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Storm Water Management/Drainage Report
For
Legacy P.U.D

Date: February 23, 2006

Prepared by: Robert W. Jones II, P.E.
Vortex Engineering, Inc.
255 Vista Valley Drive
Fruita, CO 81521
970-260-9082
VEI # F05-027

Submitted To: City of Fruita
Division of Engineering
325 E. Aspen Avenue
Fruita, Colorado 81521

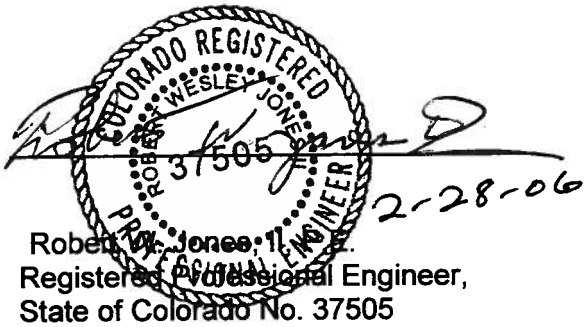
Type of Design: P.U.D.

Owners: Rick and Vicki Sanger
997 Nuland Road
Deerfield, WI 53531

Property address: T.B.D.

Tax schedule No.: 2697-163-00-055

"I hereby certify that this report for the preliminary drainage report for the Legacy P.U.D. By legal description, the property is described as W2SW4SW4 SEC 16 1N 2W S OF STATE HWY. in Mesa County, Colorado, and was prepared by me or under my direct supervision."



Robert W. Jones, II, P.E.
Registered Professional Engineer,
State of Colorado No. 37505

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I. Introduction/Site History

A. Property Location

The site is located east of 18 Road (Pine Street) and north of J Road (Wildcat Avenue) in the City of Fruita, Colorado. The property is approximately 18.47 acres in size, which includes the adjacent street area to the centerline of the right of way.

A mobile home park, residential subdivision to the west and rural lands to the north and east bound the site on the south.

B. Description of Property

As stated above, the property is approximately 18.47 acres in size. The site is currently undeveloped except an older house in the southwest corner.

The site slopes from the northeast to the southwest, with slopes averaging 1.0 percent. The lowest elevations occur near the southwest corner of the property. Elevations vary from 4515 to 4521 feet.

According to Mesa County GIS records, the soils across the site consist of BC sagers silty clay soil on the north portion of property and RC fruitland soil on the south portion of the property. Both soils are Hydrologic Soils Group "B". Soils information is included in Appendix I.

Independent Survey completed a boundary and topographic survey for the planned development. Geotechnical Engineering Group completed a soils investigation for the planned development.

C. Purpose of Drainage Report

The 18.47-acre parcel is planned to be developed in two to three phases. The purpose of this Drainage Report is to evaluate the impact or change to the existing drainage patterns and peak runoff from developing this 18.47 acre parcel.

II. Existing Drainage Conditions

A. Major Basin Characteristics

This area of Mesa County consists of a mixed rural residential, agricultural, and commercial land uses.

The general area dips to the south and west. The watershed for this site is located along the north side of Highway 6&50 in the City of Fruita, Colorado. The subject site lies approximately ¼ mile to the north of the intersection of Highway 6&50 and 18 Road. The site is located near a combination of public, agricultural and residential uses.

Drainage from the site is currently collected in the southwest corner and is conveyed to the "Murray Drain System" owned by the Grand Junction Drainage District. At this location the Murray Drain comprises a 15-inch pipe along J Road, a 36-inch pipe (Pine Street Storm Drain) and a 24-inch pipe in 18 Road. The Murray Drain combines into a 48-inch line at the intersection of 18 Road Hwy 6 and 50 and then ultimately crosses Interstate 70. The Murray Drain then flows to the west and south into the Colorado River.

According to a Hydrologic Study completed by Williams Engineering in 2001, the drains in this area are not adequate. The Study estimates that no more than 52 percent of historic peak flow during a 100-year storm event should be allowed to be released to the drains.

B. Site Characteristics

As stated above, the property is approximately 18.47 acres in size. The site is currently undeveloped and does not appear to be utilized for any specific purpose. The site slopes from the northeast to the southwest, with slopes averaging 1.0 percent. The lowest elevations occur near the southwest corner of the property. Elevations vary from 4515 to 4521 feet.

The existing drainage patterns of the property, includes a combination of sheet flow, shallow concentrated flow, and channel flow. The cover type for the site is currently pasture. Please refer to Exhibit 'A'- Pre-Development Drainage Area Map. In general, drainage flows from the north to the southwest corner of the property. Here it is collected in drainage inlets that convey the flow to the Murray Drain.

II. Proposed Drainage Conditions

A. Changes in Drainage Patterns

As expected in most developments, conversion and development of this property from bare ground to a commercial area will increase the storm water runoff, both in peak rates and volumes. However, with planned on site detention/retention, runoff rates leaving the property will be not be increased above the allowable 52 percent of historic peak flow rates for a 100 year storm event.

Please reference Exhibit 'B'- Post Development Drainage Area Map for an accurate depiction of proposed drainage areas. The building's roofs will drain via gutters and down spouts discharging in the pavement areas of the parking lot and green areas of the landscape buffers, then sheet flow to the various inlets on site. From the inlets, the storm water will be conveyed into the detention facility planned on site.

Two detention facilities, connected hydraulically by a 24-inch pipe, will accommodate the required storage. The southerly Detention Facility will be equipped with a draw down structure. This structure will limit the storm drain release and convey the flow to the 36-inch Pine Street Storm Drain near the intersection of 18 and J Road.

The detention facilities will detain approximately 90 percent of the 100-year runoff from the site. Runoff from the adjacent street, sidewalks and the 10 foot wide landscape strip will bypass the detention facility and drain directly into the 36 inch Pine Street Storm Drain. The outlet structure in the detention facility will limit the release to the storm drain system to no more than 52 percent of the Pre-Development flow minus the bypass flows.

B. Maintenance Issues

Based on the drainage concept of the development and the relatively low storm water runoff rates, no maintenance to the detention facilities is anticipated beyond normal situations. The detention facility should be monitored throughout the life of the facility with appropriate maintenance performed as needed.

V. Design Criteria and Approach

A. General Considerations

The drainage constraints imposed on this site is to contain flows greater than 52 percent of peak historic flows during a 100-year runoff.

B. Hydrology

The hydrologic analysis presented in this drainage report used procedures per the Mesa County Storm Water Management Manual (SWMM) guidelines. The SWMM guidelines allow the use of WinTR-55 and TR-20, both developed by the United States Department of Agriculture for use in modeling watersheds.

WinTR-55 was used to calculate the weighted runoff curve numbers and times of concentrations for both the pre-development flows and the post development flows. Analysis for this development includes peak discharges for the 2-year and 100-year intensity precipitation events and the 24-hour duration event. WinTR-55 was used to calculate the pre-development flows and the post-development bypass flows. The Technical Release 20 (TR-20) computer-modeling program was utilized to determine the detained post-development runoff rates. This TR-20 model was needed to allow for the detention basin routing.

V. Results and Conclusions

A. Runoff Rates for the 2-Year and the 100-Year Storm

Please reference the attached TR-55 and TR-20 computations in the Appendices for a complete breakdown of the rates and input values utilized. The summary of estimated flows is as follows:

Condition	2 year runoff (cfs)	100 year runoff (cfs)	Allowable runoff (52 % of Pre-Development
Pre-Development	Minor	6.42	3.34
Total Post-Development	1.06	14.10	
By-Pass Flows	Minor	1.52	
Detained Flows		12.58	
Actual Discharge		1.66	
Actual Discharge plus Bypass		3.18	

B. Detention

Two detention basins are proposed for this development to temporarily "store" 13.43 cfs of storm water during the 100-year design storm. The detention basins will be located in the southwest section of the PUD and will be connected by 24-inch pipe. They are both shown on Exhibit B.

The detention basins will be approximately 4 feet deep and total approximately 48,000 cubic ft. in volume. The side slopes of the basins will be 3:1 for ease of landscaping and maintenance. A 6:1 vehicle entrance ramp will be provided. Flows from the southerly basin will be released through an outlet structure into a 15 inch RCP pipe and then into the 36 inch Pine Street Storm Drain located at the intersection of 18 and K Road.

