

TECHNICAL DRAINAGE STUDY

VIRGINIA HIGHLANDS, LLC

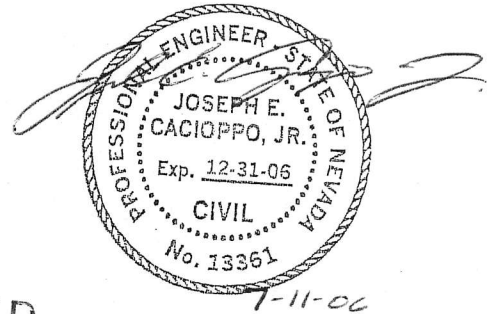
(Old TRW Site)

1 TRW Way

A.P.N. 004-201-05 & 004-151-06

Storey County, Nevada

Date Prepared:
July 11, 2006



Prepared for:

Virginia Highlands, LLC

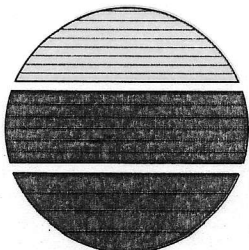
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Prepared for:

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Storey County Building



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Date Prepared:
July 11, 2006

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*File Doc: 2006-07-11 rpt. Tech Drain 06165.3 Smith, G. Blake JEC-sta L7-10.doc
[July 11, 2006]*

INTRODUCTION

This study is prepared for Virginia Highlands, LLC and presents the results of the hydrologic evaluation at what was formerly known as the "Old TRW Site." The site is 6,767 acres in size, as reported by the Storey County Assessors Office, and is owned by Virginia Highlands, LLC.

The purpose of this study is to analyze existing on-site and off-site drainage, as well as determine the existing peak flows and off-site releases. This analysis considers the 25-year and 100-year storm events, each having a 24-hour duration. Supporting documentation and calculations are provided within this study.

Because there are no proposed site additions or improvements planned at this time, this study only considers existing flows. As such, existing peak flows are summarized in Table 1, below. Refer to the attached Drainage Map and the remainder of this report for additional information.

TABLE 1

Station Designation	100-Yr, 24-Hr Peak Flow (cfs)	25-Yr, 24-Hr Peak Flow (cfs)	Contributing Sub-Areas	Zone Designation
A	955.00	670.00	1	Zone I
B	1,295.00	905.00	2	
C	1,693.00	1,186.00	1-3	
D	3,297.00	2,279.00	1-4	
E	266.00	186.00	5	Zone II
F	1,584.00	1,125.00	6	
G	1,969.00	1,397.00	5-8	
H	2,677.00	1,896.00	9	
I	240.00	170.00	10	
J	3,060.00	2,167.00	9-12	
K	699.00	488.00	14	
L	237.00	156.00	15	
M	786.00	548.00	14-17	
N	4,514.00	3,195.00	9-18	
O	6,968.00	4,887.00	9-20	Zone III
P	10,356.00	7,270.00	9-21	
Q	1,549.00	997.00	22	
R	596.00	396.00	23	
S	1,794.00	1,162.00	22-25	
T	3,139.00	2,119.00	22-26	Zone IV
U	852.00	594.00	27	

GENERAL LOCATION & DEVELOPMENT DESCRIPTION

Location of Property

The project site is located in Storey County, south of U.S. Interstate 80 and the Town of Lockwood, within Sections 31 and 32 of T.19N., R.22E., and Sections 4 through 9 and 16 through 18, T.18N., R.22E. The site is comprised of two parcels. The Assessor's Office describes the parcels as being A.P.N. 004-201-05 and 004-151-06. The physical address of the latter parcel is 1 TRW Way.

Description of Property

The project site comprises 6,767 acres within a remote area of Storey County, Nevada. The site is predominantly covered with low-lying desert shrubs and rock outcrops. Site soils are listed on the attached map entitled, "Soil Map Units", and are predominantly within Hydrologic Soil Group D, with generally slow permeability and a rapid run-off potential, based on the Natural Resource Conservation Service (NRCS, formally known as the Soil Conservation Service) Soil Survey for Storey County, Nevada. A very minor amount of landscaping and impervious surfaces exist around some of the existing buildings.

Existing site topography varies substantially throughout the site, with on-site flowline slopes ranging from 2.5% to 15%. Steeper slopes are present on-site. The general slope of the site is to the west. Off-site contributing drainage is from the north, east and south. Run-off from the project site and contributing watershed drains to the Long Valley Creek.

Floodplain Information

The project site is located within Flood Zone C, areas of minimal flooding, as delineated in the Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM) for Storey County, Community Panel Number 320033 0075 B, effective February 19, 1987. The off-site contributing areas are also located with Flood Zone C, as depicted on Community Panel Numbers 320033 0100 B and 0125 B. Refer to the attached FEMA Flood Zone Map.

Project Description

There is no land disturbance associated with this drainage study. This study is prepared to determine existing drainage conditions and will be used for the client's master planning purposes. As such, there are no grading quantities to report. Because this is an existing relatively undisturbed site, the potential for erosion, sedimentation, or other drainage problems is generally moderate.

