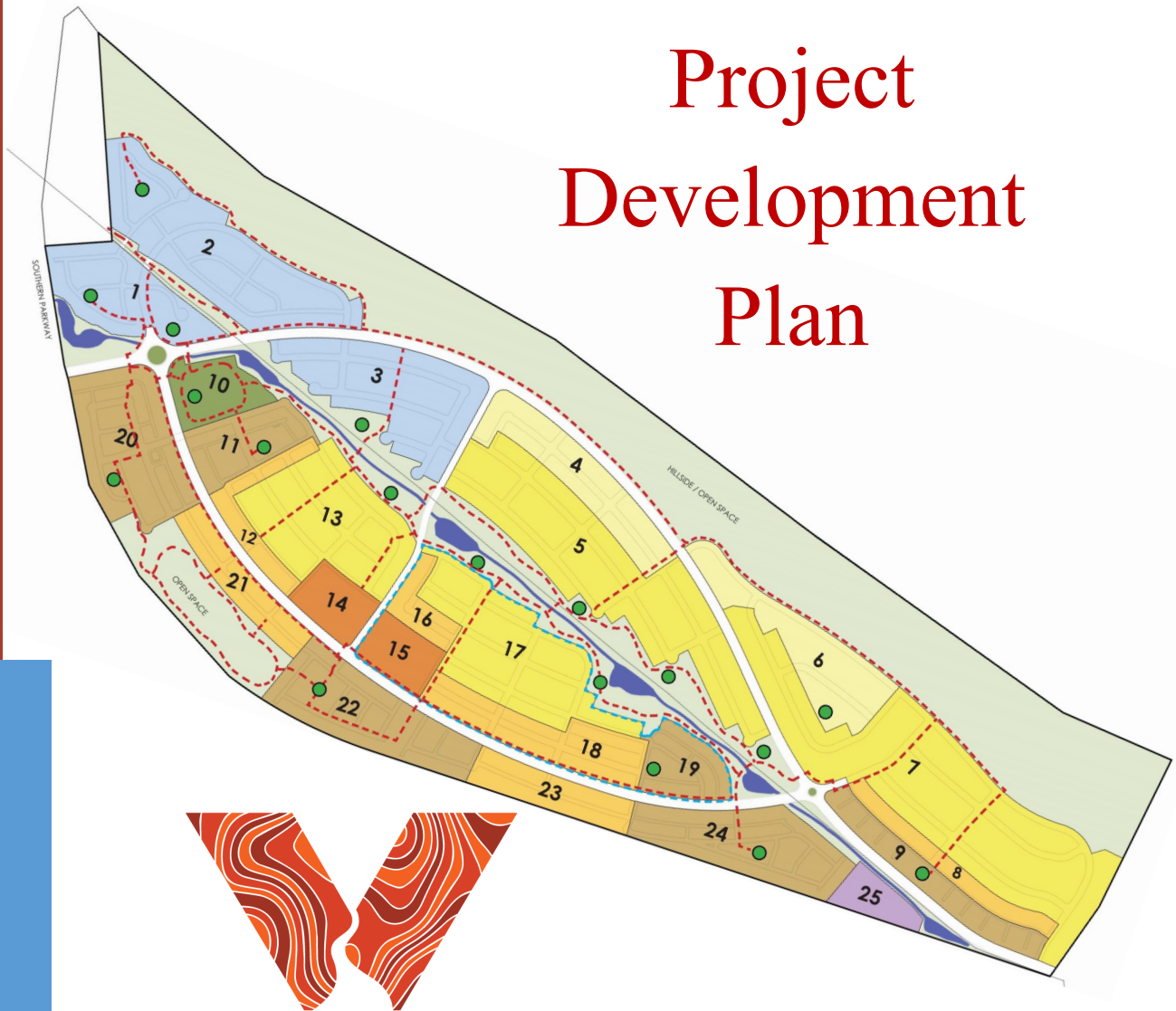
A Planned Community Development

LONG VALLEY TRAILS



Updated 10/13/2020

Project Development Plan



LONG VALLEY TRAILS

Presented by:

Brennan Family Holdings, LLC
Washington City, Utah
435-668-3641

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LONG VALLEY TRAILS

Existing Conditions

Section 1

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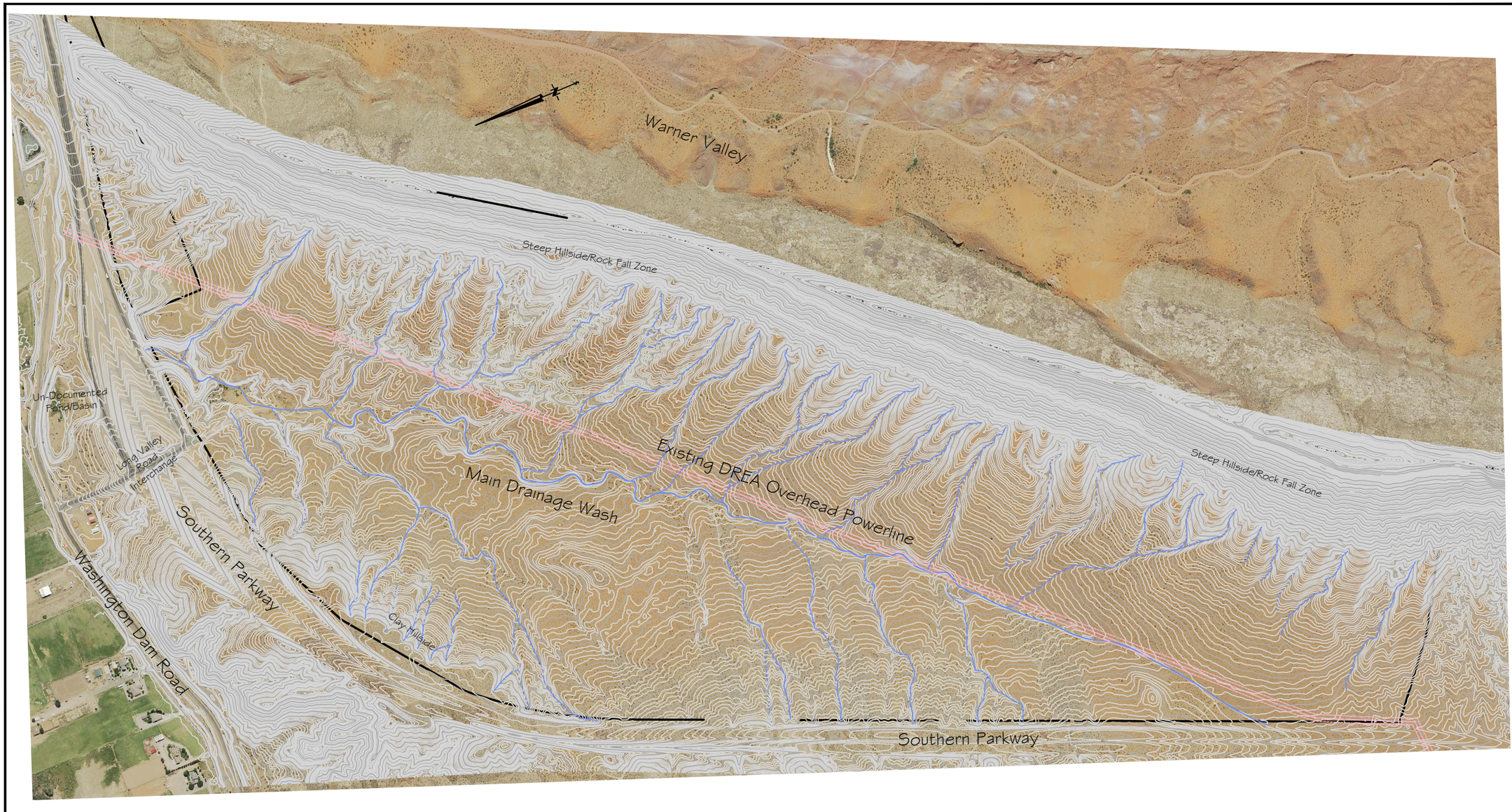
Existing Conditions:

Long Valley Trails consists of undeveloped natural terrain. The site is bound by the Southern Parkway on the North and West boundaries and by the Warner Valley Ridge on the East boundary. The South boundary borders existing BLM lands which contain Areas of Critical Environmental Concern (ACEC) related to listed endangered species.

The land slopes from the western and easterly boundaries to the center of the property which contains a natural drainage. This drainage are surrounding area are to remain un-developed and will be enhanced with trails, parks and other improvements that will allow the residents of Long Valley Trails to enjoy the beauty that the lands provide.

The steep slope along the eastern boundary will remain un-touched and the rock fall hazard presented by this slope has been identified, studied and a mitigation plan is included in the development plans for Long Valley Trails.

An existing overhead power line runs down the center of the property. This line is owned by Dixie REA and was recently upgraded. The upgrade include larger metal poles and powerline were upsized to meet the overall demand in this are of Washington County. The upgrade also included the need power infrastructure needed for the Long Valley Development. In addition to the upgrades the new power poles were lowered to minimize their impact to the planned development. The costs to lower these poles were paid by Brennan Family Holdings.



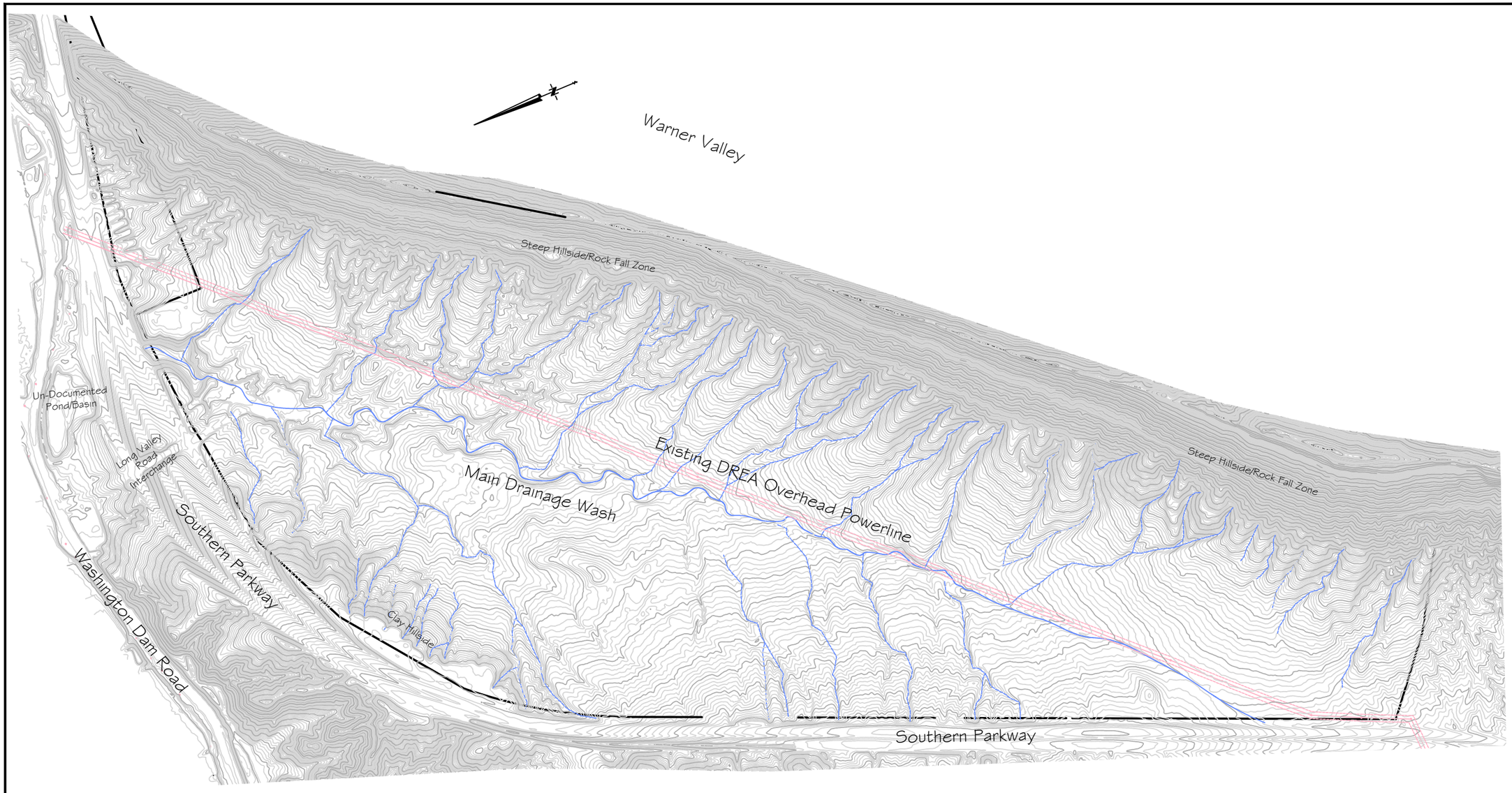
Brennan Family Holdings, LLC
Washington, Utah
435-668-3641

LONG VALLEY TRAILS

Existing Conditions

Long Valley Trails

a Master Planned Community
Located in Sections 20-29-30-31
Township 42 South, Range 14 West
Salt Lake Base and Meridian
Contains 605.61 Acres



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Washington, Utah
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LONG VALLEY TRAILS

Existing Conditions

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a Master Planned Community
Located in Sections 20-29-30-31
Township 42 South, Range 14 West
Salt Lake Base and Meridian
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LONG VALLEY TRAILS

PCD Project Plan

Section 2

PCD Project Plan Summary:

The items contained in the PCD project plan outlines the process undertaken in the development of the Long Valley Trails PCD. The plan shows detailed tables of the various Land Uses as well as a detailed project Summary.

The project plan includes the master plan map showing the location of the various land uses and identifies the significant open spaces, trails, parks and project amenities. The plan also includes some building elevations which represent the basic look of the residential units planned for Long Valley Trails. In addition to these plans, numerous variations of these buildings will be incorporated to insure a harmonious and attractive mixture of homes throughout Long Valley Trails neighborhoods.

The project plan shows the commitment on amenities will be centered around outdoor recreation. These amenities include a variety of trails for hiking, walking and biking. These trails will be assessible from each neighborhood within the development and will be enhanced with trailheads, rest areas, shade and will provide direct access to the clubhouse, pools and other planned amenities. The project plan outlines the number and types of amenities planned for Long Valley Trails.

Plan Development Process:

The PCD Development Plan shown later in this section is a culmination of an extensive planning process which incorporated the collective experience and knowledge of a wide range of Planners, Builders, Engineers and Architects. The project development team has worked on and has completed a wide range of communities stretching across the Southwest United States and beyond. Members of the development team have visited and reviewed projects throughout the County, including developments in Utah, Arizona, Nevada, California, Colorado, Texas and Florida.

As valuable members of the team, the Homebuilders have provided valuable insights into what a successful community needs to meet the needs of the Homebuying Public. The following is a list of those who were major contributors to the project:

Woodley Architectural group, Inc
Mike Woodley and his team

DR Horton, America's Builder
Boyd Martin and his team

High Point Engineering & Surveying
Marc Raines, P.E. and his team

A.G.E.C., Inc.
Wayne Rogers, P.E. and his team

JNL Solution
Jay Nelson, Senior Transportation Planner

Washington City Planning and Public Works

Project Summary:

Pod #	Land Use	Acres	Units	Density
1	Active Adult	14.35	62	4.3
2	Active Adult	27.98	165	5.9
3	Active Adult	21.72	110	5.1
Total Active Adult		**64.05**	**337**	**5.3**
4	Large Lots	13.59	34	2.5
6	Large Lots	15.17	29	1.9
Total Large Lots		**28.76**	**63**	**2.2**
5	Medium Lots	36.42	153	4.2
7	Medium Lots	48.66	161	3.3
13	Medium Lots	21.85	111	5.1
17	Medium Lots	23.4	114	4.9
Total Medium Lots		**130.33**	**539**	**4.1**
8	Patio Homes	6.16	38	6.2
12	Patio Homes	5.61	29	5.2
16	Patio Homes	4.12	29	7.0
18	Patio Homes	12.92	78	6.0
21	Patio Homes	7.8	54	6.9
23	Patio Homes	8.16	49	6.0
Total Patio Homes		**44.77**	**277**	**6.2**
9	Townhomes	9.45	90	9.5
11	Townhomes	9.15	110	12.0
19	Townhomes	7.4	86	11.6
20	Townhomes	19.55	224	11.5
22	Townhomes	17.89	187	10.5
24	Townhomes	17.19	194	11.3
Total Townhomes		**80.63**	**891**	**11.1**
14	Condos	5.78	122	21.1
15	Condos	5.8	132	22.8
Total Condos		**11.58**	**254**	**21.9**
25	RV Storage	4.26	0	0.0
10	Clubhouse	7.16	0	0.0
	Open Space and Hillside	234.07	0	0.0
Totals		**605.61**	**2361**	**3.9**

Land Use Breakdown:

Pod #	Land Use	Acres	Units	Density
1	Active Adult	14.35	62	4.3
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Land Use Densities:

Total All Land 605.61 Acres

Total all Residential Units 2,361

Gross Project Density (2,361/605.61) = 3.9 DU/Acre

Project Amenities:

1 One main Community Center, which may include, Pool, Tennis, Pickle-ball, Meeting/Classrooms, Administrative offices, Reading Room, Spa, Fitness Center and Food Service facilities.

2. Up to 10, Neighborhood Amenity Centers which will vary according to demand and may include pools, spas, meeting rooms, food service facilities etc.

3. Over 5 miles of paved walking and bike trails which access all Residential Neighborhoods.

4. Over 3 miles of secondary trails that will accommodate mountain biking, hiking and walking. These trails are accessible for all Residential Areas.

5. Improved Park providing typical park amenities.

6. Project Open Space equal to 62.81% of Total Project.

Church Sites:

Long Valley Trails will require 1 or more church sites. These sites will be located, in the Residential Neighborhoods and will replace a combination of Lots and/or open space areas. Experience has taught us not to designate specific sites because they rarely meet the specific needs of the Religious groups desiring a site. The Developer is committed to providing the required Church sites to meet the needs of Long Valley Trails.

Nightly Rentals:

It is not the intention of Long Valley Trails, to allow nightly rentals throughout the community. The PCD Plan is requesting only the Townhome units in **Development Pods 22** be approved for nightly rentals. These units will serve as a place for those potential residents visiting the community to stay while they explore the community. They can also serve as additional housing for residents who have large families who need additional room for their visiting family. The units will be individually owned and will prohibit any institutional buyers and will be managed by an entity chosen by the Master HOA. Individual renting or management of the units will not be allowed.

Workforce Housing:

It is the goal of Long Valley Trails to provide attractive, innovative and energy efficient homes that will provide the homeowner with a true value. This concept applies to each and every unit being proposed in Long Valley Trails. However, the units in **Development Pod 11** will have a specific focus on units that can be purchased by the essential workers in the greater Washington County Workforce. These workers include but are not limited to Public Safety workers, Teachers, Emergency Service personnel, Health Care workers and other public employees. Long Valley Trails will utilize Federal, State, Local and Private Sector funding programs to assist these workers and will develop high quality residential units that truly provide these workers with homes of value.

Building Elevations:

Architectural Elevations of each unit and building type will vary and will change with market demand. Long Valley Trails will maintain a consistent architectural style and theme for each neighborhood within the development and will maintain a community feel within the entire development. The builder has included several sample building elevations for illustration purposes, however, actual building elevations and materials will vary over the life of the project.

Condominiums/Apartments:

Currently the project master plan shows two separate areas labeled as Condominiums. While that is the intent of the master plan, the master developer and builder reserve the option to have these areas as apartments. The exterior of the units would not change significantly and detailed plans would be submitted for approval prior to the actual platting and or construction of these

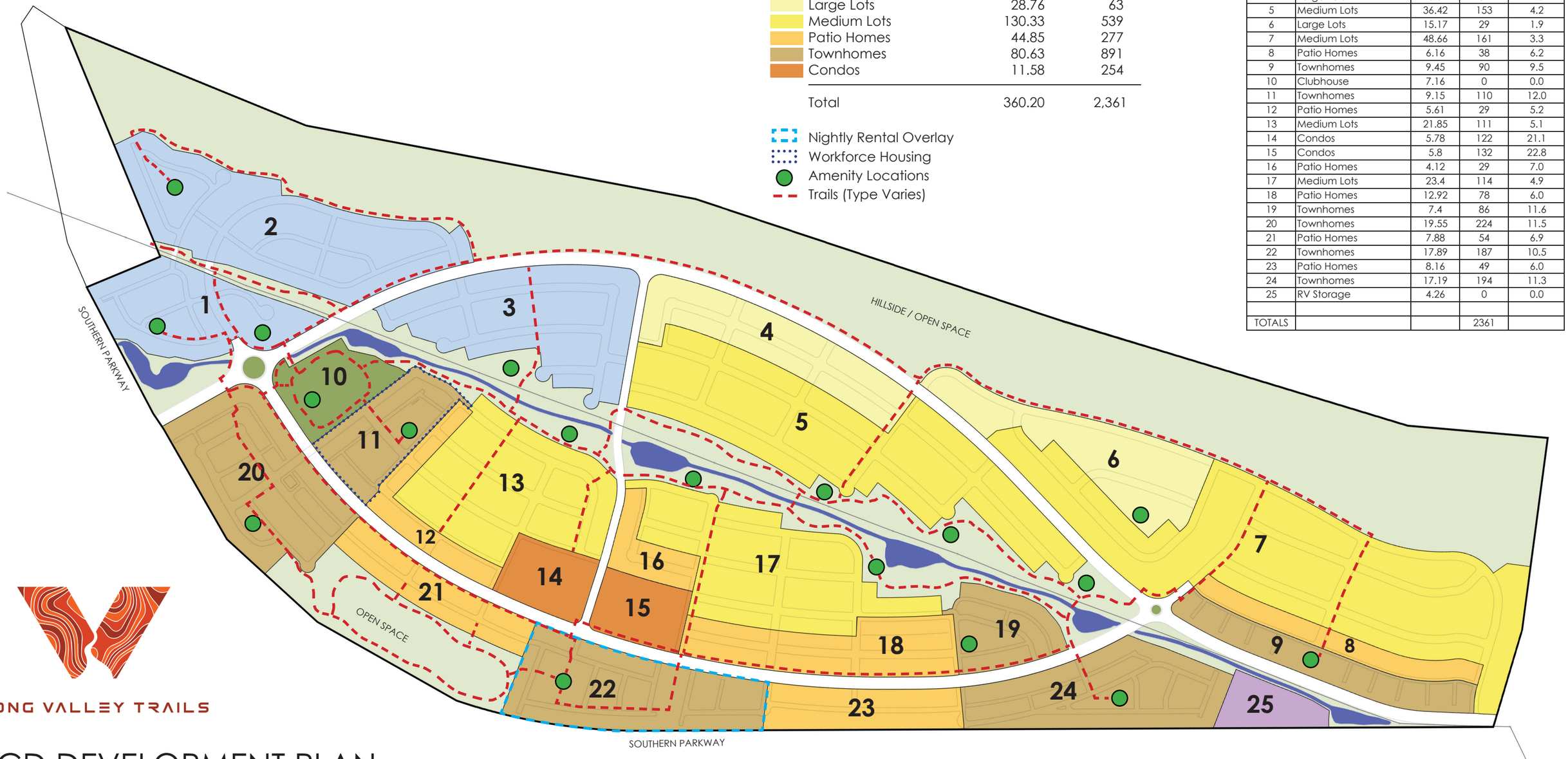
units. The final determination will be based on economic and market demand and will be subject to Washington City review and approval.

Legend

Total Area **605.61 ac**

Land Uses	Acres	Units
Active Adult	64.05	337
Large Lots	28.76	63
Medium Lots	130.33	539
Patio Homes	44.85	277
Townhomes	80.63	891
Condos	11.58	254
Total	360.20	2,361

Nightly Rental Overlay
Workforce Housing
Amenity Locations
Trails (Type Varies)



Statistical Summary

POD	Land Use	Acres	Units	DU/AC
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25	RV Storage	4.26	0	0.0
TOTALS			2361	

LONG VALLEY TRAILS

PCD DEVELOPMENT PLAN

Long Valley Trails

October 7, 2020

North

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D·R·HORTON
America's Builder

LONG VALLEY TOWNHOMES

MILLBROOK/OAKRIDGE PLANS



DESERT MODERN ELEVATION

D·R·HORTON
America's Builder

LONG VALLEY TOWNHOMES

MILLBROOK/OAKRIDGE PLANS



DESERT MODERN ELEVATION

D·R·HORTON
America's Builder

LONG VALLEY TOWNHOMES

MILLBROOK/OAKRIDGE PLANS



DESERT TRADITIONAL ELEVATION

D·R·HORTON
America's Builder

LONG VALLEY TOWNHOMES

MILLBROOK/OAKRIDGE PLANS



DESERT FARMHOUSE ELEVATION

D·R·HORTON
America's Builder

LONG VALLEY SINGLE FAMILY

RUBY PLAN



DESERT PRAIRIE ELEVATION

D·R·HORTON
America's Builder

LONG VALLEY TRAILS

Design Guidelines

Section 3

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Project Design Guideline Summary:

Long Valley Trails is a master-planned community located on the west side of Washington City, directly adjacent to the Washington Fields area. Long Valley Trails consists of a variety of planned single family and multi-family residential subdivisions, open-space, parkland, trail systems, Community Center, and churches. The 605-acre master planned community has been planned to be a sustainable and affordable community.

Long Valley Trails lies within a strikingly beautiful landscape and the land planning process, sensitive site planning, and careful building and development methods assure this beauty will remain. Setting aside sensitive lands and building in appropriate areas will assure the lasting value of this desert landscape. Preservation of these natural assets is very important to the Long Valley Trails environmentally planned community. Development in Long Valley Trails should be reflective of, and enhanced by, the colors, textures, lines, and forms of the surrounding natural terrain.

Utilizing the setting of the Mojave (southwest desert) environment with correlated parks, open space, and trail systems, Long Valley Trails beckons a lifestyle utilizing the outdoors and openness. Representative architecture for the project shall include traditional and contemporary southwestern and Mediterranean styled homes, Townhomes and Condominiums. Stucco, brick, blocks, stone, tile and other complementary materials with compatible colors that complement each-other and the desert oasis theme are to be utilized. Elements of this architectural theme are encouraged throughout the community in the design of signage and street furniture.

Long Valley Trails is a water-efficient community. Due to the arid desert environment, responsible management of our water resources is most appropriate. Water conservation is a priority and is a course of consideration that is intertwined in the Development Plan of Long Valley Trails

1. OVERVIEW OF LONG VALLEY TRAILS

1.1 INTRODUCTION

Long Valley Trails is a master-planned community located on the west side of Washington City, directly adjacent to the Washington Fields area. Long Valley Trails consists of a variety of planned single family and multi-family residential subdivisions, open-space, parkland, trail systems, Community Center, and churches. The 605 acre master planned community has been planned to be a sustainable and affordable community.

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Long Valley Trails is a water-efficient community. Due to the arid desert environment, responsible management of our water resources is most appropriate. Water conservation is a priority and is a course of consideration that is intertwined in the Development Plan of Long Valley Trails.

These Design Guidelines were created to ensure that the high standards, which are the product of this extensive planning effort, are consistently applied to help residents and builders understand the concepts and intent behind Long Valley Trails. These Guidelines are binding upon each owner of real property ("Owner") and any other individual or entity ("Builder") who is developing a single family residential of multi-family residential.

Except as otherwise indicated, where the word "Owner" is used herein, it is intended to be interchangeable with the word "Builder" during any construction process and prior to occupancy by a resident, tenant or other Owner on the subject lot or parcel. When the word "Builder" alone is used herein, it shall mean obligations required only of the Builder.

1.2 DEVELOPMENT REQUIREMENTS

There may be several Builders designing and constructing individual developments within Long Valley Trails over the years and even during the same time period. It is important to assure that there is continuity in the community as it develops and, therefore, certain standards and requirements must be set to guide current and future construction. These standards and requirements have been defined by the Master Developer of Long Valley Trails, which is Brennan Family Holdings, LLC (the "Master Developer"), or other agent, to whom, at any time, Brennan may assign Master Developer responsibilities, via the Declaration of Covenants, Conditions and Restrictions for Long Valley Trails (the "Master CC&Rs") and these Design Guidelines. Where there is a discrepancy between the Master CC&Rs and these Design Guidelines, the more restrictive requirements shall apply. Material amendments to these Design Guidelines that constitute changes such as a change of use, change in density, or change in site design standards such as setbacks and street right-of-way widths, require the approval of Washington City through the City's designated land use authority. For purposes of the Long Valley Community Development Project Plan, Washington City's land use authority shall be the Director of Community Development/Planning. The Director may at his or her discretion take substantial changes before the City Planning Commission and/or City Council for their recommendations and approvals.

A. Washington City Development Requirements:

(1) Conditions: The approved Planned Community Development ("P.C.D.") zoning stipulations for Long Valley Trails (Ordinance dated _____) include the following requirements:

1. Compliance with the PCD Zoning District criteria and with all State, County and City Codes and Ordinances in place at the time of adoption of this P.C.D. plan;

2. Compliance with a Development Agreement to be entered into between Brennan Family Holdings and Washington City;

3. Compliance with the development concepts contained in the Planned Community Development Master Plan, and made part of the zoning request;

4. Approval of the Public Utility Master Plan, or any amendments thereto, by the Washington City;

5. Approval of the Master Drainage Report, or any amendments thereto;

6. The dedication of all necessary rights-of-way, easements, open space and parks, retention areas and drainageways as required by the City;

7. Approval of the Traffic Analysis Report, or any amendments thereto;

8. Approval of other Master reports and amendments thereto which may be submitted from time to time and which pertain to the rezoned property;

9. Project Concept Plan includes sites for but not limited to temporary construction staging sites, recreational vehicle storage. Undisturbed open spaces, natural open spaces and trails, community center and project sales sites and signage;

10. Project Concept Plan also includes sites for medium to high-density residential uses including single family detached home sites, townhouses, condominiums and apartments;

(2) Ordinances/Code: The City's zoning ordinance and applicable Code set forth some additional standards and specifications for development. In the event there is an inconsistency between these Design Guidelines and/or any City ordinance or the Code, the PCD documents that were approved and adopted will control unless related to public health and safety, then the City Code shall control.

B. Master Developer Requirements:

The Master Developer shall record with the Phase 1 final plat the Master CC&Rs as Instrument No. _____of the records of the Washington County, Utah Recorder. The Master CC&Rs authorize a Residential Design Review Committee (the "DRC"). It is intended that the DRC will consider and act upon all proposals or plans submitted pursuant to these Design Guidelines. The DRC is also authorized to interpret and amend these Design Guidelines in a manner consistent with section 1.2. The "Master Developer" shall serve as the "DRC" until such time that the Master Developer has sold all parcels, lots or other interest in Long Valley Trails.

In addition, the Master CC&R's set limits on the use of the property within the Long Valley Trails, common areas and provide mechanisms for long-term maintenance of all common areas. The Master CC&R's and these Design Guidelines are binding upon all Owners of property in the community and should be consulted prior to any intended construction, reconstruction or modifications to any improvements in Long Valley Trails. Some parcels or lots within Long Valley Trails may also have ancillary CC&R's which are subsequent to the Master CC&R's.

These Design Guidelines are intended to include the standards that the DRC will consider when reviewing all proposals or plans submitted. Since it is not the Master Developer's intent to inhibit architectural creativity, exact architectural requirements are not contained herein. These Design Guidelines, therefore, contain specific requirements whenever possible and conceptual information and standards in other instances. The DRC shall have the authority to interpret these Design Guidelines on behalf of the Association. In the event there is an inconsistency in the interpretation between an Owner and the DRC, the interpretation of the Master Developer will control.

2. DESIGN REVIEW PROCESS

2.1 INTRODUCTION

The design review process to be conducted by the DRC shall not preclude on-going contact between Owners, Builders and the governing DRC. Owners, Builders and their respective representatives are encouraged to meet with the DRC to discuss all aspects of these Design Guidelines before beginning preparation of any formal documents for submittal.

The review process shall occur in two stages: preliminary and final design review. Documents are to be submitted in triplicate or as otherwise directed for both stages. Final approval shall occur provided the

final development plans are prepared consistent with the previous approved design plans (and provided the DRC has not requested revisions based on changes resulting from transforming preliminary plans into final plans).

Nothing in these guidelines, in any way, alters the applicant's obligation to comply with all municipal, state and other authorities having jurisdiction over the work.

The project will be broken down into a series of development parcels that will be made available to the building community. These parcels will have an established use entitlement under the PCD plan, (i.e. single family, multi-family, high density, common areas etc.) and will either be bounded by other development parcels, roads or open space. This overall plan will be in the nature of a "preliminary plat", prepared by phase or combination of phases, as the project develops. It is expected there will be several phases in each portion of Long Valley Trails.

As parcels are developed, the open space will be defined and then transferred, in discrete parcels, into the Master Homeowners Association. When development occurs these open spaces will be dedicated with the subdivision plats or by separated open space plats and shall be dedicated and conveyed to the Master HOA.

At the time the Master Developer wants to proceed with a project (identified on the Long Valley Project Plan), they will start the project review with city staff. Subsequent to staff review, the planning commission and city council will review and approve the Preliminary and Final plats as outlined in the Washington City Subdivision Ordinance. At each step, the project design review will occur without a public hearing notice. In addition, at each step in the process, the developer will incorporate appropriate changes or comments that are consistent with the approved PCD plan.

This process enables the city to be involved in the details of each development, at the same time providing a certain level of assurance to the Master Developer that the ground rules for the project are established in the PCD document.

2.2 DESIGN REVIEW COMMITTEE MEMBERSHIP

As provided in the Master CC&Rs the DRC shall consist of three regular members and at least one alternate member, and they will hold such positions for one year, or until the appointment of a successor (unless a member has earlier resigned or has been replaced). Until project completion, the Master Developer will select and appoint the members of the DRC committee.

2.3 MEETINGS OF THE DESIGN REVIEW COMMITTEE

The DRC will meet periodically as necessary to perform its duties pursuant to the Master CC&Rs. The written consent of a quorum of regular members shall constitute an act by the DRC.

A reasonable fee may be charged for the DRC review process to compensate for consultants' time and expenses. Said fee is established by the Board of Directors of the Association and is subject to change.

2.4 PRELIMINARY DESIGN SUBMITTAL AND REVIEW

The following documents are required to be submitted to the DRC for preliminary design approval by each Builder, including Builders of custom lots. The DRC will review the documents and inform the Builder as soon as reasonably possible, but in any event within thirty (30) days from the date of submittal, whether the preliminary design is approved. If the preliminary design is not approved, the DRC will outline the reasons for denial. The following items are minimum requirements for submission to the DRC:

A. Subdivision Preliminary Plat indicating all lots of unit boundaries and including, streets, ingress and egress to open space trails and public areas, utilities, all drainage ways, all areas to be conveyed to and maintained by the Association or a subsidiary association, all parking (covered and uncovered). Additional exhibits may be required including but not limited to features and other design elements such as walks, mailboxes, bicycle racks, linear park boundaries, patterned pavement and signage.

B. Preliminary grading and drainage plan including approximate finished lot pad elevations.

C. Phasing plan showing location of sales office, model complex and construction office.

D. Conceptual Building Elevations of proposed homes and/or units. (Only required if they are substantially different than previously approved Plans)

E. Exterior materials and color selections. (Only required if they are substantially different than previously approved materials and colors)

F. Landscape concept plan or statement indicating a typical lot landscape plan and a conceptual streetscape plan. Plan need not be a complete landscape design. (Not required from the Master Developer)

G. Plan or written statement for all street furniture, mailboxes (including customized delivery installations of centralized mailboxes and parcel boxes for all lots and parcels except custom lots), and entrance features with walls, signage, landscaping and lighting. All of the foregoing features shall complement the architecture of the subdivision or parcel development. (Not required by Master Developer)

H. Preliminary concept package or statement for all signage (permanent and/or temporary) (including proposed location thereof and any flags, if applicable.

I. If an Ancillary Association is formed pursuant to the Master CC&Rs, a draft of Builder's set of design guidelines showing regulations to govern exterior structural appearance, signage, landscape restrictions, lighting, etc. (Only required if the standards are substantially different than previously approved standards)

J. Plan or Statement showing plans for open spaces, trails and other common areas.

2.5 FINAL DESIGN SUBMITTAL AND REVIEW

The final design review is intended as a confirmation that the approved preliminary design has been carried forward into the construction documents with a reservation by the DRC to bring up any new matters in the Builder's plans. The DRC will review the documents and inform the Builder no later than thirty (30) days from the date of submittal whether the final design was approved. If the final design is not approved, the DRC will outline the reasons for denial. The following documents are to be submitted to the governing DRC for final design approval (to the extent any of the following documents are duplicative of those submitted during preliminary review, then only those documents with changes and any non-duplicative documents are to be submitted):

A. A Statement defining any and all changes from the Preliminary Design submission.

B. Final subdivision plat showing lots, streets, common areas and related information typical of a final plat as defined by Washington City Subdivision standards.

C. Construction Plans showing all streets, utilities and other improvements as required by Washington City Public Works.

D. Final grading and drainage plan and reports as required by Washington City Public Works.

E. Building Elevations if different than previously approved plans.

F. Landscape plans or statement for all lots, streetscapes, common areas and open spaces. Detailed plans are only required if they are substantially different than the standards contained herein.

G. If an Ancillary Association is formed pursuant to the Master CC&Rs, a copy of Builder's final design guidelines.

2.6 COMPLIANCE AND VARIANCES

The approved final design is binding. Once approved, the Builder must either build the project as per the submitted working drawings, or submit requested revisions. Such revisions, if approved, will be granted a variance by the DRC no later than ten (10) days after submission. No such changes may be undertaken until a variance has been granted. Variances. The DRC may, at its option and in extenuating circumstances, grant variances from the restrictions set forth in these Design Standards if the Board determines, in its sole discretion, (a) either (i) that a restriction would create an unreasonable hardship or burden on an Owner or Resident or (ii) that a change of circumstances since the recordation of this Residential Declaration has rendered such restriction obsolete; and (b) that the activity permitted under the variance will not have any substantial adverse effect on any other Owner or Resident and is consistent with the high quality of life intended for the Owners and Residents. The burden of proof shall be on the Owner or Resident seeking the variance. Notwithstanding the foregoing, with respect to any matter that specifically requires the consent of Declarant, no variance shall be effective unless Declarant shall have also approved the variance, in Declarant's sole discretion. In addition, if a variance from the design standards is requested that would result in a material change in site design standards approved by the city, such as a change in setbacks, land use, street widths etc., these changes will be presented to the city for approval and will constitute an amendment to the

PCD. Other minor variances to the design standards may be made by the design review committee. A Variance as outlined herein is not to be considered a City approved Variance and does not require the same conditions of approval as a City granted Variance.

BRENNAN FAMILY HOLDINGS and its related entities, the Association, and the Residential DRC's of the Association assume no liability to any Owner or Builder in Long Valley Trails, or any other party, for any damage or loss suffered on account of the approval or disapproval (including any delays in connection therewith) of any plans, drawings or specifications submitted to DRC or the construction or performance of any work contemplated thereunder.

2.7 CHANGES OR ALTERATIONS

Any change or alteration requested by an Owner or Builder to a structure or design of any part of a lot or parcel shall be submitted in writing to the DRC with the appropriate fee and copies of all plans and specifications detailed in Section 2.4 as to the item or items requesting to be changed or altered. If the change or alteration is preliminarily approved, the Owner or Builder shall also be required to comply with Section 2.5 of these Guidelines.

3. PROJECT-WIDE DESIGN & PLANNING STANDARDS

The Master Developer's goal is to create a community that will complement the environment. This requires locating the proper land use on the appropriate landscape and creating design standards that allow development to blend with the environment, without destroying the amenities or unduly curtailing the Builder's architectural creativity. Controlling building height, materials and colors will be necessary. The traditional and contemporary project theme will provide the basic architectural character of the community. The following standards and concepts, when used in conjunction with the architectural theme will guide Builders in creating designs that are consistent with the project identity established by the Master Developer.

3.1 LAND USE

Long Valley Trails will be a place to live, socialize and recreate for a diverse array of individual and family types, including a portion that will be an age designated community. The project includes 3 major communities:

1. **Long Valley Trails** is an age designated Community and includes elements that will allow its predominantly retired residents to enjoy an active lifestyle that includes recreation, arts and crafts, educational opportunities, social interactions and physical activity. Amenities will include a large community center, pools, tennis, racketball, trails, classrooms and other spaces for social interaction.

2. **Long Valley Ridge** is a residential community open to all ages. It will consist of a variety of single family and multi-family units. The community will focus on an active outdoor recreation lifestyle and will include City parks, trails and natural open spaces. These amenities will allow the residents of Long Valley Ridge to enjoy a high quality life at an attainable price point.

3. **Long Valley Villas** is a multi-family residential community designed and priced to meet the needs of the local area workforce as well as those of all ages looking for an affordable, quality place to own. These townhomes will provide the Washington County Market with real solutions to the ever-increasing problem

of affordable housing.

A. Residential: A full range of residential uses is planned for Long Valley Trails that will provide housing for multiple income groups and differing lifestyles. High density, medium density and multi-family residential uses are planned, all with a variety of dwelling unit types and sizes.

Medium density residential will occupy most of Long Valley Trails. A variety of lot sizes and unit types are planned. Lot sizes are shown on the zoning comparison chart (section 2). Unit types will include single family detached and single family attached dwelling units. The maximum total units/lots are shown on the zoning comparison chart (section 2).

High density residential parcels are located along the Southern Corridor where noise impacts from the roadway can be mitigated. Condominiums, townhouses, single family attached and single family detached units will be included. The Condominium units will be multiple story and will include amenity areas dedicated to these units, while still having access to the project wide amenities.

B. Civic Land: Areas are being planned for potential civic and semi-public uses such as churches, community recreation. The civic lands specific locations have not been determined and will be incorporated as the project in developed. The Master Developer shall insure that these Civic Areas are adequate to meet the needs of the residents. All residential areas will have direct access to the community wide trail system. Common facilities such as trailheads and parking areas are encouraged.

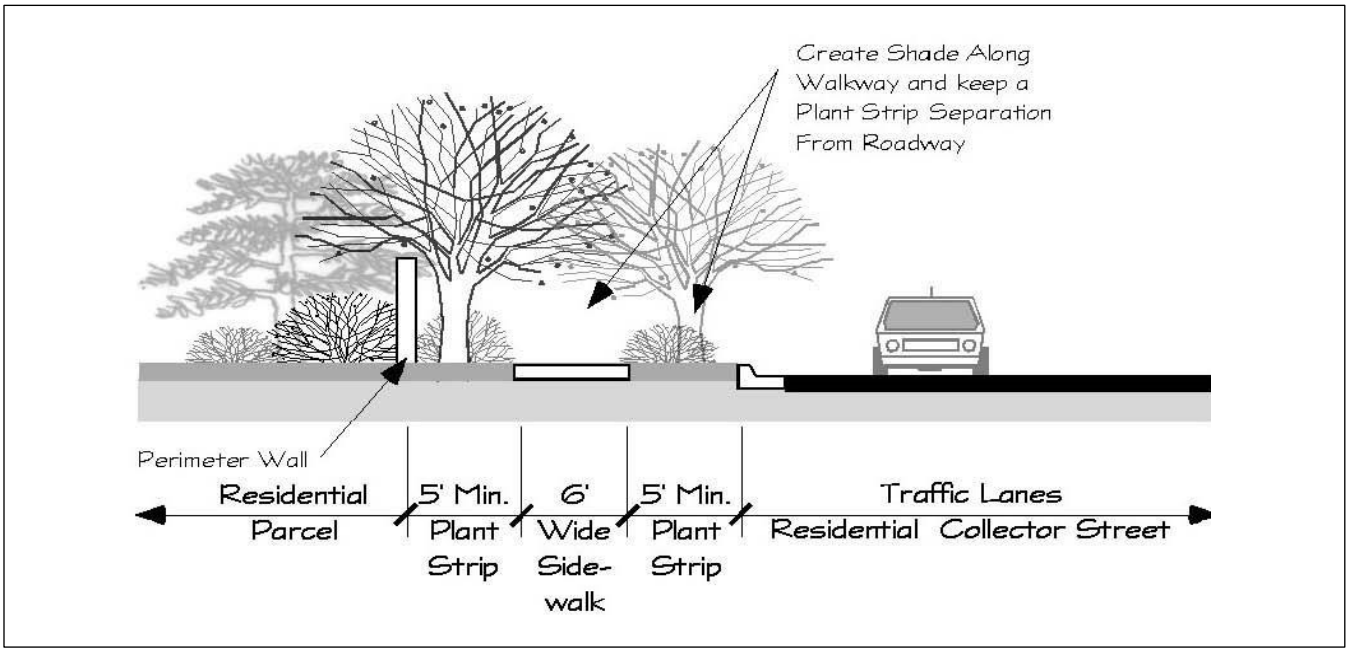
C. Open Space: Sensitive landscapes and special places have been set aside as open space. Much of this land is drainage ways and steep slopes and not appropriate for development. However, these natural areas provide ideal opportunities to supplement the recreational needs of the development. Trails and pocket parks will be provided in certain areas in addition to formal parks. Developers and builders of parcels adjoining open space must be certain that grading of their parcels will not go beyond their property lines and that grading equipment will not cross property lines. All open space areas shall be fenced during construction of adjacent development parcels. Fencing shall be shown and shall comply with the SWPPP plans and standards.

The trail and walkway system is an important component to Long Valley Trails and offers biking and walking transportation and recreation options for residents. Parcel builders are responsible for providing easy and convenient trail and walkway connections from their parcels to the trails and walkways that are close to their parcels.

All open spaces and Landscape areas shall be maintained by the Home-owners Associations unless otherwise agreed to by and dedicated to Washington City.

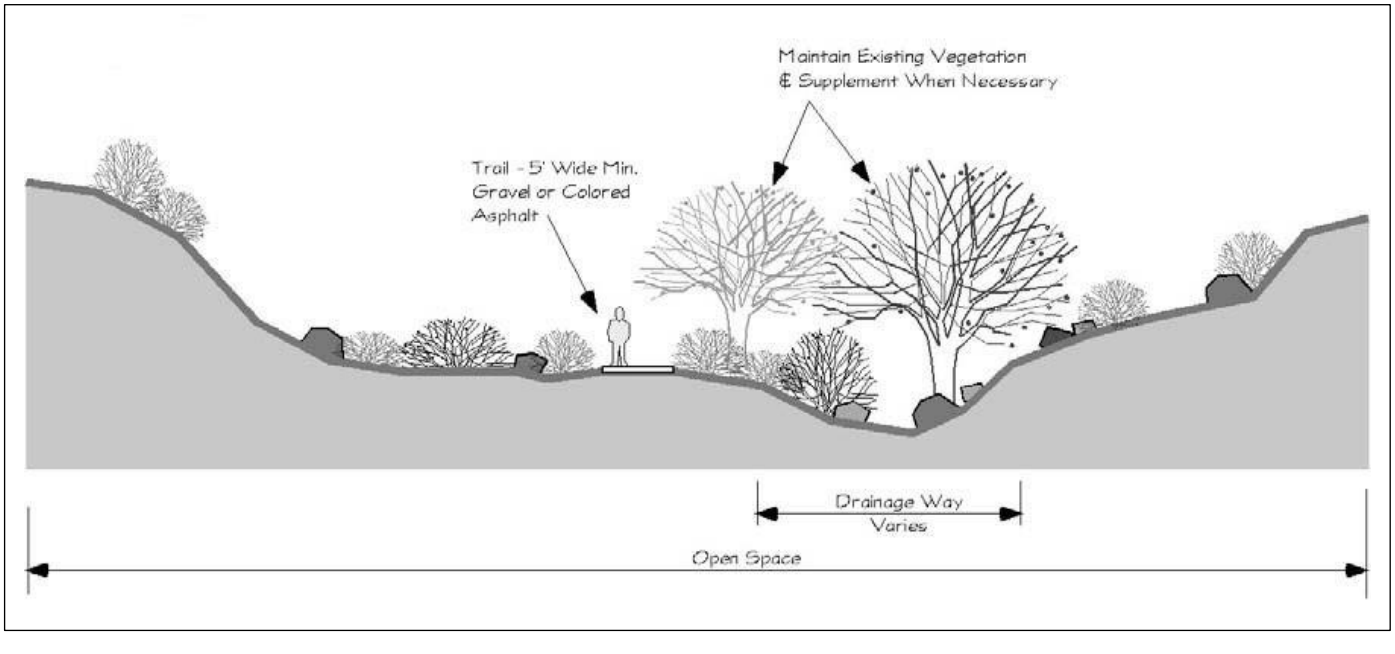
The following cross-section concepts show the Collector Road and Open Space trail and walkway systems:

Collector Road Walks and Trails



Note: 6' wide sidewalk will be replaced with 10' wide paved bike path in some areas

Open Space Walks and Trails



Note: 5' wide Trail will be replaced with 8' to 10' gravel bike and pedestrian trails in some areas.

D. Transportation:

The transportation system includes roadways, bikeways, trails and walkways. It is good planning practice to develop a hierarchical roadway system and assign the appropriate roadway level to the appropriate land use. It is also important to assign criteria to each roadway category for intersection locations, curb cuts and sidewalk requirements, etc. See Street Cross-Sections contained in the Transportation Master Plan for right-of-way, pavement, and traffic lane dimensions.

The following are the roadway categories and their criteria:

Road Type	Road width	Road Use	Road Ownership	On Street Parking	Lot Access
Arterial	110'	Entry and Exit Roadways	Public	Not Permitted	No
Collector	80'	Project Traffic between communities	Public	Not Permitted	No
Residential Collector	59'	Entry Roads/Access to Primary Local Roads	Public	Not Permitted	No
Residential Local	55'	Lot access within communities	Public	Permitted	Yes
Minor Local	34'	Lot access within communities	Public	Not Permitted	Yes
Alley	20'	Multi-Family garage access	Private	Not Permitted	Garage only

The Collector and Primary Local roads will have trails and/or sidewalks within the road right of way and will also include landscape medians. The landscape medians in the collector roads will be maintained by the Master Community Association and the landscape medians in the Primary local roads will be maintained by the adjoining lots. All landscape areas not directly adjacent to lots will be maintained by the Master Community Association or the ancillary HOA associated with the neighborhood.

All roadways will be designed and built as per the Washington City Street and Road Design Standards. These standards include but are not limited to:

- Centerline Radius
- Sight Distances
- Maximum Grades
- Intersection Design
- Design Speeds for each classification of Road
- Design Volumes
- Pavement Design etc.

3.2 LANDSCAPE CONCEPT/THEME

The City has water conservation requirements that must be passed on to Builders and individual homeowners within Long Valley Trails. In the past, traditional residential and commercial landscapes have used approximately fifty percent of water usage on outdoor irrigation. For these reasons, landscaping is an important aspect in reducing water consumption and developing an overall water-efficient community.

"Xeriscape", or the use of native and other drought-tolerant plants irrigated with water efficient and well managed "drip irrigation" systems, is the over-riding landscape theme for Long Valley Trails. This concept will not only be beneficial for water conservation but will also help Long Valley Trails blend into the existing environment. Turf grass will be limited to areas such as recreation areas and small areas within residential yards.

The principles of "Xeriscape" are as follows:

a. Start with a good, water-efficient design.
b. Use drought-tolerant plants.
c. Limit turf grass areas.
d. Establish and practice good maintenance and water management.
e. Use of soil amendments and mulches.

A. Water-Efficient Design

The density of plants should be the greatest close to structures where they will provide shade, have a cooling effect and help provide privacy. Plant density and water requirements should then be reduced towards the boundaries of the property.

The water-efficient landscape design consists of three "zones". The idea is to use the higher water-use plants close to structures where they will help cool the structure and provide shade, and then transition to the boundaries of the property where native plants are used with little or no supplemental irrigation.

The first zone, closest to the structure, is used to create a "mini-oasis" feeling. In front-yard landscape areas, semi-arid region plants and trees can be used with inorganic ground covers to create a pleasing, low-maintenance landscape. In rear-yard landscape areas various design elements can be combined to create an inviting outdoor living area. A small lawn, together with a lush, semi-arid region garden surrounding a concrete patio, and inorganic ground covers are just a few elements consistent with this concept. Use of flowering and evergreen groundcovers in this area will also reduce heat that can be reflected back into the structure or other outdoor living areas, thereby saving on energy costs.

Planting in the second zone is not as dense as the first and includes drought-tolerant groundcovers, shrubs and trees. Mounding and contouring techniques in this area can catch rainwater to help sustain these plant materials with little supplemental irrigation from drip systems.

The third zone, at the boundary of the property, is the final step in the transition to plants that require little or no supplemental irrigation.

To create shade, residential Owners may consider the following:

- Concentrate landscaping around the living area by using trees to create shade on the house and outdoor patio areas. Shade expands the outdoor living areas. For multi-family developments, mass semi-arid region trees and shrubs around buildings and associated activity areas will create an inviting outdoor environment, consistent with the character of the community. Shrubs and groundcovers shall be massed in altering size clusters to be compatible with adjacent properties. With this type of landscape concept, Owners and residents of these developments will benefit through lower water, energy and maintenance costs.

- Drought related, semi-arid region plants grow fast and provide shade quickly. Semi-arid ground covers can spread and provide cover within one year and can also provide seasonal color. A 15-gallon tree can provide shade within four years.

B. Use of Drought-Tolerant Plants

The use of drought-tolerant plants is required by the zoning stipulations issued in relation to Long Valley Trails. The drought-tolerant trees, shrubs, ground cover, herbaceous plants, grasses and annuals listed in Section 6 represent a wide variety of adaptive plant materials that will fit individual landscape needs and create a lush environment. These plant materials are of various color, texture, form and function. Most bloom throughout various times of the year providing color in the garden. Many semi-arid region trees have a graceful, feathery appearance not found in other climates. Drought-tolerant plants are acclimated to the weather and soil conditions of the area and, therefore, have a higher transplant success rate and require less maintenance. All Builders and Owners are required to choose from plants and plant materials in Section 6 for landscaping of their lots/parcels.

Builders of cluster or multi-family developments are also required to use the principals of xeriscape to give their development an inviting living environment which compliments the natural environment.

C. Limit Turf Areas

Maintaining a large lawn in Washington City requires a substantial amount of water that is not available from rainfall. In order to meet a water budget for Long Valley Trails, it is recommended to restrict lawn areas in the front yard to fifteen percent and back yards to thirty percent with any variance to be approved by the DRC according to the variance approval guidelines set forth in these Design Standards. Limited turf areas used in conjunction with other landscaping design elements will result in the feeling of residing in a green and cool area without the need for large expanses of lawn. Reduction in turf also reduces maintenance time and expense. Grass must be kept in a well-manicured condition, healthy and green with appropriate water applications, and must be over-seeded with Rye in the winter season.

D. Practice Good Maintenance and Water Management

A well-planned irrigation system that will water plants according to their individual needs is vital to assure that plants are maintained properly while achieving the water-efficient goals of the landscape concept. Several types of water-efficient irrigation systems are available and at least one type is to be installed by all Owners within Long Valley Trails.

Drip irrigation systems provide slowly emitted water deeply below the soil surface at the root level, encouraging deeper growth requiring less frequency and leach salts from roots. Low output, well-regulated sprinkler systems feed water more slowly and allow for greater absorption and less runoff. Either system is an efficient maintenance tool; however, irrigation systems also need to be managed. Installing timers that are adjusted according to seasonal needs and installing emitters that are appropriately sized are important water management tasks. Setting timers to irrigate the landscape in the early morning hours when there is less evaporation and more absorption is also important for good water management.

Rainwater can be caught and used for landscape needs by contouring the ground so rainwater flows into mini-basins around the plants and trees. In some cases, as with established desert trees, supplemental irrigation can be greatly reduced with the use of this technique.

E. Improve the Soil

Plants grow better and use water more effectively if the soil has been improved. A three-inch layer of mulch will help keep soil areas cool, reduce evaporation, retard weed growth and add interest to the landscape. Color and texture will blend with the project site.

1) Minimize the use of colored rock or pea-gravel in front yard landscaping.
2) River rock may be used to create a “drainage wash” effect.
3) Landscape boulders used for accent must be the same color family as the rock mulch used for ground cover. Surface select boulders are also approved. Quantity and size of boulders must be approved by the DRC.

Prior to and upon installation, pre-emergent herbicides shall be used annually to control weed problems. All properties shall be maintained to control invasive weeds. Homeowners shall maintain their front yard to curb line and side-yards, if on a corner lot, especially around mail box delivery points.

F. Landscape Plans—General

Builders and Owners are encouraged to hire local landscape professionals to assist in designing appropriate Xeriscape landscape plans. Principles of Xeriscape (plant material selection and irrigation methods) must be followed. The plant list in Section 6 should be utilized as well as the other landscaping guidelines found in this section. The following outlines responsibilities.

(1) Builders are responsible for design and installation of front yard landscapes in single family attached and single-family detached developments.

(2) In multi-family developments, the builder is responsible for landscape design and installation of the entire project property.

(3) Owners of single family attached or detached dwellings are responsible for the design and installation of side yard and back yard landscapes.

G. Right-of-Way and Drainage Landscaping

Sales agreements between the Master Developer and owners or builders will describe landscaping responsibilities in public areas and rights-of-ways adjacent to their developments if those areas are not already landscaped. If it is the owner or builder responsibility the owner/builder shall extend the Master Developer's landscape theme into the adjacent public area or rights-of-way of their developments. To promote visual continuity of the development, the following landscape treatments and suggestions should be utilized wherever possible:

(1) Landscaping shall relate to existing streetscape and public areas utilizing similar plant varieties prior to transition.

(2) Natural buffers between roadways and development should be used to preserve the beauty of the landscaped areas while screening development from view. Native trees and shrubs can be used for effective screening. Areas set aside as natural open space should not be disturbed to create room for non-native landscape treatments. Impact to open space adjacent to roads and other developed areas should be kept to a minimum so as to preserve the character of the natural open space. Developed or disturbed areas should be blended into natural areas.

(3) Retention basins and other flood-control solutions in individual developments should be landscaped with various mixes and densities of semi-arid plants.

(4) Landscaping in highly visible common areas and rights-of-way should include flowering groundcovers that provide seasonal color.

(5) Trees provide the greatest volume of vegetation and support the greatest densities of wildlife and should be heavily massed in and along drainage ways.

H. Front Yard Landscape Plans~Individual Residential Lots

The builders shall submit a typical landscape plan or statement showing the typical landscaping for the front yards for the lots within the development. The builder shall have the discretion to incorporate the typical landscape plans to meet each lots individual requirements. An individual plan for each lot is not required. The Typical landscape plan or statement shall include the following:

(1) Drawing or statement showing the number and size of trees, shrubs, and groundcover, to the extent known, of plant materials to be used;

(2) List of plant materials to be used if different from the approved plant lists.

(3) All irrigation systems shall be controlled by an electronic controller installed with the landscaping package. Irrigation controllers should be installed inside the garage or the house. Other irrigation equipment such as back flow preventors, risers, pipe, etc. should be kept underground as much as possible. If exposure is necessary the exposed equipment must be painted to match the body color of the house.

The following items will be considered during the DRC's review of the typical landscape plans or Statement:

(1) The predominant use of turf grass in landscaping plans will not be approved by the DRC. Generally, an area of grass not exceeding fifteen percent of the front yard and thirty percent in back yards is recommended for residential lots. Common Bermuda grass (Cynodon dactylon) will not be used. This type of Bermuda grass is almost impossible to confine to a specific area. Hybrid Bermuda grasses that are sowed by stolins or sod can be used in areas where the grass can be strictly confined. Grasses in front yards shall be bordered by a concrete header or other edging method as approved by the DRC.

(2) All front yard landscaping shall be completed by the Builder prior to occupancy by a resident. The Builder is also responsible to see that backyard landscaping on lots which abut public open space is installed. Such rear yard landscaping is to be completed within 60 days after occupancy.

(3) Each front yard will have a minimum of two trees, 15 gallon or larger in size, or as approved by the DRC. Section 6 shows a concept landscape planting plan.

(4) Plants and shrubs will be sufficient in quantity and size as to provide a well-landscaped appearance. Typically, a minimum of twenty (20) plants and shrubs are needed, or as approved by the DRC.

(5) Street side yard area must be landscaped as part of the front yard landscape package.

I. Multi-Family Landscape Requirements

All open space areas within the development shall be landscaped including landscaping in parking lots, and shall include trees planted from containers; shrubs planted from containers no smaller than one gallon; and ground covers planted containers, or flats. In areas where multi-family parcels are adjacent to single family developments, trees shall be planted along that common border at an average minimum of 1 per 20 lineal feet of common border for buffering. All front yard landscaping is to be completed by the Builder before the issuance ofa certificate of occupancy for any multi-family project. All rear and side yard landscaping is to be completed by the Builder within 30 days after a certificate of occupancy is issued for any multi-family project.

J. Other Landscaping Requirements

Inorganic landscape features, such as mulch rock ground covers and boulders, should be limited to materials indigenous to the area or to materials similar in color and appearance to these materials. Irrigation systems should be designed so over-spray and the resulting staining is minimized. Also, each Builder is responsible for landscaping around any above-the-ground appurtenance for cable television located on its lot or parcel (or in the right-of-way immediately adjacent thereto) so, as to screen the appurtenance as much as possible without limiting access by the Utility Provider.

3.3 WATER-EFFICIENT DEVELOPMENT

Developing a water-efficient community is a goal of both the Master Developer and the City. Overall water efficiency at Long Valley Trails will be the result of the combined efforts of the Master Developer, Builders and Owners.

The Master Developer is using only native and semi-arid region plants for all landscaping. Where irrigation is necessary to maintain plant materials, an automatic drip system will be installed to maximize water efficiency.

Pursuant to the Water Conservation Plan for Long Valley Trails approved by the Master Developer, all Builders are required to install water-efficient devices in their projects.

3.4 STREETSCAPE DESIGN/STREET FURNITURE

A comprehensive streetscape design will be provided for all major and local collector streets by the Master Developer. The design maintains the color, texture and character of the existing, native landscape. Rights-of-way will be vegetated using indigenous trees, shrubs and cacti to complete the landscape. Highly visible areas at median cuts and intersections with cross streets will be accented with hardy flowering ground covers and/or rock mulches. Meandering sidewalks and a bicycle trail will be included. The design of street furniture will be consistent with the southwestern design theme discussed in the Introduction. Any streetscape designs completed by Builders for their interior-project streets should blend with the overall community design established by the Master Developer. Street furnishings, light standards, and other accessories shall be of the same family and color, or of substantially similar design or color so, as to promote a unified theme.

Roadways will be landscaped in one of three concept themes: (1) Enhanced Desert; (2) Desert Garden; and (3) Desert Oasis as indicated in section 3.4A and as explained below.

Enhanced Desert – Native shrubs, trees, cacti and scattered trees all planted at a density greater than exists in a similar native desert. Ground plain will be colored gravel mulch to match the surrounding ground.

Desert Garden - Native and drought tolerant exotic shrubs, flowering shrubs, trees, and cacti all planted at a density greater than Enhanced Desert. Ground plain will be colored gravel mulch to match the surrounding ground.

Desert Oasis – Native and exotic shrubs, flowering shrubs, trees, and cacti all planted as dense as needed to create the entrance image. Ground plain can be lush ground covers or drought tolerant turf. Palm trees are allowed, but their use should be limited.

A. Streetscape Types

(1) Long Valley Parkway – Enhanced Desert Garden

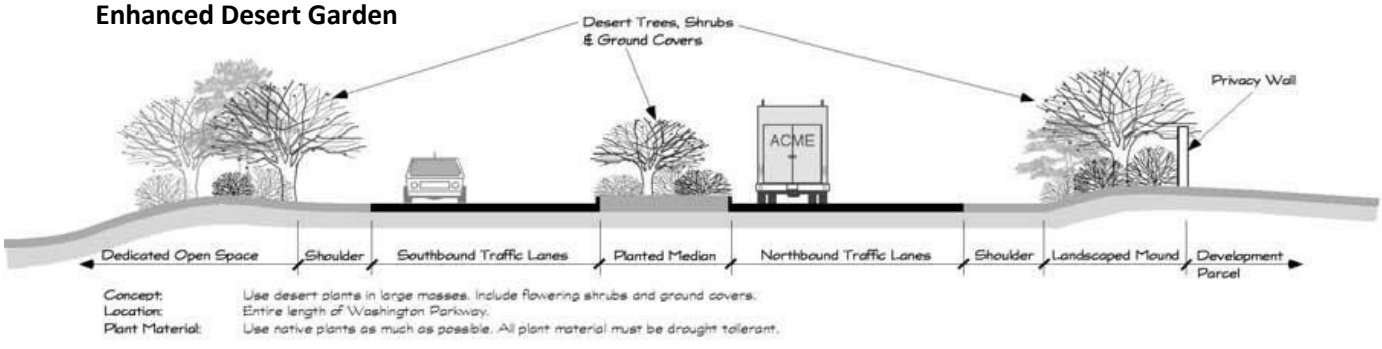
(2) Residential Collector – Enhanced Desert

(3) Residential Local Street – Enhanced

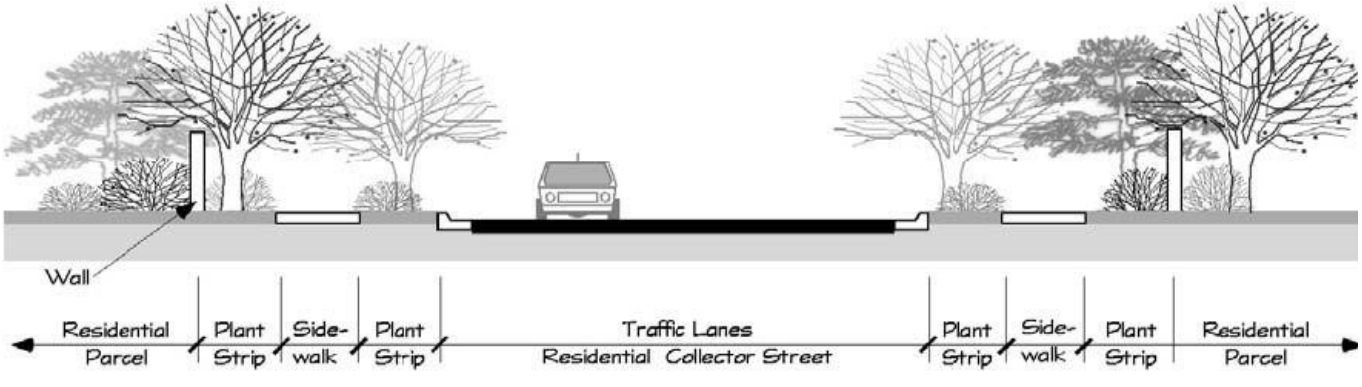
(4) Community Entries – Desert Oasis

(5) Neighborhood and Project Entries – Desert Oasis

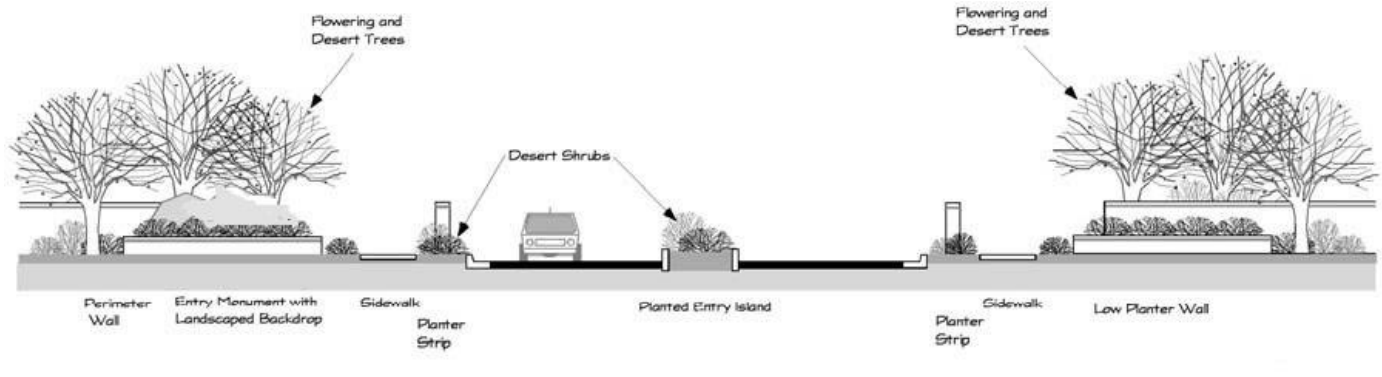
Collector Road Landscaping
Enhanced Desert Garden



Residential Collector Landscaping
Enhanced Desert

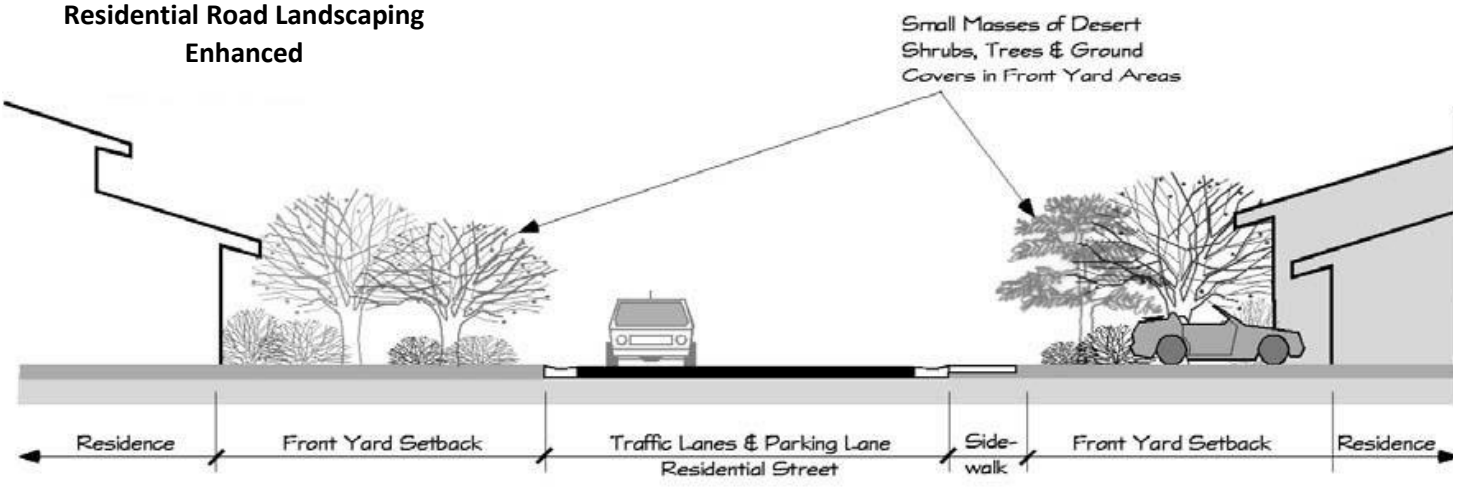


Concept: Use desert plants in small masses. Include flowering shrubs and ground covers for color accents.
Location: Along residential collector streets.
Plant Material: Use native plants as much as possible. All plant material must be drought tolerant.



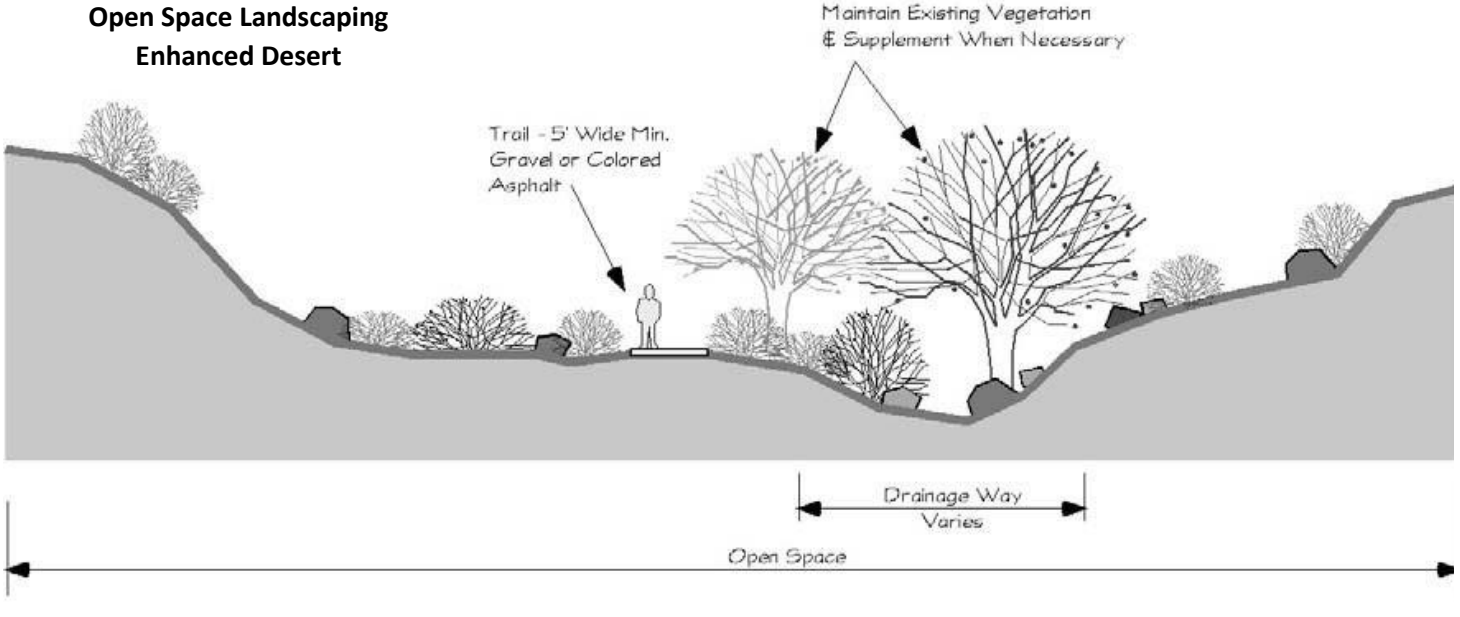
Community and Residential Entry
Landscaping Desert Oasis

Residential Road Landscaping
Enhanced



Concept: Use desert plants in small masses. Include flowering shrubs and ground covers for color accents.
Location: Front yards along residential local streets.
Plant Material: Use native plants as much as possible. All plant material must drought tolerant. Minimize turf area.

Open Space Landscaping
Enhanced Desert



3.5 WALL DESIGN

All walls shall be constructed with block decorative masonry (except for top sections of view walls described below). Each wall shall be a visual extension of the architecture of the main structure(s) and the community as a whole. The wall shall be designed so, as to create a focal point of interest with approved landscaping and other approved features. The texture and color of walls should conform to the criteria specified in the figures that follow.

A. Perimeter Walls

For purposes of definition, all walls surrounding a parcel or a Purchase Tract shall be considered a perimeter wall. All perimeter walls shall be uniform and connect and blend with previously built. The wall shall ultimately be constructed in its entirety (entirety shall mean that the walls are full height to the specified detail are complete, the wrought iron is in place, and the contractor has cleaned up the area to bring it back to a "natural looking" state. If the Builder purchased the entire residential parcel from the Master Developer, the Master Developer and Buyer must come to an agreement before close of escrow on the schedule for construction of the walls that border the parcel.

Builders and Owners are strictly prohibited from altering, dismantling or opening a perimeter wall section for any purpose without prior DRC approval (pedestrian access only!). The Restrictive Covenants will provide for a $2,500 fine for a perimeter wall violation.

All perimeter walls shall be constructed using the following options:

(1) **Standard**: A 6-foot "standard" perimeter wall shall be constructed by each residential Builder along the boundary line of its parcel (except along, common area portions and along the entry way of the parcel). Builder may erect the standard perimeter wall so that the wall does not exceed 3 feet in height around its model area so as to draw prospective purchasers or lessees to the subdivision or parcel. Thereafter, as described above, the wall shall be completed to it required 6' height.

(2) **View Wall**: A 6-foot perimeter "view" wall may be constructed by each residential Builder along the boundary line of its parcel as it abuts a common area (which includes, but is not limited to, drainage channels, retention areas, recreation areas). The perimeter view wall may include a portion of wrought iron fencing subject to the approval of the DRC. All such view perimeter walls shall be uniform and connect with contiguous perimeter view walls and as appropriately determined by the governing DRC.

(3) **View Fence** A 6-foot perimeter "view" fence may be constructed by each residential Builder along the boundary line of its parcel as it abuts internal cul-de-sac ends, walkway connections, or other appropriate locations. The purpose of the view fence is to break up the solid nature of the standard wall and allow views into the parcel from an exterior street. Long expanses of a solid, standard wall must be interrupted by a view fence or a view wall. It is important that the location of the view fences do not violate the privacy of any residences. The perimeter view fence shall be built in accordance with the criterion specified by the DRC. All such perimeter view fences shall be uniform and connect with contiguous perimeter view fences and as appropriately determined by the governing DRC

B. Party Walls

Prior to occupancy of a single family residence constructed on a lot, the Builder shall construct a party wall, i.e. a wall which separates the rear-and side-yard areas between lots (but excluding all portions of side-yards considered to be front yards) along the lot line of the lot, even if it abuts property not owned by Builder/Owner. (See the requirements shown in Figure 17).

C. Retaining Walls

Prior to occupancy of a structure on a lot or parcel, the Builder shall construct any retaining walls on such portions of a lot or parcel as may be required by the Master Developer or the DRC. A "retaining" wall is a wall which retains a differential of two or more feet of earth as may be required by the Master Drainage Plan (as hereinafter described).

D. Side Gate

In the side portion of a lot or parcel and prior to occupancy thereof, a Builder shall construct a gate in accordance with the criterion specified in Figure 17 above. Gates shall match the design of the required adjoining walls or fences.

E. Front Yard Walls Front yard walls are not allowed.

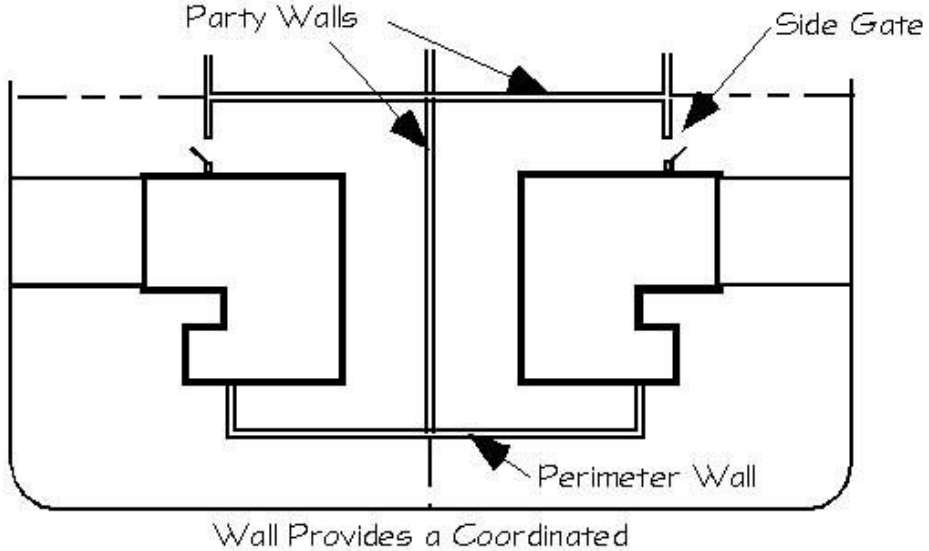


FIGURE 17
PARTY WALLS, PERIMETER WALLS
& SIDE GATES

3.6 CIRCULATION

The Master Developer incorporated into the land use plan a comprehensive network of roads to support the community as reflected in the Transportation Master Plan. All Builder plans for internal streets are subject to review and approval of the City and the governing DRC. Builders shall incorporate the following key goals when designing their individual neighborhood circulation systems:

A. Achieving ease of movement through the project and individual neighborhoods.

B. Planning neighborhood street systems to serve local traffic demands, while discouraging non-neighborhood traffic.

C. Planning neighborhood transportation routes that also serve and encourage local pedestrian needs and demands.

D. Enhancing transportation routes with a scenic beautification plan.

E. Encouraging safety.

3.7 PROJECT ENTRANCES

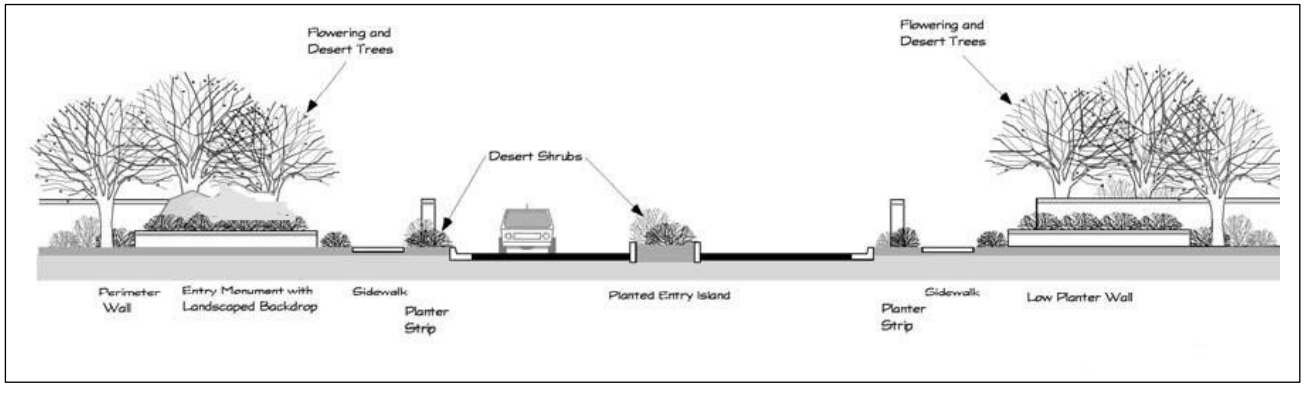
The community entrance monumentation will establish a subtle, tasteful introduction to Long Valley Trails and at the same time will define the limits of the community. Community entries will be at two locations and will be designed and approved by the Master Developer.

The design of individual project entrances are to be proposed by each Builder as part of its preliminary design submittal pursuant to Section 2.4, however, the following guidelines will apply:

A. For safe viewing at all intersections, a sight-line triangle must be maintained.

B. Individual Builder walls and custom lot walls must tie into the Master Developer walls and turn into the development and either continue or terminate at an inside corner. Builder walls and custom lot walls must match Developer's walls in their design and at the point of juncture with another wall.

C. Treatments at project entrances, such as low planter walls, sculptural shapes and low-profile lighting, shall be designed as integrated features of the project perimeter walls.



See also Section 3.11 regarding signage.

3.8 ARCHITECTURAL DESIGN THEME - RESIDENTIAL

The integration of structures with the environment is the goal of the architectural design theme for Long Valley Trails. Low-profile designs that incorporate traditional, contemporary southwestern or Mediterranean architecture with clean, rounded lines and building elements that allow the structure(s) to blend with the surroundings are encouraged. The following items will help maintain continuity through development of design plans for individual projects:

A. **Exterior Elevations and Floor Plans**: Each floor plan offered by a production builder will have a minimum of two, but preferably three, very distinctive exterior elevations. Each alternative elevation will be offered in at least three-color choices. Each exterior color combination and roof tile selection, as a package, will be pre-approved by the DRC.

B. **Variety In Exterior Elevations**: Each builder will make a concerted effort to make sure there is a utilization of all exterior elevations and exterior color and roof tile options. Putting like exterior elevations and/or color combinations next to each other should be avoided. This procedure will give a neighborhood a custom appeal and work to individualize each home.

C. **Building Height**: A building height limit of forty-two feet (42') will be maintained throughout the multi-family residential zones. A building height limit of (35') will be maintained throughout the single family detached zones. In special cases, heights greater than these may be approved by the governing DRC and in such cases, the DRC will consider how the increased height relates to the type of building, setbacks and relationship to adjacent land uses. Any height limitations approved by the DRC beyond the pre-approved height must be approved by the city and will constitute an amendment to the PCD. The height limitations also include any roof mounted HVAC equipment.

D. Exterior Building Materials: Acceptable exterior building materials include brick, masonry, stucco, adobe, stone veneer, or other exterior treatments approved by the DRC. The use of wood or vinyl as a predominant material is not allowed.

E. Colors shall be consistent with architectural style approved for each community and shall be in harmony with the overall project design. There shall be no abrupt changes in color between adjacent structures. All colors are subject to approval by the DRC. Proposals will be reviewed in terms of the development's relationships with the surrounding parcels.

F. **Roofs**: Exposed roof colors shall be integral to other building materials in the structure. Acceptable roof materials include clay tile, slate or concrete tile. On parcels with higher density zoning, other non-wood materials will be considered by the DRC. Roof materials shall exhibit muted earth-tone colors.

G. **Mechanical Equipment**: Miscellaneous items such as vents and flues shall be located to occur on the least prominent side of the ridgeline whenever possible and should be coated with a flat paint to match the color of the roof. Rotating, rooftop ventilators or other mechanical equipment are not permitted on rooftops in residential areas. Roof-mounted air-conditioning units will not be permitted on structures in residential zoned parcels.

H. **Entrances to Structures**: Deeply recessed entrances provide protection from the elements and a sense of individuality for the structures. When used with wall extensions, the entry can create a courtyard effect, which is very appropriate to the region. A combination of overhanging roofs and some change in the plan configuration can create a distinctive individual entrance. For multi-family or attached units, creating a single-family sense of privacy in the design of entrances benefits both the homeowner and the neighborhood.

I. **Pools and Spas:** No above ground pools or spas of any kind will be allowed on any lot visible from a public right-of-way or public open space.

1) Pool equipment on an open space view lot must be installed a minimum of five (5') feet from the open space property line. Pool equipment must be screened from open space view.

2) Spas must be five (5') from adjoining residential property lines. Spas that include ramadas or shade structures must be made of DRC approved material that is painted to match the body color or the trim color of the home, and shall meet the required setbacks.

3) Spas and equipment will be maintained in excellent condition or they must be removed.

4) Above ground pools may not include decks high enough to infringe on the privacy of adjoining neighbors.

J. Decks: All desks are subject to the approval of the governing DRC. Decks shall be designed and constructed to avoid visual intrusion into adjoining backyards. The deck surface shall be of approved material. Decks in builder production subdivisions may not be expanded beyond the approved plans as submitted by the Builder to the DRC. Decks may be expanded after the close of escrow by Owner or Builder, to the maximum deck as shown as an option on the Builder approved plans. All Decks and covered patios shall be outside of the required building setbacks,

K. **Patios**: All solid non-deck patio covers shall be finished to match the roof surface. All patio pillars are to be finished to match the adjacent building. Open type, "shade structures" such as an overhead trellis, are allowed, but design, materials and colors must relate to the adjacent building. Patios may not encroach into required setbacks.

L. **Postal Boxes and Lockers**: All Builders shall provide for centralized postal (mail) boxes and lockers as required by the number of residential shown on the plat or site plan. The Builder shall, however, at its own expense, build the structure to surround the mail equipment. The structure is to have a smooth finish and be painted to match the walls within Long Valley Trails and shall be placed behind the sidewalk. The Builder may apply an anodized or other finish to the mail equipment if approved by the governing DRC and the local Post Master.

M**. Guesthouses or Casitas:** Lots may have living quarters for guests or relatives on the premises in an living area attached to the principal residence or connected by a covered walkway or breezeway.

Detached guesthouses shall not exceed a height of twenty-five (25) feet.

No detached guesthouse shall have floor areas exceeding twenty-five (25) percent of principal building.

On lots having a principal building and a guesthouse, maximum lot coverage of all buildings shall not exceed sixty (60) percent.

Where a guesthouse is structurally attached to a main building, it shall be subject to and must conform to all regulations of this ordinance applicable to the main building.

Not more than one (1) guesthouse shall be permitted on any one (1) lot or parcel.

Guesthouses, whether detached or attached, shall not have an address separate from the principal residence on the lot or parcel.

Guesthouse shall have no separate utility services.

Guesthouse shall have no entry visible from public right-of-way.

A guesthouse shall be constructed of similar materials, colors and architectural style to the main building.

Guesthouses cannot be rented for either long term rentals or short term rentals.

3.10 OUTDOOR LIGHTING

B. Residential Lighting – All landscape lighting must be low voltage. High voltage spot lights or security type lighting that is mounted on the house must be directed so as not to impact or illuminate a neighbor's property.

3.11 SIGNAGE

Permanent signs within the community shall be designed to provide consistent reinforcement of the traditional and contemporary, southwestern architectural character of Long Valley Trails and blend with the surrounding landscape. Signs should not only communicate limited specific information but should add to the attractiveness of the area. The placement of signs shall not encroach into sight distance triangles at driveways and street intersections nor along streets where clear views must be maintained. Sign plans shall be reviewed by the DRC. Sign permits are required for all signs identified in the Washington City sign ordinance in effect at the time this plan is adopted.

There are three categories of signs in the community: temporary, permanent and directional.

A. Real Estate Sales Signs (Temporary):

(1) New subdivisions/developments (recently constructed or under construction): one freestanding, single-face sign per Phase may be located on the same lot or parcel as the development under construction, as permitted by municipal code. These signs shall not exceed 32 square feet and shall be no higher than 10'.

(2) Model home signs: one sign per model home stating the model name may be located on the same lot as the model home. These signs shall not exceed 10 square feet and shall be no higher than 3'.

(3) Flags and flagpoles: homebuilders are permitted a maximum of four (4) flagpoles (maximum height 40 feet) per project. Other display flags bearing any colors or designs specifically for the purpose of identifying the Builder or marketing the Builder's project must be approved by the Master Developer. At the Master Developer's direction, any such poles shall be immediately removed at the homebuilder's expense upon discontinuance of home sales and marketing activities at the project.

> Flagpoles may be permitted on individual residential lots within Long Valley Trails. The placement of all Flagpoles are subject to the approval of the DRC and only flags of the United States of America are permitted on individual residential lot flagpoles that have been DRC approved. Residents are encouraged to use house-mounted brackets to display flags if so desired.
>
> Seasonal flags may be house-mounted; flags must be of appropriate seasonal design. All flags will be in excellent condition or they must be removed.

(4) Residential signs ("for sale" and "for lease"): one sign for each single-family residential unit located on the same lot as the residence. Such residential signs shall not exceed 10 square feet and shall be no higher that 3'.

(5) Such additional signs as may be allowed by the City may be installed subject to the approval of the city and DRC.

B. Builder Identification Signs (Permanent):

(1) One or two signs may be located at the primary entrance to an individual residential development and shall be integrated into the project entry. The Master Developer shall determine if the second sign is necessary. All primary entrance signs shall be a monument type sign as defined in the Washington City Sign standards.

(2) One identification sign may be located on multi-family developments and should be integrated into the landscaping. All primary entrance signs shall be a monument type sign as defined in the Washington City Sign standards.

C. Directional signs (Permanent):

A program of directional and safety signage will be undertaken by the Master Developer to facilitate off-site traffic and recreational circulation. The Comprehensive Sign Plan for Long Valley Trails may disallow off-site directional signs by Builders/Owners in Long Valley Trails. (See also Section 3.7 on Project Entrances.) All directional signs shall comply with Washington City sign standards and be approved with the final construction drawings of all project phases.

3.12 GRADING AND DRAINAGE

The Master Developer, through its consulting engineers, has prepared a Master Drainage Plan to establish overall grading and drainage concepts for the entire development. All grading and drainage improvements constructed within the project are to be in compliance with the overall concepts defined in the Master Drainage Plan approved and adopted by the City which are further subject to review and approval by the Master Developer. Builders' drainage improvements are to be consistent with the Master Developer's existing improvements.

A system of drainageways have been saved to provide the necessary pathways for off-site drainage through the development. Pursuant to the Master Drainage Plan, sheet flow patterns must be intercepted and directed toward designated drainageways where necessary. The Master Developer shall maintain those designated areas to accept the drainage from new developments.

Builders and developers shall consider the following guidelines when grading within Long Valley Trails:

A. Exposed cut or fill slopes shall be restored so that the finished product blends smoothly with the surrounding terrain and architecture. Rock mulch, river rock, boulders or low water use plant material shall be used to prevent erosion and create visually pleasing treatments. Retaining walls may be used instead of, or in combination with, manufactured slopes to encourage terracing. Retaining walls shall be constructed in accordance with Section 3.5 herein.

B. Graded areas not used for structures shall be landscaped within 90 days after completion of improvements. Open-space areas disturbed during construction shall be vegetated with low water use plant material. Common areas and private landscaped areas shall be restored with plants from the list in Section 6.

C. When trenching along roadways, contractors shall store the excavated material on the roadway side of the trench to avoid disturbing existing terrain and vegetation adjacent to the roadway.

3.13 UTILITIES

A primary utility system will be completed within the community, including sewer, culinary water, secondary water, natural gas, phone, cable television and electric lines. Utility lines will be extended along major collector roads terminating at the beginning of development areas. All electric lines 18kV and smaller are to be underground and must meet City standards. All utilities will be underground. The existing Dixie REA transmission line will remain.

4. RESIDENTIAL DEVELOPMENT

4.1 RESIDENTIAL SITE DEVELOPMENT STANDARDS

In addition to the overall concepts related in previous sections, the following site development standards should be applied to residential developments.

A. Parcel Development Criteria

(1) Pedestrian access to open space must be provided for lots that are located on the interior of the parcel (see Figure 25).

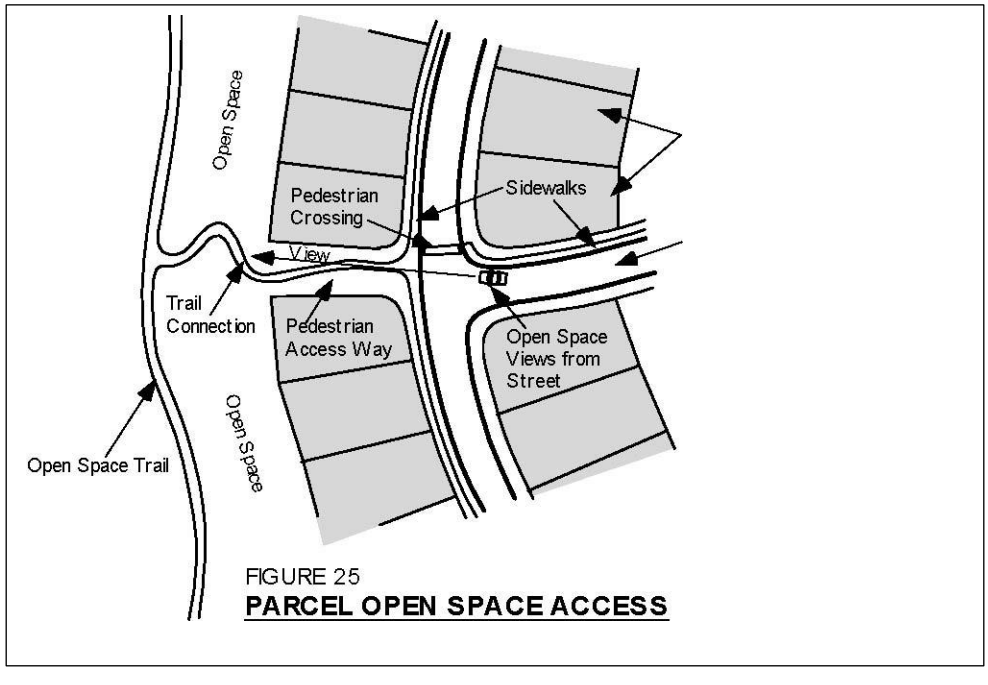


FIGURE 25
PARCEL OPEN SPACE ACCESS

(2) Pedestrian and automobile access must be provided between adjoining parcels. The roadway access shall be indirect and inconvenient to avoid a potential for increased traffic (see Figure 26).

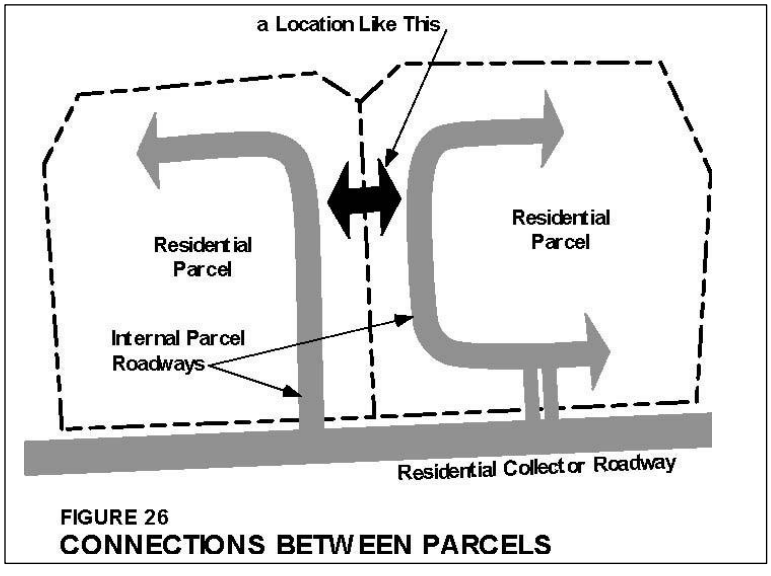


FIGURE 26
CONNECTIONS BETWEEN PARCELS

(3) Parcel entries should include special landscaping, special wall treatments and identity signing.

B. A combination of right and left-hand units, curvilinear streets, cul-de-sacs and other site-planning devices shall be used to create an interesting streetscape.

C. Long Valley Trails has a great deal of natural and developed open space. Residents of homes backing up to or fronting on these areas can enjoy the special beauty and the expansive views of the open spaces. Builders must take advantage of these scenic views when planning subdivision layouts in their projects. Drainageways and retention areas are to be treated as landscaped open spaces for people to use, rather than as bare, utilitarian areas. Proper utilization would include:

- Mini parks
- Trails and pathways
- Walkway connections
- Sitting and picnic areas
- Bird watching
- Environmental education

4.2 RESIDENTIAL ARCHITECTURAL STANDARDS

Residential structures shall be designed consistent with the standards previously discussed, with the following additional standards taken into consideration:

A. Plan Shapes: The footprint and roof overhang determine the uniqueness of a residential plan and should work together to provide variety and interest along a street of houses. Plan shapes should be arranged to complement each other and adjacent lots. Whether single-family detached or attached, imaginative plan shapes increase the sense of individuality. For multi-family layouts, the plan shapes shall vary in both the front and back.

B. Priority Elevations: It should be assumed that the houses will be seen from all angles and that there will

be a continuity of colors, materials and details on all elevations. Priority shall be given to those sides, which are visible from streets and walkways. The most articulated elevations should be those which are in public view. For multi-family clusters this will generally be true of all four exposures.

C. Elevation Massing: The same criteria for breaking up the box shape of a plan applies to the elevations. Single-story residences shall include some variation of the ridgeline. Builders should encourage privacy as much as possible and avoid creating a structure where occupants may directly overlook into a neighbor's backyard. Builders should avoid high, large deck designs to maintain backyard privacy.

D. Off-Street Parking: Where high density cluster development permits minimal setbacks, garages should be positioned to prohibit tandem parking. There should be a distance of at least 20 feet between the garage door and the closest edge of the sidewalk if parking is to be accommodated. Marginal distances, i.e., 9 to 19 feet, tend to encourage parking despite the inadequate depth. (A condition where cars parked in a garage and in the driveway behind the garage is not considered tandem parking).

Single family residential developments shall have a minimum of two off-street parking spaces per dwelling unit in an enclosed garage.

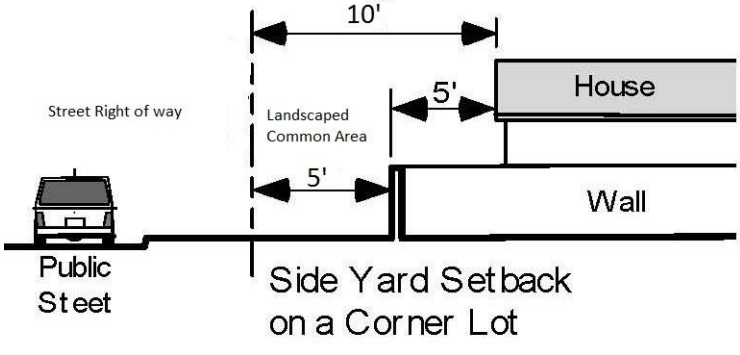
E. Rear and Side Yards: Enclosed rear yards are subject to landscaping design review when abutting open space. Residential areas within public view from a roadway, such as windows and other exterior openings of a building within public view, shall be "front elevation" quality. If a side-yard wall in a sloping area would be higher than the rear wall if extended straight out, the side yard wall should be stepped down (10' prior to intersection) to match the level of the rear wall. Step changes in wall height shall be full block heights. Wall step changes shall be a minimum of 20' apart with equalized spacing between steps when possible. Corner houses shall be joined by a wall of uniform design and color, creating a carefully coordinated architectural connection between the two end units.