The southerly detention basin proposed will be equipped with an outlet structure that will reduce the runoff rates from a one hundred-year storm. The discharge must be less than 52 percent of pre-development flows (3.34 cfs) minus bypass flows (1.52 cfs). Based on this the allowable discharge is 1.82 cfs.

Outlet Structure

The outlet structure designed for the detention basin is a concrete box, measuring 4 feet by 5.5 feet by 5.5 feet in height, width, and length. The flow into the outlet structure will be limited by a 6-inch diameter low flow orifice at the bottom of the structure. The outlet to the storm drain system will be a 15-inch pipe. The Outlet structure will have a partial open top measuring 24 inches by 24 inches for emergency overflow. A 24-inch inspection manhole cover and interior access steps are provided for inspection and maintenance. A rebar trash rack has been designed to reduce the possibility of clogging the orifice outlets during intense rainfall events.

A detail of the proposed outlet structure is included in the Appendix IV.

Miscellaneous

Approximately four (4) inlets, four (4) manholes, three (3) end sections, 32 feet of 12 inch diameter pipe, 630 feet of 15 inch diameter pipe, and 49 feet of 24 inch diameter pipe are planned for this development. Please reference the Structure and Pipe Schedules in Appendix III for a detailed description.

C. Street/Drive Aisle Flow

Runoff from the street/drive aisles will sheet flow across and drain into inlets. The inlets will direct the storm flow to a network of piping that will discharge into the detention facilities. Please reference the utility composite plan in Appendix VI, for a map of the proposed storm drain network.

D. Finish Floor Elevations of Structures

The finished floor elevations for the permanent structures are a minimum of 1.0 foot above the 100-year water surface elevation.

E. Overall Compliance

The drainage plan for the proposed development will improve the existing drainage conditions by limiting the storm drain discharge to 52 percent of historic discharge. Adherence to this drainage report will not cause any negative impacts to this site.

F. Construction Phasing

There are two phases of construction planned for this project. The first phase of construction is the residential portion located within the interior portion of the site. The storm drains and detention basins will be constructed during Phase I.

VI. Limitations/Restrictions

This report is a site-specific design for Storm Water Management and is applicable only for the client for whom our work was performed. Use of this report under other circumstances is not an appropriate application of this document. This report is a product of Vortex Engineering Incorporated and is to be taken in its entirety. Excerpts from this report may be taken out of context and may not convey the true intent of the report. It is the owner's and owner's agents responsibility to read this report and become familiar with recommendations and design guidelines contained herein.

The recommendations and design guidelines outlined in this report are based on: 1) the proposed site development and plot plan prepared by Vortex Engineering Incorporated, 2) the site conditions disclosed at the specific time of the site investigation of reference, and 3) the boundary and topographic survey prepared by Independent Survey of Grand Junction, CO. Vortex Engineering, Inc. assumes no liability for the accuracy or completeness of information furnished by the client. Site conditions are subject to external environmental effects and may change over time. Use of this plan under different site conditions is inappropriate. If it becomes apparent that current site conditions vary from those anticipated, the design engineer should be contacted to develop any required design modifications. Vortex Engineering, Inc. is not responsible and accepts no liability for any variation in assumed design parameters.

Vortex Engineering, Inc. represents this report has been prepared within the limits prescribed by the owner and in accordance with the current accepted practice of the civil engineering profession in the area. No warranty or representation either expressed or implied is included or intended in this report or in any of our contracts.

/II. References

The following manuals and computer programs were used for this drainage report:

- Storm water Management Manual, City of Grand Junction and Mesa County, May 1996.
- The NRCS method Technical Release 55 entitled "Urban Hydrology for Small Watersheds" was used to calculate runoff curve numbers and time of concentrations.
- The NRCS method Technical Release 20 entitled "Project Formulation-Hydrology" was used to calculate runoff rates and basin sizing.
- Storm water Management Master Plan (SWMMP) for the City of Fruita, June 1998.

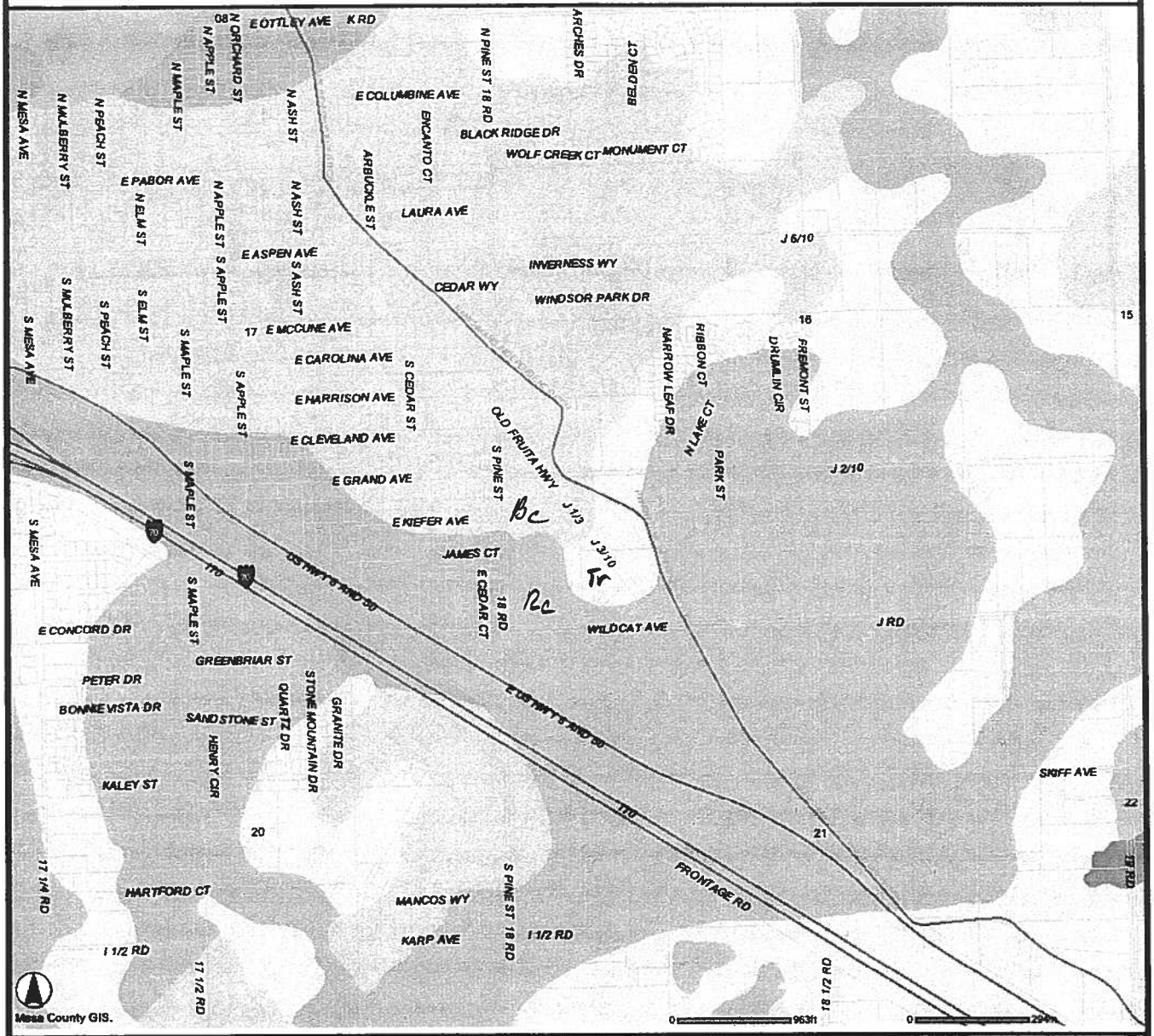
EXHIBIT 'A'

PRE-DEVELOPMENT DRAINAGE AREA MAP

APPENDIX I

MESA COUNTY SOILS INFORMATION

Sanger Legacy Project - Mesa County Soils Information



Mesa County GIS
544 Rood Ave.
Grand Junction, CO 81501

Rc-Fruitland sandy clay loam, 0 to 2 percent slopes

Map Unit Setting

MLRA:

Elevation: 4,600 to 4,800 feet (1,402 to 1,463 meters)

Mean annual precipitation: 7 to 10 inches (178 to 254 millimeters)

Average annual air temperature: 50 to 54 degrees F. (10 to 12 degrees C.)

