000	ft/ft
Discharge	7.47	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.32	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	1.61	ft^2
Wetted Perimeter	13.95	ft
Hydraulic Radius	0.12	ft
Top Width	13.63	ft
Normal Depth	0.32	ft
Critical Depth	0.41	ft

Worksheet for AP-4 Full 30' Half Street Section

Results

Critical Slope		0.00790	ft/ft
Velocity		4.64	ft/s
Velocity Head		0.33	ft
Specific Energy		0.65	ft
Froude Number		2.38	
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	0.32	ft
Critical Depth	0.41	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00790	ft/ft

Worksheet for AP-4 Full 30' Half Street Section (3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.05000	ft/ft
Discharge	14.54	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
-0+06	0.79
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06, 0.79)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.38	ft
Elevation Range	0.00 to 0.79 ft	
Flow Area	2.67	ft²
Wetted Perimeter	18.16	ft
Hydraulic Radius	0.15	ft
Top Width	17.77	ft
Normal Depth	0.38	ft
Critical Depth	0.51	ft

Worksheet for AP-4 Full 30' Half Street Section

Results

Critical Slope	0.00722	ft/ft
Velocity	5.44	ft/s
Velocity Head	0.46	ft
Specific Energy	0.84	ft
Froude Number	2.47	
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	0.38	ft
Critical Depth	0.51	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00722	ft/ft

Worksheet for AP-4 One Lane Dry 30' Half Street Section (N)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.06500	ft/ft
Discharge	1.92	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.21	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	0.53	ft²
Wetted Perimeter	7.97	ft
Hydraulic Radius	0.07	ft
Top Width	7.34	ft
Normal Depth	0.21	ft
Critical Depth	0.27	ft

Worksheet for AP-4 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.01005	ft/ft
Velocity		3.64	ft/s
Velocity Head		0.21	ft
Specific Energy		0.42	ft
Froude Number		2.39	
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	0.21	ft
Critical Depth	0.27	ft
Channel Slope	0.06500	ft/ft
Critical Slope	0.01005	ft/ft

Worksheet for AP-4 One Lane Dry 30' Half Street Section (5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.06500	ft/ft
Discharge	9.23	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00	0.00
0+00	0.67
0+00	0.00
0+02	0.13
0+28	0.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+28, 0.55)	0.017

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.32	ft
Elevation Range	0.00 to 0.67 ft	
Flow Area	1.75	ft²
Wetted Perimeter	15.31	ft
Hydraulic Radius	0.11	ft
Top Width	14.34	ft
Normal Depth	0.32	ft
Critical Depth	0.44	ft

Worksheet for AP-4 One Lane Dry 30' Half Street Section

Results

Critical Slope		0.00810	ft/ft
Velocity		5.27	ft/s
Velocity Head		0.43	ft
Specific Energy		0.76	ft
Froude Number		2.66	
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	0.32	ft
Critical Depth	0.44	ft
Channel Slope	0.06500	ft/ft
Critical Slope	0.00810	ft/ft