F.	**Setbacks**				
LONG VALLEY TRAILS PCD		Patio Homes	Small Lot	Medium Lot	Large Lot
Single Family Residential		4,000 sq, ft.	5,000 sq. ft	6,000 sq. ft	7,000 sq. ft.
Front		10' Minimum	10' Minimum	10' Minimum	10' Minimum
		20' Minimum to Garage Door	20' Minimum to Garage Door	20' Minimum to Garage Door	20' Minimum to Garage Door
Side Yard (Single Story)		5'+5' Minimum	5'+5' Minimum	5'+7' Minimum	5'+10' Minimum
(Side Yard setbacks between 2-story homes subject to fire Chief approval)		10' Total Minimum	10' Total Minimum	12' Total Minimum	15' Total Minimum
Rear Yard		10' Minimum	10' Minimum	10' Minimum	10' Minimum

Multi-Family Condominiums & Club Cottages		
Front	(20' to Garage Door) or	10' Minimum
	*Porch may encroach	5' on the front or side yard
Side	(Side Yard setbacks between multi-story units subject to fire Chief approval)	N/A
Rear		10' Minimum
Residential Townhomes		
Front	(20' to Garage Door) or	10' Minimum
Side	(Side Yard setbacks between multi-story units subject to fire Chief approval)	5'+5' Minimum
Rear		10' Minimum

Corner Lots provisions:

All corner lots shall have a minimum of a 5 foot landscape strip along the road right of way. This landscape strip will be part of the common area and lot setback of 5 feet will leave a minimum of 10 feet from the building to the road right of way.



Corner Lot
SIDE YARD SETBACKS

4.3 STREET FURNITURE

Mailboxes, light structures, benches, bicycle racks, gates and details such as address plaques should be controlled by individual project design guidelines and treated as opportunities to reinforce the design theme of each neighborhood; however, consult the Master Restrictive Covenants in respect to address plaques. These items shall meet or exceed post office and City standards.

4.4 ROOF-MOUNTED ANTENNAS AND SATELLITE DISHES

Exposed rooftop or pole-mounted antennas or other receiving/transmitting equipment will not be permitted on roofs in residential areas. Satellite dishes mounted on the walls of structures may be installed per FCC regulations and with prior DRC approval.

4.5 TRASH COLLECTION

Single family residential units must keep all refuse and containers behind the side-yard gate, until it is appropriate to place on the street for pickup. At no time will trash, refuse, containers or other debris items be allowed to be left in the front yard of the house.

For anything other than single-family developments, trash collection areas must be provided and should be fully enclosed with masonry walls and doors on metal frames. Color and finish of masonry walls shall match the exterior look of the theme wall elevations. Where possible, they should also be landscaped on at least two sides.

5. CONSTRUCTION STANDARDS

To assure that damage during construction activities is avoided to the greatest extent possible, the following construction regulations will be enforced during construction activity within Long Valley Trails:

5.1 CONSTRUCTION TRAILERS, PORTABLE FIELD OFFICES AND TEMPORARY LANDSCAPING

Builders shall contact the Master Developer and Washington City regarding construction trailers to be brought on site. The Master Developer will work closely with the Builder to determine the best possible location for the trailer. Any temporary landscaping installed by a Builder shall be consistent with the Xeriscape landscaping plan discussed in these Design Guidelines and shall be first approved by the Master Developer.

All trailers or portable offices shall have exterior walls with non-reflective and muted colors and tones. The builders name and/or logo may be displayed on the exterior walls of any such trailer or office provided that a colored scale drawing showing the name and/or logo on the trailer has been submitted to and approved by the Master Developer. The Builder shall be responsible for obtaining all applicable City sign permits. Additionally, landscaping installed by the Master Developer shall be inspected prior to any construction and restored to original condition with similar size plant material upon completion of work.

5.2 CONSTRUCTION ACCESS

In order to ensure that construction activities will have minimal impact on surrounding properties, the Builder will designate construction access and provide sufficient care and cleaning to keep all roads, sidewalks and adjacent lots clean and free from dirt, equipment, dumpsters and debris.

5.3 DEBRIS AND TRASH REMOVAL

All materials shall be contained onsite and covered in order that all debris and trash is as non-visible as possible. If the cover is off during construction hours, all lightweight materials shall also be weighted down to prevent the wind from blowing such materials off the construction site. Trash and debris shall be promptly removed from the construction site and not be dumped, buried or burned. Construction sites shall be kept neat and properly policed to prevent the construction from affecting other property.

5.4 SANITARY FACILITIES

Builders will be responsible for providing adequate sanitary facilities for their construction personnel. Sanitary facilities are not to be placed on the street or sidewalk.

5.5 CONSERVATION OF LANDSCAPE MATERIALS

Builders are advised that the property within the community contains valuable landscaping that needs to be protected during construction. It is the goal of the Master Developer for Builders to landscape as soon as possible.

5.6 LOT BUILDER SPECIAL REQUIREMENTS

All lot Builders are required to locate a dumpster on the lot for placement of all construction trash and debris. The dumpster is to be emptied as often as necessary so, as to avoid any overflowing. A port-o-john will be provided by the Builder prior to the start of construction. Dumpsters and sanitary facilities are not to be placed in any portion of the street or sidewalk.

Once construction has started, construction must continue at a professionally accepted schedule until completion. Community Association fines may be applied against the lot owner if work stops for longer than 30 calendar days.

5.7 RESTORATION OR REPAIR OF OTHER PROPERTY

Builders need to take precautions to assure that other property, including open space, other lots, roads, driveways and/or other improvements, are not damaged or scarred during construction. Builders shall, at all times encourage safety. Builders will be held responsible for the acts of their contractors, subcontractors employees or agents. If damage or scarring occurs on other property, the Builder whose contractor, subcontractors, employees or agents caused the damage will immediately repair and/or restore the other property to its prior condition at their expense.

After completion of construction, each Builder will promptly restore all improvements, including grades, shrubs and trees, and repair any streets, driveways, pathways, drains, culverts, ditches, signs, lighting, fencing or other improvements or utilities that may have been damaged during construction. Additionally, the construction site and all impacted areas will be left in a weed free condition.

LONG VALLEY TRAILS

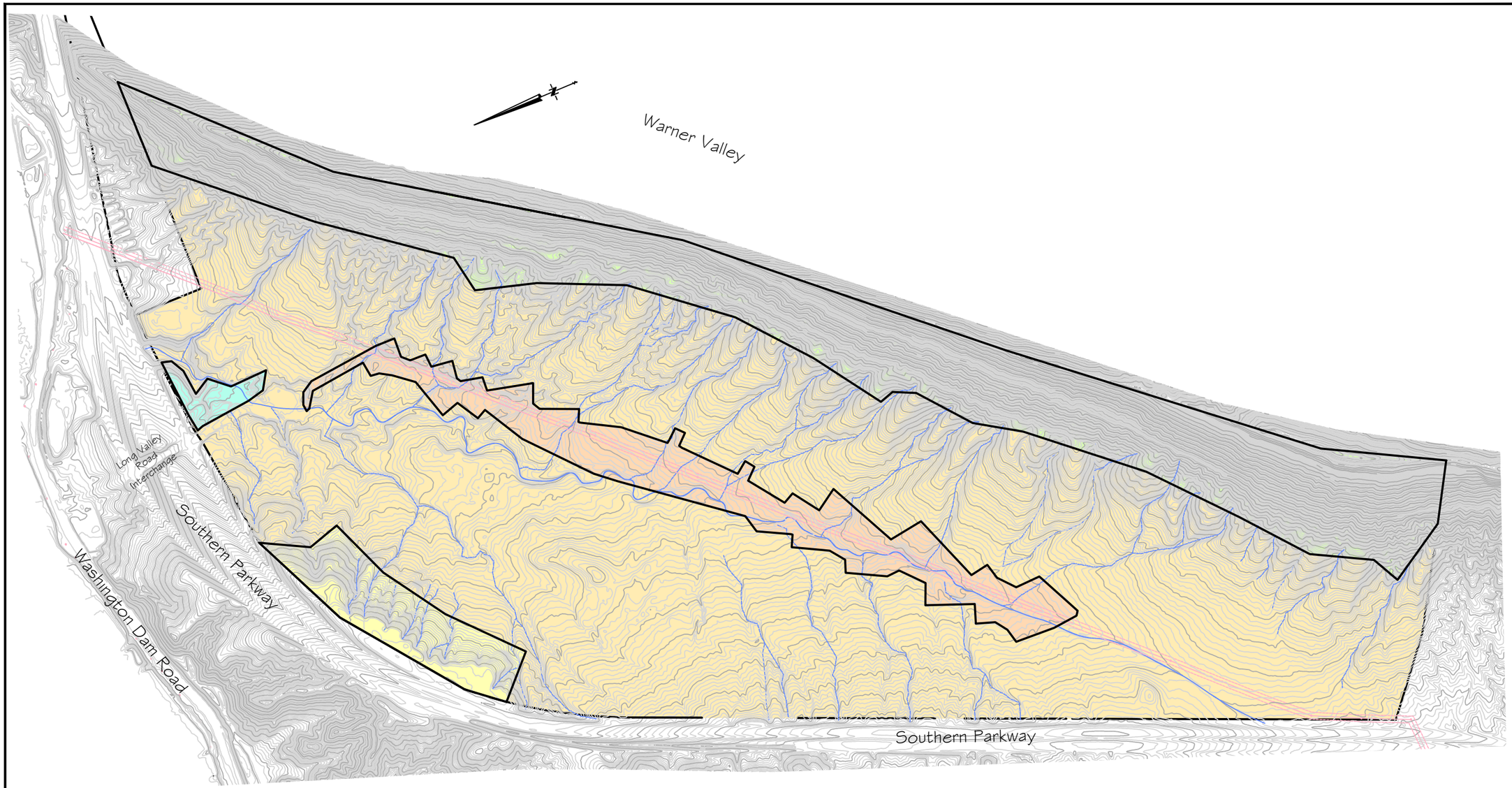
Conceptual Site Grading

Section 4

Project Grading Summary:

Long Valley Trails is located in a valley setting consisting of variety of slopes. The land slopes from the westerly and easterly boundaries towards the center of the property. A natural drainage consisting of a significant wash flows from the South boundary of the property to the North. The conceptual grading plan shown in this section identifies the areas of steep slopes that shall remain un-disturbed, the major drainage area together with the areas that will be graded for the proposed lots and units contained in Long Valley Trails.

Section 7 of this PCD plan contains the project Geotechnical studies as well as a Rock Fall Study for the steep slope running along the Warner Valley Ridge on the Easterly boundary of the entire property. The detailed Rock Fall Study identifies the extend of the natural rock fall areas. This study along with the detailed design of Long Valley Trails will ensure that no homes will be subject to these rock fall hazards. The project master plan shows a major roadway running along the toe of this slope and a detailed cross section contained in this Section shows how this cross section, which includes berms and a trapezoidal channel will effectively mitigate any rock fall that may occur. The design of these berms and channel will also protect the planned trail and roadway running along the Warner Valley Ridge. The detailed design of each segment of this road will include an evaluation by AGEC (the geotechnical engineer) of each rock formation above the roadway. This evaluation will ensure that any potential rock fall will be stopped by the berms and channel or in very limited cases rocks may be forced to fall prior to construction of the planned improvements.



Legend

- Ridge-line Slope to Remain Un-disturbed
- Center Park Area graded to relocated main wash
- Hillside to Remain Graded for Trails Only
- Detention Basin Area minimal grading
- Developed Area Gaded for Lots & Roads

Brennan Family Holdings, LLC
Washington, Utah
435-668-3641

LONG VALLEY TRAILS

Conceptual Grading Plan

Long Valley Trails

a Master Planned Community
Located in Sections 20-29-30-31
Township 42 South, Range 14 West
Salt Lake Base and Meridian
Contains 605.61 Acres



SURFACE SLOPE DATA				
NUMBER	MIN SLOPE	MAX SLOPE	AREA	COLOR
1	0.0%	20.0%	420.08 ACRES	
2	20.0%	25.0%	30.95 ACRES	
3	25.0%	30.0%	20.19 ACRES	
4	30.0%	40.0%	26.48 ACRES	
5	40.0%	Vertical	104.47 ACRES	

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)

1 inch = 350 ft.

SLOPE ANALYSIS MAP

LONG VALLEY TRAILS

PROFESSIONAL ENGINEER
9-2-20
No. 10432334
MARCUS DON RAINES
STATE OF UTAH

No	Date	By	Revision

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

DATE: SEP. 2020
DRAWN: MDR
APPROVED: MDR
SCALE: 1" = 350'
JOB NO. 161174

SLOPE ANALYSIS MAP

LONG VALLEY TRAILS

LOCATED IN WASHINGTON COUNTY, UT

SHEET 1 OF 1 SHEETS

FILE: 161174EG SLOPEMAP

LONG VALLEY TRAILS

Utility Plans

Section 5

Section 5 Executive Summary

Introduction:

Sunrise Engineering currently provides Washington City with their overall Culinary Water and Sanitary Sewer master plans. Brennan Family Holdings, LLC with the authorization of Washington City has engaged Sunrise Engineering to provide the sanitary sewer and the culinary water feasibility reports for the proposed Long Valley Trails Development. Those reports are contained in this Section of the PCD Project Plan.

The Utility improvements for Long Valley Trails are being design and constructed as a joint effort with Washington City. The offsite improvements are designed and planned to service the Washington City residents living within and adjacent to the Long Valley Trails development. The planned culinary water facilities will provide upgraded service to areas that cannot currently be adequately serviced and will enhance the reliability and sustainability of the culinary water service. Long Valley Trails has voluntarily agreed not to send its sanitary sewer flows down Washington Dam Road and will not pursue the Phase 1 improvements as outlined in the attached Sunrise Sewer Study. (See the following plan)

Offsite Sanitary Sewer:

The Sanitary Sewer Study conducted by Sunrise Engineering and contained in this PCD Plan Section outlines the capacity of the downstream sewer system if Long Valley Trails were to extend a line within Washington Dam Road. Due to the limited capacity of the downstream system and the un-known timeframe when that capacity would be exceeded. The Master Developer of Long Valley Trails, Brennan Family Holdings has agreed to not pursue using those facilities and to instead install the solution that would handle 100% of the needs of the proposed Long Valley Trails Development. Brennan in conjunction with Washington City will construct a sewer lift station, pressure line and gravity fed outfall line to the regional lines located at approximately 3650 South and the Southern Parkway. This system would collect the projects sewer as outlined in the Sunrise Study. Those flows would then flow to a new lift station located at the lower end of Long Valley Trails near the Long Valley Interchange. The lift station would pump those flows to the South boundary of Long Valley Trails where they would discharge into a new gravity flow line running to the large capacity line located in 3650 South. Washington City has agreed to use the funds that have been identified in their Capital Facilities plan towards this regional system and Brennan Family Holdings will cover the additional costs to complete this system.

Offsite Culinary Water:

The initial culinary water demands for Long Valley Trails will be handled by the extension of a water transmission line along Washington Dam Road. This line will service approximately the lower 1/3 of the proposed Long Valley Trails Development. Once the capacity and design parameters of that line have been reached a new water storage facility will be required. It is anticipated that that water tank will be located west of the Long Valley Trails development. The construction of the initial water transmission line and the future water tank and additional offsite water transmission lines will be paid for by Washington City. All onsite facilities will be paid by the developer of Long Valley Trails. These facilities will be provided in a time and manner that will not delay the development of the Long Valley Trails Development.

Section 12 of this PCD plan includes the timing and the trigger points for each phase of the water system improvements.

LONG VALLEY TRAILS SUBDIVISION HYDRAULIC ANALYSIS REPORT

August 2020

PREPARED BY:

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FAX: 435-652-8416



Steve Hall, P.E.
Project Engineer

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1. INTRODUCTION & DESIGN CRITERIA

A. INTRODUCTION

The Long Valley Trails Subdivision is located in Washington County, Utah within Sections 20, 29, 30, & 31; Township 42 South, Range 14 West, Salt Lake Base and Meridian. Access to the property is achieved from the Southern Parkway at the intersection with Long Valley Road. The subdivision is bounded by the Southern Parkway to the west and north, Warner Ridge to the east, and private property to the south.

The proposed project covers approximately 450 acres and consists of 2,361 units. Of the total 2,361 units are 1,111 residential lots, 698 condominiums, 356 townhomes, 189 cottages, and 7 clubhouses.

B. DESIGN CRITERIA

i. Number of ERCs

The proposed project has a total of 2,361 units. Assuming all units are equal to one Equivalent Residential Connection (ERC), with exception of the clubhouses being two ERCs, the total number of ERCs is 2,368.

Unit Type	Unit Count	ERCs/Unit	Total ERCs
Residential Lots	1,111	1	1,111
Condominiums	698	1	698
Townhomes	356	1	356
Cottages	189	1	189
Clubhouses	7	2	14
		Total ERCs	2,368

ii. Calculated Demands

Average Day Demand

Washington City's System-Specific Minimum Sizing Requirements state an Average Day Demand per ERC of 627.70 gpd. The total buildout average day demand was calculated as 1,032.22 gpm:

Total ADD = $\frac{627.70\ gpd}{1{,}440\ min/day} * 2{,}368\ ERCs = 1{,}032.22\ gpm$

Peak Day Demand

Washington City's System-Specific Minimum Sizing Requirements state a Peak Day Demand per ERC of 1,207.00 gpd

Total PDD = $\frac{1{,}207.00\ gpd}{1{,}440\ min/day} * 2{,}368\ ERCs = 1{,}984.40\ gpm$

Both the Average and Peak Day Demands from Washington City include indoor and outdoor water use.

Peak Instantaneous Demand

From Utah Administrative Code (UAC), Rule R309-510-9, the Peak Instantaneous Demand for indoor water use is calculated using the formula $Q = 10.8 * N^{0.64}$, where *Q* is the demand flowrate and *N* is the number of ERCs. For this project, the total indoor water use Peak Instantaneous Demand is 1,559.65 gpm:

Total Indoor PID = 10.8 * (2,368 ERCs) $^{0.64}$ = 1,559.65 gpm

To account for outdoor use (irrigation), an assumed 5,000 sq ft (0.11 acre) of irrigation per lot will be used in conjunction with an outdoor usage of 9.80 gpm/irrigated acre (as per Table 510-7 of R309) to produce a total outdoor water use Peak Instantaneous Demand of 2,552.70 gpm.

Total Outdoor PID = 0.11 acres/ERU * 9.80 gpm/irr. Acre * 2,368 ERCs = 2,552.70 gpm

The total combined Peak Instantaneous Demand is 4,112.36 gpm.

The latest version of the Culinary Water Master Plan also has calculations for Peak Instantaneous Demand. These calculations were completed to take the largest requirement:

- Average Day Demand per CWMP = 427.3 gpd/ERC
- PID Peaking Factor = 6.2
- PID = $\frac{427.30\ gpd}{1{,}440\ min/day} * 6.2\ PF * 2{,}368\ ERCs = 4{,}356.56\ gpm$

Because the PID demand calculated according to the CWMP is larger, a PID of 4,356.56 gpm was used for the model.

iii. Minimum Pressure/Fire Flow Requirements

Fire hydrants will exist within the system. Washington City requires modeling fire flow during Peak Day Demand at 1,500 gpm for one hour for residential buildings.

UAC, Rule R309-105-9 describes minimum pressure requirements during various demand scenarios, which are as follows:

1. Peak Day Demand with 40 psi minimum pressure.
2. Peak Day Demand plus Fire Flow with 20 psi minimum pressure.
3. Peak Instantaneous Flow with 30 psi minimum pressure.

2. HYDRAULIC ANALYSIS

A. MODEL SETUP

The distribution system set up was based on the layout of the development as provided by Brennan Holdings. The system contains 215 demand nodes, a tank, and two pressure reducing valves (PRVs).

The demand per node for each of the three analysis scenarios is determined by dividing the total system demand by the number of nodes in the system:

Demand per node for each scenario:

1. Peak Day Demand = 9.23 gpm/node
2. Peak Day Demand plus Fire Flow = 9.23 gpm/node + 1,500 gpm on fire flow node
3. Peak Instantaneous Flow = 20.26 gpm/node

Tank

A culinary water storage tank is planned near the development with the primary functions of storing culinary water and providing for higher demand occurrences such as fire flow and PID.

The location of the tank is planned to be west of the development on BLM land.

The base elevation of the tank has been set at 3,115 ft in the model with an assumed height to overflow of 24 ft. The highest node in the subdivision has an elevation of 2,998.64 ft resulting in static pressures of 50.4 - 60.8 psi depending on tank levels.

PRVs

Without pressure reducing valves, the lower end of the subdivision would have pressures of up to 185 psi which is well above the recommended pressures for the distribution system. Two PRVs are therefore planned at the locations shown in the exhibit. The PRVs are set in the model to have the same head as the adjacent pressure zone (high water elevation of the Washington Dam Tank).

Estimated elevation of PRVs = 2,827 ft
Pressure setting in model = 91.4 psi
Calculated Head at PRV = 3,038 ft
High water elevation of Washington Dam Tank = 3,038 ft

B. SUPPLY ALTERNATIVES

Several alternatives were considered for supplying the proposed development.

1. The first alternative considered is to tie into the Washington City main line on Washington Dam Road.
2. The second alternative considered is to tie into the Washington City main line on 3650 South.
3. The third alternative is a combination of Alternatives 1 and 2, staggered so as to allow for phased development.
4. The fourth alternative considered is to tie into the Washington County Water Conservancy District (WCWCD) line that feeds the Warner Valley Tanks.

   The latter alternative was deemed not feasible due to potential ROW issues and the need for a tank on the WCWCD transmission line. The selected alternative was Alternative 3, a combination of Alternatives 1 and 2.

C. SELECTED SUPPLY ALTERNATIVE

The water supply to the development is proposed to be built in three phases:

Phase 1. Phase 1 includes upsizing lines in Washington Dam Road to a 16" pipe. This includes the line from 1990 East to the development. This will allow for majority of the lower pressure zone to be built (assumed 1,030 ERCs) depending on exact location and elevation of improvements. The model shows that connections greater than 2,830 in elevation may not be able to meet the 30 psi requirement for PID.

Phase 2. Phase 2 includes the installation of a new 16" line from 3650 South to the PRV location. This will allow for a portion of the upper pressure zone (estimated 430 ERCs) to be completed depending on location and elevation of improvements. The model shows that connections greater than 2,880 in elevation may not be able to meet the 30 psi requirement for PID. Proximity to the 16" line and looping of distribution lines will also affect what can be installed.

Phase 3. Phase 3 includes the installation of a new tank, new booster station (location TBD), and new PRVs, which will allow the remainder of the development to be built out.

D. OVERALL IMPROVEMENTS

A map of the recommended improvements based on the selected alternative is shown in Appendix A. With the potential addition of additional connections at the southwest end of Long Valley, the waterline exiting the tank should be re-evaluated. A 20" line may be required.

A map of showing the hydraulic profile of the new improvements is included in Appendix B.

3. STORAGE REQUIREMENTS

Culinary water storage for the proposed project will need to provide equalization, fire flow, and emergency storage. The storage requirements are as follows:

Equalization Storage

Equalization storage is the volume of storage deemed necessary "to satisfy the average day demands for water for indoor use and irrigation use" (see UAC R309-510-8)

Equalization Storage = 2,368 ERCs x 627.70 gpd/ERU = 1,486,390 gallons

Fire Flow Storage

Fire flow storage is the amount of water necessary to supply fire flow (1,500 gpm for Washington City) for 60 minutes.

Fire Flow Storage = 1,500 gpm x 60 minutes = 90,000 gallons

Emergency Storage

The latest version of the City's Culinary Water Master Plan states the amount of emergency storage as 40% of the equalization storage:

Emergency Storage = 1,486,390 x 0.40 = 594,556 gallons

Total Storage

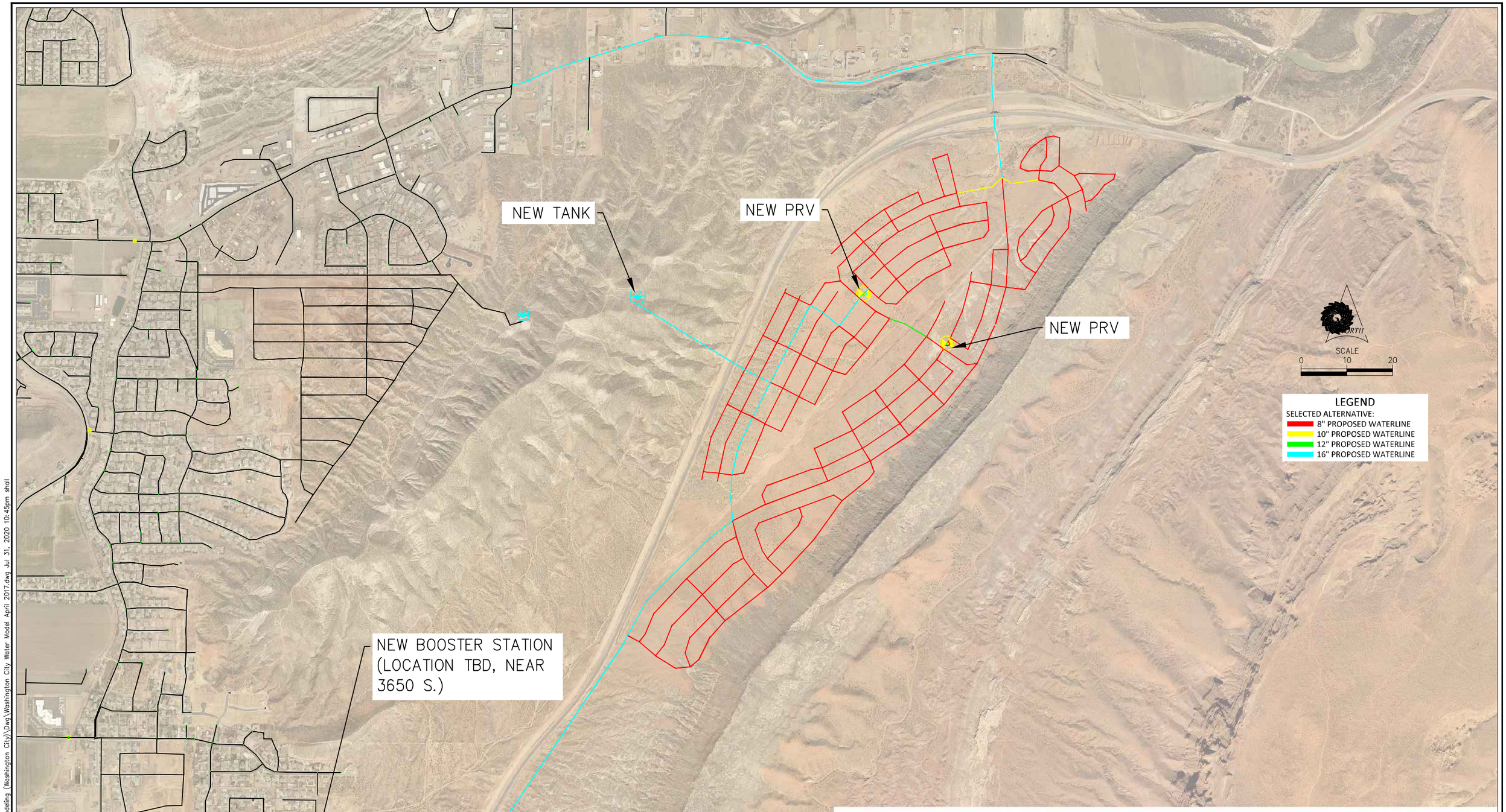
The total storage required is the sum of equalization storage, fire flow storage, and emergency storage.

Total Storage = 2,170,946 gallons

The recommended total storage volume for the subdivision is therefore 2.2 MG. However, the actual total storage capacity should be coordinated with Washington City as there will likely be future demands from the southwest of the Long Valley area.

APPENDIX A

OVERALL IMPROVEMENTS



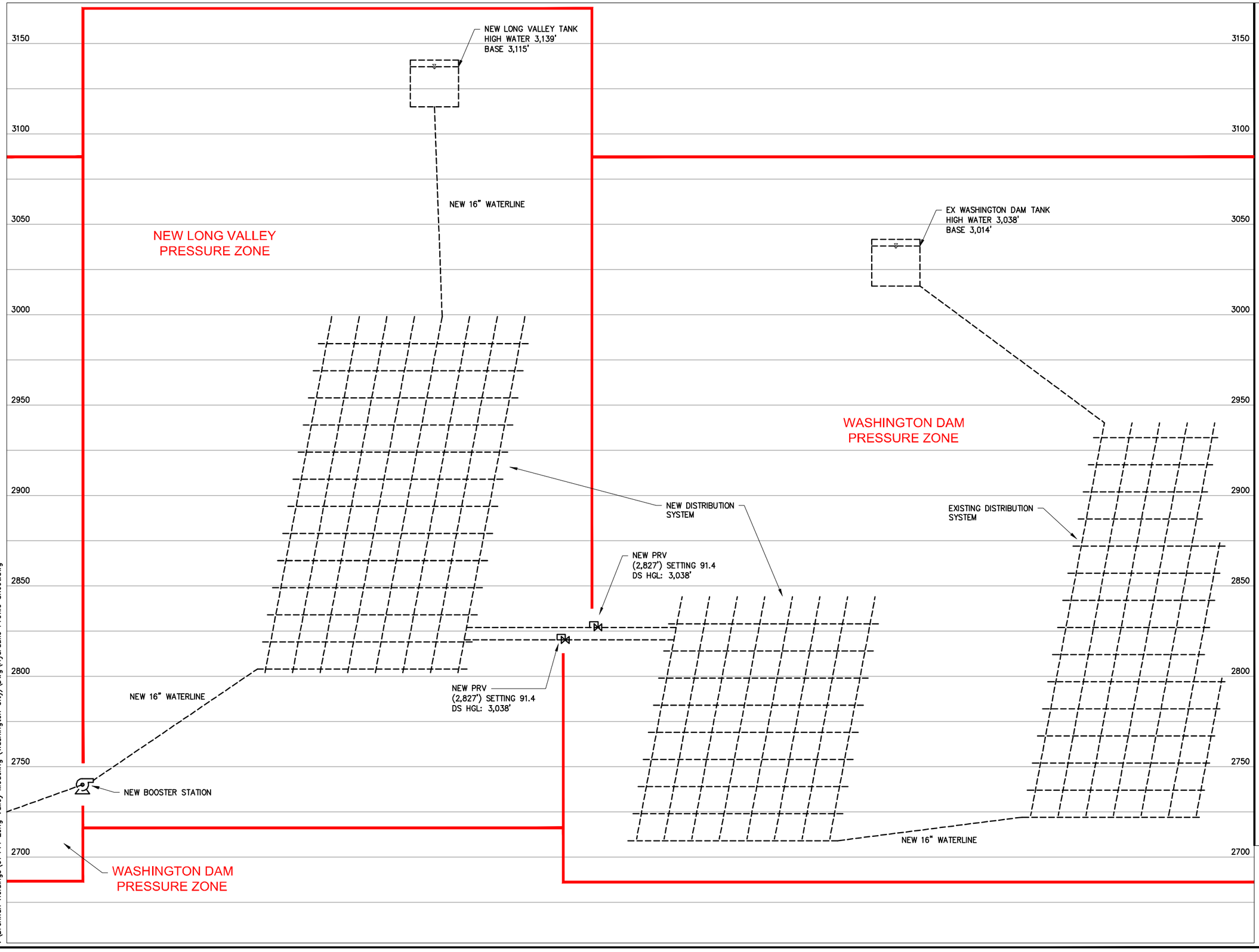
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Long Valley Trails Subdivision
SELECTED ALTERNATIVE

SUNRISE ENGINEERING
11 NORTH 300 WEST
WASHINGTON, UT 84780
TEL 435.652.8450 · FAX 435.652.8416
www.sunrise-eng.com

APPENDIX B

HYDRAULIC PROFILE



HYDRAULIC PROFILE NOTES:

ALL ELEVATIONS ARE APPROXIMATE ACTUAL CONSTRUCTED ELEVATIONS SHOULD BE BASED ON AN ENGINEERED DESIGN.

ABBREVIATIONS:

DS HGL = DOWNSTREAM HYDRAULIC GRADE LINE

PRV = PRESSURE REDUCING VALVE

SYMBOLS:

PRESSURE REDUCING VALVE

BOOSTER STATION

TANK

P:\Brennon Holdings\07444 Long Valley Modeling (Washington City)\Dwg\Hydraulic Profile Sheet.dwg

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11 NORTH 300 WEST
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APPENDIX C

MODELING RESULTS (BUILDOUT)

Peak Day Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-196	9.23	2,998.64	3,097.66	42.903
LVJ-194	9.23	2,982.81	3,097.89	49.865
LVJ-192	9.23	2,983.23	3,098.69	50.031
LVJ-195	9.23	2,976.33	3,097.77	52.621
LVJ-197	9.23	2,967.68	3,097.61	56.299
LVJ-193	9.23	2,966.88	3,098.40	56.989
LVJ-215	9.23	2,963.63	3,097.78	58.125
LVJ-207	9.23	2,959.59	3,098.01	59.979
LVJ-216	9.23	2,958.66	3,098.94	60.783
LVJ-198	9.23	2,955.27	3,097.38	61.577
LVJ-206	9.23	2,955.29	3,098.39	62.007
LVJ-219	9.23	2,952.74	3,098.30	63.07
LVJ-214	9.23	2,950.65	3,097.68	63.71
LVJ-190	9.23	2,950.00	3,100.18	65.074
LVJ-226	9.23	2,944.20	3,098.76	66.972
LVJ-208	9.23	2,940.75	3,097.88	68.083
LVJ-218	9.23	2,935.70	3,098.36	70.48
LVJ-220	9.23	2,935.00	3,097.89	70.578
LVJ-205	9.23	2,932.62	3,098.50	71.874
LVJ-213	9.23	2,931.45	3,097.39	71.903
LVJ-199	9.23	2,928.72	3,097.05	72.936
LVJ-229	9.23	2,929.13	3,098.77	73.505
LVJ-228	9.23	2,927.43	3,098.85	74.276
LVJ-209	9.23	2,926.09	3,097.87	74.434
LVJ-212	9.23	2,923.92	3,097.17	75.071
LVJ-191	9.23	2,923.68	3,099.24	76.07
LVJ-227	9.23	2,920.17	3,098.83	77.413
LVJ-222	9.23	2,918.09	3,099.16	78.455
LVJ-210	9.23	2,915.36	3,096.83	78.629
LVJ-223	9.23	2,916.20	3,098.87	79.152
LVJ-217	9.23	2,915.11	3,098.95	79.659
LVJ-211	9.23	2,910.15	3,096.35	80.679
LVJ-204	9.23	2,912.92	3,099.21	80.72
LVJ-179	9.23	2,919.16	3,106.08	80.99
LVJ-186	9.23	2,918.30	3,105.32	81.037
LVJ-200	9.23	2,908.70	3,096.17	81.231
LVJ-203	9.23	2,911.74	3,099.71	81.449
LVJ-202	9.23	2,907.97	3,096.30	81.605
LVJ-225	9.23	2,910.01	3,098.79	81.799
LVJ-176	9.23	2,913.92	3,104.62	82.629
LVJ-125	9.23	2,910.09	3,101.09	82.762
LVJ-127	9.23	2,909.42	3,100.83	82.939
LVJ-177	9.23	2,911.87	3,104.62	83.518
LVJ-75	9.23	2,844.36	3,037.39	83.64
LVJ-201	9.23	2,900.48	3,094.83	84.21
LVJ-189	9.23	2,905.67	3,100.45	84.398
LVJ-224	9.23	2,903.88	3,098.80	84.459
LVJ-63	9.23	2,841.60	3,037.78	85.006
LVJ-129	9.23	2,901.37	3,100.80	86.414
LVJ-230	9.23	2,893.78	3,094.28	86.876
LVJ-126	9.23	2,899.96	3,100.80	87.024
LVJ-185	9.23	2,904.15	3,105.02	87.037
LVJ-181	9.23	2,907.74	3,108.70	87.076
LVJ-174	9.23	2,903.37	3,104.34	87.082
LVJ-178	9.23	2,903.07	3,105.82	87.853
LVJ-175	9.23	2,900.51	3,104.34	88.321
LVJ-142	9.23	2,896.99	3,100.86	88.337

Peak Day Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-80	9.23	2,833.00	3,037.27	88.511
LVJ-128	9.23	2,896.36	3,100.82	88.592
LVJ-64	9.23	2,832.90	3,037.90	88.825
LVJ-52	9.23	2,830.50	3,037.45	89.673
LVJ-184	9.23	2,893.81	3,102.16	90.279
LVJ-145	9.23	2,890.26	3,100.82	91.236
LVJ-152	9.23	2,892.20	3,103.49	91.55
LVJ-53	9.23	2,825.90	3,037.52	91.694
LVJ-143	9.23	2,889.14	3,100.85	91.734
LVJ-28	9.23	2,826.00	3,037.93	91.828
LVJ-81	9.23	2,824.27	3,037.16	92.246
LVJ-151	9.23	2,891.36	3,104.42	92.32
LVJ-180	9.23	2,893.88	3,107.28	92.467
LVJ-56	9.23	2,823.50	3,037.39	92.679
LVJ-138	9.23	2,886.69	3,100.91	92.823
LVJ-183	9.23	2,892.39	3,106.87	92.933
LVJ-49	9.23	2,822.70	3,037.46	93.054
LVJ-135	9.23	2,885.65	3,101.11	93.357
LVJ-150	9.23	2,888.42	3,105.48	94.052
LVJ-123	9.23	2,820.01	3,037.08	94.057
LVJ-144	9.23	2,883.64	3,100.83	94.106
LVJ-172	9.23	2,886.55	3,103.83	94.148
LVJ-51	9.23	2,820.00	3,037.46	94.223
LVJ-83	9.23	2,819.40	3,037.13	94.34
LVJ-29	9.23	2,820.00	3,037.73	94.342
LVJ-82	9.23	2,818.00	3,037.14	94.954
LVJ-50	9.23	2,818.00	3,037.45	95.088
LVJ-62	9.23	2,817.40	3,037.63	95.427
LVJ-173	9.23	2,883.89	3,105.06	95.834
LVJ-170	9.23	2,882.49	3,105.47	96.616
LVJ-149	9.23	2,882.76	3,106.47	96.933
LVJ-182	9.23	2,880.14	3,106.62	98.132
LVJ-141	9.23	2,874.40	3,100.90	98.141
LVJ-27	9.23	2,811.00	3,037.69	98.225
LVJ-47	9.23	2,810.60	3,037.45	98.294
LVJ-139	9.23	2,874.09	3,100.99	98.315
LVJ-31	9.23	2,810.20	3,037.52	98.497
LVJ-48	9.23	2,809.60	3,037.47	98.736
LVJ-61	9.23	2,809.50	3,037.73	98.892
LVJ-69	9.23	2,872.80	3,101.35	99.03
LVJ-30	9.23	2,808.50	3,037.52	99.232
LVJ-89	9.23	2,807.49	3,037.14	99.506
LVJ-95	9.23	2,807.34	3,037.12	99.562
LVJ-124	9.23	2,870.53	3,101.25	99.972
LVJ-76	9.23	2,869.55	3,101.33	100.432
LVJ-46	9.23	2,805.00	3,037.44	100.716
LVJ-58	9.23	2,804.40	3,037.49	100.996
LVJ-26	9.23	2,804.00	3,037.65	101.241
LVJ-167	9.23	2,871.75	3,105.92	101.464
LVJ-148	9.23	2,871.60	3,106.26	101.678
LVJ-171	9.23	2,870.09	3,105.53	102.016
LVJ-90	9.23	2,801.37	3,037.12	102.152
LVJ-37	9.23	2,801.00	3,037.49	102.472
LVJ-154	9.23	2,869.55	3,106.42	102.634
LVJ-32	9.23	2,800.00	3,037.56	102.934
LVJ-98	9.23	2,799.07	3,037.12	103.148
LVJ-136	9.23	2,862.91	3,101.14	103.225

Peak Day Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-188	9.23	2,868.08	3,106.42	103.271
LVJ-100	9.23	2,798.73	3,037.08	103.278
LVJ-130	9.23	2,861.34	3,101.27	103.959
LVJ-44	9.23	2,797.00	3,037.45	104.188
LVJ-97	9.23	2,796.37	3,037.12	104.316
LVJ-96	9.23	2,795.74	3,037.12	104.588
LVJ-25	9.23	2,796.00	3,037.61	104.691
LVJ-41	9.23	2,794.00	3,037.40	105.467
LVJ-24	9.23	2,792.00	3,037.56	106.402
LVJ-168	9.23	2,859.44	3,105.69	106.699
LVJ-153	9.23	2,859.85	3,106.29	106.784
LVJ-55	9.23	2,790.50	3,037.40	106.98
LVJ-59	9.23	2,790.60	3,037.57	107.011
LVJ-38	9.23	2,790.30	3,037.46	107.095
LVJ-33	9.23	2,790.00	3,037.52	107.251
LVJ-161	9.23	2,857.97	3,105.93	107.439
LVJ-36	9.23	2,789.34	3,037.49	107.525
LVJ-93	9.23	2,788.04	3,037.12	107.924
LVJ-92	9.23	2,787.67	3,037.12	108.086
LVJ-140	9.23	2,851.52	3,101.05	108.119
LVJ-187	9.23	2,856.33	3,106.29	108.31
LVJ-94	9.23	2,786.76	3,037.12	108.479
LVJ-85	9.23	2,785.76	3,037.12	108.912
LVJ-40	9.23	2,786.00	3,037.40	108.933
LVJ-147	9.23	2,854.48	3,105.99	108.979
LVJ-84	9.23	2,784.30	3,037.12	109.546
LVJ-133	9.23	2,848.31	3,101.33	109.631
LVJ-45	9.23	2,784.00	3,037.43	109.813
LVJ-91	9.23	2,783.61	3,037.12	109.846
LVJ-35	9.23	2,783.40	3,037.47	110.09
LVJ-160	9.23	2,851.54	3,105.89	110.208
LVJ-163	9.23	2,851.31	3,105.70	110.227
LVJ-23	9.23	2,782.00	3,037.53	110.721
LVJ-101	9.23	2,781.32	3,037.08	110.821
LVJ-57	9.23	2,780.80	3,037.42	111.193
LVJ-102	9.23	2,780.41	3,037.08	111.215
LVJ-155	9.23	2,848.92	3,105.88	111.34
LVJ-43	9.23	2,780.00	3,037.43	111.545
LVJ-169	9.23	2,848.18	3,105.62	111.547
LVJ-60	9.23	2,779.80	3,037.57	111.691
LVJ-22	9.23	2,779.00	3,037.50	112.009
LVJ-132	9.23	2,842.02	3,101.35	112.366
LVJ-131	9.23	2,840.65	3,101.31	112.944
LVJ-99	9.23	2,776.35	3,037.09	112.978
LVJ-146	9.23	2,843.82	3,105.81	113.519
LVJ-21	9.23	2,775.19	3,037.49	113.654
LVJ-39	9.23	2,774.50	3,037.46	113.94
LVJ-134	9.23	2,838.11	3,101.52	114.135
LVJ-162	9.23	2,841.92	3,105.71	114.3
LVJ-137	9.23	2,837.34	3,101.17	114.318
LVJ-103	9.23	2,772.13	3,037.08	114.803
LVJ-165	9.23	2,839.32	3,105.48	115.327
LVJ-157	9.23	2,837.81	3,105.72	116.084
LVJ-20	9.23	2,768.00	3,037.46	116.758
LVJ-156	9.23	2,835.98	3,105.88	116.947
LVJ-86	9.23	2,765.55	3,037.14	117.68
LVJ-19	9.23	2,765.30	3,037.46	117.926

Peak Day Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-42	9.23	2,765.00	3,037.41	118.034
LVJ-74	9.23	2,831.60	3,105.72	118.774
LVJ-34	9.23	2,762.60	3,037.46	119.097
LVJ-104	9.23	2,761.69	3,037.08	119.326
LVJ-107	9.23	2,761.38	3,037.09	119.464
LVJ-78	9.23	2,830.00	3,105.72	119.467
LVJ-164	9.23	2,828.69	3,105.34	119.87
LVJ-73	9.23	2,828.00	3,105.59	120.28
LVJ-16	9.23	2,759.40	3,037.43	120.471
LVJ-158	9.23	2,826.33	3,105.29	120.873
LVJ-18	9.23	2,758.40	3,037.46	120.914
LVJ-166	9.23	2,826.28	3,105.36	120.924
LVJ-108	9.23	2,757.88	3,037.09	120.982
LVJ-65	9.23	2,822.00	3,101.41	121.069
LVJ-15	9.23	2,757.00	3,037.40	121.499
LVJ-106	9.23	2,755.23	3,037.09	122.128
LVJ-66	9.23	2,820.80	3,102.73	122.16
LVJ-87	9.23	2,754.58	3,037.17	122.445
LVJ-118	9.23	2,753.95	3,037.10	122.691
LVJ-88	9.23	2,751.91	3,037.30	123.659
LVJ-79	9.23	2,751.68	3,037.37	123.791
LVJ-14	9.23	2,750.00	3,037.36	124.512
LVJ-159	9.23	2,816.37	3,105.08	125.096
LVJ-109	9.23	2,748.00	3,037.09	125.262
LVJ-105	9.23	2,747.90	3,037.08	125.302
LVJ-119	9.23	2,747.50	3,037.09	125.481
LVJ-120	9.23	2,746.73	3,037.10	125.817
LVJ-13	9.23	2,746.00	3,037.36	126.247
LVJ-72	9.23	2,811.50	3,104.92	127.137
LVJ-121	9.23	2,743.61	3,037.09	127.167
LVJ-111	9.23	2,743.27	3,037.09	127.311
LVJ-70	9.23	2,809.00	3,103.36	127.546
LVJ-67	9.23	2,808.00	3,102.73	127.705
LVJ-117	9.23	2,742.00	3,037.10	127.865
LVJ-116	9.23	2,741.68	3,037.09	128.002
LVJ-17	9.23	2,742.00	3,037.44	128.015
LVJ-122	9.23	2,740.81	3,037.09	128.378
LVJ-68	9.23	2,802.00	3,102.73	130.304
LVJ-115	9.23	2,735.38	3,037.09	130.731
LVJ-71	9.23	2,802.00	3,103.77	130.758
LVJ-114	9.23	2,728.53	3,037.09	133.698
LVJ-110	9.23	2,713.72	3,037.09	140.115
LVJ-113	9.23	2,710.80	3,037.09	141.381
LVJ-112	9.23	2,710.80	3,037.09	141.381

Fire Flow

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
LVJ-196	9.23	42.90	3,097.66	1,500.00	33.069	2,896.80	20
LVJ-192	9.23	50.03	3,098.69	1,500.00	40.231	3,533.49	20
LVJ-216	9.23	60.78	3,098.94	1,500.00	48.947	3,581.46	20
LVJ-215	9.23	58.13	3,097.78	1,500.00	47.07	3,673.33	20
LVJ-195	9.23	52.62	3,097.77	1,500.00	42.626	3,681.09	20
LVJ-207	9.23	59.98	3,098.01	1,500.00	48.551	3,686.68	20
LVJ-194	9.23	49.87	3,097.89	1,500.00	40.749	3,877.51	20
LVJ-226	9.23	66.97	3,098.76	1,500.00	55.735	4,141.61	20
LVJ-228	9.23	74.28	3,098.85	1,500.00	62.013	4,183.18	20
LVJ-229	9.23	73.51	3,098.77	1,500.00	61.41	4,193.57	20
LVJ-75	9.23	83.64	3,037.39	1,500.00	73.567	4,215.01	20
LVJ-227	9.23	77.41	3,098.83	1,500.00	64.815	4,224.17	20
LVJ-197	9.23	56.30	3,097.61	1,500.00	46.898	4,264.89	20
LVJ-225	9.23	81.80	3,098.79	1,500.00	68.736	4,279.90	20
LVJ-214	9.23	63.71	3,097.68	1,500.00	53.331	4,312.41	20
LVJ-224	9.23	84.46	3,098.80	1,500.00	71.295	4,364.67	20
LVJ-219	9.23	63.07	3,098.30	1,500.00	53.135	4,588.19	20
LVJ-52	9.23	89.67	3,037.45	1,500.00	80.324	4,596.02	20
LVJ-223	9.23	79.15	3,098.87	1,500.00	67.399	4,615.40	20
LVJ-198	9.23	61.58	3,097.38	1,500.00	52.161	4,670.06	20
LVJ-193	9.23	56.99	3,098.40	1,500.00	48.074	4,699.00	20
LVJ-190	9.23	65.07	3,100.18	1,500.00	55.665	4,813.63	20
LVJ-222	9.23	78.46	3,099.16	1,500.00	67.615	4,958.56	20
LVJ-213	9.23	71.90	3,097.39	1,500.00	61.967	5,124.63	20
LVJ-191	9.23	76.07	3,099.24	1,500.00	65.92	5,175.37	20
LVJ-123	9.23	94.06	3,037.08	1,500.00	85.566	5,277.46	20
LVJ-206	9.23	62.01	3,098.39	1,500.00	53.143	5,322.50	20
LVJ-68	9.23	130.30	3,102.73	1,500.00	115.132	5,349.65	20
LVJ-220	9.23	70.58	3,097.89	1,500.00	61.324	5,624.58	20
LVJ-177	9.23	83.52	3,104.62	1,500.00	74.509	5,752.98	20
LVJ-218	9.23	70.48	3,098.36	1,500.00	61.327	5,761.39	20
LVJ-212	9.23	75.07	3,097.17	1,500.00	65.704	5,769.33	20
LVJ-210	9.23	78.63	3,096.83	1,500.00	69.135	5,860.08	20
LVJ-51	9.23	94.22	3,037.46	1,500.00	88.048	6,077.78	20
LVJ-95	9.23	99.56	3,037.12	1,500.00	92.721	6,280.83	20
LVJ-83	9.23	94.34	3,037.13	1,500.00	87.938	6,281.89	20
LVJ-53	9.23	91.69	3,037.52	1,500.00	86.163	6,300.03	20
LVJ-186	9.23	81.04	3,105.32	1,500.00	72.959	6,319.85	20
LVJ-76	9.23	100.43	3,101.33	1,500.00	90.007	6,354.15	20
LVJ-103	9.23	114.80	3,037.08	1,500.00	106.913	6,366.06	20
LVJ-82	9.23	94.95	3,037.14	1,500.00	88.687	6,383.07	20
LVJ-102	9.23	111.22	3,037.08	1,500.00	103.647	6,402.62	20
LVJ-156	9.23	116.95	3,105.88	1,500.00	106.456	6,418.67	20
LVJ-97	9.23	104.32	3,037.12	1,500.00	97.437	6,449.26	20
LVJ-69	9.23	99.03	3,101.35	1,500.00	88.83	6,457.34	20
LVJ-208	9.23	68.08	3,097.88	1,500.00	59.657	6,468.46	20
LVJ-104	9.23	119.33	3,037.08	1,500.00	111.372	6,488.95	20
LVJ-92	9.23	108.09	3,037.12	1,500.00	101.086	6,525.63	20
LVJ-100	9.23	103.28	3,037.08	1,500.00	96.491	6,533.10	20
LVJ-101	9.23	110.82	3,037.08	1,500.00	103.633	6,596.20	20
LVJ-144	9.23	94.11	3,100.83	1,500.00	84.55	6,608.16	20
LVJ-199	9.23	72.94	3,097.05	1,500.00	64.412	6,619.07	20
LVJ-209	9.23	74.43	3,097.87	1,500.00	65.745	6,655.85	20
LVJ-105	9.23	125.30	3,037.08	1,500.00	117.387	6,710.28	20

Fire Flow

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
LVJ-189	9.23	84.40	3,100.45	1,500.00	75.468	6,723.52	20
LVJ-96	9.23	104.59	3,037.12	1,500.00	98.197	6,766.07	20
LVJ-205	9.23	71.87	3,098.50	1,500.00	63.388	6,790.43	20
LVJ-98	9.23	103.15	3,037.12	1,500.00	96.894	6,792.65	20
LVJ-93	9.23	107.92	3,037.12	1,500.00	101.459	6,849.49	20
LVJ-78	9.23	119.47	3,105.72	1,500.00	109.403	6,854.98	20
LVJ-91	9.23	109.85	3,037.12	1,500.00	103.307	6,878.47	20
LVJ-217	9.23	79.66	3,098.95	1,500.00	70.681	6,890.96	20
LVJ-145	9.23	91.24	3,100.82	1,500.00	82.162	6,905.94	20
LVJ-143	9.23	91.73	3,100.85	1,500.00	82.632	6,941.63	20
LVJ-67	9.23	127.71	3,102.73	1,500.00	116.385	6,986.65	20
LVJ-125	9.23	82.76	3,101.09	1,500.00	74.217	6,996.24	20
LVJ-175	9.23	88.32	3,104.34	1,500.00	80.255	7,011.56	20
LVJ-141	9.23	98.14	3,100.90	1,500.00	88.769	7,040.12	20
LVJ-127	9.23	82.94	3,100.83	1,500.00	74.457	7,053.15	20
LVJ-90	9.23	102.15	3,037.12	1,500.00	96.423	7,129.95	20
LVJ-176	9.23	82.63	3,104.62	1,500.00	75.087	7,170.19	20
LVJ-89	9.23	99.51	3,037.14	1,500.00	94.02	7,175.74	20
LVJ-211	9.23	80.68	3,096.35	1,500.00	72.177	7,341.05	20
LVJ-60	9.23	111.69	3,037.57	1,500.00	106.922	7,352.51	20
LVJ-81	9.23	92.25	3,037.16	1,500.00	87.454	7,370.82	20
LVJ-80	9.23	88.51	3,037.27	1,500.00	84.261	7,486.19	20
LVJ-94	9.23	108.48	3,037.12	1,500.00	102.84	7,498.97	20
LVJ-84	9.23	109.55	3,037.12	1,500.00	103.897	7,502.08	20
LVJ-140	9.23	108.12	3,101.05	1,500.00	98.642	7,508.24	20
LVJ-185	9.23	87.04	3,105.02	1,500.00	79.496	7,522.00	20
LVJ-115	9.23	130.73	3,037.09	1,500.00	124.004	7,620.31	20
LVJ-106	9.23	122.13	3,037.09	1,500.00	115.858	7,632.84	20
LVJ-116	9.23	128.00	3,037.09	1,500.00	121.466	7,656.79	20
LVJ-109	9.23	125.26	3,037.09	1,500.00	118.866	7,657.92	20
LVJ-128	9.23	88.59	3,100.82	1,500.00	80.234	7,668.49	20
LVJ-114	9.23	133.70	3,037.09	1,500.00	126.906	7,686.94	20
LVJ-62	9.23	95.43	3,037.63	1,500.00	92.098	7,734.60	20
LVJ-63	9.23	85.01	3,037.78	1,500.00	82.593	7,796.61	20
LVJ-111	9.23	127.31	3,037.09	1,500.00	120.985	7,797.52	20
LVJ-41	9.23	105.47	3,037.40	1,500.00	100.838	7,846.18	20
LVJ-99	9.23	112.98	3,037.09	1,500.00	107.45	7,872.87	20
LVJ-142	9.23	88.34	3,100.86	1,500.00	80.067	7,874.83	20
LVJ-117	9.23	127.87	3,037.10	1,500.00	121.7	7,938.76	20
LVJ-122	9.23	128.38	3,037.09	1,500.00	122.2	7,962.65	20
LVJ-124	9.23	99.97	3,101.25	1,500.00	91.168	7,982.45	20
LVJ-131	9.23	112.94	3,101.31	1,500.00	103.567	8,000.87	20
LVJ-121	9.23	127.17	3,037.09	1,500.00	121.125	8,013.46	20
LVJ-107	9.23	119.46	3,037.09	1,500.00	113.779	8,020.09	20
LVJ-40	9.23	108.93	3,037.40	1,500.00	104.323	8,020.65	20
LVJ-113	9.23	141.38	3,037.09	1,500.00	134.712	8,056.77	20
LVJ-188	9.23	103.27	3,106.42	1,500.00	95.438	8,068.82	20
LVJ-126	9.23	87.02	3,100.80	1,500.00	78.924	8,118.72	20
LVJ-50	9.23	95.09	3,037.45	1,500.00	91.407	8,235.21	20
LVJ-112	9.23	141.38	3,037.09	1,500.00	134.975	8,270.91	20
LVJ-108	9.23	120.98	3,037.09	1,500.00	115.564	8,338.31	20
LVJ-61	9.23	98.89	3,037.73	1,500.00	96.181	8,359.63	20
LVJ-119	9.23	125.48	3,037.09	1,500.00	119.963	8,417.78	20
LVJ-49	9.23	93.05	3,037.46	1,500.00	89.61	8,424.36	20

Fire Flow

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
LVJ-135	9.23	93.36	3,101.11	1,500.00	85.154	8,445.60	20
LVJ-120	9.23	125.82	3,037.10	1,500.00	120.323	8,464.96	20
LVJ-46	9.23	100.72	3,037.44	1,500.00	96.994	8,479.61	20
LVJ-110	9.23	140.12	3,037.09	1,500.00	134.064	8,535.04	20
LVJ-139	9.23	98.32	3,100.99	1,500.00	89.991	8,547.62	20
LVJ-138	9.23	92.82	3,100.91	1,500.00	84.735	8,565.08	20
LVJ-85	9.23	108.91	3,037.12	1,500.00	104.313	8,595.23	20
LVJ-86	9.23	117.68	3,037.14	1,500.00	112.9	8,731.93	20
LVJ-57	9.23	111.19	3,037.42	1,500.00	107.428	8,767.09	20
LVJ-59	9.23	107.01	3,037.57	1,500.00	103.912	8,798.01	20
LVJ-204	9.23	80.72	3,099.21	1,500.00	72.63	8,884.42	20
LVJ-118	9.23	122.69	3,037.10	1,500.00	117.737	8,902.11	20
LVJ-56	9.23	92.68	3,037.39	1,500.00	89.649	8,941.32	20
LVJ-137	9.23	114.32	3,101.17	1,500.00	105.648	9,059.61	20
LVJ-130	9.23	103.96	3,101.27	1,500.00	95.62	9,083.22	20
LVJ-200	9.23	81.23	3,096.17	1,500.00	73.433	9,110.08	20
LVJ-20	9.23	116.76	3,037.46	1,500.00	112.952	9,114.28	20
LVJ-136	9.23	103.23	3,101.14	1,500.00	94.998	9,155.70	20
LVJ-23	9.23	110.72	3,037.53	1,500.00	107.303	9,158.83	20
LVJ-45	9.23	109.81	3,037.43	1,500.00	106.259	9,170.33	20
LVJ-36	9.23	107.53	3,037.49	1,500.00	104.183	9,207.34	20
LVJ-55	9.23	106.98	3,037.40	1,500.00	103.66	9,259.03	20
LVJ-154	9.23	102.63	3,106.42	1,500.00	95.451	9,265.39	20
LVJ-132	9.23	112.37	3,101.35	1,500.00	103.811	9,302.54	20
LVJ-19	9.23	117.93	3,037.46	1,500.00	114.305	9,431.62	20
LVJ-22	9.23	112.01	3,037.50	1,500.00	108.692	9,439.22	20
LVJ-33	9.23	107.25	3,037.52	1,500.00	104.113	9,440.39	20
LVJ-34	9.23	119.10	3,037.46	1,500.00	115.473	9,462.05	20
LVJ-47	9.23	98.29	3,037.45	1,500.00	95.37	9,530.18	20
LVJ-173	9.23	95.83	3,105.06	1,500.00	88.861	9,621.82	20
LVJ-134	9.23	114.14	3,101.52	1,500.00	105.828	9,651.81	20
LVJ-171	9.23	102.02	3,105.53	1,500.00	94.891	9,674.29	20
LVJ-179	9.23	80.99	3,106.08	1,500.00	74.658	9,714.24	20
LVJ-133	9.23	109.63	3,101.33	1,500.00	101.42	9,745.94	20
LVJ-146	9.23	113.52	3,105.81	1,500.00	106.061	9,921.69	20
LVJ-58	9.23	101.00	3,037.49	1,500.00	98.537	10,053.18	20
LVJ-48	9.23	98.74	3,037.47	1,500.00	96.119	10,085.04	20
LVJ-172	9.23	94.15	3,103.83	1,500.00	87.36	10,138.19	20
LVJ-65	9.23	121.07	3,101.41	1,500.00	112.571	10,141.52	20
LVJ-37	9.23	102.47	3,037.49	1,500.00	99.822	10,162.13	20
LVJ-17	9.23	128.02	3,037.44	1,500.00	124.553	10,168.15	20
LVJ-169	9.23	111.55	3,105.62	1,500.00	104.272	10,181.72	20
LVJ-87	9.23	122.45	3,037.17	1,500.00	118.552	10,183.28	20
LVJ-187	9.23	108.31	3,106.29	1,500.00	101.314	10,281.62	20
LVJ-74	9.23	118.77	3,105.72	1,500.00	111.289	10,287.33	20
LVJ-18	9.23	120.91	3,037.46	1,500.00	117.747	10,319.03	20
LVJ-25	9.23	104.69	3,037.61	1,500.00	102.258	10,376.81	20
LVJ-43	9.23	111.55	3,037.43	1,500.00	108.671	10,433.93	20
LVJ-174	9.23	87.08	3,104.34	1,500.00	80.559	10,465.50	20
LVJ-29	9.23	94.34	3,037.73	1,500.00	92.443	10,631.07	20
LVJ-26	9.23	101.24	3,037.65	1,500.00	99.108	10,839.38	20
LVJ-44	9.23	104.19	3,037.45	1,500.00	101.782	10,982.94	20
LVJ-166	9.23	120.92	3,105.36	1,500.00	113.451	11,140.37	20
LVJ-38	9.23	107.10	3,037.46	1,500.00	104.72	11,168.08	20

Fire Flow

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)
LVJ-183	9.23	92.93	3,106.87	1,500.00	86.834	11,177.42	20
LVJ-24	9.23	106.40	3,037.56	1,500.00	104.218	11,188.14	20
LVJ-64	9.23	88.83	3,037.90	1,500.00	88.378	11,205.32	20
LVJ-31	9.23	98.50	3,037.52	1,500.00	96.42	11,235.04	20
LVJ-42	9.23	118.03	3,037.41	1,500.00	115.382	11,457.70	20
LVJ-39	9.23	113.94	3,037.46	1,500.00	111.496	11,468.68	20
LVJ-21	9.23	113.65	3,037.49	1,500.00	111.337	11,642.37	20
LVJ-35	9.23	110.09	3,037.47	1,500.00	107.856	11,723.59	20
LVJ-164	9.23	119.87	3,105.34	1,500.00	112.72	11,844.65	20
LVJ-88	9.23	123.66	3,037.30	1,500.00	120.719	11,895.02	20
LVJ-30	9.23	99.23	3,037.52	1,500.00	97.369	11,948.93	20
LVJ-16	9.23	120.47	3,037.43	1,500.00	118.047	12,047.28	20
LVJ-160	9.23	110.21	3,105.89	1,500.00	103.632	12,103.51	20
LVJ-66	9.23	122.16	3,102.73	1,500.00	114.371	12,192.61	20
LVJ-32	9.23	102.93	3,037.56	1,500.00	101.159	12,269.61	20
LVJ-162	9.23	114.30	3,105.71	1,500.00	107.644	12,381.94	20
LVJ-27	9.23	98.23	3,037.69	1,500.00	96.823	12,705.22	20
LVJ-153	9.23	106.78	3,106.29	1,500.00	100.5	12,709.49	20
LVJ-202	9.23	81.61	3,096.30	1,500.00	74.429	12,874.32	20
LVJ-79	9.23	123.79	3,037.37	1,500.00	121.342	12,917.53	20
LVJ-13	9.23	126.25	3,037.36	1,500.00	123.691	12,932.94	20
LVJ-159	9.23	125.10	3,105.08	1,500.00	117.953	12,994.28	20
LVJ-15	9.23	121.50	3,037.40	1,500.00	119.276	13,026.49	20
LVJ-178	9.23	87.85	3,105.82	1,500.00	81.942	13,037.32	20
LVJ-70	9.23	127.55	3,103.36	1,500.00	119.917	13,117.88	20
LVJ-201	9.23	84.21	3,094.83	1,500.00	76.963	13,179.81	20
LVJ-14	9.23	124.51	3,037.36	1,500.00	122.067	13,197.02	20
LVJ-170	9.23	96.62	3,105.47	1,500.00	90.462	13,378.99	20
LVJ-230	9.23	86.88	3,094.28	1,500.00	79.556	13,429.40	20
LVJ-168	9.23	106.70	3,105.69	1,500.00	100.503	13,525.43	20
LVJ-203	9.23	81.45	3,099.71	1,500.00	74.816	13,608.33	20
LVJ-165	9.23	115.33	3,105.48	1,500.00	108.821	13,811.71	20
LVJ-71	9.23	130.76	3,103.77	1,500.00	123.294	13,842.00	20
LVJ-182	9.23	98.13	3,106.62	1,500.00	92.357	14,177.09	20
LVJ-72	9.23	127.14	3,104.92	1,500.00	120.113	14,308.32	20
LVJ-163	9.23	110.23	3,105.70	1,500.00	104.094	14,569.30	20
LVJ-167	9.23	101.46	3,105.92	1,500.00	95.593	14,623.01	20
LVJ-158	9.23	120.87	3,105.29	1,500.00	114.33	14,870.22	20
LVJ-129	9.23	86.41	3,100.80	1,500.00	80.096	14,975.86	20
LVJ-161	9.23	107.44	3,105.93	1,500.00	101.535	15,103.79	20
LVJ-184	9.23	90.28	3,102.16	1,500.00	84.125	15,739.15	20.001
LVJ-152	9.23	91.55	3,103.49	1,500.00	85.609	16,242.91	20.001
LVJ-151	9.23	92.32	3,104.42	1,500.00	86.477	16,400.36	20.001
LVJ-150	9.23	94.05	3,105.48	1,500.00	88.495	17,145.04	20.001
LVJ-73	9.23	120.28	3,105.59	1,500.00	114.188	17,285.82	20.001
LVJ-181	9.23	87.08	3,108.70	1,500.00	82.188	17,504.80	20.001
LVJ-147	9.23	108.98	3,105.99	1,500.00	103.26	17,706.81	20.001
LVJ-155	9.23	111.34	3,105.88	1,500.00	105.562	17,717.30	20.001
LVJ-148	9.23	101.68	3,106.26	1,500.00	96.152	17,731.32	20.001
LVJ-180	9.23	92.47	3,107.28	1,500.00	87.294	17,814.50	20.001
LVJ-157	9.23	116.08	3,105.72	1,500.00	110.215	17,884.95	20.001
LVJ-28	9.23	91.83	3,037.93	1,500.00	91.759	18,022.77	20.001
LVJ-149	9.23	96.93	3,106.47	1,500.00	91.608	18,174.76	20.001

Peak Instantaneous Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-196	20.23	2,998.64	3,103.31	45.353
LVJ-192	20.23	2,983.23	3,102.13	51.52
LVJ-194	20.23	2,982.81	3,103.29	52.205
LVJ-195	20.23	2,976.33	3,103.30	55.014
LVJ-197	20.23	2,967.68	3,103.32	58.772
LVJ-193	20.23	2,966.88	3,102.90	58.939
LVJ-215	20.23	2,963.63	3,103.27	60.504
LVJ-216	20.23	2,958.66	3,101.84	62.04
LVJ-207	20.23	2,959.59	3,103.24	62.243
LVJ-206	20.23	2,955.29	3,103.23	64.101
LVJ-198	20.23	2,955.27	3,103.43	64.197
LVJ-219	20.23	2,952.74	3,103.23	65.206
LVJ-190	20.23	2,950.00	3,101.28	65.551
LVJ-214	20.23	2,950.65	3,103.29	66.137
LVJ-226	20.23	2,944.20	3,101.84	68.307
LVJ-208	20.23	2,940.75	3,103.59	70.557
LVJ-218	20.23	2,935.70	3,103.58	72.743
LVJ-220	20.23	2,935.00	3,103.38	72.96
LVJ-205	20.23	2,932.62	3,103.58	74.078
LVJ-213	20.23	2,931.45	3,103.60	74.592
LVJ-229	20.23	2,929.13	3,101.81	74.821
LVJ-228	20.23	2,927.43	3,101.71	75.514
LVJ-199	20.23	2,928.72	3,103.64	75.791
LVJ-209	20.23	2,926.09	3,103.80	77.001
LVJ-191	20.23	2,923.68	3,101.59	77.09
LVJ-212	20.23	2,923.92	3,103.62	77.862
LVJ-227	20.23	2,920.17	3,101.73	78.668
LVJ-222	20.23	2,918.09	3,101.61	79.519
LVJ-223	20.23	2,916.20	3,101.70	80.376
LVJ-75	20.23	2,844.36	3,031.48	81.079
LVJ-179	20.23	2,919.16	3,106.75	81.284
LVJ-186	20.23	2,918.30	3,106.32	81.47
LVJ-210	20.23	2,915.36	3,103.92	81.701
LVJ-217	20.23	2,915.11	3,104.02	81.853
LVJ-125	20.23	2,910.09	3,100.87	82.665
LVJ-204	20.23	2,912.92	3,104.08	82.83
LVJ-225	20.23	2,910.01	3,101.75	83.081
LVJ-127	20.23	2,909.42	3,101.38	83.178
LVJ-176	20.23	2,913.92	3,105.97	83.214
LVJ-203	20.23	2,911.74	3,104.82	83.66
LVJ-211	20.23	2,910.15	3,104.00	83.993
LVJ-177	20.23	2,911.87	3,105.97	84.102
LVJ-63	20.23	2,841.60	3,036.24	84.337
LVJ-200	20.23	2,908.70	3,104.04	84.64
LVJ-189	20.23	2,905.67	3,101.22	84.73
LVJ-202	20.23	2,907.97	3,104.65	85.222
LVJ-80	20.23	2,833.00	3,030.44	85.551
LVJ-224	20.23	2,903.88	3,101.74	85.732
LVJ-181	20.23	2,907.74	3,108.80	87.118
LVJ-126	20.23	2,899.96	3,101.15	87.175
LVJ-185	20.23	2,904.15	3,106.14	87.521
LVJ-52	20.23	2,830.50	3,032.95	87.723
LVJ-174	20.23	2,903.37	3,105.86	87.741
LVJ-178	20.23	2,903.07	3,106.51	88.15
LVJ-129	20.23	2,901.37	3,104.87	88.177
LVJ-201	20.23	2,900.48	3,104.59	88.439
LVJ-142	20.23	2,896.99	3,101.34	88.546

Peak Instantaneous Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-64	20.23	2,832.90	3,037.47	88.639
LVJ-81	20.23	2,824.27	3,029.43	88.897
LVJ-175	20.23	2,900.51	3,105.86	88.98
LVJ-128	20.23	2,896.36	3,102.45	89.3
LVJ-53	20.23	2,825.90	3,033.67	90.027
LVJ-56	20.23	2,823.50	3,031.49	90.12
LVJ-123	20.23	2,820.01	3,028.68	90.415
LVJ-83	20.23	2,819.40	3,029.04	90.836
LVJ-49	20.23	2,822.70	3,032.96	91.107
LVJ-230	20.23	2,893.78	3,104.59	91.342
LVJ-82	20.23	2,818.00	3,029.23	91.525
LVJ-184	20.23	2,893.81	3,105.23	91.608
LVJ-28	20.23	2,826.00	3,037.83	91.784
LVJ-145	20.23	2,890.26	3,102.27	91.865
LVJ-143	20.23	2,889.14	3,101.47	92.003
LVJ-51	20.23	2,820.00	3,032.96	92.274
LVJ-152	20.23	2,892.20	3,105.58	92.458
LVJ-180	20.23	2,893.88	3,107.38	92.511
LVJ-183	20.23	2,892.39	3,106.53	92.788
LVJ-138	20.23	2,886.69	3,101.09	92.901
LVJ-151	20.23	2,891.36	3,105.86	92.942
LVJ-50	20.23	2,818.00	3,032.87	93.105
LVJ-135	20.23	2,885.65	3,100.87	93.255
LVJ-29	20.23	2,820.00	3,035.85	93.528
LVJ-62	20.23	2,817.40	3,034.49	94.067
LVJ-150	20.23	2,888.42	3,106.18	94.355
LVJ-144	20.23	2,883.64	3,102.10	94.66
LVJ-172	20.23	2,886.55	3,105.61	94.919
LVJ-95	20.23	2,807.34	3,028.95	96.023
LVJ-89	20.23	2,807.49	3,029.21	96.069
LVJ-173	20.23	2,883.89	3,105.76	96.134
LVJ-47	20.23	2,810.60	3,032.80	96.279
LVJ-170	20.23	2,882.49	3,105.82	96.767
LVJ-31	20.23	2,810.20	3,033.67	96.831
LVJ-48	20.23	2,809.60	3,033.09	96.84
LVJ-149	20.23	2,882.76	3,106.57	96.977
LVJ-27	20.23	2,811.00	3,035.51	97.281
LVJ-30	20.23	2,808.50	3,033.63	97.549
LVJ-61	20.23	2,809.50	3,035.63	97.981
LVJ-182	20.23	2,880.14	3,106.29	97.992
LVJ-141	20.23	2,874.40	3,101.22	98.282
LVJ-139	20.23	2,874.09	3,101.04	98.335
LVJ-69	20.23	2,872.80	3,100.09	98.483
LVJ-46	20.23	2,805.00	3,032.61	98.623
LVJ-90	20.23	2,801.37	3,029.08	98.665
LVJ-58	20.23	2,804.40	3,032.68	98.912
LVJ-100	20.23	2,798.73	3,028.68	99.636
LVJ-98	20.23	2,799.07	3,029.05	99.649
LVJ-124	20.23	2,870.53	3,100.61	99.693
LVJ-76	20.23	2,869.55	3,100.16	99.924
LVJ-26	20.23	2,804.00	3,035.15	100.155
LVJ-37	20.23	2,801.00	3,033.35	100.676
LVJ-97	20.23	2,796.37	3,029.01	100.801
LVJ-96	20.23	2,795.74	3,028.94	101.044
LVJ-167	20.23	2,871.75	3,105.82	101.421
LVJ-32	20.23	2,800.00	3,034.15	101.456
LVJ-148	20.23	2,871.60	3,105.94	101.541

Peak Instantaneous Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-171	20.23	2,870.09	3,105.67	102.078
LVJ-44	20.23	2,797.00	3,032.84	102.189
LVJ-154	20.23	2,869.55	3,105.83	102.382
LVJ-41	20.23	2,794.00	3,031.54	102.928
LVJ-188	20.23	2,868.08	3,105.83	103.018
LVJ-136	20.23	2,862.91	3,100.88	103.113
LVJ-25	20.23	2,796.00	3,034.76	103.456
LVJ-130	20.23	2,861.34	3,100.63	103.682
LVJ-93	20.23	2,788.04	3,028.94	104.382
LVJ-55	20.23	2,790.50	3,031.44	104.399
LVJ-92	20.23	2,787.67	3,029.00	104.569
LVJ-94	20.23	2,786.76	3,028.93	104.932
LVJ-24	20.23	2,792.00	3,034.22	104.952
LVJ-38	20.23	2,790.30	3,032.95	105.141
LVJ-85	20.23	2,785.76	3,028.90	105.352
LVJ-59	20.23	2,790.60	3,033.75	105.358
LVJ-33	20.23	2,790.00	3,033.74	105.613
LVJ-36	20.23	2,789.34	3,033.39	105.746
LVJ-84	20.23	2,784.30	3,028.95	106.005
LVJ-91	20.23	2,783.61	3,029.03	106.342
LVJ-40	20.23	2,786.00	3,031.51	106.381
LVJ-153	20.23	2,859.85	3,105.67	106.515
LVJ-168	20.23	2,859.44	3,105.42	106.585
LVJ-101	20.23	2,781.32	3,028.67	107.176
LVJ-161	20.23	2,857.97	3,105.49	107.251
LVJ-102	20.23	2,780.41	3,028.66	107.568
LVJ-45	20.23	2,784.00	3,032.46	107.657
LVJ-187	20.23	2,856.33	3,105.67	108.04
LVJ-140	20.23	2,851.52	3,100.98	108.092
LVJ-35	20.23	2,783.40	3,033.13	108.208
LVJ-147	20.23	2,854.48	3,105.22	108.645
LVJ-57	20.23	2,780.80	3,031.78	108.748
LVJ-23	20.23	2,782.00	3,033.87	109.136
LVJ-99	20.23	2,776.35	3,028.72	109.35
LVJ-133	20.23	2,848.31	3,100.68	109.351
LVJ-43	20.23	2,780.00	3,032.37	109.353
LVJ-160	20.23	2,851.54	3,105.07	109.855
LVJ-163	20.23	2,851.31	3,105.05	109.945
LVJ-60	20.23	2,779.80	3,033.75	110.037
LVJ-22	20.23	2,779.00	3,033.54	110.292
LVJ-155	20.23	2,848.92	3,104.97	110.947
LVJ-103	20.23	2,772.13	3,028.66	111.155
LVJ-169	20.23	2,848.18	3,105.17	111.353
LVJ-21	20.23	2,775.19	3,033.35	111.861
LVJ-132	20.23	2,842.02	3,100.31	111.917
LVJ-39	20.23	2,774.50	3,032.89	111.958
LVJ-131	20.23	2,840.65	3,100.42	112.557
LVJ-146	20.23	2,843.82	3,104.64	113.013
LVJ-162	20.23	2,841.92	3,104.67	113.849
LVJ-134	20.23	2,838.11	3,100.93	113.88
LVJ-86	20.23	2,765.55	3,028.90	114.111
LVJ-137	20.23	2,837.34	3,100.92	114.21
LVJ-20	20.23	2,768.00	3,032.99	114.819
LVJ-165	20.23	2,839.32	3,104.70	114.989
LVJ-42	20.23	2,765.00	3,031.66	115.542
LVJ-157	20.23	2,837.81	3,104.57	115.586
LVJ-104	20.23	2,761.69	3,028.66	115.679

Peak Instantaneous Demand

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
LVJ-107	20.23	2,761.38	3,028.68	115.822
LVJ-19	20.23	2,765.30	3,032.92	115.96
LVJ-156	20.23	2,835.98	3,104.97	116.553
LVJ-34	20.23	2,762.60	3,032.97	117.152
LVJ-108	20.23	2,757.88	3,028.68	117.339
LVJ-74	20.23	2,831.60	3,104.35	118.183
LVJ-16	20.23	2,759.40	3,032.23	118.219
LVJ-106	20.23	2,755.23	3,028.68	118.485
LVJ-87	20.23	2,754.58	3,028.92	118.871
LVJ-78	20.23	2,830.00	3,104.35	118.875
LVJ-18	20.23	2,758.40	3,032.86	118.925
LVJ-15	20.23	2,757.00	3,031.47	118.928
LVJ-118	20.23	2,753.95	3,028.72	119.056
LVJ-164	20.23	2,828.69	3,104.31	119.427
LVJ-73	20.23	2,828.00	3,103.98	119.582
LVJ-88	20.23	2,751.91	3,029.21	120.154
LVJ-158	20.23	2,826.33	3,104.20	120.399
LVJ-65	20.23	2,822.00	3,099.94	120.429
LVJ-166	20.23	2,826.28	3,104.48	120.545
LVJ-79	20.23	2,751.68	3,029.92	120.563
LVJ-14	20.23	2,750.00	3,029.34	121.038
LVJ-109	20.23	2,748.00	3,028.66	121.612
LVJ-66	20.23	2,820.80	3,101.54	121.644
LVJ-105	20.23	2,747.90	3,028.66	121.654
LVJ-119	20.23	2,747.50	3,028.69	121.841
LVJ-120	20.23	2,746.73	3,028.70	122.178
LVJ-13	20.23	2,746.00	3,029.18	122.702
LVJ-121	20.23	2,743.61	3,028.68	123.522
LVJ-111	20.23	2,743.27	3,028.66	123.661
LVJ-117	20.23	2,742.00	3,028.69	124.22
LVJ-116	20.23	2,741.68	3,028.67	124.354
LVJ-159	20.23	2,816.37	3,104.01	124.636
LVJ-122	20.23	2,740.81	3,028.67	124.728
LVJ-17	20.23	2,742.00	3,032.59	125.912
LVJ-72	20.23	2,811.50	3,103.57	126.554
LVJ-70	20.23	2,809.00	3,102.14	127.017
LVJ-115	20.23	2,735.38	3,028.67	127.081
LVJ-67	20.23	2,808.00	3,101.53	127.186
LVJ-68	20.23	2,802.00	3,101.53	129.785
LVJ-114	20.23	2,728.53	3,028.66	130.047
LVJ-71	20.23	2,802.00	3,102.54	130.223
LVJ-110	20.23	2,713.72	3,028.66	136.465
LVJ-113	20.23	2,710.80	3,028.66	137.729
LVJ-112	20.23	2,710.80	3,028.66	137.729

LONG VALLEY TRAILS SUBDIVISION
WASTEWATER REPORT

August 2020

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1. INTRODUCTION & DESIGN CRITERIA

A. INTRODUCTION

The Long Valley Trails Subdivision is located in Washington County, Utah within Sections 20, 29, 30, &31, Township 42 South, Range 14 West, Salt Lake Base and Meridian. Access to the property is achieved from the Southern Parkway at the intersection with Long Valley Road. The subdivision is bounded by the Southern Parkway to the west and north, Warner Ridge to the east, and private property to the south.

The proposed project covers approximately 450 acres and consists of 2,361 units. Of the total 2,361 units are 1,111 residential lots, 698 condominiums, 356 townhomes, 189 cottages, and 7 clubhouses.

B. DESIGN CRITERIA

i. Number of ERCs

The proposed project has a total of 2,361 units. Assuming all units are equal to one Equivalent Residential Connection (ERC), with exception of the clubhouses being two ERCs, the total number of ERCs is 2,368.

Unit Type	Unit Count	ERCs/Unit	Total ERCs
Residential Lots	1,111	1	1,111
Condominiums	698	1	698
Townhomes	356	1	356
Cottages	189	1	189
Clubhouses	7	2	14
Total ERCs			2,368

ii. Calculated Demands

The Utah Administrative Code R317-3-2.2(B)(2) and Washington City Design Standards Section 3.5.1 require using design flows of 250 gallons per day per person for design of mains, trunks, and outfalls. Washington City's most recent Wastewater Capital Improvements Plan (March 2017) states a value of 2.88 people per each residential unit. These numbers were multiplied together in the following equation to determine the total design flows form the subdivision at buildout.

$$2{,}368\ ERCs \times \frac{2.88\ persons}{ERC} \times \frac{250\ gal}{day \times person} \times \frac{1\ day}{1440\ min} = 1{,}184\ gpm$$

The resulting value of 1,184 gpm of design flow can be anticipated from the Long Valley Trails Subdivision based on the current Master Plan of the subdivision. The value of 1,184 gpm will be referred to as the buildout design flow.

2. SEWER MODEL

A. MODEL SETUP

The model of Washington City's wastewater system that was used for the City's March 2017 Wastewater Capital Improvements Plan was updated to aid in recommendations for current and buildout release of its wastewater into larger trunk lines. According to the model, the overall sewer system south of the river currently has locations that are at or near their capacity. The intent of the Developer is to initially run sewer through the gravity system towards the sewer lift station being built at S. County Way until said lift station or the lines downstream approaches capacity. This would allow for some initial phases of the subdivision to be constructed prior to the need for a dedicated lift station for the Long Valley Trails Subdivision.

The City is in the process of building the aforementioned lift station on S. Country Way adjacent to Washington Dam Road. Wastewater could be sent to this lift station and from there pumped into the line running to the west down Washington Dam Rd. The line in Washington Dam Rd. feeds into the trunk line at Nielson Ranch Rd., 140 W., 2000 S. This trunk line serves the northern part of the Washington Fields area. According to the Capital Improvements Plan and verified by the updated model, following improvements by the City, the trunk line in this area will only be able to handle a limited number of additional units.

After the subdivision is no longer able to send additional wastewater to the City's lift station, the development would need to construct a separate lift station. This new lift station would take wastewater and pump it south through Long Valley and tie into the line on 3650 S. This line goes to the system that serves the southern portion of the Washington Fields area.

The model was used to determine how much flow could be taken to the City's lift station on S. Country Way and then if the trunk line starting at 3650 S. could handle the buildout flow from the subdivision.

B. RESULTS

Northern Washington Fields (Nielson Ranch Rd., 140 W., 2000 S.)

According to the model and based on the design flows input into the model, the trunk line in this area is already at its capacity. The City's Wastewater Capital Improvements Plan recommended installing a parallel 12" line to increase capacity in this area. The City has preliminary plans to complete this project in the near future. Based on results from the model, no additional flow could be sent to this trunk line until the City installs the parallel line.

After the parallel line is added, the model shows that there would be an additional available capacity of 278 gpm or 556 ERC's in the lines downstream of the lift station. This additional capacity could act as an interim capacity for the Long Valley Trails Subdivision which would allow for construction of initial phases

in the subdivision. The Long Valley Trails Subdivision has the ability to send wastewater to the trunk line in 3650 S. Because of this, when the northern Washington fields trunk line is nearing capacity, the Long Valley Trails Subdivision would need to send all of its wastewater to the southern Washington Fields trunk line.

The new line to be installed down Washington Dam Road is planned to be a 10" line. The 10" line was modeled and results show that it will meet the requirements for the maximum 556 ERC's that can feed into the northern Washington Fields trunk line.

Southern Washington Fields (3650 S.)

The main trunk line that would be tied into on 3650 S. has a segment of undersized pipe. This area currently has more available capacity than the lines serving the northern Washington Fields area. However, there is not enough available capacity to handle the flows from the fully built subdivision. The City's Wastewater Capital Improvements Plan included this line to be upsized in the 10 to 20-year horizon.

According to the model, this line can handle approximately an additional 355 gpm or 711 ERC's before it reaches capacity. After the line is upsized, the model indicates that the trunk line would have capacity to handle the full demand from the subdivision and still be under capacity.

Sewer System within the Subdivision

Based on topography of the subdivision area, nearly all wastewater would need to be sent to a lift station constructed at the north end of the subdivision and pumped to the south in order for the wastewater to reach 3650 S. It is recommended that the lift station and main trunk line heading to 3650 S. be designed to handle the full buildout design flow unless it can be shown based on grading design that areas can gravity feed to the south. All trunk lines within the subdivision should be designed during each phase with consideration of the other phases based on slopes/elevations.

3. CONCLUSIONS AND RECOMMENDATIONS

The intent of the Developer is to start the construction of the initial phases of the Long Valley Trails development while the City works on constructing a trunk line in the north Washington Fields area. It is recommended that the City completes this trunk line as soon as possible to eliminate any possible capacity issues.

With the addition of this parallel line, the capacity of the contributing area will increase by approximately 556 additional units. This capacity would allow more units to be built within the contributing area, including but not limited to the Long Valley area. As the limit of additional units approaches, the Long Valley Trails Subdivision would need to construct a lift station and line to connect to the system at 3650 S.

After the northern Washington Fields trunk line reaches capacity, the subdivision will then need to send all of its wastewater south. The City's existing trunk line in 3650 S. would need to be improved as per the City's Wastewater Capital Improvements Plan - after which the trunk line is anticipated to have the capacity to handle the full buildout flow from this master planned subdivision.

APPENDIX A

EXHIBIT

LONG VALLEY TRAILS SUBDIVISION

NORTH

SCALE
0 1500 3000

HORIZ: 1" =3000'

FUTURE LINE/FLOW FROM OTHERS

FORCE MAIN TO NORTHERN WASHINGTON FIELDS TRUNK LINE

NEW 10" GRAVITY LINE TO LIFT STATION

LIFT STATION TO BE INSTALLED BY CITY

FUTURE PARALLEL LINE TO BE INSTALLED BY CITY. EXACT LOCATION OF IMPROVEMENTS T.B.D.

LONG VALLEY TRAILS SUBDIVISION LOCATION

FUTURE GRAVITY TRUNK LINE AND FORCE MAIN

FUTURE LIFT STATION INSTALLED BY SUBDIVISION

NORTHERN WASHINGTON FIELDS TRUNK LINE

SOUTHERN WASHINGTON FIELDS TRUNK LINE

FUTURE LINE UPSIZE

FUTURE GRAVITY LINE

SUNRISE ENGINEERING
11 NORTH 300 WEST
WASHINGTON, UT 84780
TEL 435.652.8450 · FAX 435.652.8416
www.sunrise-eng.com

P:\Washington City\WW\05155 Wastewater Master Plan Update\dwg\10 YEAR IMPROVEMENTS.dwg Aug 05, 2020 11:06am dleonard

LONG VALLEY TRAILS

Landscape Standards

Section 6

Project Landscaping:

Long Valley Trails is planned to be a waterwise community that provides an attractive landscape environment for each residential lot and unit as well as all the common areas and streetscapes within the project. The landscape types, plants and examples shown in this section are for demonstration purposes and the developer and the City acknowledge that these standards can be enhanced and modified to take advantage of the latest developments and techniques in waterwise landscaping. These standards will not be change in any manner that will reduce the quality and or quantity of the landscaping shown in this section. It is a major goal of Long Valley Trails to be the most attractive and best waterwise community in Washington City,

The project will promote and incorporate a variety of street trees that will provide shade and help cool the adjoining amenity areas and trails. Extensive and ongoing research will be conducted to identify and utilize trees and other plants that will provide beautiful yards, streets and common areas which require less water, while still being able to thrive in our desert climate. While many natural areas will remain in their natural state, these areas will be enhanced with plants and landscape elements that will not require irrigation but that will significantly beautify the area, Xero-scape will not become Zero-scape where no effort is made to improve and enhance the beauty of the natural areas within Long Valley Trails. Areas of natural un-disturbed beauty can and will be maintained and preserved.

Appendix A
Long Valley Approved Plant Lists

Low Water Use Plants

TREES	
Common Name	Scientific Name
Rocky Mtn. Maple	Acer glabrum
Bigtooth Maple	Acer grandidentatum
Ohio Buckeye	Aesculus glabra
Western Catalpa	Catalpa speciosa
Common Hackberry	Celtis occidentalis
Western Hackberry	Cetris reticulata
Smoke Tree	Continus obovatus
Cockspur Hawthorne	Crataegus crusgalli inermis
Single-leaf Ash	Fraxinus anomala
Green Ash	Fraxinus pennslyvanica
Kentucky Coffee Tree	Gymnocladus dioica
Rocky Mtn. Juniper	Juniperus scopulorum
Utah Juniper	Juniperus utahensis
Goldenrain tree	Koelreuteria paniculata
Bristlecone Pine	Pinus aristata
Pinyon Pine	Pinus edulis
Limber Pine	Pinus flexilis
Ponderosa Pine	Pinus ponderosa
Lanceleaf Cottonwood	Populus acuminata
Wafer Ash	Ptelea trifoliata
Gambel Oak	Quercus gambelii
Burr Oak	Quercus macrocarpa
New Mexico Locust	Robinia neomexicana

SHRUBS	
Common Name	Scientific Name
Manzanita	Arctostaphylos patula
Serviceberry	Amelanchier alnifolia
Dwarf Indigo bush	Amorpha nana
Sand Sagebrush	Artemisia filifolia
Fringed sagebrush	Artemisia frigida
Black sagebrush	Artemisia nova
Big sagebrush	Artemisia tridentata
Fourwing saltbush	Atriplex canescens
Blue mist spirea	Caryopteris clandonensis
Fendler ceanothus	Ceanothus fendleri
Snowbrush	Ceanothus velutinus
Winterfat	Ceratoides (Eurotia) lanata
Curl-leaf mtn.mahongany	Cercocarpus ledifolius
Birch-leaf mtn.mahongany	Cerocarpus montanus
Rubber rabbitbrush	Chrysothamnus nauseous
Fernbush	Chamaebatiaria millefolium
Cotoneaster	Cotoneaster sp
Cliffrose	Cowania mexicana
Mormon tea	Ephedra viridis
Apache plume	Fallugia paradoxa
New Mexico Privet	Forestiera neomexicana
Broom snakeweed	Gutierrezia sarothrae
Rock cliff spirea	Holodiscus dumosus
Fremont barberry	Mahonia fremontii
Mock orange	Philadelphus microphyllus
Mugo pine	Pinus mugo
Chokecherry	Prunus virginiana
Antelope bitterbrush	Purshia tridentata

GRASSES	
Common Name	Scientific Name
Crested wheatgrass	Agropyron cristatum
streambank wheatgrass	Agropyron/Elymus riparium
Western wheatgrass	Agropyron/Pascopyrum smithii
Bluebunch wheatgrass	Agropyron/Psedoroegneria
Sideoats grama	Bouteloua curtipendula
Blue grama	Bouteloua gracilis
Smooth brome	Bromus inermis
Buffalograss	Buchloe dadtyloides
Slender wheatgrass	Elymus trachycaulus
Tall or lawn fescue	Festuca arundiacea
Idaho fescue	Festuca idahoensis
Sheep fescue	Festuca ovina
Creeping red fescue	Festuca rubra
Galleta grass	Hilaria jamesii
Prairie junegrass	Koeleria cristata
Mountain muhly	Muhlenbergia montana
Indian ricegrass	Oryzopsis hymenoides
Sandberg/Big bluegrass	Poa secunda
Alkali sacaton	Sporobolus airoides
Sand dropseed	Sporobolus cryptandrus
Needleandthread	Stipa comata

SHRUBS (con't.)	
Fragrant sumac	Rhus aromatica
Dwarf smooth sumac	Rhus glabra cismontata
Three-leaf sumac	Rhus trilobata
Woods rose	Rosa woodsii
Silver buffaloberry	Shepherdia argentea

No plant types are allowed in areas where street sight distances may be limited!

Appendix A
Long Valley Approved Plant Lists

Low Water Use Plants

GROUND COVERS	
Common Name	Scientific Name
Greek Yarrow	Achillea ageratifolia
Carpet bugle	Ajuga reptans
Dwarf pussy toes	Antennaria sp.
Kinnikinnick / Bearberry	Arctostaphylos uva-ursi
Dalmatian bellflower	Campanula portenshlagiana
Hardy plumbago	Ceratostigma plumbaginoides
Hardy purple ice plant	Delosperma cooperi
Sweet woodruff	Galium odoratum
Horizontal juniper	Juniperus horizontalis
Creeping Oregon grape	Mahonia repens
Creeping shrubby ice plant	Ruschia pulrinaris
Two-row stonecrop	Sedum spurium
Thyme	Thymus sp.
Red devil verbena	Verbena peruviana
Speedwell	Veronica sp.

SUCCULENTS	
Common Name	Scientific Name
Agave/Century plant	Agave parryi
Sotol	Dasylirion wheeleri
Claretcup Hedgehog cactus	Echinocereus sp.
Pincushion cactus	Escobaria sp.
Texas red Yucca	Hesperaloe parvifolia
Prickly pear	Opuntia sp.
Hens & Chicks	Sempervivum tectorum
Yucca	Yucca sp.

VINES	
Common Name	Scientific Name
Fiveleaf akebia	Akebia quinata
Trumpet vine	Campsis radicans
Coral honeysuckle	Lonicera sempervirens
virginia creeper	Parthenocissus quinquefolia
Silverlace vine	Polygonum aubertii
Wisteria	Wisteria sp.

WILDFLOWERS & FORBES	
Common Name	Scientific Name
Yarrow	Achillea sp.
Double bubblemint	Agastache cana
Pink pussy toes	Antennaria rosea
Butterfly weed	Asclepias tuberosa
Chocolate flower	Berlandiara lyrata
Poppy mallow	Callirhoe involucrata
Sun drops	Calylophus hartwegii
Coreopsis	Coreopsis sp.
Coneflower	Echinacea purpurea
Buckwheat	Criogonum sp.
Gaillardia	Gaillardia grandiflora
Guara	Guara linheimeri
Maximilian's sunflower	Helianthus maximiliani
Skyrocket	Ipomopsis rubra
Lavender	Lavendula angustifolia
Blue flax	Linum perenne lewisii
4 O'Clock	Mirabilis multiflora
Blue catmint	Nepeta x faassenii
Evening primrose	Oenothera sp.

WILDFLWS & FORBS (con't.)	
Common Name	Scientific Name
Penstemon	Penstemon sp.
Russian sage	Perovskia atriplicifolia
Purple prairie clover	Petalostemum purpureum
Mexican hat	Ratibida columnifera
Black-eyed susan	Rudbeckia fulgida/hirta
Sage	Salvia sp.
Sedum	Sedum sp/
globermallow	Sphaeralcea sp.
Prince's plume	Stanleya pinnata
Hummingbird trumpet	Zauschneria arizonica
Showy goldereye	Viguiera multiflora
Desert zinnia	Zinnia grandiflora

Long Valley Trails - Enhanced Desert Landscape



Long Valley Trails - Enhanced Desert Landscape



Long Valley Trails – Desert Garden Landscape



Long Valley Trails - Desert Garden Landscape



Long Valley Trails – Desert Oasis Landscape



Long Valley Trails – Residential Yard Landscape



Long Valley Trails – Residential Yard Landscape



LONG VALLEY TRAILS

Geotechnical/Soils Study

Section 7

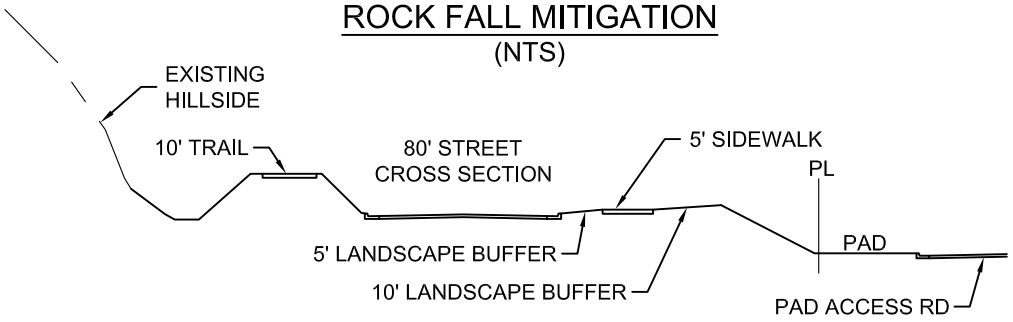
Geotechnical/Soils and Rock Fall:

Long Valley Trails like any large tract of land in Washington County contains a variety of soil types and characteristics. The successful development of any land requires a comprehensive understanding of these soils and the creation of a workable development master plan requires that the characteristics of the soils be considered in the planning and layout of the land.

Long Valley Trails has conducted 3 separate studies in the planning and development of a master plan for this property. A comprehensive geotechnical study was performed on the entire 605-acre site. In addition to this comprehensive study a more detailed study was conducted in conjunction with the upgrade of the Dixie REA powerline. The upgrade of this line included the grading of over 200,000 cubic yards of material to lower the new power poles being installed. The third study addressed the rock fall potential along the Warner Valley Ridge. This ridge runs along the Easterly boundary of the entire parcel and the actual boundary of Long Valley runs along the top of this ridgeline.

The detailed Rock Fall Study identifies the extend of the natural rock fall areas. This study along with the detailed design of Long Valley Trails will ensure that no homes will be subject to these rock fall hazards. The project master plan shows a major roadway running along the toe of this slope and a detailed cross section contained in this Section shows how this cross section, which includes berms and a trapezoidal channel will effectively mitigate any rock fall that may occur. The design of these berms and channel will also protect the planned trail and roadway running along the Warner Valley Ridge. The detailed design of each segment of this road will include an evaluation by AGEC (the geotechnical engineer) of each rock formation above the roadway. This evaluation will ensure that any potential rock fall will be stopped by the berms and channel or in very limited cases rocks may be forced to fall prior to construction of the planned improvements.

ROCK FALL MITIGATION
(NTS)



ROCK FALL MITIGATION EXHIBIT

LONG VALLEY TRAILS
BRENNAN HOLDINGS, LLC

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ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
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BG JOB# 161174 Road Cross Section

AGEC

Applied GeoTech

GEOTECHNICAL INVESTIGATION

LONG VALLEY TRAILS

WASHINGTON COUNTY, UTAH

PREPARED FOR:

BRENNAN HOLDINGS NO. 100
205 EAST TABERNACLE, SUITE #4
ST. GEORGE UT 84770

ATTENTION: JIM RAINES

PROJECT NO. 2171312

JANUARY 29, 2019

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

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SUMMARY

1. AGEC has conducted a preliminary geotechnical and geological study for the approximately 605 acre area located east and south of the Southern Parkway in the area known as Long Valley. The subsurface conditions were evaluated by excavation of 25 test pits at the locations shown on Figure 2. In addition, AGEC has previously completed a geotechnical study for the proposed Long Valley Parkway Road where 18 additional test pits were excavated along the proposed alignment also shown on Figure 2.

The subsurface conditions observed within the test pits varies from shallow bedrock to silty sand with varied amounts of fines. The bedrock consists of 5 different members of the Moenkopi Formation, 1 member of the Chinle Formation and 1 member of the Kaibab Formation.

Bedrock from the Upper Red Member (Trmu) consists of red, siltstone and sandstone along the east bench and white to gray siltstone and gypsum from the Shnabkaib member (Trms) was encountered in the lower east bench. There are locations where the bedrock is exposed through the center of the site consisting of red shale, siltstone and sandstone from the Middle Red Member (Trmm).