Frost-free period: 150 to 190 days

Map Unit Composition

Fruitland and similar soils: 90 percent

Minor components: 10 percent

Component Descriptions

Fruitland soils

Landform: Alluvial fan

Geomorphic position: Unspecified

Parent material: Alluvium derived from sandstone and shale

Slope: 0 to 2 percent

Surface fragments: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Well drained "C" "B"

Slowest permeability: About 0.60 in/hr (moderate)

Available water capacity: About 7.6 inches (moderate)

Shrink-swell potential: About 1.5 LEP (low)

Flooding hazard: None

Ponding hazard: Unspecified

Seasonal water table minimum depth: Greater than 6 feet

Runoff class: Low

Calcium carbonate maximum: About 10 percent

Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodicity maximum: About 0 SAR (nonsodic)

Ecological site: Unspecified

Potential native vegetation: Unspecified

Land capability (irrigated): 2e

Land capability (non irrigated): 7c

##

Typical Profile:

Ap-0 to 8 inches; sandy clay loam

C1-8 to 30 inches; stratified gravelly sandy loam to fine sandy loam

C2-30 to 60 inches; stratified sandy loam to fine sandy loam

##

Minor Components

Other Soils and similar soils

Composition: About 10 percent

Landform: Unspecified

Geomorphic Position: Unspecified

Slope: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Unspecified

Ecological site: Unspecified

Bc-Sagers silty clay loam, 0 to 2 percent slopes

Map Unit Setting

MLRA:

Elevation: 4,500 to 5,900 feet (1,372 to 1,798 meters)

Mean annual precipitation: 5 to 8 inches (127 to 203 millimeters)

Average annual air temperature: 50 to 54 degrees F. (10 to 12 degrees C.)

Frost-free period: 150 to 190 days

Map Unit Composition

Sagers and similar soils: 90 percent

Minor components: 10 percent

Component Descriptions

Sagers soils

Landform: Alluvial fan

Geomorphic position: Toeslope

Parent material: Alluvium derived from clayey shale

Slope: 0 to 2 percent

Surface fragments: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Well drained

Slowest permeability: About 0.20 in/hr (moderately slow) B

Available water capacity: About 11.2 inches (high)

Shrink-swell potential: About 4.5 LEP (moderate)

Flooding hazard: None

Ponding hazard: Unspecified

Seasonal water table minimum depth: Greater than 6 feet

Runoff class: Medium

Calcium carbonate maximum: About 15 percent

Gypsum maximum: About 5 percent

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodicity maximum: About 5 SAR (slightly sodic)

Ecological site: Unspecified

Potential native vegetation: Unspecified

Land capability (irrigated): 2e

Land capability (non irrigated): 7c

##

Typical Profile:

Ap-0 to 12 inches; silty clay loam

Cy-12 to 60 inches; silty clay loam

##

Minor Components

Sagers, Wet and similar soils

Composition: About 5 percent

Landform: Terrace

Geomorphic Position: Unspecified

Slope: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Unspecified

Ecological site: Unspecified

##

Other Soils and similar soils

Composition: About 5 percent

Landform: Unspecified

Geomorphic Position: Unspecified

Slope: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Unspecified

Ecological site: Unspecified

##

Major uses: Irrigated cropland, urban development

Major management limitations: Irrigated Cropland

Soil related factors: Salinity, piping hazard in some areas, slow permeability, moderate shrink-swell potential

Management considerations:

Suitable irrigation systems are furrow, sprinkler, and drip

If irrigation water is to be applied and removed efficiently, leveling is needed in sloping areas

All crops but legumes respond to nitrogen. Legumes respond to phosphorus

Urban Development

Soil related factors: Piping hazard in some areas, moderate shrink-swell potential, soft shale bedrock within 60 inches in some areas

Management considerations:

Heavy equipment is needed for excavation.

Because of the high content of gypsum, the soil may subside as the gypsum is dissolved and leached.

Some areas of this unit may be subject to salt heave because of the expansion of sodium sulfate salts. This action is likely to crack concrete slab floors, driveways, and sidewalks.

The deep cuts needed to level the road surface can expose soft bedrock; however, it can be easily excavated.

Cut slopes generally are stable, but slumping can occur where the bedrock is highly fractured or where rock layers are parallel to the slope.

The quality of roadbeds and road surfaces can be adversely affected by shrinking and swelling, frost action, and limited soil strength.

Local roads and streets may require a special base to prevent frost heave damage.

Septic tank absorption fields may function poorly because of limited permeability, which restricts the movement and filtration of the effluent.

Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.

Onsite investigation is needed to determine whether the area considered for a septic tank absorption field is underlain by unsuitable material. If such material is present, consider placing absorption lines beneath it.

Tr-Turley clay loam, 0 to 2 percent slopes

Map Unit Setting

MLRA:

Elevation: 4,500 to 4,800 feet (1,372 to 1,463 meters)

Mean annual precipitation: 7 to 10 inches (178 to 254 millimeters)

Average annual air temperature: 50 to 54 degrees F. (10 to 12 degrees C.)

Frost-free period: 150 to 190 days

Map Unit Composition

Turley and similar soils: 90 percent

Minor components: 10 percent

Component Descriptions

Turley soils

Landform: Fan terrace

Geomorphic position: Unspecified

Parent material: Alluvium derived from sandstone and shale

Slope: 0 to 2 percent

Surface fragments: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Well drained

Slowest permeability: About 0.20 in/hr (moderately slow) "B"

Available water capacity: About 10.4 inches (high)

Shrink-swell potential: About 1.5 LEP (low)

Flooding hazard: None

Ponding hazard: Unspecified

Seasonal water table minimum depth: Greater than 6 feet

Runoff class: Medium

Calcium carbonate maximum: About 10 percent

Gypsum maximum: None

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodicity maximum: About 0 SAR (nonsodic)

Ecological site: Unspecified

Potential native vegetation: Unspecified

Land capability (irrigated): 2e

Land capability (non irrigated): 7c

##

Typical Profile:

Ap-0 to 10 inches; clay loam

C1-10 to 20 inches; fine sandy loam

C2-20 to 30 inches; clay loam

C3-30 to 60 inches; stratified loam to silty clay loam

##

Minor Components

Other Soils and similar soils

Composition: About 10 percent

Landform: Unspecified

Geomorphic Position: Unspecified

Slope: Unspecified

Depth to restrictive feature: Unspecified

Drainage class: Unspecified

Ecological site: Unspecified

##

5. **Hydrologic Soil Group** In addition to values being listed by ARC classification, they are also listed according to a hydrologic soil group (HSG). Infiltration varies considerably with soil type, and the difference is accounted for by selecting a CN value under the appropriate soil type. The four HSGs are defined by SCS TR-55 as follows:

Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission (greater than 0.30 in/hr).

Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

Group D soils have high runoff potential. They have low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0.-0.05 in/hr).

The SCS has published Soil Surveys for most areas, which map out soil "names" along with hydraulic properties allowing one to classify the HSG. Most soil surveys already contain a listing of the HSG, however. Another source that classifies the HSG once the soil "name" is known is the SCS TR-55 or NEH-4 (SCS 1972 & 1986).

In initial selection of the Hydrologic Soil Group (A, B, C, or D), care should be taken in matching soil profile conditions. Hydrologic Soil Groups (HSGs) taken from SCS Soil Surveys generally consider the profile to a depth to 60 inches, which is adequate, but they only reflect information found at the time of the survey. Earthwork in the area may have changed conditions, and there may have been changes in groundwater levels as well. These should be considered.

Some areas may not be mapped by an SCS Soil Survey. HSG must be selected by other general descriptions such as those summarized below.