DRAINAGE BASIN DESCRIPTION

Off-Site Drainage Description

The total contributing watershed is 16,034.3 acres. Given that the project site is 6,767 acres, a total of 9,267.3 acres is the contributing off-site contribution. Off-site drainage entering the site occurs from the north, east and south. Based on the attached Drainage Map, off-site drainage enters the site at 10 locations, confluence points A, B, E, F, H, I, K, L, Q and R.

These points were analyzed in an effort to separately quantify on-site and off-site peak flows. Peak flows leave the site through 4 locations, confluence points D, P, T and U. Table 1 of this report lists the peak flows for each analyzed storm event at these confluence points.

Historic drainages remain predominantly intact. Existing structures and operations do not seem to have substantially altered any watercourses or catchments.

Off-site areas, as previously described, are covered with low-lying desert shrubs and rock outcrops. Soils generally have a slow permeability and a rapid run-off potential. As such, the Soil Survey for Storey County, Nevada lists the soils as predominantly being within Hydrologic Soil Group D. Off-site topography consists of the Virginia and Flowery mountain ranges, and is generally steeper than that found on-site.

On-Site Drainage Description

The 6,767-acre project site is very similar in vegetative cover and soil type to the off-site areas. The Hydrologic Soil Group D classification, as well as the low-lying desert shrub and rock outcrops, is an accurate characterization of the on-site area. Topography within the property is generally less steep than that of the off-site contributing areas, with flowline slopes ranging between 2.5% and 15%.

Previous Drainage Studies

Resource Concepts, Inc. (RCI) is not aware of the existence of any previous drainage studies prepared for this site.

PROPOSED DRAINAGE FACILITIES

General Description

There are no proposed drainage facilities associated with this study. The attached analyses were performed to determine existing peak flows. The criteria used in this report are based on conversations with Storey County staff, and the requirements of some of the surrounding counties.

DESCRIPTION OF ANALYSIS AND RESULTS

Hydrologic Criteria

Given the size of the existing property and its contributing watershed, the drainages were analyzed using the U.S. Army Corps of Engineer's, Hydrologic Engineering Center, Floodplain Analysis Program (HEC-1). Input parameters entered into the program primarily included the watershed size, vegetative cover and the precipitation distribution from a Type II storm event, as well as channel characteristics such as slope, length, and roughness. Overland flow was routed through each of the sub-areas comprising the overall 16,034.3-acre analysis area using the SCS Curve Number Loss Rate and Dimensionless Unit Hydrograph. Channel routing was performed using the Kinematic Wave routing method.

The overall contributing watershed was divided into 4 zones and 27 sub-areas, as listed in Tables 1 and 2. The 4 zones coincide with the 4 release points (Confluence Points D, P, T and U). Table 1 is located on Page 1 and Appendix A of this study. Table 2 is located in Appendix A. Refer to the attached Drainage Map, located in Appendix C, for the delineation of all sub-areas, confluence points, and routing.

Compliance with Regulations and Adopted Plans

Because this is an existing site with no proposed improvements or modifications, Resource Concepts, Inc. (RCI) is of the understanding that the site is currently in compliance with FEMA and Storey County regulations. Any improvements, modifications, or additions that might be proposed in the future, must comply with the codes in place at that time.

Prior to the preparation of this report and the associated analyses, RCI contacted Storey County Public Works, Planning and Building departments to ensure any and all appropriate regulations were adhered to. Based on County input, this report and attached analyses address the requirements of Storey County.

Facility Design Calculations

Because this study analyzes only existing site conditions, no discussion or calculations pertaining to facility design are provided. However, since future development, if any, would potentially impact existing peak flows, it is important to represent the amount of water generated by a peak flow event.

The analyses contained within this report consider the 25-year and 100-year storm recurrence intervals, each having a 24-hour duration. Upon determining peak flows at each confluence point, approximate cross sections were then generated to represent an estimate of the amount of existing water any future development should anticipate. These cross sections are contained within Appendix A of this study.

Results

Peak flows for the 25-year and 100-year storm events were determined for each sub-area, and at each confluence point. As such, peak flows were determined for 27 sub-areas and 21 confluence points. Tables 1 and 2, shown within Appendix A of this study, respectively summarize the peak flows and sub-area sizes. As previously discussed, off-site drainage enters the property at 10 locations and leaves the site through 4 locations. Refer to the Drainage Map in Appendix C of this study.

CONCLUSIONS

This Drainage Study is prepared in accordance with Storey County requirements and represents actual field conditions/characteristics to the extent reasonably possible. The format and analysis methods chosen are modeled from Carson City requirements. Storey County staff acknowledged that this approach was acceptable. Based on our findings, the contributing watershed appears to be stable and adequately accommodates impacting peak flows from the 24-hour duration, 25- and 100-year storm events.

The Virginia Highlands, LLC property consists of two parcels that combined with their off-site contributing watershed, constitute 16,034.3 acres of land, located within FEMA FIRM Flood Zone C. At this time, there are no immediate plans for development. In the event future development is anticipated, drainage issues will comply with regulations in place at that time. At a minimum, post-development peak flows should be detained so that off-site releases do not exceed pre-development peak flows as listed herein.

REFERENCES

Storey County Public Works Department

Storey County Building & Planning Departments

Precipitation Frequency Study of the United States, NOAA Atlas 14

US Department of Agriculture Technical Release 55, Urban Hydrology for Small Watersheds

United States Department of Agriculture, Soil Survey of Storey County Area, Nevada