The majority of the western portion of the site consists of silty sand with varied amounts of silt. Concealed below the silty sand is the Virgin River Formation (Trmv) that consists of 3 gray to yellowish brown limestone layers interbedded with claystone and siltstone layers. The claystone layers within this member are known to be expansive. The geology maps show several locations where the limestone layers are outcropping. These areas will require additional investigation to determine the extent, depth and expansive nature of the claystone. The geologic literature indicates the Virgin River Limestone member varies from 25 to 115 feet thick, thus the area affected depends on the dipping angle of the bedrock. The mapped angles vary from 20 to 37 degrees within the property with the steeper areas along the southern portion (see Figure 3A and 3B).

2. Groundwater was not encountered within the test pits to the maximum depths investigated.

3. Based on the subsurface conditions and initial laboratory testing, the proposed structures within the development may be constructed on conventional foundations supported on bedrock, dense silty sands or compacted fills. We anticipate a significant amount of grading will occur to grade the site. As phases of the development are designed, AGEC should conduct additional investigation utilizing the proposed grading to provide detailed recommendations for each phase.

The eolian silty sand was found to be loose to significant depths. The sands will likely require overexcavation or densification by pre-wetting. The pre-wetting treatment has been used with success throughout the area.

In areas where the expansive claystone or mudstone is found, our experience has shown that a separation of 17 feet is suitable between pad grade and the expansive materials. This may be accomplished by overexcavation or raising areas of concern.

4. The on-site materials may be re-used as grading fill. The expansive claystone materials should not be used in structural areas. Some difficulty may be encountered when excavating the limestone layers within the Virgin River Limestone and the Shnabkaib siltstone and gypsum materials, particularly in confined excavations such as utility trenches. These materials may require the use of rock hammer or light blasting. These materials may also require processing or breaking them up to re-use as fill. The Virgin River Limestone may be re-used as rock stacking materials for rock walls.

5. The eastern slope is moderately steep and is capped by conglomerate and sandstone bedrock from the Shinarump Conglomerate member (Trcs). AGEC has conducted a rock fall evaluation for the general area and provided a "runout line" of expected development limits. The study is included in the appendix of the report. We would recommend further evaluation as each area encroaches into the area of potential rockfall to refine the "runout line".

6. AGEC has also reviewed the geologic literature to determine geologic hazards on the site. Other than the potential rock fall, expansive soils, hard bedrock and loose or collapsible soils, no other significant hazards were identified. Maps of the various hazards are included in Figures 3A through 3F.

7. The information provided in this summary should not be used independent of that provided within the body of this report.

SCOPE

This report presents the results of a preliminary geotechnical investigation and geologic hazard study for the proposed Long Valley Trails at Long development as shown on Figure 1 and 2. This report presents the subsurface conditions encountered, laboratory test results, and recommendations for the project. This report was prepared in general accordance with the Cost Estimate for Professional Geotechnical Services dated August 16, 2017.

Field exploration was conducted to obtain information on the subsurface conditions and to obtain samples for laboratory testing. Information obtained from the field was used to define conditions at the site and to develop recommendations for the proposed development.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Preliminary design parameters and a discussion of geotechnical engineering considerations related to construction are included in this report.

SITE CONDITIONS

The proposed Long Valley Trails development is located west and north of the Southern Parkway (SR-7) near the Washington Dam Road Interchange as shown on Figure 1. The property is primarily a valley between the Washington Dome to the west and a large ridge to the east. The development area generally slopes down from the south to the north with each hillside sloping down to the approximate center of the property. There are several small erosion washes and drainage areas that are exposed along both hillside slopes. The northern edge of the property and the proposed alignment of Long Valley Parkway has also been recently, partially graded for installation of the new overhead power line.

There is moderate vegetation consisting of small brush and desert grasses and plants. The majority of the west and south end of the site is covered with sand soils. Several bedrock outcroppings are visible, primarily along the north and eastern portion of the site.

GEOLOGIC HAZARD EVALUATION

AGEC has evaluated the potential geologic hazards as shown in Figures 3A through 3F. AGEC has utilized the most recent geologic literature, conducted a field study (Rock Fall Evaluation), previously noted and attached and the field exploration to preliminarily evaluate the subsurface conditions.

Rock Fall - AGEC has previously conducted a preliminary rockfall evaluation and provided a "runout line" for the potential rock fall zone. The results of this evaluation are attached. We recommend that further evaluation for refinement of the "runout line" be conducted in areas where the development extends into or near the line.

Expansive Soils/Bedrock - Figure 3D shows hazard map for potential expansive soils. As discussed above, the Virgin River Limestone member of the Moekopi Formation is a potential risk of expansive soil/rock. There are several small outcroppings of the limestone mapped and have been field identified. These areas were investigated by limited subsurface exploration. Through the majority of the area within the property where the potential exists, there is sand overlying the concealed bedrock. These areas should be further evaluated as each phase or grading is planned.

Collapsible Soils - Figure 3E shows the hazard map for areas of potential collapsible soils. In addition, AGEC conducted several explorations and laboratory tests on samples of the sand. The thickest areas of sand appear to be located on the south end of the property. These sediments are deposited by wind and generally in a loose state. In addition, alluvial soils that are deposited during rainfall events over time have also been found to be moisture sensitive.

These soils generally collapse or densify when wetted. The extent and depth of these soils should also be further refined prior to each phase of grading.

Shallow Bedrock - Figure 3F shows the hazard map for areas of potential shallow bedrock. Our experience in the area has shown that the Shnabkaib Member and portions of the Virgin River Limestone are difficult to excavate. In most cases, large excavation equipment can be used to remove these materials. In some cases, light blasting may be required. The northeastern and eastern portion of site contains the Shanbkaib Member. This member can be seen as light gray or white rock. The limestone is generally concealed as described above in the expansive soils/rock section. The limestone is generally 3 to 10 feet in thickness and generally fractured when near the surface.

PRELIMINARY FIELD STUDY

On August 22-24, 2017, an engineer from AGEC visited the site and observed the excavation of 25 test pits at the approximate locations shown on the Site Plan, Figure 2. In addition, 18 test pits were excavated along the proposed Long Valley Parkway as shown on Figure 2. The locations were determined from the survey stakes provided by Bush & Gudgell, Inc. The test pits were excavated with a track mounted excavator. The subsurface soil profile was logged and soil samples were obtained by an engineer from AGEC.

SUBSURFACE SOIL CONDITIONS

The subsurface conditions observed within the test pits varies from shallow bedrock to silty sand with varied amounts of fines. The bedrock consists of 5 different members of the Moenkopi Formation, 1 member of the Chinle Formation and 1 member of the Kaibab Formation.

Bedrock from the Upper Red Member (Trmu) consists of red, siltstone and sandstone along the east bench and white to gray siltstone and gypsum from the Shnabkaib member (Trms) was encountered in the lower east bench. There are locations where the bedrock is exposed through the center of the site consisting of red shale, siltstone and sandstone from the Middle Red Member (Trmm). .

The majority of the western portion of the site consists of silty sand with varied amounts of silt. Concealed below the silty sand is the Virgin River Formation (Trmv) that consists of 3 gray to yellowish brown limestone layers interbedded with claystone and siltstone layers. The claystone layers within this member are known to be expansive. The geology maps show several locations where the limestone layers are outcropping. These areas will require additional investigation to determine the extent, depth and expansive nature of the claystone. The geologic literature indicates the Virgin River Limestone member varies from 25 to 115 feet thick, thus the area affected depends on the dipping angle of the bedrock. The mapped angles vary from 20 to 37 degrees within the property with the steeper areas along the southern portion (see Figure 3A and 3B).

Descriptions of the various rock or soil types encountered are as follows.

Clayey Sand - The clayey sand is generally medium dense to dense, dry to slightly moist, contains occasional gravel, and is red to brown in color. Portions of the clayey sand are slightly cemented.

Silty Sand - The silty sand contains occasional gravel and varied amounts of fines. The material varies from loose to medium dense and is reddish brown in color. Portions of the silty sand are slightly to moderately cemented.

Poorly Graded Sand with Silt - The poorly graded sand with silt is loose to medium dense, dry to slightly moist, and reddish brown in color.

Siltstone Bedrock - The siltstone bedrock is part of the Middle Red Member of the Moenkopi Formation. It consists of interlayered siltstone, fine graded sandstone and occasional mudstone. The siltstone is generally weathered in the upper several feet and varies from soft to moderately hard, dry to slightly moist and red to brown in color. It is non to low plastic.

Mudstone Bedrock - The mudstone bedrock encountered is part of Middle Red Member of the Moenkopi Formation. It has occasional layers of siltstone and fine grained sandstone. The mudstone is moderately hard, medium plastic and red in color.

Claystone Bedrock - The claystone bedrock is part of the Virgin River Limestone Member. It is moderately hard, slightly moist, medium to highly plastic and is yellow to brown in color. The claystone was found primarily in TP-3 (this study).

Limestone Bedrock - The limestone bedrock is part of the Virgin River Limestone member of the Moenkopi Formation. It was encountered in TP-11 (this study) at 8 feet and in TP-17 (Parkway study) at a depth of 11 feet. The limestone is generally hard and is slightly fractured, dry and yellow to gray in color.

LABORATORY TESTING

AGEC conducted several laboratory tests on samples obtained during the field study. The following tests were conducted for the listed test method.

Test	Test Method
Moisture Density Relation (Proctor)	ASTM D1557
Atterberg Limits	ASTM D4318 - 10e1
Gradation	ASTM D117/ASTM D6913M-17
One-Dimensional Consolidation/Swell	ASTM D2435M-11
California Bearing Ratio	ASTM D1883
In-Place Density of Soil	ASTM D 7263-09
Moisture Content	ASTM D2216-10

The results of the laboratory testing is shown on Figures 4 through 6 and also listed on Table 1 "Summary of Laboratory Test Results". The consolidation tests are shown on Figures 8 to 21. The logs and lab results for the investigation for Long Valley Parkway are included in Appendix B.

SUBSURFACE WATER

No free water was observed within the test pits at the time of excavation. Fluctuations in the groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

We understand it is proposed to develop a residential development within the property. It will be constructed in phases initiating at the north end of the site. We anticipate a variety of products from single family to multi family with a larger amenity/clubhouse area. Based on discussions with the developer, there will likely be significant grading for portions of the property. Details of the improvements associated with the development are currently in

planning. The property resides within Washington City limits and will be designed according to Washington City Design Guidelines.

PRELIMINARY RECOMMENDATIONS

Based on our experience in the area, the subsurface conditions encountered, laboratory test results, and the proposed construction, the following recommendations are given:

A. Site Grading

At the time of this report, detailed grading plans were not available. When they become available, AGEC should review the plans for each phase and provide recommendations for the specific grading and subsurface conditions in that area. This will require additional field exploration and laboratory testing as a part of our evaluation. At this time, we would anticipate the following:

1. General Site Preparation

   The site contains sparse vegetation and should be grubbed prior to cutting and filling. Removal of soil containing roots and organics should also be conducted.

2. Grading

   a. *Subgrade Preparation*

      We anticipate a wide range of cuts and fills and subsurface conditions.

Sand Subsurface Conditions: For areas of sand that are dense and found to be low to non moisture sensitive, we anticipate that on the order of 2 to 4 feet of properly compacted sand would be required below foundations. In areas where the sand is moisture sensitive, we anticipate the use of ponding or pre-wetting of the deeper sands along with providing a recompacted zone at the surface consisting of 3 to 4 feet of sand. Our experience has shown great success in many areas using the pre-wet method of treatment for deeper moisture sensitive or collapsible soils.

Siltstone/Shale Bedrock Conditions - The siltstone and shale bedrock was found through the majority of the central, eastern and northern portions of the site. These materials will require minimal subgrade preparation. We anticipate 0 to 2 feet of overexcavation through these materials. Occasional higher plastic layers may require 3 to 5 feet of rework or overexcavation.

Mudstone/Claystone (expansive soils) - The mudstone/claystone bedrock encountered in the preliminary test pits was non to low expansive. We anticipate there will be layers of high expansive claystone located within the Virgin River Limestone member. Our experience has shown that up to 17 feet of separation is necessary between the surface of the expansive material and the residence foundation/slab. Portions of the materials may be re-used and mixed in the deeper replacement zone. The remaining materials should be discarded or placed in non structural zones.

3. Cut Slopes

Permanent cut slopes should be cut at least 2:1 (horizontal to vertical). If cut slopes are within bedrock materials, they may be steepened to 1:1.

4. Fill Slopes

Fill slopes should be constructed no steeper than 2:1 (horizontal:vertical). The exposed slopes will likely be highly susceptible to erosion, particularly at a 2:1 slope. Erosion protection measures such as rip rap underlain by filter fabric or geosynthetic matts should be considered. Fill slopes should be constructed by overbuilding and then cutting back the slope face to the desired grade to provide a properly compacted slope face. Fill placed on existing slopes should be benched into the existing slopes to provide a level surface for placement and compaction of the fill.

5. Excavation

We anticipate that excavation of the soils at the site may be accomplished with heavy duty conventional excavation equipment. We anticipate some areas of difficulty in dense, cemented gravels (north end of site) or hard bedrock will be experienced. The use of heavy duty equipment and possibly a rock hammer may be required in confined excavations such as utility trenches. Our experience has also shown some need for blasting in portions of the Shnabkaib Rock and Limestone.

6. Materials

The onsite materials may be used as site grading fill. The material should be free of vegetation and organics. Larger particles (greater than 4 inches in size) should not be used in the top 1 foot of the roadway. Particles up to 12 inches in size may be used in deeper fills. If mudstone or claystone is encountered during grading, the material should be discarded or mixed and placed in deeper fills. The on-site soils, properly mixed and processed, may be used as utility trench backfill.

7. Compaction

Compaction of materials placed at the site should equal or exceed the following minimum densities when compared to the maximum dry density as determined by ASTM D-1557:

Area	Percent Compaction
Roadway Subgrade	90
Roadway Fill	95
Utility Trench backfill	95
Basecourse	95
Pipe zone	90

To facilitate the compaction process, the fill should be moisture conditioned to within 2 percentage points of the optimum moisture content as determined by ASTM D-1557 prior to placement. Fill should be placed in loose lift thicknesses which do not exceed the capacity of the equipment being utilized. Generally, 6 to 8-inch loose lifts are adequate. Lift thicknesses should be reduced to 4-inches for hand compaction equipment.

B. Foundations

Recommendations for design of conventional foundations are provided below.

1. Bearing Material

Footings should bear on a properly prepared subgrade as described in the Subgrade Preparation section of this report. As each phase of the project is evaluated and designed, the details for the subgrade preparation will be refined.

2. Bearing Pressure

Spread footings bearing on properly compacted structural fill may be designed for a net allowable bearing pressure of 2,000 pounds per square foot (psf). For foundations with a footing width greater than 3 feet, the allowable bearing pressure may be increased to 2,500 psf.

3. Footing Width and Embedment

Footings should have a minimum width of 18 inches and footings should be embedded at least 12 inches below the lowest adjacent grade.

4. Temporary Loading Conditions

The allowable bearing pressure may be increased by one-third for temporary loading conditions such as wind or seismic loads.

5. Settlement

We estimate that settlement will be less than 1 inch for footings designed as indicated above due to the load of the structure. Differential settlement is estimated to be approximately ½ inch.

6. Foundation Base

The base of excavations should be cleared of loose or deleterious material prior to placement of fill or concrete.

C. Concrete Slab-on-Grade

1. Slab Support

Slabs should be supported on properly compacted structural fill as provided in the Subgrade Preparation section of this report.

2. Underslab Base Course

A 4-inch layer of properly compacted base course should be placed below slabs to provide a firm and consistent subgrade and promote even curing of the concrete. Portions of the on-site sand soils are suitable for use as underslab material.

3. Vapor Barrier

A vapor barrier should be placed below slabs in areas which will receive floor coverings sensitive to moisture or coverings which are impermeable. In addition, a vapor barrier should also be considered beneath the building slab to provide protection from sulfate attack (on the concrete slab) due to the potentially high water soluble sulfates which may exist in the underlying soil.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for spread footings is controlled by sliding resistance developed between the footing and the subgrade soil. An ultimate friction value of 0.4 may be used in design for ultimate lateral resistance of footings bearing on properly compacted, on-site granular soils.

2. Retaining Structures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. We recommend the basement walls be designed in an at-rest condition.

The values listed below assume a horizontal surface adjacent the top and bottom of the wall.

Description	Active	At-Rest	Passive
Granular backfill (sand or processed sandstone)	35 pcf	55 pcf	275 pcf

The above values account for the lateral earth pressures due to the soil and level backfill conditions and do not account for hydrostatic pressures or surcharge loads.

Lateral loading should be increased to account for surcharge loading (using the appropriate earth pressure coefficient) and a rectangular distribution if structures are placed above the wall and are within a horizontal distance equal to the height of the wall. If the ground surface slopes up away from the wall, the equivalent fluid weights should also be increased.

Care should be taken to prevent percolation of surface water into the backfill material adjacent to the retaining walls. The risk of hydrostatic buildup can be reduced by placing a subdrain behind the walls consisting of free-draining gravel wrapped in a filter fabric.

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weights should be modified as follows according to the Mononobe-Okabe method assuming a level backfill condition:

Lateral Earth Pressure Condition	Seismic Modification (2% PE in 50 yrs)
	Granular Backfill
Active	14 pcf increase
At-rest	no increase
Passive	28 pcf decrease

The seismic increases and decrease assume a peak ground acceleration of 0.25g using the Mononobe-Okabe pressure distribution. The resultant of the seismic increase should be placed up ⅓ from the base of the wall.

4. Safety Factors

The values recommended assume mobilization of the soil to achieve the assumed soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Seismicity, Liquefaction and Faults

1. Seismicity

Listed below is a summary of the site parameters as required by the 2015 International Building Code and ASCE 7, Chapter 20:

Description	Seismic Event - 2% PE in 50 Yrs
	Value
2015 IBC Site Class	D
Site Longitude	-113.4509°
Site Latitude	37.1110°
PGA - Site Class B	0.25g
S_s (0.2 second period) - Site Class B	0.60g
S_1 (1 second period) - Site Class B	0.18g
F_a - Site Class Factor	1.37
F_v - Site Class Factor	2.08
F_{PGA} - Site Class Factor	1.31

2. Faults

Based on a review of available geologic literature, the inferred location of the Washington Fault is located approximately 1 to 2 miles to the west of the property.

F. Soil Corrosion

Based on laboratory testing and our experience in the area, the on-site soils, bedrock, and many import soil sources contain sulfates in sufficient concentration to be corrosive to concrete. Therefore, we recommend concrete elements that will be exposed to the on-site soils be designed in accordance with provisions provided in the American Concrete Institute Manual of Concrete Practice (ACI) 318.14. Tables 19.3.1.1 and 19.3.2.1 of ACI 318-14 should be referenced for design of concrete elements utilizing a Sulfate Exposure Class of S2. Consideration should also be given to cathodic protection of buried metal pipes. We recommend utilizing PVC pipes where local building codes allow.

G. Pavement

Based on the subsoil conditions encountered and the laboratory test results, the following recommendations are given:

1. Analysis

   a. Asphaltic Concrete: The flexible pavement analysis is based on UDOT and AASHTO design methods and a 20 year design life. The following parameters were considered for our analysis:

   - Base course that meets specifications which would correspond to a Structural Coefficient (a_2) of at least 0.12. Asphalt that provides a Structural Coefficient (a_1) of at least 0.40.
   - Drainage Coefficient = 1.0.

- The subgrade support soils varied. A M_R value of 15,000 psi was used for the subgrade based upon an estimated California Bearing Ratio (CBR) value of 10 percent and the relationship between CBR and Resilient Modulus (M_R).
- Serviceability Index: $P_o = 4.2$, $P_t = 2.5$.
- Reliability of 90 percent.
- Standard Deviation (S_o) = 0.45.

2. Subgrade Support

We anticipate the subgrade materials will consist of compacted on-site silty sand Our design assumes a properly compacted subgrade with a CBR of 10 percent as described above. Prior to placing granular sub-base, base course or pavement area grading fill, the subgrade should be prepared as recommended in the Subgrade Preparation section of this report.

3. Pavement Thickness

Based on the anticipated traffic, a 20 year design life, PCC and AASHTO design methods, the following pavement sections are recommended.

Roadway	Asphaltic concrete (inches)	Base Course (inches)
Interior Residential	2.5	6
Major Arterial	3.5	10
Major Arterial	3.0	12

4. Pavement Materials

Flexible Pavement (Asphaltic Concrete)

The pavement materials should meet AASHTO and Washington County specifications for gradation and quality. The pavement thicknesses indicated above assume that the base course is high quality material with a CBR of at least 60 percent. Asphalt material should have a Marshall stability of at least 1,800 pounds.

5. Drainage

The collection and diversion of drainage away from the pavement surface is extremely important to the satisfactory performance of the pavement section. Proper drainage should be provided. We further recommend a yearly maintenance program including crack sealing and a surface treatment such as a "slurry seal" to extend the pavement life and reduce water infiltration into the subsurface soils.

H. Geotechnical Recommendation Review

The client should familiarize themselves with the information contained in this report. If specific questions arise or if the client does not fully understand the conclusions and recommendations provided, AGEC should be contacted to provide clarification.

LIMITATIONS

This report is a preliminary report and further evaluation should be conducted as the grading plans for each phase is designed. The preliminary recommendations provided within this report have been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the test pits excavated, and our experience in the area. Variations in the subsurface conditions may not become evident until excavation is conducted. If the subsurface conditions or groundwater level are found to be significantly different from those described above, we should be notified to reevaluate our recommendations.

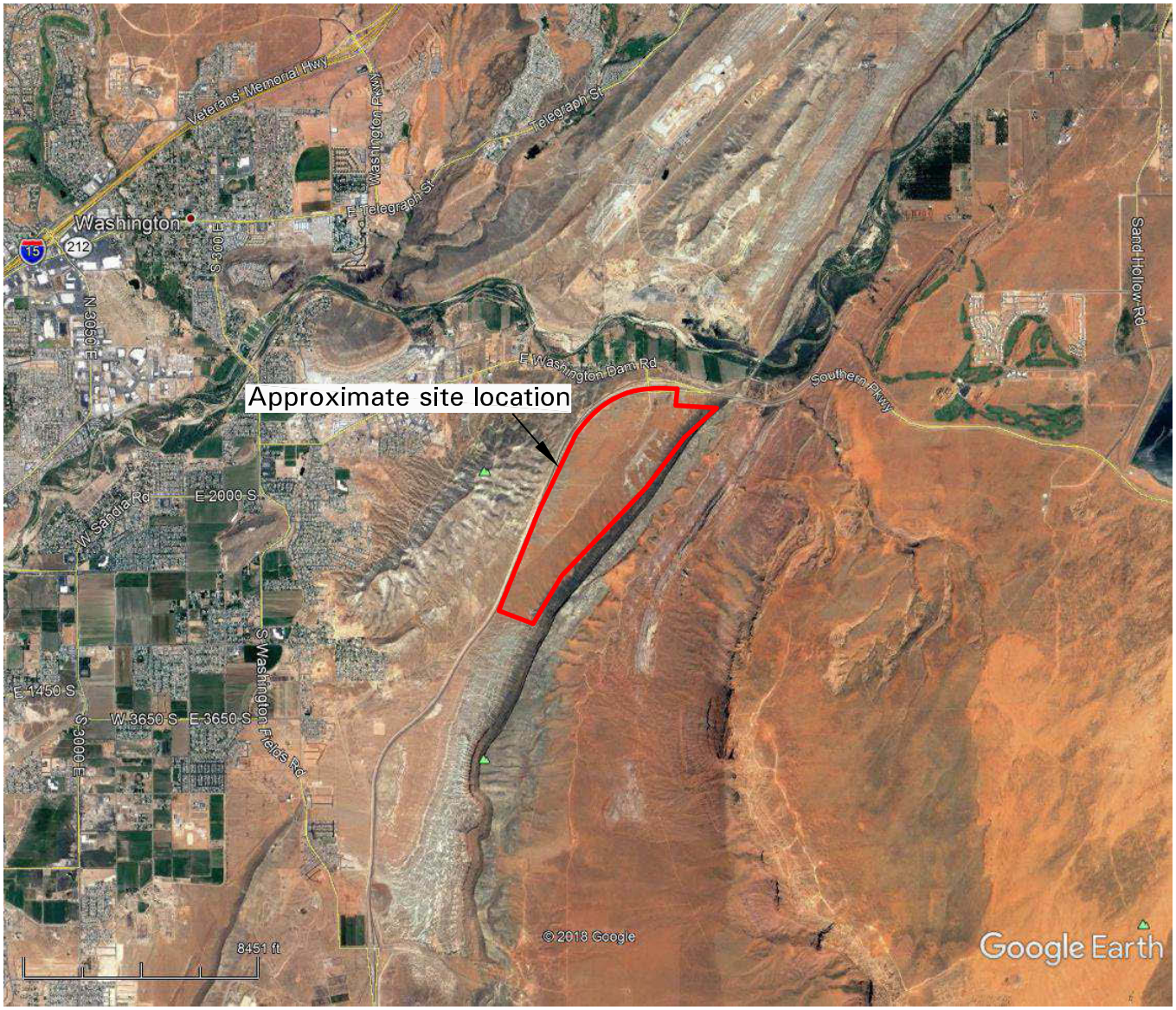
If you have any questions or if we can be of further service please call.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



G. Wayne Rogers, P.E.

Reviewed by Jon Russell Hanson, P.E.
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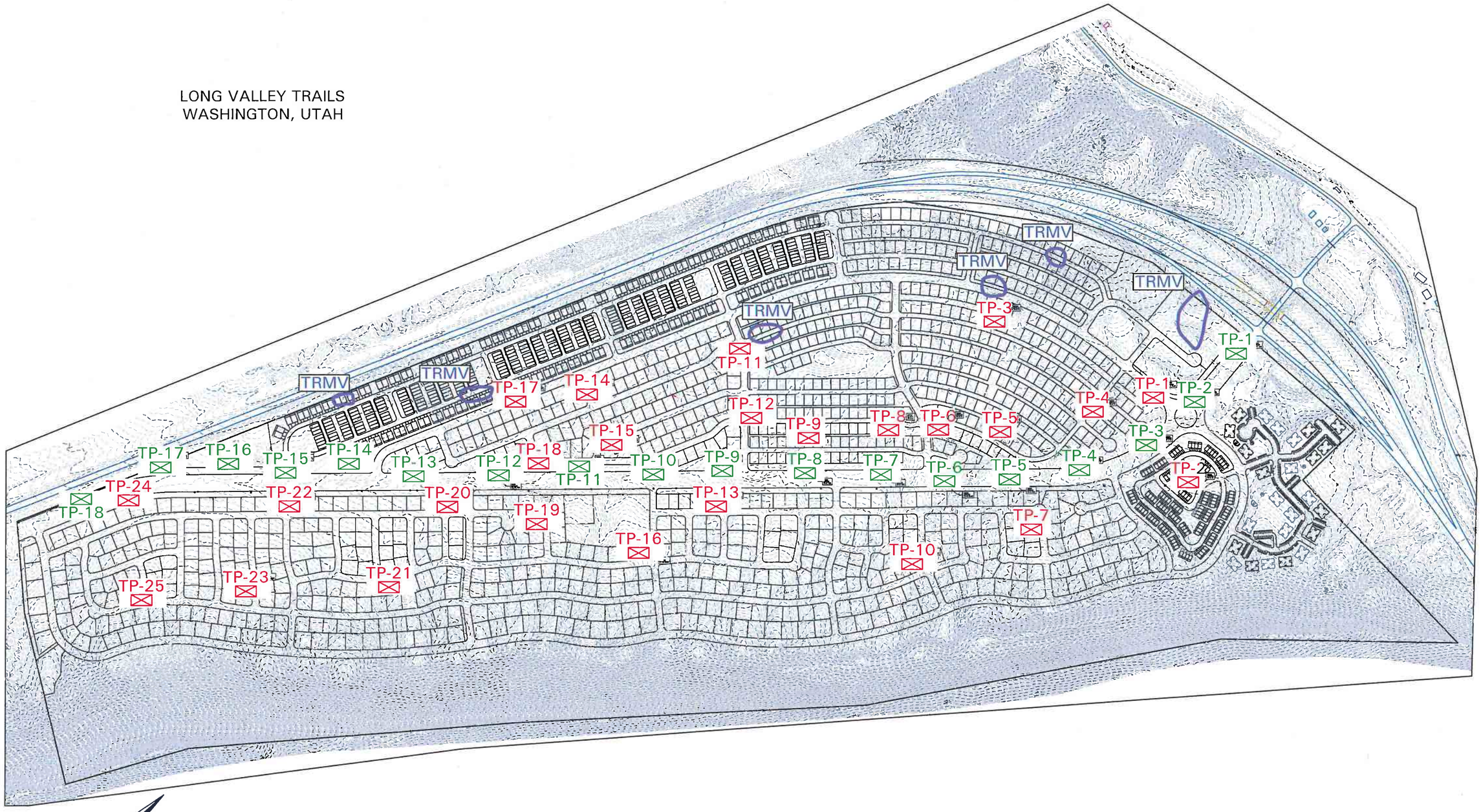
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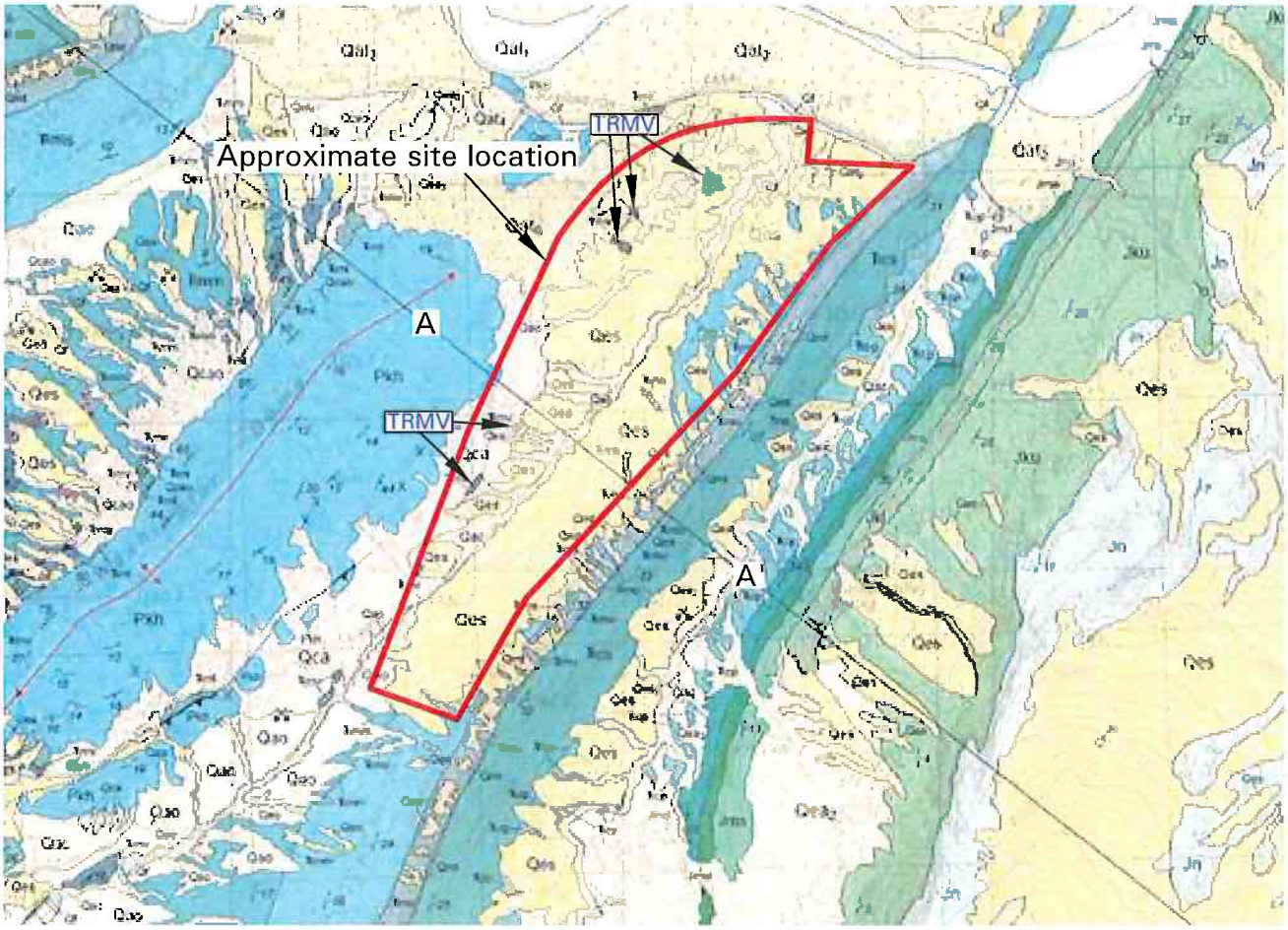
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2171312	AGEC	Vicinity Map	Figure 1

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2171312	AGEC	Site Plan	Figure 2



Geologic Map of the Washington Dome Quadrangle, Washington County, Utah, Janice M. Hayden, 2005 Map M-209

See Figure 3A-1 for Notes to Geologic Map

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2171312	AGEC	Geologic Map	Figure 3A

Trcs:-Petrified Forest Formation, Shinarump Conglomerate Member -- Varies from a dark-brown to moderate-yellowish-brown, medium-to coarse-grained sandstone with locally well-developed limonite bands ("picture rock" or landscape stone") to a moderate-brown, pebbly conglomerate; mostly thick to very thick bedded with both planar and low-angle cross-stratification, although thin, platy beds with ripple cross-stratification occur locally; strongly jointed with common slickensides; contains poorly preserved petrified wood, commonly replaced in part by iron-manganese oxides; forms a cap rock above the Moenkopi Formation; deposited principally in braided stream channels; ranges from 5 to 200 feet (1.5-60 m) thick.unconformity

Trmu-Moenkopi Formation, Upper red member -- Interbedded moderate-reddish-brown, thin-bedded siltstone and moderate-reddish-orange, thin- to medium-bedded sandstone with planar, low-angle, and ripple cross-stratification; some thin gypsum beds and abundant discordant gypsum stringers; well-preserved ripple marks common in the siltstone; forms ledgy slopes and cliffs; a prominent, commonly cliff-forming, pale-yellowish-orange, fine-grained sandstone with Liesegang banding is present about 50 feet (15 m) above the base of the member; 475 feet (145 m) thick.

Trms-Moenkopi Formation, Shnabkaib Member -- Interbedded light-gray to pale- red, "bacon-striped," laminated to thin-bedded, gypsiferous siltstone and laminated to very thick bedded gypsum that forms a ledgy slope; contains several thin interbeds of resistant dolomitic, unfossiliferous limestone near the base; gypsum also present as discordant veins; ripple marks are common; upper part is very gypsiferous and weathers to a powdery soil; forms a valley except where held up by more resistant overlying units; 730 feet (220 m) thick.

Trmm- Moenkopi Formation, Middle red member -- Interbedded moderate-red to moderate-reddish-brown, laminated to thin-bedded siltstone, mudstone, and very fine grained sandstone; thin, white to greenish-gray gypsum beds and veins are common, especially in the upper part of the member, forms a slope; 400 feet (120 m) thick.

Trmv- Moenkopi Formation, Virgin Limestone Member -- Three distinct, resistant, medium-gray to yellowish-brown limestone ledges interbedded with nonresistant, muddy siltstone and pale-reddish-brown, very thin bedded sandstone; limestone beds are 5 to 10 feet (1.5-3 m) thick and contain five-sided crinoid columnals; poorly preserved Composita brachiopods (Billingsley, 1992a) are found in the upper part of the lowest limestone bed, which is also the thickest; forms ledgy slope; total thickness varies from 25 to 115 feet (8-35 m) because of attenuation.

Trmu-Moenkopi Formation, Lower red member -- Moderate-reddish-brown siltstone, mudstone, and fine-grained, slope-forming sandstone; generally calcareous and has laminated interbeds and stringers of gypsum; ripple marks and small-scale cross-beds are common in the siltstone; thickness varies considerably from 25 to 200 feet (8-60 m) due to attenuation and paleotopography.unconformity

Pkh – PERMIAN Kaibab Formation Harrisburg Member -- Light-gray, fossiliferous, sandy, fine- to medium-grained limestone interbedded with red and gray gypsiferous siltstone, sandstone, and gray gypsum beds several feet thick; beds of cherty limestone and sandy limestone form a 30-foot-thick (9 m) resistant ledge near upper middle; solution of interbedded gypsum causes local distorted bedding; forms slope with limestone ledges; base is not exposed; incomplete exposed thickness is 200 feet (60 m)

Qes -Eolian sand deposits -- Well- to very well sorted, very fine to medium-grained, well-rounded, usually frosted, mostly quartz sand; derived principally from the Navajo and Kayenta Formations; commonly deposited in irregular hummocky mounds on the lee side of ridges, as well as on Sand Mountain and in Warner Valley; locally forms poorly developed dunes; 0 to 50 feet (0-15 m) thick.

Qac - Mixed alluvial and colluvial deposits -- Poorly tomoderately sorted clay- to boulder- sized material
in minor drainages; gradational with colluvial deposits; includes stream deposits too small to map separately; 0 to 10 feet (0-3 m) thick.

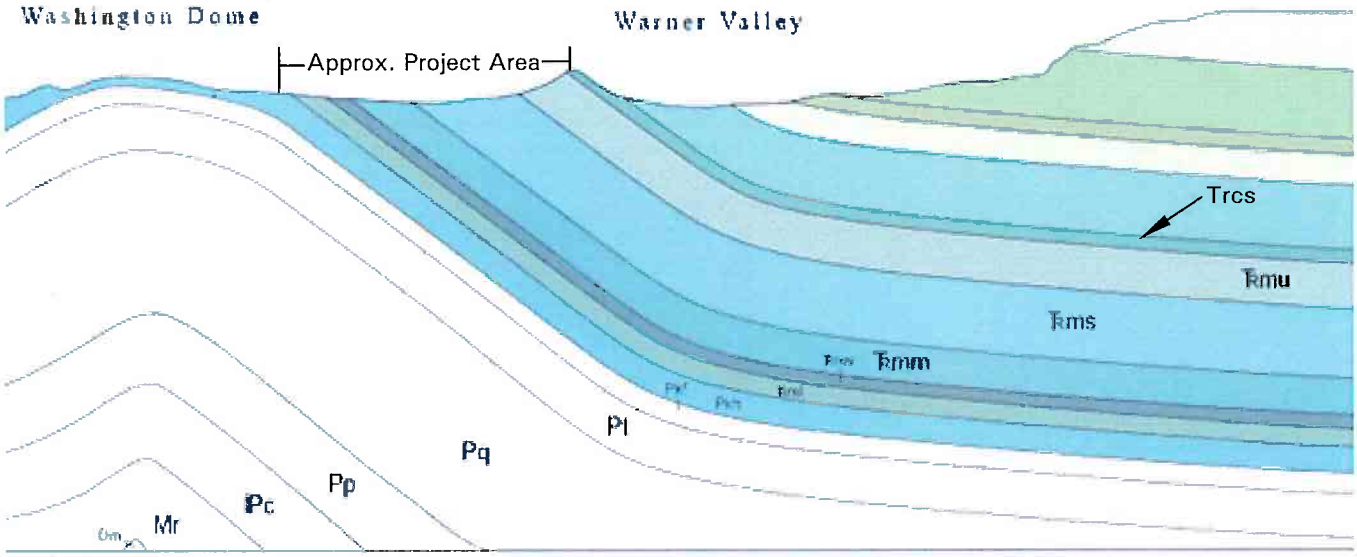
Qca-Mixed colluvial and alluvial deposits -- Poorly sorted, angular to rounded, fine-grained to boulder-sized material deposited on broad, low to moderate slopes; locally includes talus, eolian, or alluvial deposits; deposited by sheet-wash, debris-flow, and slope-creep processes and lack well-defined drainage pattern; younger (Qca) deposits form active depositional surfaces whereas older deposits (Qcao) are deeply incised and locally offset by the Washington fault; 0 to 30 feet (0-10 m) thick.

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Not to Scale

2171312	AGEC	Notes to Geologic Map	Figure 3A-1



Washington Domes 7.5' Quadrangle - Cross Section A-A'

Trcs:-Petrified Forest Formation, Shinarump Conglomerate Member

Trmu-Moenkopi Formation, Upper red member

Trms-Moenkopi Formation, Shnabkaib Member

Trmm- Moenkopi Formation, Middle red member

Trmv- Moenkopi Formation, Virgin Limestone Member

Trmu-Moenkopi Formation, Lower red member

Pkh – PERMIAN Kaibab Formation Harrisburg Member

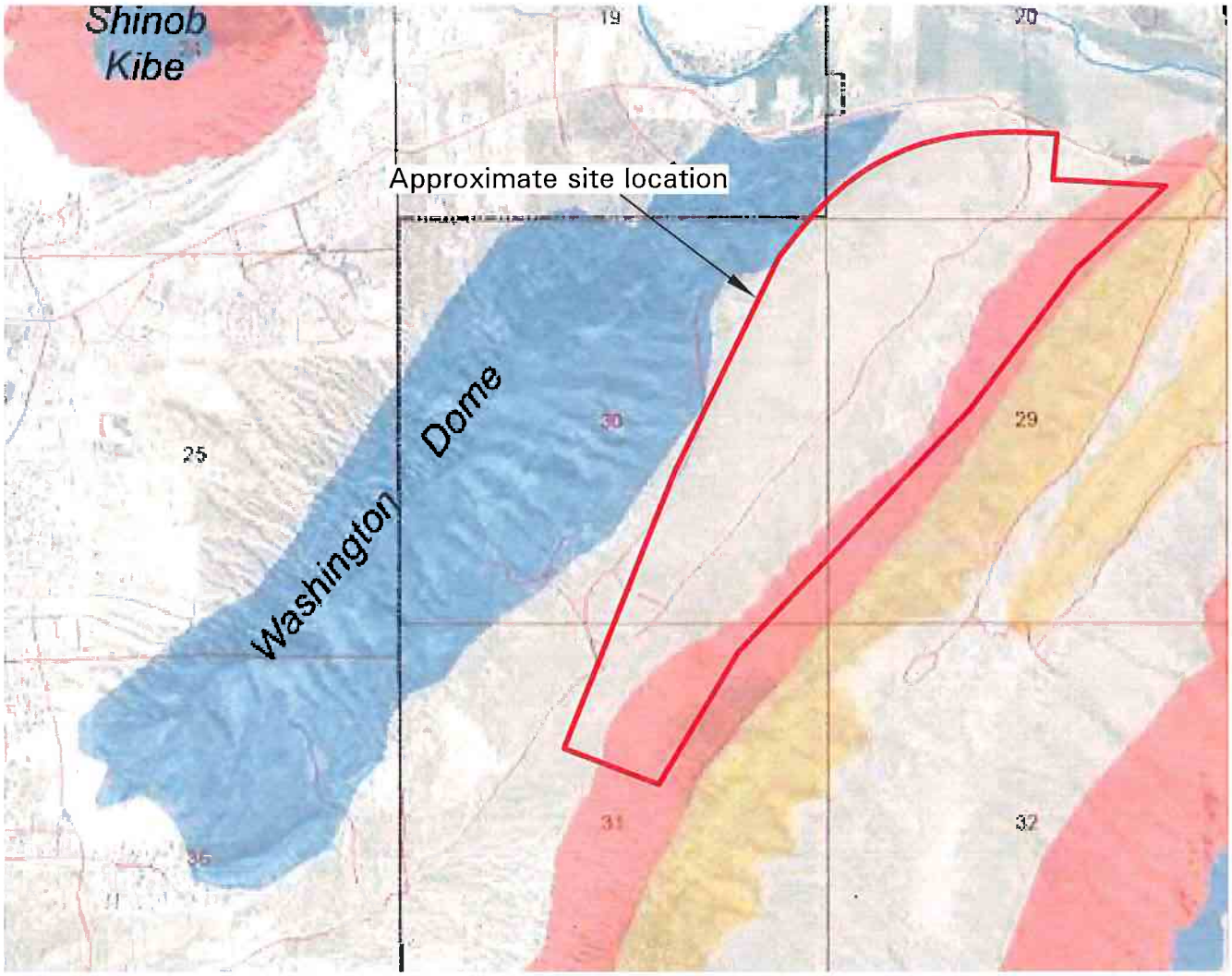
Note: Trcs is the formation that presents the rockfall hazard along the crest of the east slope.
Trmu is the formation that contains layers of expansive claystone.

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2181312	AGEC	Cross Section A-A'	Figure 3B



Rockfall Hazard Map of the St. George-Hurricane, Metropolitan Area, Washington County, Utah, UGS Special Study 127, W.R. Lund, T.R. Knudsen, G.S. Vice, L.M. Shaw, 2008

EXPLANATION

H — High rock-fall hazard areas include steep slopes below resistant cliff forming units where the acceleration and runout zones are littered with abundant rock-fall boulders greater than 1.5 feet in diameter. Such large boulders can do significant damage to property and threaten lives. Rock units in high rock-fall-hazard areas chiefly include the Shinarump Member of the Chinle Formation, upper Kayenta Formation, Springdale Sandstone Member of the Kayenta Formation, Navajo Sandstone, Virgin Limestone Member of the Moenkopi Formation, Kaibab Formation, Toroweap Formation, and Tertiary-Quaternary basalt flows. Where jointed or fractured, outcrops of these rock units can produce large, angular boulders.

M — Moderate rock-fall-hazard areas are present where slopes provide sufficient relief to create an acceleration zone, but where only sparse rock-fall debris is present on slopes or in the runout zone at the base of the slope. Typically rock units in moderate-hazard areas crop out in the slope instead of forming a capping unit, or where a capping unit is present, the resulting rock-fall debris is typically less than 1.5 feet in diameter. Rock units in moderate rock-fall-hazard areas include the Kayenta Formation, Moenave Formation, and portions of the Kaibab Formation and Navajo Sandstone.

L — Low rock-fall-hazard areas are present where fine-grained, comparatively soft rock units such as mudstone and shale crop out on steep slopes, or where rock units typical of moderate- or high-hazard categories crop out in areas of low to moderate relief. Low rock-fall-hazard areas typically contain sparse rock sources of limited extent. Low rock fall hazard is most common adjacent to low relief outcrops of Navajo Sandstone and basalt.

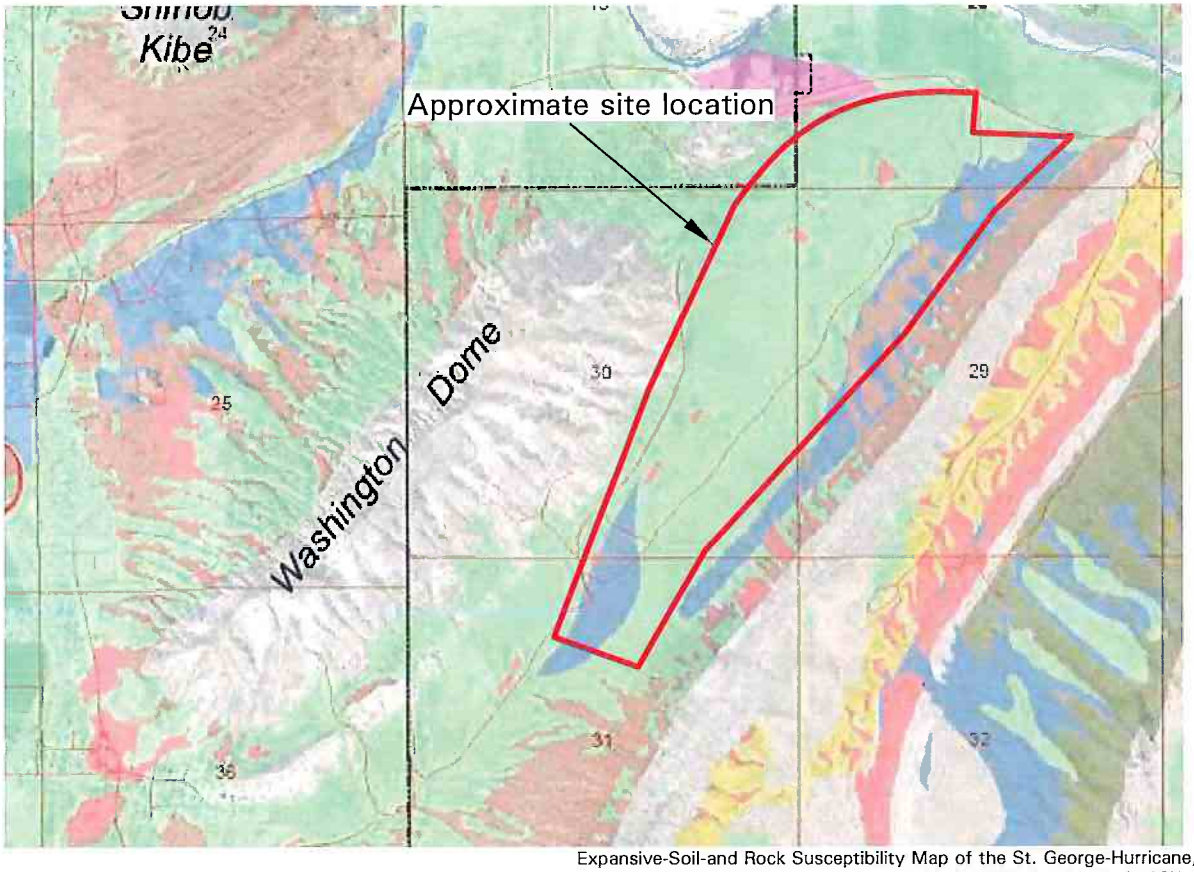
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Note: See Appendix for Rockfall Evaluation report.

2171312	AGEC	Rockfall Hazard Map	Figure 3C



Expansive-Soil-and Rock Susceptibility Map of the St. George-Hurricane, Metropolitan Area, Washington County, Utah, UGS Special Study 127, W.R. Lund, T.R. Knudsen, G.S. Vice, L.M. Shaw, 2008

EXPLANATION

SOIL

ESH Soils with high susceptibility for volumetric change are typically clay rich and have a liquid limit (LL) ≥45, a plasticity index (PI) ≥30, and/or a swell/collapse test (SCT) value of ≥3 percent swell. Soils with these characteristics are of limited areal extent at the surface in the study area, but are frequently found at depth as shown by the geotechnical database (see GEOTECHNICAL DATA EVALUATION section in accompanying text). This phenomenon reflects the fact that most of the geotechnical data available for the study area come from the municipalities of St. George, Santa Clara, Ivins, and Washington, portions of which are underlain at shallow depth (typically <20 feet) by bedrock with high or moderate susceptibility for volumetric change. The influence of this shallow, often clay-rich source rock on overlying soils is apparent in the geotechnical data collected from below a depth of 60 inches.

ESM Soils classified by the Natural Resources Conservation Service (NRCS) as having moderate susceptibility for volumetric change (LL from 29 to 50, and PI from nonplastic [NP] to 30). These values overlap at their upper ends with soils in the high susceptibility category. Chen (1988) recognized that while PI is an indicator of expansive potential, other factors also exert an influence, and therefore reported a range of PI values when categorizing soil's capacity to shrink or swell.

ESL Soils classified by the NRCS as having low susceptibility for volumetric change (LL from 0-30, and PI from NP-15). These values overlap at their upper ends with soils in the moderate susceptibility category. However, the low category includes soils with highly variable potential for volumetric change that do not fit neatly into the moderate or high categories.

ROCK

ERH Bedrock units with high shrink/swell susceptibility include claystone horizons in the Virgin Limestone Member of the Moenkopi Formation, the Petrified Forest Member of the Chinle Formation, known locally as the "Blue Clay," the lower red beds of the Dinosaur Canyon Member and the Whitmore Point Member of the Moenave Formation, the Iron Springs Formation, which contains abundant clay-rich strata in its lower part, and a thin interval (maximum thickness 90 feet) of montmorillonitic clay that lies between the Carmel Formation and the overlying Iron Springs Formation. Landslides mapped within these rock units were also included in the high-susceptibility category. These bedrock units contain an abundance of expansive clay minerals and are commonly associated with expansive rock problems in the study area.

ERM Bedrock units with moderate shrink/swell susceptibility include the Shnabkaib and lower, middle, and upper red members of the Moenkopi Formation, the Co-op Creek and Crystal Creek Members of the Carmel Formation, and the Temple Cap Formation. These rock units are chiefly fine grained and contain alternating strata of shale, claystone, mudstone, siltstone, sandstone, and limestone. Not all or necessarily the majority of these strata contain expansive clay minerals, but past experience in the study area has shown that a sufficiently high percentage of strata do contain expansive clays that foundation problems are often associated with these rock units. Where mapped as undivided, we assigned a moderate susceptibility to the Moenkopi Formation, Carmel Formation, and grouped Triassic, Triassic/Jurassic, and Jurassic/Cretaceous rocks. Landslides mapped within moderate susceptibility units are also included in this category.

ERL Bedrock units with low shrink/swell susceptibility include the Timpoweap Member of the Moenkopi Formation and the the Kayenta Formation. Although we consider these units to have a low susceptibility relative to the bedrock units identified above, they contain some fine-grained, clay-rich strata that may cause shrink/swell problems locally.

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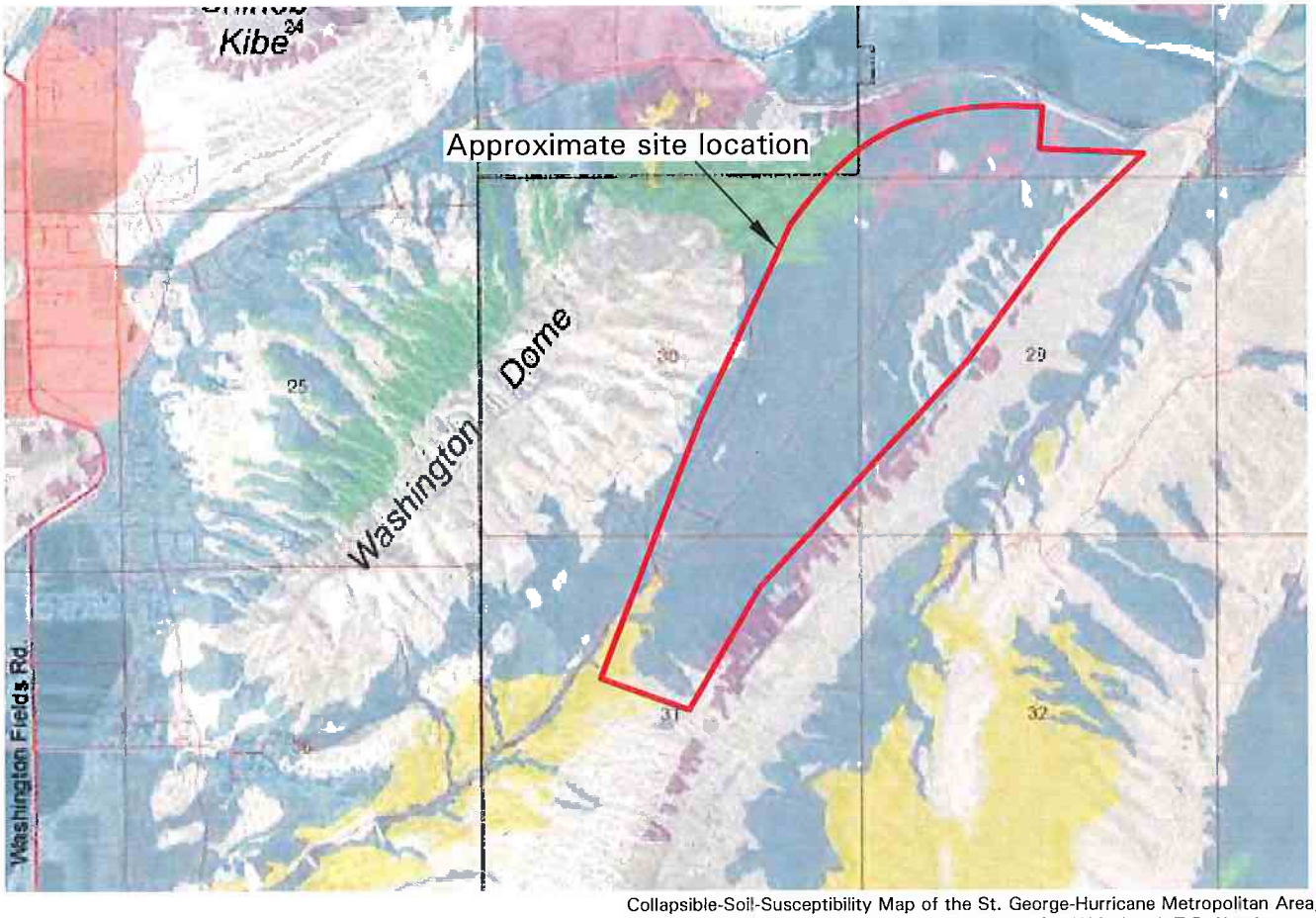
CHESR Area of highly expansive soil or rock (≥5 percent swell) in the shallow subsurface (≤20 feet), but with little or no evidence of such material at the ground surface. Based on past engineering experience, such highly expansive soil or rock can cause differential displacements at the ground surface even when overlain by as much as 20 feet of nonexpansive material, and these areas are considered to have a high potential for expansive soil and rock problems.

LONG VALLEY TRAILS
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2171312	AGEC	Expansive Soils Map	Figure 3D



Collapsible-Soil-Susceptibility Map of the St. George-Hurricane Metropolitan Area, Washington County, Utah, UGS Special Study 127, W.R. Lund, T.R. Knudsen, G.S. Vice, L.M. Shaw, 2008

EXPLANATION

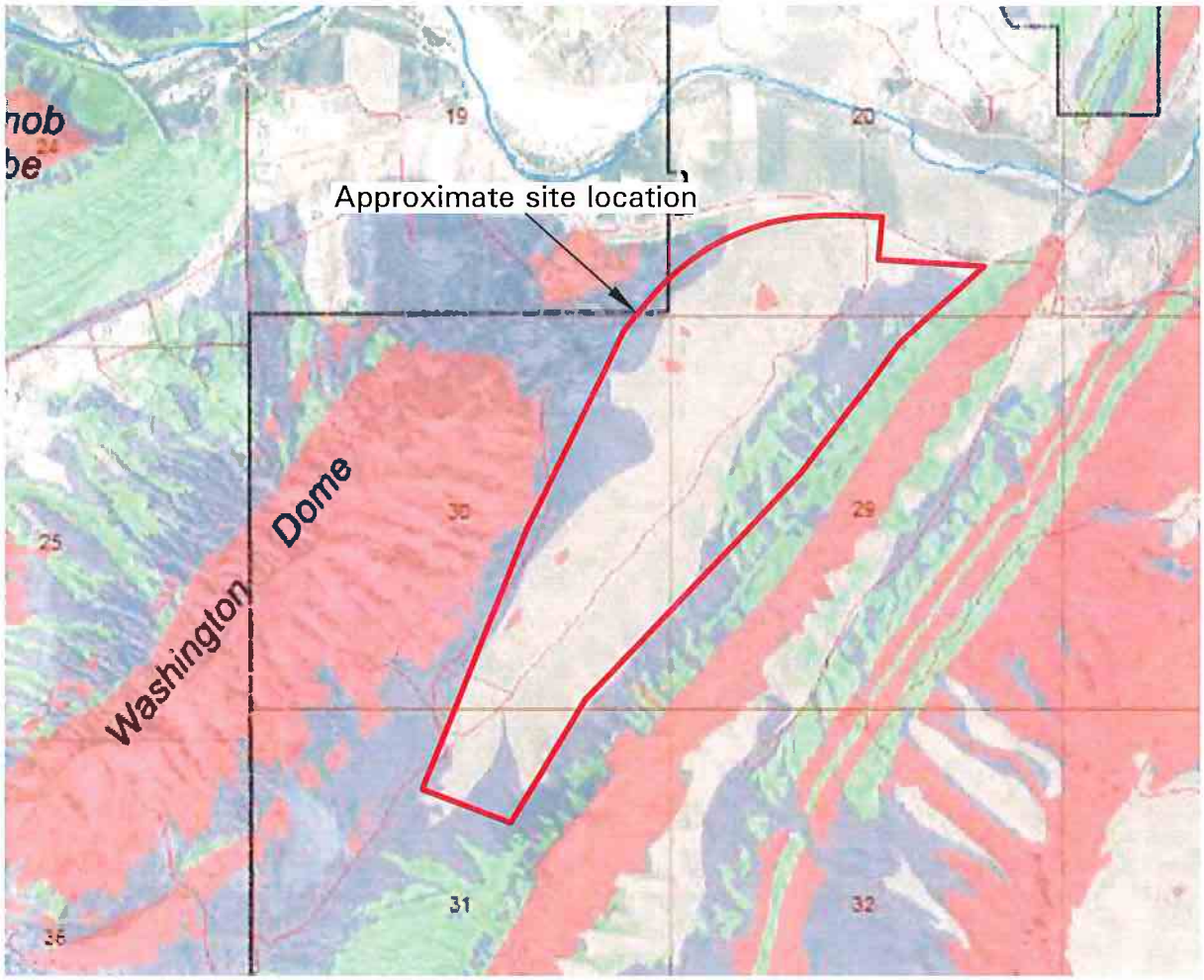
HCS	Area of known high collapse soils. Areas identified by geotechnical consultants working in the St. George – Hurricane metropolitan area as containing high collapse (≥5 percent) soils. Soils in these areas have a high potential for collapsible soil problems.
CS_A	Unconsolidated geologic units with reported collapse values of ≥3 percent.
CS_B	Unconsolidated geologic units lacking collapse data, but for which other geotechnical information (chiefly low unit weight and moisture content) are indicative of collapse-susceptible material.
CS_C	Geologically young (Holocene) unconsolidated geologic units for which no geotechnical data are available, but whose genesis or texture are permissive of collapse (chiefly geologically young alluvial, colluvial, and eolian deposits).
CS_D	Older unconsolidated geologic units (Pleistocene) for which no geotechnical data are available, but like category CS_C have a genesis or texture permissive of collapse. Because of their age, these deposits have had greater exposure to natural wetting and collapse may have occurred, and or the deposits may have become cemented by secondary calcium carbonate or other soluble minerals.

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LONG VALLEY TRAILS
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2171312	AGEC	Collapsible Soils Hazard Map	Figure 3E



Shallow Bedrock Map of the St. George-Hurricane, Metropolitan Area, Washington County, Utah, UGS Special Study 127, W.R. Lund, T.R. Knudsen, G.S. Vice, L.M. Shaw, 2008

EXPLANATION

HCS — Area of known high collapse soils. Areas identified by geotechnical consultants working in the St. George – Hurricane metropolitan area as containing high collapse (≥5 percent) soils. Soils in these areas have a high potential for collapsible soil problems.

CS_A — Unconsolidated geologic units with reported collapse values of ≥3 percent.

CS_B — Unconsolidated geologic units lacking collapse data, but for which other geotechnical information (chiefly low unit weight and moisture content) are indicative of collapse-susceptible material.

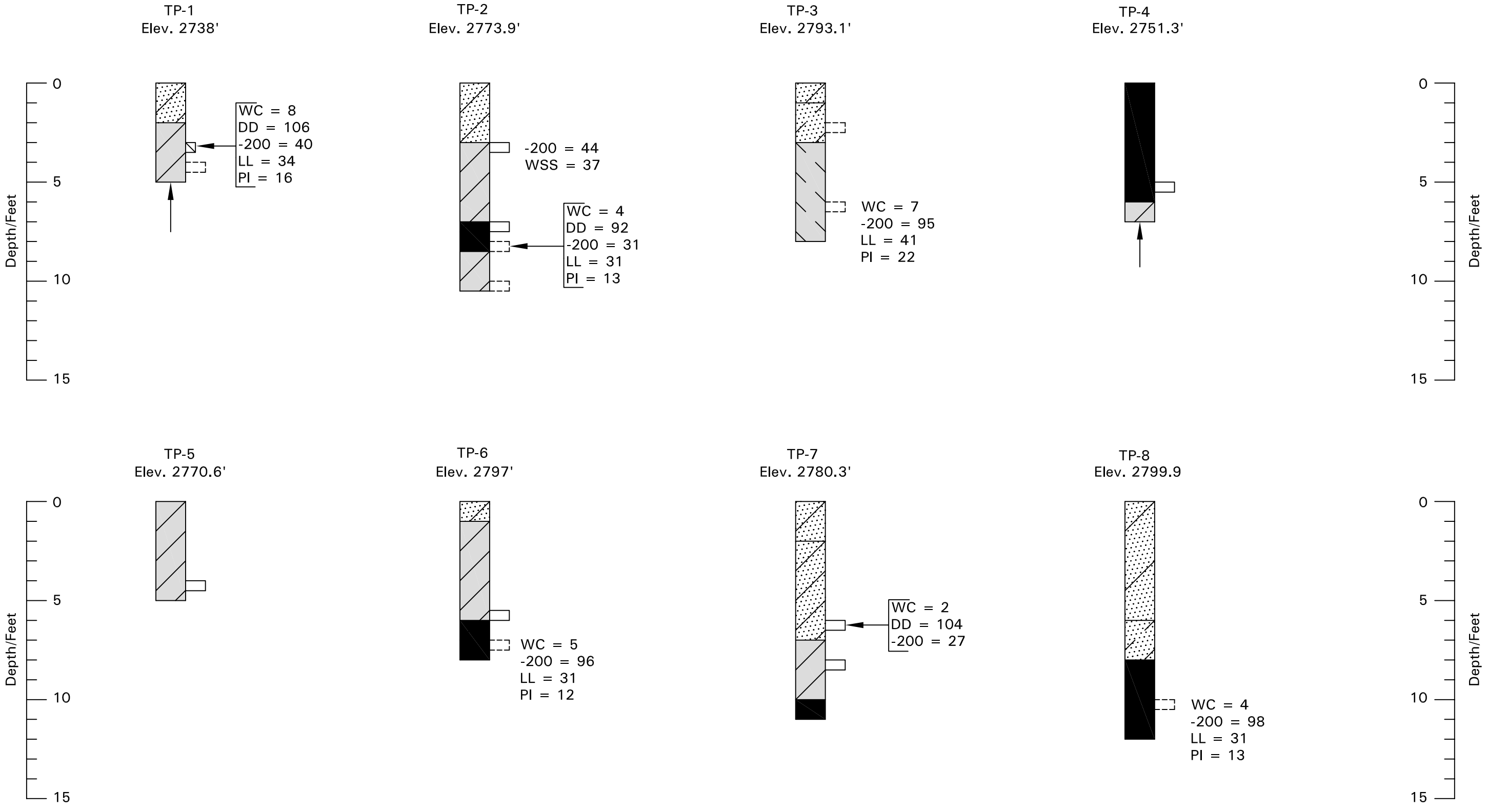
CS_C — Geologically young (Holocene) unconsolidated geologic units for which no geotechnical data are available, but whose genesis or texture are permissive of collapse (chiefly geologically young alluvial, colluvial, and eolian deposits).

CS_D — Older unconsolidated geologic units (Pleistocene) for which no geotechnical data are available, but like category CS_C have a genesis or texture permissive of collapse. Because of their age, these deposits have had greater exposure to natural wetting and collapse may have occurred, and/or the deposits may have become cemented by secondary calcium carbonate or other soluble minerals.

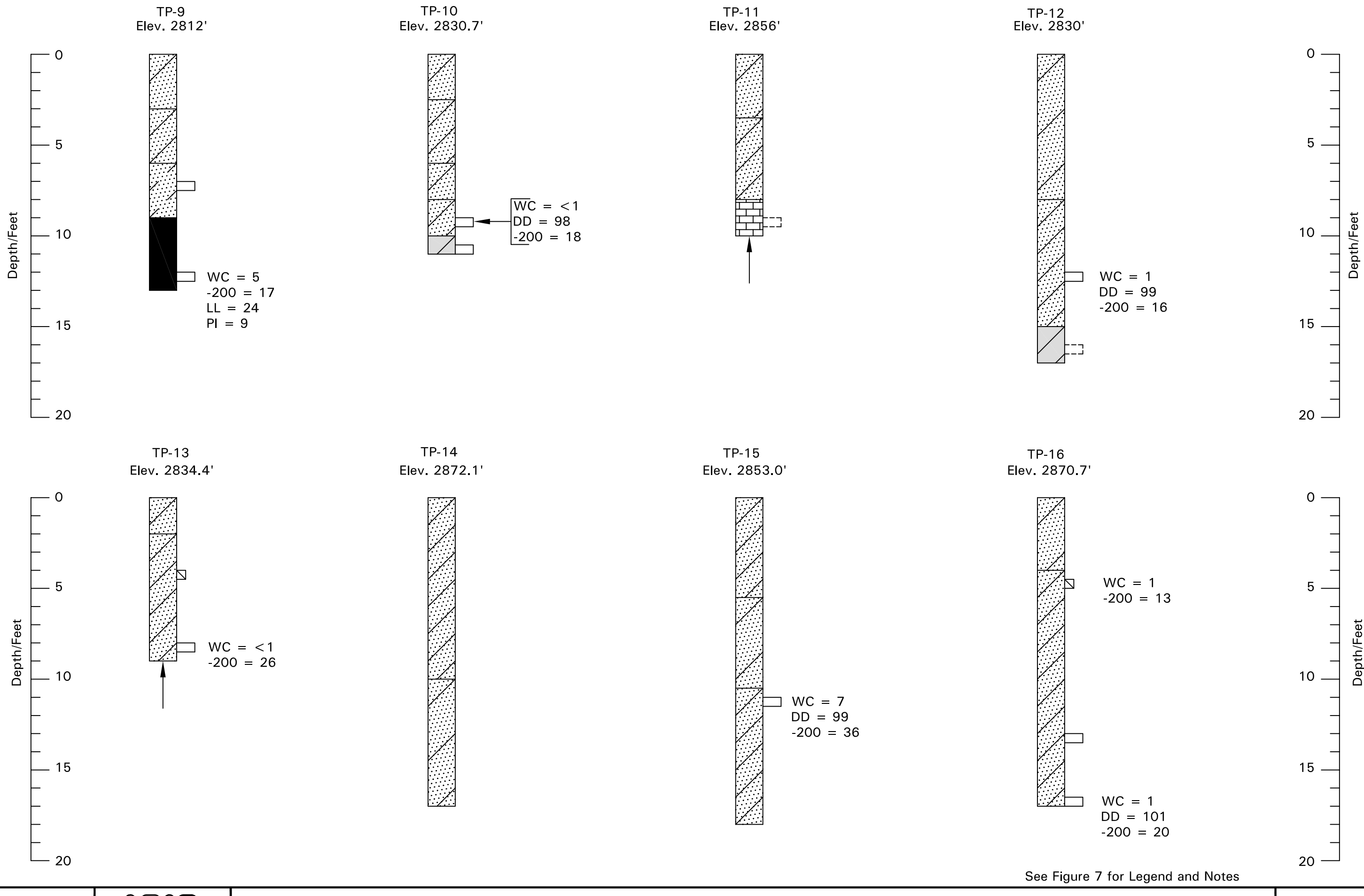
N

Not to Scale

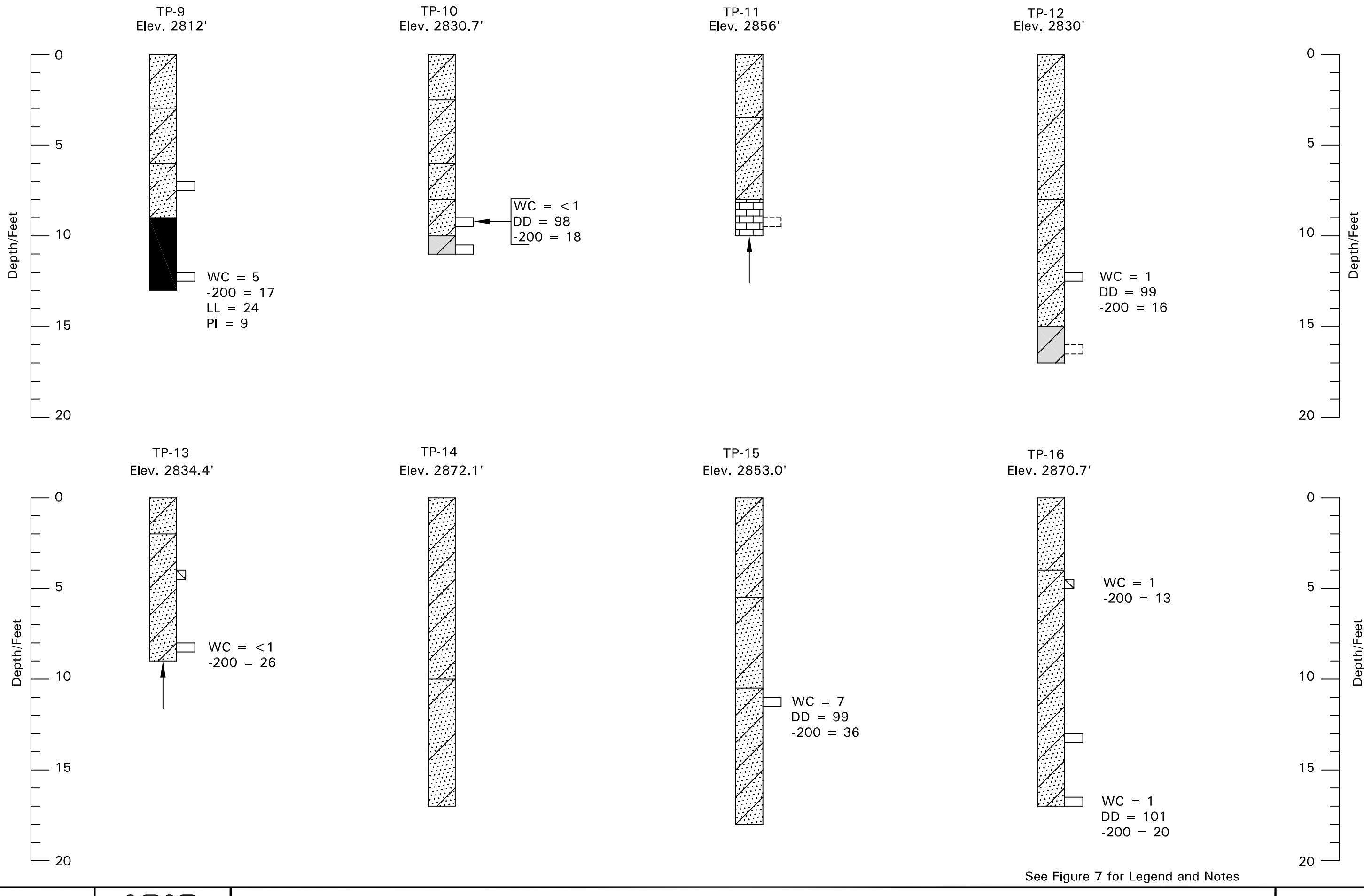
LONG VALLEY TRAILS
WASHINGTON, UTAH



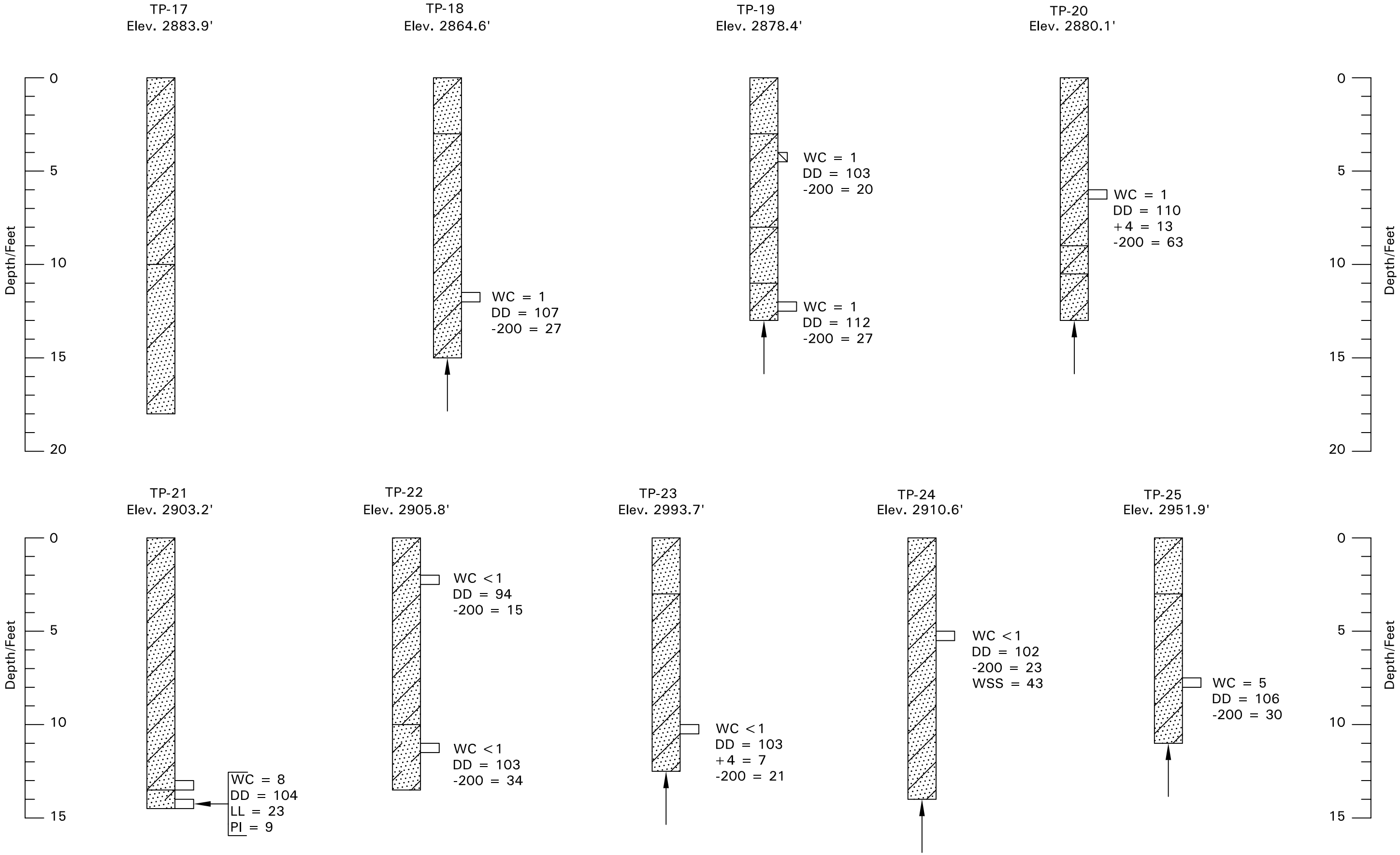
See Figure 7 for Legend and Notes



See Figure 7 for Legend and Notes



See Figure 7 for Legend and Notes



See Figure 7 for Legend and Notes

LEGEND:

Clayey Sand (SC); medium dense to dense, dry to slightly moist, contains occasional gravel, red to brown. Portions of the clayey sand are slightly cemented.

Silty Sand (SM); loose to medium dense, dry to slightly moist, reddish brown.

Poorly Graded Sand with Silt (SP-SM); loose to medium dense, dry to slightly moist, reddish brown.

Siltstone Bedrock; moderately hard, layers of low to medium plastic, reddish brown.

Mudstone Bedrock; moderately hard, medium plastic, occasional layers of siltstone and fine grained sandstone, red.

Claystone Bedrock; moderately hard, slightly moist, medium to highly plastic, yellow to brown.

Limestone Bedrock; moderately hard to hard, dry, slightly fractured, grey to yellow.

Indicates relatively undisturbed hand drive sample taken.

Indicates relatively undisturbed block sample taken.

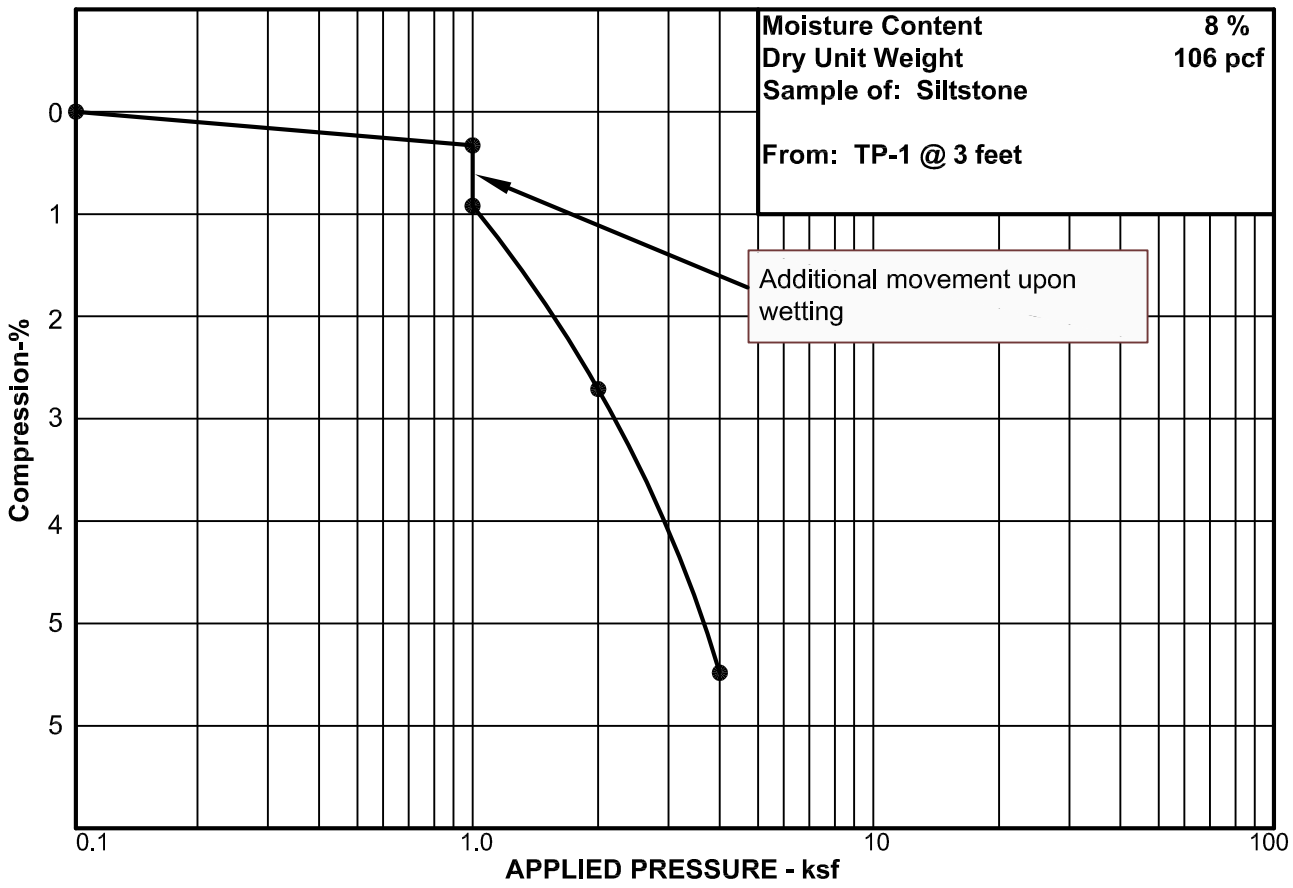
Indicates disturbed sample taken.

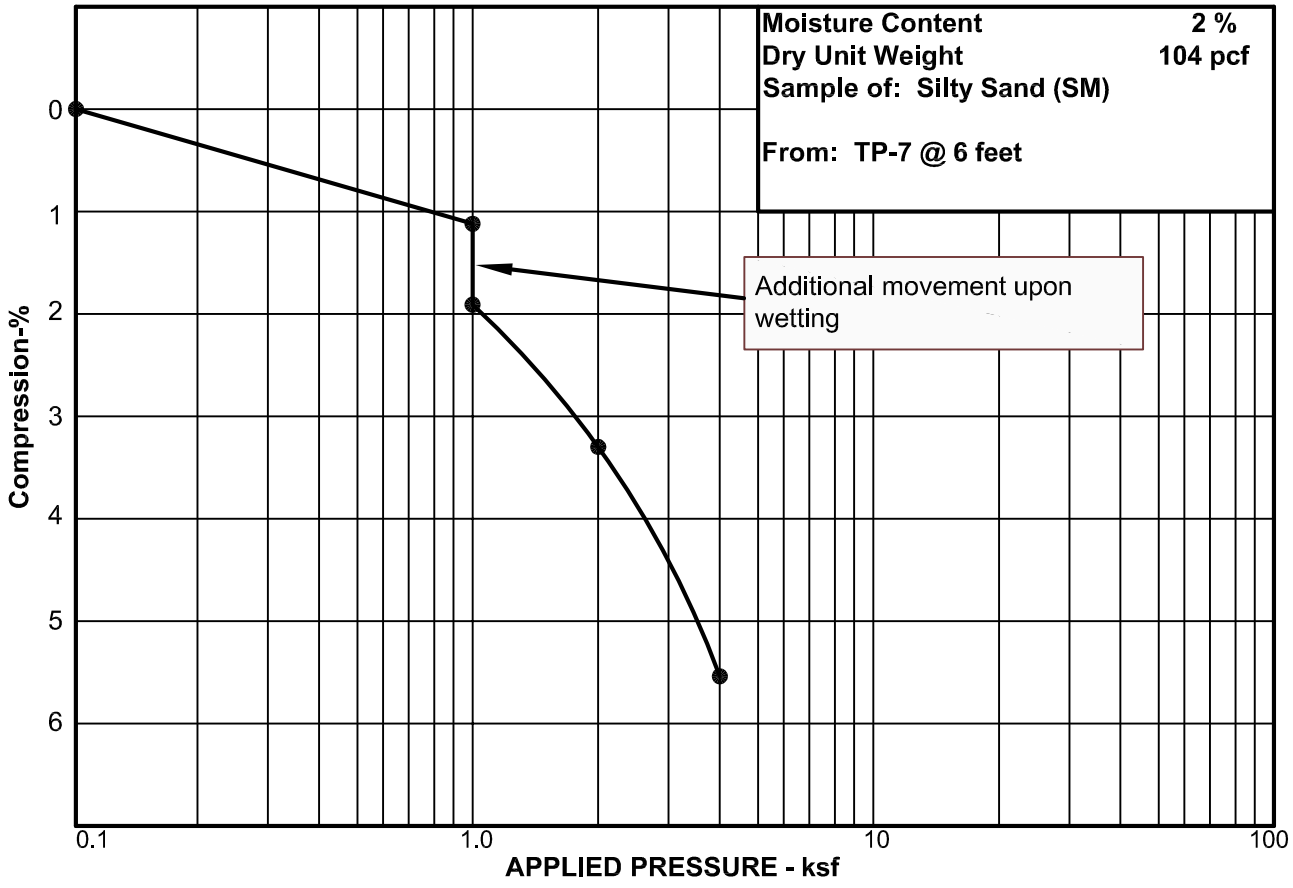
Practical excavator refusal.

NOTES:

1. The test pits were excavated on August 22, 23 and 24, 2017 with a track excavator.
2. The locations and elevations of the test pits were measured by survey by Bush & Gudgell, Inc.
3. The test pit locations and elevations should be considered accurate only to the degree implied by the method used.
4. The lines between the materials shown on the test pit logs represent the approximate boundaries between material types and the transitions may be gradual.
5. Free water was not encountered in the test pits at the time of excavation.
6. WC = water content (%);
   DD = dry density (pcf);
   +4 = percent retained on the No. 4 sieve;
   -200 = percent passing No. 200 sieve;
   LL = liquid limit (%);
   PI = plasticity index (%);
   WSS = water soluble sulfates (ppm).

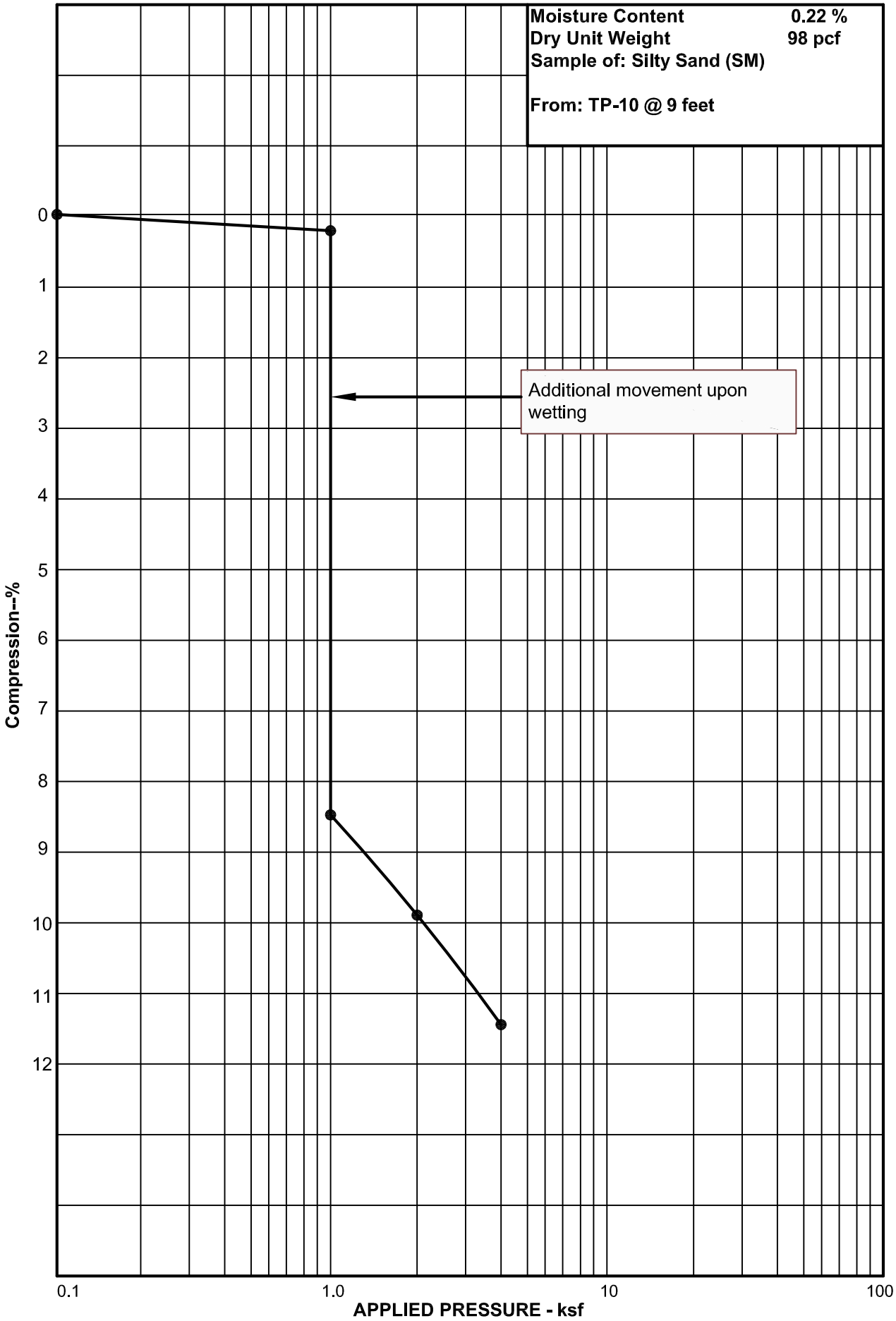
Applied Geotechnical Engineering Consultants, Inc.





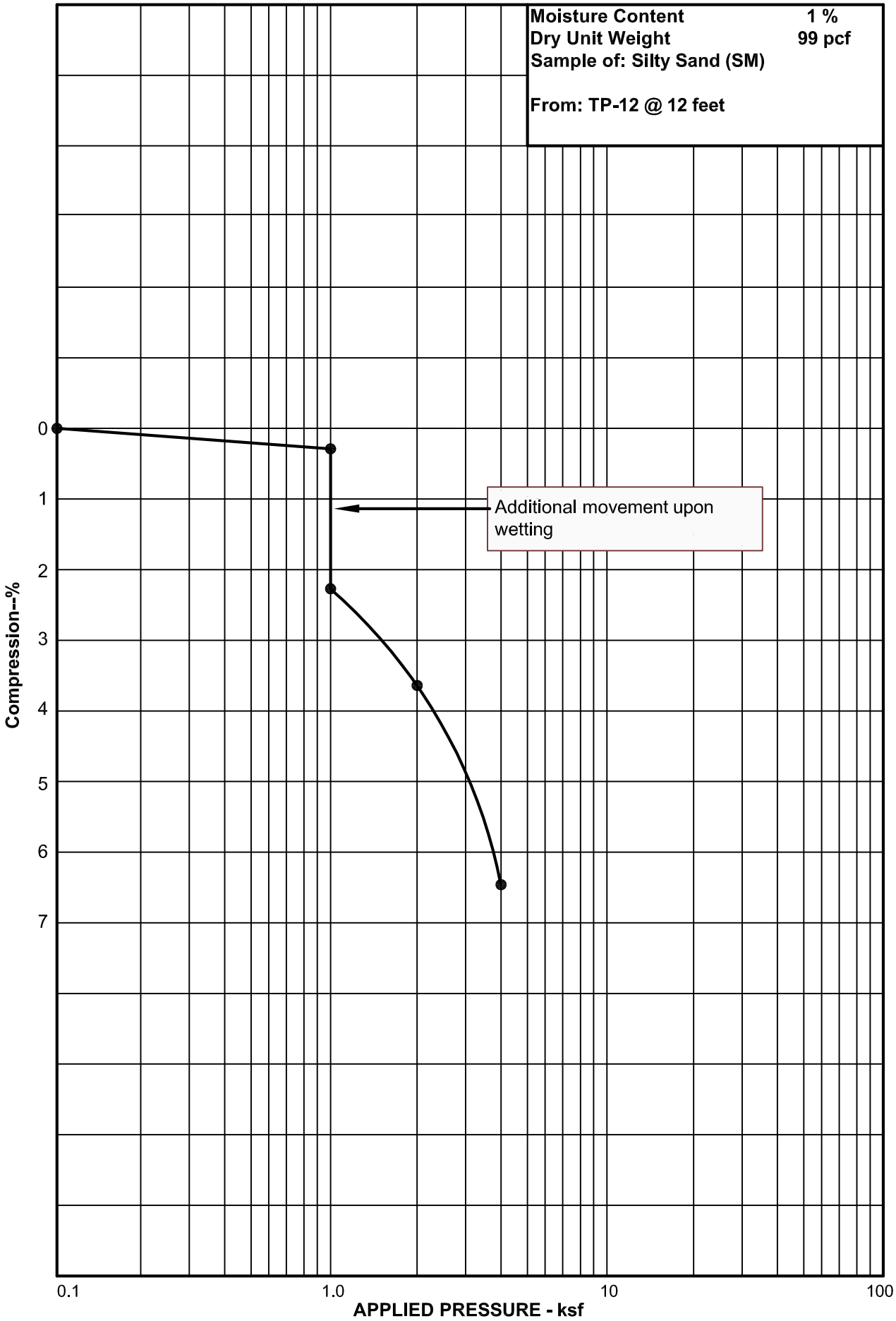
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 8**

Applied Geotechnical Engineering Consultants, Inc.



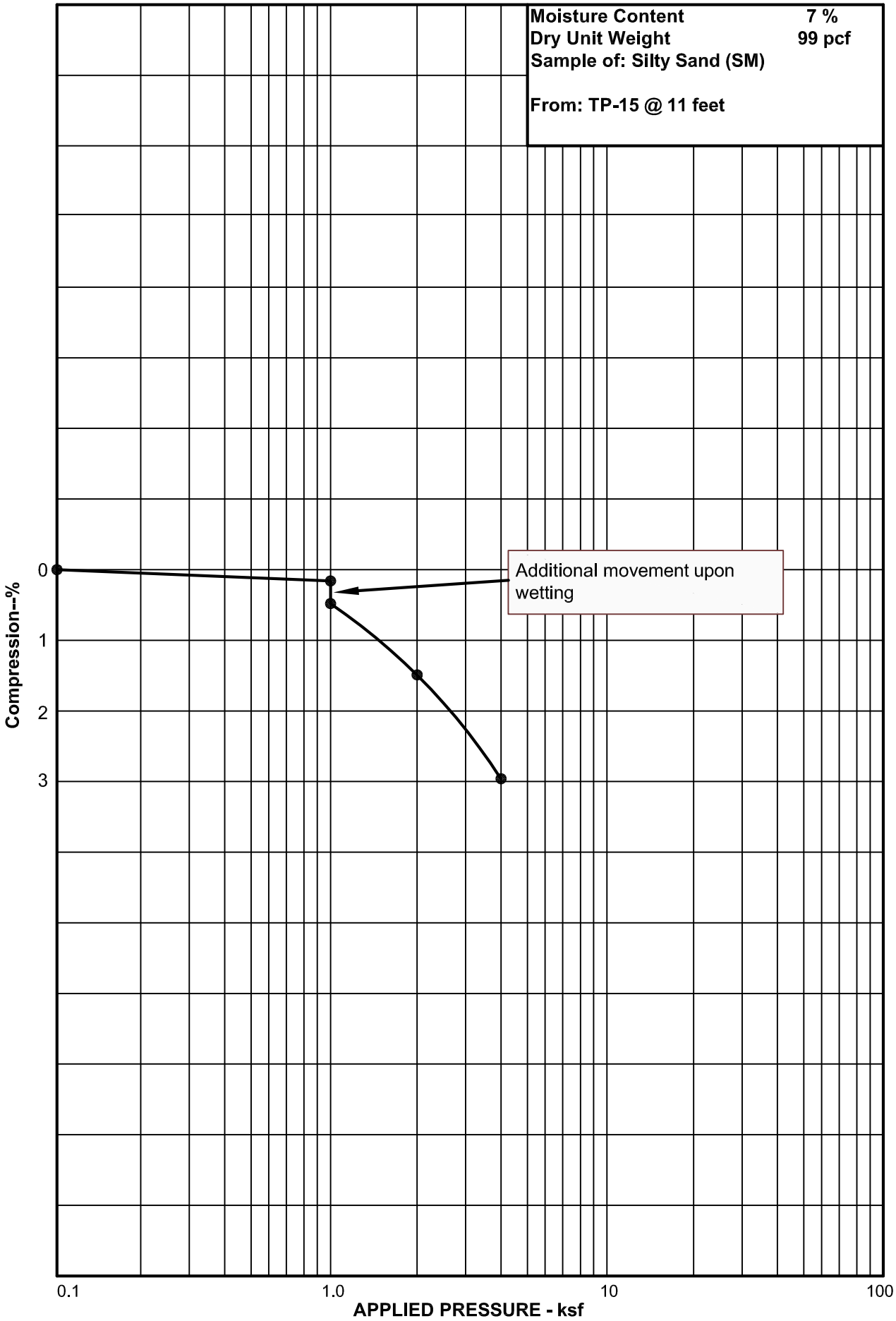
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 9**

Applied Geotechnical Engineering Consultants, Inc.



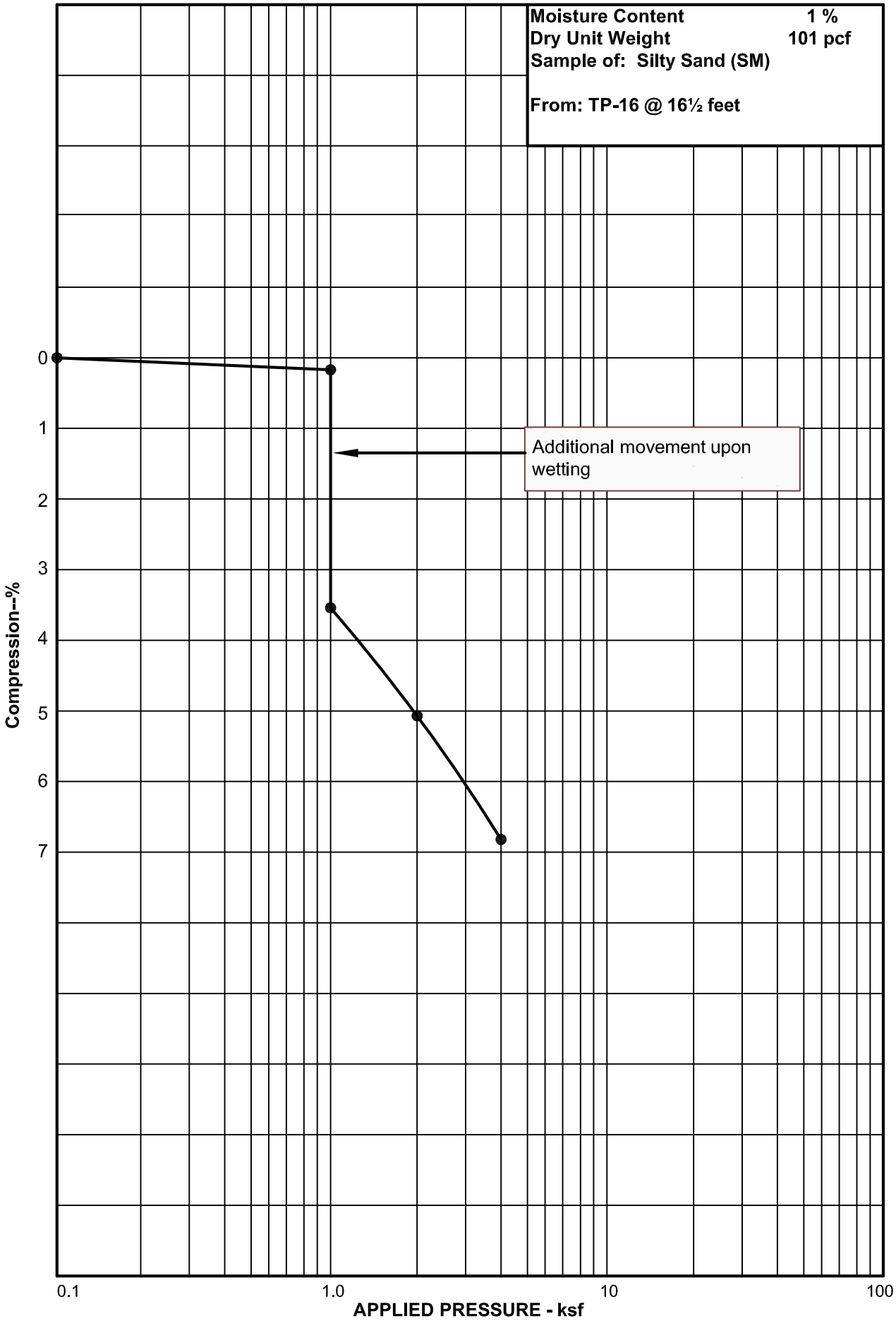
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 10**

Applied Geotechnical Engineering Consultants, Inc.