HSG	Soil textures
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam

APPENDIX II

TR-55 SUMMARY FOR EXISTING HYDROLOGIC CONDITIONS

WinTR-55 Current Data Description

--- Identification Data ---

User: Parker
Project: Sanger
SubTitle: Pre Development
State: Colorado
County: Mesa
Filename: Z:\Network Share\Vortex Engineering Projects\Sanger Development_F05-027\Stormwater\Sanga

Date: 2/6/2006
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Site		Outlet	18.47	79	.643

Total area: 18.47 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
.7	.0	.0	.0	.0	2.01	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Parker

Sanger
Pre Development
Mesa County, Colorado

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
.7	.0	.0	.0	.0	2.01	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Parker

Sanger
Pre Development
Mesa County, Colorado

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
Site	.00	6.42
REACHES		
OUTLET	.00	6.42

Parker

Sanger
Pre Development
Mesa County, Colorado

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
Site	.00	n/a	6.42	12.31
REACHES				
OUTLET	.00		6.42	

Parker

Sanger
Pre Development
Mesa County, Colorado

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Site	18.47	0.643	79	Outlet	

Total Area: 18.47 (ac)

Parker

Sanger
Pre Development
Mesa County, Colorado

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Site							
SHEET	100	0.0100	0.060				0.221
SHALLOW	400	0.0040	0.050				0.109
SHALLOW	1150	0.0040	0.050				0.313
						Time of Concentration	.643

Parker

Sanger
Pre Development
Mesa County, Colorado

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Site	Paved parking lots, roofs, driveways	B	.54	98
	Row Crop Straight row [SR] (good)	B	17.93	78
	Total Area / Weighted Curve Number		18.47	79

APPENDIX III

TR-55 AND TR-20 SUMMARIES FOR PROPOSED/DEVELOPED HYDROLOGIC CONDITIONS

WinTR-55 Current Data Description

--- Identification Data ---

User: Parker
Project: Sanger
SubTitle: Post Development
State: Colorado
County: Mesa
Filename: Z:\Network Share\Vortex Engineering Projects\Sanger Development_F05-027\Stormwater\Sanga

Date: 2/22/2006
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Site		Outlet	16.46	89	.603

Total area: 16.46 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
.7	.0	.0	.0	.0	2.01	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Parker

Sanger
Post Development
Mesa County, Colorado

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
.7	.0	.0	.0	.0	2.01	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Parker

Sanger
Post Development
Mesa County, Colorado

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
Site	1.15	13.35
REACHES		
OUTLET	1.15	13.35

Parker

Sanger
Post Development
Mesa County, Colorado

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
Site	1.15	12.31	13.35	12.24
REACHES				
OUTLET	1.15		13.35	

Parker

Sanger
Post Development
Mesa County, Colorado

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Site	16.46	0.603	89	Outlet	

Total Area: 16.46 (ac)

Parker

Sanger
Post Development
Mesa County, Colorado

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Site							
SHEET	100	0.0100	0.150				0.461
SHALLOW	300	0.0100	0.025				0.041
SHALLOW	740	0.0100	0.025				0.101
					Time of Concentration		.603

Parker

Sanger
Post Development
Mesa County, Colorado

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Site	Open space; grass cover > 75%	(good)	B	.76	61
	Paved; curbs and storm sewers		B	6.57	98
	Commercial & business		B	1.46	92
	Residential districts (1/8 acre)		B	7.07	85
	Natural desert (pervious areas only)		B	.6	77
	Total Area / Weighted Curve Number			16.46	89

WinTR-55 Current Data Description

--- Identification Data ---

User: Parker
Project: Sanger
SubTitle: Post Development -By Pass Flows
State: Colorado
County: Mesa
Filename: C:\Documents and Settings\ROB\Application Data\WinTR-55\SangarPostDevByPass.w55

Date: 2/14/2006
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Site		Outlet	2.01	88	.603

Total area: 2.01 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
.7	.0	.0	.0	.0	2.01	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Parker

Sanger
Post Development -By Pass Flows
Mesa County, Colorado

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
.7	.0	.0	.0	.0	2.01	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Parker

Sanger
Post Development -By Pass Flows
Mesa County, Colorado

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
Site	0.11	1.52
REACHES		
OUTLET	0.11	1.52

Parker

Sanger
Post Development -By Pass Flows
Mesa County, Colorado

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
Site	0.11	12.32	1.52	12.24
REACHES				
OUTLET	0.11		1.52	

Parker

Sanger
Post Development -By Pass Flows
Mesa County, Colorado

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Site	2.01	0.603	88	Outlet	

Total Area: 2.01 (ac)

Parker

Sanger
Post Development -By Pass Flows
Mesa County, Colorado

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Site							
SHEET	100	0.0100	0.150				0.461
SHALLOW	300	0.0100	0.025				0.041
SHALLOW	740	0.0100	0.025				0.101
						Time of Concentration	.603

Parker

Sanger
Post Development -By Pass Flows
Mesa County, Colorado

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Site	Open space; grass cover > 75%	(good)	B	.54	61
	Paved; curbs and storm sewers		B	1.47	98
	Total Area / Weighted Curve Number			2.01	88

Sangar - Legacy PUD, Fruita, CO.

Detention Control Structure

DETENTION POND

		Inch Diameter	6	0.5
Structure 1 is a Circular Orifice	Structure 1 Invert =	4512.50	0.1963125	(area)
$Q = C*A*(2GH)^{1/2}$	**CEN. LINE =**	**4512.75**		
C=0.60				
A = 0.196313	**TOP=**	**4513.00**		
			L [FT]	
Structure 2 is a RECT. WEIR	Structure 2 Invert =	4516.50	2	
$Q = C*L(H)^{3/2}$				
C=3.1				

Stage/Storage/Discharge Chart

Depth	Elev.	Volume	Discharge		Discharge		Discharge	Detention Pond storage volume
			Structure 1	H1	Structure 2	H2	Total	
feet	feet	Acre-ft	cfs	feet	cfs	feet	cfs	ac-ft
0.00	4512.5	**0.0000**		-0.25	0.000	-4.000	0.000	**0.0000**
0.50	4513.0	**0.0756**	0.473	0.25	0.000	-3.500	0.473	**0.0756**
1.50	4514.0	**0.2586**	1.057	1.25	0.000	-2.500	1.057	**0.2586**
2.50	4515.0	**0.4855**	1.418	2.25	0.000	-1.500	1.418	**0.4855**
3.50	4516.0	**0.7590**	1.704	3.25	0.000	-0.500	1.704	**0.7590**
4.50	4517.0	**1.0829**	1.949	4.25	2.192	0.500	4.141	**1.0829**

Legacy Detention Basin Storage Table

North Basin

Elevation [ft.]	Length	Width	Area [ft²]	Area [acre]	Change in Elevation [ft]	Average Area [acre]	Incremental Volume [acre-ft]	Volume [ft³]	Cumulative Volume ft^3	Cumulative Volume acre-ft
4517.00	80.00	80.00	5631.0	0.1293	1.0	0.1190	0.1190	5,184	16,785	0.3853
4516.00	74.00	74.00	4736.0	0.1087	1.0	0.0990	0.0990	4,313	11,601	0.2663
4515.00	68.00	68.00	3890.0	0.0893	1.0	0.0801	0.0801	3,491	7,288	0.1673
4514.00	62.00	62.00	3092.0	0.0710	1.0	0.0624	0.0624	2,719	3,797	0.0872
4513.00	56.00	56.00	2345.0	0.0538	0.5	0.0495	0.0248	1,079	1,079	0.0248
4512.50	53.00	53.00	1970.0	0.0452	0.0	0.0226	0.0000	0	0	0.0000

100yr El. 4515.8

South Basin

Elevation [ft.]	Length	Width	Area [ft²]	Area [acre]	Change in Elevation [ft]	Average Area [acre]	Incremental Volume [acre-ft]	Volume [ft³]	Cumulative Volume ft^3	Cumulative Volume acre-ft
4517.00	150.00	65.00	9623.0	0.2209	1.0	0.2049	0.2049	8,927	30,388	0.6976
4516.00	144.00	59.00	8231.0	0.1890	1.0	0.1745	0.1745	7,602	21,461	0.4927
4515.00	138.00	53.00	6972.0	0.1601	1.0	0.1467	0.1467	6,392	13,860	0.3182
4514.00	132.00	47.00	5811.0	0.1334	1.0	0.1206	0.1206	5,256	7,468	0.1714
4513.00	126.00	41.00	4700.0	0.1079	0.5	0.1016	0.0508	2,213	2,213	0.0508
4512.50	123.00	38.00	4150.0	0.0953	0.0	0.0476	0.0000	0	0	0.0000

100yr El. 4515.8

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****************

JOB TR-20                       FULLPRINT           SUMMARY
TITLE     LEGACY PUD SUBDIVISION - POST DEVELOPMENT  2 & 100 YR STORM (ROUTED)
TITLE     PROPOSED HYDRAULICS TO DETENTION BASIN     12/07/05
 3 STRUCT      01                                                      SWM#1
 8                        4512.50    0.000       0.0000
 8                        4513.00    0.473       0.0756
 8                        4514.00    1.057       0.2586
 8                        4515.00    1.418       0.4855
 8                        4516.00    1.704       0.7590
 8                        4517.00    4.141       1.0829
 9 ENDTBL
 6 RUNOFF 1    01     1 .0257188     89.0        .603       1          1 005
 6 RESVOR 2    01 1   2  4514.0                             1          1
   ENDATA
 7 INCREM 6              0.05
 7 COMPUT 7    01    01 0.0          0.70        1.0        2 2  01   02
   ENDCMP 1
 7 COMPUT 7    01    01 0.0          2.01        1.0        2 2  01   99
   ENDCMP 1
   ENDJOB 2
0*******************************END OF 80-80 LIST*********************************
1



 EXECUTIVE CONTROL OPERATION INCREM
RECORD ID
+                                    MAIN TIME INCREMENT =    .05 HOURS


 EXECUTIVE CONTROL OPERATION COMPUT
RECORD ID
+                                    FROM STRUCTURE  1
+                                                      TO STRUCTURE  1
        STARTING TIME =    .00    RAIN DEPTH =    .70    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND=
2
        ALTERNATE NO.= 1          STORM NO.= 2    MAIN TIME INCREMENT =    .05 HOURS
```

```
 OPERATION RUNOFF   STRUCTURE  1
           OUTPUT HYDROGRAPH=  1
           AREA=     .03 SQ MI   INPUT RUNOFF CURVE= 89.    TIME OF CONCENTRATION=    .60 HOURS
           INTERNAL HYDROGRAPH TIME INCREMENT=  .0502 HOURS

 *** WARNING-NO PEAK FOUND, MAXIMUM DISCHARGE =        1.10 CFS.

           PEAK TIME(HRS)          PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.35                      1.10                       (RUNOFF)

   RUNOFF VOLUME ABOVE BASEFLOW =    .07 WATERSHED INCHES,      1.22 CFS-HRS,      .10 ACRE-FEET;   BASEFLOW =     .00
CFS


 OPERATION RESVOR   STRUCTURE  1
           INPUT HYDROGRAPH= 1     OUTPUT HYDROGRAPH= 2
           SURFACE ELEVATION= 4514.00

           PEAK TIME(HRS)          PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
                .00                      1.06                      4514.00