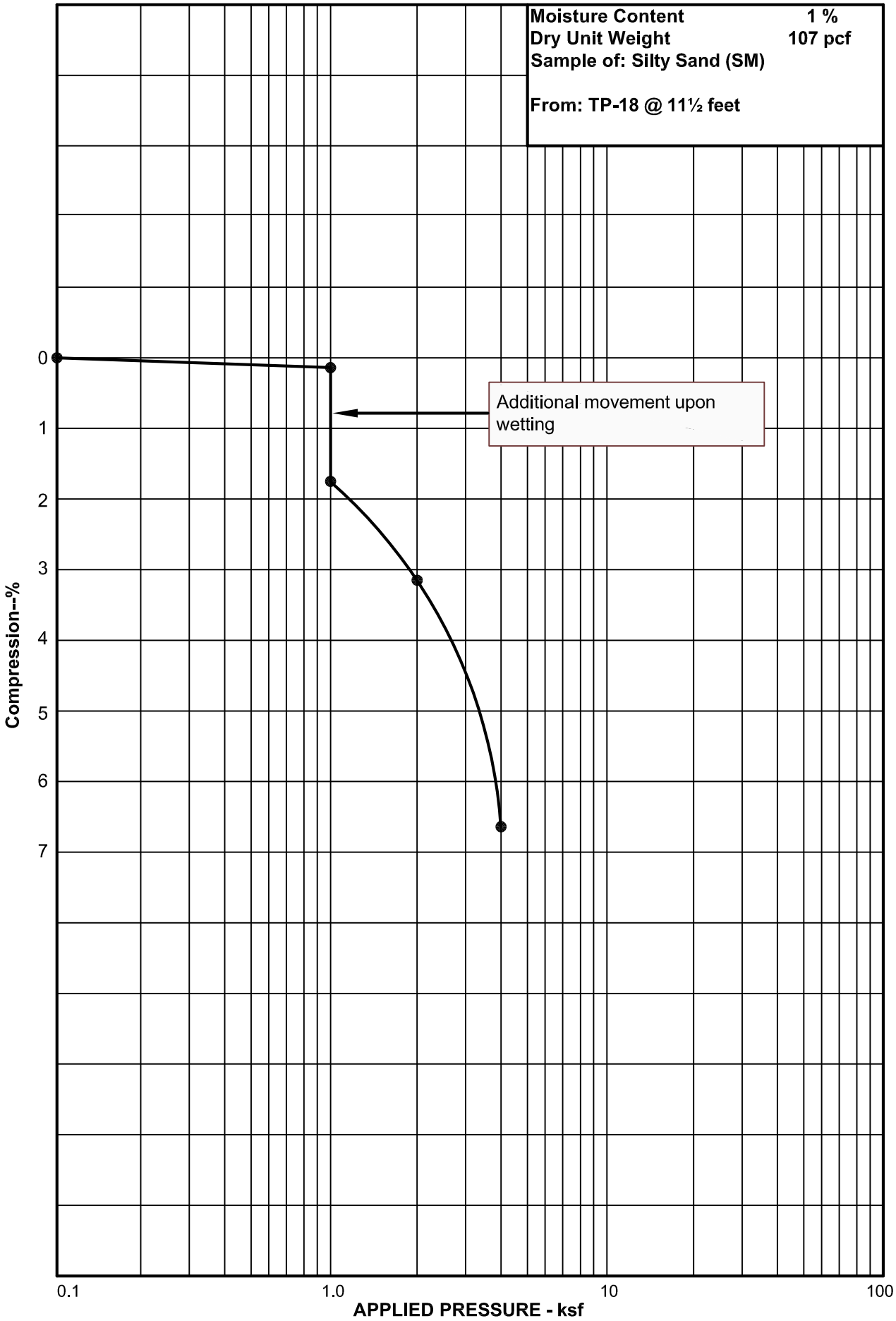
Project No. 2171312 **CONSOLIDATION TEST RESULTS** Figure 11

Applied Geotechnical Engineering Consultants, Inc.



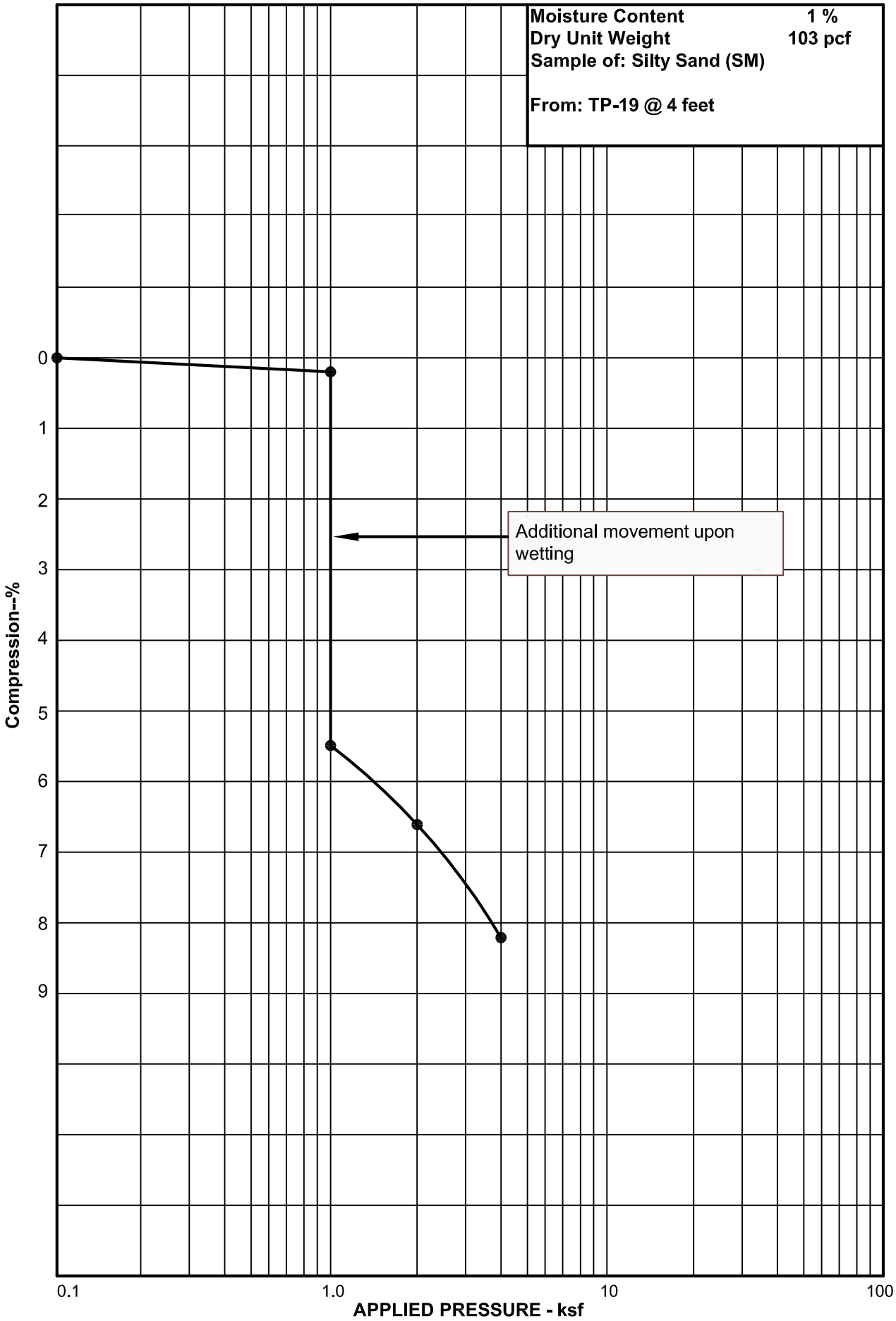
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 12**

Applied Geotechnical Engineering Consultants, Inc.



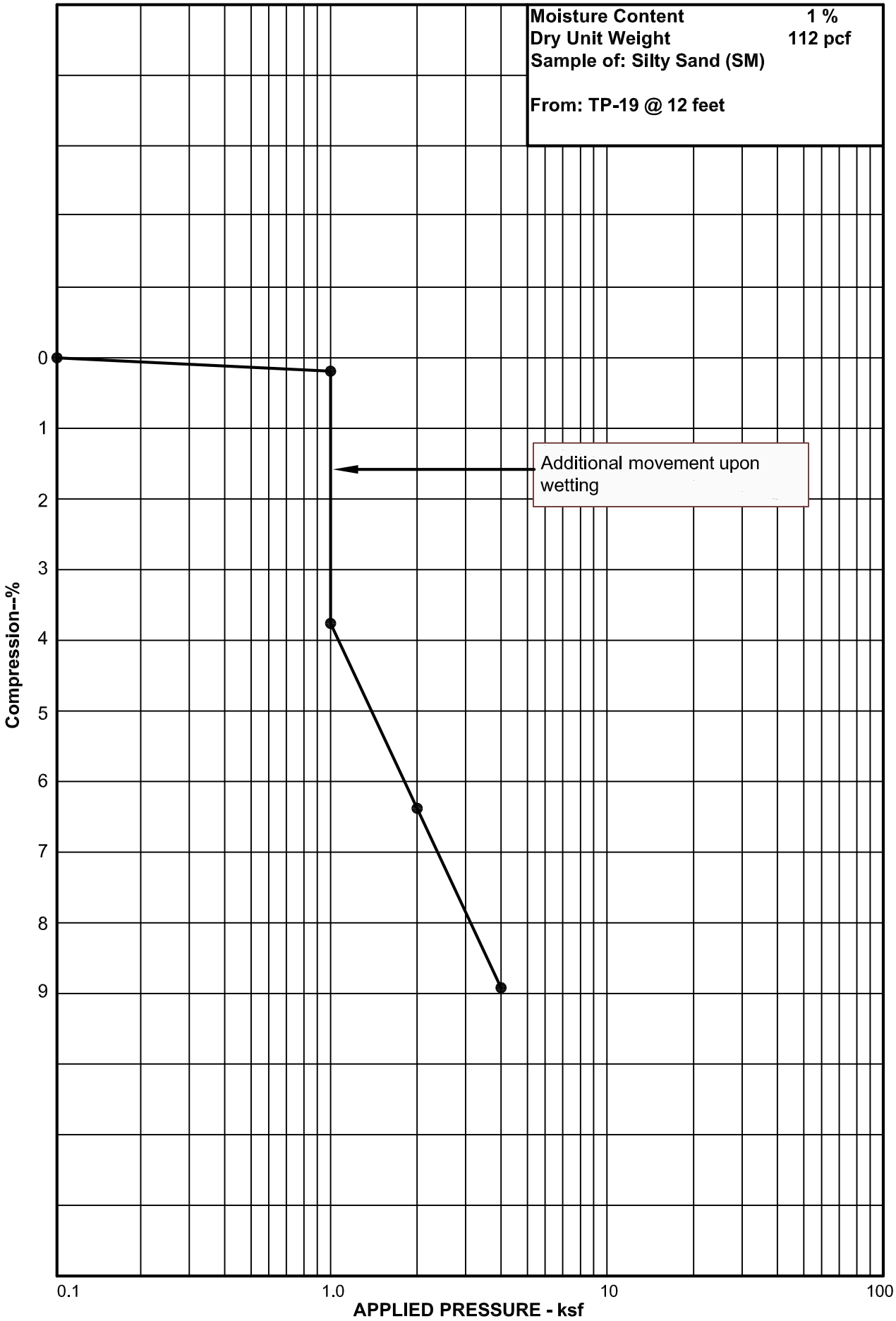
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 13**

Applied Geotechnical Engineering Consultants, Inc.



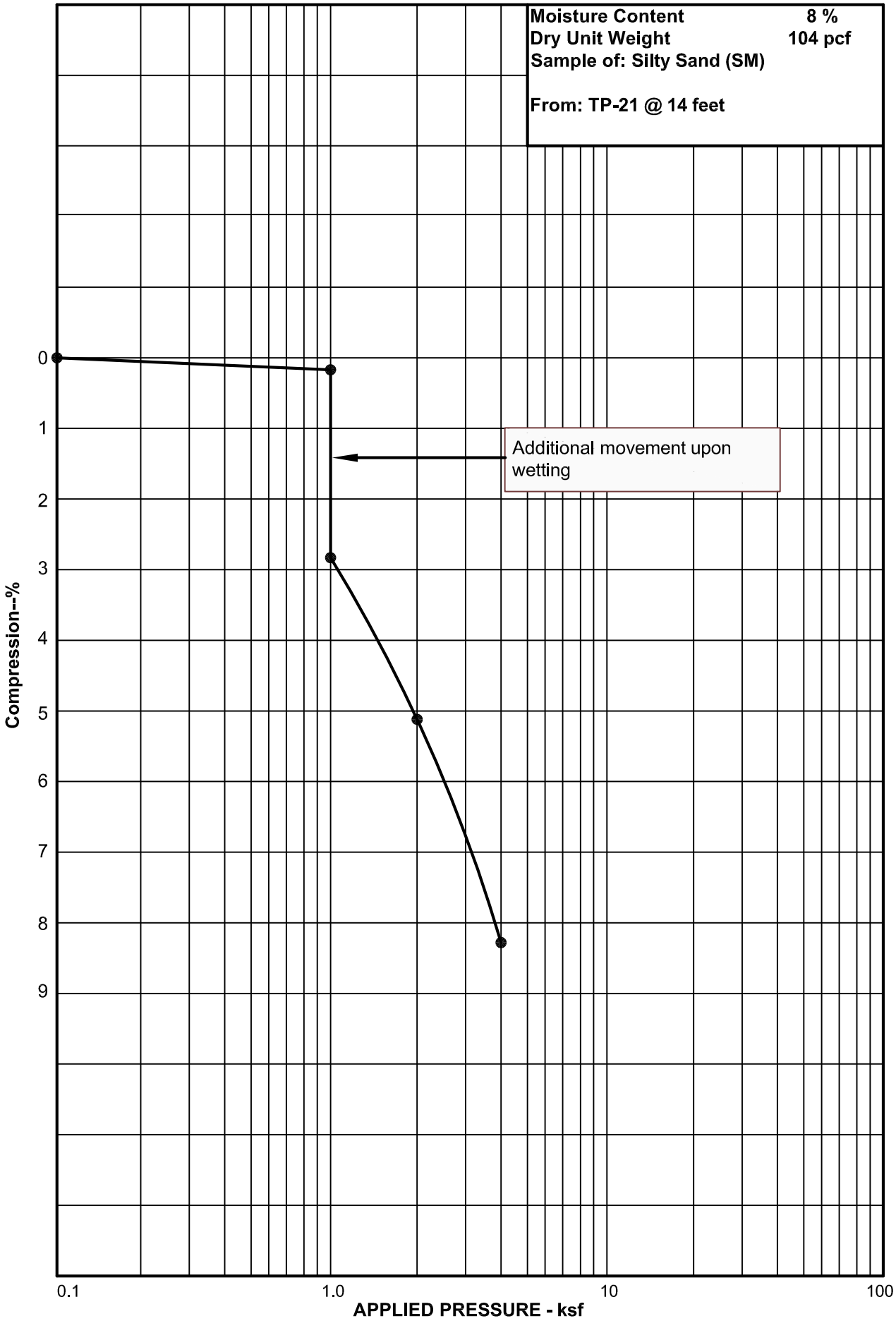
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 14**

Applied Geotechnical Engineering Consultants, Inc.



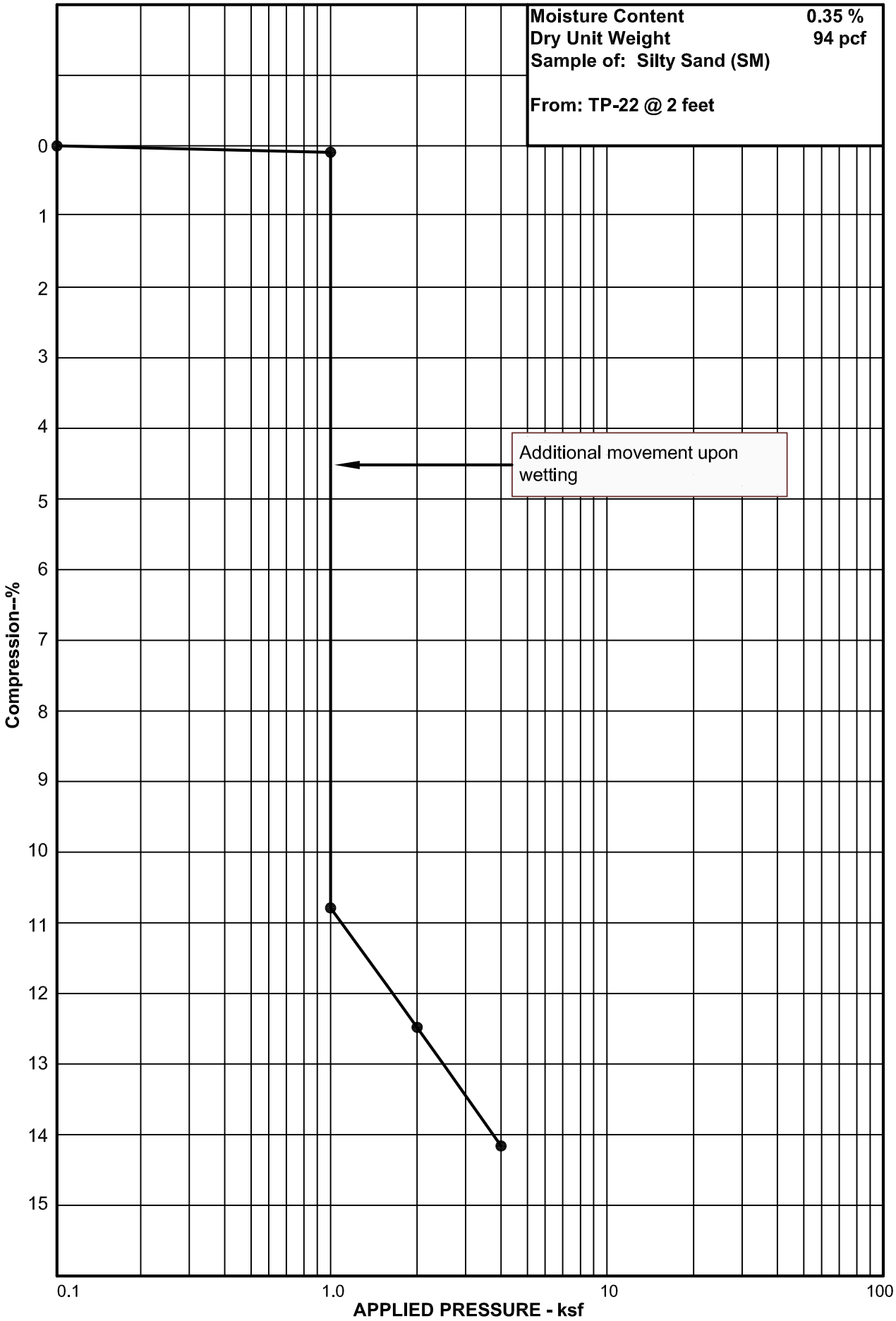
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 15**

Applied Geotechnical Engineering Consultants, Inc.



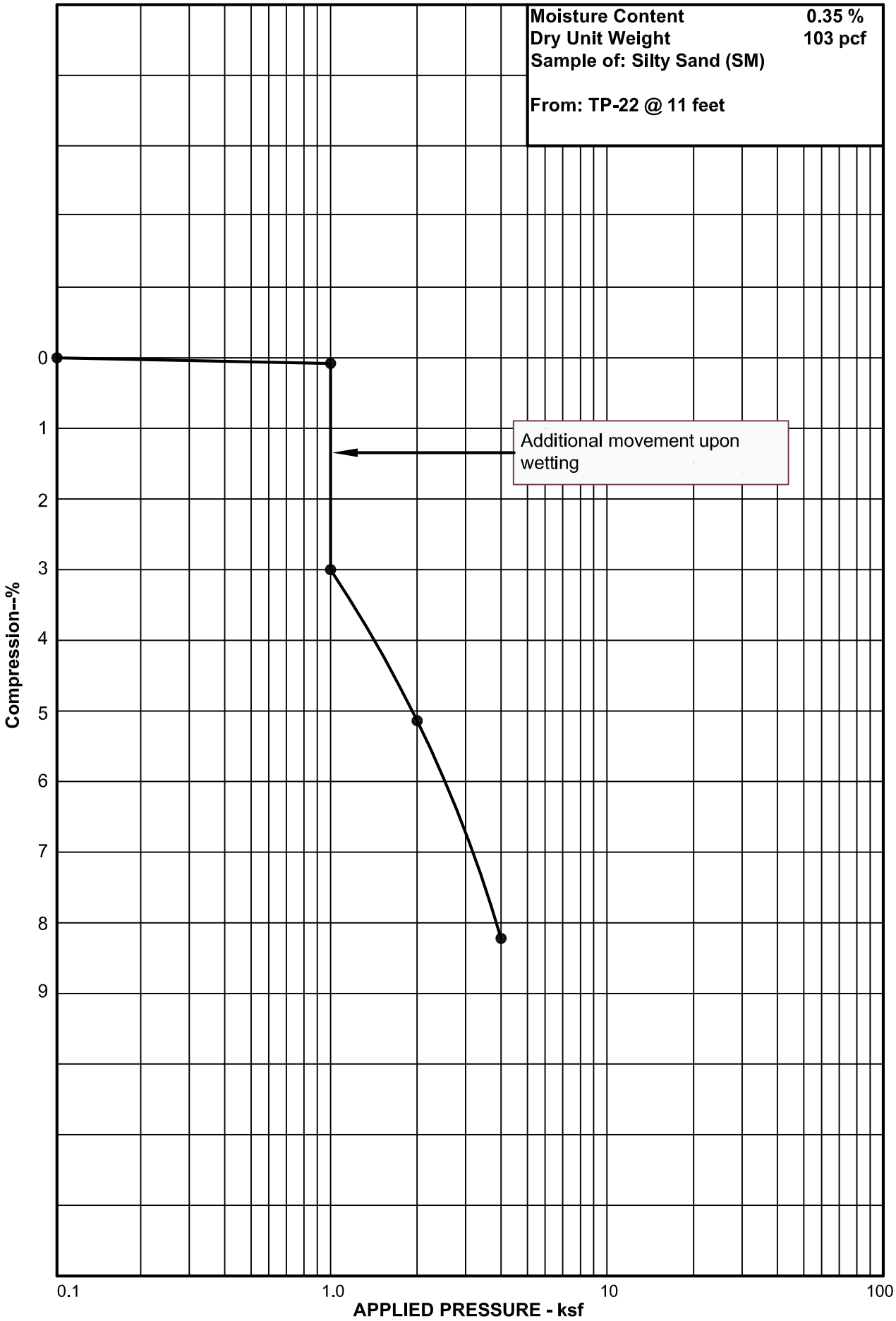
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 16**

Applied Geotechnical Engineering Consultants, Inc.



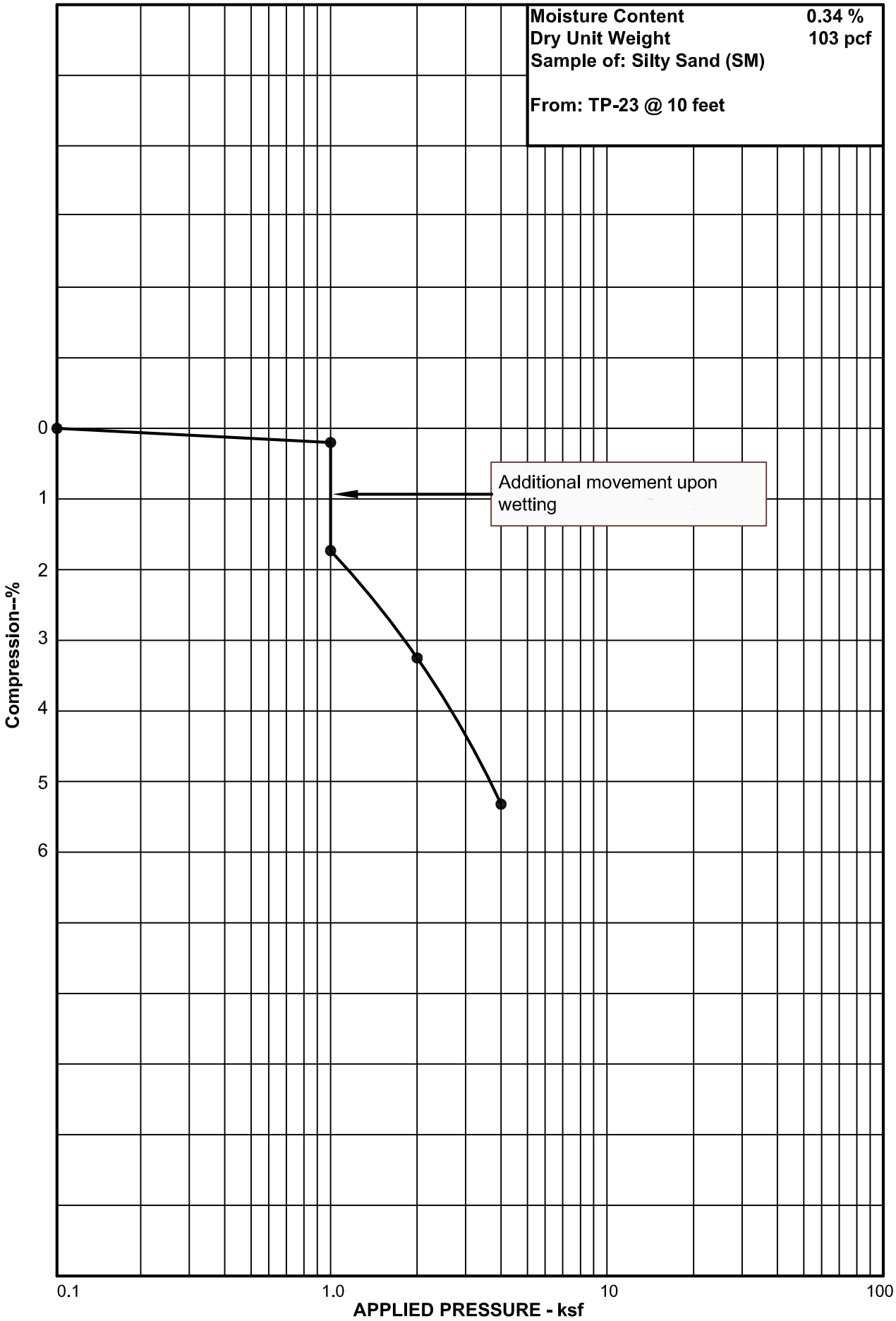
Project No. 2171312 CONSOLIDATION TEST RESULTS Figure 17

Applied Geotechnical Engineering Consultants, Inc.



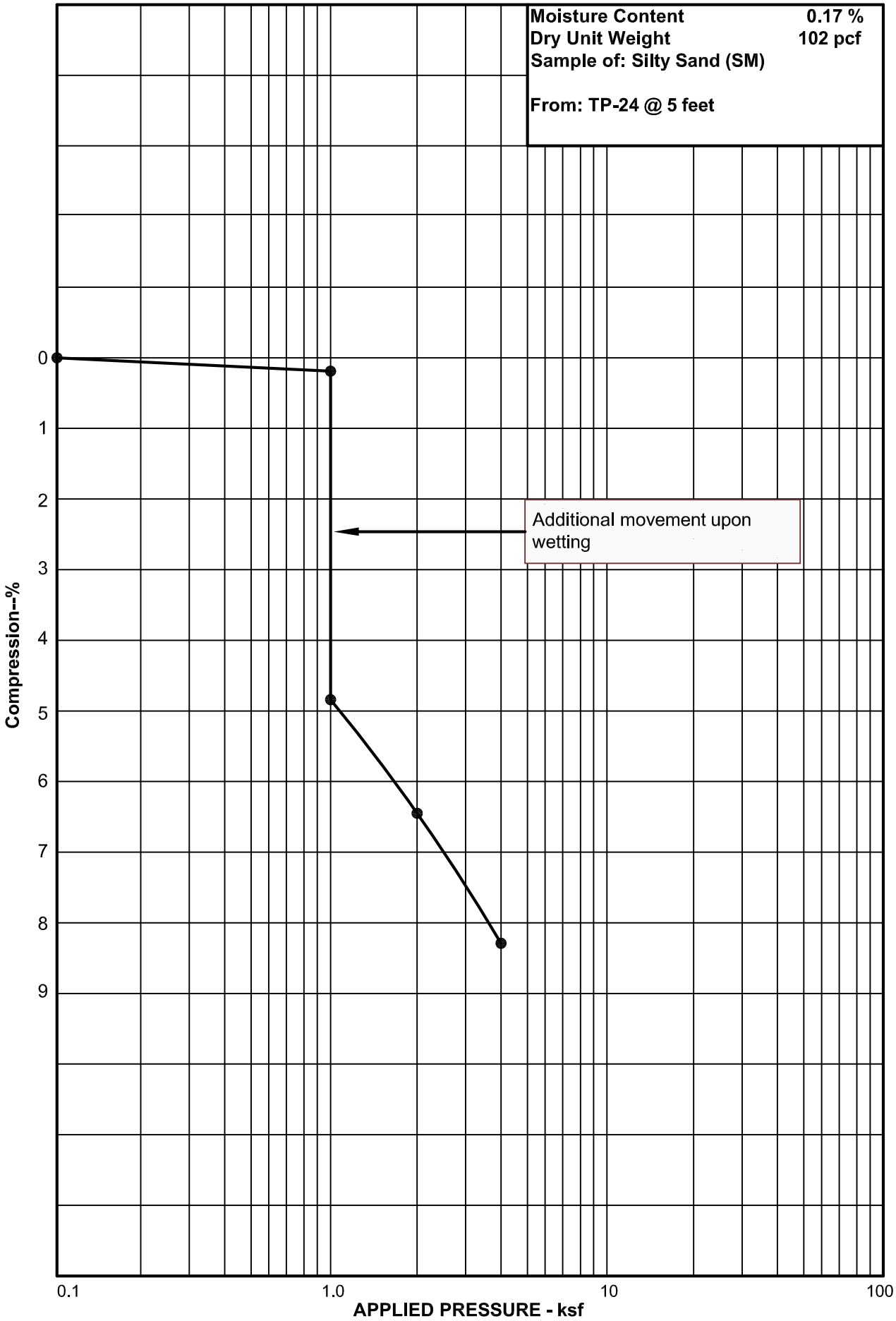
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 18**

Applied Geotechnical Engineering Consultants, Inc.



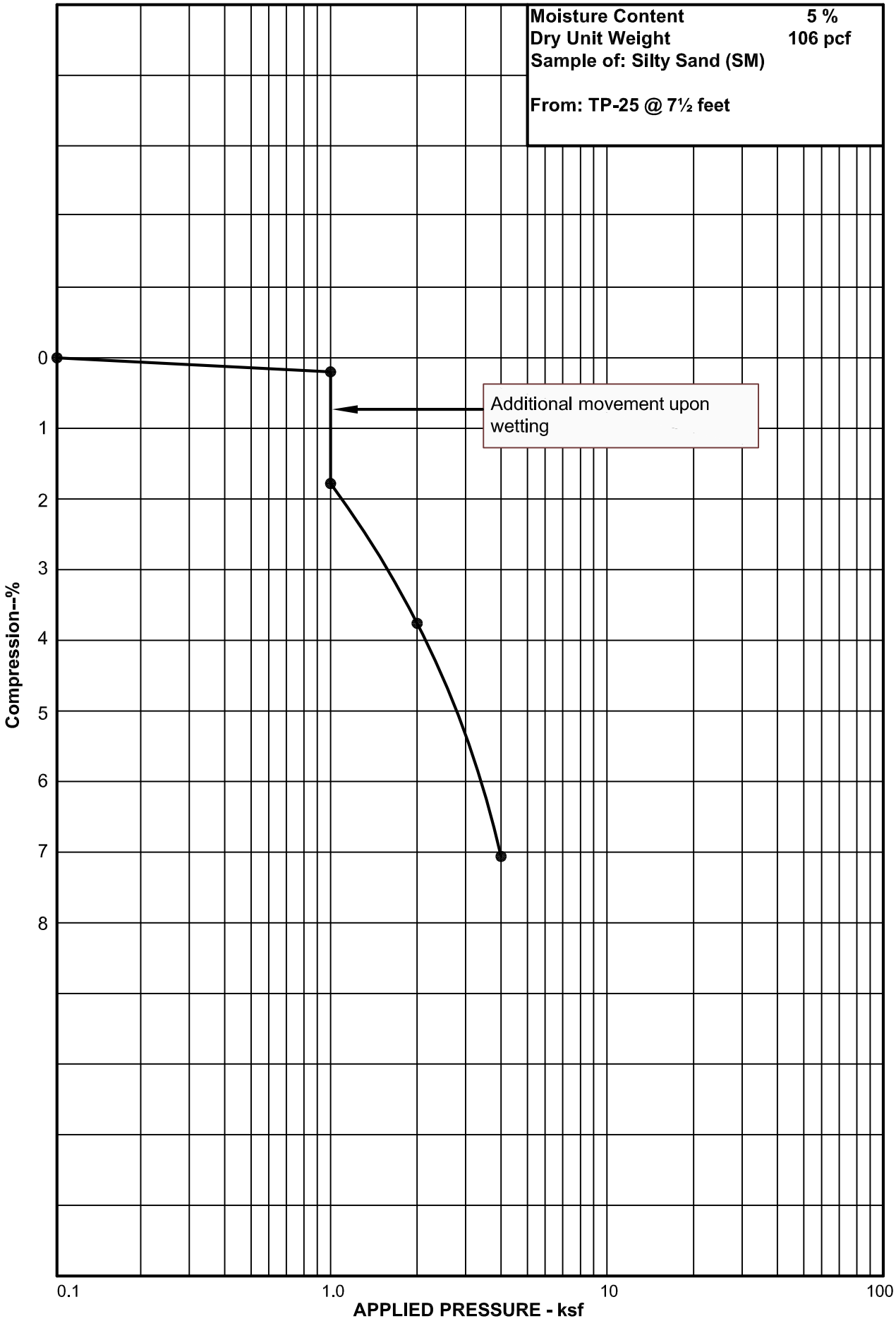
Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 19**

Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 20**

Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171312 **CONSOLIDATION TEST RESULTS** **Figure 21**

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

The Trails at Long Valley

Project Number 2171312

Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg Limits		Water Soluble Sulfates (ppm)	Sample Classification
Test Pit No.	Depth (feet)			Gravel (%)	Sand (%)	Silt/ clay (%)	Liquid Limit (%)	Plasticity Index (%)		
TP-1	3	8	106			40	34	16		Siltstone
TP-2	4					44			37	Silty Sand (SM)
TP-2	8	4				92	31	13		Mudstone
TP-3	6	7				95	41	22		Mudstone
TP-6	7	5				96	31	12		Mudstone
TP-7	6	2	104			27				Silty Sand (SM)
TP-8	10	4				98	31	13		Mudstone
TP-9	12	5				17	24	9		Mudstone
TP-10	9	<1	98			18				Silty Sand (SM)
TP-12	12	1	99			16				Silty Sand (SM)
TP-13	4	1	103							Silty Sand (SM)
TP-13	8	<1				26				Silty Sand (SM)
TP-15	11	7	99			36				Silty Sand (SM)
TP-16	4½	1				13				Silty Sand (SM)
TP-16	16½	1	101			20				Silty Sand (SM)
TP-18	11½	1	107			27				Silty Sand (SM)

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

The Trails at Long Valley

Project Number 2171312

Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg Limits		Water Soluble Sulfates (ppm)	Sample Classification
Test Pit No.	Depth (feet)			Gravel (%)	Sand (%)	Silt/ clay (%)	Liquid Limit (%)	Plasticity Index (%)		
TP-19	4	1	103			20				Silty Sand (SM)
TP-19	12	1	112			27				Silty Sand (SM)
TP-20	6	1	110	13	24	63				Sandy Silt (ML)
TP-21	14	8	104				23	9		Clayey Sand (SC)
TP-22	2	<1	94			15				Silty Sand (SM)
TP-22	11	<1	103			34				Silty Sand (SM)
TP-23	10	<1	103	7	72	21				Silty Sand (SM)
TP-24	5	<1	102			23			43	Silty Sand (SM)
TP-25	7½	5	106			30				Silty Sand (SM)

APPENDIX A

Rockfall Hazard Assessment
Long Valley Trails
Project No. 2171312, dated October 23, 2017

AGEC

Applied GeoTech

October 23, 2017

Brennan Holdings, LLC
205 East Tabernacle #4
St George, Utah 84770

Attention: Jim Raines

Subject: Rockfall Hazard Assessment
Long Valley Trails
Sections 20, 29, 30 and 31
Township 42 South Range 14 West, SLBM
Washington County, Utah
Project No. 2171312

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. (AGEC) was requested to evaluate rockfall hazard for the proposed Long Valley Trails development located in Sections 20, 29, 30 and 31, Township 42 South Range 14 West, SLBM in Washington County, Utah.

PROPOSED CONSTRUCTION

We understand the area is planned for commercial, residential and other uses. The approximate area planned for development is shown on Figures 1 and 2.

GEOLOGY

The geology of the site is mapped by Hayden (2005) to consist of the Triassic-age Shinarump Conglomerate Member of the Chinle Formation, the source of rockfall, overlying the Triassic-age Moenkopi Formation. The bedrock in the area dips down toward the southeast at approximately 33 degrees.

ROCKFALL EVALUATION

Low-sun-angle aerial photographs from 1981 and color aerial photographs from 2000 were reviewed along with site reconnaissance to determine the extent of rockfall runout from the steep slope on the southeast side of the property.

A site visit was made on August 31, 2017. Source boulders for rockfall hazard originate from the Shinarump Conglomerate Member of the Chinle Formation, which forms cliffs at the top

of the hill on the southeast side of the property. Reconnaissance of the rockfall source area finds that there are numerous rock outcrops that could potentially dislodge from the cliffs above the site. These blocks of bedrock are similar to the other boulders along and at the base of the slope. It appears that the boulders typically break into smaller particles as they roll down the slope.

Rockfall modeling using the Colorado Rockfall Simulation Program was performed for the slope based on the topography provided. The approximate limit of the rockfall runout is presented on Figures 1 and 2. Modifications of the slope above the northwest limit line can result in a different rockfall runout, which could be farther northwest of the limit line presented. Generally, cutting the slope down and/or increasing the hardness of the ground, such as paving the surface, increases the lateral extent of the rockfall hazard area.

Consideration may be given to constructing appropriately designed berms or fences to reduce the rockfall hazard area.

LIMITATIONS

This letter has been prepared in accordance with generally accepted geologic engineering practices in the area for the use of the client. The conclusions and recommendations included in the letter are based on conditions observed during our field study, topographic information provided and use of the Colorado Rockfall Simulation Program. It should be understood that determining the extent of rockfall hazard is not an exact science and the rockfall hazard may extend beyond the area identified as rockfall hazard.

If you have questions or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Douglas R. Hawkes, P.E., P.G.

Reviewed by JEN, P.E.
Enclosures

Reference:

Hayden, J.M., 2005; Geologic map of the Washington Dome quadrangle, Washington County, Utah, Utah Geological Survey Map 209.

N

0 500 1000 feet

Approximate Scale

LEGEND:

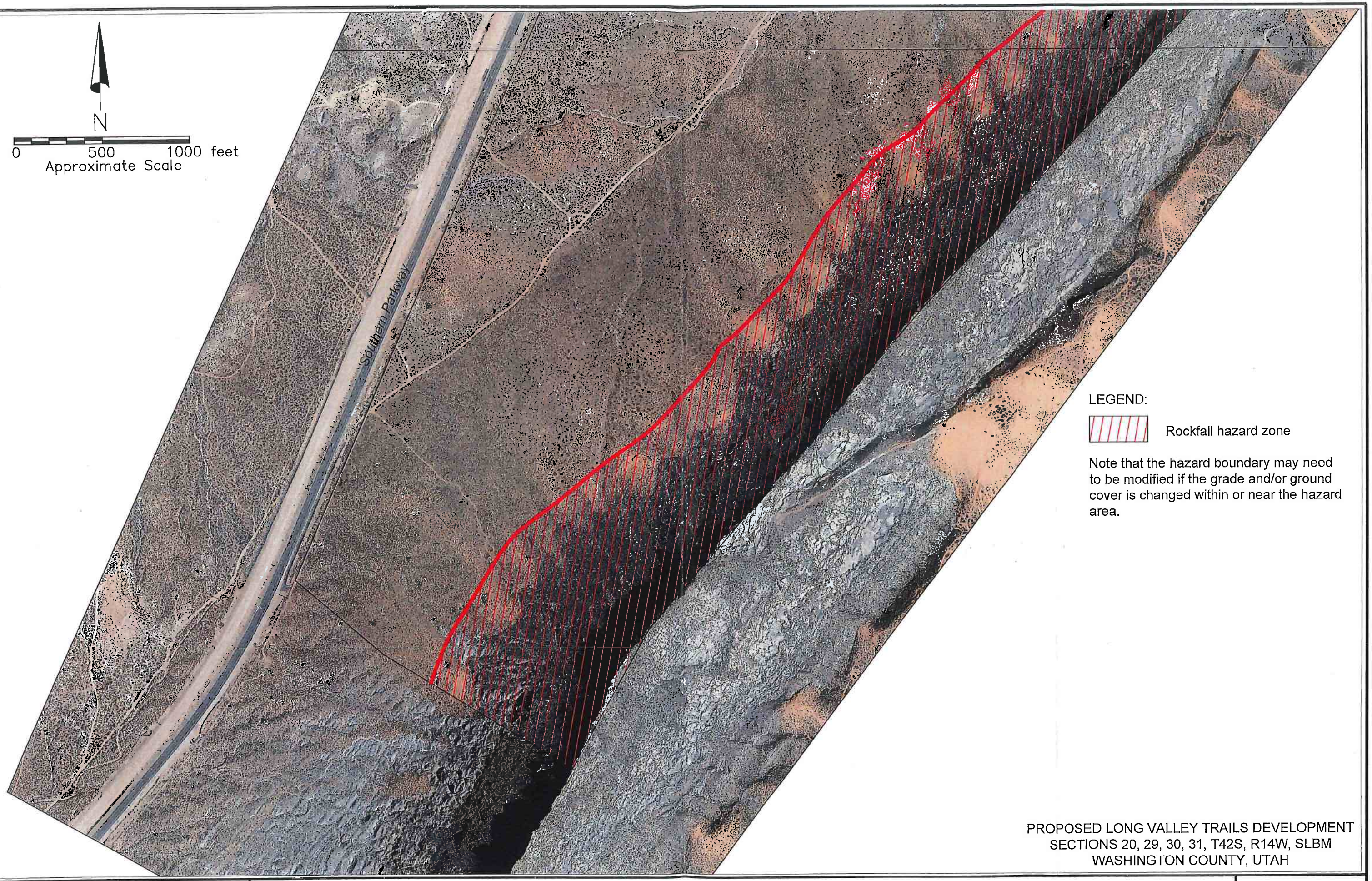
Rockfall hazard zone

Note that the hazard boundary may need to be modified if the grade and/or ground cover is changed within or near the hazard area.

Southern Parkway

PROPOSED LONG VALLEY TRAILS DEVELOPMENT
SECTIONS 20, 29, 30, 31, T42S, R14W, SLBM
WASHINGTON COUNTY, UTAH

2171312	AGEC	Rockfall Hazard Area	Figure 1



LEGEND:

Rockfall hazard zone

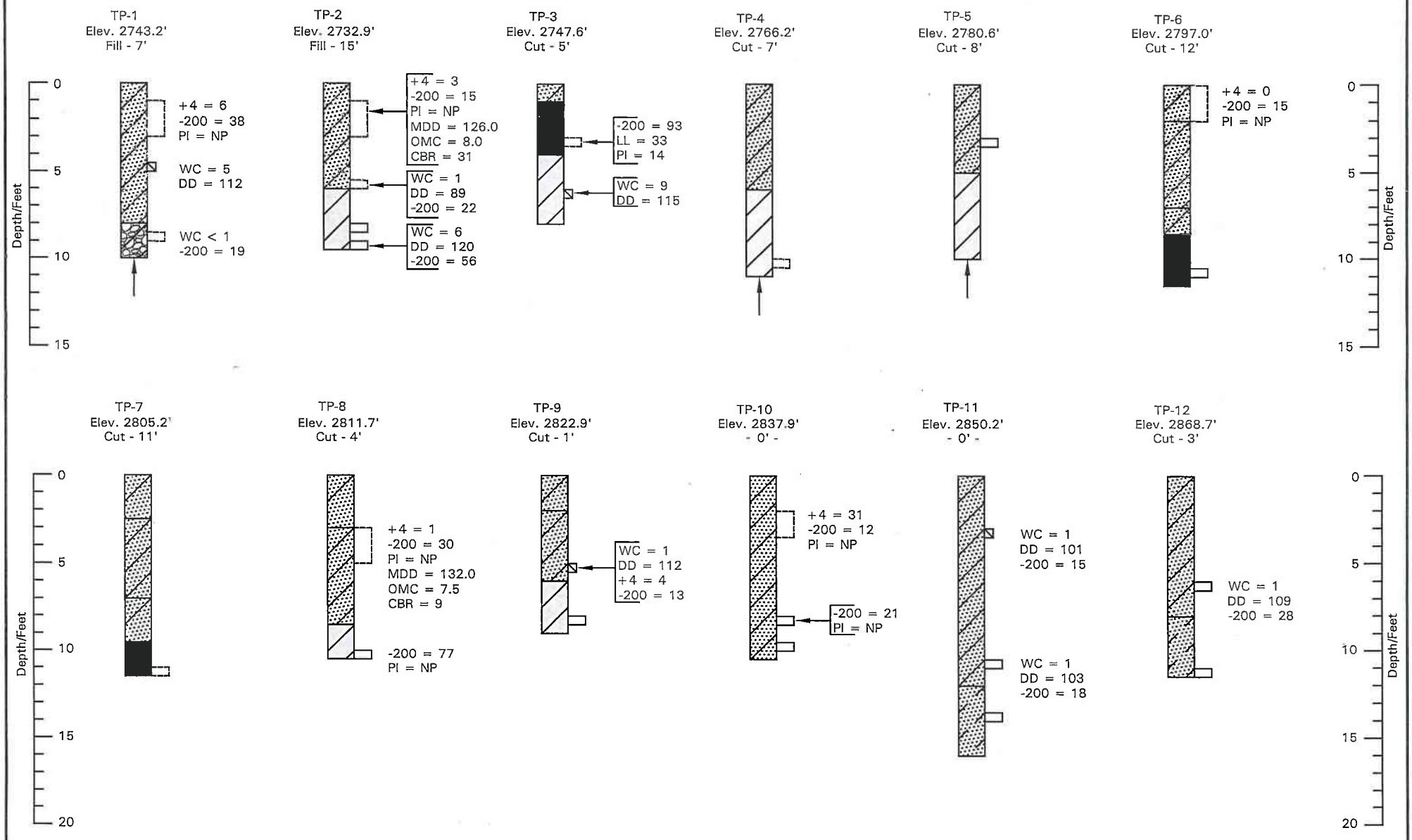
Note that the hazard boundary may need to be modified if the grade and/or ground cover is changed within or near the hazard area.

PROPOSED LONG VALLEY TRAILS DEVELOPMENT
SECTIONS 20, 29, 30, 31, T42S, R14W, SLBM
WASHINGTON COUNTY, UTAH

2171312	AGEC	Rockfall Hazard Area	Figure 2

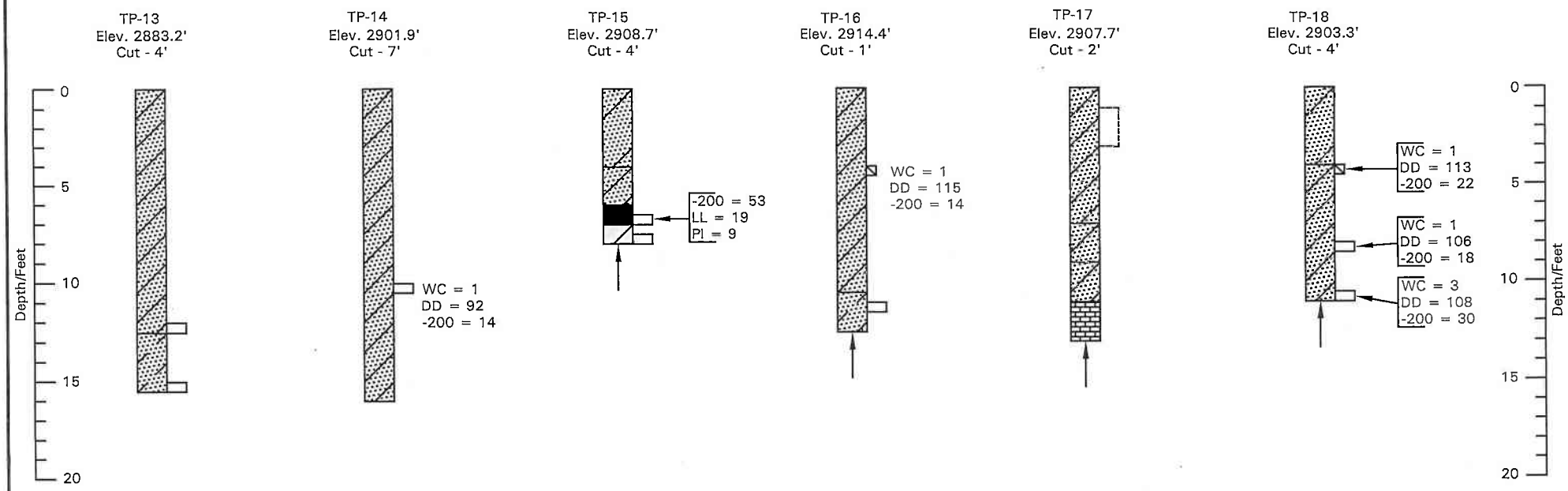
APPENDIX B

Laboratory Test Results
Long Valley Parkway
Project No. 2171313, Dated January 17, 2018



See Figure 5 for Legend and Notes

2171313	AGEC	Logs of Test Pits	Figure 3



See Figure 5 for Legend and Notes

2171313	AGEC	Logs of Test Pits	Figure 4

LEGEND:



Clayey Sand (SC); medium dense to dense, slightly to moderately cemented, dry to slightly moist, red-brown.



Silty Sand (SM); loose to medium dense, occasionally slightly cemented, dry to slightly moist, red-brown.



Poorly Graded Sand with Silt (SP-SM); loose to medium dense, dry to slightly moist, red-brown.



Silty Gravel (GM); dense, slightly cemented, cobbles, grey to brown.



Siltstone Bedrock; intermixed with mudstone and fine grained sandstone, weathered in upper few feet, soft to hard, slightly moist, red-brown.



Limestone Bedrock (TP-17 only); hard, fractured.



Mudstone Bedrock; interlayered with fine grained sandstone and siltstone, weathered in upper zone, soft to hard, slightly moist, red-brown.



Indicates relatively undisturbed hand drive sample taken.



Indicates relatively undisturbed block sample taken.



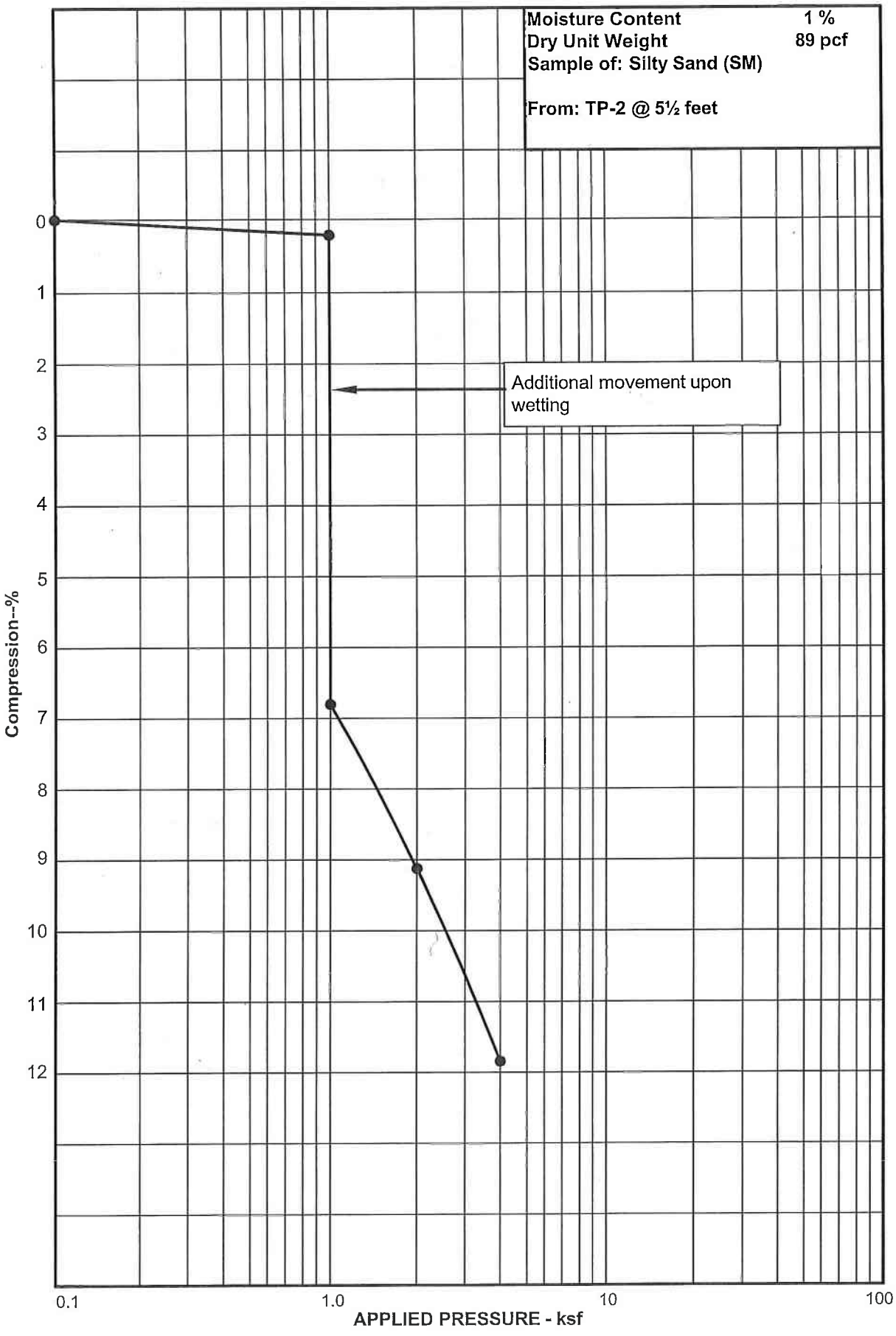
Indicates disturbed sample taken.

Indicates practical backhoe refusal dense gravel or hard bedrock.

NOTES:

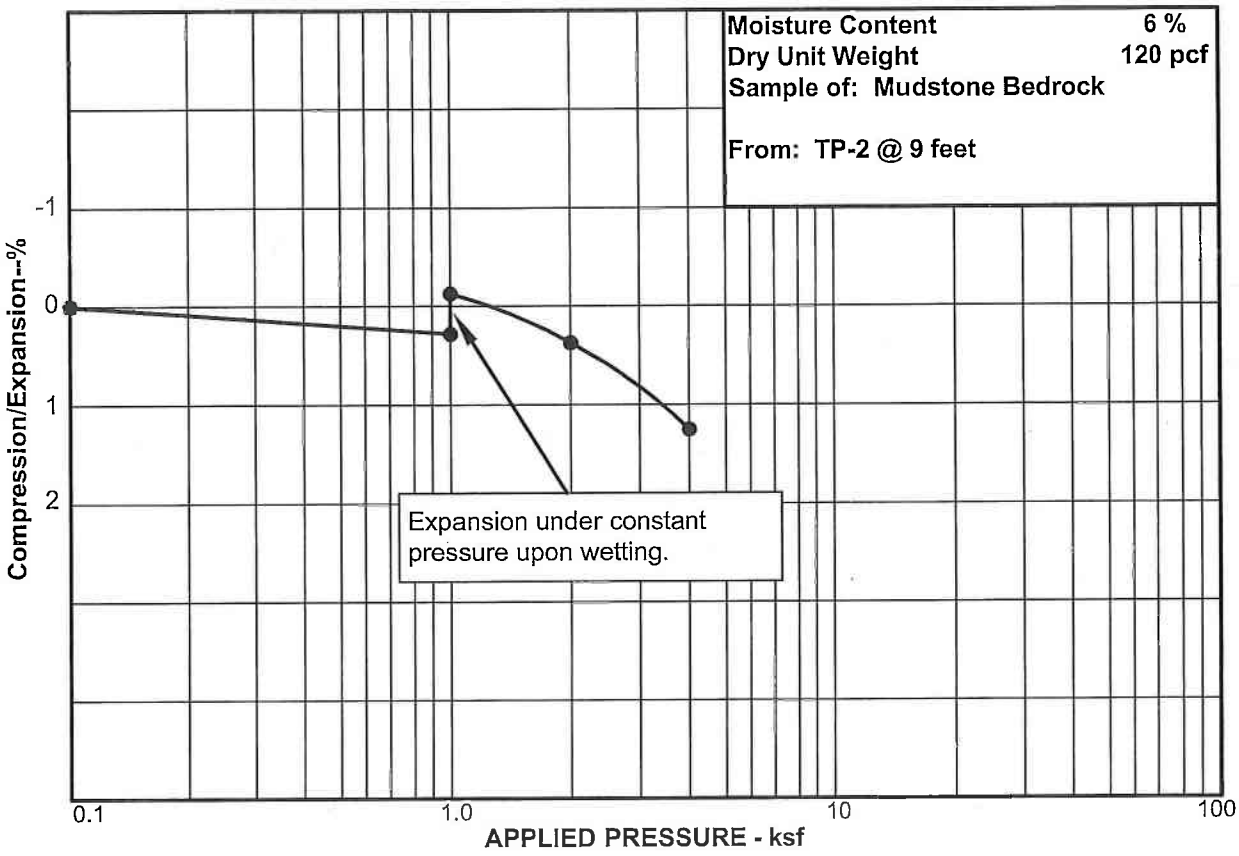
1. The test pits were excavated on August 22 and 23, 2017 with a rubber tire backhoe.
2. The locations of the test pits were measured by survey by Bush & Gudgell Engineering.
3. The elevations of the test pits were surveyed by Bush & Gudgell Engineering.
4. The test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the test pit logs represent the approximate boundaries between material types and the transitions may be gradual.
6. Free water was not encountered in the test pits at the time of excavation.
7. WC = water content (%);
   DD = dry density (pcf);
   +4 = percent retained on the No. 4 sieve;
   -200 = percent passing No. 200 sieve;
   LL = liquid limit (%);
   PI = plasticity index (%);
   MDD = maximum dry density (pcf);
   OMC = optimum moisture content (%);
   CBR = California Bearing Ratio (%).

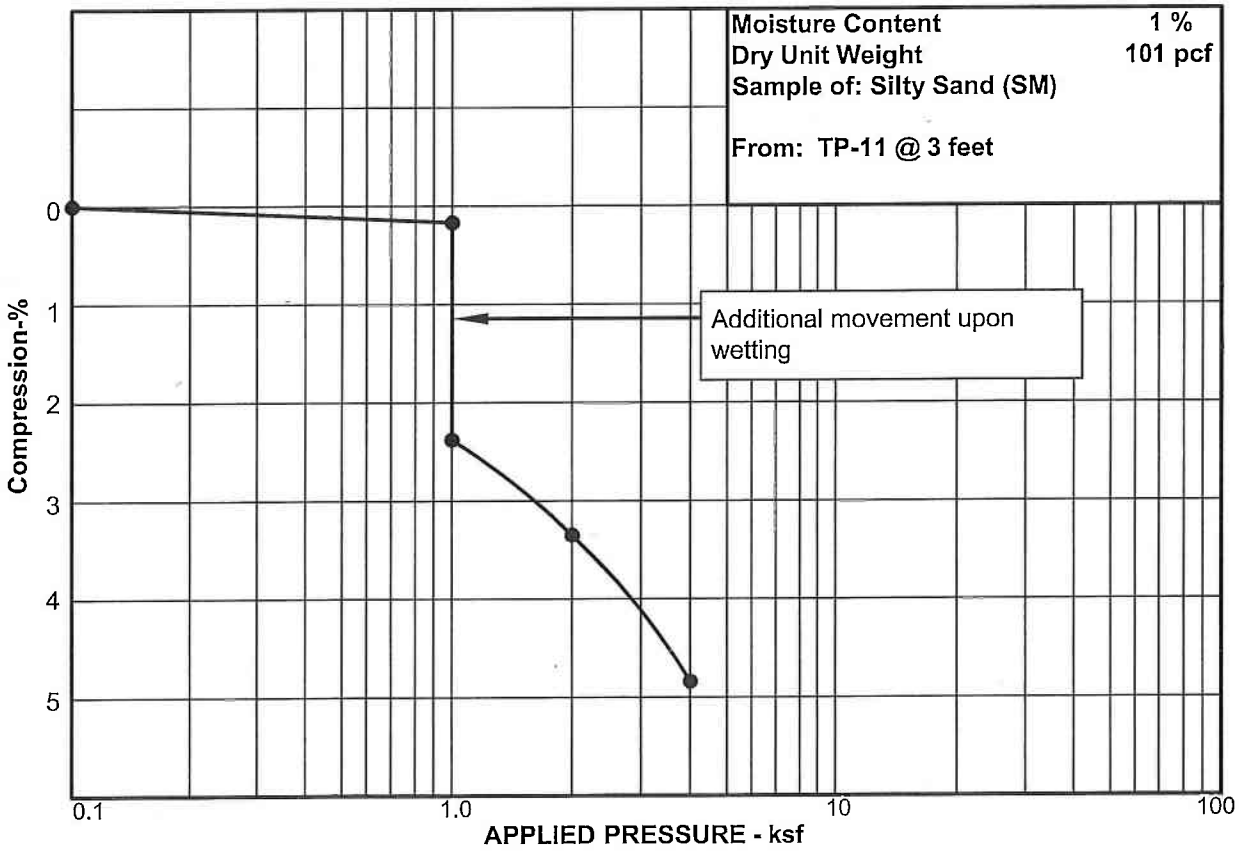
Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 6**

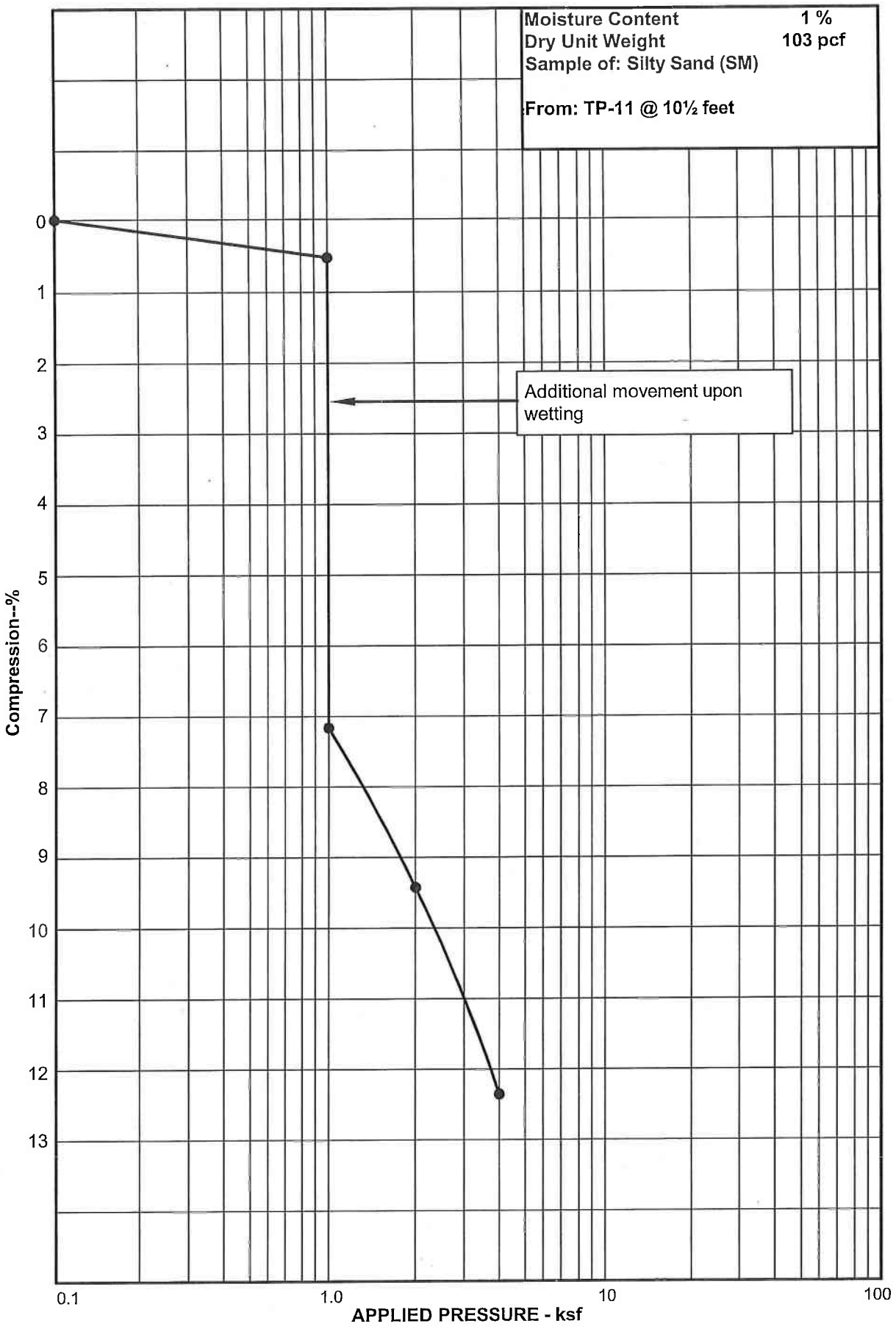
Applied Geotechnical Engineering Consultants, Inc.





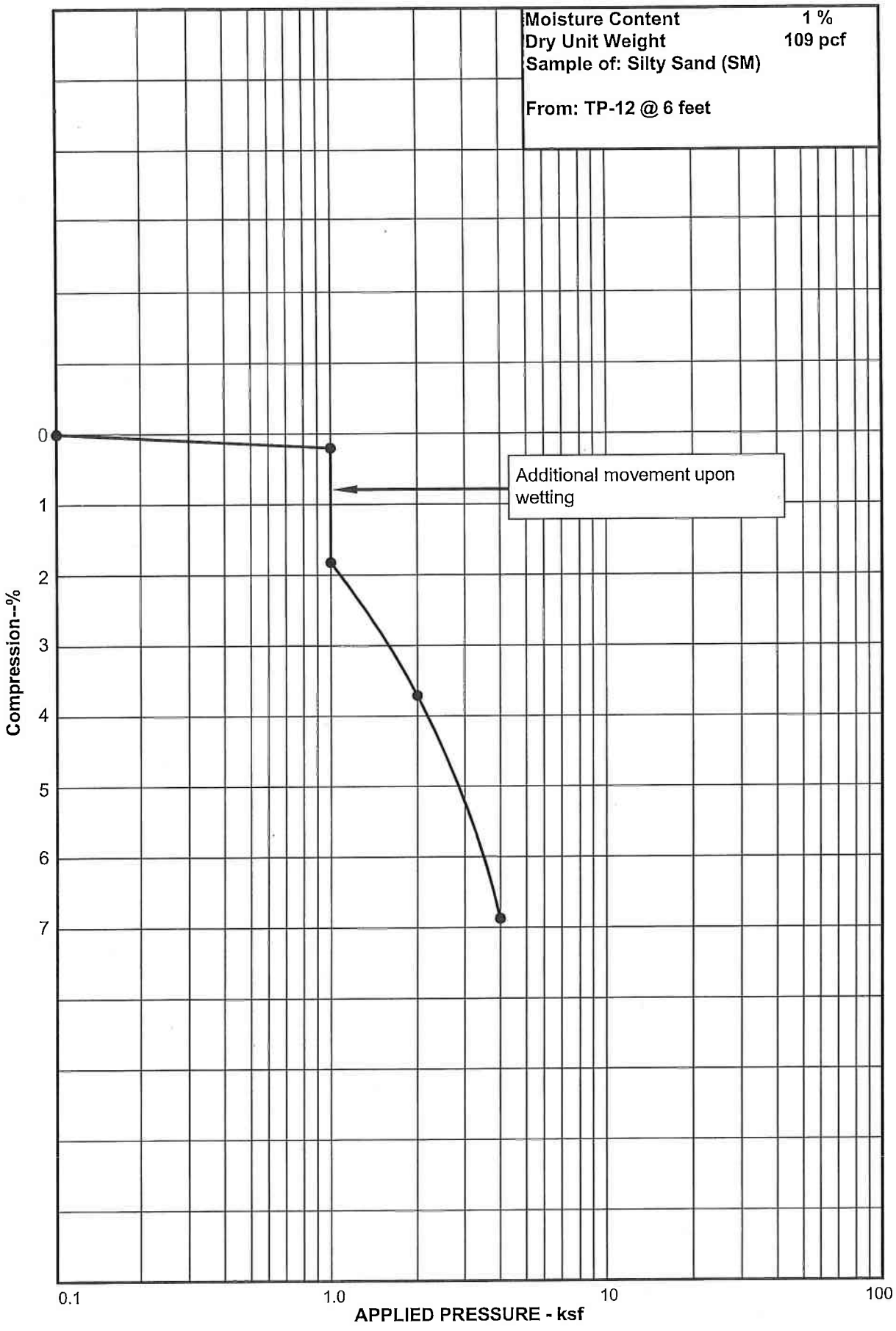
Project No. 2171313 CONSOLIDATION TEST RESULTS Figure 7

Applied Geotechnical Engineering Consultants, Inc.



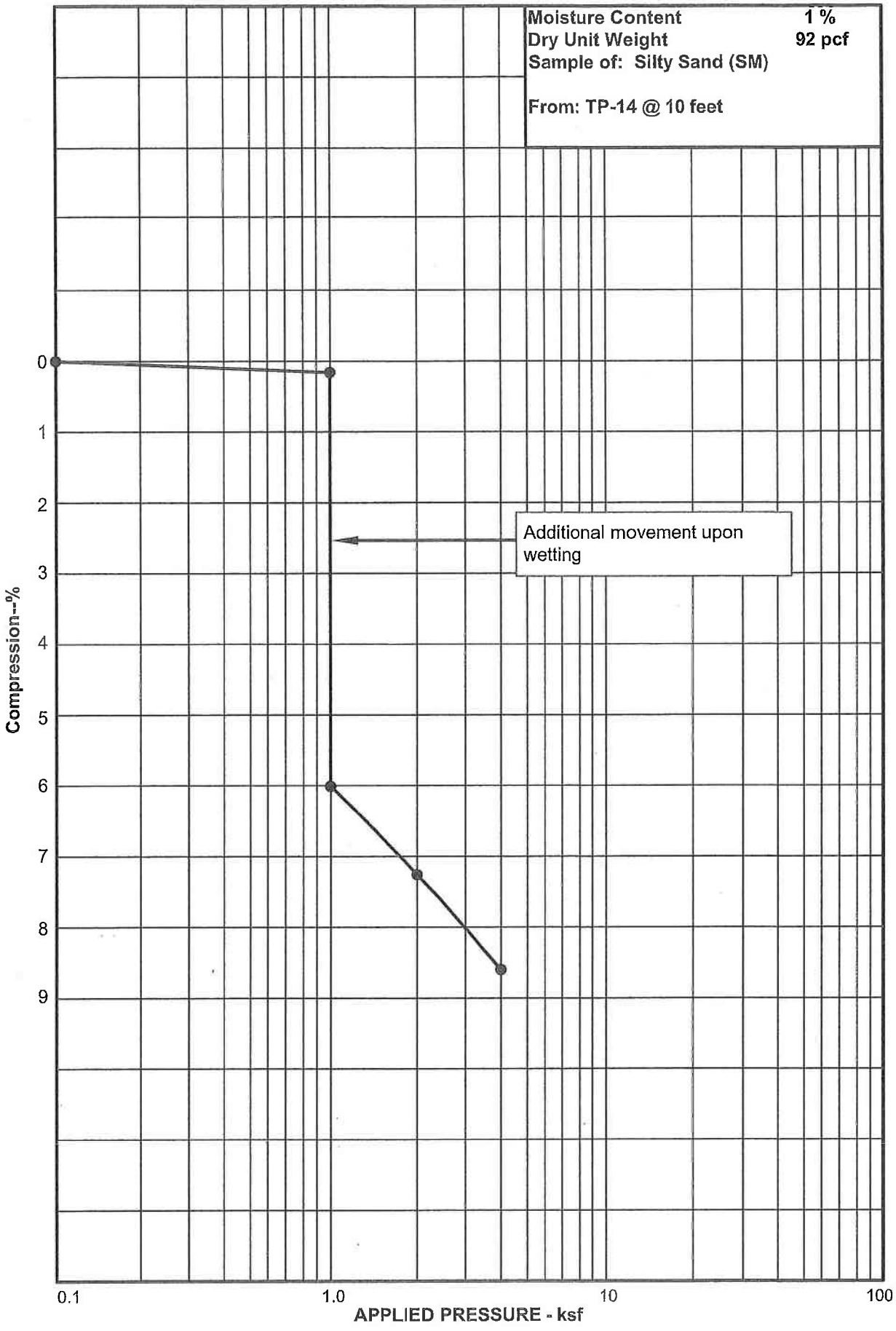
Project No. 2171313 **CONSOLIDATION TEST RESULTS** Figure 8

Applied Geotechnical Engineering Consultants, Inc.



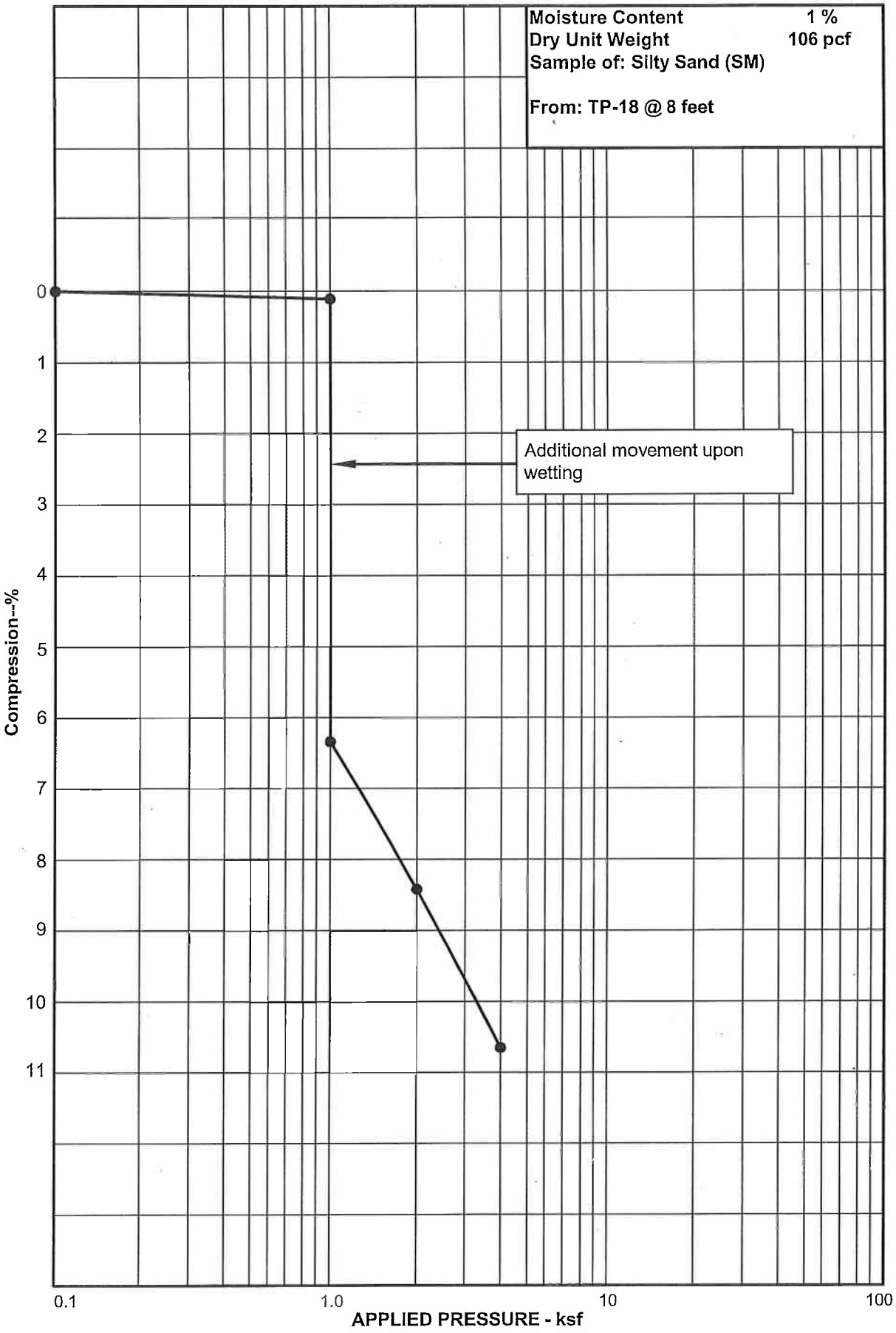
Project No. 2171313 **CONSOLIDATION TEST RESULTS** Figure 9

Applied Geotechnical Engineering Consultants, Inc.



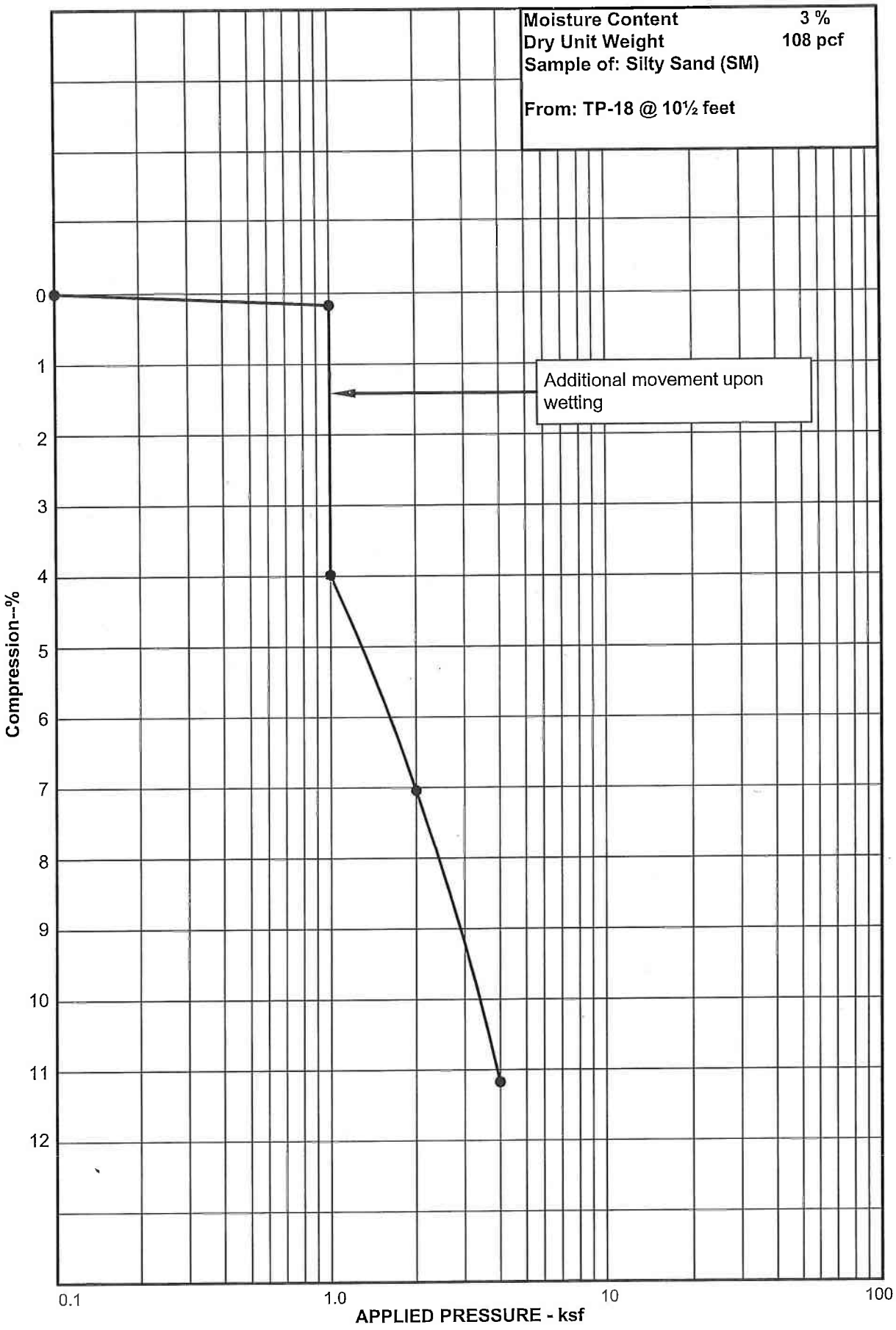
Project No. 2171313 **CONSOLIDATION TEST RESULTS** Figure 10

Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171313 CONSOLIDATION TEST RESULTS Figure 11

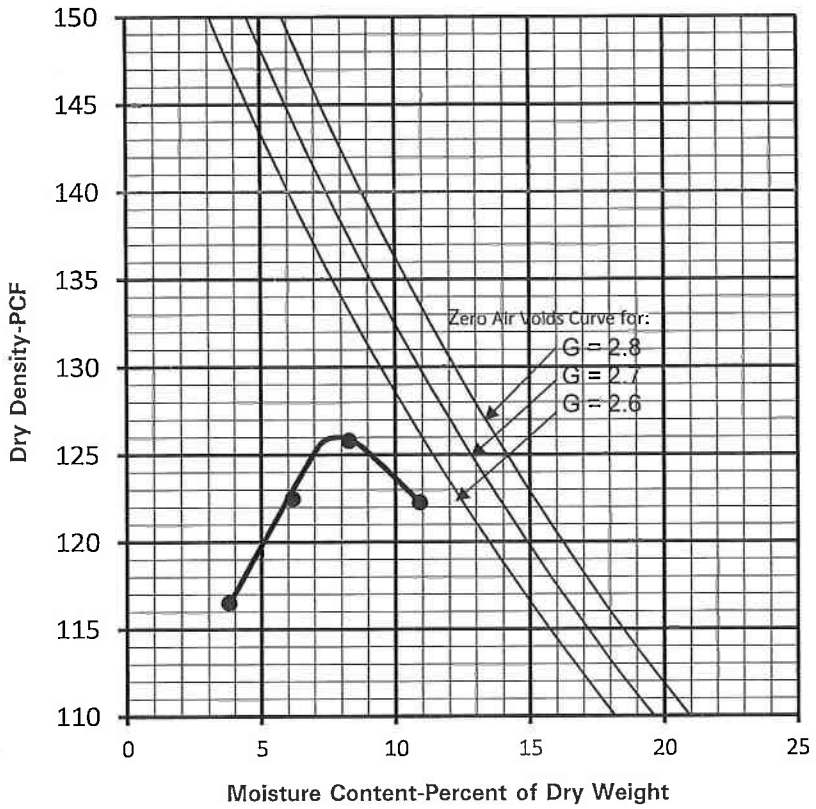
Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171313 CONSOLIDATION TEST RESULTS Figure 12

AGEC

Applied GeoTech Project: Long Valley Parkway



Sample Date:	9/23/17
Sample No.	170927F
Maximum Dry Density:	126.0
Optimum Moisture:	8.0

Atterberg Limits

Liquid Limit:	
Plasticity Index:	Non-Plastic

Gradation

Gravel:	3%
Sand:	82%
Silt & Clay:	15%

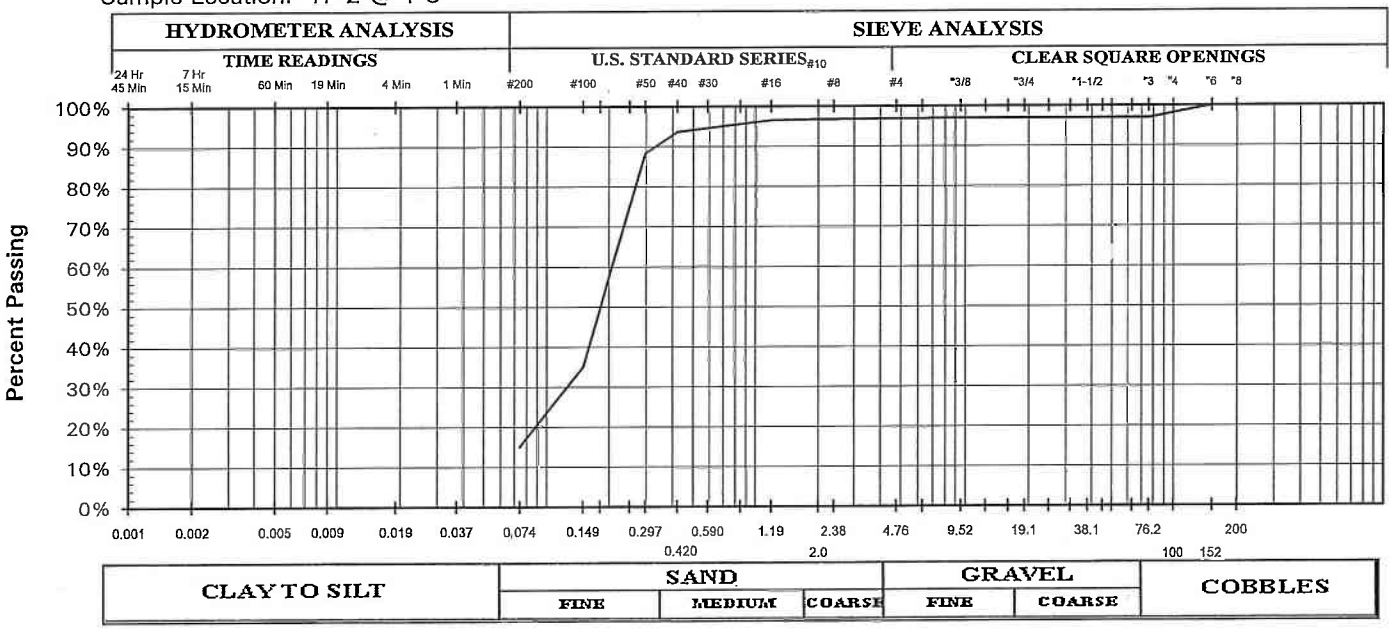
Moisture - Density Relationship Test Procedure: AASHTO T-180 B

Reviewed By: TT

USCS Classification: silty sand (SM)

AASHTO Classification: A-2-4

Sample Location: TP-2 @ 1-3'



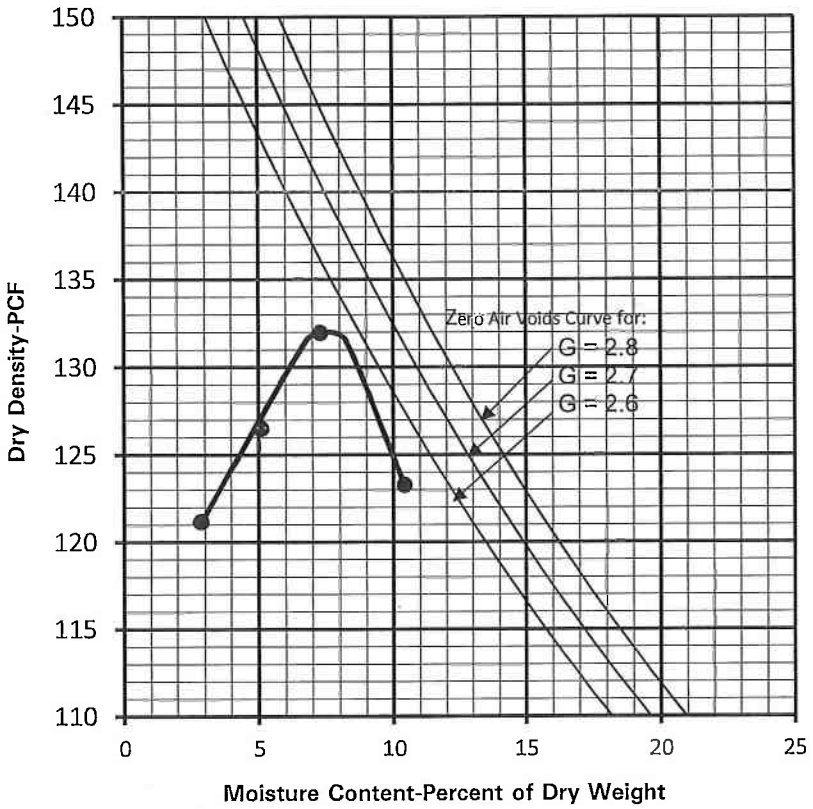
GRADATION AND MOISTURE-DENSITY RELATIONSHIP RESULTS

Project No.: 2171313

Figure: 13

AGEC

Applied GeoTech Project: Long Valley Parkway



Sample Date:	9/23/17
Sample No.	170927D
Maximum Dry Density:	132.0
Optimum Moisture:	7.5

Atterberg Limits

Liquid Limit:	
Plasticity Index:	Non-Plastic

Gradation

Gravel:	1%
Sand:	69%
Silt & Clay:	30%

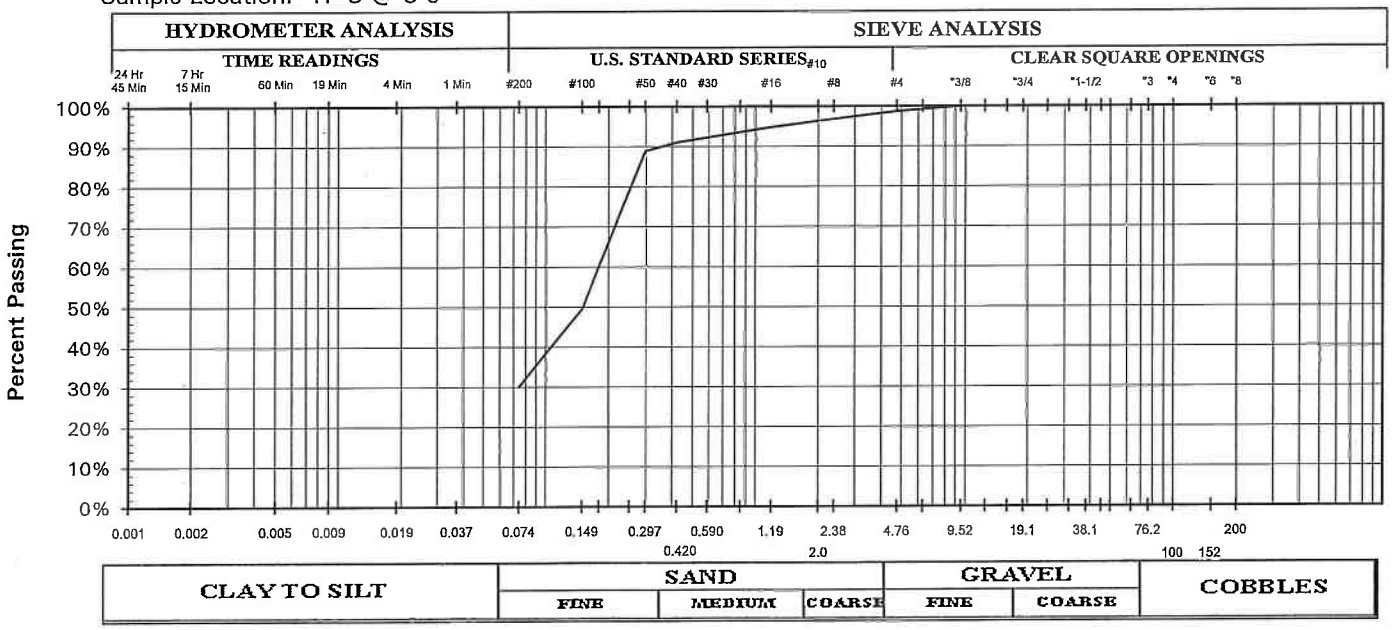
Moisture - Density Relationship Test Procedure: AASHTO T-180 B

Reviewed By: TT

USCS Classification: silty sand (SM)

AASHTO Classification: A-2-4

Sample Location: TP-8 @ 3-5'

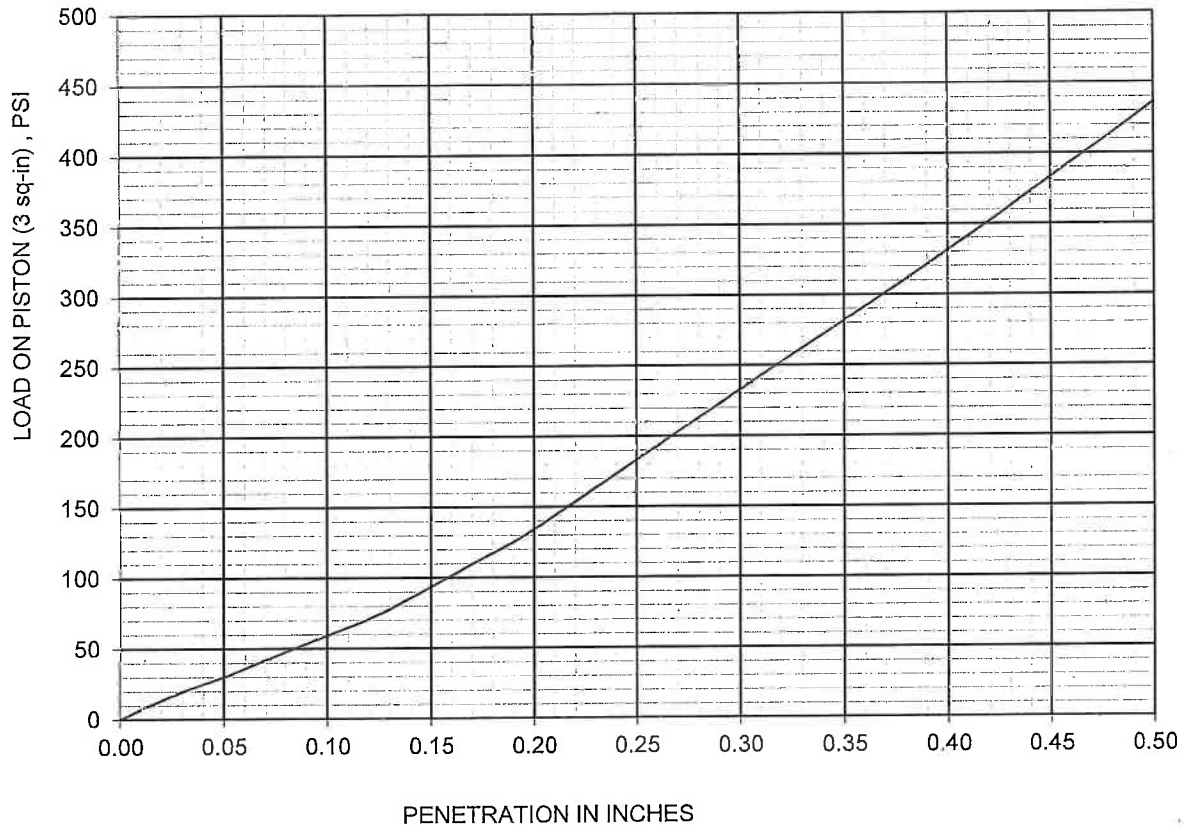


GRADATION AND MOISTURE-DENSITY RELATIONSHIP RESULTS

Project No.: 2171313

Figure: 14

AGEC
Applied GeoTech



Project Long Valley Parkway **Sample Location** TP-8 @ 3-5'

Sample Classification SM **AGEC Sample ID No.** B-092317

Method of sample preparation: Remolded to approximately 95% of the maximum dry density at the optimum moisture content as per ASTM D 1557

Sample penetration after soaking for 96 hours

Dry Density: as molded 125.8 pcf **Moisture Content:** as molded 7.8 percent

after soaking 125.4 pcf top 1-inch after soaking 9.3 percent

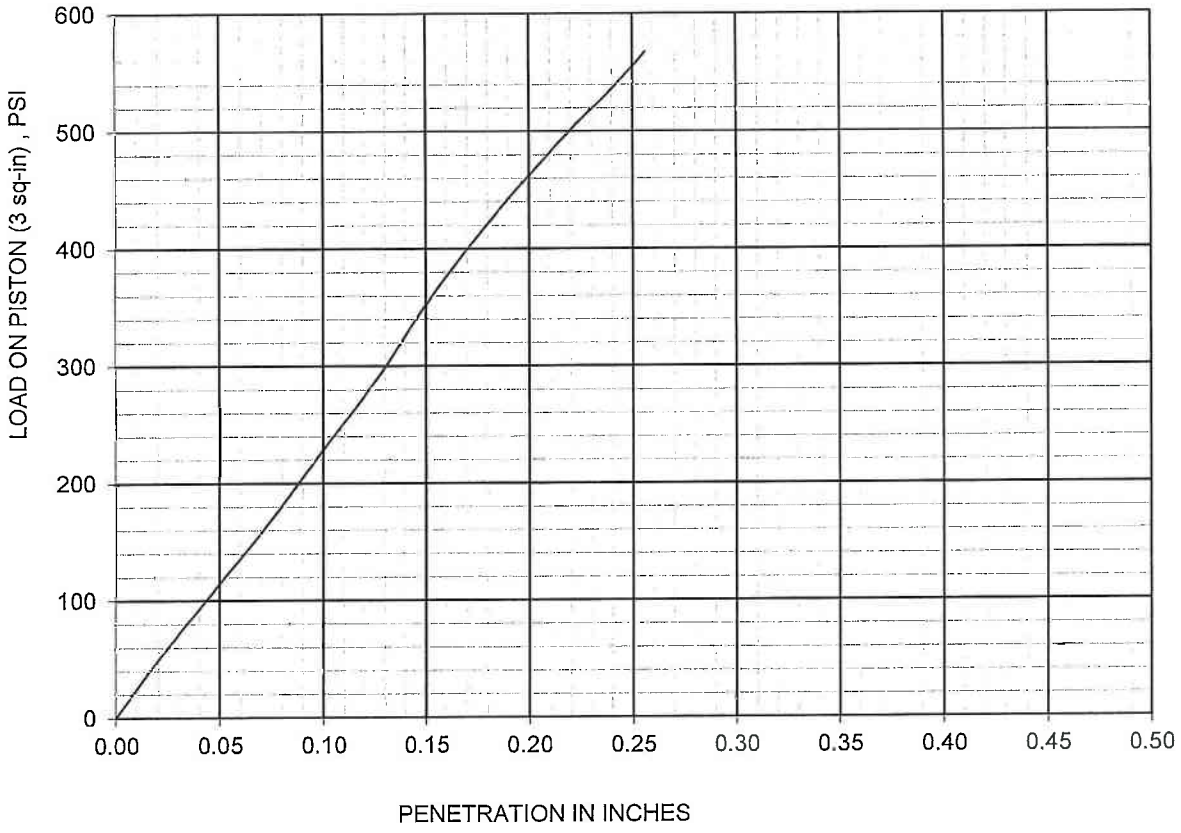
Swell: after soaking 0.0 percent average after soaking 9.8 percent

Comments CBR value taken at 0.2 inch penetration

Bearing Ratio of Sample, **CBR =** 9 percent **Surcharge** 30 lb

Proj. No. 2171313 **CALIFORNIA BEARING RATIO TEST RESULTS** 15

AGEC
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Project Long Valley Parkway **Sample Location** TP-2 @ 1-3'

Sample Classification SM **AGEC Sample ID No.** D-092317

Method of sample preparation: Remolded to approximately 95% of the maximum dry density at the optimum moisture content as per ASTM D 1557

Sample penetration after soaking for 96 hours

Dry Density:	as molded	119.9	pcf	**Moisture Content:**	as molded	8.2	percent
	after soaking	122.6	pcf		top 1-inch after soaking	9.9	percent
Swell:	after soaking	0.0	percent		average after soaking	10.3	percent

Comments CBR value taken at 0.2 inch penetration

Bearing Ratio of Sample, CBR = **31** percent **Surcharge** 30 lb

Proj. No. 2171313 **CALIFORNIA BEARING RATIO TEST RESULTS** 16

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SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: TM
LAB NO.: A-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-1 @ 1-3'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	0.0	100
3/8"	0.0	100
#4	5.8	94
#10	14.3	86
#40	29.2	71
#200	61.7	38
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SM) Silty sand
AASHTO SOIL CLASS:
A-4

TOTAL DRY WEIGHT OF SAMPLE: 17465.4

REMARKS:

Figure 17

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

AGEC
Applied GeoTech

SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: TM
LAB NO.: C-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-6 @ 0-2'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	0.0	100
3/8"	0.0	100
#4	0.2	100
#10	0.4	100
#40	1.0	99
#200	84.9	15
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SM) Silty sand
AASHTO SOIL CLASS:
A-2-4

TOTAL DRY WEIGHT OF SAMPLE: 19540.3

REMARKS:

Figure 18

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SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: CU
LAB NO.: E-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-10 @ 2-4'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	11.1	89
3/8"	26.2	74
#4	30.5	69
#10	39.8	60
#40	51.1	49
#200	88.3	12
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SP - SM) Poorly graded sand with silt and gravel
AASHTO SOIL CLASS:
A-1-b

TOTAL DRY WEIGHT OF SAMPLE: 19685.6

REMARKS:

Figure 19

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AGEC
Applied GeoTech

SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: CU
LAB NO.: F-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-17 @ 1-3'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	0.8	99
3/8"	3.7	96
#4	5.2	95
#10	6.3	94
#40	8.7	91
#200	71.0	29
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SM) Silty sand
AASHTO SOIL CLASS:
A-2-4

TOTAL DRY WEIGHT OF SAMPLE: 17960.0

REMARKS:

Figure 20

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

Applied Geotechnical Engineering Consultants, Inc.