   RUNOFF VOLUME ABOVE BASEFLOW =    .23 WATERSHED INCHES,      3.87 CFS-HRS,      .32 ACRE-FEET;   BASEFLOW =     .00
CFS


 EXECUTIVE CONTROL OPERATION ENDCMP
RECORD ID
+                                  COMPUTATIONS COMPLETED FOR PASS   1




 EXECUTIVE CONTROL OPERATION COMPUT
RECORD ID
+                                  FROM STRUCTURE  1
+                                                  TO STRUCTURE  1
        STARTING TIME =    .00    RAIN DEPTH =  2.01    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND=
2
        ALTERNATE NO.= 1         STORM NO.=99    MAIN TIME INCREMENT =    .05 HOURS
```

OPERATION RUNOFF STRUCTURE 1
OUTPUT HYDROGRAPH= 1
AREA= .03 SQ MI INPUT RUNOFF CURVE= 89. TIME OF CONCENTRATION= .60 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0502 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.27	12.58	

RUNOFF VOLUME ABOVE BASEFLOW = .78 WATERSHED INCHES, 12.87 CFS-HRS, 1.06 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 1
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 2
SURFACE ELEVATION= 4514.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
.00	1.06	4514.00
13.60	1.66	4515.84

RUNOFF VOLUME ABOVE BASEFLOW = .48 WATERSHED INCHES, 8.01 CFS-HRS, .66 ACRE-FEET; BASEFLOW = .00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP
RECORD ID
+ COMPUTATIONS COMPLETED FOR PASS 2

EXECUTIVE CONTROL OPERATION ENDJOB
RECORD ID
1

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	(CSM)
ALTERNATE 1 STORM 2													
STRUCTURE 1	RUNOFF	.03	2	2	.05	.0	.70	24.00	.07	---	12.35?	1.10?	42.8
STRUCTURE 1	RESVOR	.03	2	2	.05	.0	.70	24.00	.23	4514.00	.00	1.06	41.1
ALTERNATE 1 STORM 99													
STRUCTURE 1	RUNOFF	.03	2	2	.05	.0	2.01	24.00	.78	---	12.27	12.58	489.3
STRUCTURE 1	RESVOR	.03	2	2	.05	.0	2.01	24.00	.48	4515.84	13.60	1.66	64.5

1

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 2	99
0 STRUCTURE 1	.03		
ALTERNATE 1		1.06	1.66

1END OF 1 JOBS IN THIS RUN

APPENDIX IV

STRUCTURE AND PIPE SCHEDULE SUMMARIES

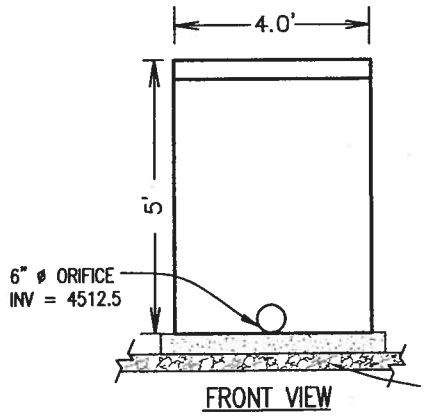
Legact P.U.D - FRUITA, CO.
Inlet Capacity Calculations

DRAINAGE AREA	INLET #	area (ft^2) Total	area (ft^2) Imperv.	AREA Imperv.	'C' Imperv.	'CA' Imperv.	area (ft^2) Pervious	AREA Pervious	'C' Pervious	'CA' Pervious	time of conc(min)	TOTAL AREA	TOTAL 'CA'	WEIGHTED 'C'	2-Yr. Storm Intensity (In/hr)	100-Yr. Storm Intensity (In/hr)	2-Yr. Q (cfs)	100-Yr. Q (cfs)	
13	Note 1	174176	158176	3.6312	0.94	3.4133	16000	0.3673	0.33	0.1212	5	3.9985	3.5346	0.88396	1.11	4.41	3.9234	15.5874	After development
13	Note 1	174176		0	0.94	0	174176	3.9985	0.33	1.3195	4	3.9985	1.3195	0.33	1.11	4.41	1.4647	5.81906	pre-dev
14	Note 1	35346	27863	0.6396	0.94	0.6013	7483	0.1718	0.33	0.0567	5	0.8114	0.658	0.81086	1.11	4.41	0.7303	2.90159	added flow from subdivision to 18 rd
15	Note 1	15488	15488	0.3556	0.94	0.3342	0	0	0.33	0	5	0.3556	0.3342	0.94	1.11	4.41	0.371	1.47392	existing 18 road pavement