Table 1 - Summary of Laboratory Test Results

The Trails at Long Valley

Project No. 2171313

Sample Location				Gradation			Atterberg Limits			Moisture-Density Relationship		
Test Pit No.	Depth (ft)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gravel (%)	Sand (%)	Silt/Clay (%)	Liquid Limit (%)	Plastic Index (%)	California Bearing Ratio (CBR)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Soil Type
TP-1	1-3			6	56	38		NP				Silty Sand (SM)
TP-1	4½	5	112									Silty Sand (SM)
TP-1	8½	<1				19						Silty Gravel (GM)
TP-2	1-3			3	82	15		NP	31	126.0	8.0	Silty Sand (SM)
TP-2	5½	1	89			22						Silty Sand (SM)
TP-2	9	6	120			56						Siltstone Bedrock
TP-3	2					93	33	14				Mudstone Bedrock
TP-3	6	9	115									Siltstone Bedrock
TP-6	0-2			0	85	15		NP				Silty Sand (SM)
TP-8	3-5			1	69	30		NP	9	132.0	7.5	Silty Sand (SM)
TP-8	10					77		NP				Siltstone Bedrock
TP-9	5	1	112	4	83	13						Silty Sand (SM)
TP-10	2-4			31	58	11		NP				Poorly Graded Sand with Silt and Gravel (SP-SM)
TP-10	8					21		NP				Silty Sand (SM)

Applied Geotechnical Engineering Consultants, Inc.

Table 1 - Summary of Laboratory Test Results

The Trails at Long Valley

Project No. 2171313

Sample Location				Gradation			Atterberg Limits			Moisture-Density Relationship		
Test Pit No.	Depth (ft)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gravel (%)	Sand (%)	Silt/Clay (%)	Liquid Limit (%)	Plastic Index (%)	California Bearing Ratio (CBR)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Soil Type
TP-11	3	1	101			15						Silty Sand (SM)
TP-11	10½	1	103			18						Silty Sand (SM)
TP-12	6	1	109			28						Silty Sand (SM)
TP-14	10	1	92			14						Silty Sand (SM)
TP-15	6½					53	19	9				Mudstone Bedrock
TP-16	4	1	115			14						Silty Sand (SM)
TP-17	1-3			5	66	29		NP				Silty Sand (SM)
TP-18	4	1	113			22						Silty Sand (SM)
TP-18	8	1	106			18						Silty Sand (SM)
TP-18	10½	3	108			30						Silty Sand (SM)

AGEC
Applied GeoTech

September 4, 2020

Brennan Holdings No. 100
c/o Land Development Consultants, LLC

Attention: Jim Raines

Subject: Long Valley Trails - Response to City Review Comments
Preliminary Study - Geological Hazard Evaluation
Washington, Utah
AGEC Project Number 2171312 and 2171313

AGEC has previously provided the following documents for the development and design of the Long Valley Trails Project:

1. Geotech Study, Long Valley Parkway, by AGEC, dated January 17, 2018, Project No. 2171313. *This study was conducted with the Parkway extending through the center of the project. We understand that the Parkway alignment no longer extends through this area and this area will be open space. The 17 test pits will provide subsurface information for the drainage detention areas and infiltration rates for the project.*

2. Rockfall Hazard Assessment, by AGEC dated October 23, 2017, Project No. 2171312.

3. Preliminary Geotechnical Study, Overall Project-Long Valley Trails, dated January 29, 2019.

At the time of our initial report, the property was located in Washington County and we understand that the property will be Annexed into Washington City. AGEC was provided comments from the City Review. Based on our further evaluation and using Washington City Specifications, the following responses are provided:

1. **Updated Pavement Designs that Reflect Traffic**

   During our study for References No. 1 and 3 above, the pavement sections were based on Washington County Specifications and are now revised to Washington City Specifications and in particular to Table 4.8 (City Specifications). The report is a preliminary report and when final construction plans are provided for each

2. **Updated Map with Explorations and Current Layout**

The location of the test pits (Figure 2) were updated for Reference No.s 1 and 3 with the current lot layout. (Attached)

3. **Drainage and Comments on LID (low impact drainage)**

We understand that the development will be required to meet the recently adopted LID Guidance for Storm Water by the State of Utah. We understand that the City of Washington is in the process of adopting the document prepared by Dixie Storm Water Coalition, dated June 12, 2020.

Based on the "flow chart" on page 8 within the document, due to the potentially expansive bedrock, shallow bedrok and collapsible soils, the use of the listed BMP's (Best Management Practices) are not feasible. We understand the project drainage has been designed to go to the low area along the center of the property in alignment with the existing overhead power line and will flow to the north through a series of drainage basins. Based on the test pits conducted within Reference No. 1 along the previous alignment of the Long Valley Parkway, the majority of the subsurface soils through this area are silty sand and possibly deeper bedrock soil. Based on the regional topography and the open space area designed for this portion of the development, the proposed drainage plan would be appropriate with regards to the geotechnical issues at the site. We do not recommend retaining storm water on individual lots using the various BMP's at the risk of structural damage to homes.

When the various details of grading are known, we recommend that infiltration testing be conducted at the proposed bottom of the various detention basins. We would anticipate that the detention basins with sandy subsurface soils will likely have infiltration rates varying from 14 to less than 1 inches/hour. The variation will depend on the density and fines content of the subgrade soil.

4. Rock Fall Hazard

AGEC has conducted a rock fall study (see reference No. 2) on a preliminary basis with no mitigation taken into consideration for the runout line. We understand that the development has included a roadway and berm along the upper portion of the planned development along the east slope of the project where the rockfall hazard exists. AGEC recommends that individual phases when grading is proposed to evaluate each area for rockfall and determine the appropriate berm configuration if the runout extends into the roadway area.

phase, AGEC should review the proposed roadways within each section and The following table was modified to meet current specifications from Page 18 in Reference No. 3 and Page 13 in Reference No. 1.

Reference No. 3- Pg 18

Pavement Thickness

Based on the anticipated traffic, a 20 year design life, PCC and AASHTO design methods, the following pavement sections are recommended.

Roadway	Traffic Index	Average Daily Traffic	Asphaltic concrete (inches)	Base Course (inches)
Interior Residential	5	510-1250	2.5	6
Residental Collector	5.5	1260-2000	2.5	6
Minor Arterial	7	6,000-20,000	4	8
Major Arterial (long Valley Parkway)	8	>20,000	5	10

Reference No. 1- Pg 13 (Long Valley Parkway)

Pavement Thickness

Based on the anticipated traffic, a 20 year design life, PCC and AASHTO design methods, the following pavement sections are recommended.

Roadway	Traffic Index	Average Daily Traffic	Asphaltic concrete (inches)	Base Course (inches)
Major Arterial (long Valley Parkway)	8	>20,000	5	10

The materials used should be specifications for Washington City. It should be noted that the final traffic study was in progress at the time of preparation this report. When the various construction plans are prepared for each phase or portion of the development, AGEC should review to determine the specific pavement thickness for each roadway location and the anticipated subgrade condition.

2. **Updated Map with Explorations and Current Layout**

The location of the test pits (Figure 2) were updated for Reference No.s 1 and 3 with the current lot layout. (Attached)

3. **Drainage and Comments on LID (low impact drainage)**

We understand that the development will be required to meet the recently adopted LID Guidance for Storm Water by the State of Utah. We understand that the City of Washington is in the process of adopting the document prepared by Dixie Storm Water Coalition, dated June 12, 2020.

Based on the "flow chart" on page 8 within the document, due to the potentially expansive bedrock, shallow bedrok and collapsible soils, the use of the listed BMP's (Best Management Practices) are not feasible. We understand the project drainage has been designed to go to the low area along the center of the property in alignment with the existing overhead power line and will flow to the north through a series of drainage basins. Based on the test pits conducted within Reference No. 1 along the previous alignment of the Long Valley Parkway, the majority of the subsurface soils through this area are silty sand and possibly deeper bedrock soil. Based on the regional topography and the open space area designed for this portion of the development, the proposed drainage plan would be appropriate with regards to the geotechnical issues at the site. We do not recommend retaining storm water on individual lots using the various BMP's at the risk of structural damage to homes.

When the various details of grading are known, we recommend that infiltration testing be conducted at the proposed bottom of the various detention basins. We would anticipate that the detention basins with sandy subsurface soils will likely have infiltration rates varying from 14 to less than 1 inches/hour. The variation will depend on the density and fines content of the subgrade soil.

4. Rock Fall Hazard

AGEC has conducted a rock fall study (see reference No. 2) on a preliminary basis with no mitigation taken into consideration for the runout line. We understand that the development has included a roadway and berm along the upper portion of the planned development along the east slope of the project where the rockfall hazard exists. AGEC recommends that individual phases when grading is proposed to evaluate each area for rockfall and determine the appropriate berm configuration if the runout extends into the roadway area.

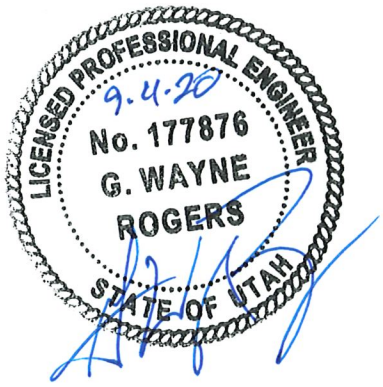
Long Valley Trails- Update Letter
September 4, 2020
AGEC Project No. 2171312/2171313

AGEC has included the previous documents for your reference with this letter.

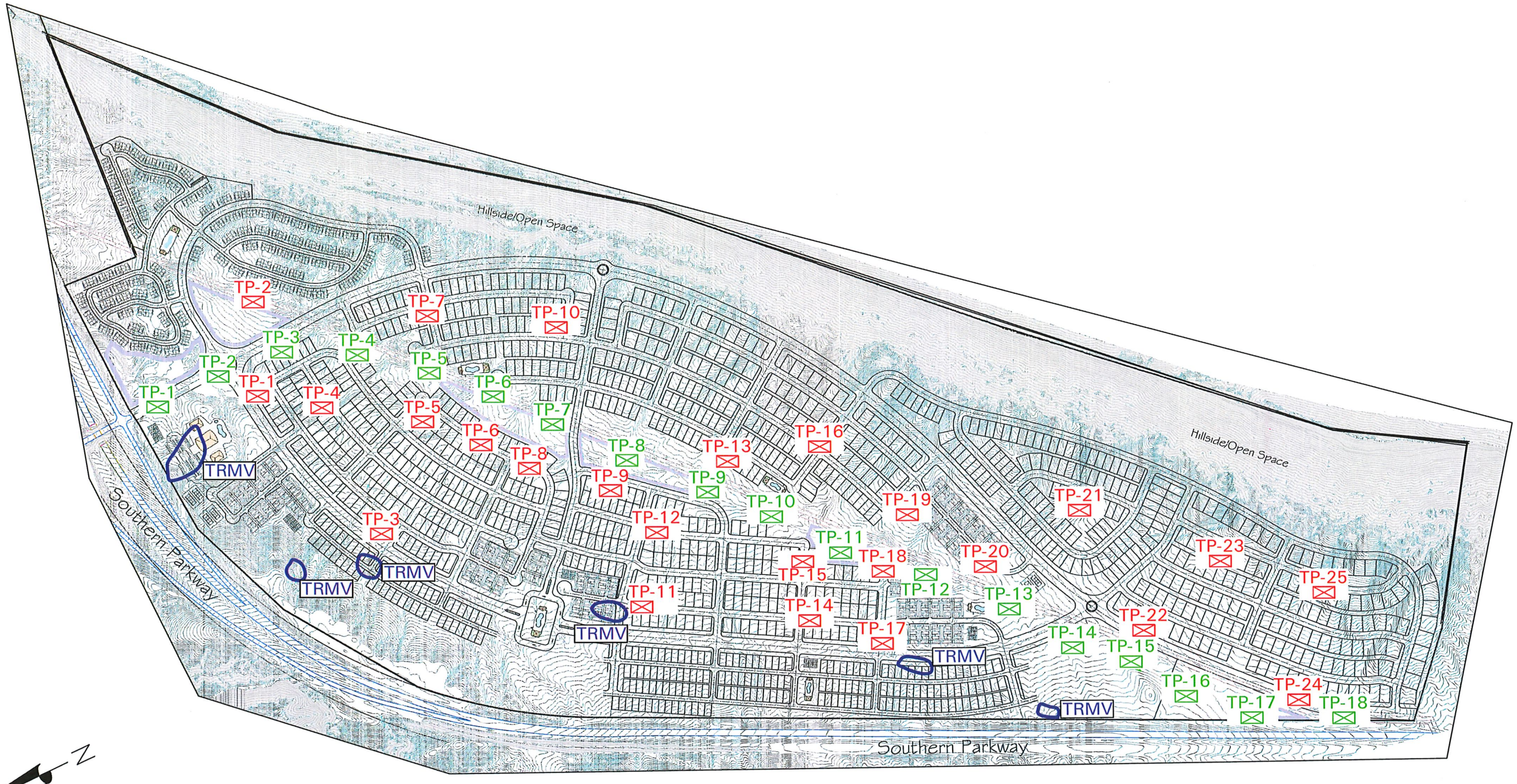
Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

G. Wayne Rogers, P.E.
P:\2017 Project Files\2171300\2171312 - GT - Long Valley Trails (prelim)\update letter.wpd
Enclosures



LONG VALLEY TRAILS
WASHINGTON, UTAH



2171312	AGEC	Site Plan	Figure 2

AGEC
Applied GeoTech

GEOTECHNICAL INVESTIGATION

LONG VALLEY PARKWAY

WASHINGTON COUNTY, UTAH

PREPARED FOR:

BRENNAN HOLDINGS NO. 100
205 EAST TABERNACLE, SUITE #4
ST. GEORGE UT 84770

ATTENTION: JIM RAINES

PROJECT NO. 2171313

JANUARY 17, 2018

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

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SUMMARY

1. The subsurface soils along the alignment of the approximately 9,314 feet of an arterial road named Long Valley Parkway was investigated by excavating 18 test pits at the approximate locations shown on Figure 2. The subsurface conditions observed within the test pits consist of silty sand with varied amounts of fines. The northern (approximately) half of the alignment encountered interlayered siltsone and mudstone bedrock below the silty sand. Occasional bedrock was encountered below the silty sand on the southern portion of the site. The upper sand was found to be loose and moderately moisture sensitive. The bedrock depths vary from 1 to 10 feet within test pits TP-2 through TP-9. Bedrock was also encountered at depths of approximately 7 and 11 feet in TP-15 and TP-17.

2. Groundwater was not encountered within the test pits to the depths investigated.

3. Based on the variation in subgrade materials, the subgrade soil strengths (California Bearing Ratio, CBR) of 9 to 31 were determined based on laboratory test results. The sand that contained higher fines contents were found to have lower CBR values than the sand with less fines. We utilized a CBR value of 10 for determining the pavement section thicknesses.

4. The roadway subgrade should be prepared by clearing and grubbing areas that contain vegetation or surface soils with organics. Following removal and depending on the grade of the roadway through the various sections, the subgrade should be prepared by overexcavation of 0 to 2 feet. The subgrade below the overexcavation section should be scarified, moisture conditioned and properly compacted. The overexcavation varies with the cuts and fills and the anticipated condition. The various conditions are described within the site grading section and may be compared to the test pit logs, figures 3 and 4, that indicate the approximate proposed cuts and fills at each test pit location based on the proposed grading.

5. The on site soils may be used to grade the roadway to the subgrade elevation. Details for use and compaction is outlined in the report.

6. The proposed roadway was assumed to be an Arterial Road with an Average Daily Traffic value (ADT) of 6,000 and a 1 percent truck traffic value for a 20 year design life.

7. Based on the provided traffic, the subgrade conditions and the laboratory test results, the pavement section may vary from 3 to 3½ inches of asphaltic concrete over 10 to 12 inches of base course. The materials used should meet Washington City Design Guidelines for quality and placement.

8. The information provided in this summary should not be used independent of that provided within the body of this report.

SCOPE

This report presents the results of a geotechnical investigation for the proposed Long Valley Parkway Road as shown on Figure 2. This report presents the subsurface conditions encountered, laboratory test results, and recommendations for the project. This report was prepared in general accordance with the Cost Estimate for Professional Geotechnical Services dated August 16, 2017.

Field exploration was conducted to obtain information on the subsurface conditions and to obtain samples for laboratory testing. Information obtained from the field was used to define conditions at the site and to develop recommendations for the proposed development.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in this report. The design criteria for Washington City was used with the assumption that the property will be annexed from Washington County prior to construction.

SITE CONDITIONS

The proposed Trails at Long Valley Development is located west and north of the Souther Parkway (SR-7) near the Washington Dam Road Interchange as shown on Figure 1. The alignment of the roadway extends off the interchange to the south as shown on Figure 2. The northern edge of the property and alignment has been partially graded in the area of the roadway. There is an existing power line that extends along the eastern side of the proposed alignment. Recently a new planned power line was partially graded for the power pole locations.

The general area slopes down to the north with slopes down from the west and to the east to approximately the road alignment area, which is the low area of the property. There is a large slope and hillside to the east of the property and also to the west of the property across the Southern Parkway. There are multiple drainages or small ravines that drain off of each hillside.

There is moderate vegetation consisting of small brush and desert grasses and plants. The majority of the alignment area is covered with sand soils.

FIELD STUDY

On August 22 and 23, 2017, an engineer from AGEC visited the site and observed the excavation of 18 test pits at the approximate locations shown on the Site Plan, Figure 2. The locations were determined from the survey stakes provided by Bush & Gudgell, Inc. The test pits were excavated with track mounted excavator. The subsurface soil profile was logged and soil samples were obtained by an engineer from AGEC.

SUBSURFACE SOIL CONDITIONS

The subsurface soils along the alignment of the approximately 9,314 feet of an arterial road named Long Valley Parkway was investigated by excavating 18 test pits at the approximate locations shown on Figure 2. The subsurface conditions observed within the test pits consist of silty sand with varied amounts of fines. The northern (approximately) half of the alignment encountered interlayered siltsone and mudstone bedrock below the silty sand. Occasional bedrock was encountered below the silty sand on the southern portion of the site. The upper sand was found to be loose and moderately moisture sensitive. The bedrock depths vary from 1 to 10 feet within test pits TP-2 through TP-9. Bedrock was also encountered at depths of approximately 7 and 11 feet in TP-15 and TP-17.

Detailed descriptions of the various soil types encountered follow.

Clayey Sand - The clayey sand is generally medium dense to dense, dry to slightly moist, occasional gravel, and red to brown in color. Portions of the clayey sand are slightly cemented.

Silty Sand - The silty sand contains occasional gravel and varied amounts of fines. The material varies from loose to medium dense and reddish brown in color. Portions of the silty sand are slightly to moderately cemented.

Silty Gravel - The silty gravel is dense to very dense, dry to slightly moist, and grey to brown in color. The gravel was slightly to moderately cemented. The gravel was encountered within TP-1 on the north end of the site.

Siltstone Bedrock - The siltstone bedrock is part of the Middle Red Member of the Moenkopi Formation. It consists of interlayered siltstone, fine graded sandstone and occasional mudstone. The siltstone is generally weathered in the upper several feet and varies from soft to moderately hard, dry to slightly moist and red to brown in color. It is non to low plastic.

Mudstone Bedrock: The mudstone bedrock is part of Middle Red Member of the Moenkopi Formation. It has occasional layers of siltstone and fine graded sandstone. The mudstone is moderately hard, medium plastic and red in color.

Limestone Bedrock: The limestone bedrock is part of the Virgin River Limestone member of the Moenkopi Formation. It was encountered in TP-17 at a depth of 11 feet. The limestone is generally hard and is slightly fractured, dry and yellow to gray in color.

LABORATORY TESTING

AGEC conducted several laboratory tests on samples obtained during the field study. The following tests were conducted for the listed test method.

Test	Test Method
Moisture Density Relation (Proctor)	ASTM D1557
Atterberg Limits	ASTM D4318 - 10e1
Gradation	ASTM D117/ASTM D6913M-17
One-dimensional Consolidation/Swell	ASTM D2435M-11
California Bearing Ratio	ASTM D1883
In-Place Density of Soil	ASTM D 7263-09
Moisture Content	ASTM D2216-10

Sand: The sand was tested in the laboratory to determine the in-place moisture content, which varied from 1 to 3 percent. The dry density values varied from 89 to 115 pounds per cubic foot (pcf). Gradation tests indicate that percentages of gravel (percent retained on the No. 4 sieve) varied from 0 to 31 percent and the fines contents (percent passing the No. 200 sieve) ranges from 11 to 38. Portions of the sand were moderately silty. The fines portions of the sand were non plastic.

One dimensional consolidation tests indicate the sand is moderately to highly moisture sensitive when wetted. It should be noted that the samples were slightly cemented and a portion of the collapse is likely due to sample disturbance. Two disturbed samples of the sand were obtained and a moisture-density relationship test (proctor) was conducted on the material. Maximum dry density values of 126 to 132 pcf and optimum moisture contents of 7.5 to 8.0 percent were determined. Two California Bearing Ratio (CBR) tests were conducted on a recompacted samples of the material and values of 9 and 31 were measured.

Silstone and Mudstone: The bedrock was tested in the laboratory to determine the in-place moisture content, which varied from 1 to 9 percent. The dry density values varied from 115 to 120 pcf. Gradation tests indicate the fines contents of the bedrock ranges from 53 to 93 percent. Atterberg Limit tests indicate the bedrock is non plastic to medium plastic. The samples with plasticity had liquid limits of 19 to 33 percent and plastic indexes of 9 to 14 percent. One consolidation test conducted on relatively undisturbed samples of the siltstone/mudstone indicates the bedrock is non to slightly moisture sensitive.

The consolidation tests are shown on Figures 6 to 12. The Proctor tests are shown on Figures 13 and 14 and the CBR tests are shown on Figures 15 and 16. The gradation tests for several bulk samples are graphically shown on Figures 17 to 20. The laboratory testing are shown on the Test Pit Logs, Figures 3-4 and are summarized on Table 1.

SUBSURFACE WATER

No free water was observed within the test pits at the time of excavation. Fluctuations in the groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

We understand it is proposed to construct an Arterial Road with a length of approximately 9,314 feet and will have a width of 65 feet of asphaltic concrete along the alignment as shown on Figure 2. The road will consist of 4 lanes with portions that contain turn lanes and landscape strips. The road will have a trapezoidal drainage canal along a portion of the roadway. The channel is planned to be 3 feet wide at the bottom with 2:1 side slopes and will be 6 feet deep. It will be lined with rip rap varying from 30 to 60 inches thick. The channel will be on the northwest side of the roadway. There will be curb, gutter and sidewalk on both sides. At this time, the channel is within the Washington County limits, but

will soon be annexed into Washington City. Thus, our design is based on Washington City Design Guidelines.

Based on provided profiles of the roadway grading provided by Bush & Gudgell Engineering, the roadway will generally be a cut from station 0+00 to approximately station 84+50 (southern extending north) with cuts varying up to 15 feet. The majority of the cut will be less than 5 feet with the greater cuts from approximately station 54+00 to 84+50. From station 84+50 to then northern end of the road (station 93+14), the roadway will be filled with up to approximately 16 feet of fill.

AGEC has assumed a traffic ADT values and a percentage of truck traffic. For the calculation of the daily 18 kip equivalent single axle load (ESAL), a 1 percent heavy truck factor was used.

ADT	% Truck Traffic	Calculated 18k ESAL
6,000	1	126

If the proposed construction, or traffic are different from those listed, we should be notified so that we can reevaluate our recommendations.

RECOMMENDATIONS

Based on our experience in the area, the subsurface conditions encountered, laboratory test results, and the proposed construction, the following recommendations are given:

A. Site Grading

Based on the subsurface conditions and engineering analysis, the following recommendations are provided:

1. General Site Preparation

The site contains sparse vegetation and should be grubbed prior to cutting and filling. Removal of soil containing roots and organics should also be conducted.

2. Grading

a. *Subgrade Preparation*

Due to the variation of the cuts and fills, the variation in the subgrade conditions, the following recommendations are provided for the condition stated:

1. Cut Condition greater than 4 feet sand subgrade: The exposed subgrade following cutting should be scarified to a depth of 12 inches, moisture conditioned and compacted to at least 90 percent of the maximum dry density (MDD) as determined by ASTM D1557.

2. Cut Condition between 2 to 4 feet, sand subgrade: The exposed subgrade should be overexcavated at least 12 inches. Following the overexcavation, the subgrade should be scarfied to a depth of 12 inches, moisture conditioned and compacted to at least 90 percent of the maximum dry density (MDD) as determined by ASTM D1557. Following preparation of the subgrade, the 12 inches may be replaced and properly compacted to at least 95 percent as determined by ASTM D1557.

3. Cut condition < 2 feet or Fill Condition <1 foot, sand subgrade: In areas where the roadway will be cut less than 2 feet or filled and the exposed subgrade consists of a sand, we recommend overexcavating 2 feet of the sand. Following the overexcavation, the subgrade should be scarfied to a depth of 12 inches, moisture conditioned and compacted to at least 90 percent of the maximum dry density (MDD) as determined by ASTM D1557. Following preparation of the subgrade, the 2 feet of removed material and additional fill may be replaced and properly compacted to at least 95 percent of the MDD as determined by ASTM D1557.

4. Fill condition > 1 foot sand or bedrock subgrade: In areas where the roadway will be filled greater than 1 foot, the subgrade should be scarified 12 inches, moisture conditioned and properly recompacted to at least 90 percent of the MDD as determined by ASTM D1557.

4. Cut Condition and Bedrock subgrade: If the exposed subgrade is exposed during the grading of the roadway, the bedrock should be scarified, moisture conditioned and properly compacted. The scarification depth should be at least 6 inches. The scarification process may be eliminated at the discretion of the engineer if the bedrock is moderately hard and uniform. Proof rolling should be conducted following the subgrade preparation.

b. *Cut Slopes*

Permanent cut slopes should be cut at least 2 to 1 (horizontal to vertical). If cut slopes are within bedrock materials, they may be steepened to 1 to 1.

c. *Fill Slopes*

Fill slopes should be constructed no steeper than 3:1 (horizontal:vertical). If there is insufficient area in the right-of-way for the construction of 3:1 slopes, the slopes may be steepened to 2:1. The exposed slopes will likely be highly susceptible to erosion, particularly at a 2:1 slope. Erosion protection measures such as rip rap underlain by filter fabric or geosynthetic matts should be considered. Fill slopes should be constructed by overbuilding and then cutting back the slope face to the desired grade to provide a properly compacted slope face. Fill placed on existing slopes should be benched into the existing slopes to provide a level surface for placement and compaction of the fill.

3. Excavation

We anticipate that excavation of the soils at the site may be accomplished with conventional excavation equipment. We anticipate some areas of difficulty in dense, cemented gravels or hard bedrock will be experienced. The use of heavy duty equipment and possibly a rock hammer may be required in confined excavations such as utility trenches.

4. Materials

The onsite materials may be used a site grading fill. The material should be free of vegetation and organics. Larger particles (greater than 4 inches in size) should not be used in the top 1 foot of the roadway. Particles up to 8 inches in size may be used in deeper fills. If mudstone is encountered during road grading, the material should be discarded or mixed and placed in deeper fills. The on-site soils, properly mixed and processed, may be used as utility trench backfill.

Import materials should be non-expansive, non-gypsiferous, granular soil. Listed below are the materials recommended for imported fill.

Area	Fill Type	Recommendations
Roadway Fill	Fill	**-200** <35%, **LL** <30% Maximum size: 4 inches

-200 = Percent Passing the No. 200 Sieve
LL = Liquid Limit

5. Compaction

Compaction of materials placed at the site should equal or exceed the following minimum densities when compared to the maximum dry density as determined by ASTM D-1557:

Area	Percent Compaction
Roadway Subgrade	90
Roadway Fill	95
Utility Trench backfill	95
Basecourse	95
Pipe zone	90

To facilitate the compaction process, the fill should be moisture conditioned to within 2 percentage points of the optimum moisture content as determined by ASTM D-1557 prior to placement. Fill should be placed in loose lift thicknesses which do not exceed the capacity of the equipment being utilized. Generally, 6 to 8-inch loose lifts are adequate. Lift thicknesses should be reduced to 4-inches for hand compaction equipment.

B. Pavement

Based on the subsoil conditions encountered and the laboratory test results, the following recommendations are given:

1. Analysis

a. Asphaltic Concrete: The flexible pavement analysis is based on UDOT and AASHTO design methods and a 20 year design life. The following parameters were considered for our analysis:

- Base course that meets specifications which would correspond to a Structural Coefficient (a_2) of at least 0.12. Asphalt that provides a Structural Coefficient (a_1) of at least 0.40.

- Drainage Coefficient = 1.0.

- The subgrade support soils varied. A M_R value of 15,000 psi was used for the subgrade based upon an estimated CBR value of 10 percent and the relationship between CBR and Resilient Modulus (M_R).

- Serviceability Index: $P_o = 4.2$, $P_t = 2.5$.

- Reliability of 90 percent.

- Standard Deviation (S_o) = 0.45.

2. Subgrade Support

We anticipate the subgrade materials will consist of compacted on-site silty sand Our design assumes a properly compacted subgrade with a CBR of 10 percent as described above. Prior to placing granular sub-base, base course or pavement area grading fill, the subgrade should be prepared as recommended in the Subgrade Preparation section of this report.

3. Pavement Thickness

Based on the anticipated traffic, a 20 year design life, PCC and AASHTO design methods, the following pavement sections are recommended.

Asphaltic concrete (inches)	Base Course (inches)
3.5	10
3.0	12

4. Pavement Materials

Flexible Pavement (Asphaltic Concrete)

The pavement materials should meet AASHTO and Washington County specifications for gradation and quality. The pavement thicknesses indicated above assume that the base course is high quality material with a CBR of at least 60 percent. Asphalt material should have a Marshall stability of at least 1,800 pounds.

5. Drainage

The collection and diversion of drainage away from the pavement surface is extremely important to the satisfactory performance of the pavement section. Proper drainage should be provided. We further recommend a yearly maintenance program including crack sealing and a surface treatment such as a "slurry seal" to extend the pavement life and reduce water infiltration into the subsurface soils.

C. **Soil Corrosion**

Based on our experience in the area, we recommend concrete elements that will be exposed to the on-site soils be designed in accordance with provisions provided in the American Concrete Institute Manual of Concrete Practice (ACI) 318-11. Tables 4.2.1 and 4.3.1 of ACI 318-11 should be referenced for design of concrete elements utilizing a Sulfate Exposure Class of S2, and a sulfate exposure severity of "severe".

D. **Geotechnical Recommendation Review**

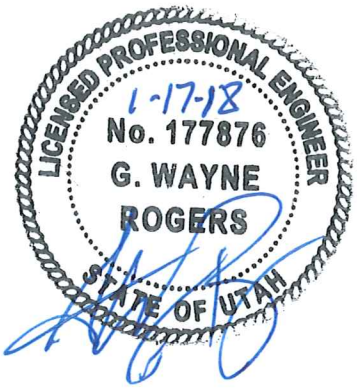
The client should familiarize themselves with the information contained in this report. If specific questions arise or if the client does not fully understand the conclusions and recommendations provided, AGEC should be contacted to provide clarification.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the test pits excavated, and our experience in the area. Variations in the subsurface conditions may not become evident until excavation is conducted. If the subsurface conditions or groundwater level are found to be significantly different from those described above, we should be notified to reevaluate our recommendations.

If you have any questions or if we can be of further service please call.

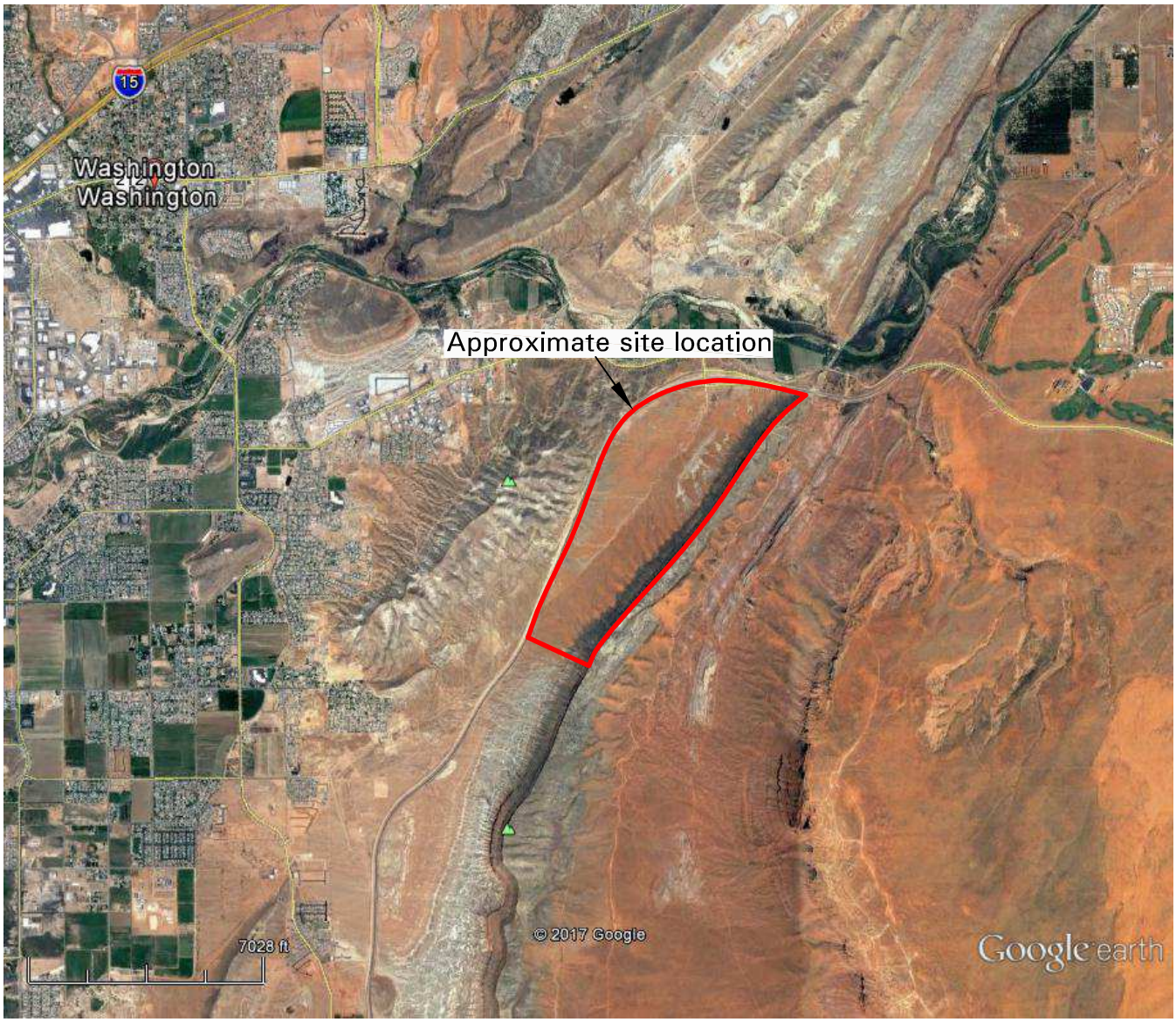
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



G. Wayne Rogers, P.E.

Reviewed by Jon Russell Hanson, P.E.

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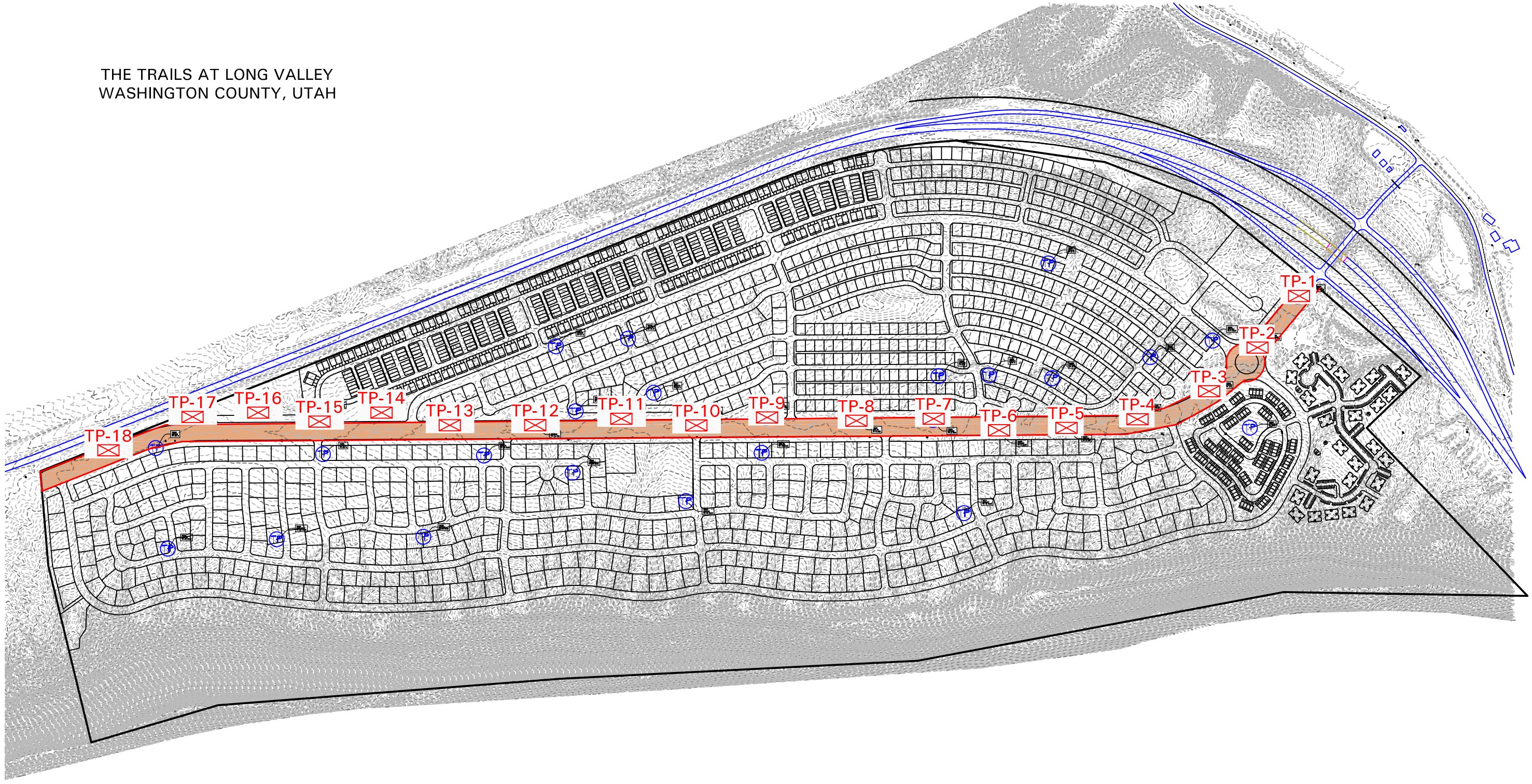
LONG VALLEY PARKWAY
WASHINGTON COUNTY, UTAH

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Not to Scale

2171313	AGEC	Vicinity Map	Figure 1

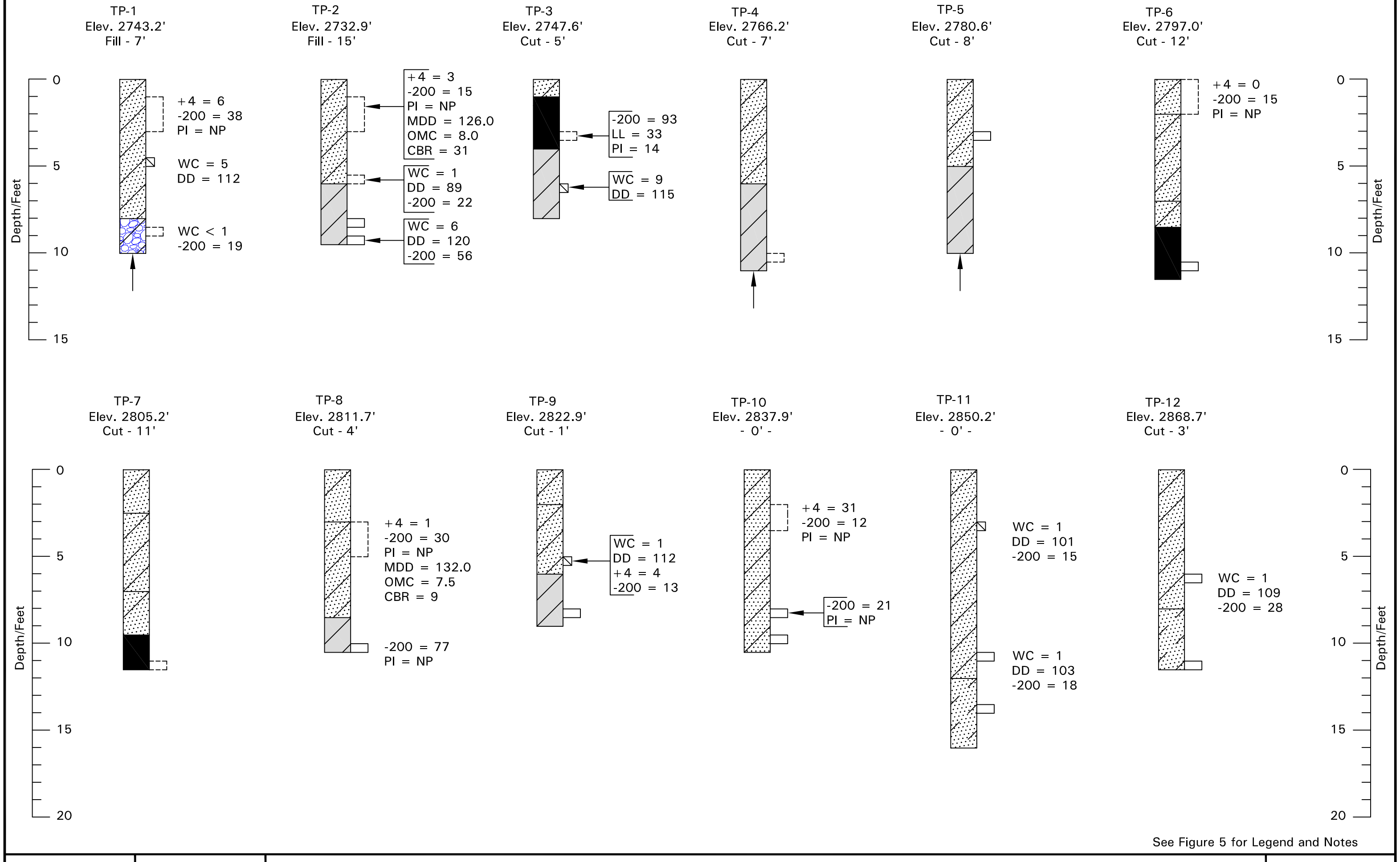
THE TRAILS AT LONG VALLEY
WASHINGTON COUNTY, UTAH



Approximate test pit location

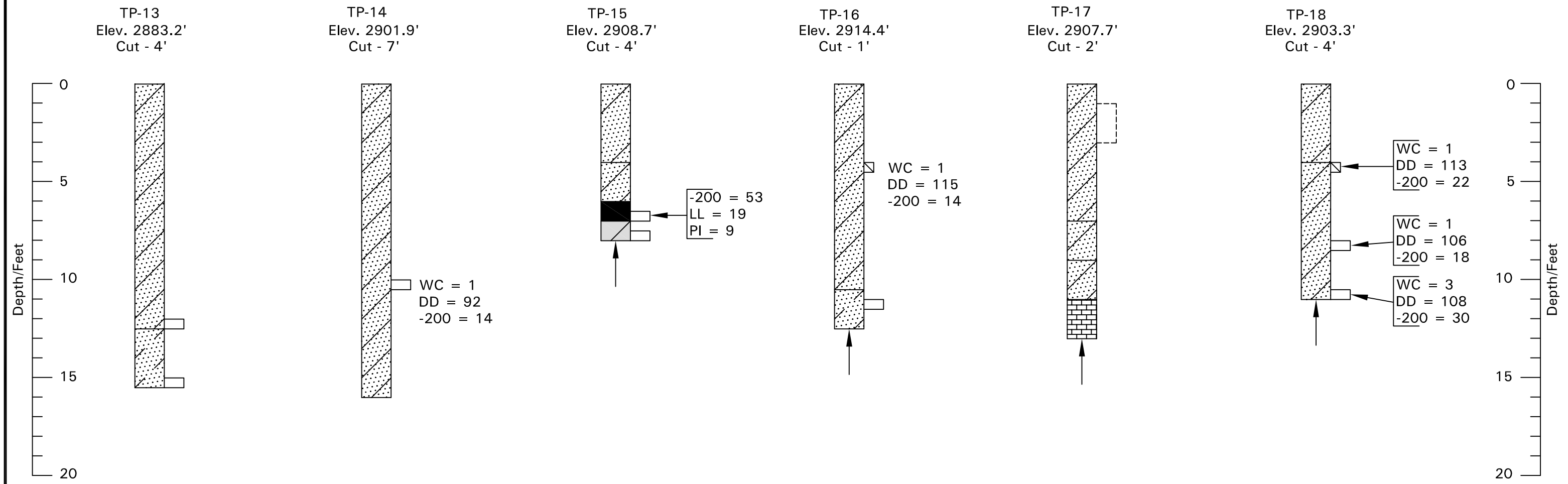
0 700 1400 feet
Approximate Scale

2171313	AGEC	Site Plan	Figure 2



See Figure 5 for Legend and Notes

2171313	AGEC	Logs of Test Pits	Figure 3



See Figure 5 for Legend and Notes

2171313	AGEC	Logs of Test Pits	Figure 4

LEGEND:

Clayey Sand (SC); medium dense to dense, slightly to moderately cemented, dry to slightly moist, red-brown.

Silty Sand (SM); loose to medium dense, occasionally slightly cemented, dry to slightly moist, red-brown.

Poorly Graded Sand with Silt (SP-SM); loose to medium dense, dry to slightly moist, red-brown.

Silty Gravel (GM); dense, slightly cemented, cobbles, grey to brown.

Siltstone Bedrock; intermixed with mudstone and fine grained sandstone, weathered in upper few feet, soft to hard, slightly moist, red-brown.

Limestone Bedrock (TP-17 only); hard, fractured.

Mudstone Bedrock; interlayered with fine grained sandstone and siltstone, weathered in upper zone, soft to hard, slightly moist, red-brown.

Indicates relatively undisturbed hand drive sample taken.

Indicates relatively undisturbed block sample taken.

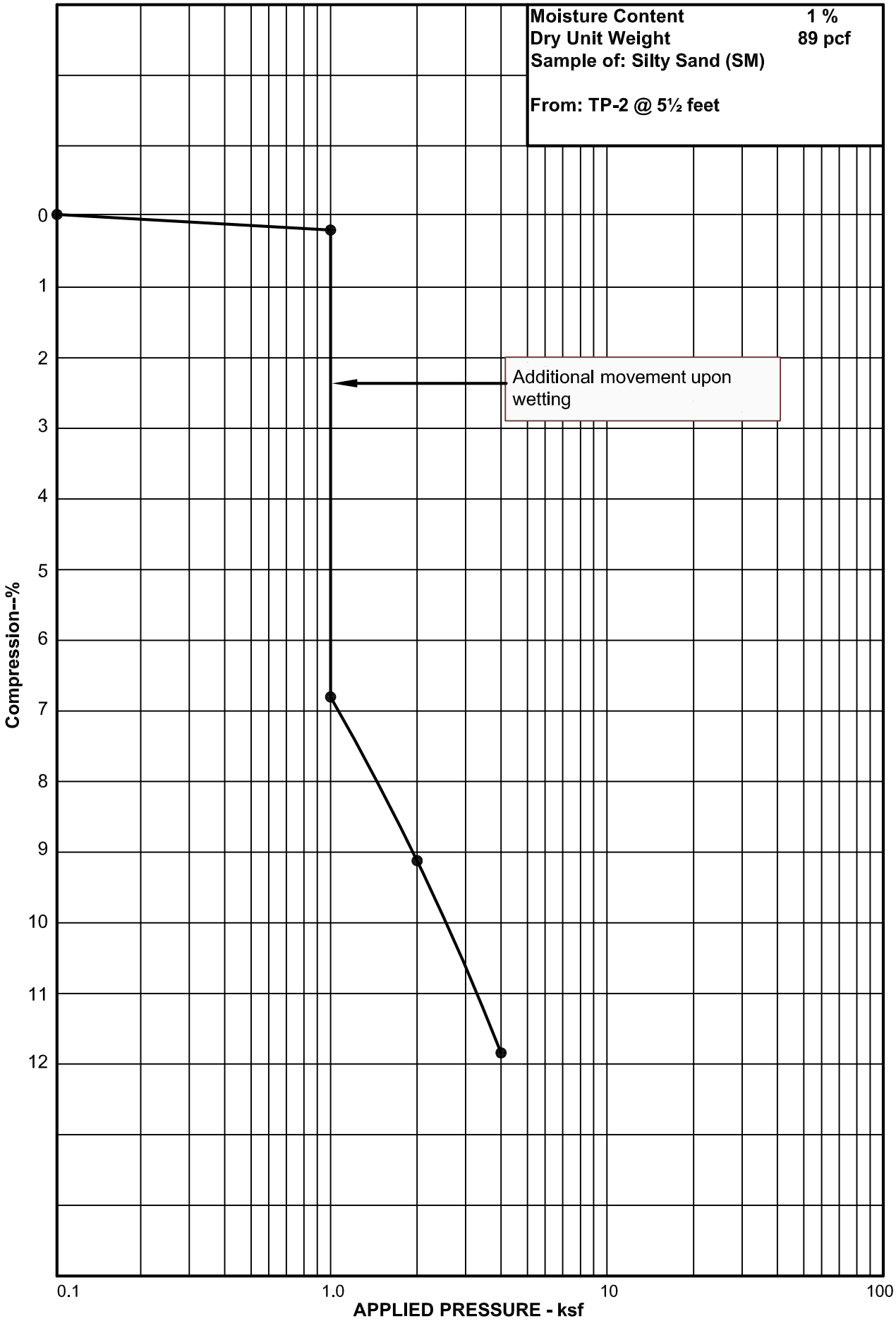
Indicates disturbed sample taken.

Indicates practical backhoe refusal dense gravel or hard bedrock.

NOTES:

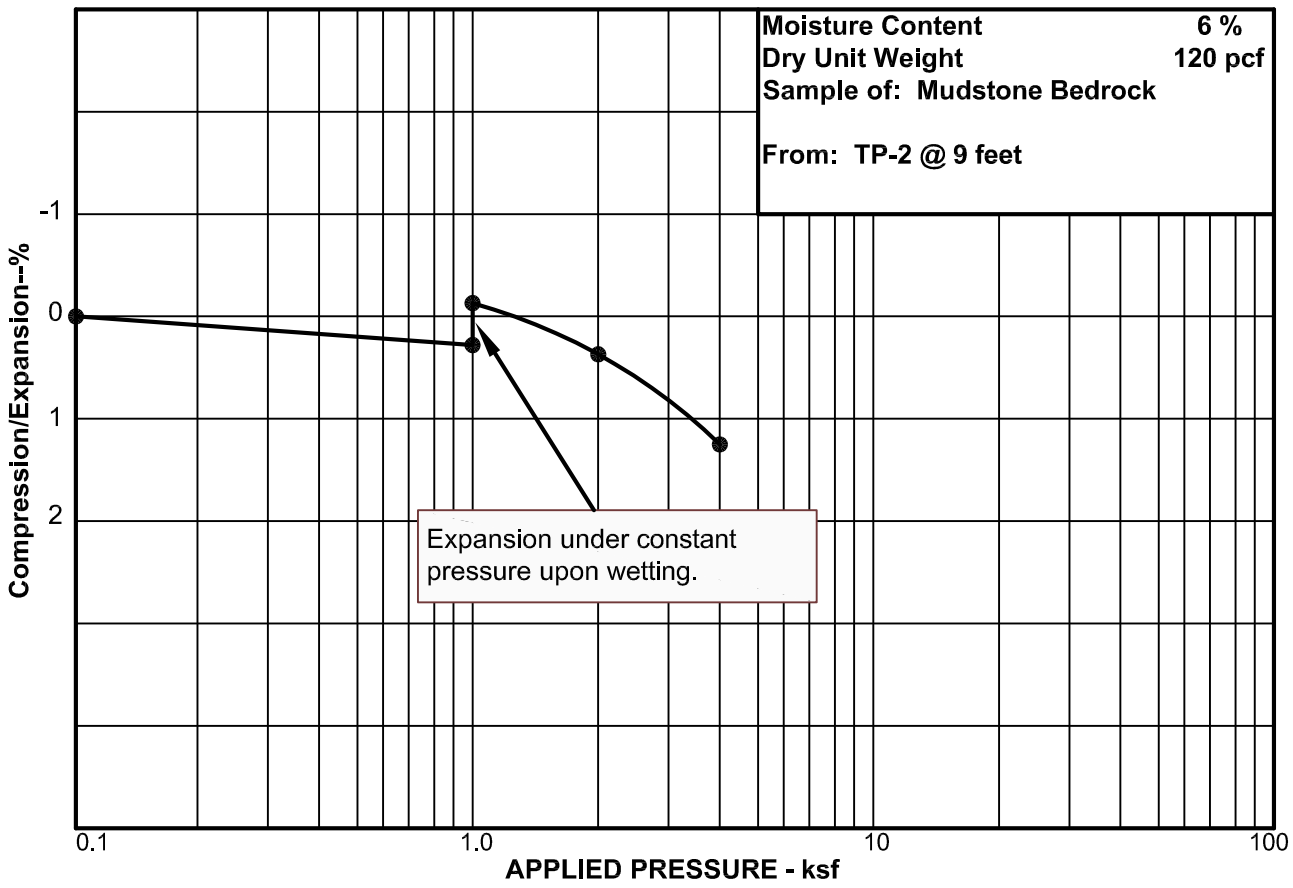
1. The test pits were excavated on August 22 and 23, 2017 with a rubber tire backhoe.
2. The locations of the test pits were measured by survey by Bush & Gudgell Engineering.
3. The elevations of the test pits were surveyed by Bush & Gudgell Engineering.
4. The test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the test pit logs represent the approximate boundaries between material types and the transitions may be gradual.
6. Free water was not encountered in the test pits at the time of excavation.
7. WC = water content (%);
   DD = dry density (pcf);
   +4 = percent retained on the No. 4 sieve;
   -200 = percent passing No. 200 sieve;
   LL = liquid limit (%);
   PI = plasticity index (%);
   MDD = maximum dry density (pcf);
   OMC = optimum moisture content (%);
   CBR = California Bearing Ratio (%).

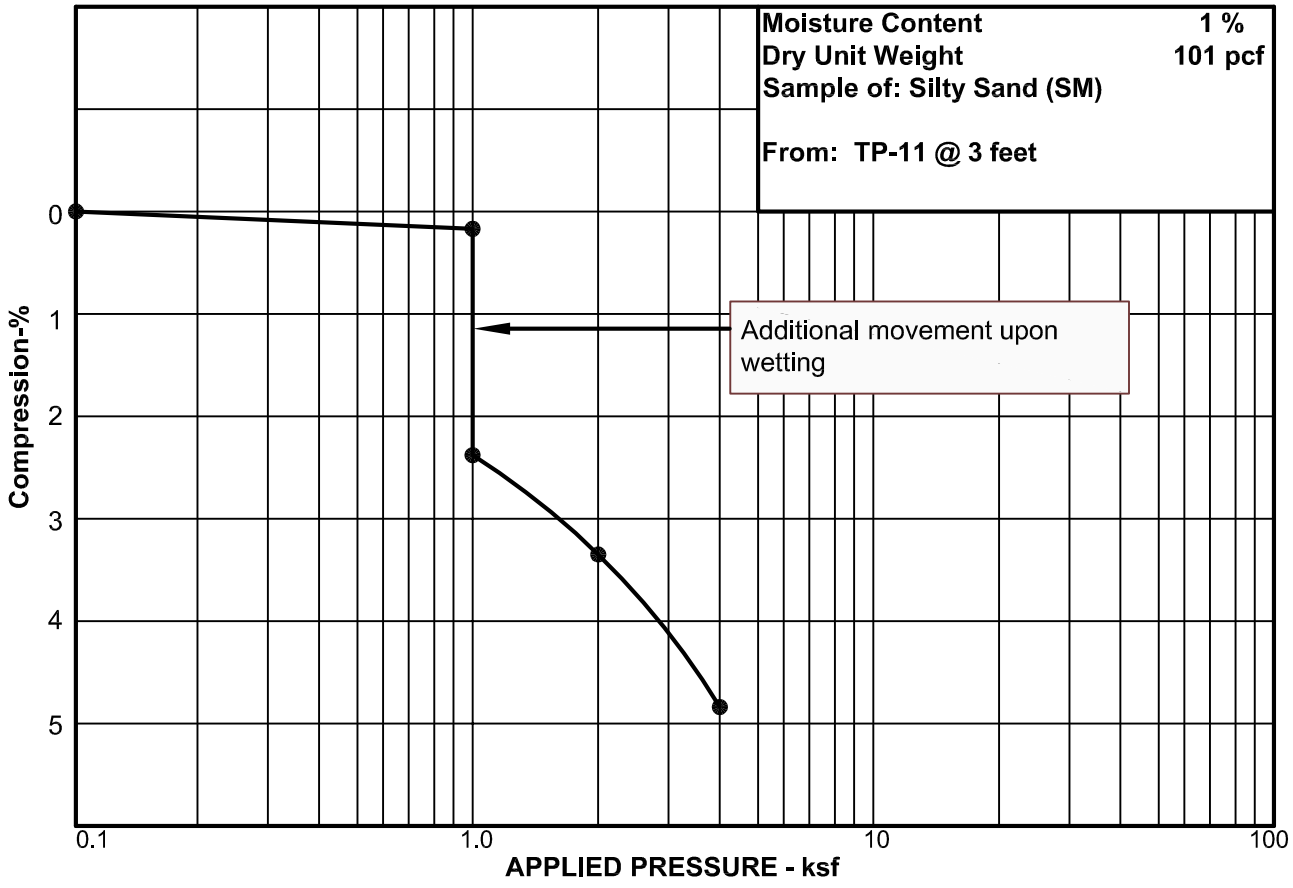
Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 6**

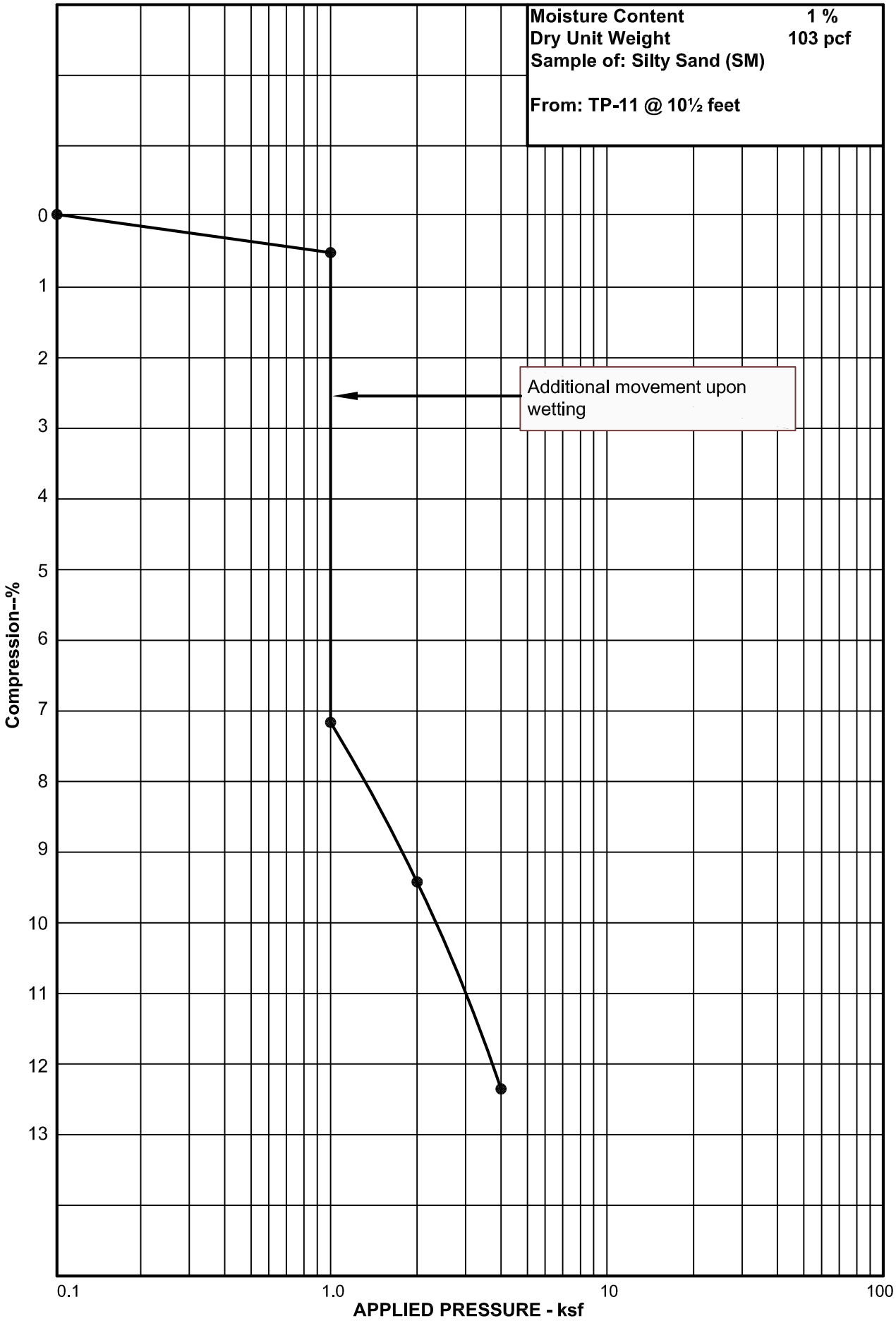
Applied Geotechnical Engineering Consultants, Inc.





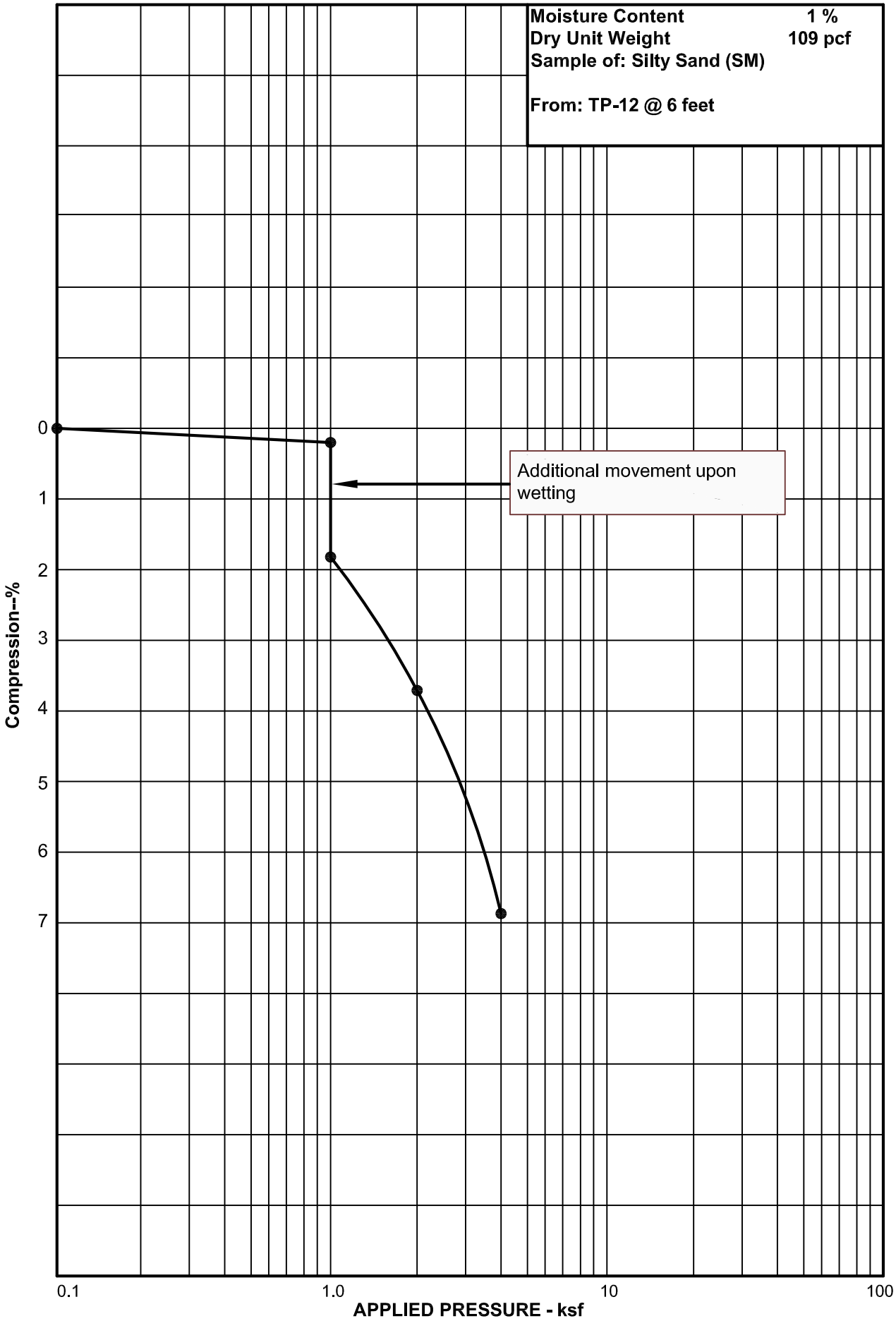
Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 7**

Applied Geotechnical Engineering Consultants, Inc.



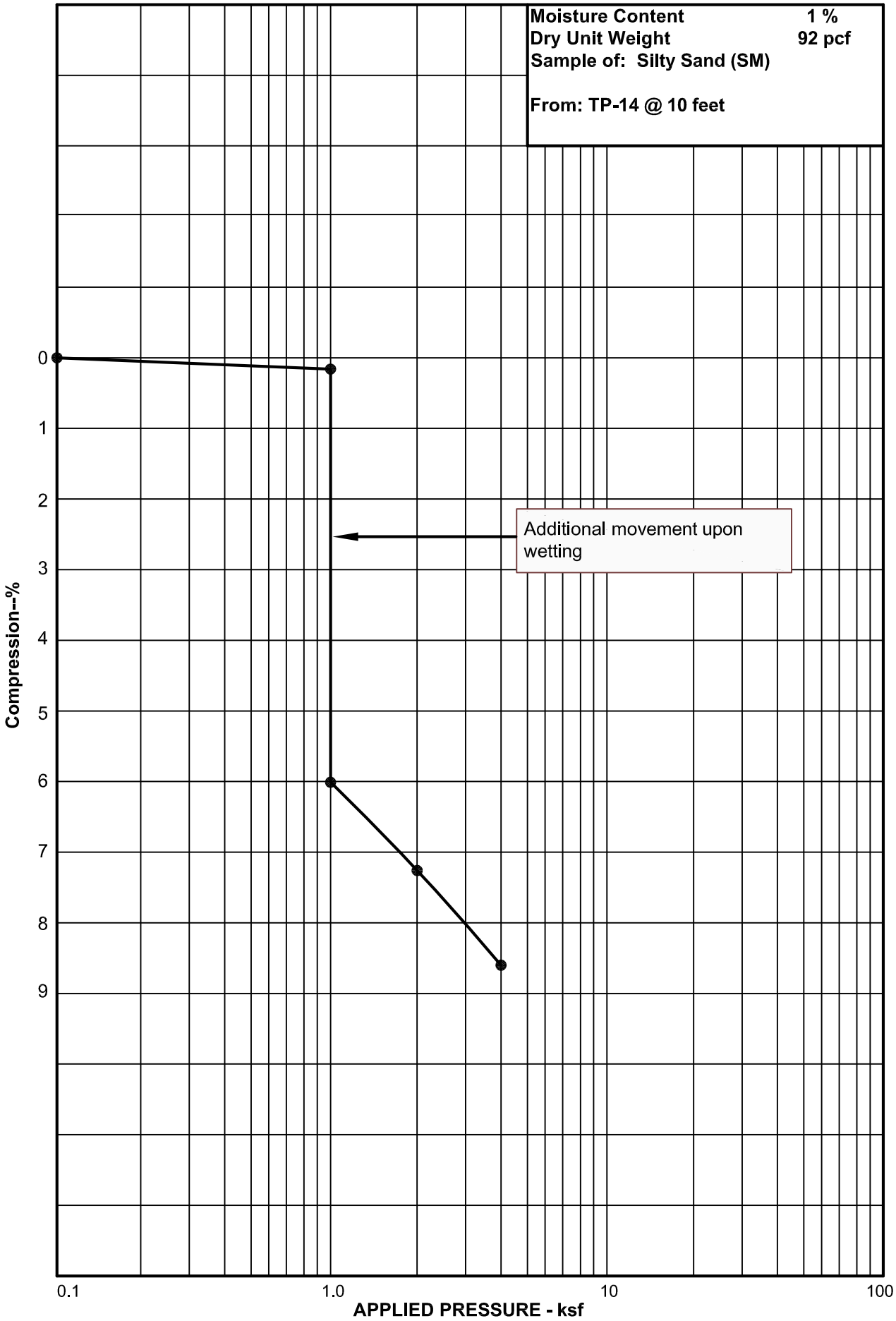
Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 8**

Applied Geotechnical Engineering Consultants, Inc.



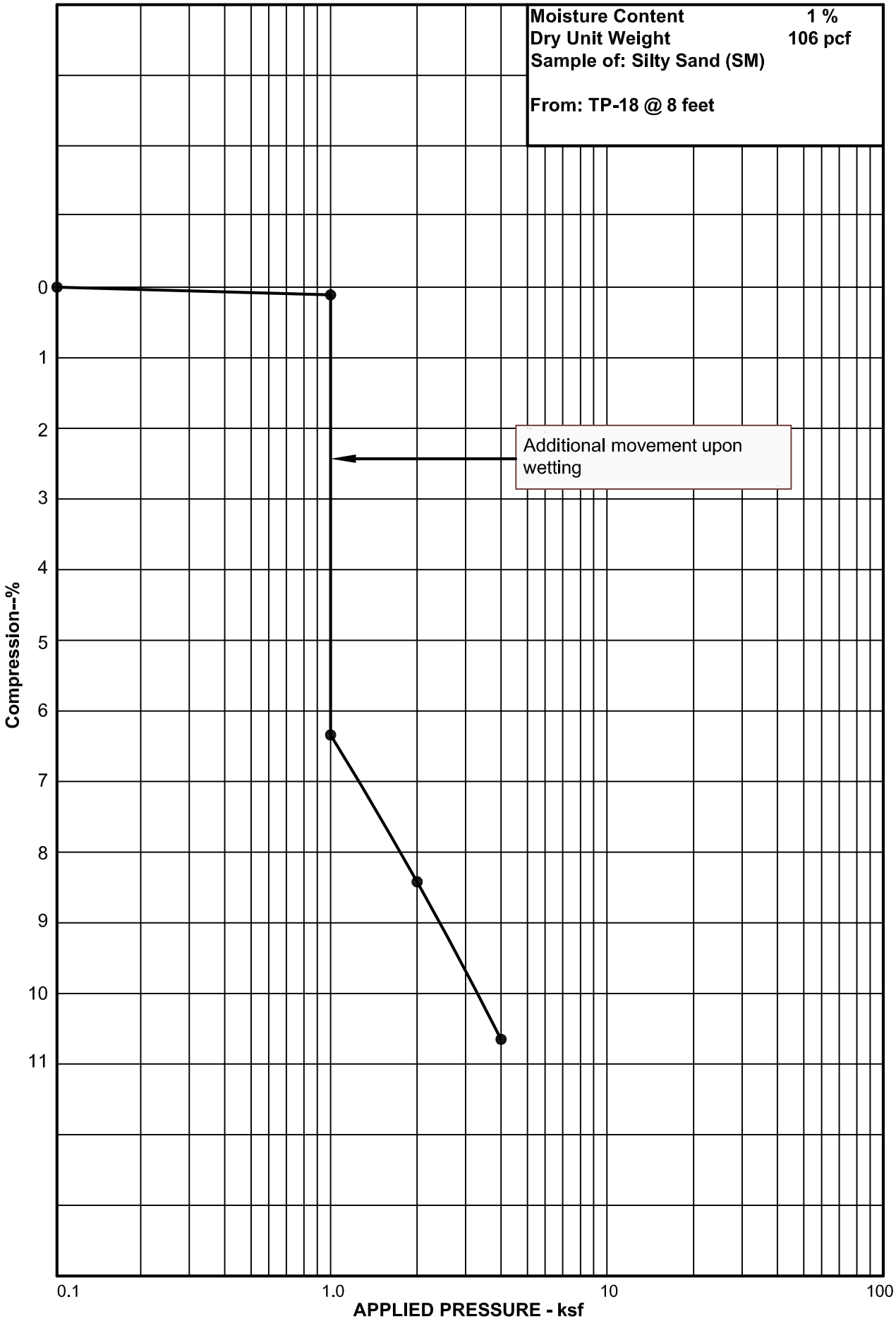
Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 9**

Applied Geotechnical Engineering Consultants, Inc.



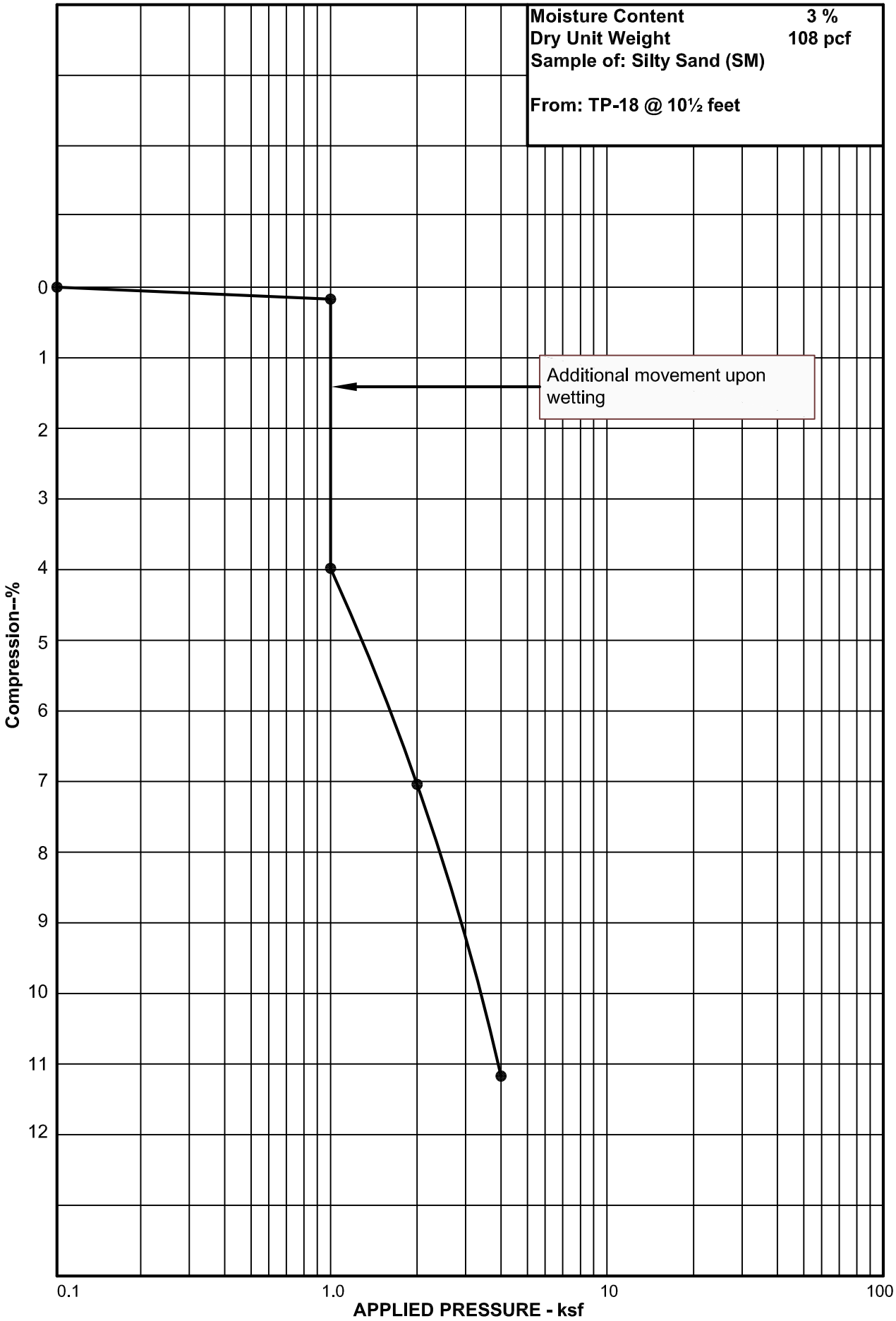
Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 10**

Applied Geotechnical Engineering Consultants, Inc.



Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 11**

Applied Geotechnical Engineering Consultants, Inc.

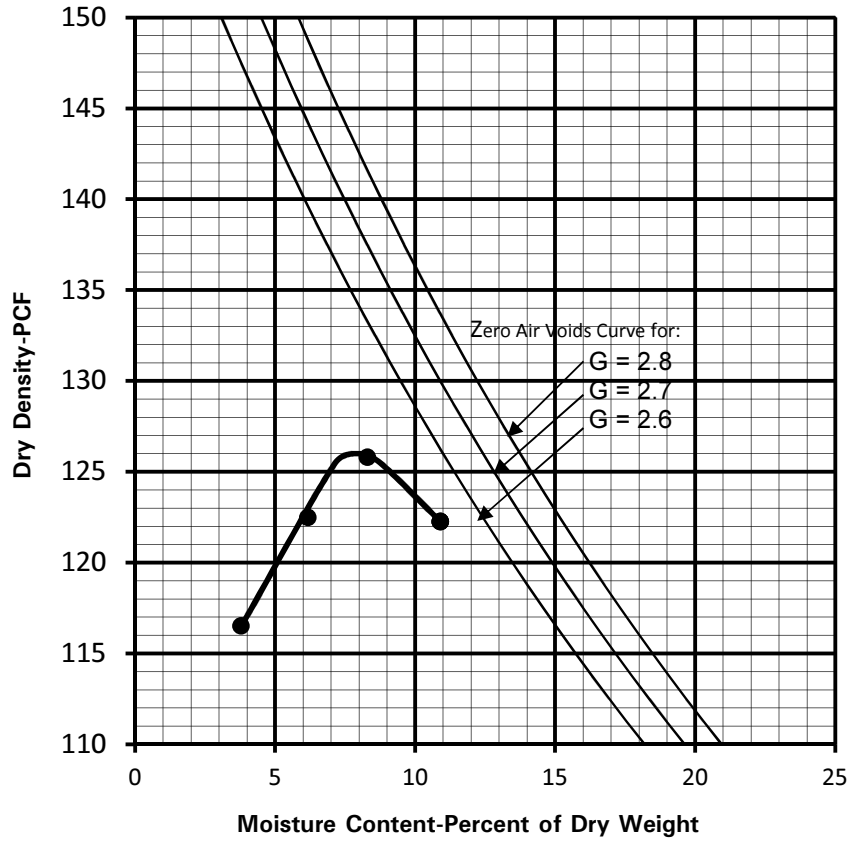


Project No. 2171313 **CONSOLIDATION TEST RESULTS** **Figure 12**

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Project: Long Valley Parkway



Sample Date:	9/23/17
Sample No.	170927F
Maximum Dry Density:	126.0
Optimum Moisture:	8.0

Atterberg Limits

Liquid Limit:	
Plasticity Index:	Non-Plastic

Gradation

Gravel:	3%
Sand:	82%
Silt & Clay:	15%

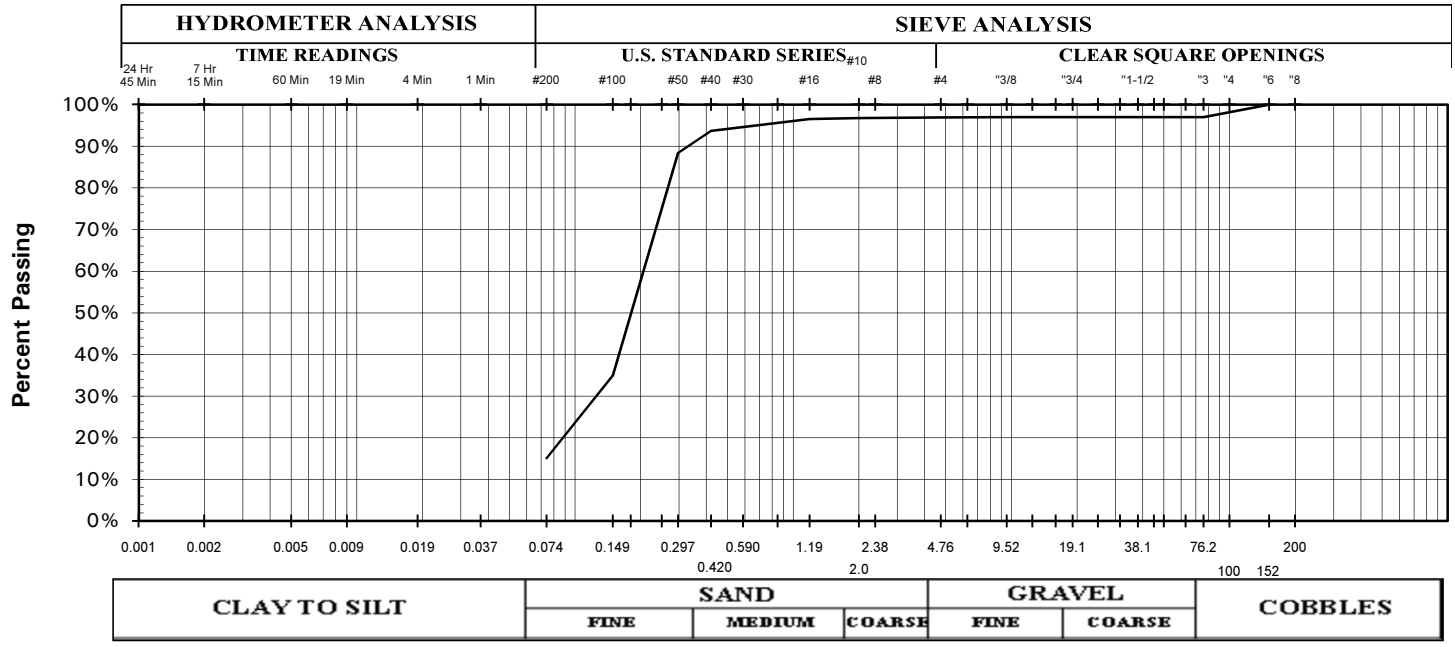
Moisture - Density Relationship Test Procedure: AASHTO T-180 B

Reviewed By: TT

USCS Classification: silty sand (SM)

AASHTO Classification: A-2-4

Sample Location: TP-2 @ 1-3'



GRADATION AND MOISTURE-DENSITY RELATIONSHIP RESULTS

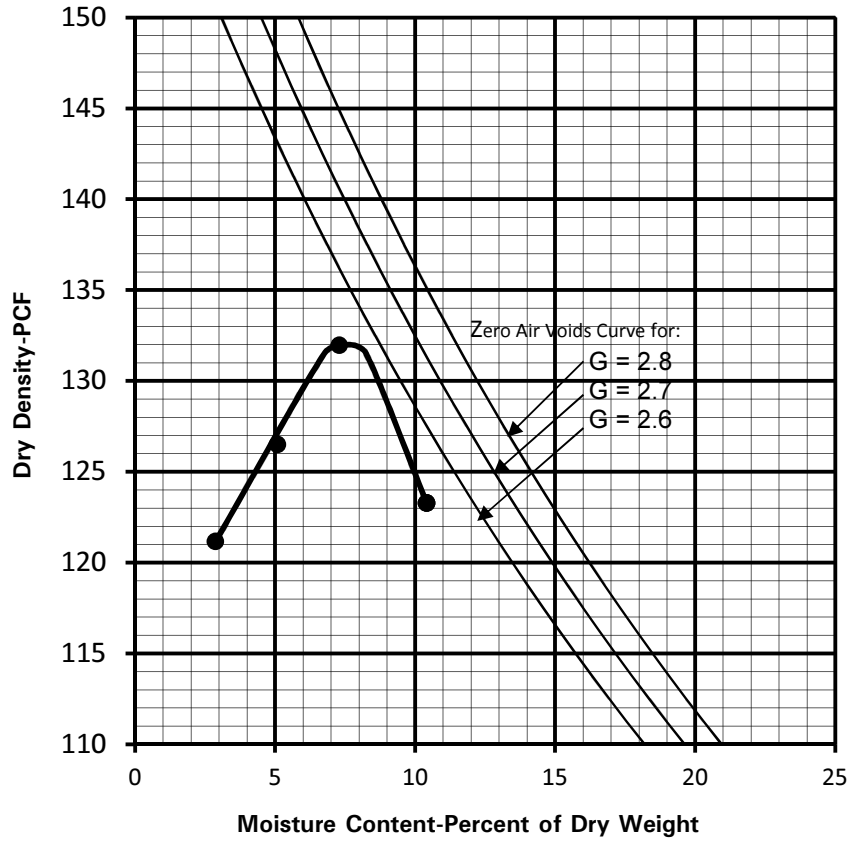
Project No.: 2171313

Figure: 13

AGEC

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Project: Long Valley Parkway



Sample Date:	9/23/17
Sample No.	170927D
Maximum Dry Density:	132.0
Optimum Moisture:	7.5

Atterberg Limits

Liquid Limit:	
Plasticity Index:	Non-Plastic

Gradation

Gravel:	1%
Sand:	69%
Silt & Clay:	30%

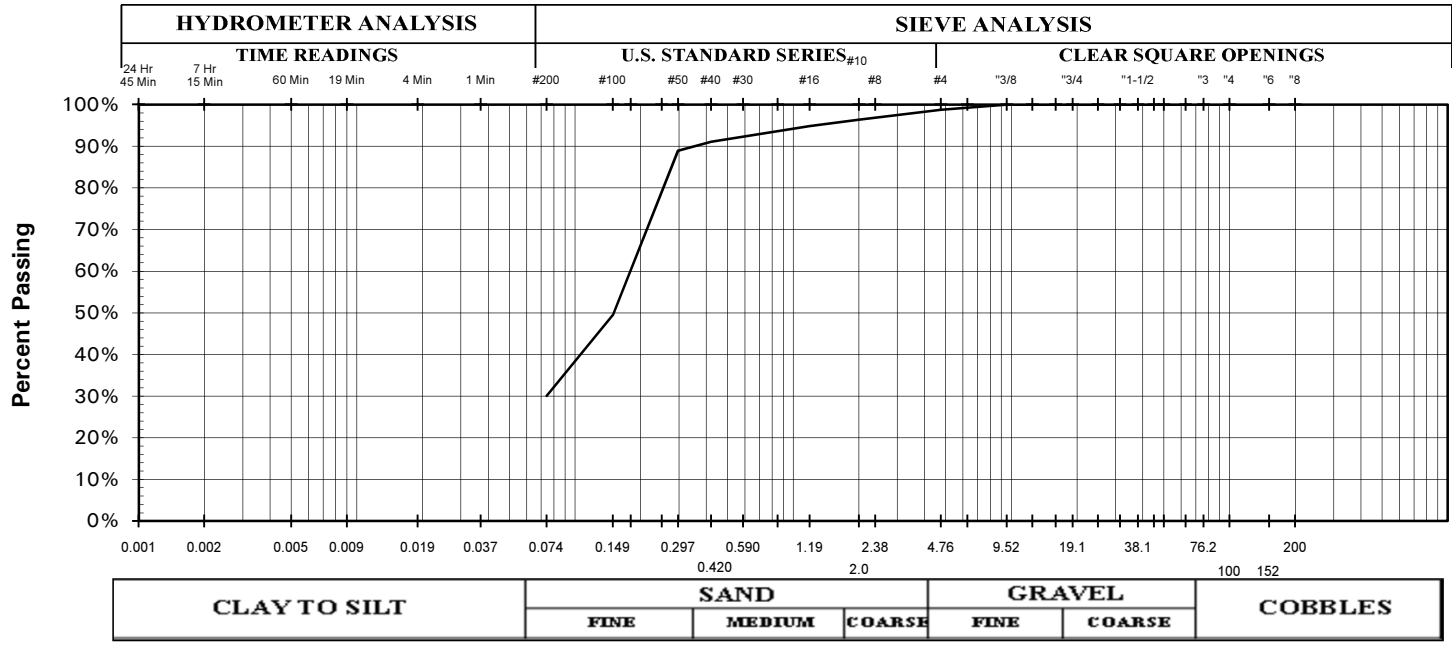
Moisture - Density Relationship Test Procedure: AASHTO T-180 B

Reviewed By: TT

USCS Classification: silty sand (SM)

AASHTO Classification: A-2-4

Sample Location: TP-8 @ 3-5'

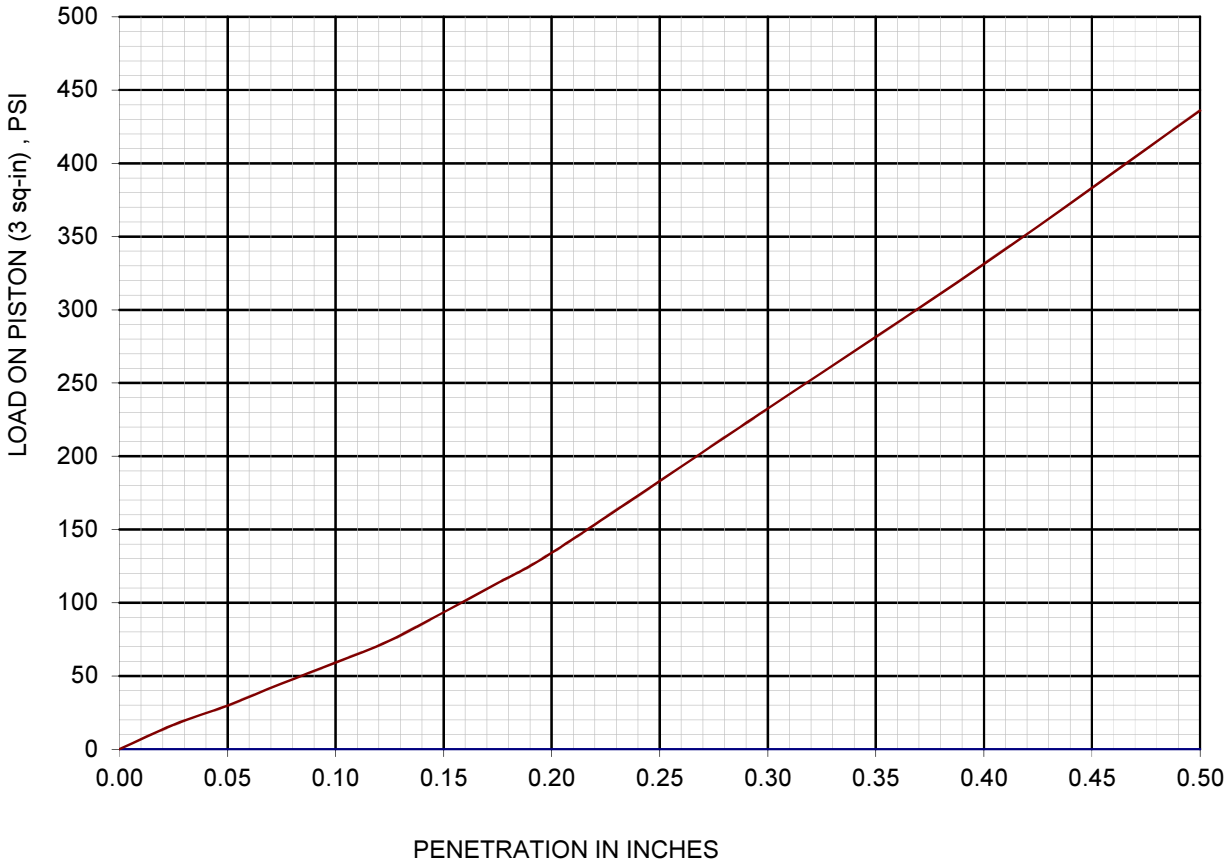


GRADATION AND MOISTURE-DENSITY RELATIONSHIP RESULTS

Project No.: 2171313

Figure: 14

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Project Long Valley Parkway **Sample Location** TP-8 @ 3-5'

Sample Classification SM **AGEC Sample ID No.** B-092317

Method of sample preparation: Remolded to approximately 95% of the maximum dry density at the optimum moisture content as per ASTM D 1557

Sample penetration after soaking for 96 hours

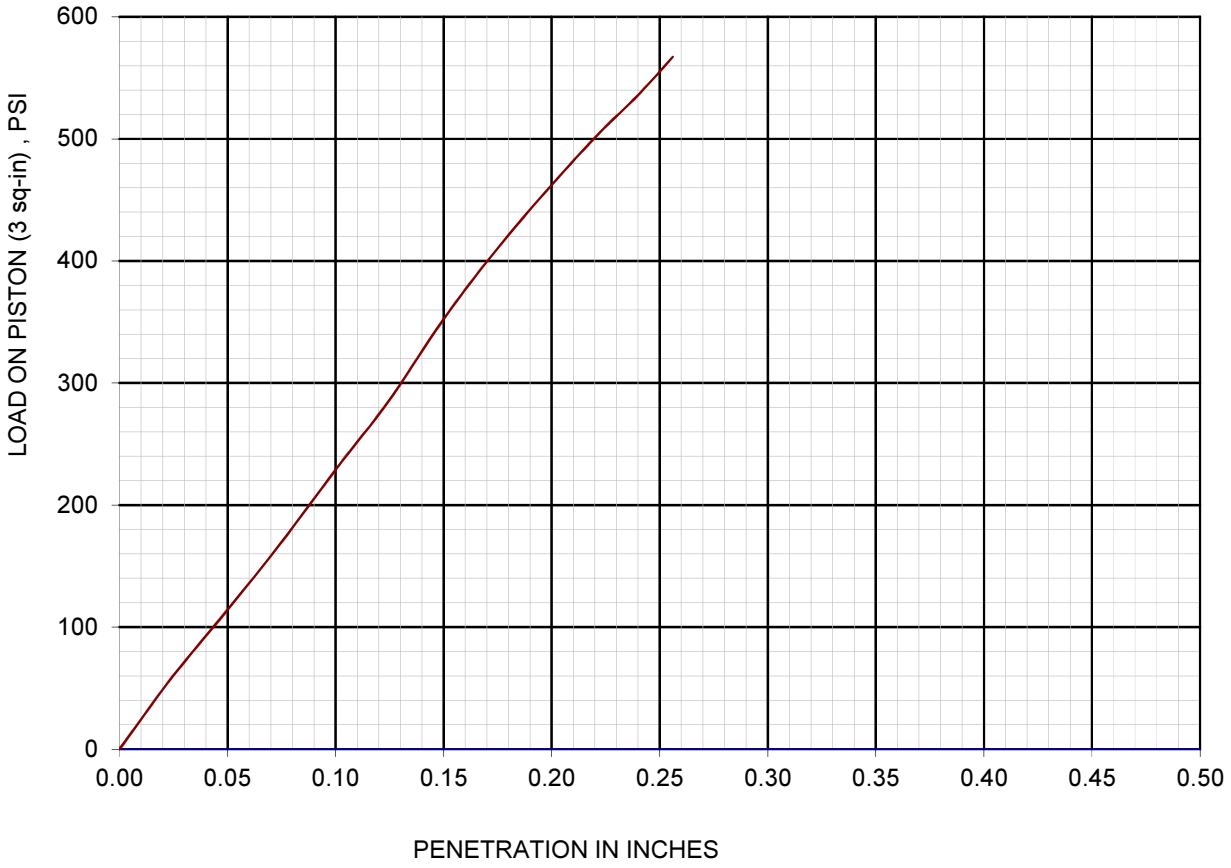
Dry Density:	as molded	125.8	pcf	**Moisture Content:**	as molded	7.8	percent
	after soaking	125.4	pcf		top 1-inch after soaking	9.3	percent
Swell:	after soaking	0.0	percent		average after soaking	9.8	percent

Comments CBR value taken at 0.2 inch penetration

Bearing Ratio of Sample, CBR = **9** percent **Surcharge** 30 lb

Proj. No. 2171313 **CALIFORNIA BEARING RATIO TEST RESULTS** 15

AGEC
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Project Long Valley Parkway **Sample Location** TP-2 @ 1-3'

Sample Classification SM **AGEC Sample ID No.** D-092317

Method of sample preparation: Remolded to approximately 95% of the maximum dry density at the optimum moisture content as per ASTM D 1557

Sample penetration after soaking for 96 hours

Dry Density:	as molded	119.9	pcf	**Moisture Content:**	as molded	8.2	percent
	after soaking	122.6	pcf		top 1-inch after soaking	9.9	percent
Swell:	after soaking	0.0	percent		average after soaking	10.3	percent

Comments CBR value taken at 0.2 inch penetration

Bearing Ratio of Sample, CBR = 31 percent **Surcharge** 30 lb

Proj. No. 2171313 **CALIFORNIA BEARING RATIO TEST RESULTS** 16

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SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.:	2171313	DATE SAMPLED:	9/23/2017
PROJECT NAME:	Long Valley Parkway	DATE TESTED:	9/26/2017
CLIENT:	Brennan Holdings, No. 100 LLC	PROCTOR No.:	
SAMPLED BY:	WR	TESTED BY:	TM
		LAB NO.: (Office Personnel Use Only)	A-092317

SAMPLE LOCATION: TP-1 @ 1-3'

SUPPLIER: Native AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	0.0	100
3/8"	0.0	100
#4	5.8	94
#10	14.3	86
#40	29.2	71
#200	61.7	38
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SM) Silty sand
AASHTO SOIL CLASS:
A-4

TOTAL DRY WEIGHT OF SAMPLE: 17465.4

REMARKS:

Figure 17

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

AGEC
Applied GeoTech

SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: TM
LAB NO.: C-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-6 @ 0-2'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	0.0	100
3/8"	0.0	100
#4	0.2	100
#10	0.4	100
#40	1.0	99
#200	84.9	15
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SM) Silty sand
AASHTO SOIL CLASS:
A-2-4

TOTAL DRY WEIGHT OF SAMPLE: 19540.3

REMARKS:

Figure 18

AGEC
Applied GeoTech

SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: CU
LAB NO.: E-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-10 @ 2-4'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	11.1	89
3/8"	26.2	74
#4	30.5	69
#10	39.8	60
#40	51.1	49
#200	88.3	12
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SP - SM) Poorly graded sand with silt and gravel
AASHTO SOIL CLASS:
A-1-b

TOTAL DRY WEIGHT OF SAMPLE: 19685.6

REMARKS:

Figure 19

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

AGEC
Applied GeoTech

SIEVE ANALYSIS: SOILS (ASTM C136-95)
MATERIALS FINER THAN NO. 200 SCREEN (ASTM C117-95)

PROJECT NO.: 2171313
PROJECT NAME: Long Valley Parkway
CLIENT: Brennan Holdings, No. 100 LLC
SAMPLED BY: WR

DATE SAMPLED: 9/23/2017
DATE TESTED: 9/26/2017
PROCTOR No.:
TESTED BY: CU
LAB NO.: F-092317
(Office Personnel Use Only)

SAMPLE LOCATION: TP-17 @ 1-3'
SUPPLIER: Native
AGGERGATE SIZE:

Test performed according to ASTM D75-87, C702-93, C136-93, D-5644 and C7117-90 or D1140-92.

Sieve Size	Percent Retained	Percent Passing
6"	0.0	100
3"	0.0	100
2"	0.0	100
1 1/2"	0.0	100
3/4"	0.8	99
3/8"	3.7	96
#4	5.2	95
#10	6.3	94
#40	8.7	91
#200	71.0	29
-#200		

ATTERBERG TEST RESULTS	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	Non-Plastic

USCS CLASSIFICATION:
(SM) Silty sand
AASHTO SOIL CLASS:
A-2-4

TOTAL DRY WEIGHT OF SAMPLE: 17960.0

REMARKS:

Figure 20

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

Applied Geotechnical Engineering Consultants, Inc.

Table 1 - Summary of Laboratory Test Results

The Trails at Long Valley

Project No. 2171313

Sample Location				Gradation			Atterberg Limits			Moisture-Density Relationship		
Test Pit No.	Depth (ft)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gravel (%)	Sand (%)	Silt/Clay (%)	Liquid Limit (%)	Plastic Index (%)	California Bearing Ratio (CBR)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Soil Type
TP-1	1-3			6	56	38		NP				Silty Sand (SM)
TP-1	4½	5	112									Silty Sand (SM)
TP-1	8½	<1				19						Silty Gravel (GM)
TP-2	1-3			3	82	15		NP	31	126.0	8.0	Silty Sand (SM)
TP-2	5½	1	89			22						Silty Sand (SM)
TP-2	9	6	120			56						Siltstone Bedrock
TP-3	2					93	33	14				Mudstone Bedrock
TP-3	6	9	115									Siltstone Bedrock
TP-6	0-2			0	85	15		NP				Silty Sand (SM)
TP-8	3-5			1	69	30		NP	9	132.0	7.5	Silty Sand (SM)
TP-8	10					77		NP				Siltstone Bedrock
TP-9	5	1	112	4	83	13						Silty Sand (SM)
TP-10	2-4			31	58	11		NP				Poorly Graded Sand with Silt and Gravel (SP-SM)
TP-10	8					21		NP				Silty Sand (SM)

Applied Geotechnical Engineering Consultants, Inc.

Table 1 - Summary of Laboratory Test Results

The Trails at Long Valley

Project No. 2171313

Sample Location				Gradation			Atterberg Limits			Moisture-Density Relationship		
Test Pit No.	Depth (ft)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gravel (%)	Sand (%)	Silt/Clay (%)	Liquid Limit (%)	Plastic Index (%)	California Bearing Ratio (CBR)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Soil Type
TP-11	3	1	101			15						Silty Sand (SM)
TP-11	10½	1	103			18						Silty Sand (SM)
TP-12	6	1	109			28						Silty Sand (SM)
TP-14	10	1	92			14						Silty Sand (SM)
TP-15	6½					53	19	9				Mudstone Bedrock
TP-16	4	1	115			14						Silty Sand (SM)
TP-17	1-3			5	66	29		NP				Silty Sand (SM)
TP-18	4	1	113			22						Silty Sand (SM)
TP-18	8	1	106			18						Silty Sand (SM)
TP-18	10½	3	108			30						Silty Sand (SM)

LONG VALLEY TRAILS

Roads and Street Plans

Section 8

Long Valley Roads and Streets

Introduction:

The offsite improvements for Long Valley Trails are being design and constructed as a joint effort with Washington City. The offsite improvements are designed and planned to service the Washington City residents living within and adjacent to the Long Valley Trails development. Completion of Washington Dam Road will enhance the City's overall traffic facilities and will fulfill a regional transportation demand for the entire region.

Offsite Roads:

Washington Dam Road is a master planned Arterial Road for Washington City. This PCD plan and related Development Agreement outlines the improvements that are being made in conjunction with Long Valley Trails. Washington Dam Road will be built to it full cross section which will accommodate 5 traffic lanes. The cost for these improvements will be paid by the Master Developer (Brennan Family Holdings, LLC) for Long Valley Trails.

In addition to Washington Dam Road the Long Valley Trails Development has obtained and will provide the Right of Way for the Extension of Long Valley Parkway over and through the BLM controlled lands to the location of the planned 3650 Interchange on the Southern Parkway. Washington City was the applicant for the ROW and Brennan Family Holdings, LLC has paid all costs associated with obtaining the ROW. The master developer, builder and City have agreed to monitor the timeframe in which this road will be paved. The paving of this roadway will be dictated by the funding and completion of the 3650 South Interchange on the Southern Parkway. Upon construction of the 3650 South Interchange, the master developer, builder and City will meet to set the schedule for the completion of the pavement extension of Long Valley Parkway to the completed Interchange. This roadway will be improved to the rural road cross section as shown in this PCD Plan. The paving of this roadway will not, in any case, be required before the construction of the 3650 Interchange nor will it be delayed longer than the traffic demands of the development shall dictate

Onsite Roads and Streets:

Attached to this section is a road classification map and detailed road cross-sections for each type of road and street that will be used in the project. The proposed road classification and cross-section have been used in the Sienna Hills PCD and have proven to be very desirable and functional. All road and street design standards including but not limited to centerline radius, sight distances, intersection geometry, design speeds, pavement design and depths along with all other design criteria will meet the Washington City Standards for each designated road type and cross-section used in the Long Valley Trails PCD.

All streets within the Long Valley Trails PCD, with the exception of the 34' private roads and the 20' Alleys, are proposed to be public roads. The 34' private roads and the 20' wide alleys will not be public roads and will be governed and maintained by the Long Valley Trails Home-Owners Association. The developer, the builder and the City recognize that the roadway located in the center of the development and that connects the two main North-South collector roads may be upsized in classification depending on the placement of public facilities and the corresponding increased traffic flows.

Project Roundabouts:

The Long Valley Trails PCD is initially proposing 2 Roundabouts. The location of these are shown on the Long Valley Trails Master Plan and related exhibits contained within this PCD Plan. Both of these Roundabouts are proposed to be designed as two-lane facilities. The final design will be submitted and approved with the appropriate phase of Long Valley Trails. The approval of this PCD Plan does not give design approval for these proposed Roundabouts. Additional Roundabouts may be proposed within individual phases of Long Valley Trails. Any proposed Roundabout must meet the traffic needs of the proposed developments and must be designed and approved using all applicable standards.

Secondary and Emergency Access:

A secondary emergency access will be provided and constructed with the first phase of Long Valley Trails. The attached exhibit in this section shows the location of this access which follows the eventual extension of Long Valley Parkway. Additional information is provided showing the design of the access that is located beyond the boundary of the Long Valley Trails PCD. The ROW for a future Public Road running from the South Boundary of Long Valley Trails to the proposed 3650 Interchange on the Southern Parkway has been obtained by the Master Developer of Long Valley Trails. This ROW is granted to Washington City as a Public Road and Utility easement and was obtained from the Bureau of Land Management (BLM). Acquiring this ROW required an Environmental Assessment and the payment of fees for the mitigation of the impacted endangered species. All costs to acquire this ROW have been paid by Brennan Family Holdings, LLC.

The secondary emergency access will be constructed with the first phase of the Long Valley PCD and will include grading of the roadways to their final sub-grade and an all-weather surface (Road-Base) will be installed along the graded portion of the road. The secondary access will meet the fire code requirements for a development of the size being proposed. All culverts and other improvements required to ensure that this road remain open and functional will also be installed. The secondary access will be maintained by the Long Valley Home-owners Association until such time that the road is improved to rural road cross section standard, as

shown on the project road cross sections. At that time the road will become a public road owned and maintained by Washington City.

The master developer in conjunction with the Washington City Public works director have met with UDOT and have gained preliminary approval to install an emergency only access gate in the ROW fence of the Southern Parkway at the location of the planned 3650 South Interchange.

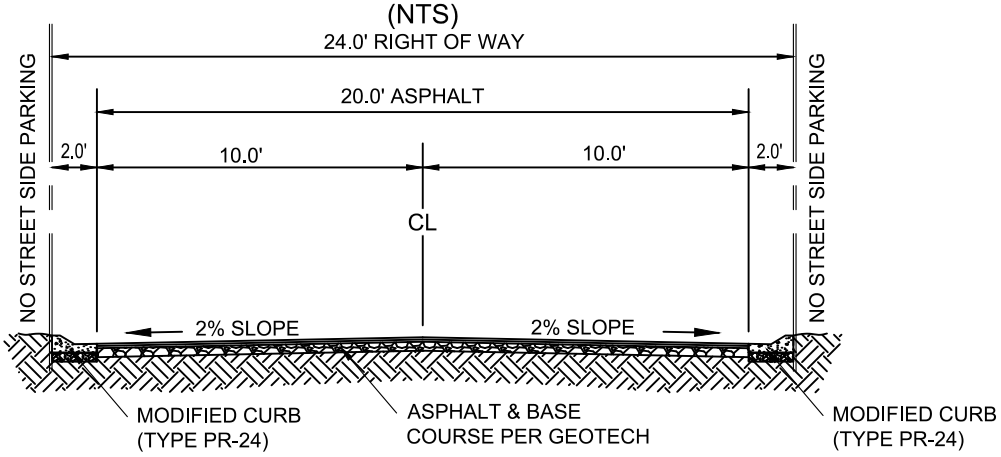
Street Landscaping and adjoining Trails:

Each of the proposed cross-sections shown in this section have a significant amount of landscape areas. These areas include planter strips and wider open space corridors along with paved pedestrian and bike trails. The Long Valley Trails PCD Plan proposes that all landscape areas will be constructed by the project developer and maintained by the Home-owners Association. The Long Valley Trails PCD and Washington City can consider at any time, that portions of these landscape areas and trails may to be dedicated to the City for Public use.

A 10’ wide paved bike path which meets all AASHTO and City design standards will be built adjacent to all major and minor collector streets within the development. Additional bike paths will also be built throughout the development to provide adequate circulation and access of bicycles and pedestrians. It is the design goal of Long Valley Trails to remove bike traffic from the road cross sections and provide a safer and more enjoyable trail system for bicycle use.

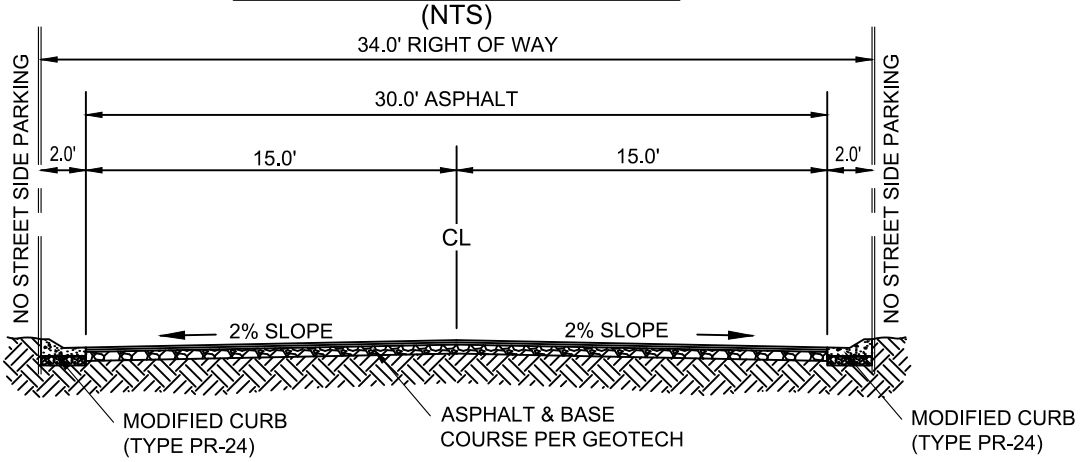
TYPICAL 24' PRIVATE LANE

(NTS)



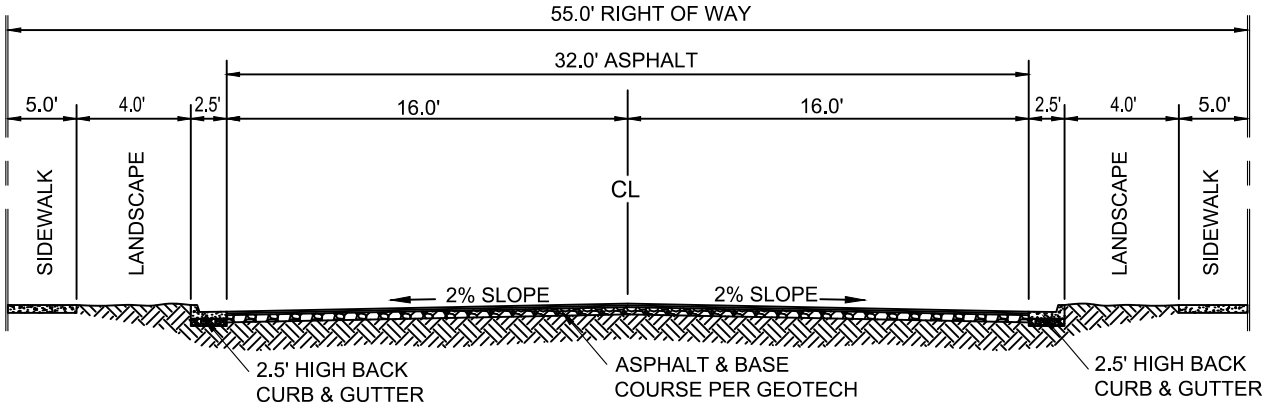
TYPICAL 34' PUBLIC STREET

(NTS)



RESIDENTIAL STANDARD
TYPICAL 55' STREET SECTION

(NTS)



STREET CROSS SECTIONS - EXHIBIT 1

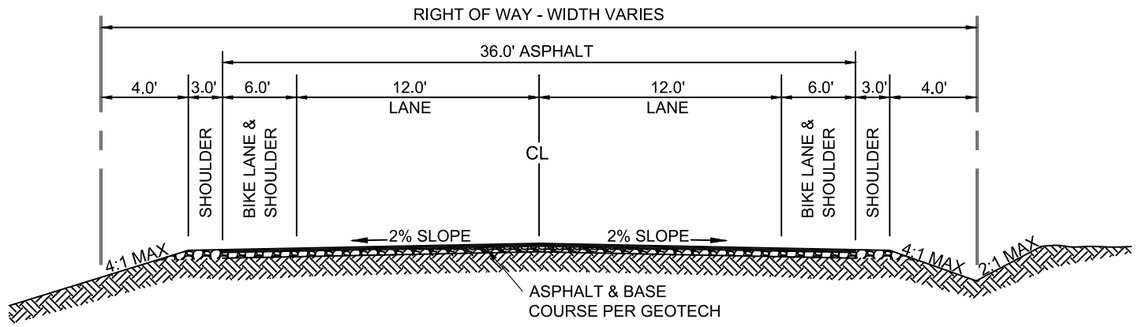
LONG VALLEY TRAILS
BRENNAN HOLDINGS, LLC

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

BG JOB# 161174 Road Cross Section

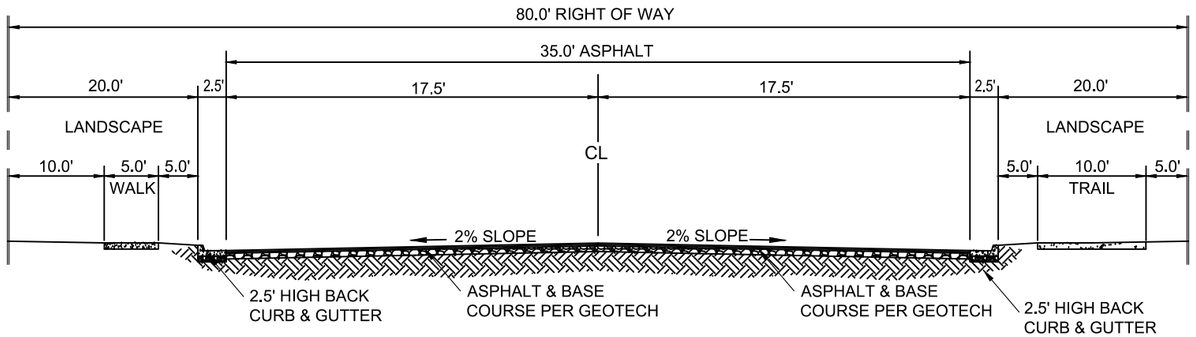
TYPICAL RURAL STREET SECTION

(NTS)



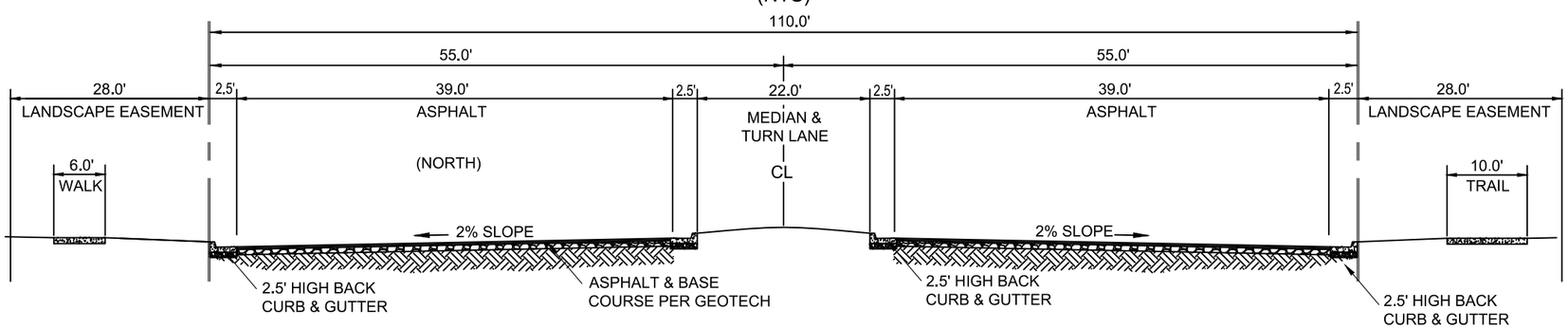
MINOR ARTERIAL
80' STREET SECTION

(NTS)



MAJOR ARTERIAL
110' STREET SECTION

(NTS)



STREET CROSS SECTIONS - EXHIBIT 2

LONG VALLEY TRAILS
BRENNAN HOLDINGS, LLC

HIGH POINT ENGINEERING & SURVEYING
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ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

BG JOB# 161174 Rood Cross Section



STREET CLASSIFICATION

- 110 FOOT - RIGHT OF WAY
- 80 FOOT - RIGHT OF WAY
- 59 FOOT - RIGHT OF WAY
- 55 FOOT - RIGHT OF WAY
- 34 FOOT - RIGHT OF WAY
- 24 FOOT - RIGHT OF WAY
- 2 LANE ROUNDABOUT

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)

1 inch = 350 ft.

STREET CLASSIFICATION MAP

LONG VALLEY TRAILS

HIGH POINT ENGINEERING & SURVEYING

ENGINEERING - PLANNING - SURVEYING

1360 WEST 2130 SOUTH

ST. GEORGE UT 84770

OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

No	Date	By	Revision

DATE: SEP. 2020

DRAWN: MDR

APPROVED: MDR

SCALE: 1" = 350'

JOB NO. 161174

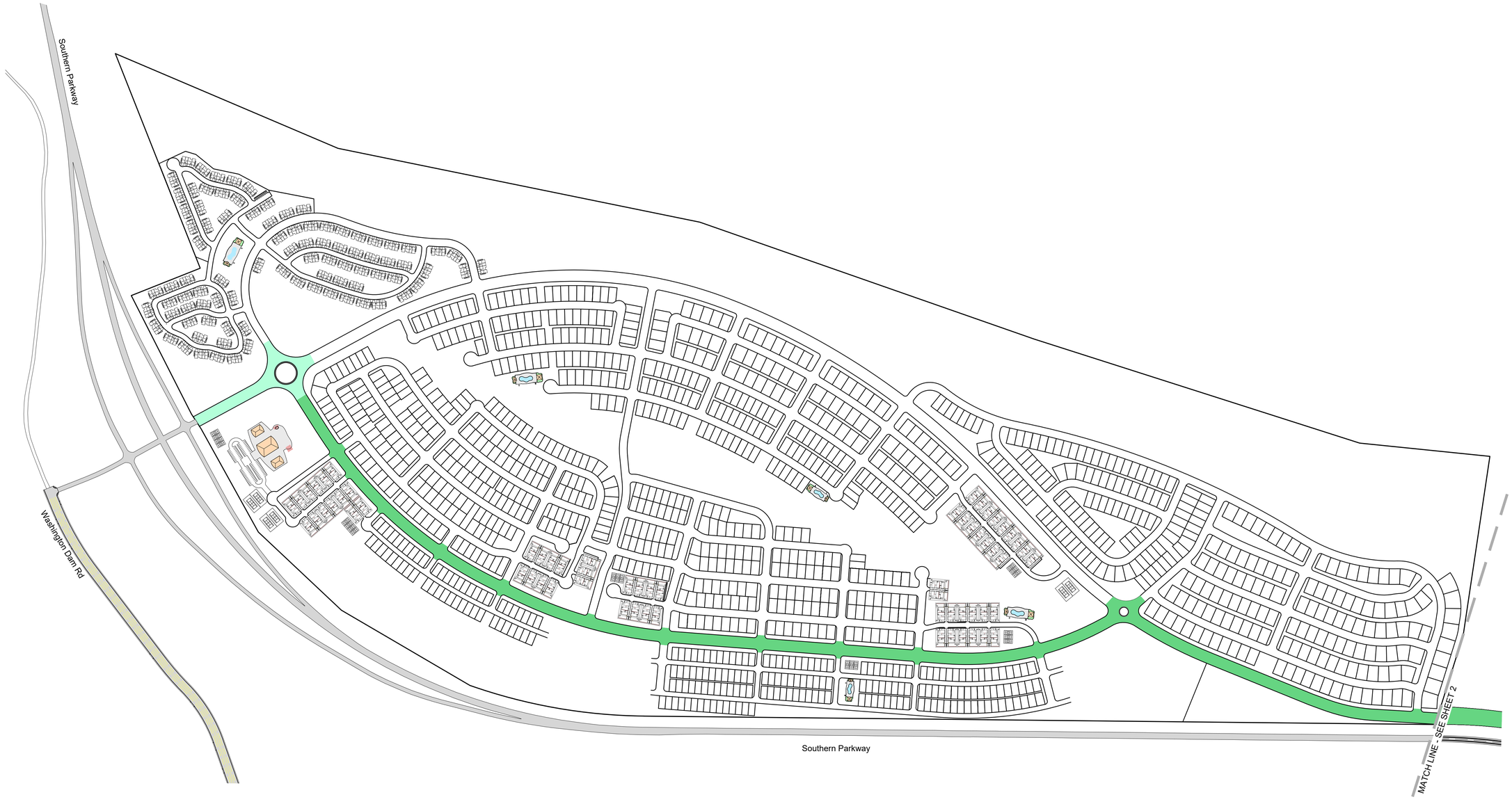
STREET CLASSIFICATION MAP

LONG VALLEY TRAILS

LOCATED IN WASHINGTON COUNTY, UT

SHEET 1 OF 1 SHEETS

FILE: 161174EC SLOPEMAP



LEGEND

- PRIMARY ACCESS
- SECONDARY EMERGENCY ACCESS

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)

1 inch = 350 ft.

PROJECT ACCESS PLAN - SHEET 1

LONG VALLEY TRAILS

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

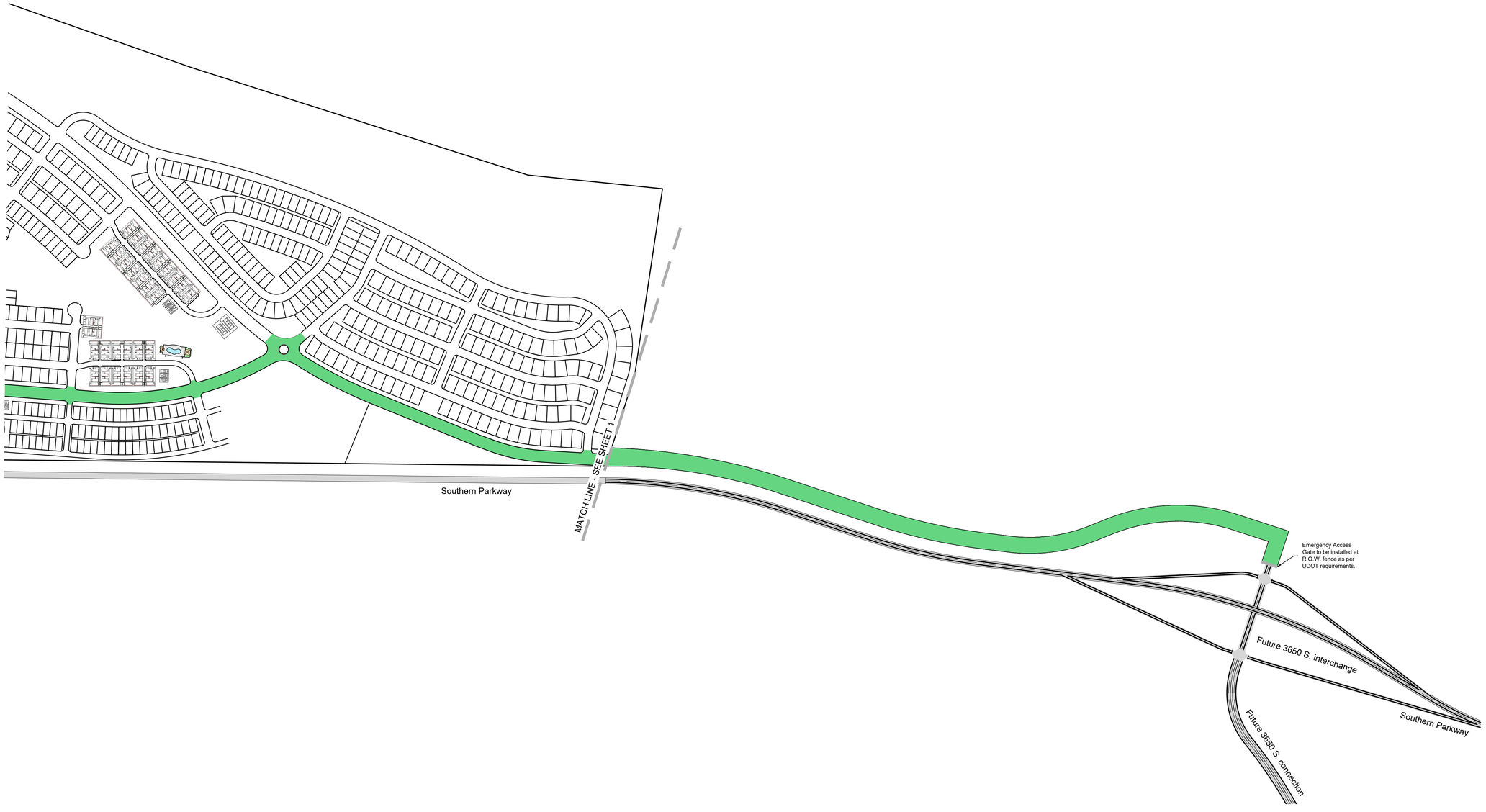
No	Date	By	Revision

DATE: SEP. 2020
DRAWN: MDR
APPROVED: MDR
SCALE: 1" = 350'
JOB NO.: 161174

PROJECT ACCESS PLAN
LONG VALLEY TRAILS
LOCATED IN WASHINGTON COUNTY, UT
SHEET 1

SHEET 1 OF 2 SHEETS

FILE: 16174 - Access Plan



LEGEND

PRIMARY ACCESS

SECONDARY EMERGENCY ACCESS

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)

1 inch = 350 ft.

PROJECT ACCESS PLAN - SHEET 2

LONG VALLEY TRAILS

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

No	Date	By	Revision

DATE: SEP. 2020
DRAWN: MDR
APPROVED: MDR
SCALE: 1" = 350'
JOB NO. 16174

PROJECT ACCESS PLAN
LONG VALLEY TRAILS
LOCATED IN WASHINGTON COUNTY, UT
SHEET 2

SHEET 2 OF 2 SHEETS

FILE: 16174 - Access Plan



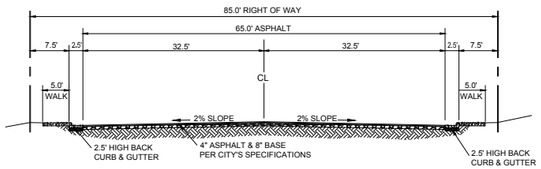
GRAPHIC SCALE

250 0 125 250 500

(IN FEET)

1 inch = 250 ft.

WASHINGTON DAM ROAD



LEGEND

- PROJECT BOUNDARY
- PROPOSED LOT LINE
- S — S PROPOSED SEWER LINE
- W — W PROPOSED WATER LINE
- PROPOSED STORM DRAIN

OFFSITE IMPROVEMENTS

LONG VALLEY TRAILS

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle Suite #4
St. George, Utah 84770
Phone (435) 673-2337 / Fax (435) 673-3161
www.bushandgudgell.com

No.	Date	By	Revision

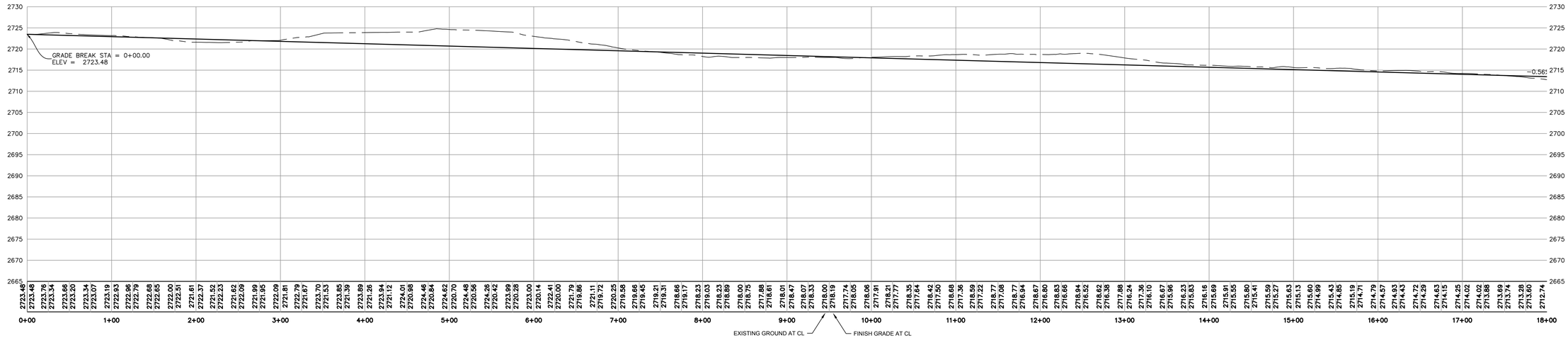
DATE: FEB. 2020
DRAWN: MDR
APPROVED:
SCALE: 1" = 250'
JOB NO. 161174

OFFSITE IMPROVEMENTS
LONG VALLEY TRAILS
LOCATED IN WASHINGTON COUNTY, UT

SHEET 1 OF 5 SHEETS

FILE: 161174 BASE





WASHINGTON DAM ROAD

STA. 0+00 TO STA. 18+00

LEGEND

- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- PAD= 00.0 — FINISH PAD ELEVATION
- LOCATION ELEVATION — SPOT ELEVATION
- PROPOSED CURB & GUTTER
- COUNTY PARCELS (GIS)

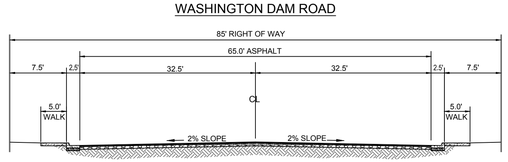
GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

N

WASHINGTON DAM ROAD



WASHINGTON DAM RD - SHEET 1

THE TRAILS AT LONG VALLEY

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle Suite #4
St. George, Utah 84770
Phone (435) 673-2337 / Fax (435) 673-3161
www.bushandgudgell.com

No.	Date	By	Revision

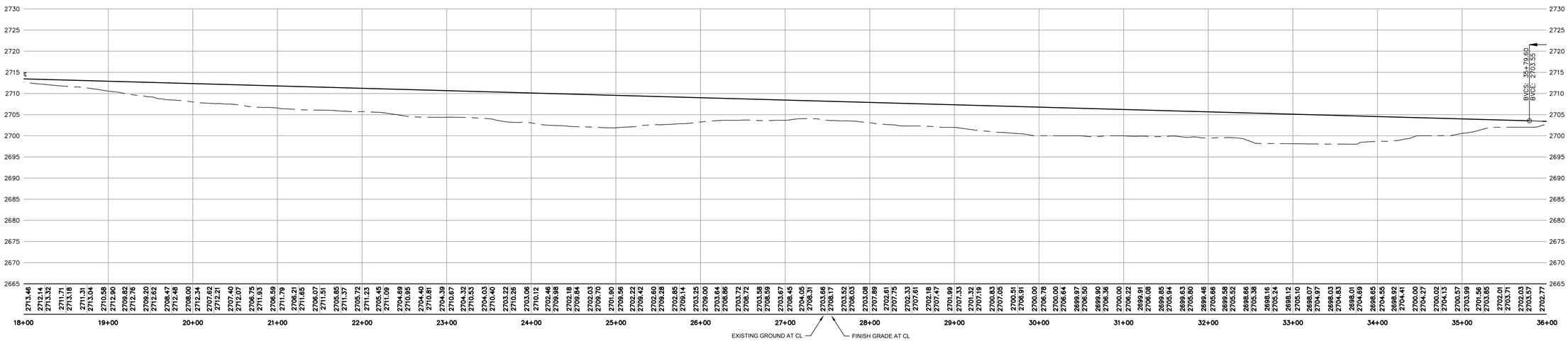
DATE: FEB. 2020
DRAWN: MDR
APPROVED:
SCALE: 1" = 60'
JOB NO. 161174

PLAN & PROFILE
WASHINGTON DAM RD - SHEET 1
LOCATED IN WASHINGTON COUNTY, UT

SHEET 2 OF 5 SHEETS

FILE: 161174 BASE





LEGEND

- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- PAD= 00.0 — FINISH PAD ELEVATION
- LOCATION ELEVATION — SPOT ELEVATION
- PROPOSED CURB & GUTTER
- COUNTY PARCELS (GIS)

GRAPHIC SCALE

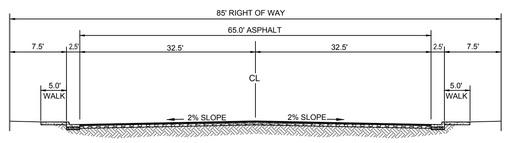
60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

WASHINGTON DAM ROAD

STA. 18+00 TO STA. 36+00

WASHINGTON DAM ROAD



WASHINGTON DAM RD - SHEET 2
THE TRAILS AT LONG VALLEY

BUSH & GUDGELL, INC.
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St. George, Utah 84770
Phone (435) 673-2337 / Fax (435) 673-3161
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No.	Date	By	Revision

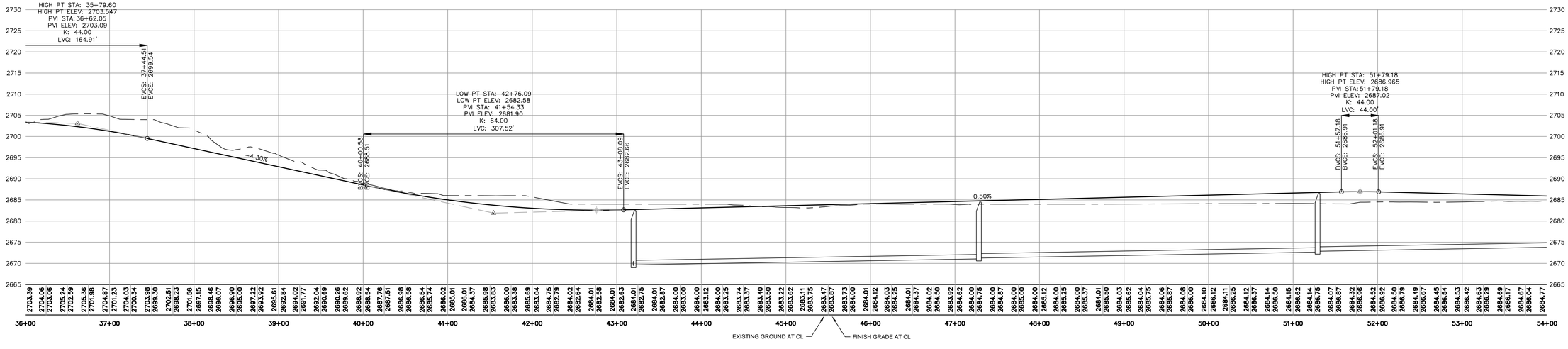
DATE: FEB. 2020
DRAWN: MGR
APPROVED:
SCALE: 1" = 60'
JOB NO. 161174

PLAN & PROFILE
WASHINGTON DAM RD - SHEET 2
LOCATED IN WASHINGTON COUNTY, UT

SHEET 3 OF 5 SHEETS

FILE:161174 BASE





WASHINGTON DAM ROAD

STA. 36+00 TO STA. 54+00

LEGEND

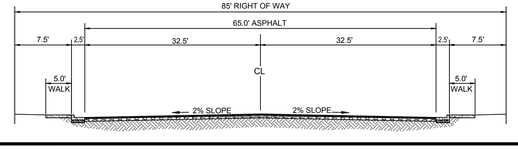
- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- FINISH PAD ELEVATION (PAD= 00.0)
- SPOT ELEVATION (LOCATION ELEVATION)
- PROPOSED CURB & GUTTER
- COUNTY PARCELS (GIS)

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

WASHINGTON DAM ROAD



WASHINGTON DAM RD - SHEET 3
THE TRAILS AT LONG VALLEY

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle Suite #4
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No.	Date	By	Revision

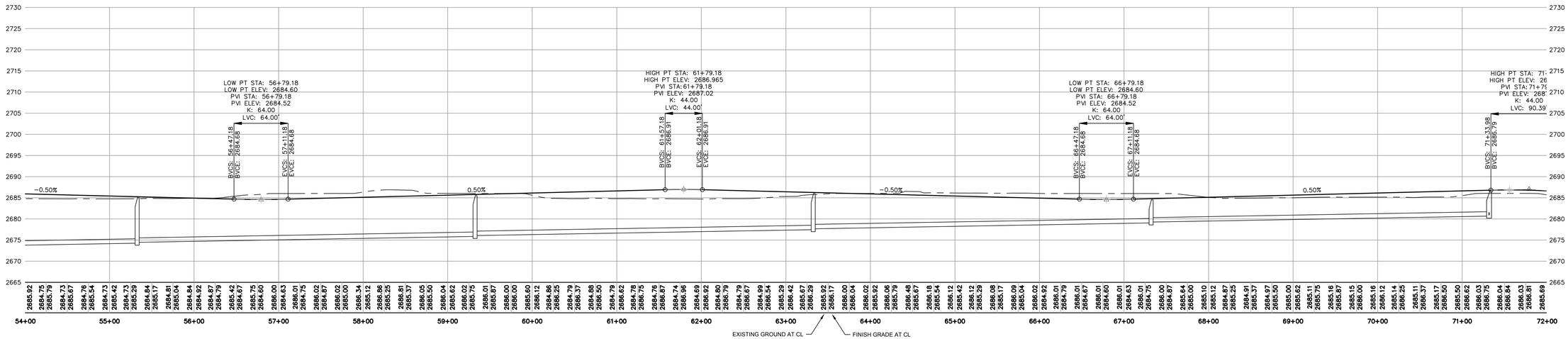
DATE: FEB. 2020
DRAWN: MJR
APPROVED:
SCALE: 1" = 60'
JOB NO.: 161174

PLAN & PROFILE
WASHINGTON DAM RD - SHEET 3
LOCATED IN WASHINGTON COUNTY, UT

SHEET 4 OF 5 SHEETS

FILE:161174 BASE





WASHINGTON DAM ROAD

STA. 54+00 TO STA. 72+00

LEGEND

- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- FINISH PAD ELEVATION (PAD= 00.0)
- SPOT ELEVATION (LOCATION ELEVATION)
- PROPOSED CURB & GUTTER
- COUNTY PARCELS (GIS)

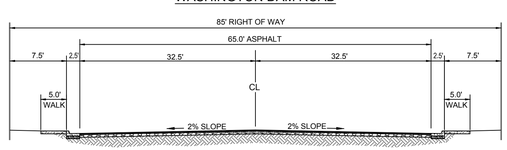
GRAPHIC SCALE

60 0 30 60 120

(IN FEET)

1 inch = 60 ft.

WASHINGTON DAM ROAD



WASHINGTON DAM RD - SHEET 4

THE TRAILS AT LONG VALLEY

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle Suite #4
St. George, Utah 84770
Phone (435) 673-2337 / Fax (435) 673-3161
www.bushandgudgell.com

No	Date	By	Revision

DATE: FEB. 2020
DRAWN: MJR
APPROVED:
SCALE: 1" = 60'
JOB NO.: 161174

PLAN & PROFILE
WASHINGTON DAM RD - SHEET 4
LOCATED IN WASHINGTON COUNTY, UT

SHEET 5 OF 5 SHEETS

FILE:161174 BASE

B&G PROJECT NUMBER 161174

LONG VALLEY ROAD EXTENSION

PROPOSED ACCESS ROAD

CONSTRUCTION PLANS

LOCATED IN WASHINGTON, UTAH

SECTION 31, T 42 S, R 14 W, SLB&M
SECTION 36, T 42 S, R 15 W, SLB&M
SECTION 6, T 43 S, R 14 W, SLB&M

OWNER / DEVELOPER

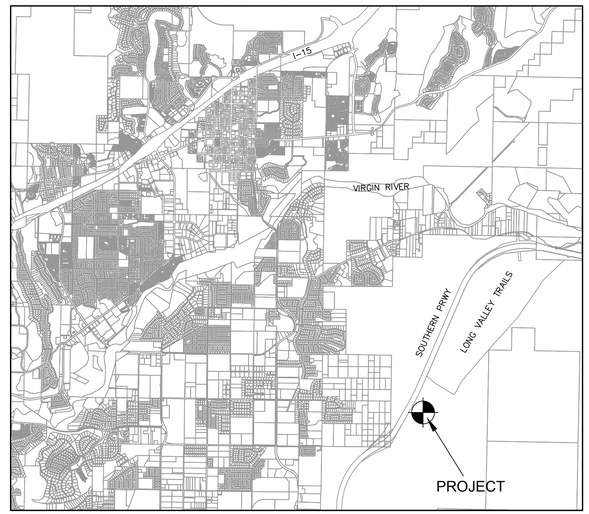
BRENNAN HOLDINGS NO 100, LLC
205 E. TABERNACLE #4
ST. GEORGE, UT 84770

JIM RAINES
435-668-3641

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Call before you Dig
1-800-662-4111
BLUE STAKES LOCATION CENTER (UTAH)

SHEET NO.	DESCRIPTION
1	COVER SHEET
2	RECORD OF SURVEY
3	CUT & FILL PLAN
4	PLAN & PROFILE - SHEET 1 (NORTH END)
5	PLAN & PROFILE - SHEET 2 (CENTER)
6	PLAN & PROFILE - SHEET 3 (SOUTH END)

VICINITY MAP



GENERAL NOTES

1) CONTRACTOR IS RESPONSIBLE TO VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO COMMENCEMENT OF WORK IN ANY ZONE.
2) ALL WORK AND MATERIALS SHALL COMPLY WITH WASHINGTON CITY STANDARD SPECIFICATIONS.
3) PROJECTS SHALL INSTALL AN INFORMATIONAL SIGN ON SITE BEFORE CONSTRUCTION BEGINS. THIS SIGN WILL HAVE A MINIMUM SIZE, PLACEMENT LOCATION AND CONTENT INFORMATION WITH THE COMPANY NAME, PHONE CONTACT AND GRADING PERMIT NUMBER.
4) PROJECTS SHALL SUBMIT A DUST CONTROL PLAN WITH DETAILS ON EQUIPMENT, SCHEDULING AND REPORTING OF DUST CONTROL ACTIVITIES.
5) A MANDATORY PRE-CONSTRUCTION MEETING WILL BE REQUIRED ON ALL PROJECTS PRIOR TO ANY GRUBBING, GRADING OR CONSTRUCTION ACTIVITIES. THE PERMIT HOLDER WILL BE REQUIRED TO NOTIFY ALL DEVELOPMENT SERVICE INSPECTORS.
6) FOLLOW APPENDIX 'J' STANDARDS FOUND IN THE IBC.
7) ALL OBJECTS SHALL BE KEPT OUT OF THE SIGHT DISTANCE CORRIDORS THAT MAY OBSTRUCT THE DRIVER'S VIEW.

DUST CONTROL

THESE DUST CONTROL MEASURES MUST BE OBSERVED AT ALL TIMES:

EARTH MOVING ACTIVITIES:

1) APPLY WATER BY MEANS OF TRUCKS, HOSES AND/OR SPRINKLERS AT SUFFICIENT FREQUENCY AND QUANTITY, PRIOR TO CONDUCTING, DURING AND AFTER EARTHMOVING ACTIVITIES.
2) PRE-APPLY WATER TO THE DEPTH OF THE PROPOSED CUTS OR EQUIPMENT PENETRATION.
3) APPLY WATER AS NECESSARY AND PRIOR TO EXPECTED WIND EVENTS.
4) OPERATE HAUL VEHICLES APPROPRIATELY IN ORDER TO MINIMIZE FUGITIVE DUST AND APPLY WATER AS NECESSARY DURING LOADING OPERATIONS.

DISTURBED SURFACE AREAS OR INACTIVE CONSTRUCTION SITES:

1) WHEN ACTIVE CONSTRUCTION OPERATIONS HAVE CEASED, APPLY WATER AT SUFFICIENT FREQUENCY AND QUANTITY TO DEVELOP A SURFACE CRUST AND PRIOR TO EXPECTED WIND EVENTS.
2) INSTALL FENCE BARRIER AND/OR "NO TRESPASSING" SIGNS TO PREVENT ACCESS TO DISTURBED SURFACE AREAS.

APRIL, 2019

BUSH & GUDGELL, INC.
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205 East Tabernacle #4
St. George, Utah 84770
Phone (435) 673-2337

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www.bushandgudgell.com

Drawn : MDR Date : APRIL, 2019
Email : mrodnes@bushandgudgell.com
Checked : JAR
Approved : JAR
Scale : 1" = 60'
Job No : 161174

LONG VALLEY BLM PARCEL - PLAN & PROFILE

LOCATED IN
SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W,
SALT LAKE BASE & MERIDIAN

SHEET 1 OF 1 SHEETS
FILE: 161174BLM road profile

GRAPHIC SCALE

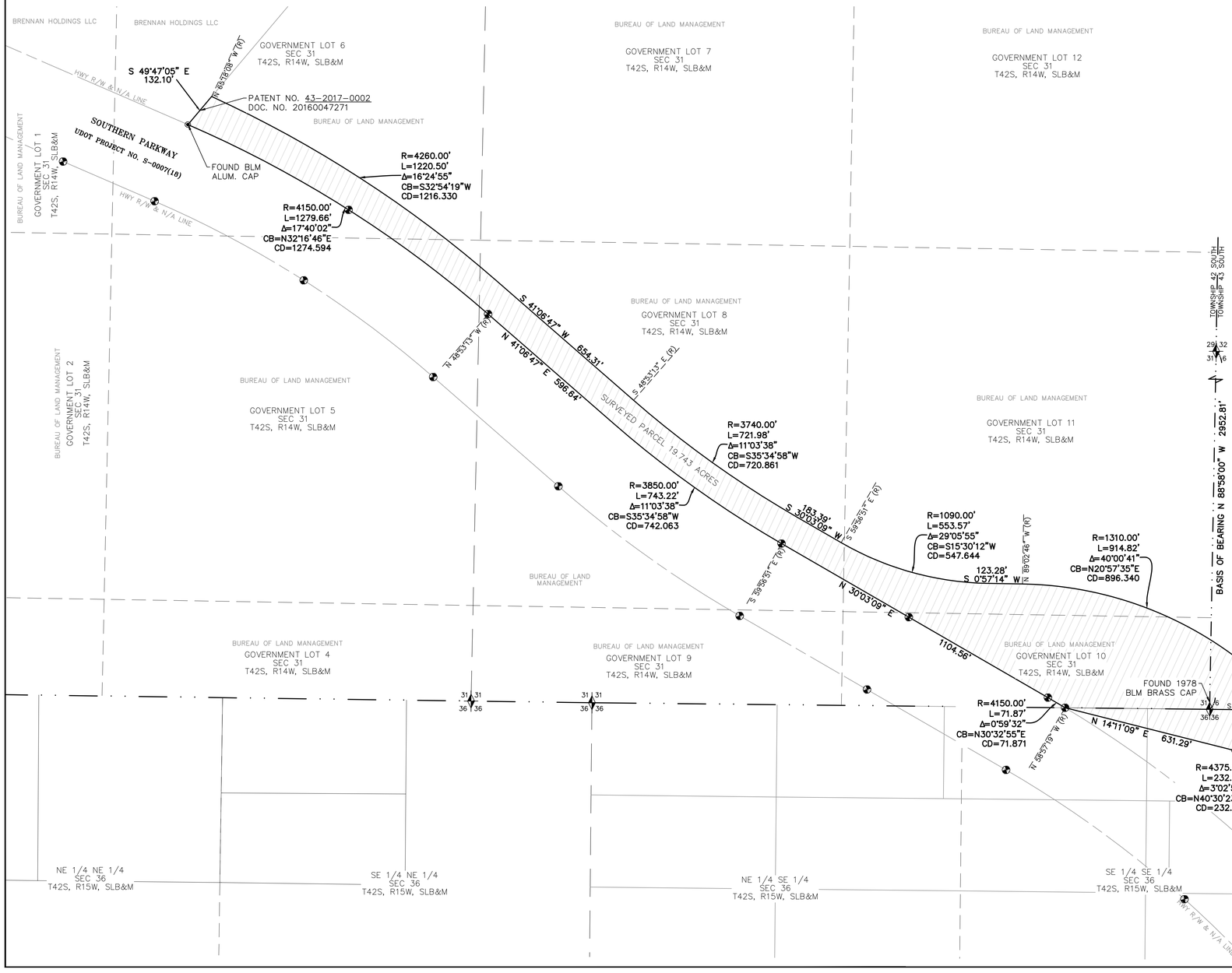
200 0 100 200 400

(IN FEET)

1 inch = 200 ft.

LEGEND

- SECTIONAL MONUMENTATION
- FOUND SOUTHERN PARKWAY RIGHT-OF-WAY MONUMENTATION
- FOUND BLM ALUMINUM CAP
- BOUNDARY LINE
- SECTION/RANGE/TOWNSHIP LINE
- 1/4 SECTION LINE
- 1/16 SECTION LINE
- ROW LINE
- PROPERTY LINE



SURVEYOR'S CERTIFICATE

I, D. GREGG MEYERS, A PROFESSIONAL LAND SURVEYOR, LICENSED UNDER TITLE 58, CHAPTER 22, PROFESSIONAL ENGINEERS AND PROFESSIONAL LAND SURVEYORS LICENSING ACT, HOLDING LICENSE NO. 312770, DO HEREBY CERTIFY THAT THIS PLAT REPRESENTS THE RESULTS OF A SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THE INFORMATION AND MEASUREMENTS SHOWN HEREON ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

APRIL 29, 2019

DATE:
BUSH AND GUDGELL INC.

PROFESSIONAL LAND SURVEYOR
LICENSE #312770
D. GREGG MEYERS
4/29/19
STATE OF UTAH

D. GREGG MEYERS
PROFESSIONAL LAND SURVEYOR
UTAH LICENSE NUMBER 312770

BOUNDARY DESCRIPTION

A PARCEL OF LAND SITUATED IN GOVERNMENT LOTS 5, 6, 8, 10 AND 11 OF SECTION 31, TOWNSHIP 42 SOUTH, RANGE 14 WEST, GOVERNMENT LOT 1 OF SECTION 6, TOWNSHIP 43 SOUTH, RANGE 14 WEST, SOUTHEAST QUARTER (SE1/4) OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 36 TOWNSHIP 42 SOUTH, RANGE 15 WEST, SALT LAKE BASE AND MERIDIAN, WASHINGTON COUNTY, UTAH, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT THAT LIES SOUTH 00°36'38" WEST ALONG THE WEST LINE OF GOVERNMENT LOT 1, SAID SECTION 6 A DISTANCE OF 273.74 FEET AND NORTH 89°23'22"WEST A DISTANCE OF 297.44 FEET FROM THE NORTHWEST CORNER OF SECTION 6, TOWNSHIP 43 SOUTH, RANGE 14 WEST, SALT LAKE BASE AND MERIDIAN, SAID POINT ALSO BEING ON THE SOUTHEAST RIGHT-OF-WAY LINE OF SOUTHERN PARKWAY, UTAH, DEPARTMENT OF TRANSPORTATION PROJECT NUMBER S-0007(18), THENCE, ALONG SAID RIGHT-OF-WAY THE FOLLOWING SEVEN (7) COURSES AND DISTANCES: 1) NORTHEASTERLY ALONG A 4,375.00 FOOT RADIUS CURVE TO THE LEFT, (LONG CHORD BEARS NORTH 40°30'23" EAST A DISTANCE OF 232.71 FEET, CENTER POINT LIES NORTH 47°58'11" WEST), THROUGH A CENTRAL ANGLE OF 03°02'53" A DISTANCE OF 232.74 FEET, 2) NORTH 14°11'09" EAST 631.29 FEET, 3) NORTHEASTERLY ALONG A 4,150.00 FOOT RADIUS NON-TANGENT CURVE TO THE LEFT, (LONG CHORD BEARS NORTH 30°32'55" EAST A DISTANCE OF 71.87 FEET, CENTER POINT LIES NORTH 58°57'19" WEST), THROUGH A CENTRAL ANGLE OF 00°59'32" A DISTANCE OF 71.87 FEET, 4) NORTH 30°03'09" EAST 1,104.56 FEET, 5) NORTHEASTERLY ALONG A 3,850.00 FOOT RADIUS CURVE TO THE RIGHT, (LONG CHORD BEARS NORTH 35°34'58" EAST A DISTANCE OF 742.06 FEET, CENTER POINT LIES SOUTH 59°56'51" EAST), THROUGH A CENTRAL ANGLE OF 11°03'38" A DISTANCE OF 743.22 FEET, 6) NORTH 41°06'47" EAST 596.64 FEET, 7) NORTHEASTERLY ALONG A 4,150.00 FOOT RADIUS CURVE TO THE LEFT, (LONG CHORD BEARS NORTH 32°16'46" EAST A DISTANCE OF 1,274.59 FEET, CENTER POINT LIES NORTH 48°53'13" WEST), THROUGH A CENTRAL ANGLE OF 17°40'02" A DISTANCE OF 1,279.66 FEET TO THE SOUTH LINE OF THAT CERTAIN PROPERTY CONVEYED BY LAND PATENT FROM THE UNITED STATES OF AMERICA TO BRENNAN HOLDINGS, LLC BY DOCUMENT NUMBER 20160047271, RECORDED IN THE OFFICE OF THE WASHINGTON COUNTY RECORDER, STATE OF UTAH , THEN LEAVING SAID RIGHT-OF-WAY AND RUNNING ALONG SAID SOUTH LINE, THENCE, SOUTH 49°47'05" EAST 132.10 FEET, THEN LEAVING SAID SOUTH LINE AND RUNNING THENCE, SOUTHERLY ALONG A 4,260.00 FOOT RADIUS CURVE TO THE RIGHT, (LONG CHORD BEARS SOUTH 32°54'19" WEST A DISTANCE OF 1,216.33 FEET, CENTER POINT LIES NORTH 65°18'08" WEST, THROUGH A CENTRAL ANGLE OF 16°24'55" A DISTANCE OF 1,220.50 FEET; THENCE, SOUTH 41°06'47" WEST 654.31 FEET; THENCE, SOUTHERLY ALONG A 3,740.00 FOOT RADIUS CURVE TO THE LEFT, (LONG CHORD BEARS SOUTH 35°34'58" WEST A DISTANCE OF 720.86 FEET, CENTER POINT LIES SOUTH 48°53'13" EAST, THROUGH A CENTRAL ANGLE OF 11°03'38" A DISTANCE OF 721.98 FEET; THENCE, SOUTH 30°03'09" WEST 183.39 FEET; THENCE, SOUTHERLY ALONG A 1,090.00 FOOT RADIUS CURVE TO THE LEFT, (LONG CHORD BEARS SOUTH 15°30'12" WEST A DISTANCE OF 547.64 FEET, CENTER POINT LIES SOUTH 59°56'51" EAST, THROUGH A CENTRAL ANGLE OF 29°05'55" A DISTANCE OF 553.57 FEET; THENCE, SOUTH 00°57'14" WEST 123.28 FEET; THENCE, SOUTHERLY ALONG A 1,310.00 FOOT RADIUS CURVE TO THE RIGHT, (LONG CHORD BEARS SOUTH 20°57'35" WEST A DISTANCE OF 896.34 FEET, CENTER POINT LIES NORTH 89°02'46" WEST, THROUGH A CENTRAL ANGLE OF 40°00'41" A DISTANCE OF 914.82 FEET; THENCE, SOUTH 40°57'56" WEST 361.18 FEET; THENCE, NORTH 49°02'04" WEST 255.68 FEET TO THE POINT OF BEGINNING.

THE AREA DESCRIBED CONTAINS 860,007 SQ.FT. OR 19.743 ACRES

NARRATIVE

THE PURPOSE OF THIS SURVEY IS TO ESTABLISH THE BOUNDARY ON THE HEREON DESCRIBED PARCEL OF LAND. THE SURVEY WAS PERFORMED AT THE REQUEST OF BRENNAN HOLDINGS, LLC. THE BASIS OF BEARING FOR THIS SURVEY IS SOUTH 88°58'00" EAST BETWEEN THE NORTHWEST CORNER AND THE NORTH QUARTER CORNER OF SECTION 6, TOWNSHIP 43 SOUTH, RANGE 14 WEST, SALT LAKE BASE AND MERIDIAN. ESTABLISHED BY PREVIOUS SURVEY'S PERFORMED BY BUSH AND GUDGELL. THE CONTROLLING BOUNDARY ELEMENT'S FOR THIS PLAT ARE THE ESTABLISHED SOUTHERN PARKWAY AS PLATTED AND MONUMENTED. NORTH BOUNDARY WAS ESTABLISHED BY PATENT AS NOTED AND THE EAST BOUNDARY WAS ESTABLISHED BY A FUTURE DESIGN RIGHT OF WAY.

NOTES

1. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS BOUNDARY SURVEY TO OBTAIN OR SHOW DATA CONCERNING EXISTENCE, SIZE, DEPTH, CONDITION, CAPACITY, OR LOCATION OF ANY UTILITY OR MUNICIPAL/PUBLIC SERVICE FACILITY. FOR INFORMATION REGARDING THESE UTILITIES OR FACILITIES, PLEASE CONTACT THE APPROPRIATE AGENCIES.

2. SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP, TITLE EVIDENCE, OR ANY OTHER FACTS WHICH AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE.

3. ALL COURSES SHOWN ARE RECORD INFORMATION TAKEN FROM DEED DESCRIPTION OR OFFICIAL MAPS OR PLATS OF RECORD, AND ARE THE RESULT OF ACTUAL FIELD MEASUREMENTS.

4. BOUNDARY MONUMENTS WILL BE SET PRIOR TO RECORDATION OF THIS PLAT.

RECORD OF SURVEY PLAT

LOCATED IN
SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W, SALT LAKE BASE AND MERIDIAN
PREPARED FOR: BRENNAN HOLDINGS

No. | Date | By | Revision

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle Suite #4
St. George, Utah 84770
Phone (435) 673-2337 / Fax (435) 673-3161
www.bushandgudgell.com

Drawn : BRS Date : 4-26-2019
Email : GMeyers@bushandgudgell.com
Checked : DGM
Approved : DGM
Scale : 1" = 200'
Job No : 161174

BRENNAN HOLDINGS RECORD OF SURVEY
LOCATED IN
SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W, SALT LAKE BASE & MERIDIAN

SHEET 1
1 SHEETS
FILE: 161174 ROS



CUT & FILL TAG LEGEND

(RED) INDICATES A CUT IN 1 FOOT INCREMENTS

(GREEN) INDICATES A FILL IN 1 FOOT INCREMENTS

CUT FILL - LONG VALLEY PARKWAY

LONG VALLEY BLM PARCEL EXCHANGE

No.	Date	By	Revision

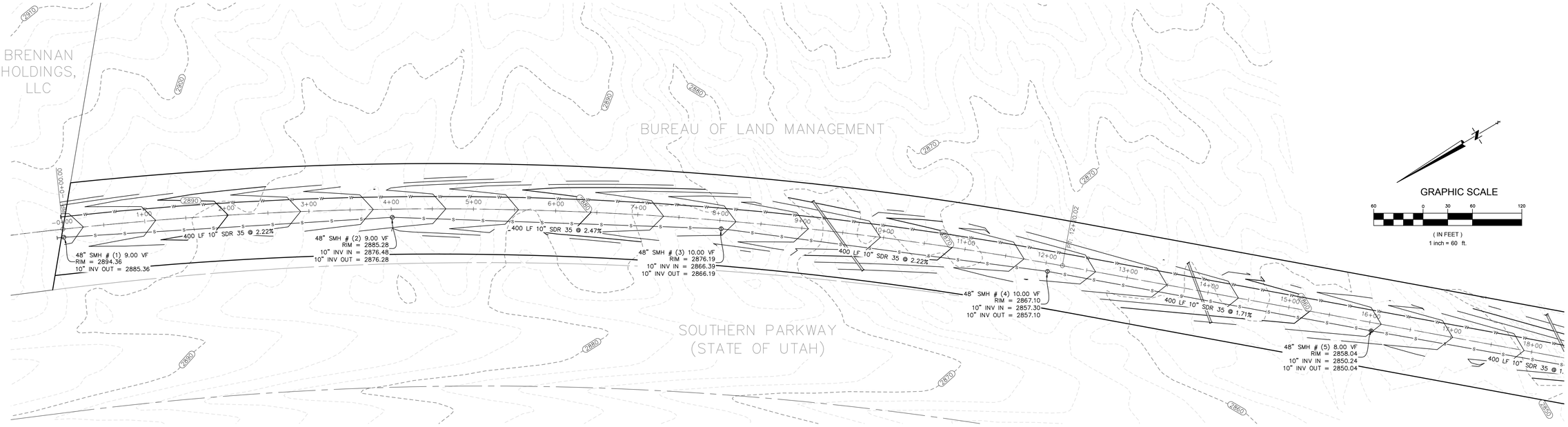
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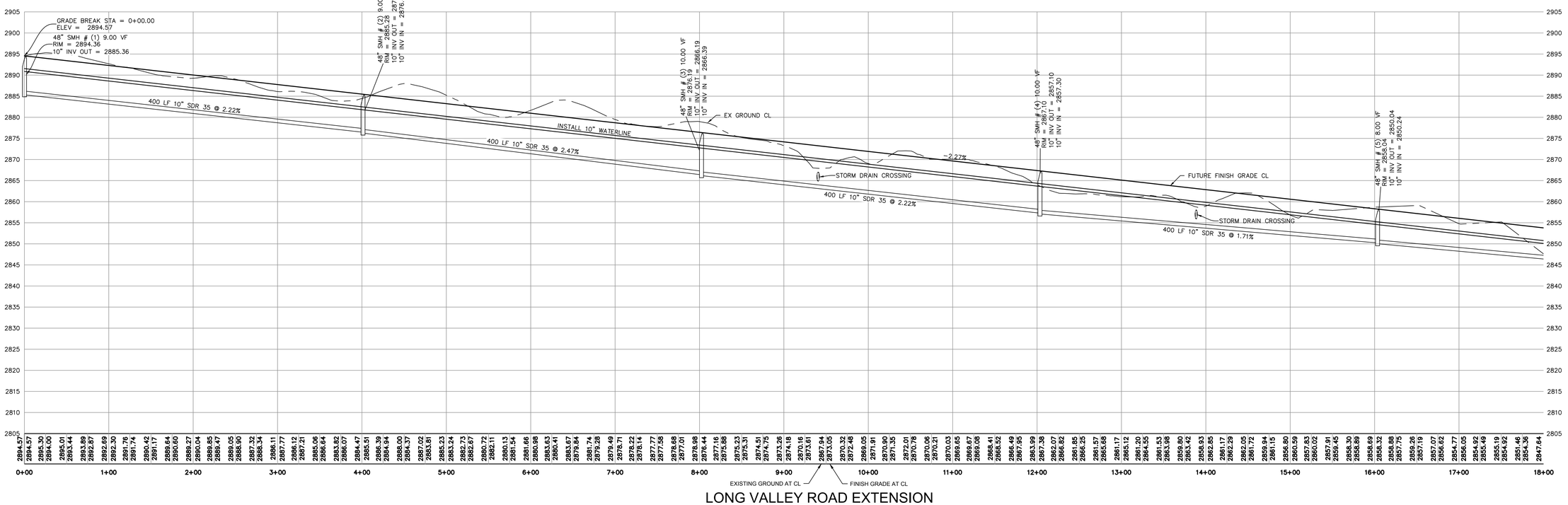
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Email : mmoore@bushandgudgell.com
Checked : JAR
Approved : JAR
Scale : 1" = 60'
Job No : 161174

LONG VALLEY BLM PARCEL -CUT FILL
LOCATED IN
SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W, SALT LAKE BASE & MERIDIAN

SHEET 1 OF 1 SHEETS

FILE: 161174BLM road profile



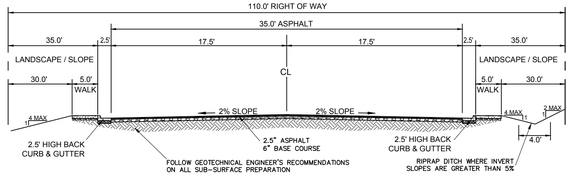


LONG VALLEY ROAD EXTENSION

PROFILE RANGE: STA. 0+00 TO STA. 18+00

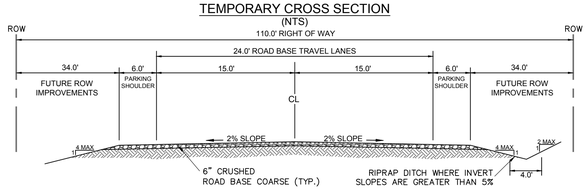
FINISHED CROSS SECTION

(NTS)



TEMPORARY CROSS SECTION

(NTS)



LEGEND

- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- PROPOSED ROW LINE
- EXISTING SOUTHER PARKWAY ROW
- EXISTING PROPERTY LINE

PLAN & PROFILE - LONG VALLEY PARKWAY

LONG VALLEY BLM PARCEL EXCHANGE

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Drawn : MDR Date : APRIL, 2019
Email : mcraines@bushandgudgell.com
Checked : JAR
Approved : JAR
Scale : 1" = 60'
Job No : 161174

LONG VALLEY BLM PARCEL - PLAN & PROFILE

SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W, SALT LAKE BASE & MERIDIAN

SHEET 1 OF 1 SHEETS

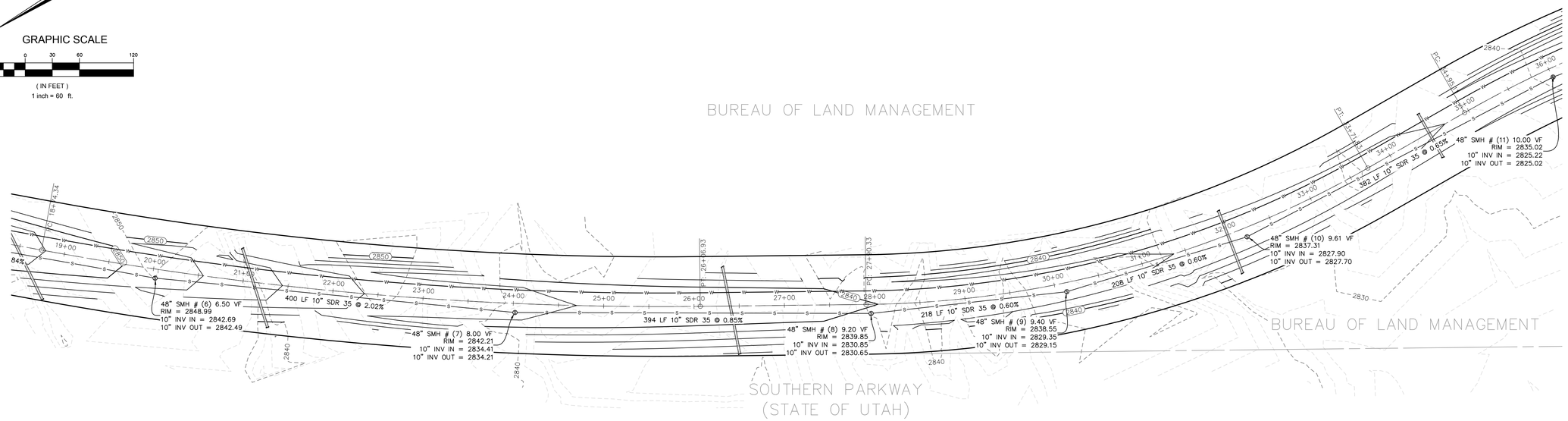
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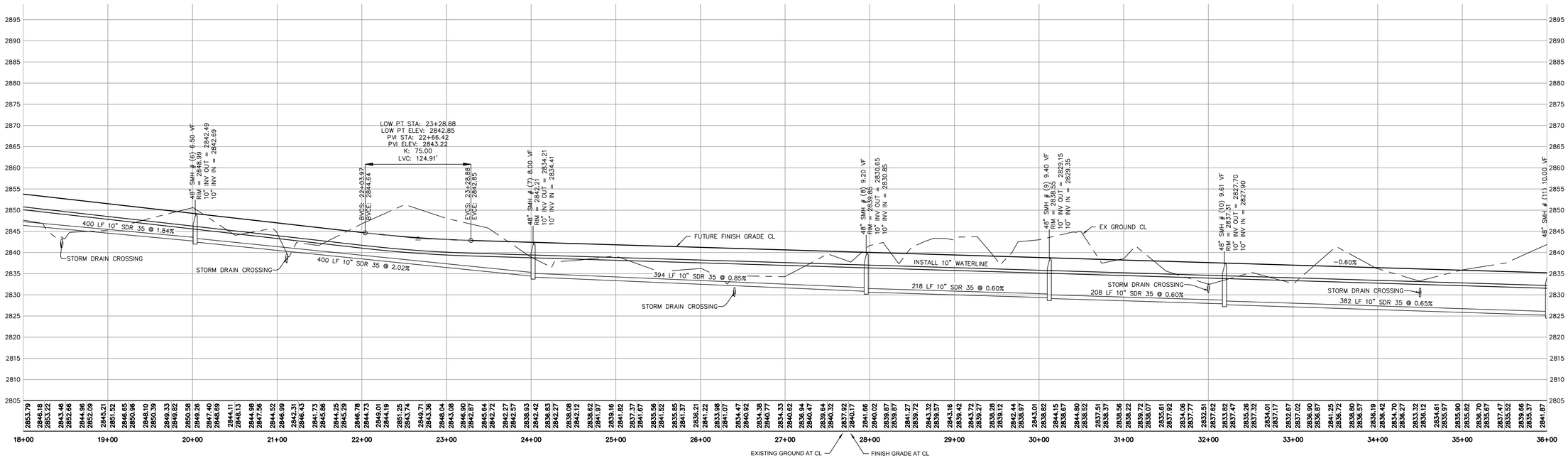
GRAPHIC SCALE

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(IN FEET)

1 inch = 60 ft.



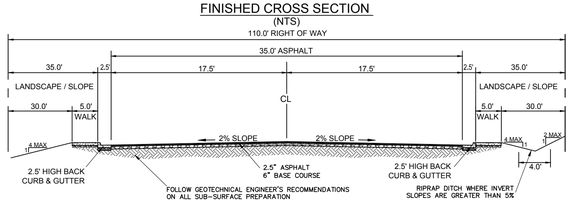


LONG VALLEY ROAD EXTENSION

PROFILE RANGE: STA. 18+00 TO STA. 36+00

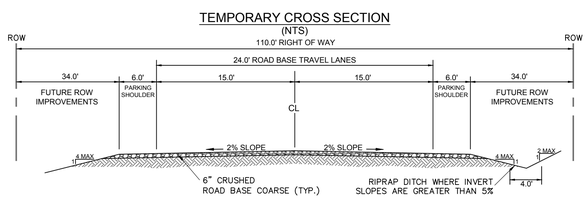
FINISHED CROSS SECTION

(NTS)



TEMPORARY CROSS SECTION

(NTS)



LEGEND

- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- PROPOSED ROW LINE
- EXISTING SOUTHER PARKWAY ROW
- EXISTING PROPERTY LINE

PLAN & PROFILE - LONG VALLEY PARKWAY

LONG VALLEY BLM PARCEL EXCHANGE

No.	Date	By	Revision

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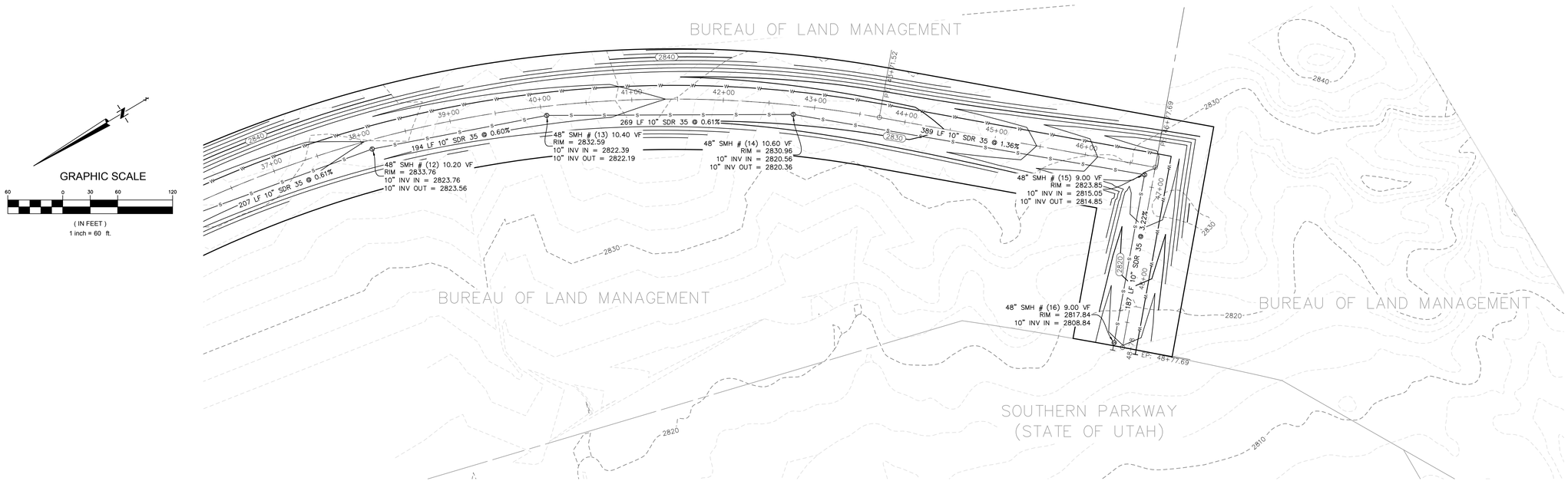
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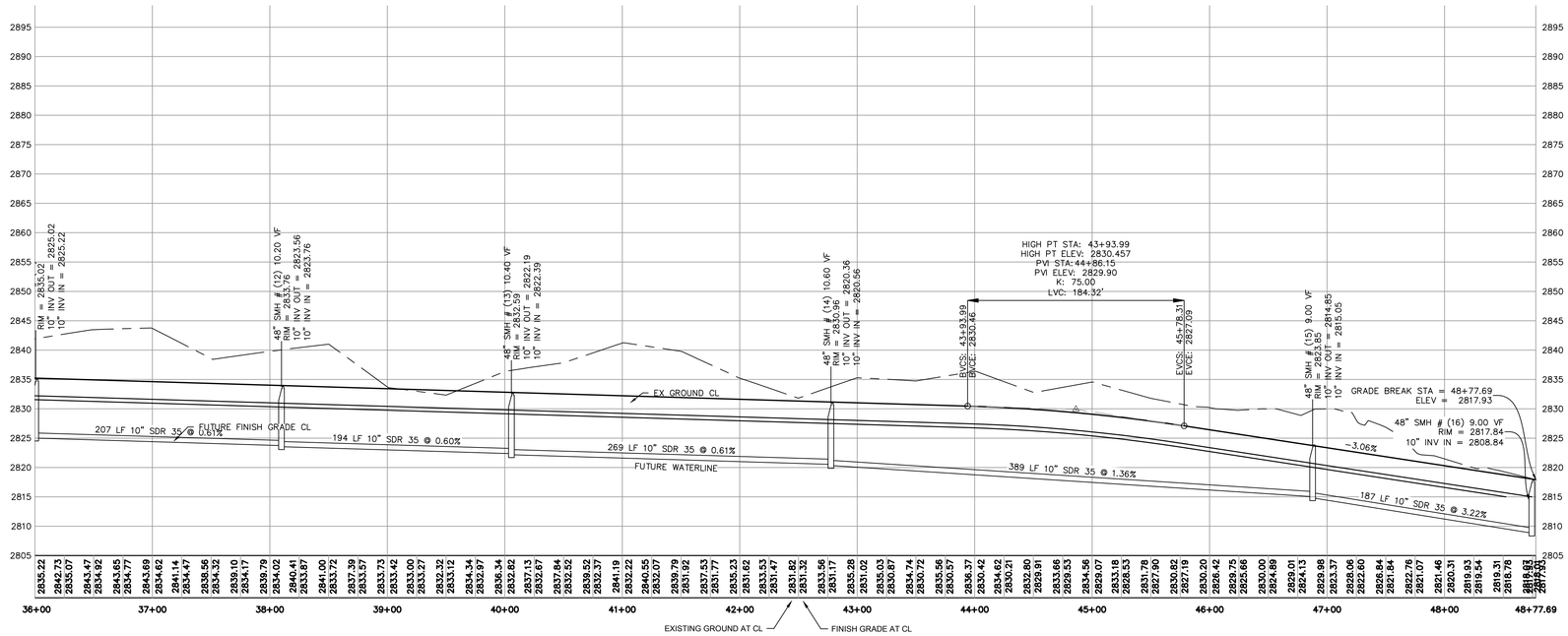
LONG VALLEY BLM PARCEL - PLAN & PROFILE

LOCATED IN
SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W,
SALT LAKE BASE & MERIDIAN

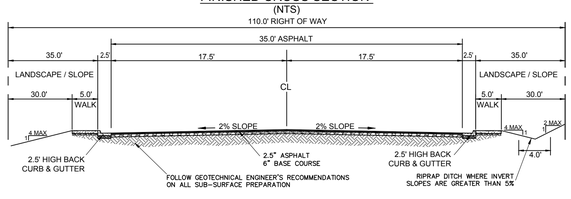
SHEET
2
3
SHEETS

FILE: 161174LVW road profile

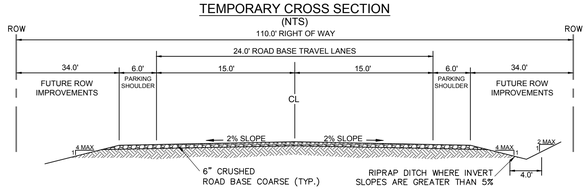




FINISHED CROSS SECTION
(NTS)



TEMPORARY CROSS SECTION
(NTS)



LEGEND

- EXISTING GROUND CONTOUR
- FINISH GROUND CONTOUR
- DRAINAGE FLOW
- PROPOSED ROW LINE
- EXISTING SOUTHER PARKWAY ROW
- EXISTING PROPERTY LINE

PLAN & PROFILE - LONG VALLEY PARKWAY
LONG VALLEY BLM PARCEL EXCHANGE

No.	Date	By	Revision

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St. George, Utah 84770
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Drawn : MDR Date : APRIL, 2019
Email : mraines@bushandgudgell.com
Checked : JAR
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Scale : 1" = 60'
Job No : 161174

LONG VALLEY BLM PARCEL - PLAN & PROFILE
LOCATED IN
SEC. 6, T43S, R14W, SEC. 31, T42S, R14W & SEC. 36, T42S, R15W,
SALT LAKE BASE & MERIDIAN

SHEET
3
3
SHEETS
FILE: 161174BLM road profile

LONG VALLEY TRAILS

Master Storm Drain Plan

Section 9

Master Drainage study:

Long Valley Trails is located within the Virgin River Anticline an eroded geological formation that presents today as a long bowl shaped valley that generally slopes to the north. Presently the storm water that falls onto the Long Valley site flows towards the centerline of the valley and then is conveyed in a natural wash towards the north end of the valley. At this location there are two existing 42” pipes that allow the storm discharge to pass under the southern parkway to an existing retention basin adjacent to Washington Dam Road. Currently no conveyance system exists that allows the storm water to pass downstream from the retention basin to the Virgin River. As part of an improvement project for Washington Dam Road (currently in the design phase) a conveyance system is being designed to allow such discharge to reach the Virgin River.

Long Valley Trails has conducted a master drainage study that has evaluated the major drainage infrastructure needs that would safely allow development of this valley to commence. This study has also provided the minimum required sizing of the detention basins, the LID - Water Quality Required Volume and the major conveyance infrastructure needed to adequately handle the major & minor design storm events. The study shows the minimum size of conveyance pipes and orifice sizing, but lacks the specifics for a final design of the detention basins, outlet structures, overflow structure and how the final design of said specifics will affect each downstream item. It is planned to submit an in-depth analysis of the drainage infrastructures needs for the area with each preliminary plat submittal. In this way the most accurate analysis/design can be provided to accommodate the final layout for each area, while ensuring adherence to the minimum requirements specified in the Master Drainage Study presented within this PCD. It should be noted that the entire drainage infrastructure will be accessible from a public roadway or paved trails system both of which the City will be given legal access to. The detention basins will be located in HOA common area and will be maintained by a HOA.

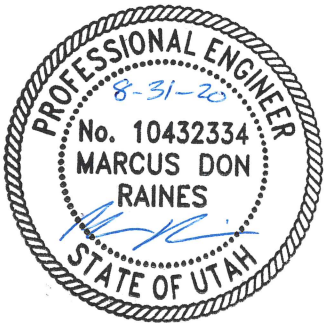
MASTER DRAINAGE STUDY
FOR

Long Valley Trails

A Residential Subdivision located in Washington City, Utah

Located in the Sections 20, 29, 30 & 31, T 42 S, R 14 W, SLB&M

"This report for the drainage design for the proposed development and related offsite storm drain system was prepared by me in accordance with the provisions of Washington City's Storm Drainage Design and Technical Criteria, and was designed to comply with the provisions thereof. I understand that Washington City does not and will not assume liability for drainage facilities design/engineer's stamp."



PREPARED BY:

High Point Engineering & Surveying
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Phone: (435) 668-5293
Email: marcraines@gmail.com

Project Engineer	Marcus Raines, P.E.
Date	August 31, 2020
Job Number	HP # 161174

I. GENERAL LOCATION AND DESCRIPTION

A. Location: The subject property is situated at Washington Dam Exit & Southern Parkway.

☐ **Township, range, section, 1/4 section**

Township, Range, & Section	(SW ¼ of Section 20), (NE ¼, NW ¼ & SW ¼ of Section 29), (NE ¼ & SE ¼ of Section 30) and (NE ¼ & NW ¼ of Section 31), Township 42 South, Range 14 West

☐ **Local streets within and adjacent to the subdivision with ROW width shown**:

Nearest major cross roads	Washington Dam Exit & Southern Parkway

☐ **Major drainage ways, facilities, and easements within and adjacent to the site**: The site is located in the Master Plan basin Washington Dam Road Basin (WAD). Currently, there is almost no storm drain infrastructure in east side of this basin with the exception of what was installed as part of the Southern Parkway and the existing retention basis just north of the subject property.



Names of surrounding developments: The site is adjacent the Southern Parkway which bounds the property on the north and west sides. The nearest subdivision would be Country Way Estates Phases 1 & 2 about a mile to the west of the property along Washington Dam Road.

B. Description of Property

Area: The proposed development includes approximately 600 acres of land.

Ground Cover: Historically the property has been undisturbed indigenous natural habitat.

Major Drainage ways: There is one main major drainage way that runs through the center of the site.

General Project Description: The subject property generally slopes from the northwest and the southeast to the center of the property where the storm water is collected and conveyed northeast to the northern most boundary.

Irrigation Facilities: The site will install a dry irrigation system that may be used for future use.

Proposed Land Use: The area will be used for residential development and the amenities associated with such.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Basin Description

☐ **Reference to major drainage way planning studies such as flood hazard delineation report**: There has not been any major drainage way planning studies that would affect this site.

- **Storm Water Capital Facilities Master Plan**: This site fully complies with the Storm Water Capital Facilities Master Plan by detaining the storm water and time releasing the water at historic discharge point at or below pre-development flows for the proposed project. It should be mentioned that the discharge type being proposed is a pipe, High Point Engineering interoperates the existing narrow drainage to be a point discharge and thus the historic type and location of the discharge will effectively remain unchanged.

- **Flood insurance rate maps**: The site is located within the FEMA Flood Insurance Rate Map community-panel number 49035C1055G. The map shows the project is located in Zone "X", "Areas determined to be outside the 0.2% annual chance floodplain". Effective date April 2, 2009. However no construction will be taking place in the flood plain.

☐ **Major basin drainage characteristics**: There is a natural drainage feature that runs down the center of the property that collects the runoff from the hillsides adjacent to the areas that will be developed and conveys the storm water towards the northeast eventually leaving the project area along the northern most boundary. Right after the runoff leaves the site it's conveyed under the Southern Parkway via dual 42" storm drain pipes and then proceeds to an existing retention basin with no feasible outlet.

A soil survey was conducted of the area and is 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. If soils are mapped Badlands, Badlands (very steep), eroded land-Shalet complex, warm or Rock land stony then the curve numbers will be pulled from Washington City's Storm Water Capital Facilities Master Plan. The following table lists the types of soil, each soils hydrologic group classification, and the map symbols. A copy of the soils map is located in the appendix.

Soil Name (Onsite)	Soil Symbol	Hydrologic Group	% of Area
Badland	BA	D*	3.6%
Badland, very steep	BB	D*	14.9%
Eroded land-Shalet complex, warm	EB	D*	16.9%
Laverkin fine sandy loam, 2 to 5 percent slopes	LcC	B	4.6%
Nikey sandy loam, 3 to 15 percent slopes	NLE	B	13.1
Pintura loamy fine sand, 1 to 5 percent slopes	PnC	A	31.0%
Pintura loamy fine sand, hummocky, 1 to 10 percent slopes	PoD	A	15.6%
Rock land, stony	RP	D*	0.3%

Soil Name (Offsite)	Soil Symbol	Hydrologic Group	% of Area
Badland	BA	D*	84.5%
Laverkin fine sandy loam, 2 to 5 percent slopes	LcC	B	0.2%
Nikey sandy loam, 3 to 15 percent slopes	NLE	B	15.3%

*Hydrologic Groups were pulled from Washington City Storm Water Capital Facilities Master Plan

- **Existing**: Historically this property has been undisturbed indigenous natural habitat. With the exception of a transmission power line that runs the length of the project with a corresponding dirt access road.
- **Planned land uses**: Residential development.

☐ **Identification of all irrigation facilities within the basin which will influence or be influenced by the local drainage**: A dry irrigation system will be installed.

B. Sub-Basin Description

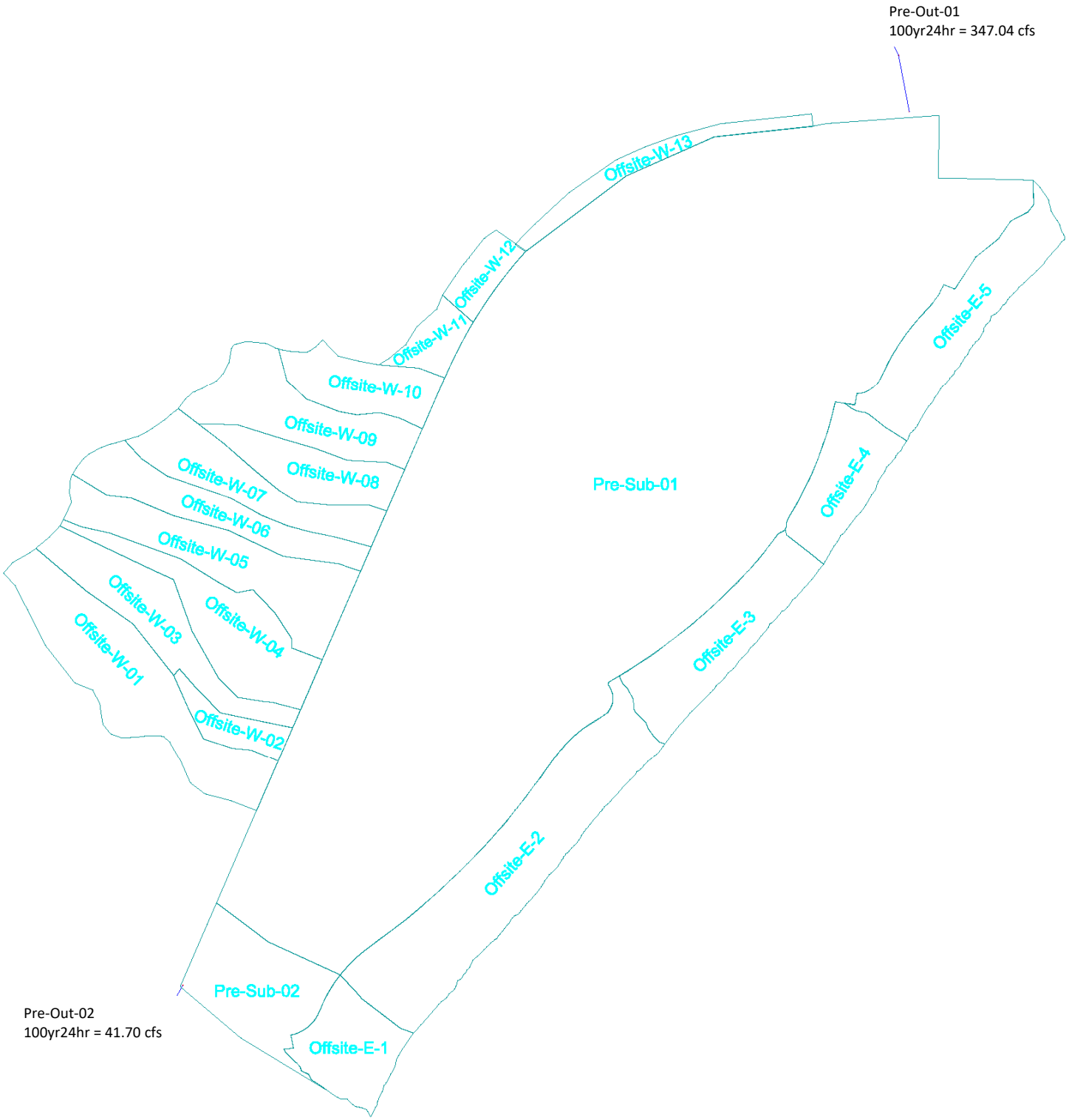
☐ **Discussion of historic drainage patterns of the property in question**: Historically drainage from the northwest and southeast sheet flows collecting in minor drainage channels from the adjacent hillsides that culminates at the centerline of the project into a larger unnamed drainage. The flows are then conveyed through the site via the unnamed drainage leaving the site at the

northern most boundary. From there the flows are conveyed under the Southern Parkway through two 42" storm drain pipes that convey the runoff towards the existing retention basis. It should be noted that this historic basin has been in place for a very long time and the origins are unknown, but it appears it was used for irrigation purposes at one time. There is a non operating outlet turn valve that leads High Point Engineering to this conclusion.

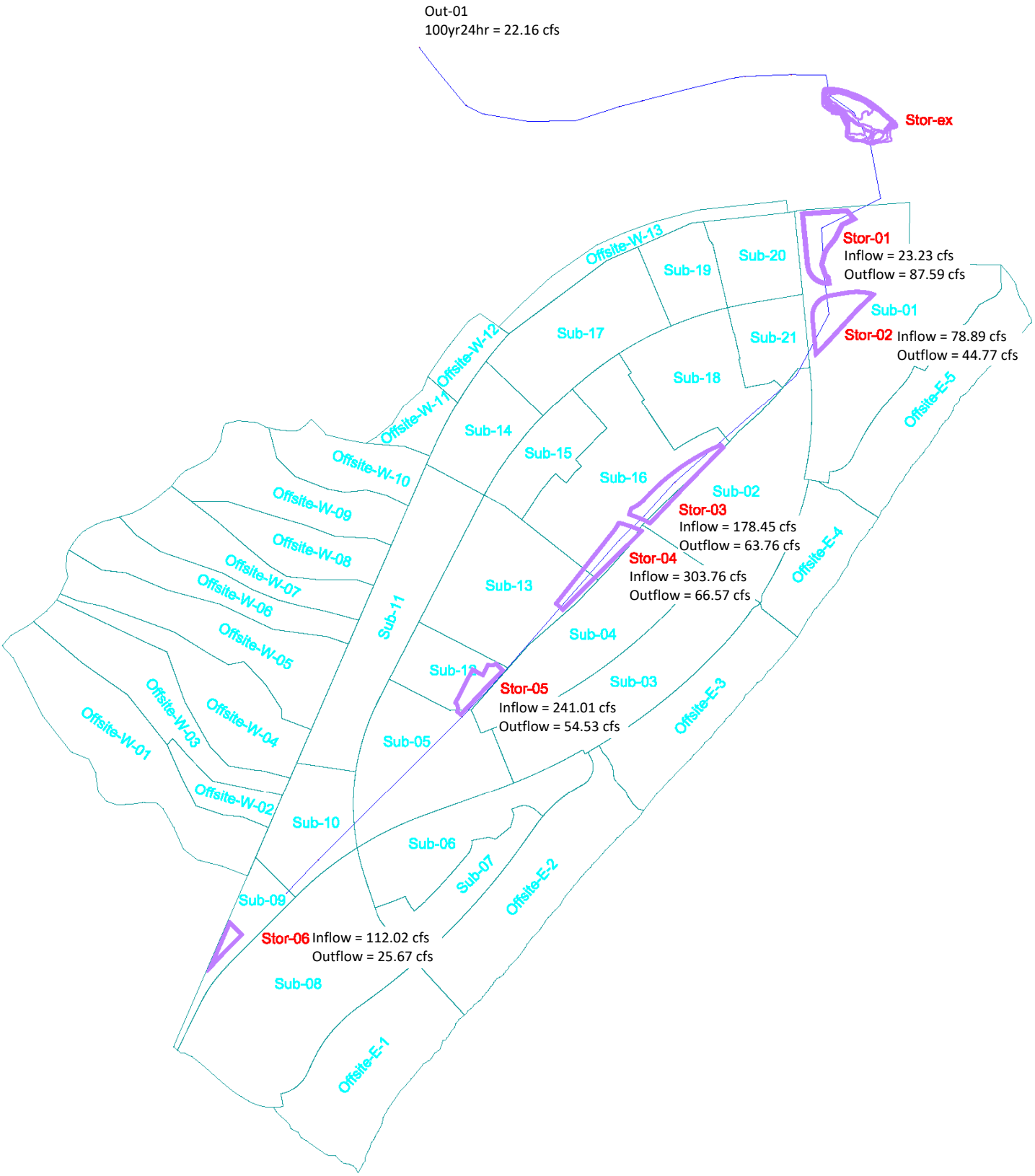
- ☐ **Discussion of offsite drainage flow patterns and impact on development under existing and fully developed basin conditions as defined by the Washington City General Plan**: Historically runoff would sheet flow or be conveyed by minor drainage channels across the offsite adjacent hillside to the northwest culminating at the edge of the Southern Parkway, these flows along with the runoff from the parkway are then conveyed onto the property through a series of storm drain pipes. The discharge points of these pipes connect with the existing minor drainages that lead to the above mention larger unnamed drainage. However, this generally only occurs during large storm events. The proposed development would collect and convey these flows safely through the developed area and be directed by a series of inlets and pipes (designed in future storm drain studies) towards a series of new master planned detention basins and onto the historic discharge locations without exceeding the pre-developed peak flows.

  The master planned detention basins will insure the post-development peak flows will be at or below the pre-development peak discharge rates and the historic type of discharge will remain the same (point discharge).