16	Note 1	4663	5277	0.1211	0.94	0.1139	0	0	0.33	0	5	0.1211	0.1139	0.94	1.11	4.41	0.1264	0.50219	added flow from subdivision to 18 rd
3,4,5	1	155484	94286	2.1645	0.94	2.0346	61198	1.4049	0.33	0.4636	5	3.5694	2.4983	0.69991	1.11	4.41	2.7731	11.0173	
(1/2)*1,2,6,7,8,11,12	2	274361	181730	4.1719	0.94	3.9216	92631.5	2.1265	0.33	0.7018	5	6.2985	4.6234	0.73405	1.11	4.41	5.1319	20.3891	
some overflow	3		100	0.0023	0.94	0.0022	100	0.0023	0.33	0.0008	6	0.0046	0.0029	0.635	1.11	4.41	0.0032	0.01286	
(1/2)*1,9,10	4	107264	94282.5	2.1644	0.94	2.0346	12981.5	0.298	0.33	0.0983	7	2.4624	2.1329	0.86618	1.11	4.41	2.3675	9.40612	10.27254

Note 1: Drain to Existing Inlet on J Road, East of 18 Road

PIPE SCHEDULE

FROM STR.	TO STR.	Starting Invert Elevation	Ending Invert Elevation	PIPE MATERIAL	PIPE LENGTH (FT.)	PIPE DIA. (IN.)	Construction Phase
1	11	4514.00	4513.00	RCP CLASSIII	16	15	1
2	5 (Basin)	4512.70	4512.50	RCP CLASSIII	22	15	1
3	12	4514.30	4513.40	RCP CLASSIII	16	12	1
4	12	4514.30	4513.40	RCP CLASSIII	16	12	1
6	7	4512.50	4512.50	RCP CLASSIII	33	24	1
8	9	4512.40	4511.50	RCP CLASSIII	35	15	1
9	10	4511.50	4508.60	RCP CLASSIII	160	15	1
10	Existing	4508.60	4507.50	RCP CLASSIII	50	15	1
11	2	4513.00	4512.70	RCP CLASSIII	16	15	1
12	11	4513.40	4513.00	RCP CLASSIII	100	15	1



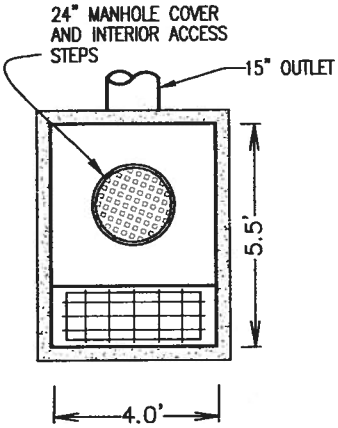
FRONT VIEW

NOTE:

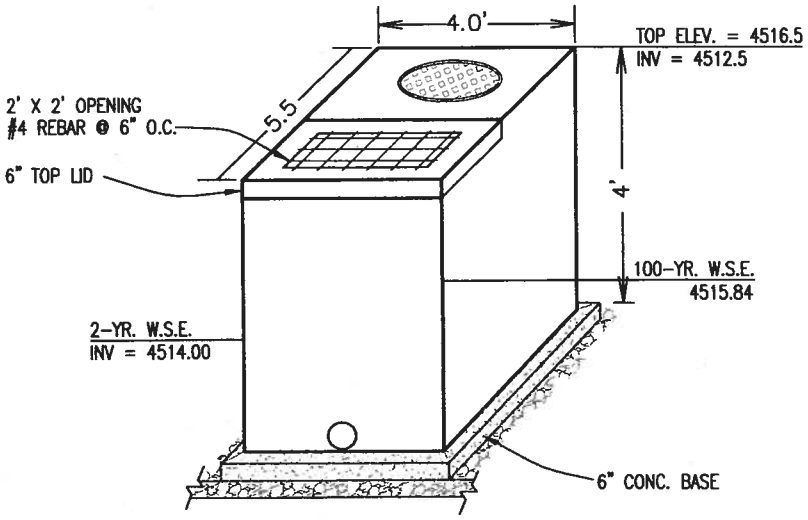
BUTYL RESIN MASTIC SEAL SHALL BE PLACED WITHIN ALL JOINTS OF THE OUTLET STRUCTURE WHEN ASSEMBLED AND BETWEEN TOP OF GRATE AND TOP OF STRUCTURE.

NOTE:

OUTLET STRUCTURE PLANS ARE TO BE SUBMITTED BY THE CONTRACTOR TO DESIGN ENGINEER AND CITY OF FRUITA ENGINEERING DEPARTMENT FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.



PLAN VIEW



ISOMETRIC VIEW

N.T.S.

TITLE:	SCALE:	DATE:	DRAWN BY: / CK'D BY:	CAD I.D.#: / PROJECT #:
OUTLET STRUCTURE DETAIL	N.T.S.	1/30/06	KDF / RWJ	legacy-const.dwg / F05-027

Vortex Engineering, Inc

* CONSTRUCTION MANAGERS & SITE PLANNERS *
* CIVIL & CONSULTING ENGINEERS *
* PROJECT MANAGERS *

255 Vista Valley Drive * Phone: (970) 858-4888
Fruita, Colorado 81521 * * Fax (970) 858-7373

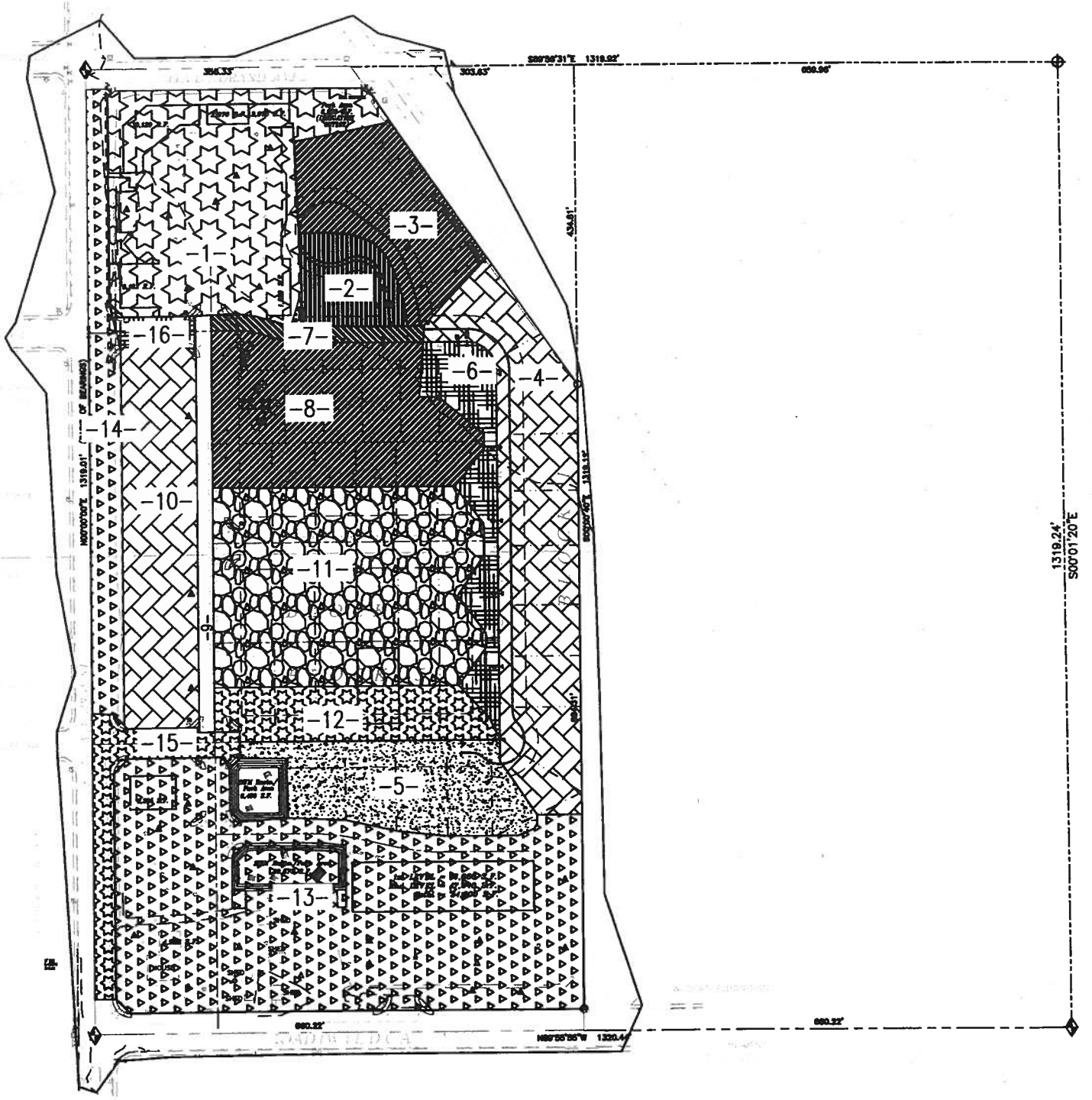
PROJECT:

Legacy P.U.D. Subdivision
18 & J Road
Fruita, Colorado

P:\Sanger Development_F05-027\CAD-dwgs\Legacy-Const.dwg

APPENDIX VI

PROPOSED STORM DRAIN NETWORK



TITLE:	SCALE:	DATE:	DRAWN BY: / CK'D BY:	CAD I.D. #: / PROJECT #:
DRAINAGE AREAS	1"=200'	2/20/06	GAP / RWJII	legacy-const..dwg / F05-027

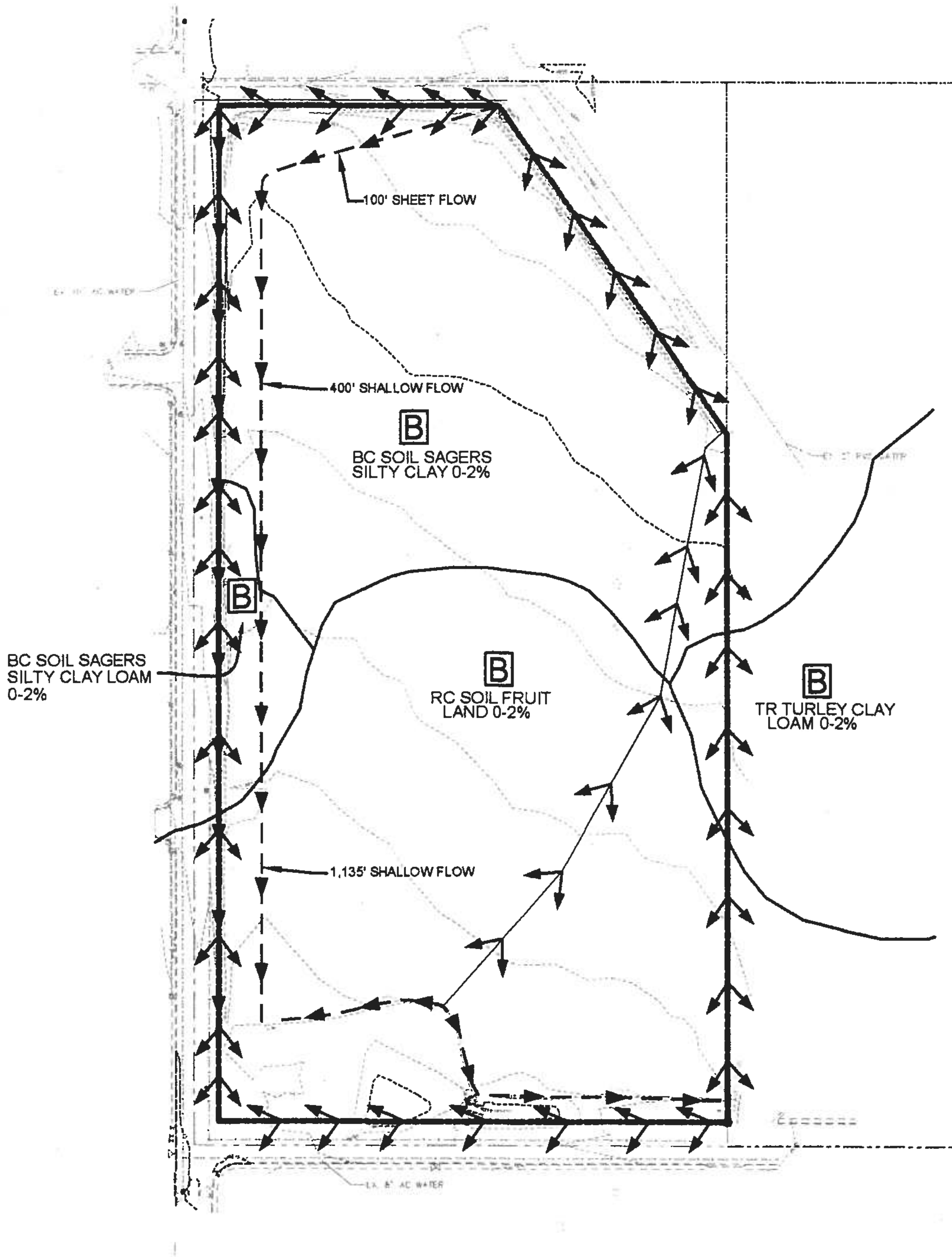
Vortex Engineering, Inc

* CONSTRUCTION MANAGERS & SITE PLANNERS *
* CIVIL & CONSULTING ENGINEERS *
* PROJECT MANAGERS *

255 Vista Valley Drive * Phone: (970) 245-9051
Fruita, Colorado 81521 * * Fax (970) 245-7639

PROJECT:

LEGACY P.U.D.
SUBDIVISION
18 & J ROAD
FRUITA, COLORADO



N

SCALE IN FEET
40 20 0 40 80
1" = 40'

1	12/21/05	REV. PER CITY COMMENTS	GAP