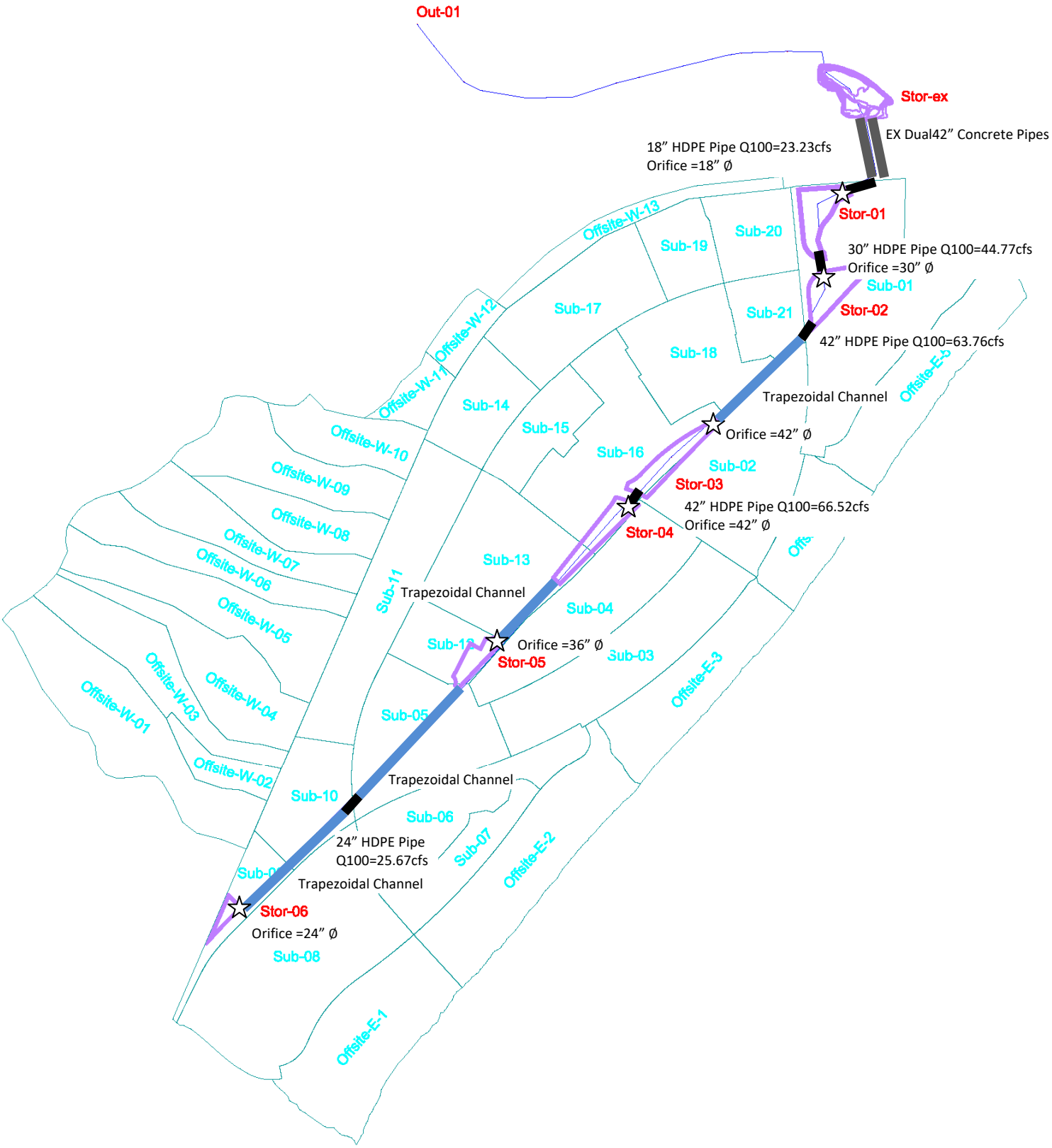
Pre Development Sub-Basins



Post Development Sub-Basins



Post Development Conveyance System



Pre & Post Development Sub-Basin Runoff

Model Storm	SCS Type II: 10 Yr - 24 Hr (cfs)	SCS Type II: 100 Yr - 24 Hr (cfs)	Farmer Fletcher: 10 Yr - 3 Hr (cfs)	Farmer Fletcher: 100 Yr - 3 Hr (cfs)
Sub-Basin ID	Peak Runoff	Peak Runoff	Peak Runoff	Peak Runoff
Pre-Development flows				
Offsite-E-1	13.01	26.83	5.65	19.23
Offsite-E-2	31.49	65.13	13.86	47.23
Offsite-E-3	17.31	35.48	7.49	25.63
Offsite-E-4	12.53	25.93	5.42	18.90
Offsite-E-5	21.05	43.54	9.11	31.53
Offsite-W-01	9.04	25.47	2.59	15.28
Offsite-W-02	0.52	2.73	0.07	1.27
Offsite-W-03	7.85	18.55	2.90	12.38
Offsite-W-04	1.64	8.74	0.22	4.23
Offsite-W-05	11.08	25.49	4.28	17.39
Offsite-W-06	8.77	19.06	3.61	13.38
Offsite-W-07	10.45	21.68	4.66	15.86
Offsite-W-08	8.32	17.22	3.70	12.59
Offsite-W-09	12.17	25.31	5.50	18.62
Offsite-W-10	9.66	19.81	4.18	14.31
Offsite-W-11	3.93	8.08	1.70	5.82
Offsite-W-12	4.04	8.31	1.75	5.99
Offsite-W-13	5.59	11.53	2.46	8.38
Pre-Sub-01	1.52	38.64	0.00	15.08
Pre-Sub-02	6.97	19.74	1.63	10.92
Post Development flows				
Offsite-E-1	27.04	55.80	11.75	39.99
Offsite-E-2	28.36	58.52	12.32	41.94
Offsite-E-3	20.30	41.89	8.82	30.02
Offsite-E-4	13.31	27.45	5.78	19.67
Offsite-E-5	21.76	44.90	9.45	32.18
Offsite-W-01	14.13	38.08	3.47	21.90
Offsite-W-02	0.95	3.82	0.08	1.67
Offsite-W-03	11.34	26.32	3.89	17.15
Offsite-W-04	3.06	13.28	0.28	5.66
Offsite-W-05	15.71	35.14	5.62	23.34
Offsite-W-06	12.73	27.55	4.96	19.00
Offsite-W-07	13.60	28.04	5.91	20.51
Offsite-W-08	10.85	22.41	4.71	16.39
Offsite-W-09	16.26	33.30	7.05	24.27
Offsite-W-10	11.34	23.41	4.93	16.77
Offsite-W-11	4.69	9.71	2.03	7.04
Offsite-W-12	4.75	9.82	2.05	7.11
Offsite W 13	6.31	12.96	2.73	9.36
Sub-01	34.12	77.16	12.41	51.67
Sub-02	12.82	35.59	2.86	19.65
Sub-03	4.77	20.05	0.53	8.88
Sub-04	2.47	14.60	0.16	5.63
Sub-05	16.54	39.20	5.53	25.27
Sub-06	11.82	27.40	3.92	17.49
Sub-07	1.00	6.26	0.07	2.45
Sub-08	14.44	44.51	2.20	22.15
Sub-09	7.04	14.40	3.13	10.39
Sub-10	15.11	29.20	7.59	22.94
Sub-11	11.62	30.85	3.07	17.82
Sub-12	0.92	5.36	0.06	2.06
Sub-13	2.72	15.11	0.18	5.77
Sub-14	14.79	28.04	7.72	22.17
Sub-15	8.11	18.39	2.87	12.24
Sub-16	3.29	17.75	0.22	6.81
Sub-17	7.75	22.37	1.76	12.28
Sub-18	2.14	11.84	0.14	4.53
Sub-19	6.50	14.71	2.36	9.85
Sub-20	3.65	10.88	0.65	5.68
Sub-21	0.98	5.36	0.07	2.05

Post Development Pipes

Model Storm	SCS Type II: 10 Yr - 24 Hr	SCS Type II: 100 Yr - 24 Hr	Farmer Fletcher: 10 Yr - 3 Hr	Farmer Fletcher: 100 Yr - 3 Hr
Pipe ID (size)	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)
Link-06 (30inch)	11.86	22.16	3.07	14.82
Link-07 (30inch)	11.86	22.17	3.07	14.82
Link-08 (30inch)	11.87	22.18	3.07	14.82
Link-09 (30inch)	11.87	22.18	3.07	14.82
Link-10 (30inch)	11.88	22.19	3.07	14.82
Link-11 (30inch)	11.88	22.20	3.07	14.82
Link-12 (30inch)	11.89	22.21	3.07	14.82
Link-13 (30inch)	11.89	22.21	3.07	14.82
Link-14 (30inch)	11.90	22.22	3.07	14.82
Link-15 (30inch)	11.91	22.23	3.07	14.82
Link-16 (30inch)	11.91	22.23	3.07	14.82
Link-17 (30inch)	11.91	22.24	3.07	14.82
Link-18 (30inch)	11.92	22.25	3.07	14.82
Link-19 (42inch)	12.56	23.22	3.17	15.12

Model Storm	SCS Type II: 10 Yr - 24 Hr	SCS Type II: 100 Yr - 24 Hr	Farmer Fletcher: 10 Yr - 3 Hr	Farmer Fletcher: 100 Yr - 3 Hr
Pipe ID (size)	Max Flow Depth / Total Flow Depth Ratio	Max Flow Depth / Total Flow Depth Ratio	Max Flow Depth / Total Flow Depth Ratio	Max Flow Depth / Total Flow Depth Ratio
Link-06 (30inch)	0.45	0.66	0.22	0.51
Link-07 (30inch)	0.45	0.65	0.22	0.51
Link-08 (30inch)	0.45	0.66	0.22	0.51
Link-09 (30inch)	0.45	0.65	0.22	0.51
Link-10 (30inch)	0.45	0.66	0.22	0.51
Link-11 (30inch)	0.45	0.66	0.22	0.51
Link-12 (30inch)	0.45	0.66	0.22	0.51
Link-13 (30inch)	0.45	0.66	0.22	0.51
Link-14 (30inch)	0.45	0.66	0.22	0.51
Link-15 (30inch)	0.44	0.65	0.22	0.50
Link-16 (30inch)	0.45	0.66	0.22	0.51
Link-17 (30inch)	0.45	0.66	0.22	0.51
Link-18 (30inch)	0.22	0.30	0.11	0.24
Link-19 (42inch)	0.19	0.26	0.10	0.21

III. DRAINAGE DESIGN CRITERIA

A. Regulations

- ☐ **Discussion of the optional provisions selected or the deviation from the HYDROLOGY MANUAL, if any, and its justification**: The site will fully comply with the Washington City Hydrology Manual, except the format of this study which follows the check list provided by the City.

B. Development Criteria Reference and Constraints

- ☐ **Discussion of previous drainage studies (i.e., project master plans) for the site in question that influence or are influenced by the drainage design and how the plan will affect drainage design for the site**. Washington City hired Rosenberg Associates to conduct an updated look into the Storm Water Capital Facilities Master Plan and give general recommendations on future storm infrastructure needs. This update was adopted by the City in October 22nd, 2014. It should be mentioned that this review of the capital facilities was a broad overview of the entire City and as such would lack the specific details to provide truly accurate flow numbers that a adequate design could be completed from.

- ☐ **Discussion of the effects of adjacent drainage studies**: As state above, the Washington City Storm Water Capital Facilities Master Plan Update is a brief over look of the project area, but is little use for a detail examination of the storm water infrastructure needs for this project.

C. Hydrological Criteria

- ☐ **Identify design rainfall**: The proposed site will consist of a series of storm drain inlets that will convey the runoff through a series of drainage pipes to a series of detention basins or the historic runoff locations, the basins will provide storage to accommodate the 100-year 24-hour storm events. It also should be noted that the drainage system has been design in such a way to shed water away from all structures in the event of a failure or over run of the system. It also should be mentioned that this study lacks the specific detail to provide a complete analysis for each subdivision and as such future individual drainage studies will need to be completed for each future subdivision.

  The 100-yr 24-hr, 100-yr 3-hr, 10-yr 24-hr & 10-yr 3-hr storm events were used to analyze the site. The 100-year 24-hour rainfall totals read 2.41 inches, 1.69 inches for the 100- year 3-hour and 1.63 inches for the 10-year 24-hour storm event as per NOAA Atlas 14 precipitation frequency estimates and Washington City Rainfall Data estimates. The SCS Synthetic Type 2 rainfall distribution and Farmer-Fletcher rainfall distribution was used for the meteorological model.

☐ **Identify runoff calculation method**: The SCS Curve Number method was used for the loss calculations in all scenarios. The curve numbers for the watersheds were determined using a weighted average based on soil type, vegetation and land use.

- **Curve Number**: The SCS Curve Number method was used for the loss calculations in all scenarios. The curve numbers for the watersheds were determined using a weighted average based on soil type, vegetation and land use. Located in the appendix is a detail chart outlining the Curve Number for each sub-basin.

- **Lag Time**: The lag time for the basin was calculated using the SCS empirical method. The shortest lag time was then used in the transform analysis. Below is an outline of the formulas used to calculate the lag time. Individual lag time calculations are found in the appendix.

TOC Method: SCS TR-55

Sheet Flow Equation:

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hr)

n = Manning's roughness

Lf = Flow Length (ft)

P = 2 yr, 24 hr Rainfall (inches)

Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation:

V = 16.1345 * (Sf^0.5) (unpaved surface)

V = 20.3282 * (Sf^0.5) (paved surface)

V = 15.0 * (Sf^0.5) (grassed waterway surface)

V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)

V = 9.0 * (Sf^0.5) (cultivated straight rows surface)

V = 7.0 * (Sf^0.5) (short grass pasture surface)

V = 5.0 * (Sf^0.5) (woodland surface)

V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)

Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)

Lf = Flow Length (ft)

V = Velocity (ft/sec)

Sf = Slope (ft/ft)

Channel Flow Equation:

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n

R = Aq / Wp

Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)

Lf = Flow Length (ft)

R = Hydraulic Radius (ft)

Aq = Flow Area (ft^2)

Wp = Wetted Perimeter (ft)

V = Velocity (ft/sec)

Sf = Slope (ft/ft)

n = Manning's roughness

- **Hydrologic Modeling Software:** The software used to model the site is Storm and Sanitary Analysis developed by Autodesk. Rainfall depth, basin area, curve number and lag time data were entered into the program to produce the peak discharges shown below. The site specific model generated was used to size the detention pond and the outlet orifice plate. All inputs and results are found in the appendix.

- **Facility Design Calculation**

  The storm drain system was analyzed hydraulically by using the computer program Storm and Sanitary Analysis developed by Autodesk. The program utilized the Manning's equation to model the pipes to ensure that the proposed facilities will have adequate capacity, refer to the appendix for more information. The pond was analyzed using the Storm and Sanitary Analysis computer program.

- **Storm Drain Pipes:** The storm drain system was analyzed hydraulically using the program Storm and Sanitary Analysis developed by Autodesk to

ensure that the proposed facilities will have adequate capacity and is located in the appendix. This program utilizes the manning equation with a roughness factor of 0.013.

$$Q = Discharge\left(\frac{ft^3}{sec}\right)$$

$$A = Cross - sectional\ Area\ of\ Flow\ (ft^2)$$

$$n = Coefficient\ of\ Roughness$$

$$R = Hydraulic\ Radius\ (ft) or \left(\frac{A}{P}\right)$$

$$S = Slope\ of\ pipe\ \left(\frac{ft}{ft}\right)$$

$$Q = (A)\left(\frac{1.486}{n}\right)\left(R^{\frac{2}{3}}\right)\left(S^{\frac{1}{2}}\right)$$

Identify detention discharge and storage calculation method: The detention basins for this site are located throughout the centerline of proposed development. These basins were designed to provide adequate detention volume to maintain a controlled release for major design storm event. This will be achieved by providing a series of detention basins along the length of the site with the net result being that the northern most detention basin will not exceed the pre-development flows, in fact the outlet discharge for the entire site will not exceed the minor storm peak discharge (SCS Type II 10yr-24hr design storm). This means that the outlet structure designs will only require a single orifice and forgo the staged discharge requirement that is usually in place. See below for the specific details for each detention basin:

DETENTION BASIN STOR-01	**POND SIZE (FT^3)**	**Depth (FT)**	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Outlet Orifice (inch)**
10yr - 24hr storm	338,453	2.83	37.94	12.56	18.0∅ @ bottom
100yr - 24hr storm	1,050,378	7.87	87.59	23.23	n/a
DETENTION BASIN STOR-02	**POND SIZE (FT^3)**	**Depth (FT)**	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Outlet Orifice (inch)**
10yr - 24hr storm	231,374	1.93	33.84	18.33	30.0∅ @ bottom
100yr - 24hr storm	592,838	4.68	78.89	44.77	n/a

DETENTION BASIN STOR-03	POND SIZE (FT^3)	Depth (FT)	Peak Inflow (CFS)	Peak Outflow (CFS)	Outlet Orifice (inch)
10yr - 24hr storm	209,834	1.76	66.06	21.54	42.0∅ @ bottom
100yr - 24hr storm	444,341	3.56	178.45	63.76	n/a
DETENTION BASIN STOR-04	**POND SIZE (FT^3)**	**Depth (FT)**	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Outlet Orifice (inch)**
10yr - 24hr storm	193,796	1.79	116.72	22.98	42.0∅ @ bottom
100yr - 24hr storm	459,835	3.72	303.76	66.57	n/a
DETENTION BASIN STOR-05	**POND SIZE (FT^3)**	**Depth (FT)**	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Outlet Orifice (inch)**
10yr - 24hr storm	106,691	1.81	99.50	20.07	36.0∅ @ bottom
100yr - 24hr storm	248,684	3.95	241.01	54.53	n/a
DETENTION BASIN STOR-06	**POND SIZE (FT^3)**	**Depth (FT)**	**Peak Inflow (CFS)**	**Peak Outflow (CFS)**	**Outlet Orifice (inch)**
10yr - 24hr storm	36,016	1.64	33.84	25.67	24.0∅ @ bottom
100yr - 24hr storm	92,460	3.75	112.02	44.77	n/a

The detention basins were analyzed using the Storm and Sanitary Analysis developed by Autodesk computer program. All the inputs for the model are located in the appendix.

PROJECT DISCHARGE RATES	Detention (Stor-01) Peak Discharge (CFS)
100 year 24 hour Storm	N/A
Pre-Development	347.04
Post Development	23.23

- ☐ **Identify design storm recurrence intervals.** The 100-year 24 hour & 10-year 24 hour SCS Synthetic Type 2 rainfall distribution, the 100-year 3 hour & 10-year 3 hour Farmer Fletcher rainfall distributions were used for the meteorological models as per the requirements set forth by the updated Washington City Storm Drainage Master Plan, 2014.

- ☐ **Discussion and justification of other criteria or calculation methods used that are not presented in or referenced by the HYDROLOGY MANUAL**: The site was designed that the 10 year - 24 hour, 100 year - 3 hour, 100 year - 24 hour and

10 year - 3 hour storm events will be conveyed downstream to be detained by the master plan detention basin.

- ☐ **Discussion and justification of Green Infrastructure and Low-Impact Development implantation.** Due to the vertical clearances to bedrock and the lack of acceptable native soils (expansive soils present) the listed Utah LID BMP's in the Region Applicability Matrix contained within the Dixie Storm Water Coalition document "GREEN INFRASTRUCTURE AND LOW-IMPACT DEVELOPMENT APPLICATION GUIDANCE FOR WASHINGTON COUNTY, UTAH" Dated June 12th, 2020, were considered not applicable within this region using the Applicability Matrix Flow Chart (Figure 2). An alternative approach was established using the Alternative Approach Section in the above stated document. It was determined that a regional retention volume approach was a suitable solution that would minimize the risk to the future homes within this project. This master planned development plans to meet the intent of the UT DWQ permit described in the above mentioned document by providing a Water Quality Retention Volume calculated with the aid of the above mentioned document.

$$WQRV = \left(\frac{P_{80\%} * \ R_{new} * \mathrm{A}}{12}\right)(ac * ft) \qquad EQ1$$

$WQRV = Water\ Quality\ Retention\ Volume\ (ac * ft)$

$P_{80\%} = 80th\ percentile\ value\ (found\ in\ Figure\ 1\ on\ page\ 4\ of the\ above\ mentioned\ doc.)(inches)$

$R_{new} = Storm\ Water\ Runoff\ Coefficient\ associated\ with\ the\ proposed\ new\ development, and$

$R_{new} = 1.14\ (Imp) - \ 0.371 \qquad when\ imp\ \geq 55\%$

$R_{new} = .225\ (Imp) + \ (-0.05) \qquad when\ imp\ \leq 55\%$

$A = Area\ (acres)$

$Imp = decimal\ percentage\ of\ impervious\ surface\ in\ the\ contributing\ watershed$

$$\boldsymbol{WQRV_{required} = 0.969\ ac * ft}$$

DETENTION BASIN	Water Quality Retention Volume (ac*ft)	Anticipated Infiltration Rates (in/hr)
STOR-01	0.214	*
STOR-02	0.220	*
STOR-03	0.217	*
STOR-04	0.196	*
STOR-05	0.106	*
STOR-06	0.038	*
Total Provide storage	**0.991**	

* Anticipated Infiltration Rates can be found in the corresponding AGEC Geotechnical Report for this master planned development.

It should be mentioned that some flexibility should remain on how and where the required WQRV is to be stored. As long as the required WQRV is being provided in some or all the detention basins listed above and the corresponding Infiltration Rates are considered the GI/LID requirements are still to be considered met.

Hydraulic Criteria

- ☐ **Identify various capacity references**: The critical master planned storm drain pipes, inlets, orifices and the detention basin were sized to convey/detain the design storm events.

- ☐ **Discussion of other drainage facility design criteria used that are not presented in the HYDROLOGY MANUAL**: Please see above.

IV. DRAINAGE FACILITY DESIGN

A. General Concept

- ☐ **Discussion of concept and typical drainage patterns**: The proposed site will consist of a series of storm drain inlets that will convey drainage through a series of drainage pipes through the master planned development to the proposed series of detention basins eventually leaving the site at the historic location along the northern most boundary. The majority of the developments runoff will be directed towards the proposed detention basins to be time release through orifice at the outlet of each basin.

It should noted that further analysis of each subdivision conveyance systems will be needed and supplied with each subsequent submittal of the Preliminary Plat.

- ☐ **Discussion of compliance with offsite runoff considerations:** As discussed above, offsite flows will enter the site from the adjacent hillside and parkway from the northwest and will be directed into the proposed storm drain system. The flows will then be controlled released downstream at a maximum of the pre-developed release rate for the controlling design storm event.

- ☐ **Discussion of the content of tables, charts, figures, plates, or drawings presented in the report**: The appendix has several tables, charts, figures, plates and drawings. These charts show the detail calculations, inputs, and print outs for the computer programs used.

- ☐ **Discussion of anticipated and proposed drainage patterns**: The proposed drainage system will effectively convey the onsite and offsite flows through the site and safely downstream to the Virgin River. The proposed system will be alleviating the current problem of storm water being stopped just downstream from the site at the existing retention basin on the south side of the Washington Dam Road. This retention basin is not adequate to handle even the existing conditions let alone post development conditions and if overtopped or breached would have devastating impacts to the downstream properties. A full design of the downstream storm drain infrastructure from the existing retention basin on private property near the Washington Dam Rd & Southern Parkway interchange to the Virgin River will be provide with the Washington Dam Road improvement plans.

B. Specific Details

- ☐ **Discussions of drainage problems encountered and solutions at specific design points**: The largest design obstacle that had to be overcome was the lack of adequate downstream storm drain infrastructure. There was no safe place to send the pre or post development flows. As mentioned above there was an undersized retention basin without a functioning outlet or overflow wire. The proposed solution to this problem is to install a storm drain pipe from the existing retention basin to the Virgin River, providing a safe economical way to provide for the existing and future conditions of the Long Valley drainage basin. Said solution will be provided by the Washington Dam Road improvements and shown in the associated plans, these improvements will be installed prior to the commencement of this project.

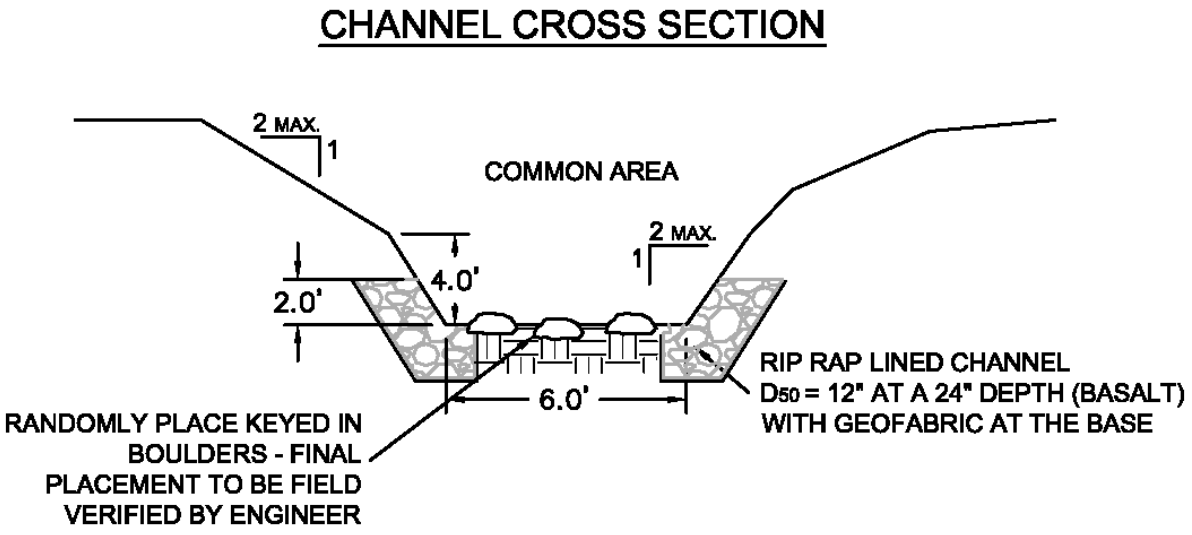
- ☐ **Discussion of detention storage and outlet design**: As discussed above, the proposed plans will collect and convey the storm water to a proposed series of detention basin and time release the flows through a series of designed orifices keeping the demand on the downstream infrastructure at or below pre-

development flows. An exhibit can be found in the appendices of this report showing critical master planned storm water infrastructure such as detention basins, main channel cross section, orifice sizes, and conveyance pipes (under roadway crossings only) with sizes.

- ☐ **Discussion of maintenance access and aspects of the design**: All the storm drain system is located in the right-a-way or in easements.

- ☐ **Discussion of easements and tracts for drainage purposes, including the conditions and limitations for use**: The proposed storm drain system should be all located within the public right of way, City own land, existing or proposed easements. Access to these improvements can be achieved through the proposed road ways or paved trail systems.

- ☐ **Discussion of riprap sizing for main channel based on storm water velocity:** Being proposed are some trapezoidal channels that will connect the above mentioned detention basins, these channels will be armored using riprap rock. See below for the riprap calculations.



Riprap Design for Channel Lining Based
(Section 704.2.1.3 - Clark County Hydraulic Criteria and Drainage Design Manual, 8/ 12/ 99)

Location:
Located throughout the center on the valley floor, between the detention basins.

Given:

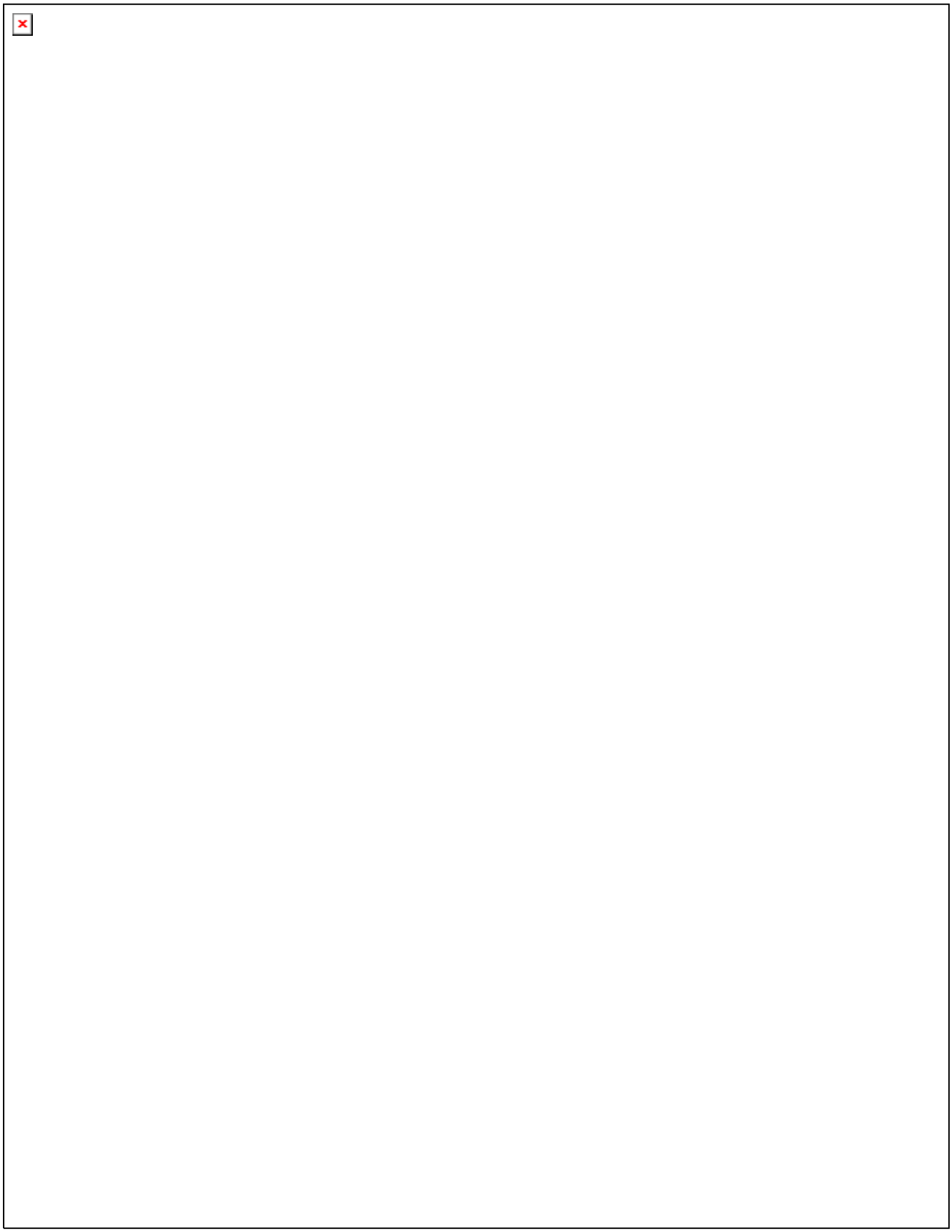
Mean Velocity of Channel (V) =	8.45 ft/sec
Channel Slope (S) =	0.049 ft/ft
Specific Gravity of rock material (basalt) used for riprap (Ss) =	2.8-3.0 Ss = 2.8

Equation (Smith & Murray Model):

$$V = 3(d_{50})^{0.5}\frac{(S_S - 1)}{S^{0.17}}$$

d_{50} = 0.88 ft ≈ 10.5 in

$d_{50(recommended)}$ = 1 ft ≈ 12.0 in



V. CONCLUSIONS

A. Compliance with Standards

- ☐ **"HYDROLOGY MANUAL"**: This design has strived to comply will all aspects of the Hydrology Manual. The following are the key component that this study has met or exceeded the requirements set forth: 1) Detention of the 10-year and 100-year 24-hour storm events. 2) Release rates of the storm runoff do not exceed pre-development flows. 3) Storm water discharge rates do not exceed the pre-developed rates for the design storm events.

- ☐ "**Storm Water Capital Facilities Master Plan**": The site has reduced the post development peak runoff to pre-development peak runoff levels or below; before discharging storm water downstream to the historic locations.

- ☐ "**GRADING MANUAL**": A separate grading plan will be submitted to the City.

B. Drainage Concept

- ☐ **Effectiveness of drainage design to control damage from storm runoff**: All the storm runoff will be conveyed to right-of-ways or storm drain infrastructure within the proposed master planned development. All offsite flows will be diverted to the proposed storm water infrastructure and safely conveyed through the site to the historic discharge location.

- ☐ ***This study did not analyze each lot on an individual basis and it is strongly recommended that each lot have a grading/drainage site plan completed before a building permit is issued or any structures are built on any lots.***

- ☐ **Influence of proposed development on the Storm Water Capital Facilities Master Plan recommendation(s)**: It is the intent of this study to have no additional negative downstream impacts to any of the City's facilities.

C. Recommendations

1. It is recommended that each subdivision with the Long Valley Trails master planned area complete its own individual more detailed drainage study to be submitted with the associated preliminary plats.

2. This study did not analyze each lot on an individual basis and it is strongly recommended that each lot have a grading/drainage site plan completed before a building permit is issued or any structures are built on any lots. All lots should direct the runoff towards the street frontage. All house should have rain gutters which convey the runoff to the front of the lot and then to the street.

3. All structures should be elevated above the curb and gutter.

4. Follow any recommendation from the geotechnical engineer. (Please note, geotechnical or review of the geotechnical work was not performed by High Point Engineering and Surveying and was outside the scope of work which was required by High Point Engineering and Surveying.)

5. It is recommended that special care is giving to the continual removal of silt in the proposed detention pond; this will help to maintain optimal performance of the downstream infrastructure.

6. It is highly recommended that the building department ensure that all homes built in this subdivision have rain gutters installed that direct all roof drainage toward the public streets fronting the homes.

VI. REFERENCES

☐ **Reference all criteria and technical information used**:

1. United States Department of Agriculture - USDA / Natural Resources Conservation Service -NRCS Custom Soil Resource Report
2. Federal Emergency Management Agency - FEMA Flood Insurance Rate Maps
3. National Oceanic and Atmospheric Administration - NOAA Point Precipitation Frequency Estimates
4. Washington City - Storm Water Capital Facilities Master Plan Update
5. Washington City - Hydrology Manual
6. Dixie Storm Water Coalition – Green Infrastructure and Low-Impact Development Application Guidance for Washington County, Utah.

VII. APPENDICES

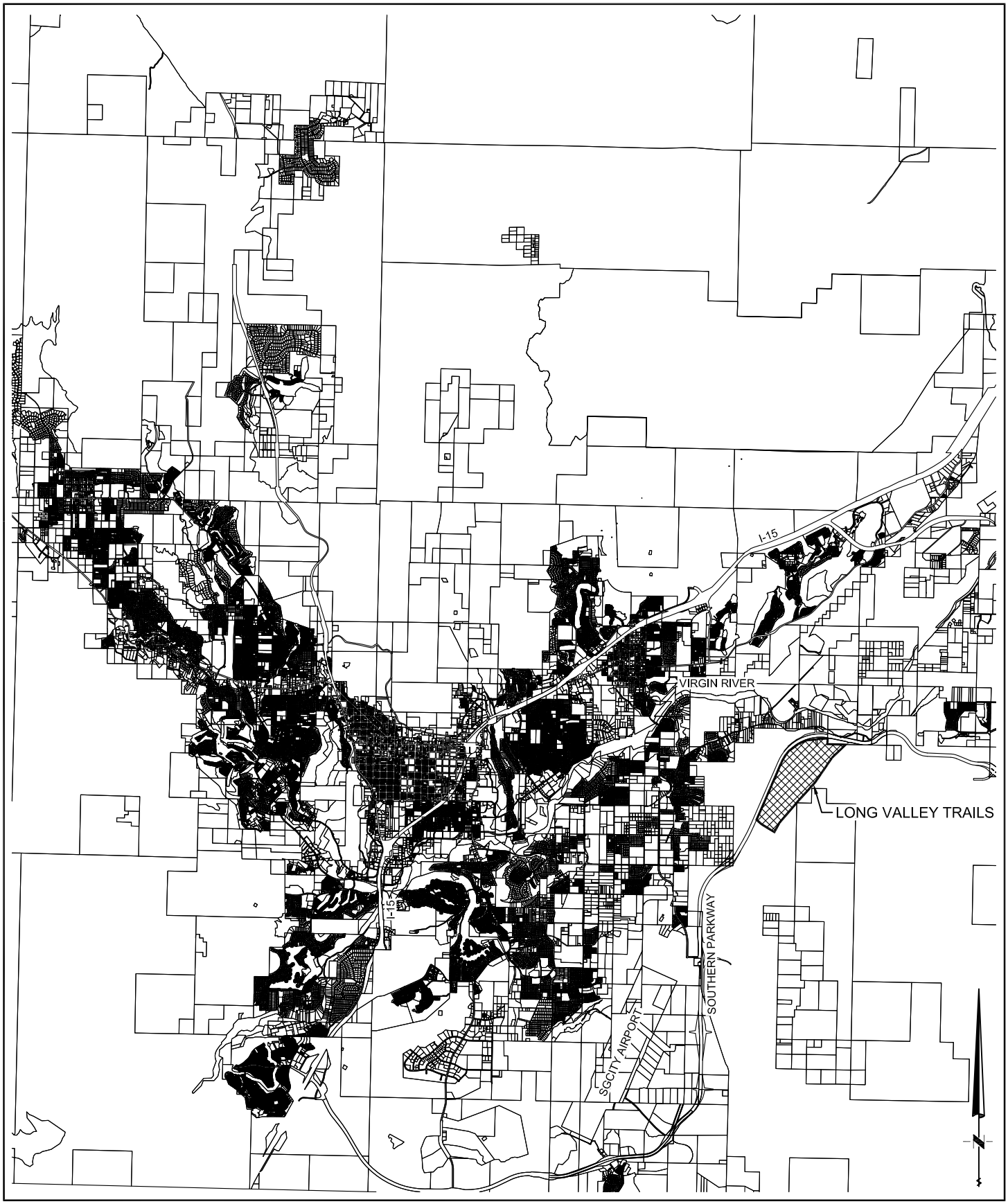
A. Project and maps

1. Vicinity Map
2. Drainage Exhibit
3. Project Map
4. FEMA
5. Soils Map and Report

B. Hydraulic and hydrologic Computations

1. Hydrologic Computations - 100 yr 24hr storm event
    a. Basins
2. Hydraulic Computations - 100 yr 24hr storm event
    a. Pipes
    b. Inlets
    c. Ponds
3. Hydrologic & Hydraulic summary sheets - 10 yr 24hr storm event
4. Hydrologic & Hydraulic summary sheets -
   100 yr 3hr storm event - Farmers Fletcher
5. Hydrologic & Hydraulic summary sheets -
   10 yr 3hr storm event - Farmer Fletcher

Vicinity Map:



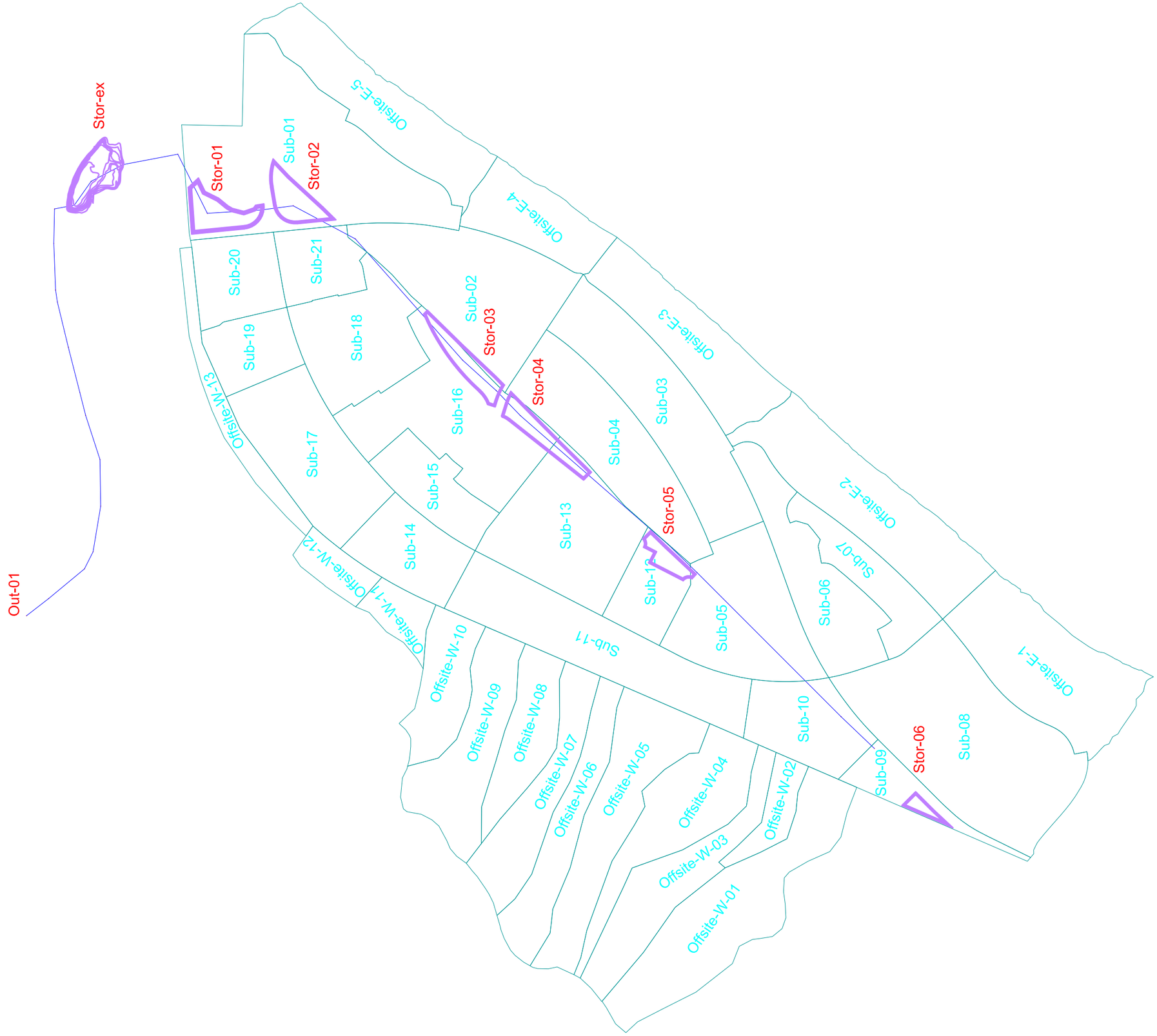
VICINITY MAP

LONG VALLEY TRAILS
WASHINGTON COUNTY, UTAH

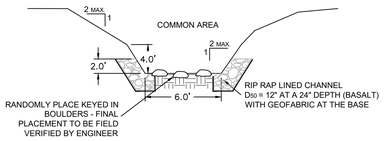
HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

HP Job No:161174-Vicinity Map

Drainage Exhibit:


Stor-ex
Stor-01
Stor-02
Stor-03
Stor-04
Stor-05
Stor-06
Out-01
Sub-01
Sub-02
Sub-03
Sub-04
Sub-05
Sub-06
Sub-07
Sub-08
Sub-09
Sub-10
Sub-11
Sub-12
Sub-13
Sub-14
Sub-15
Sub-16
Sub-17
Sub-18
Sub-19
Sub-20
Sub-21
Offsite-E-1
Offsite-E-2
Offsite-E-3
Offsite-E-4
Offsite-E-5
Offsite-W-01
Offsite-W-02
Offsite-W-03
Offsite-W-04
Offsite-W-05
Offsite-W-06
Offsite-W-07
Offsite-W-08
Offsite-W-09
Offsite-W-10
Offsite-W-11
Offsite-W-12
Offsite-W-13

CHANNEL CROSS SECTION



Hillside/Open Space

STOR-02
592,838 CU.FT.
ORIFICE = 30"ø

42" HDPE PIPE Q100=63.76CFS

30" HDPE PIPE Q100=44.77CFS

EX. DUEL 42" CONCRETE PIPES

18" HDPE PIPE Q100=23.23CFS

STOR-01
1,050,378 CU.FT.
ORIFICE=18"ø

STOR-03
444,341 CU.FT.
ORIFICE = 42"ø

42" HDPE PIPE Q100=66.52CFS

STOR-04
459,835 CU.FT.
ORIFICE = 42"ø

Hillside/Open Space

STOR-05
248,684 CU.FT.
ORIFICE = 36"ø

24" HDPE PIPE Q100=25.67CFS

STOR-06
92,460 CU.FT.
ORIFICE = 24"ø

Southern Parkway

Southern Parkway

Legend

- DETENTION BASIN - ACTUAL SHAPE AND LOCATION MAY VARY*
- CONVEYANCE PIPE - REQUIRED MINIMUM SIZE*
- OUTLET ORIFICE LOCATION - REQUIRED MINIMUM SIZE*
- TRAPEZOIDAL CHANNEL (SEE CHANNEL CROSS SECTION)*

* ALTERNATE MATERIALS, SHAPES AND SIZES MAY BE USED AS LONG AS DEMONSTRATED TO BE SAFE AND EFFECTIVE

Long Valley Trails

a Master Planned Community
Located in Sections 20-29-30-31
Township 42 South, Range 14 West
Salt Lake Base and Meridian
Contains 605.61 Acres

Project Map:

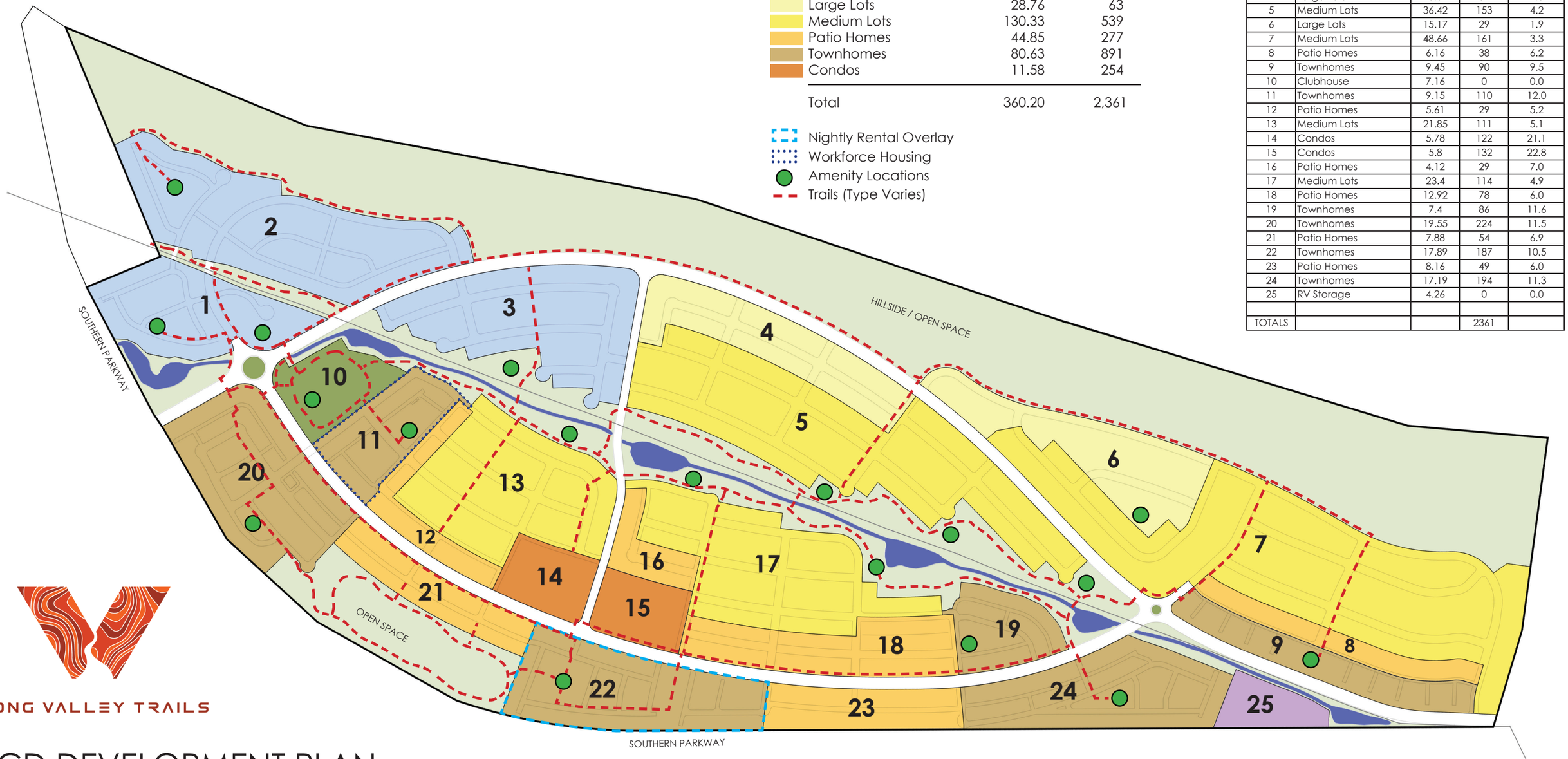
Legend

Total Area	**605.61 ac**	
Land Uses	**Acres**	**Units**
Active Adult	64.05	337
Large Lots	28.76	63
Medium Lots	130.33	539
Patio Homes	44.85	277
Townhomes	80.63	891
Condos	11.58	254
Total	360.20	2,361

Nightly Rental Overlay
Workforce Housing
Amenity Locations
Trails (Type Varies)

Statistical Summary

POD	Land Use	Acres	Units	DU/AC
1	Active Adult	14.35	62	4.3
2	Active Adult	27.98	165	5.9
3	Active Adult	21.72	110	5.1
4	Large Lots	13.59	34	2.5
5	Medium Lots	36.42	153	4.2
6	Large Lots	15.17	29	1.9
7	Medium Lots	48.66	161	3.3
8	Patio Homes	6.16	38	6.2
9	Townhomes	9.45	90	9.5
10	Clubhouse	7.16	0	0.0
11	Townhomes	9.15	110	12.0
12	Patio Homes	5.61	29	5.2
13	Medium Lots	21.85	111	5.1
14	Condos	5.78	122	21.1
15	Condos	5.8	132	22.8
16	Patio Homes	4.12	29	7.0
17	Medium Lots	23.4	114	4.9
18	Patio Homes	12.92	78	6.0
19	Townhomes	7.4	86	11.6
20	Townhomes	19.55	224	11.5
21	Patio Homes	7.88	54	6.9
22	Townhomes	17.89	187	10.5
23	Patio Homes	8.16	49	6.0
24	Townhomes	17.19	194	11.3
25	RV Storage	4.26	0	0.0
TOTALS			2361	



LONG VALLEY TRAILS

PCD DEVELOPMENT PLAN

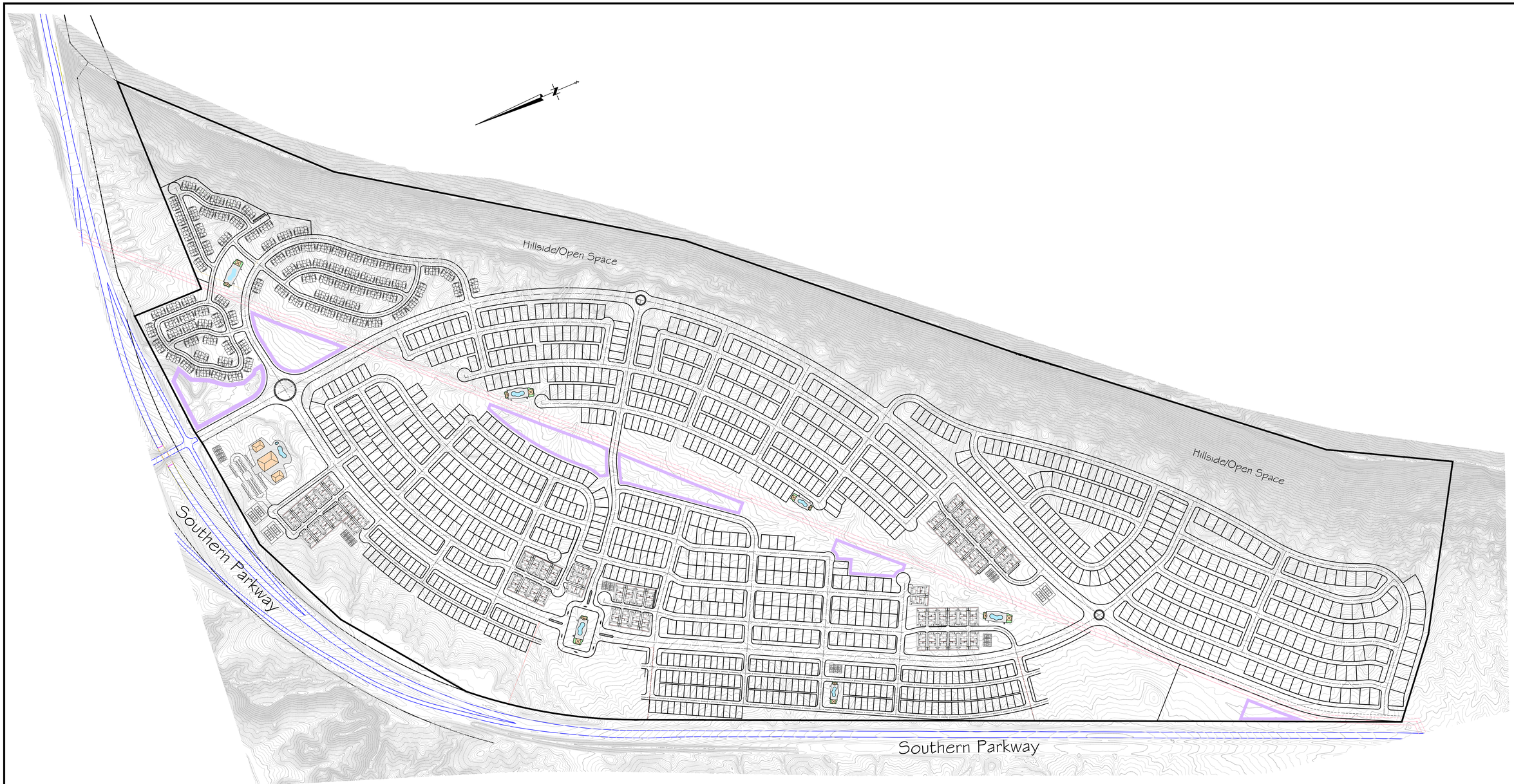
Long Valley Trails

October 7, 2020

North

BH

D·R·HORTON
America's Builder



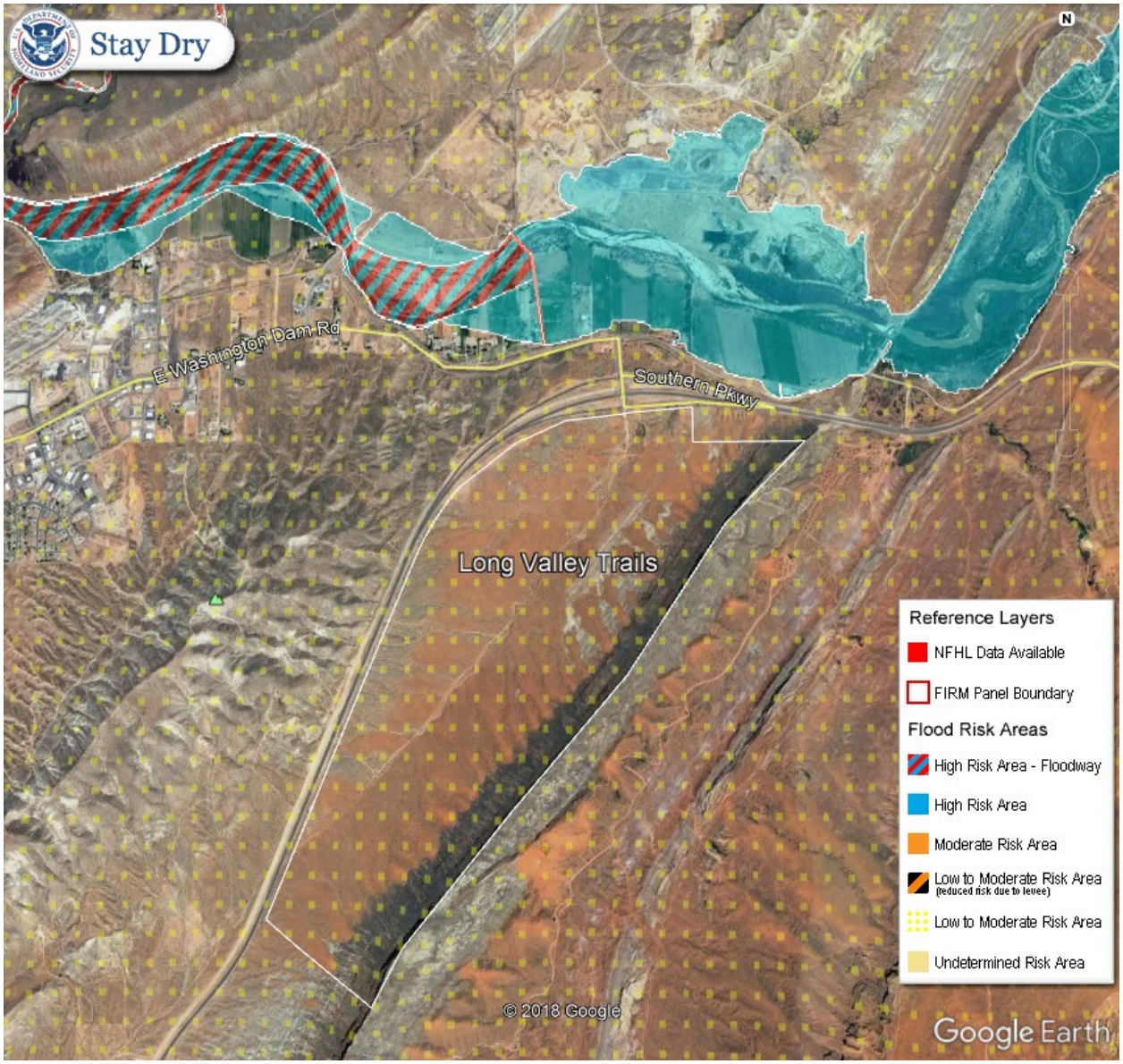
Legend

- Swimming Pool
- Tennis Courts
- Pickleball Courts
- Pond/Detention Basin

Long Valley Trails

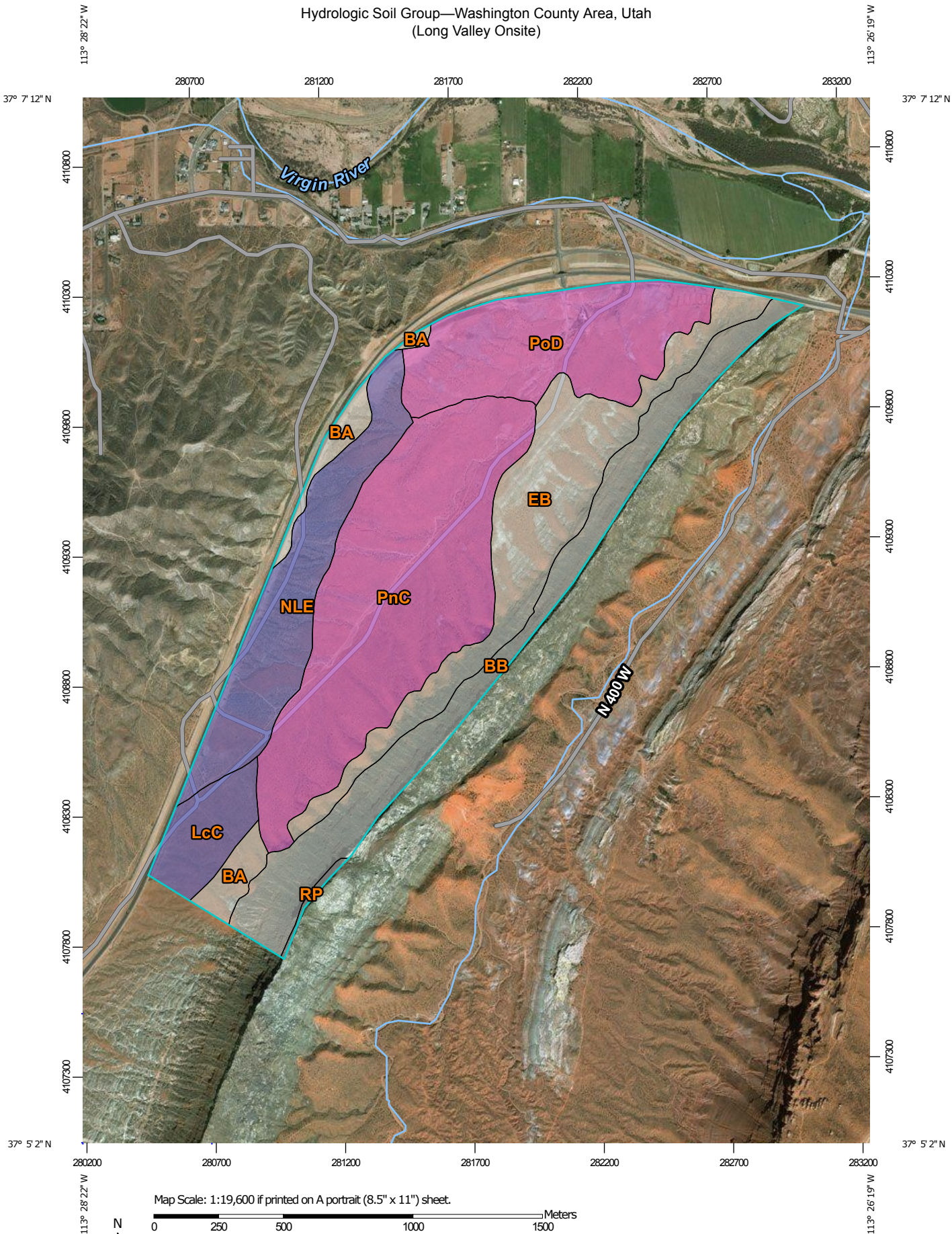
a Master Planned Community
Located in Sections 20-29-30-31
Township 42 South, Range 14 West
Salt Lake Base and Meridian
Contains 605.61 Acres

FEMA Map:


Stay Dry
N
E Washington Dam Rd
Southern Pkwy
Long Valley Trails
Reference Layers
NFHL Data Available
FIRM Panel Boundary
Flood Risk Areas
High Risk Area - Floodway
High Risk Area
Moderate Risk Area
Low to Moderate Risk Area
(reduced risk due to levee)
Low to Moderate Risk Area
Undetermined Risk Area
© 2018 Google
Google Earth

Soils Map & Report:

Hydrologic Soil Group—Washington County Area, Utah
(Long Valley Onsite)



Map Scale: 1:19,600 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

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.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Washington County Area, Utah
Survey Area Data: Version 10, Sep 13, 2016

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

Date(s) aerial images were photographed: Feb 23, 2015—Mar 18, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BA	Badland		23.4	3.6%
BB	Badland, very steep		97.6	14.9%
EB	Eroded land-Shalet complex, warm		110.4	16.9%
LcC	Laverkin fine sandy loam, 2 to 5 percent slopes	B	30.4	4.6%
NLE	Nikey sandy loam, 3 to 15 percent slopes	B	85.4	13.1%
PnC	Pintura loamy fine sand, 1 to 5 percent slopes	A	203.1	31.0%
PoD	Pintura loamy fine sand, hummocky, 1 to 10 percent slopes	A	102.1	15.6%
RP	Rock land, stony		2.0	0.3%
Totals for Area of Interest			**654.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

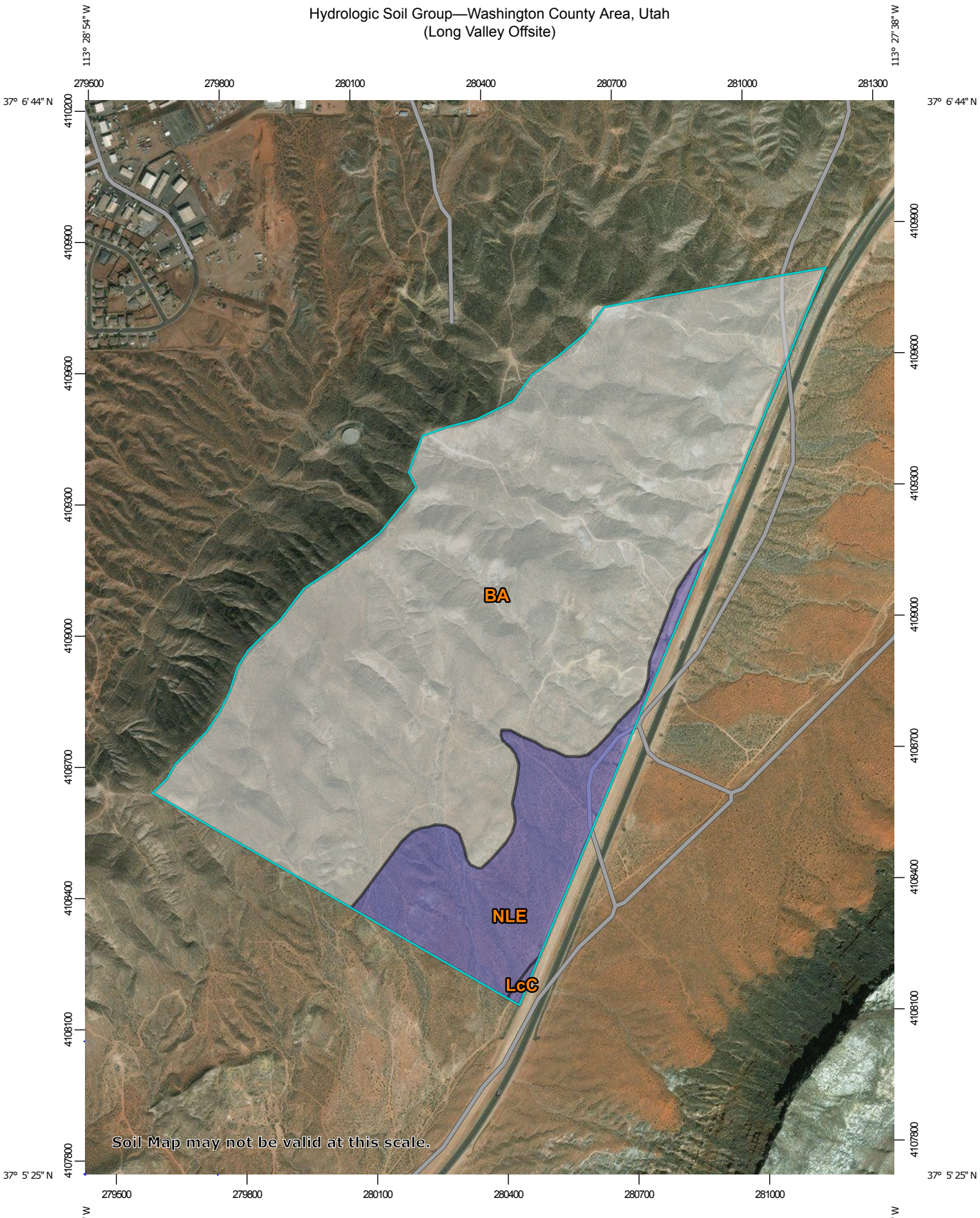
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—Washington County Area, Utah
(Long Valley Offsite)



Map Scale: 1:12,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

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:
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: Washington County Area, Utah
Survey Area Data: Version 10, Sep 13, 2016

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

Date(s) aerial images were photographed: Feb 23, 2015—Mar 18, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BA	Badland		244.3	84.5%
LcC	Laverkin fine sandy loam, 2 to 5 percent slopes	B	0.5	0.2%
NLE	Nikey sandy loam, 3 to 15 percent slopes	B	44.3	15.3%
Totals for Area of Interest			**289.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydraulic and hydrologic Computations:

Hydrologic Computations - 100 yr 24hr storm event

b. Basins

Hydraulic Computations - 100 yr 24hr storm event

d. Pipes
e. Inlets
f. Ponds

Project Description

File Name ..... 161174-Master Drainage Model.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Sep 30, 2019	00:00:00
End Analysis On	Oct 01, 2019	00:00:00
Start Reporting On	Sep 30, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	39
Nodes	28
Junctions	10
Outfalls	1
Flow Diversions	0
Inlets	10
Storage Nodes	7
Links	33
Channels	6
Pipes	14
Pumps	0
Orifices	7
Weirs	6
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	100yr-24hr	Cumulative	inches	Utah	Washington	100	2.41	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Offsite-E-1	30.01	484.00	86.00	2.41	1.17	35.11	55.80	0 00:05:00
2	Offsite-E-2	31.47	484.00	86.00	2.41	1.17	36.83	58.52	0 00:05:00
3	Offsite-E-3	22.53	484.00	86.00	2.41	1.17	26.36	41.89	0 00:05:00
4	Offsite-E-4	14.76	484.00	86.00	2.41	1.17	17.27	27.45	0 00:05:00
5	Offsite-E-5	24.14	484.00	86.00	2.41	1.17	28.25	44.90	0 00:05:00
6	Offsite-W-01	32.59	484.00	79.00	2.41	0.78	25.36	38.08	0 00:05:33
7	Offsite-W-02	5.81	484.00	72.00	2.41	0.48	2.81	3.82	0 00:05:00
8	Offsite-W-03	18.85	484.00	82.50	2.41	0.96	18.10	26.32	0 00:07:31
9	Offsite-W-04	20.86	484.00	72.00	2.41	0.48	10.08	13.28	0 00:07:07
10	Offsite-W-05	24.92	484.00	83.20	2.41	1.00	24.92	35.14	0 00:08:52
11	Offsite-W-06	16.04	484.00	84.60	2.41	1.08	17.37	27.55	0 00:05:00
12	Offsite-W-07	16.63	484.00	86.00	2.41	1.17	19.46	28.04	0 00:08:19
13	Offsite-W-08	13.08	484.00	86.00	2.41	1.17	15.31	22.41	0 00:07:45
14	Offsite-W-09	20.39	484.00	86.00	2.41	1.17	23.85	33.30	0 00:09:39
15	Offsite-W-10	12.59	484.00	86.00	2.41	1.17	14.73	23.41	0 00:05:00
16	Offsite-W-11	5.43	484.00	86.00	2.41	1.17	6.36	9.71	0 00:06:18
17	Offsite-W-12	5.46	484.00	86.00	2.41	1.17	6.39	9.82	0 00:06:04
18	Offsite-W-13	8.36	484.00	86.00	2.41	1.17	9.78	12.96	0 00:12:13
19	Sub-01	52.20	484.00	83.30	2.41	1.01	52.52	77.16	0 00:07:15
20	Sub-02	32.89	484.00	78.05	2.41	0.73	24.11	35.59	0 00:05:45
21	Sub-03	30.60	484.00	72.85	2.41	0.51	15.73	20.05	0 00:09:28
22	Sub-04	27.51	484.00	70.25	2.41	0.42	11.58	14.60	0 00:07:46
23	Sub-05	26.84	484.00	82.20	2.41	0.94	25.31	39.20	0 00:05:24
24	Sub-06	21.15	484.00	82.25	2.41	0.95	20.01	27.40	0 00:10:14
25	Sub-07	12.31	484.00	70.25	2.41	0.42	5.18	6.26	0 00:09:26
26	Sub-08	49.32	484.00	75.65	2.41	0.63	30.88	44.51	0 00:05:27
27	Sub-09	7.61	484.00	86.30	2.41	1.19	9.05	14.40	0 00:05:00
28	Sub-10	14.98	484.00	88.25	2.41	1.32	19.80	29.20	0 00:07:28
29	Sub-11	30.21	484.00	79.35	2.41	0.80	24.02	30.85	0 00:12:22
30	Sub-12	9.99	484.00	70.25	2.41	0.42	4.21	5.36	0 00:07:19
31	Sub-13	27.58	484.00	70.25	2.41	0.42	11.61	15.11	0 00:06:26
32	Sub-14	13.43	484.00	88.90	2.41	1.37	18.39	28.04	0 00:06:19
33	Sub-15	11.59	484.00	83.30	2.41	1.01	11.66	18.39	0 00:05:00
34	Sub-16	31.96	484.00	70.25	2.41	0.42	13.46	17.75	0 00:05:49
35	Sub-17	24.52	484.00	77.85	2.41	0.72	17.73	22.37	0 00:12:34
36	Sub-18	21.55	484.00	70.25	2.41	0.42	9.07	11.84	0 00:06:17
37	Sub-19	9.91	484.00	83.30	2.41	1.01	9.97	14.71	0 00:07:09
38	Sub-20	11.97	484.00	76.45	2.41	0.66	7.90	10.88	0 00:07:43
39	Sub-21	9.70	484.00	70.25	2.41	0.42	4.08	5.36	0 00:06:01

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	2730.00	2734.00	0.00	0.00	0.00	44.77	2731.22	0.00	5.78	0 00:00	0.00	0.00
2	Jun-02	Junction	2775.00	2782.00	0.00	0.00	0.00	63.76	2775.95	0.00	6.05	0 00:00	0.00	0.00
3	Jun-03	Junction	2795.00	2802.00	0.00	0.00	0.00	66.57	2796.44	0.00	5.56	0 00:00	0.00	0.00
4	Jun-04	Junction	2849.00	2856.00	0.00	0.00	0.00	54.53	2850.03	0.00	5.97	0 00:00	0.00	0.00
5	Jun-05	Junction	2905.00	2912.00	0.00	0.00	0.00	25.67	2905.65	0.00	6.35	0 00:00	0.00	0.00
6	Jun-06	Junction	2702.00	2708.00	0.00	0.00	0.00	23.23	2702.90	0.00	9.10	0 00:00	0.00	0.00
7	Jun-07	Junction	2689.97	2708.00	0.00	0.00	0.00	23.22	2690.87	0.00	17.13	0 00:00	0.00	0.00
8	Jun-08	Junction	2686.00	2698.00	0.00	0.00	0.00	22.25	2686.75	0.00	11.25	0 00:00	0.00	0.00
9	Jun-09	Junction	2657.82	2662.82	0.00	0.00	0.00	22.18	2659.46	0.00	3.36	0 00:00	0.00	0.00
10	Jun-10	Junction	2655.00	2660.00	0.00	0.00	0.00	22.17	2656.64	0.00	3.36	0 00:00	0.00	0.00
11	Out-01	Outfall	2653.80					22.16	2655.44					
12	Stor-01	Storage Node	2729.00	2738.00	0.00		0.00	87.59	2736.87				0.00	0.00
13	Stor-02	Storage Node	2731.00	2738.00	0.00		0.00	78.89	2735.68				0.00	0.00
14	Stor-03	Storage Node	2776.00	2782.00	0.00		0.00	178.45	2779.56				0.00	0.00
15	Stor-04	Storage Node	2796.00	2802.00	0.00		0.00	303.76	2799.72				0.00	0.00
16	Stor-05	Storage Node	2850.00	2856.00	0.00		0.00	241.01	2853.95				0.00	0.00
17	Stor-06	Storage Node	2906.00	2912.00	0.00		0.00	112.02	2909.75				0.00	0.00
18	Stor-ex	Storage Node	2686.00	2698.00	0.00		0.00	23.22	2688.19				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-06	Pipe	Jun-10	Out-01	241.11	2655.00	2653.80	0.5000			22.16	28.94	0.77	6.50	1.64	0.66	0.00	Calculated
2	Link-07	Pipe	Inlet-10	Jun-10	400.03	2657.00	2655.00	0.5000			22.17	29.00	0.76	6.51	1.64	0.65	0.00	Calculated
3	Link-08	Pipe	Jun-09	Inlet-10	164.52	2657.82	2657.00	0.5000			22.18	28.96	0.77	6.50	1.64	0.66	0.00	Calculated
4	Link-09	Pipe	Inlet-09	Jun-09	399.10	2659.82	2657.82	0.5000			22.18	29.04	0.76	6.51	1.64	0.65	0.00	Calculated
5	Link-10	Pipe	Inlet-08	Inlet-09	400.72	2661.82	2659.82	0.5000			22.19	28.98	0.77	6.50	1.64	0.66	0.00	Calculated
6	Link-11	Pipe	Inlet-07	Inlet-08	399.35	2663.82	2661.82	0.5000			22.20	29.03	0.76	6.51	1.64	0.66	0.00	Calculated
7	Link-12	Pipe	Inlet-06	Inlet-07	205.10	2664.83	2663.82	0.4900			22.21	28.78	0.77	6.47	1.65	0.66	0.00	Calculated
8	Link-13	Pipe	Inlet-05	Inlet-06	400.62	2666.83	2664.83	0.5000			22.21	28.98	0.77	6.51	1.64	0.66	0.00	Calculated
9	Link-14	Pipe	Inlet-04	Inlet-05	399.18	2668.83	2666.83	0.5000			22.22	29.03	0.77	6.52	1.64	0.66	0.00	Calculated
10	Link-15	Pipe	Inlet-03	Inlet-04	104.18	2669.36	2668.83	0.5100			22.23	29.26	0.76	6.56	1.63	0.65	0.00	Calculated
11	Link-16	Pipe	Inlet-02	Inlet-03	401.67	2671.36	2669.36	0.5000			22.23	28.94	0.77	6.50	1.64	0.66	0.00	Calculated
12	Link-17	Pipe	Inlet-01	Inlet-02	296.85	2672.85	2671.36	0.5000			22.24	29.06	0.77	6.52	1.64	0.66	0.00	Calculated
13	Link-18	Pipe	Jun-08	Inlet-01	173.46	2686.00	2672.85	7.5800			22.25	112.94	0.20	17.88	0.75	0.30	0.00	Calculated
14	Link-19	Pipe	Jun-06	Jun-07	476.71	2702.00	2689.97	2.5200			23.22	159.83	0.15	11.84	0.90	0.26	0.00	Calculated
15	Link-01	Channel	Jun-01	Stor-01	100.00	2730.00	2729.00	1.0000			44.77	458.90	0.10	4.33	1.22	0.31	0.00	
16	Link-02	Channel	Jun-02	Stor-02	881.55	2775.00	2731.00	4.9900			63.76	1025.24	0.06	8.45	0.95	0.24	0.00	
17	Link-03	Channel	Jun-03	Stor-03	1575.06	2795.00	2776.00	1.2100			66.57	504.02	0.13	5.20	1.44	0.36	0.00	
18	Link-04	Channel	Jun-04	Stor-04	1907.73	2849.00	2796.00	2.7800			54.52	764.90	0.07	6.58	1.03	0.26	0.00	
19	Link-05	Channel	Jun-05	Stor-05	1753.28	2905.00	2850.00	3.1400			25.57	812.79	0.03	5.41	0.65	0.16	0.00	
20	Link-20	Channel	Jun-07	Stor-ex	312.10	2689.97	2686.00	1.2700			23.22	4048.36	0.01	3.85	0.79	0.08	0.00	
21	Orifice-01	Orifice	Stor-01	Jun-06		2729.00	2702.00				23.23							
22	Orifice-02	Orifice	Stor-02	Jun-01		2731.00	2730.00				44.77							
23	Orifice-03	Orifice	Stor-03	Jun-02		2776.00	2775.00				63.76							
24	Orifice-04	Orifice	Stor-04	Jun-03		2796.00	2795.00				66.57							
25	Orifice-05	Orifice	Stor-05	Jun-04		2850.00	2849.00				54.53							
26	Orifice-06	Orifice	Stor-06	Jun-05		2906.00	2905.00				25.67							
27	Orifice-ex	Orifice	Stor-ex	Jun-08		2686.00	2686.00				22.25							
28	Weir-01	Weir	Stor-01	Jun-06		2729.00	2702.00				0.00							
29	Weir-02	Weir	Stor-02	Jun-01		2731.00	2730.00				0.00							
30	Weir-03	Weir	Stor-03	Jun-02		2776.00	2775.00				0.00							
31	Weir-04	Weir	Stor-04	Jun-03		2796.00	2795.00				0.00							
32	Weir-05	Weir	Stor-05	Jun-04		2850.00	2849.00				0.00							
33	Weir-06	Weir	Stor-06	Jun-05		2906.00	2905.00				0.00							

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2677.85
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2676.36
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2674.36
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2673.83
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2671.83
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2669.83
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2668.82
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2666.82
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2664.82
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2662.00

Subbasin Hydrology

Subbasin : Offsite-E-1

Input Data

Area (ac)	30.01
Peak Rate Factor	484.00
Weighted Curve Number	86.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	30.01	D	86.00
Composite Area & Weighted CN	30.01		86.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	58	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.24	0.00	0.00
Computed Flow Time (min) :	0.34	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	58	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	12.29	0.00	0.00
Computed Flow Time (min) :	0.02	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.05	.03	0.00
Flow Length (ft) :	773	918.86	0.00
Channel Slope (%) :	58	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	27.60	11.54	0.00
Computed Flow Time (min) :	0.47	1.33	0.00

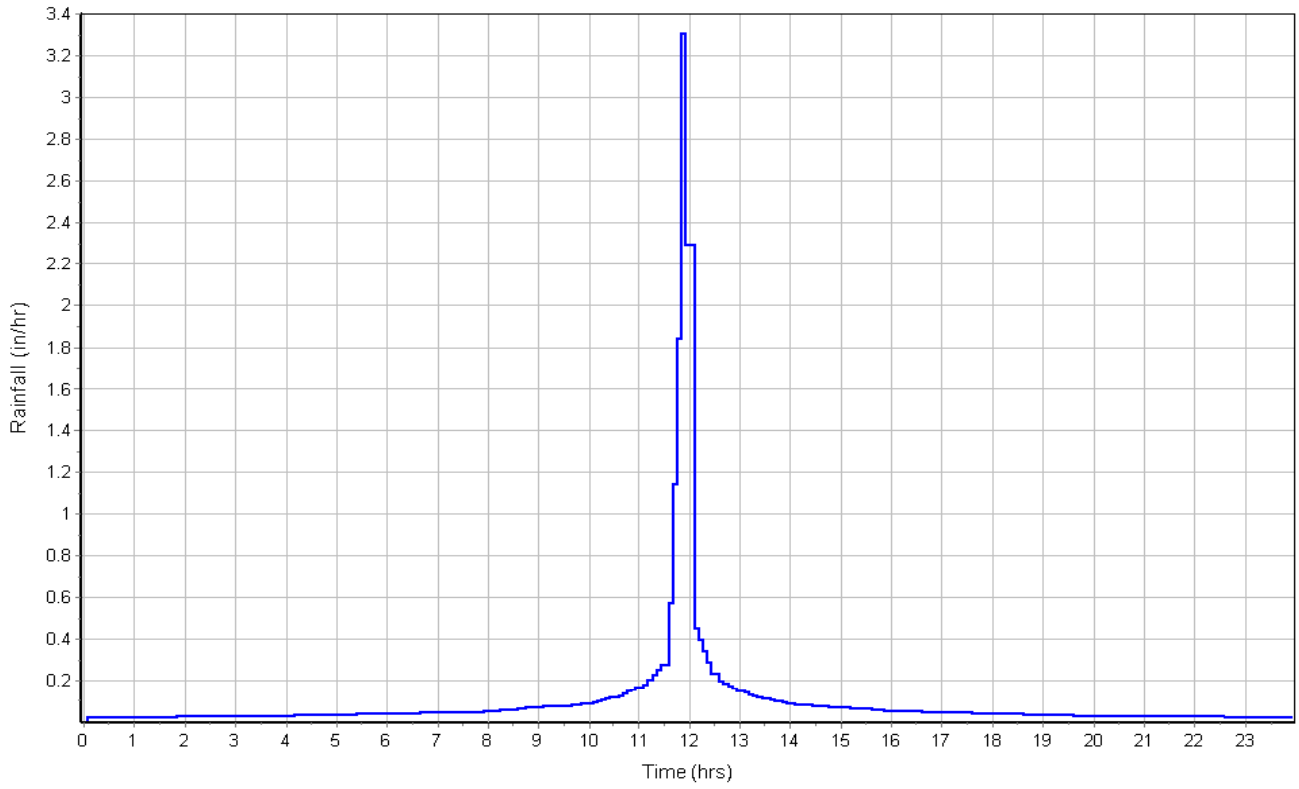
Total TOC (min) 2.16

Subbasin Runoff Results

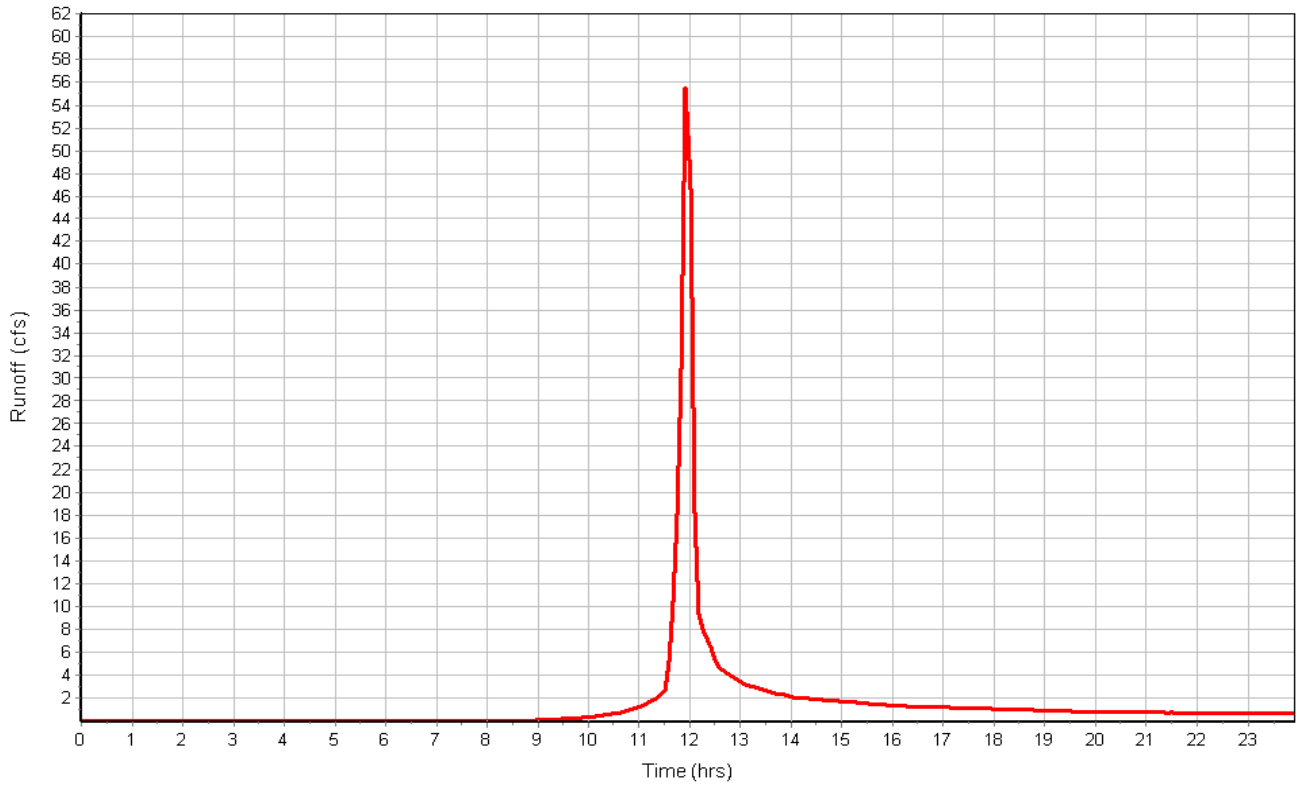
Total Rainfall (in)	2.41
Total Runoff (in)	1.17
Peak Runoff (cfs)	55.80
Weighted Curve Number	86.00
Time of Concentration (days hh:mm:ss)	0 00:02:10

Subbasin : Offsite-E-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-E-2

Input Data

Area (ac) 31.47
Peak Rate Factor 484.00
Weighted Curve Number 86.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	31.47	D	86.00
Composite Area & Weighted CN	31.47		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	55.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.24	0.00	0.00
Computed Flow Time (min) :	0.35	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	55.4	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	12.01	0.00	0.00
Computed Flow Time (min) :	0.02	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	677	2062.24	0.00
Channel Slope (%) :	55.4	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	26.98	11.54	0.00
Computed Flow Time (min) :	0.42	2.98	0.00

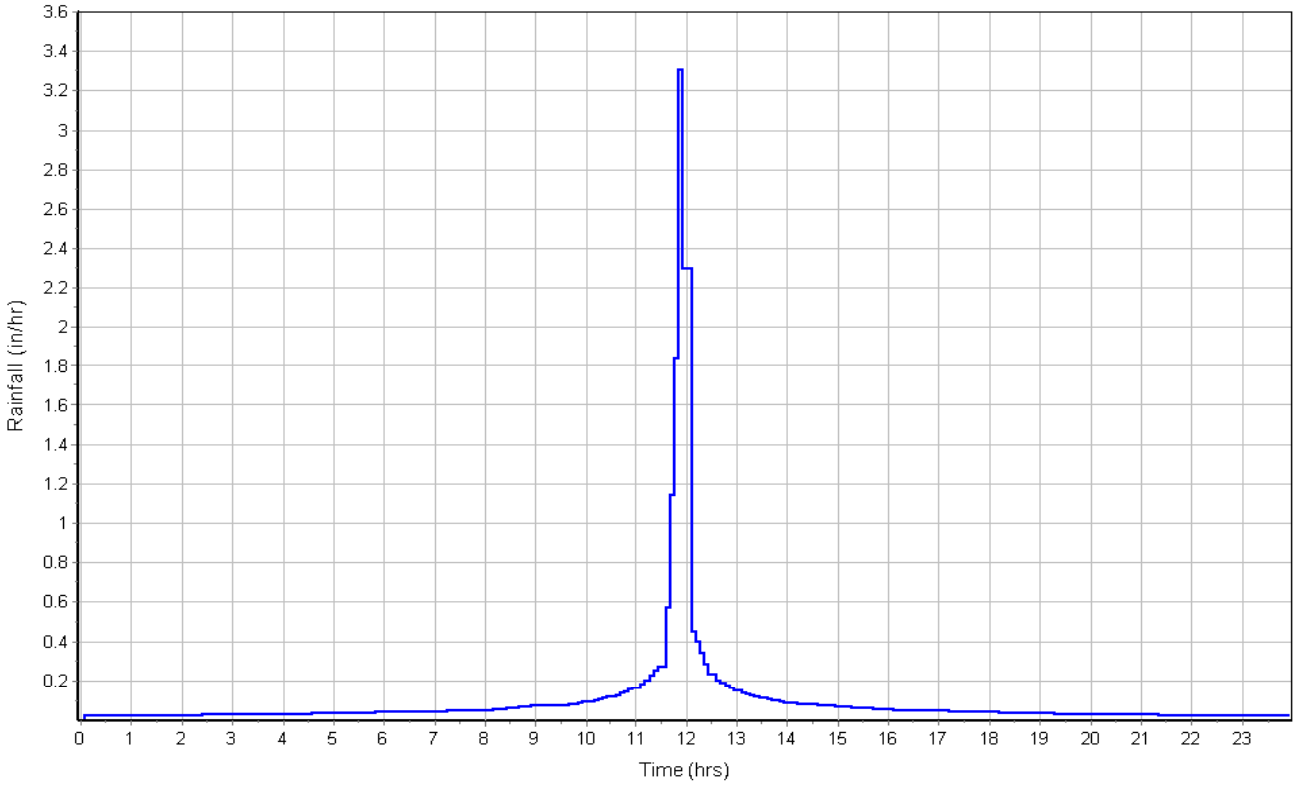
Total TOC (min) 3.77

Subbasin Runoff Results

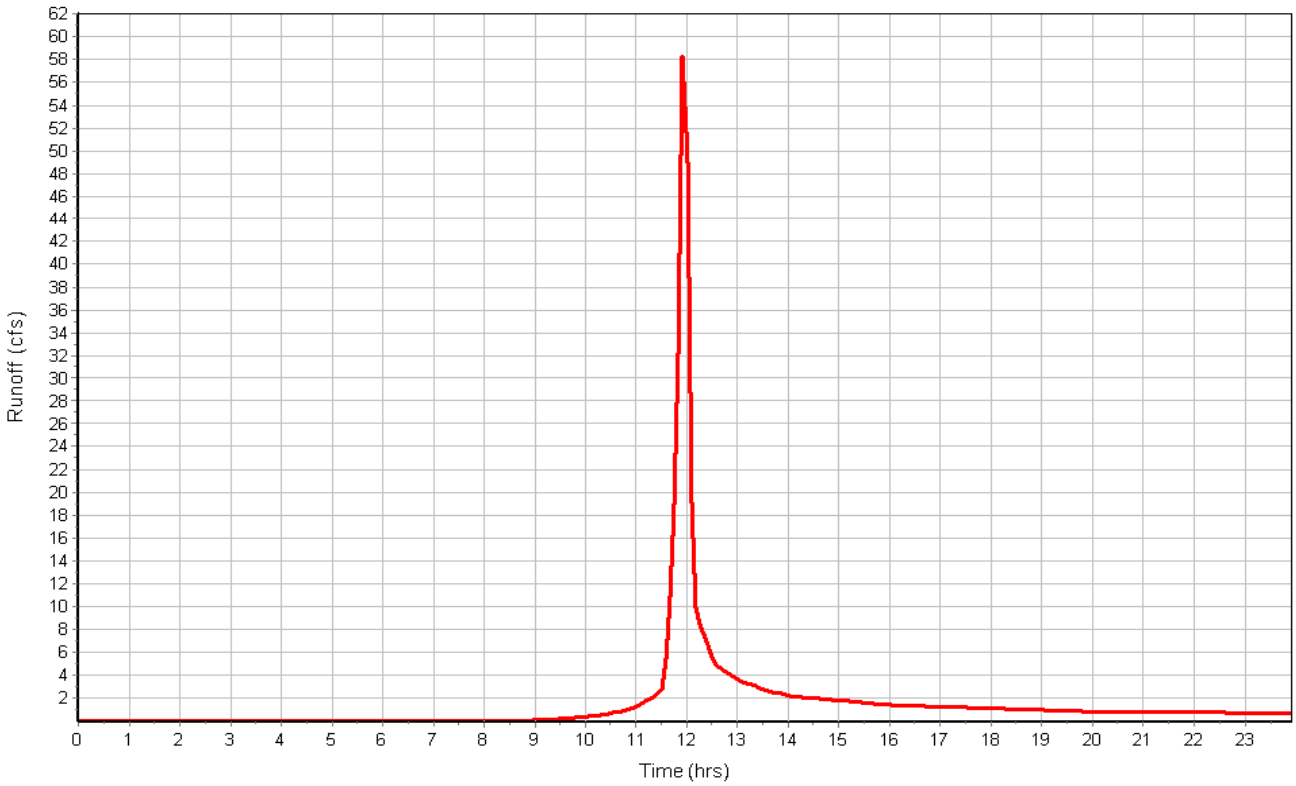
Total Rainfall (in) 2.41
Total Runoff (in) 1.17
Peak Runoff (cfs) 58.52
Weighted Curve Number 86.00
Time of Concentration (days hh:mm:ss) 0 00:03:46

Subbasin : Offsite-E-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-E-3

Input Data

Area (ac) 22.53
Peak Rate Factor 484.00
Weighted Curve Number 86.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	22.53	D	86.00
Composite Area & Weighted CN	22.53		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	43.6	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.22	0.00	0.00
Computed Flow Time (min) :	0.38	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	43.6	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	10.65	0.00	0.00
Computed Flow Time (min) :	0.02	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	507	1930.94	0.00
Channel Slope (%) :	43.6	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	23.93	11.54	0.00
Computed Flow Time (min) :	0.35	2.79	0.00

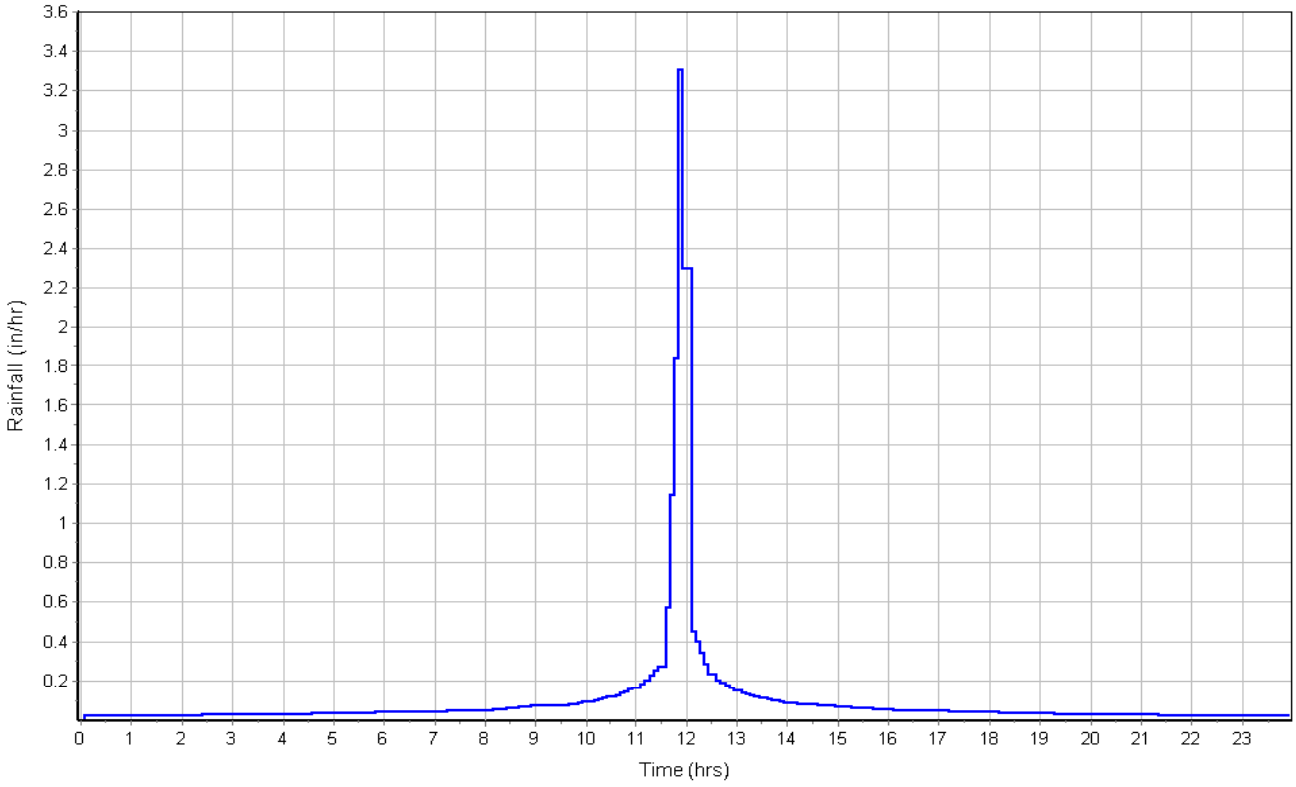
Total TOC (min) 3.55

Subbasin Runoff Results

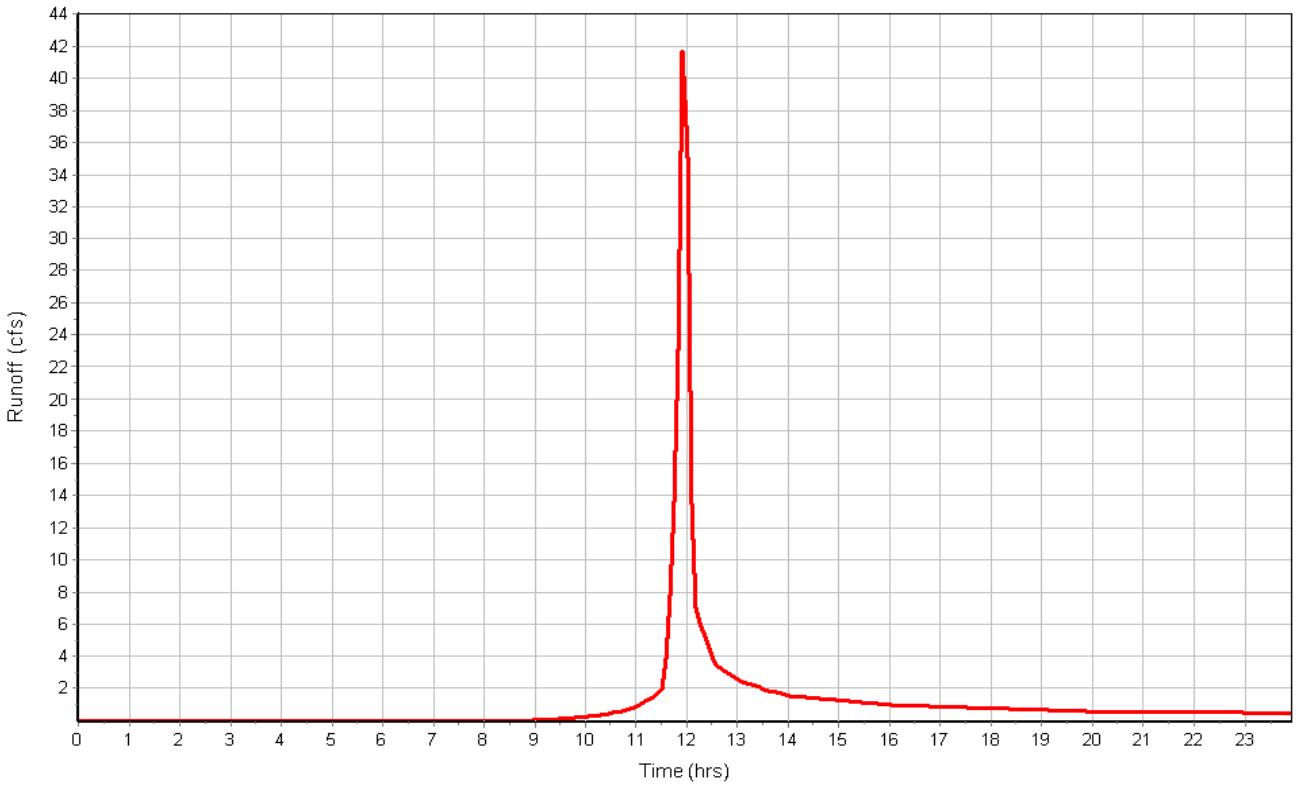
Total Rainfall (in) 2.41
Total Runoff (in) 1.17
Peak Runoff (cfs) 41.89
Weighted Curve Number 86.00
Time of Concentration (days hh:mm:ss) 0 00:03:33

Subbasin : Offsite-E-3

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-E-4

Input Data

Area (ac)	14.76
Peak Rate Factor	484.00
Weighted Curve Number	86.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	14.76	D	86.00
Composite Area & Weighted CN	14.76		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	40.43	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.21	0.00	0.00
Computed Flow Time (min) :	0.40	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	40.43	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	10.26	0.00	0.00
Computed Flow Time (min) :	0.02	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	633	1131.52	0.00
Channel Slope (%) :	40.43	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	23.05	11.54	0.00
Computed Flow Time (min) :	0.46	1.63	0.00