Rev	Date	Comment	By

Vortex Engineering, Inc
CONSTRUCTION MANAGERS & SITE PLANNERS • • • PROJECT MANAGERS • • • CIVIL & CONSULTING ENGINEERS
255 Vista Valley Drive, Fruita, Colorado 81521 — Phone (970) 245-9051, Fax (970) 245-7639

LEGACY P.U.D. SUBDIVISION

PROJECT *Legacy P.U.D. Subdivision*
18 & J Road
Fruita, Colorado

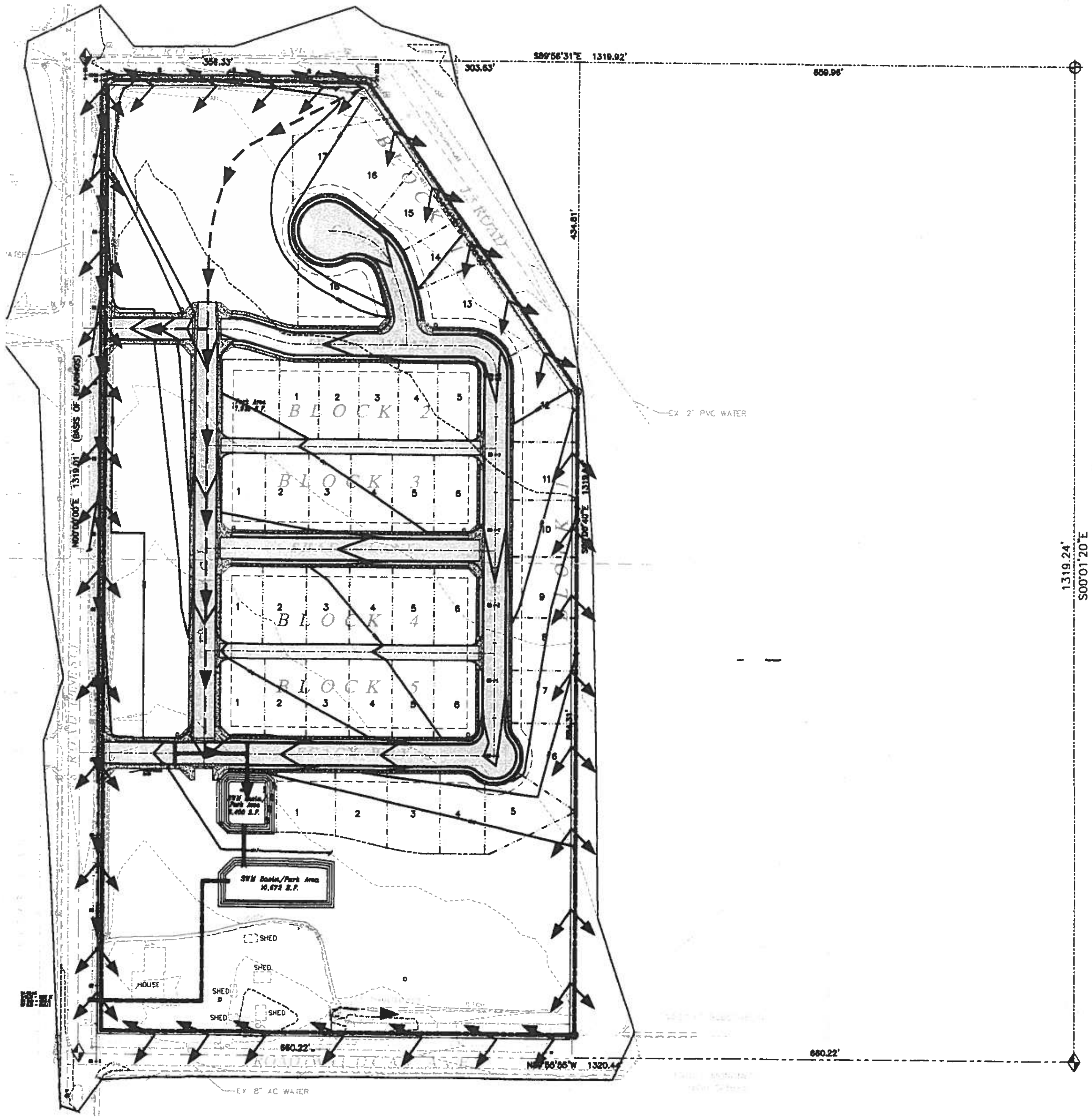
TITLE ***PRE. DEVELOPMENT DRAINAGE AREA MAP***

R.W. JONES II
PROFESSIONAL ENGINEER
COLORADO LICENSE No 37505
VIRGINIA LICENSE No 0402037490

SCALE 1" = 40'	DATE 07/10/05	SHEET No 1 OF 1
DRAWN BY KDA	PROJECT NO F05-027	
CHECKED BY RWJII	CAD ID legacy.dwg	
CONSTRUCTION CHECK	DATE	REV. No 1

EXHIBIT 'B'

POST-DEVELOPMENT DRAINAGE AREA MAP



N

SCALE IN FEET

80 40 0 80 160

1" = 80'

LOCATION OF UTILITIES SHOWN HEREON WAS PROVIDED BY OTHERS. CONTRACTOR MUST VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

⊗ CONTRACTOR TO TEST PIT ALL CROSSINGS OF EXISTING UTILITIES WHERE IT IS DEPICTED ON THESE PLANS PRIOR TO BIDDING AND CONSTRUCTION. ANY DISCREPANCIES FOUND ARE TO BE REPORTED TO VORTEX ENGINEERING, INC. IN WRITING

CALL

1-800-922-1987

UTILITY NOTIFICATION CENTER OF COLORADO

APPROVAL/SIGNATURE BLOCK

CITY ENGINEER	DATE
COMMUNITY DEVELOPMENT	DATE

Rev	Date	Comment	By
1	12/21/05	REV. PER CITY COMMENTS	GAP

Vortex Engineering, Inc

CONSTRUCTION MANAGERS & SITE PLANNERS • • • PROJECT MANAGERS • • • CIVIL & CONSULTING ENGINEERS

255 Vista Valley Drive
Fruita, Colorado 81521

Phone (970) 245-9051
Fax (970) 245-7639

PRELIMINARY

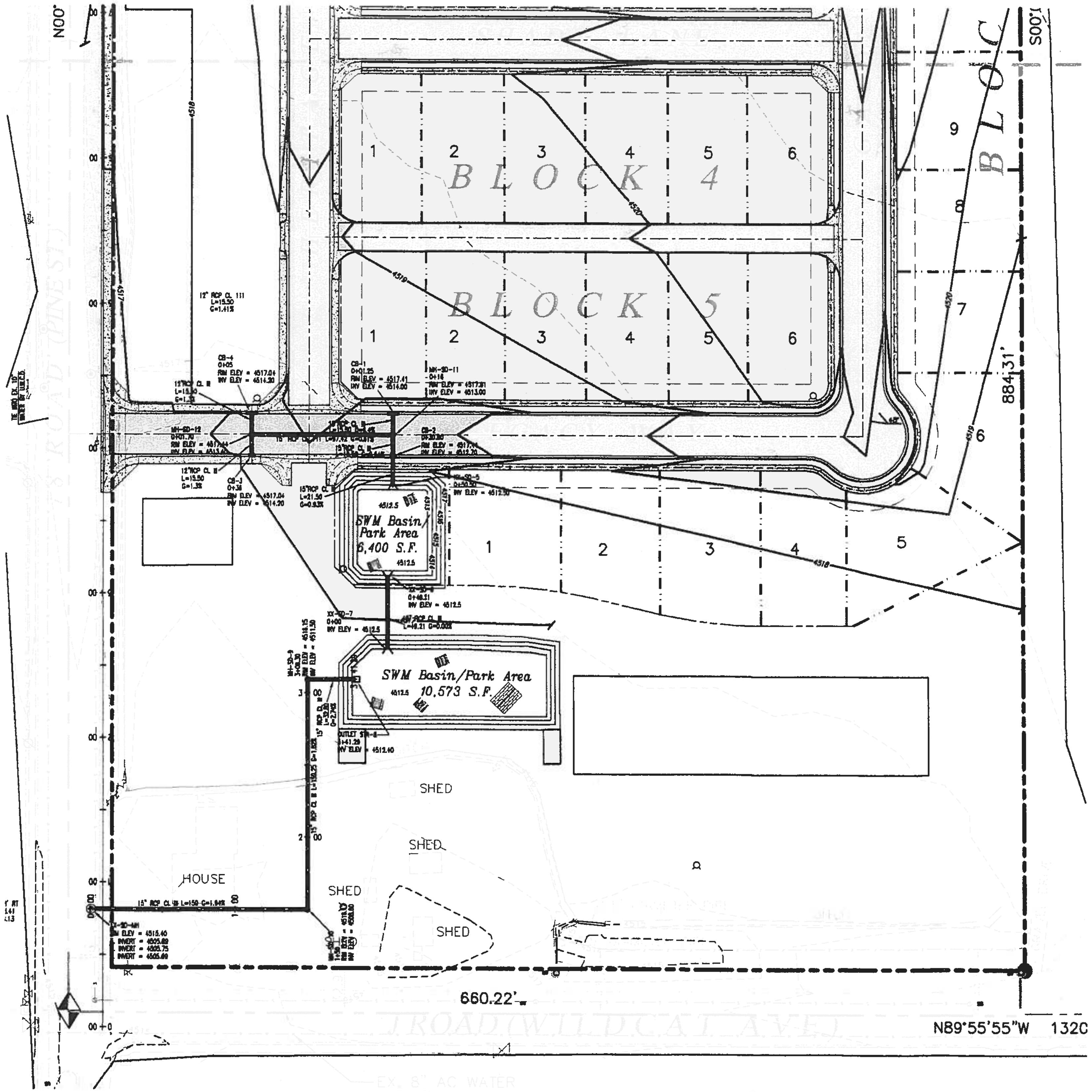
PROJECT *Legacy P.U.D. Subdivision*
18 & J Road
Fruita, Colorado

TITLE *POST DEVELOPMENT DRAINAGE PLAN*

R.W. JONES II

PROFESSIONAL ENGINEER
COLORADO LICENSE No. 37805
VIRGINIA LICENSE No. 0402037460

SCALE 1"=80'	DATE 07/10/05	SHEET No 1 of 1
DRAWN BY KDF	PROJECT NO F05-027	
CHECKED BY RWJII	CAD ID legacy.dwg	
CONSTRUCTION CHECK	DATE	REV No 1



LOCATION OF UTILITIES SHOWN HEREON WAS PROVIDED BY OTHERS. CONTRACTOR MUST VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.

⊗ CONTRACTOR TO TEST PIT ALL CROSSINGS OF EXISTING UTILITIES WHERE IT IS DEPICTED ON THESE PLANS PRIOR TO BIDDING AND CONSTRUCTION. ANY DISCREPANCIES FOUND ARE TO BE REPORTED TO VORTEX ENGINEERING, INC. IN WRITING

CALL
1-800-922-1987
UTILITY NOTIFICATION CENTER OF COLORADO

APPROVAL/SIGNATURE BLOCK

CITY ENGINEER	DATE
COMMUNITY DEVELOPMENT	DATE

Rev	Date	Comment	By
1	12/21/05	REV. PER CITY COMMENTS	GAP

Vortex Engineering, Inc
CONSTRUCTION MANAGERS & SITE PLANNERS • • • PROJECT MANAGERS • • • CIVIL & CONSULTING ENGINEERS
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PROJECT: Legacy P.U.D. Subdivision
18 & J Road
Fruita, Colorado

TITLE: STORM DRAIN NETWORK PLAN

R.W. JONES II
PROFESSIONAL ENGINEER

SCALE 1"=60'	DATE 02/21/06	SHEET No 1 OF 1
DRAWN BY GAP	PROJECT NO P05-027	
CHECKED BY RWJII	CAD ID legacy.dwg	
CONSTRUCTION CHECK	DATE	REV No 1