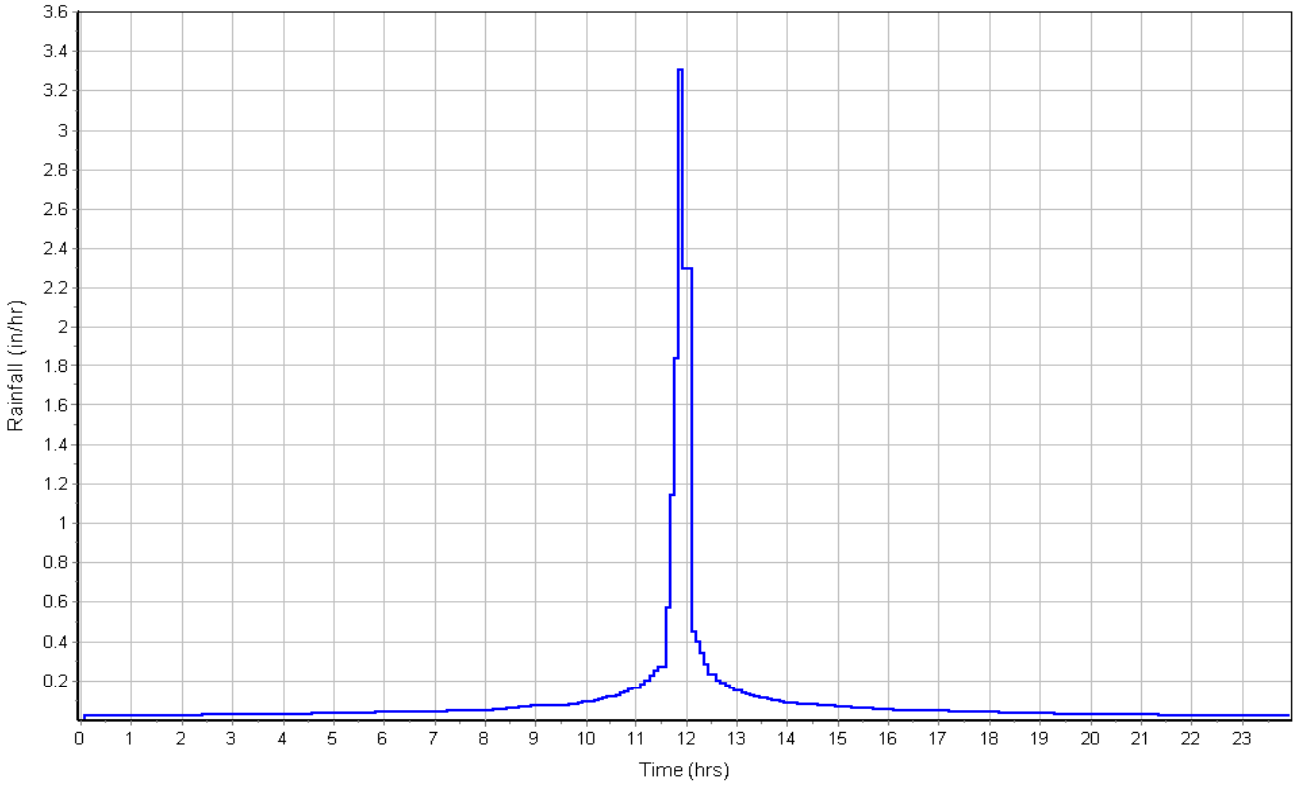
Total TOC (min) 2.51

Subbasin Runoff Results

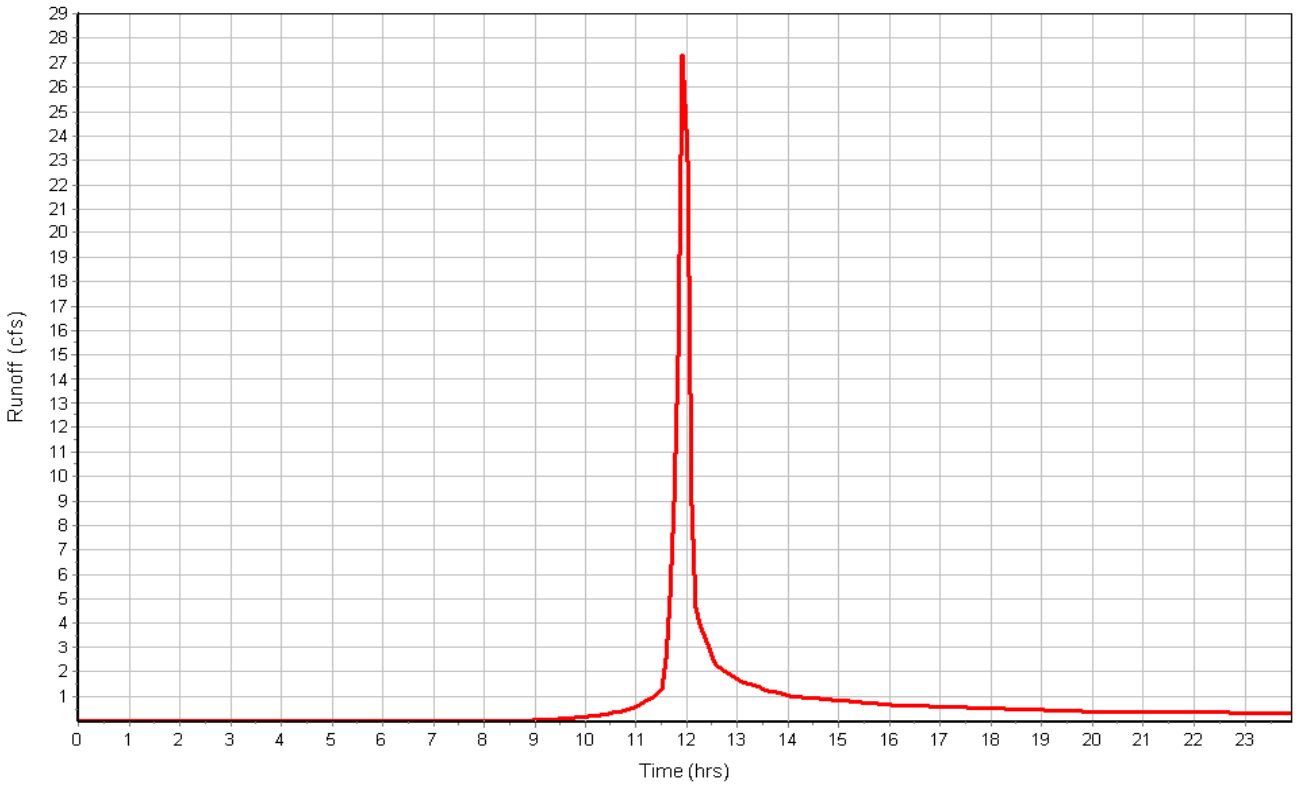
Total Rainfall (in)	2.41
Total Runoff (in)	1.17
Peak Runoff (cfs)	27.45
Weighted Curve Number	86.00
Time of Concentration (days hh:mm:ss)	0 00:02:31

Subbasin : Offsite-E-4

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-E-5

Input Data

Area (ac) 24.14
Peak Rate Factor 484.00
Weighted Curve Number 86.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	24.14	D	86.00
Composite Area & Weighted CN	24.14		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	58.12	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.24	0.00	0.00
Computed Flow Time (min) :	0.34	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	58.12	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	12.30	0.00	0.00
Computed Flow Time (min) :	0.02	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	479	1164.61	0.00
Channel Slope (%) :	58.12	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	27.63	11.54	0.00
Computed Flow Time (min) :	0.29	1.68	0.00

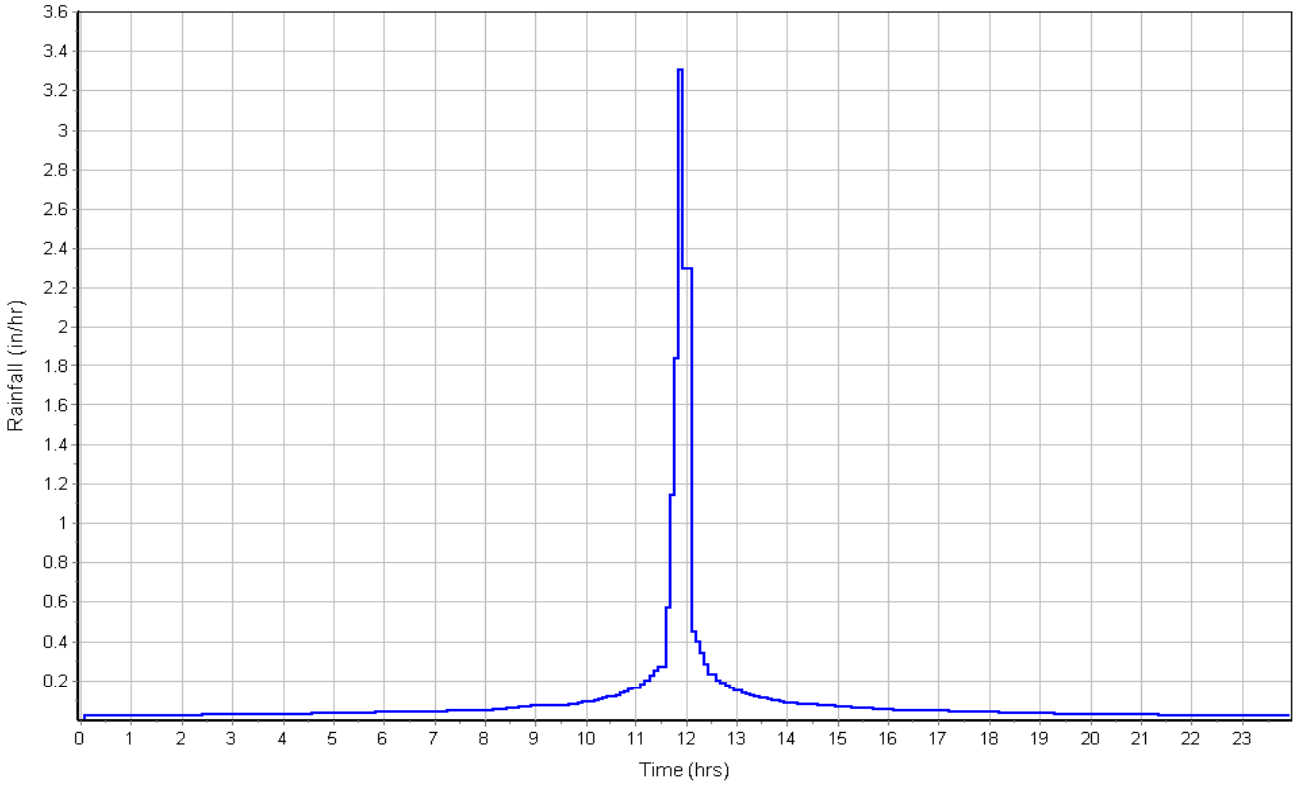
Total TOC (min) 2.33

Subbasin Runoff Results

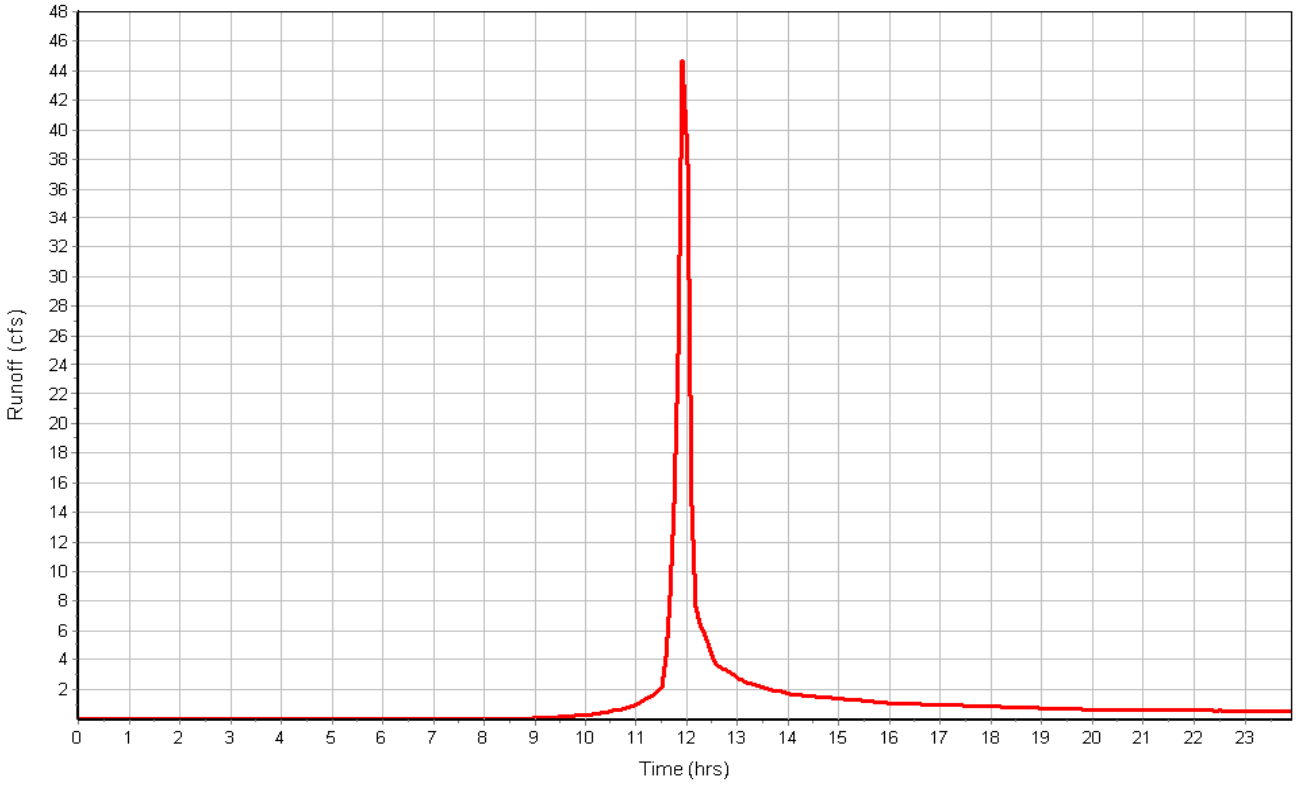
Total Rainfall (in) 2.41
Total Runoff (in) 1.17
Peak Runoff (cfs) 44.90
Weighted Curve Number 86.00
Time of Concentration (days hh:mm:ss) 0 00:02:20

Subbasin : Offsite-E-5

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-01

Input Data

Area (ac)	32.59
Peak Rate Factor	484.00
Weighted Curve Number	79.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	16.30	B	72.00
Desert shrub range, Fair	16.30	D	86.00
Composite Area & Weighted CN	32.60		79.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	13.12	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	0.62	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	13.12	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	5.84	0.00	0.00
Computed Flow Time (min) :	0.04	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.05	0.03	0.00
Flow Length (ft) :	2769	954.00	0.00
Channel Slope (%) :	13.12	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	13.13	11.54	0.00
Computed Flow Time (min) :	3.52	1.38	0.00

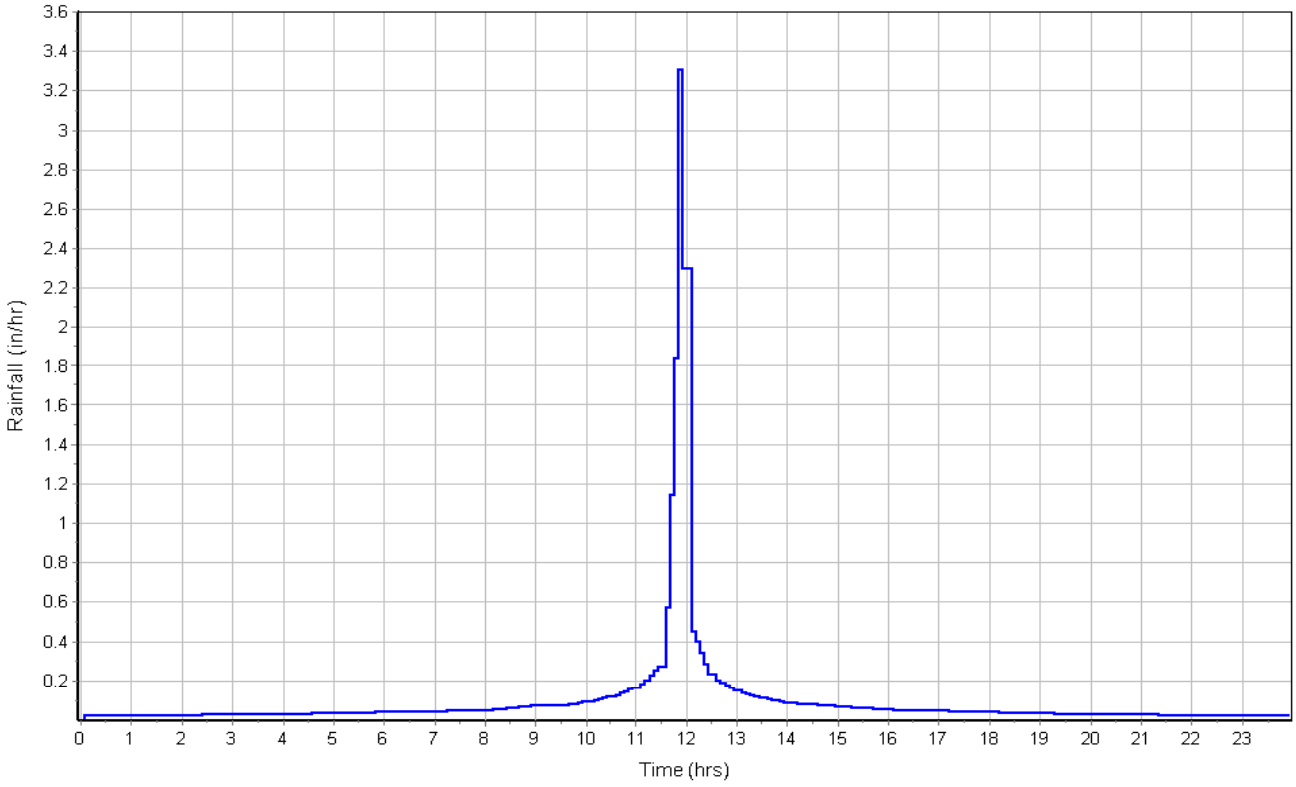
Total TOC (min) 5.56

Subbasin Runoff Results

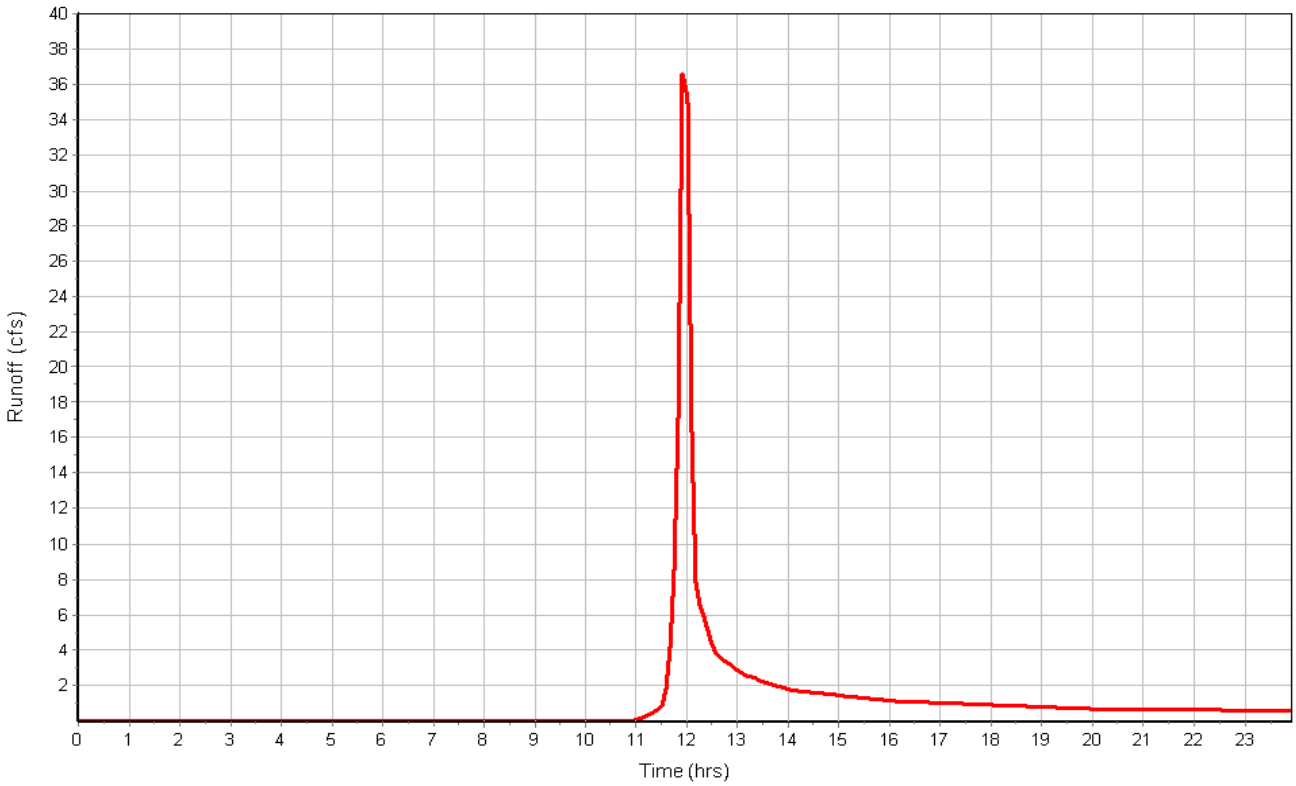
Total Rainfall (in)	2.41
Total Runoff (in)	0.78
Peak Runoff (cfs)	38.08
Weighted Curve Number	79.00
Time of Concentration (days hh:mm:ss)	0 00:05:34

Subbasin : Offsite-W-01

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-02

Input Data

Area (ac) 5.81
Peak Rate Factor 484.00
Weighted Curve Number 72.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	5.81	B	72.00
Composite Area & Weighted CN	5.81		72.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	9.36	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.12	0.00	0.00
Computed Flow Time (min) :	0.71	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	9.36	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	4.94	0.00	0.00
Computed Flow Time (min) :	0.05	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	621	503.25	0.00
Channel Slope (%) :	9.36	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	11.09	11.54	0.00
Computed Flow Time (min) :	0.93	0.73	0.00

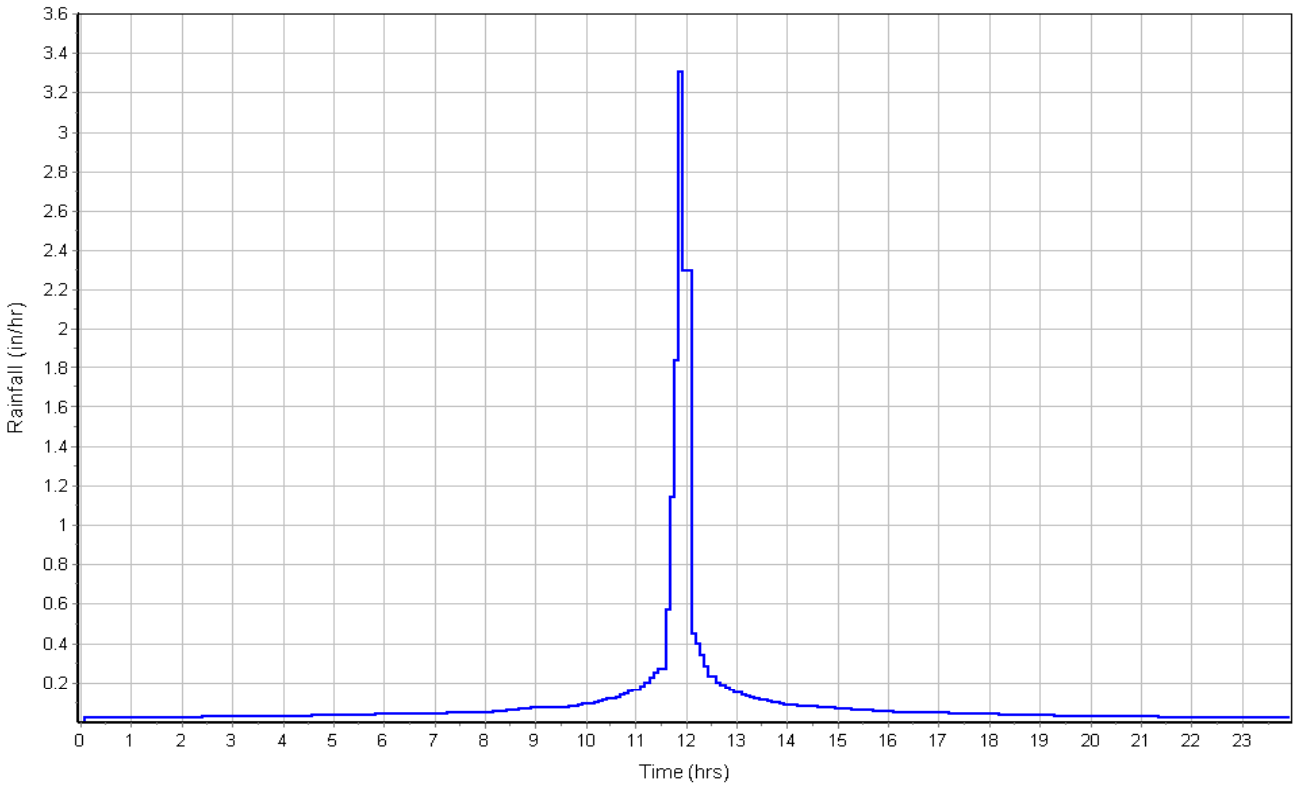
Total TOC (min) 2.42

Subbasin Runoff Results

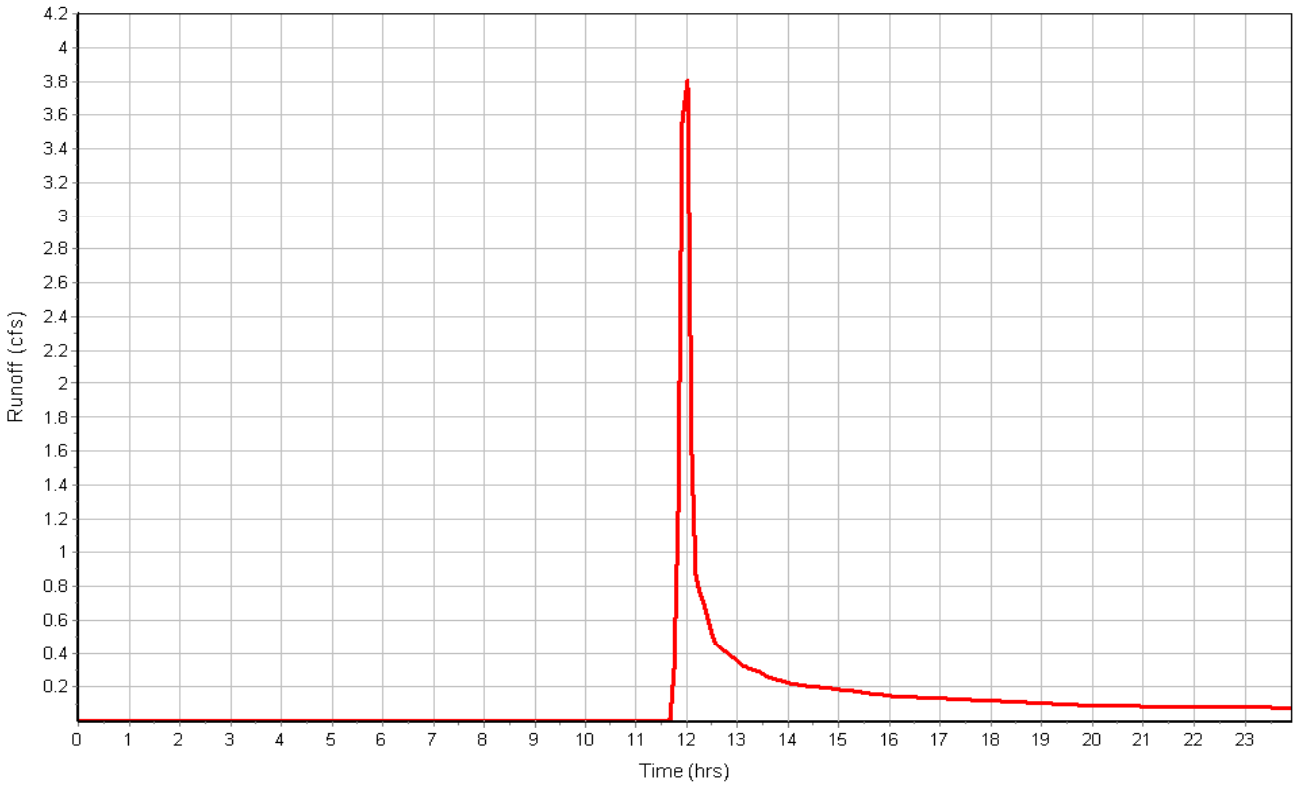
Total Rainfall (in) 2.41
Total Runoff (in) 0.48
Peak Runoff (cfs) 3.82
Weighted Curve Number 72.00
Time of Concentration (days hh:mm:ss) 0 00:02:25

Subbasin : Offsite-W-02

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-03

Input Data

Area (ac) 18.85
Peak Rate Factor 484.00
Weighted Curve Number 82.50
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	4.71	B	72.00
Desert shrub range, Fair	14.14	D	86.00
Composite Area & Weighted CN	18.85		82.50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.08	0.00	0.00
Computed Flow Time (min) :	3.99	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	168	0.00	0.00
Slope (%) :	5	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.61	0.00	0.00
Computed Flow Time (min) :	0.78	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	2127	261.16	0.00
Channel Slope (%) :	16.9	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	14.90	11.54	0.00
Computed Flow Time (min) :	2.38	0.38	0.00

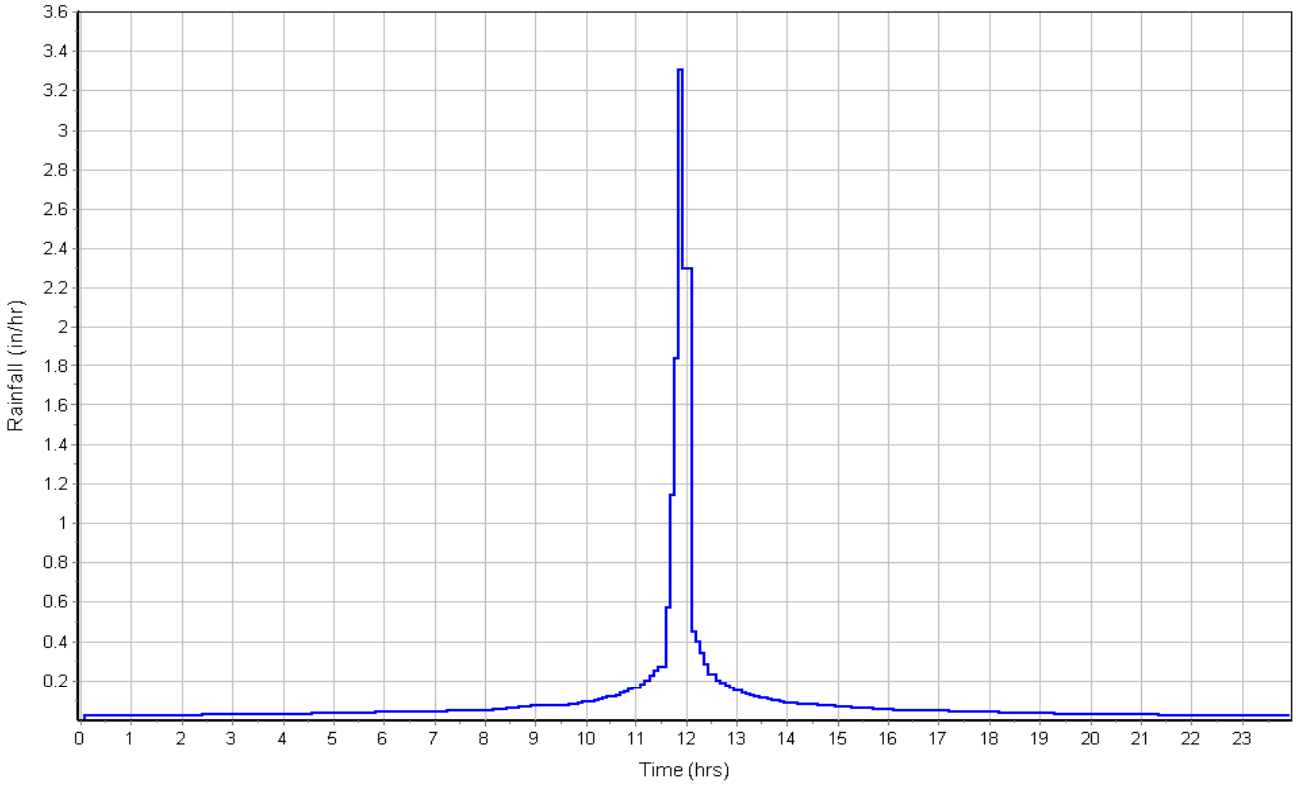
Total TOC (min) 7.52

Subbasin Runoff Results

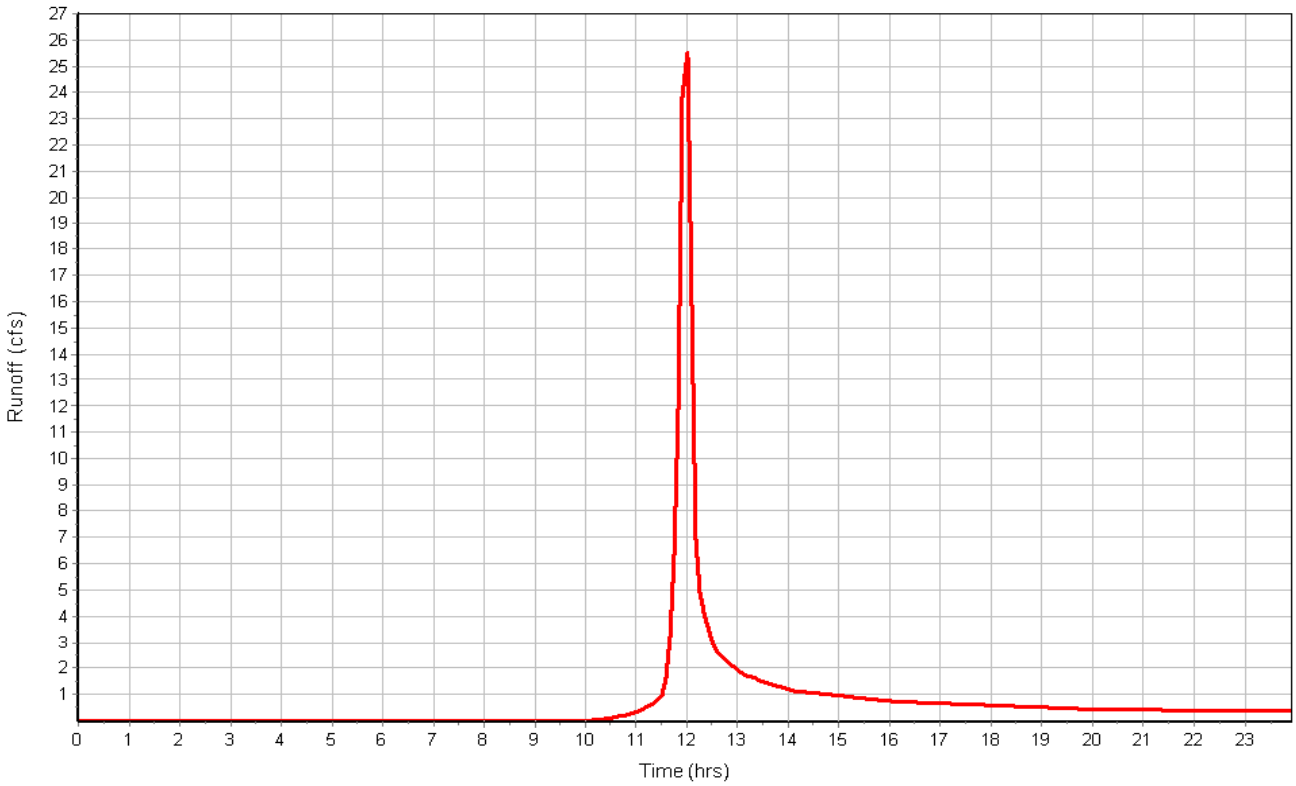
Total Rainfall (in) 2.41
Total Runoff (in) 0.96
Peak Runoff (cfs) 26.32
Weighted Curve Number 82.50
Time of Concentration (days hh:mm:ss) 0 00:07:31

Subbasin : Offsite-W-03

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-04

Input Data

Area (ac)	20.86
Peak Rate Factor	484.00
Weighted Curve Number	72.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	20.86	B	72.00
Composite Area & Weighted CN	20.86		72.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.08	0.00	0.00
Computed Flow Time (min) :	3.99	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	180	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	1.32	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	1175	285.05	0.00
Channel Slope (%) :	14.81	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	13.95	11.54	0.00
Computed Flow Time (min) :	1.40	0.41	0.00

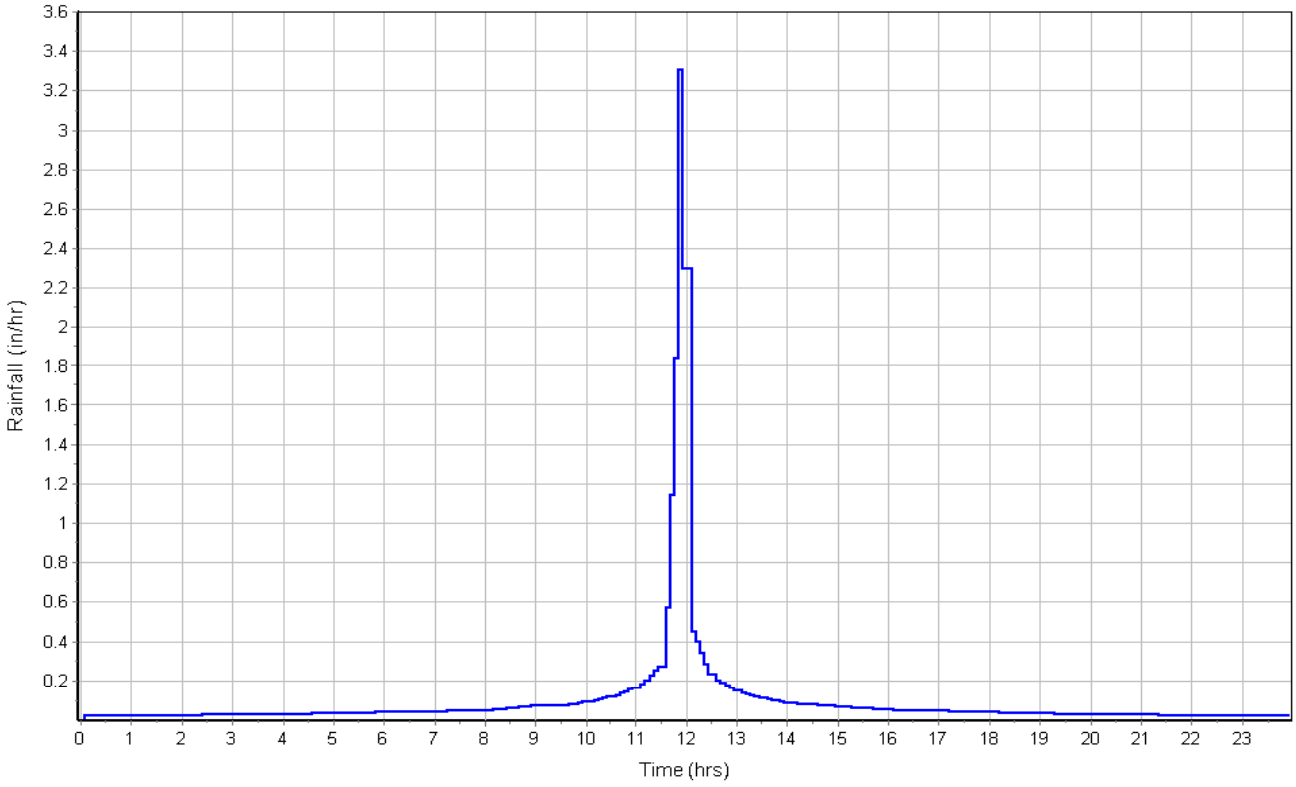
Total TOC (min) 7.12

Subbasin Runoff Results

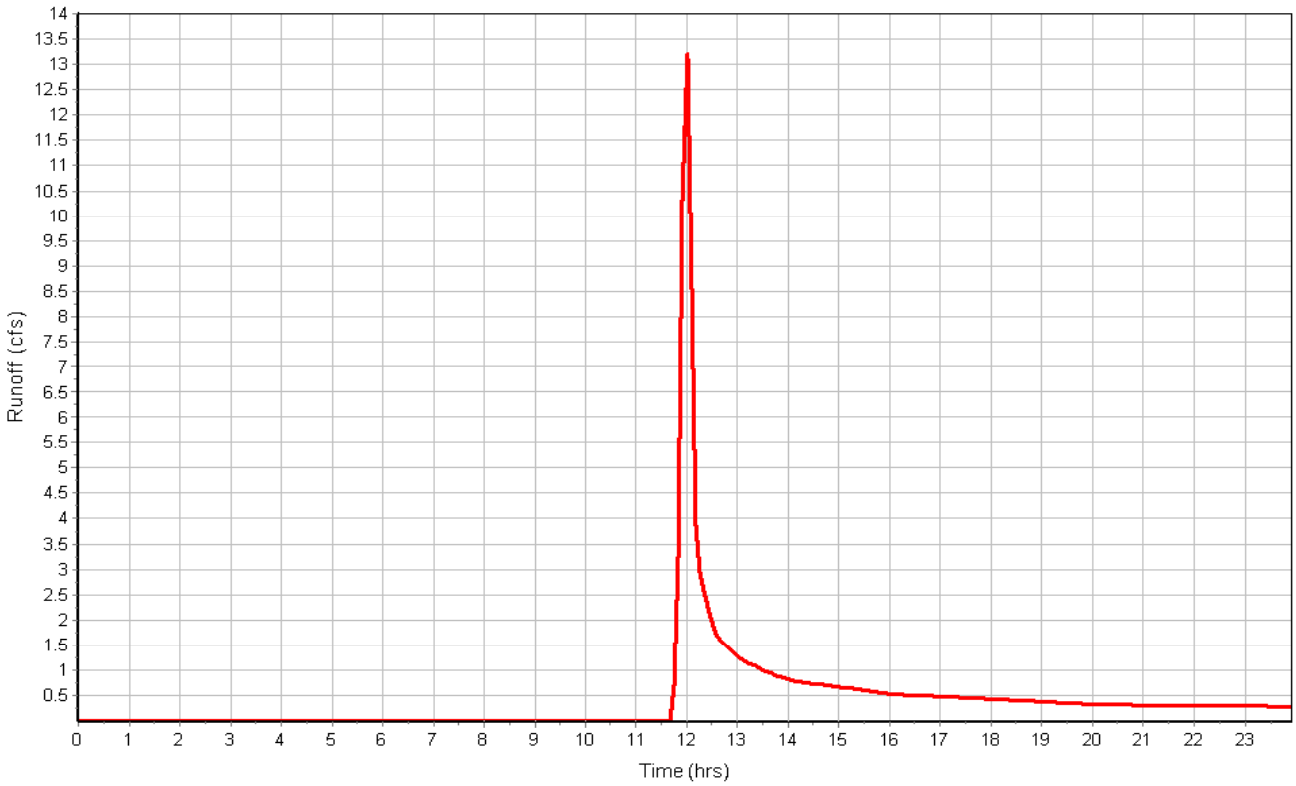
Total Rainfall (in)	2.41
Total Runoff (in)	0.48
Peak Runoff (cfs)	13.28
Weighted Curve Number	72.00
Time of Concentration (days hh:mm:ss)	0 00:07:07

Subbasin : Offsite-W-04

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-05

Input Data

Area (ac)	24.92
Peak Rate Factor	484.00
Weighted Curve Number	83.20
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	4.98	B	72.00
Desert shrub range, Fair	19.94	D	86.00
Composite Area & Weighted CN	24.92		83.20

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.08	0.00	0.00
Computed Flow Time (min) :	3.99	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	150	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	1.10	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	2330	779.11	0.00
Channel Slope (%) :	16.05	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	14.52	11.54	0.00
Computed Flow Time (min) :	2.67	1.13	0.00

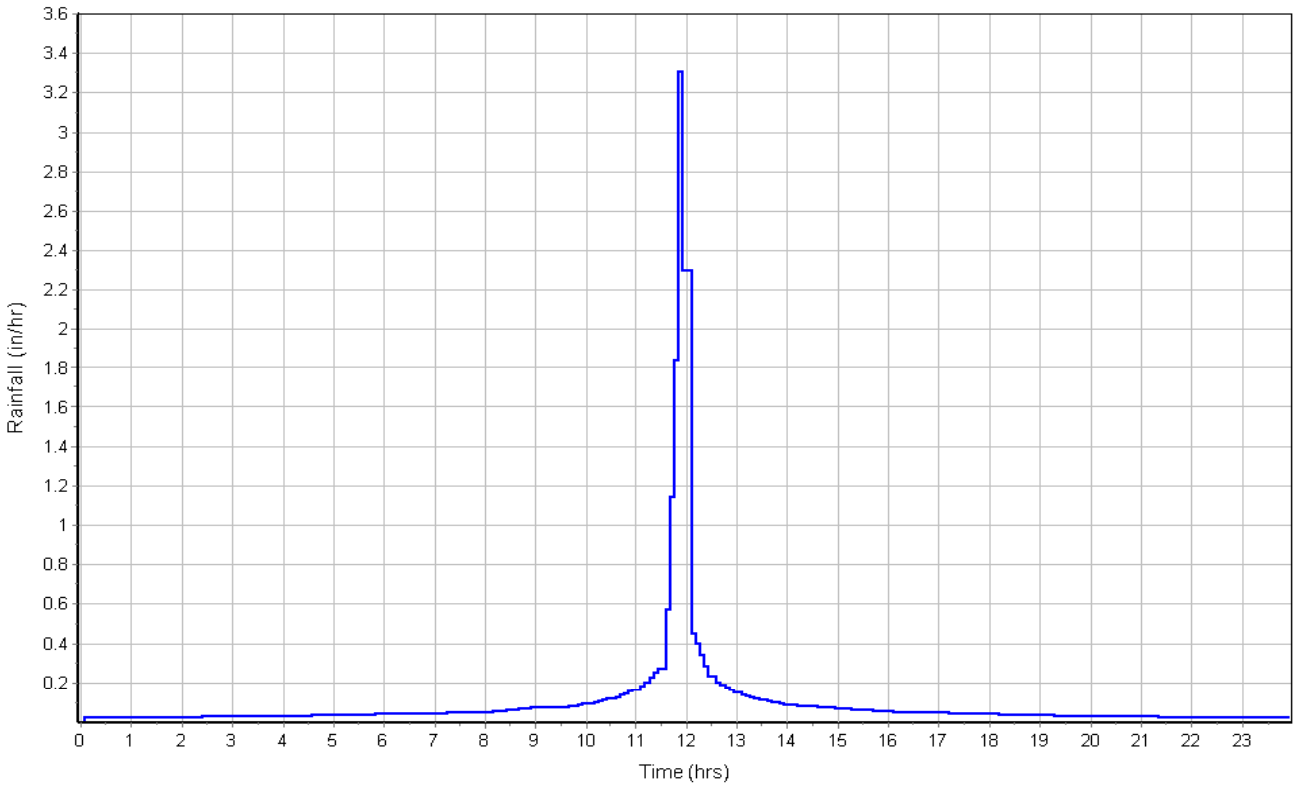
Total TOC (min) 8.88

Subbasin Runoff Results

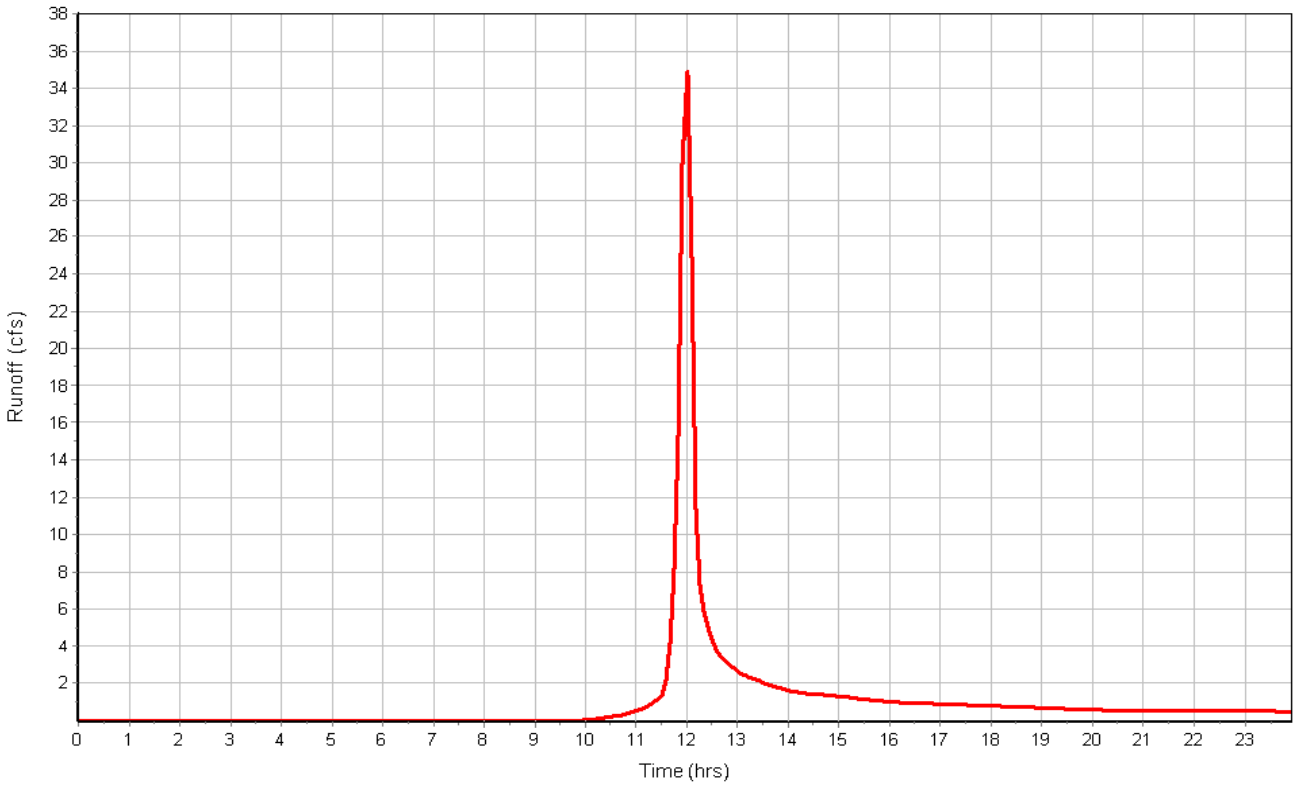
Total Rainfall (in)	2.41
Total Runoff (in)	1.00
Peak Runoff (cfs)	35.14
Weighted Curve Number	83.20
Time of Concentration (days hh:mm:ss)	0 00:08:53

Subbasin : Offsite-W-05

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-06

Input Data

Area (ac)	16.04
Peak Rate Factor	484.00
Weighted Curve Number	84.60
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	1.60	B	72.00
Desert shrub range, Fair	14.44	D	86.00
Composite Area & Weighted CN	16.04		84.60

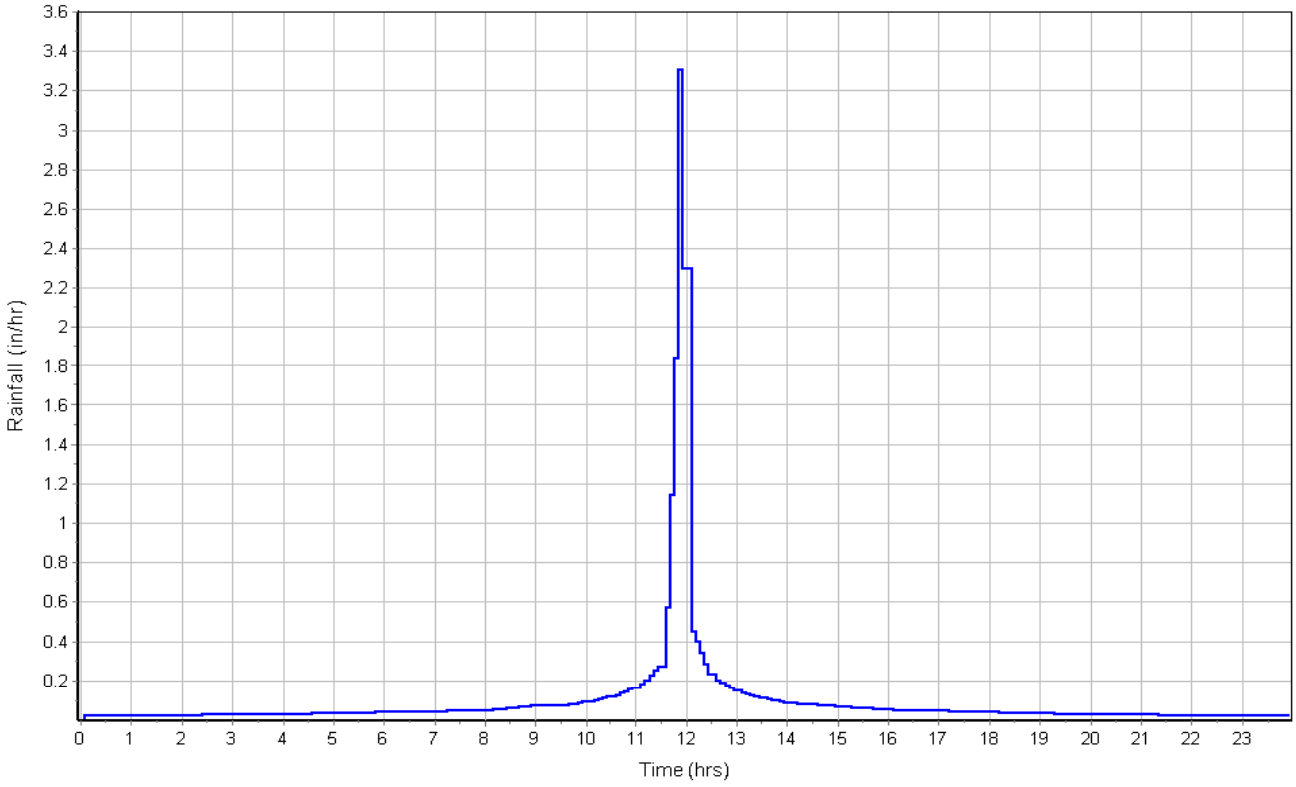
Time of Concentration

Subbasin Runoff Results

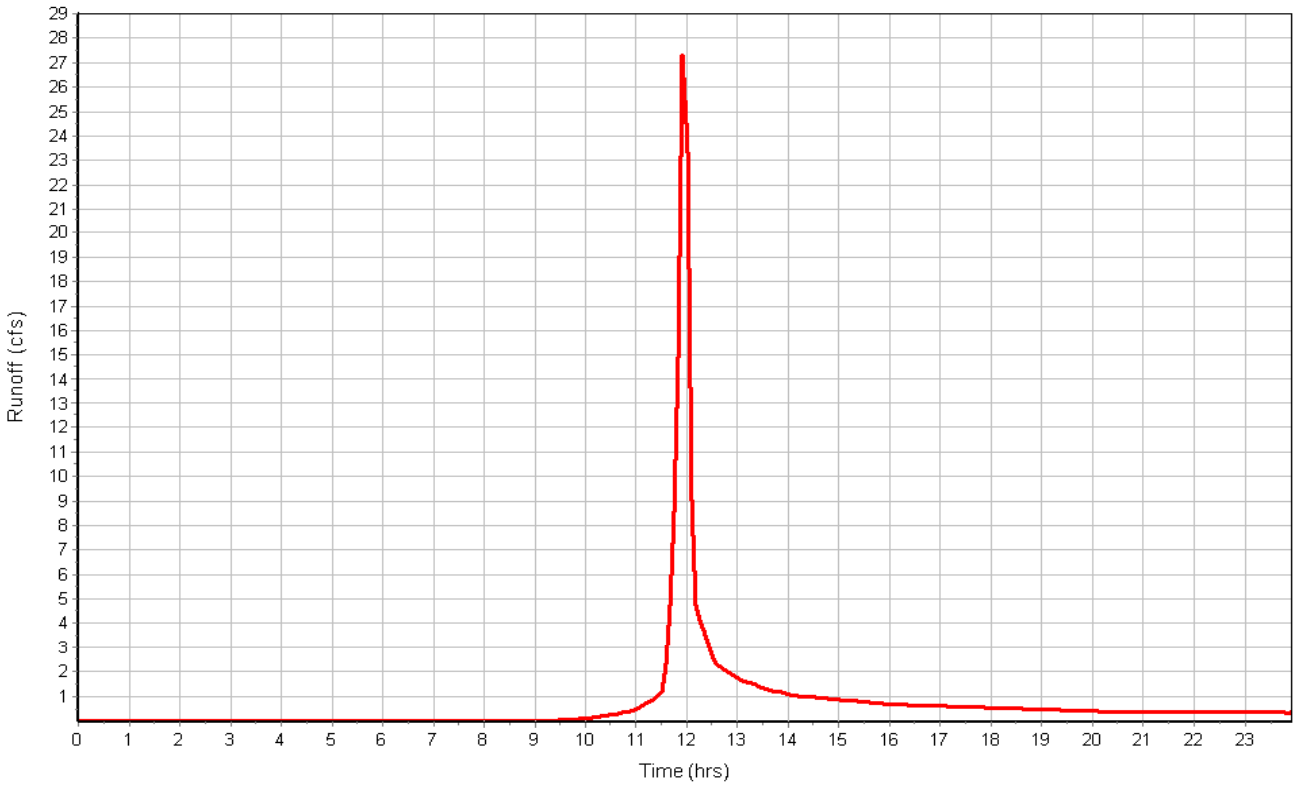
Total Rainfall (in)	2.41
Total Runoff (in)	1.08
Peak Runoff (cfs)	27.55
Weighted Curve Number	84.60
Time of Concentration (days hh:mm:ss)	0 00:00:00

Subbasin : Offsite-W-06

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-07

Input Data

Area (ac) 16.63
Peak Rate Factor 484.00
Weighted Curve Number 86.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	16.63	D	86.00
Composite Area & Weighted CN	16.63		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	4.77	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	175	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	1.28	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	1831	210.16	0.00
Channel Slope (%) :	18.24	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	15.48	11.54	0.00
Computed Flow Time (min) :	1.97	0.30	0.00

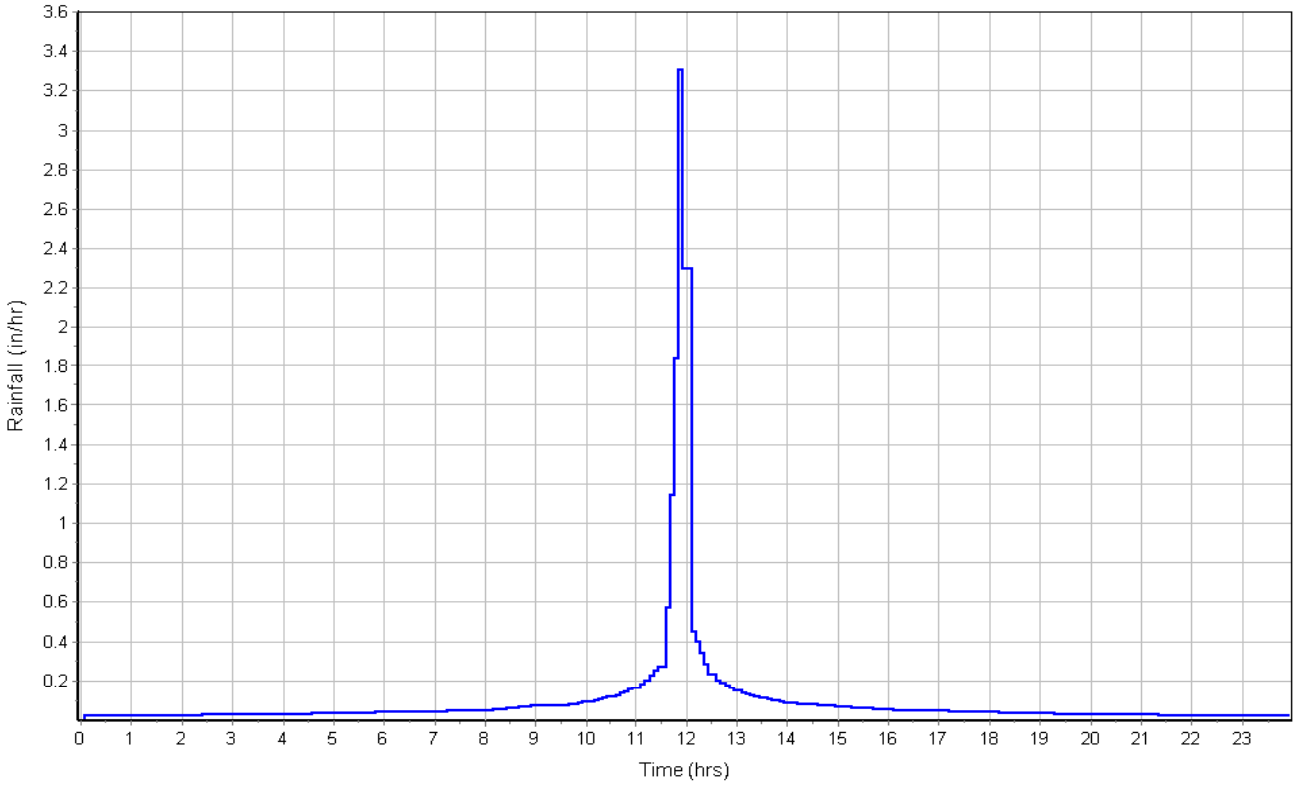
Total TOC (min) 8.32

Subbasin Runoff Results

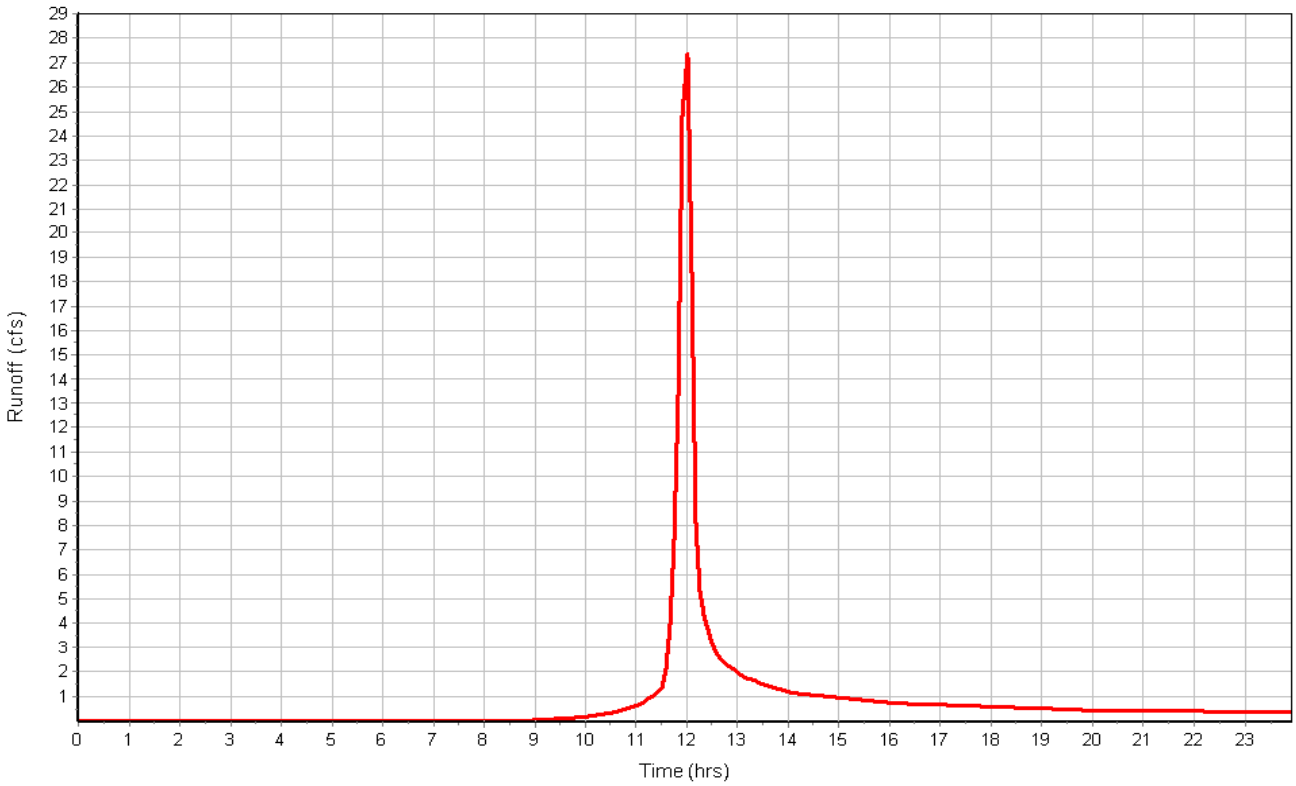
Total Rainfall (in) 2.41
Total Runoff (in) 1.17
Peak Runoff (cfs) 28.04
Weighted Curve Number 86.00
Time of Concentration (days hh:mm:ss) 0 00:08:19

Subbasin : Offsite-W-07

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-08

Input Data

Area (ac)	13.08
Peak Rate Factor	484.00
Weighted Curve Number	86.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	13.08	D	86.00
Composite Area & Weighted CN	13.08		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	4.77	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	150	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	1.10	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	1263	333.27	0.00
Channel Slope (%) :	17.10	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	14.99	11.54	0.00
Computed Flow Time (min) :	1.40	0.48	0.00

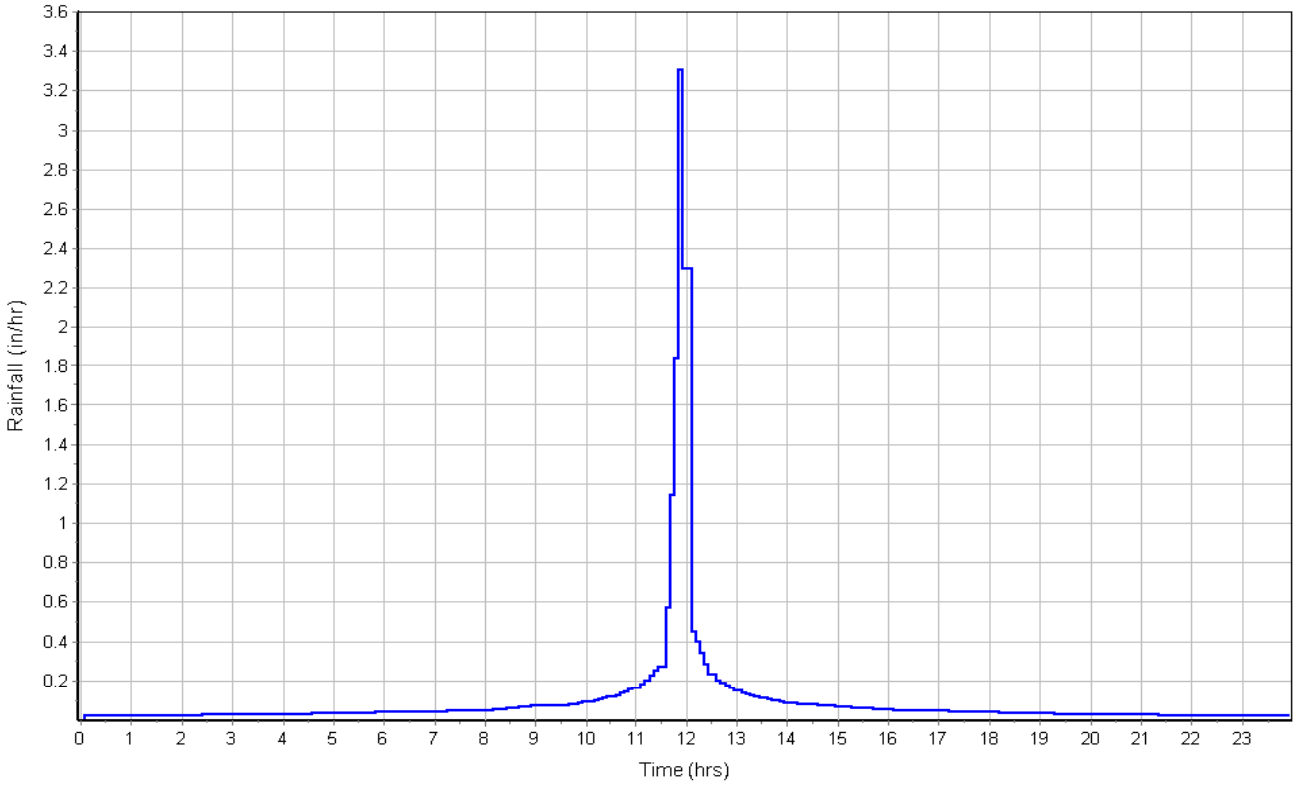
Total TOC (min) 7.75

Subbasin Runoff Results

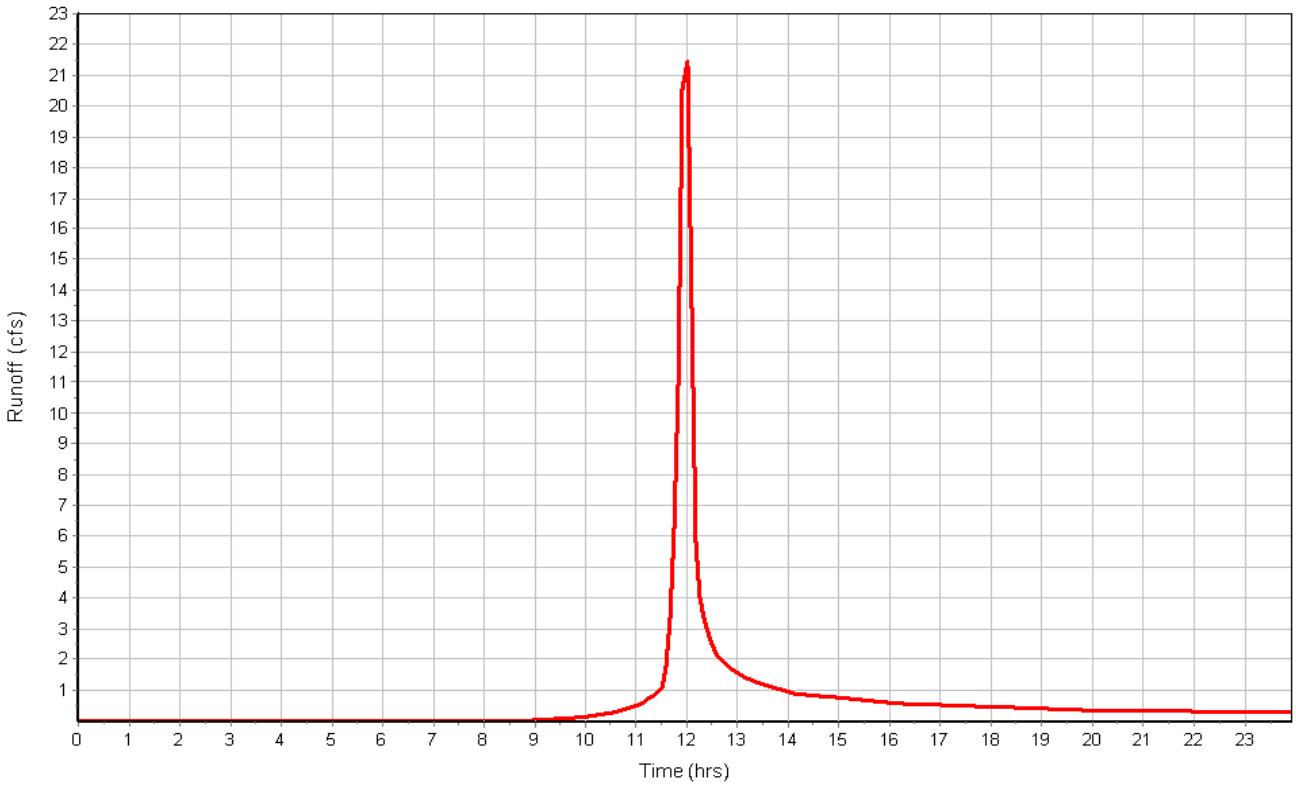
Total Rainfall (in)	2.41
Total Runoff (in)	1.17
Peak Runoff (cfs)	22.41
Weighted Curve Number	86.00
Time of Concentration (days hh:mm:ss)	0 00:07:45

Subbasin : Offsite-W-08

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-09

Input Data

Area (ac)	20.39
Peak Rate Factor	484.00
Weighted Curve Number	86.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	20.39	D	86.00
Composite Area & Weighted CN	20.39		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	33	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	5.95	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	167	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	1.22	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	1627	263.80	0.00
Channel Slope (%) :	12.66	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	12.90	11.54	0.00
Computed Flow Time (min) :	2.10	0.38	0.00

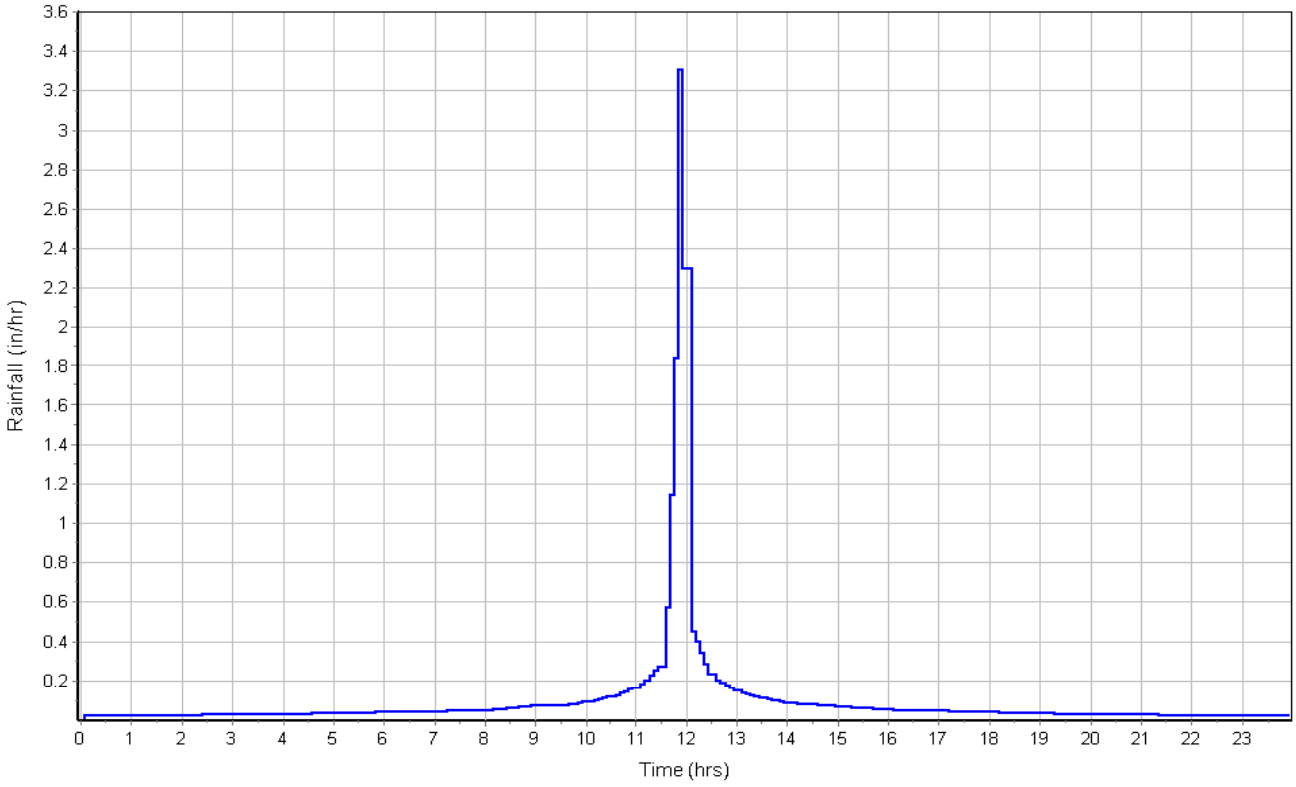
Total TOC (min) 9.66

Subbasin Runoff Results

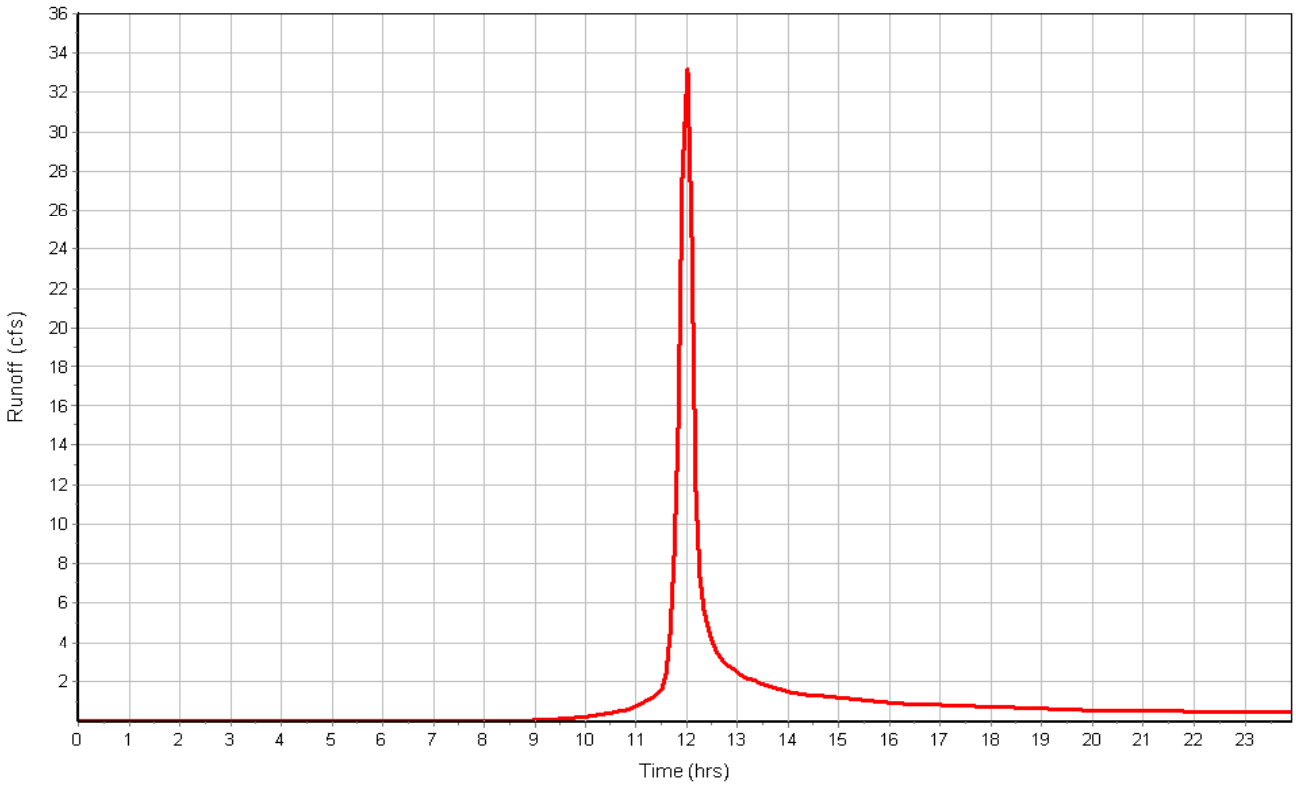
Total Rainfall (in)	2.41
Total Runoff (in)	1.17
Peak Runoff (cfs)	33.30
Weighted Curve Number	86.00
Time of Concentration (days hh:mm:ss)	0 00:09:40

Subbasin : Offsite-W-09

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-10

Input Data

Area (ac) 12.59
Peak Rate Factor 484.00
Weighted Curve Number 86.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	12.59	D	86.00
Composite Area & Weighted CN	12.59		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	5	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.06	0.00	0.00
Computed Flow Time (min) :	1.32	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	55	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.40	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	946	321.66	0.00
Channel Slope (%) :	14.8	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	13.94	11.54	0.00
Computed Flow Time (min) :	1.13	0.46	0.00

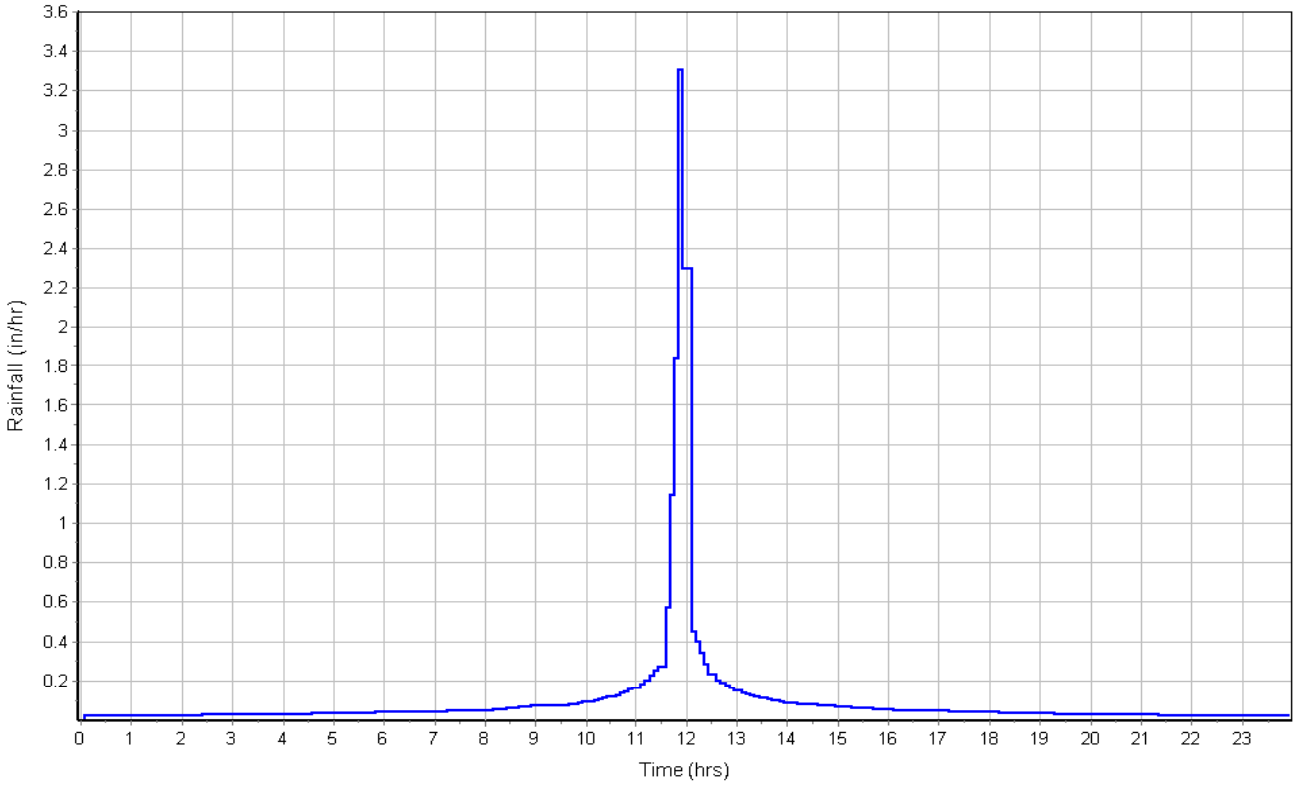
Total TOC (min) 3.31

Subbasin Runoff Results

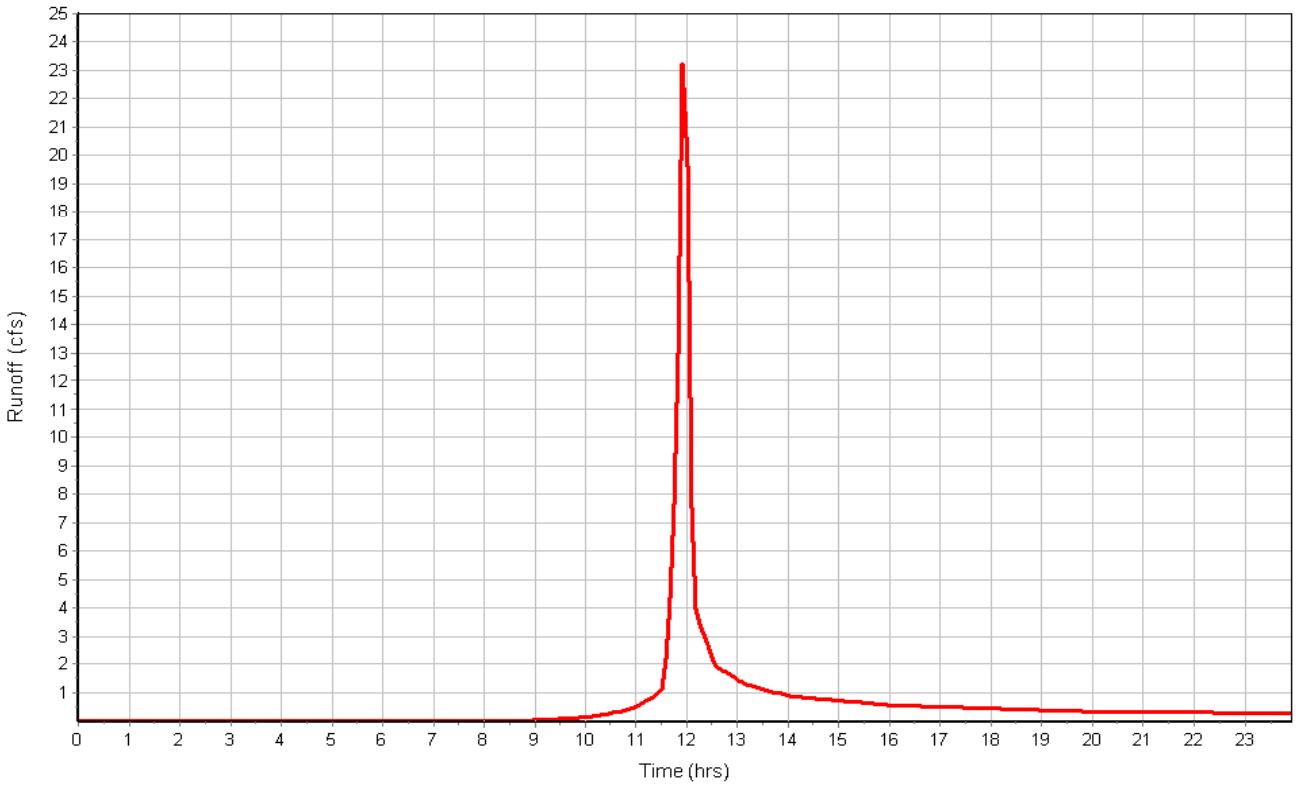
Total Rainfall (in) 2.41
Total Runoff (in) 1.17
Peak Runoff (cfs) 23.41
Weighted Curve Number 86.00
Time of Concentration (days hh:mm:ss) 0 00:03:19

Subbasin : Offsite-W-10

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-11

Input Data

Area (ac)	5.43
Peak Rate Factor	484.00
Weighted Curve Number	86.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	5.30	D	86.00
Composite Area & Weighted CN	5.30		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	4.77	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	120	0.00	0.00
Slope (%) :	4	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.23	0.00	0.00
Computed Flow Time (min) :	0.62	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	460	260.56	0.00
Channel Slope (%) :	15.22	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	14.14	11.54	0.00
Computed Flow Time (min) :	0.54	0.38	0.00

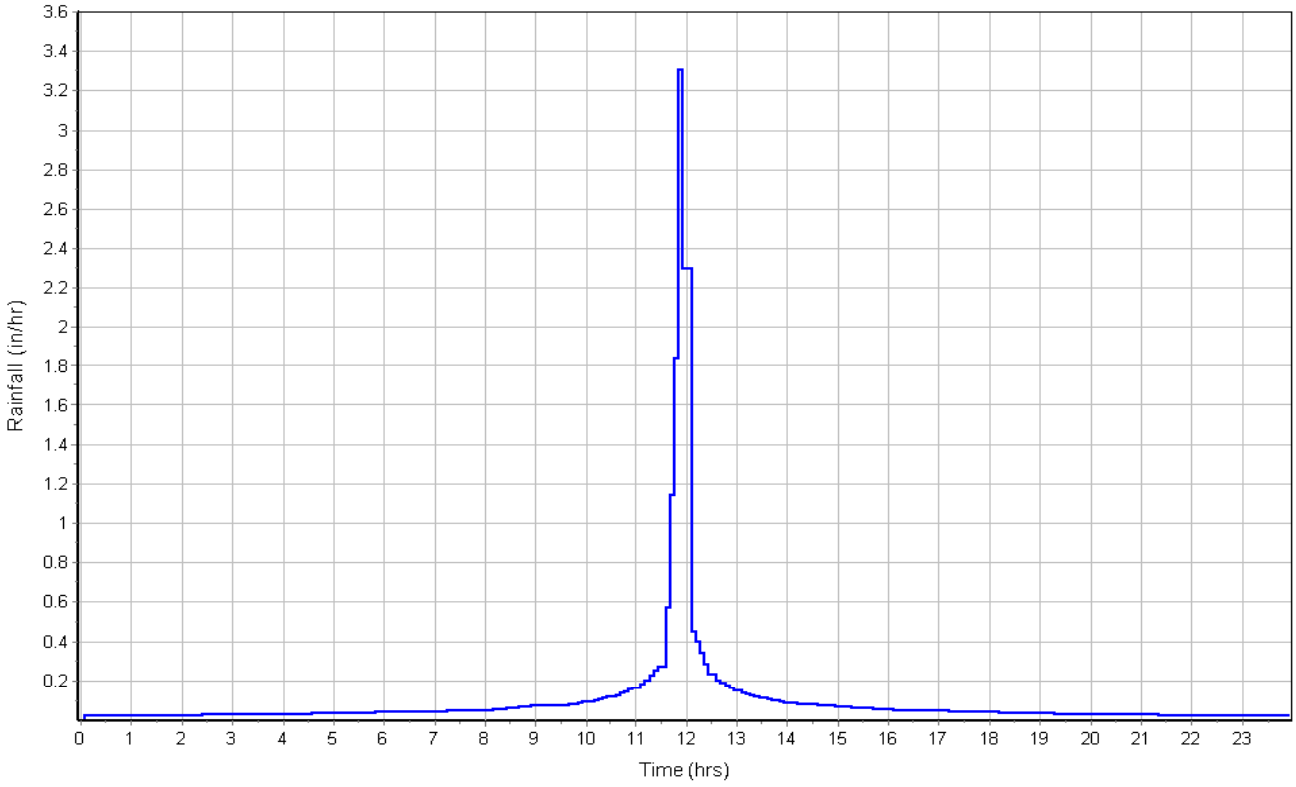
Total TOC (min) 6.30

Subbasin Runoff Results

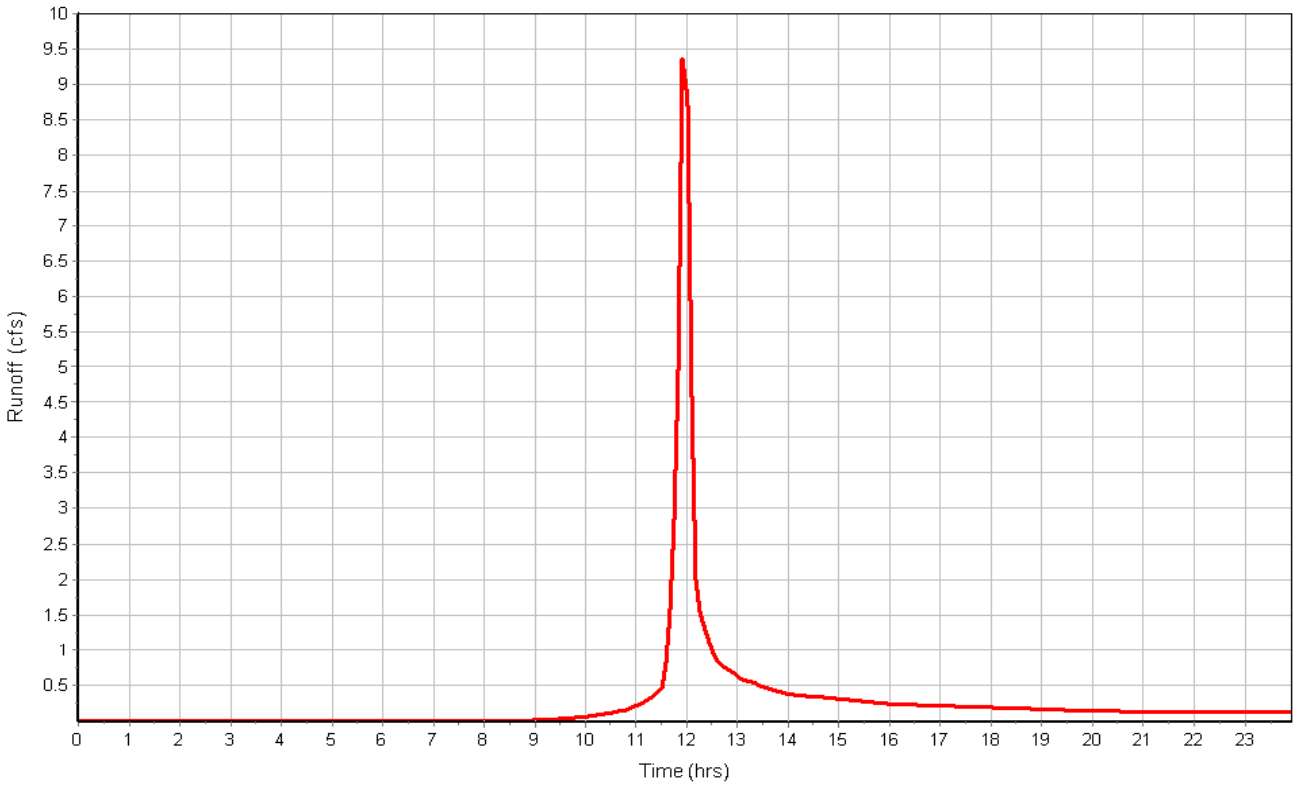
Total Rainfall (in)	2.41
Total Runoff (in)	1.17
Peak Runoff (cfs)	9.71
Weighted Curve Number	86.00
Time of Concentration (days hh:mm:ss)	0 00:06:18

Subbasin : Offsite-W-11

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-12

Input Data

Area (ac) 5.46
Peak Rate Factor 484.00
Weighted Curve Number 86.00
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	5.46	D	86.00
Composite Area & Weighted CN	5.46		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.08	0.00	0.00
Computed Flow Time (min) :	3.99	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	125	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.91	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	374.15	434.02	0.00
Channel Slope (%) :	10.2	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	11.58	11.54	0.00
Computed Flow Time (min) :	0.54	0.63	0.00

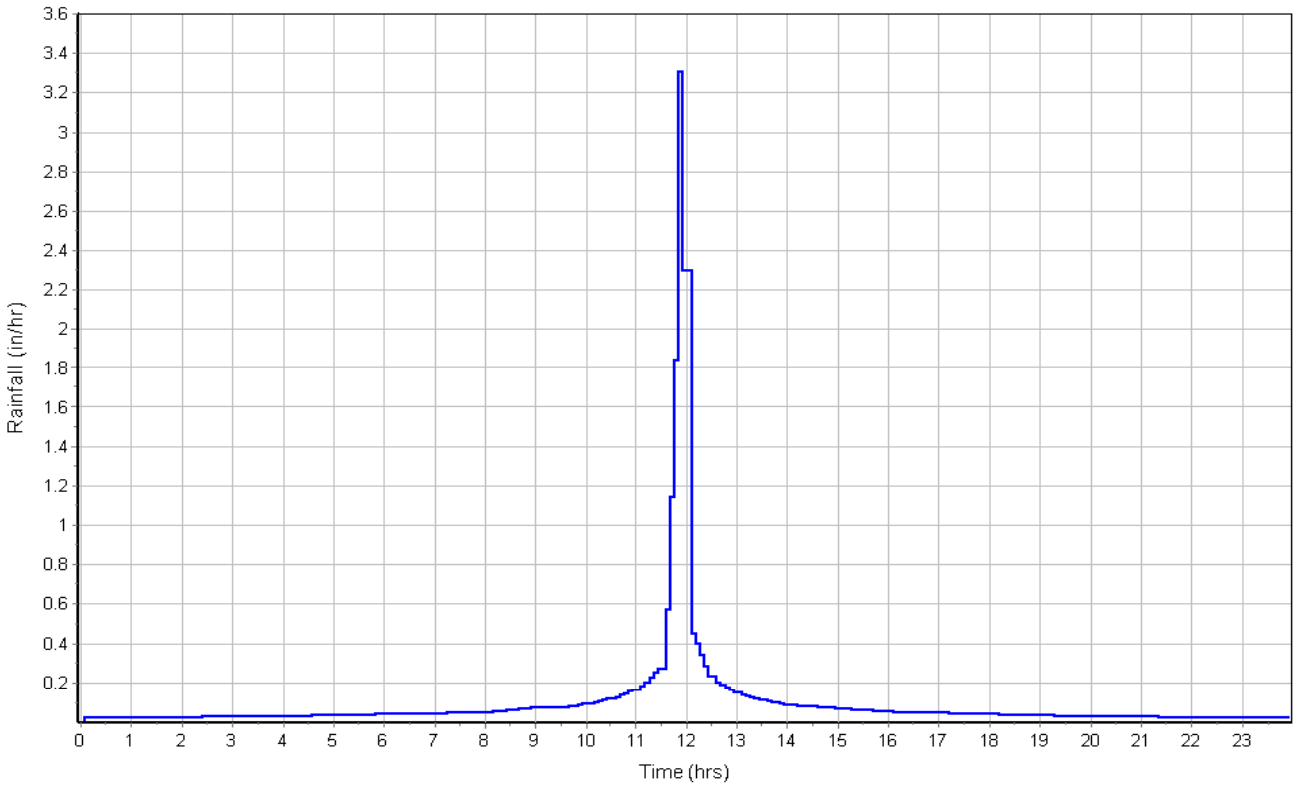
Total TOC (min) 6.07

Subbasin Runoff Results

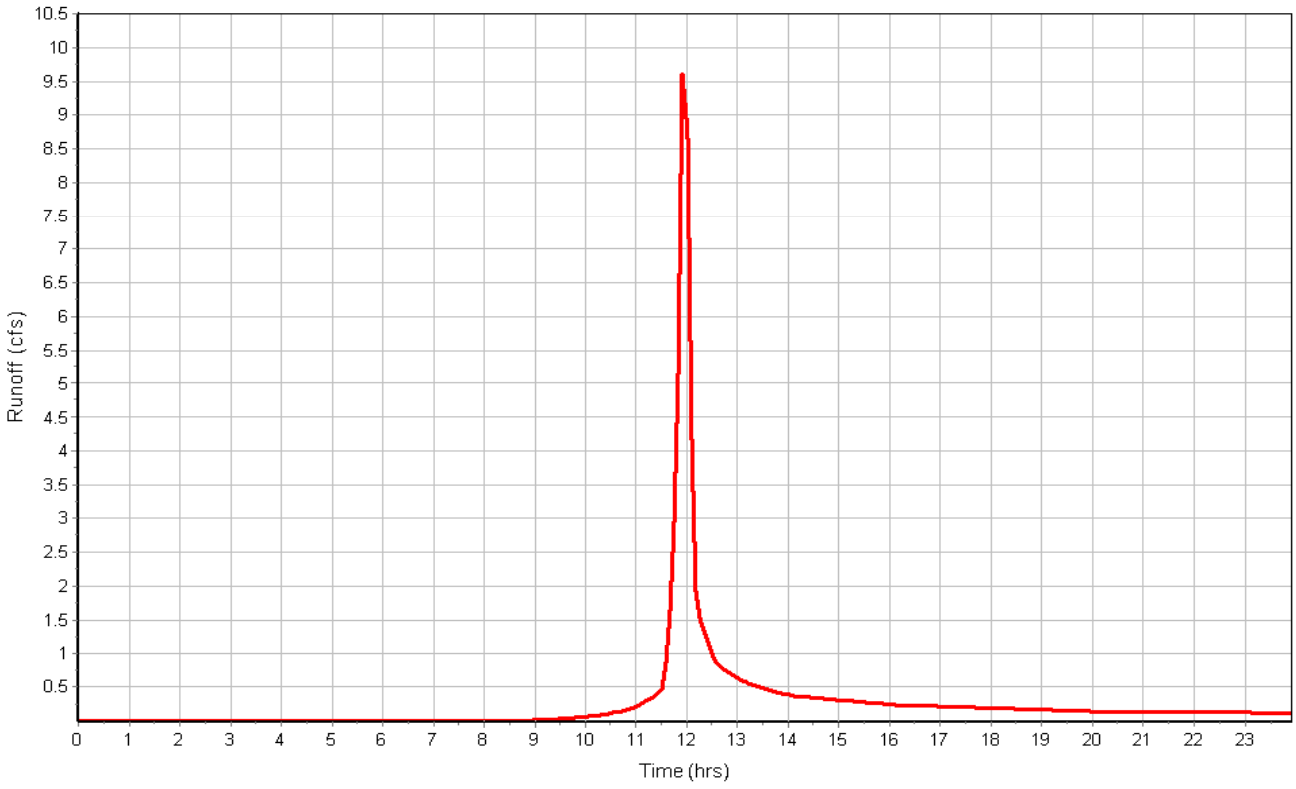
Total Rainfall (in) 2.41
Total Runoff (in) 1.17
Peak Runoff (cfs) 9.82
Weighted Curve Number 86.00
Time of Concentration (days hh:mm:ss) 0 00:06:04

Subbasin : Offsite-W-12

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Offsite-W-13

Input Data

Area (ac)	8.36
Peak Rate Factor	484.00
Weighted Curve Number	86.00
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Desert shrub range, Fair	8.32	D	86.00
Composite Area & Weighted CN	8.32		86.00

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.13	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.09	0.00	0.00
Computed Flow Time (min) :	4.77	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.05	.03	0.00
Flow Length (ft) :	1608.89	1437.89	0.00
Channel Slope (%) :	2	2	0.00
Cross Section Area (ft^2) :	18	44	0.00
Wetted Perimeter (ft) :	13.42	20.89	0.00
Velocity (ft/sec) :	5.13	11.54	0.00
Computed Flow Time (min) :	5.23	2.08	0.00

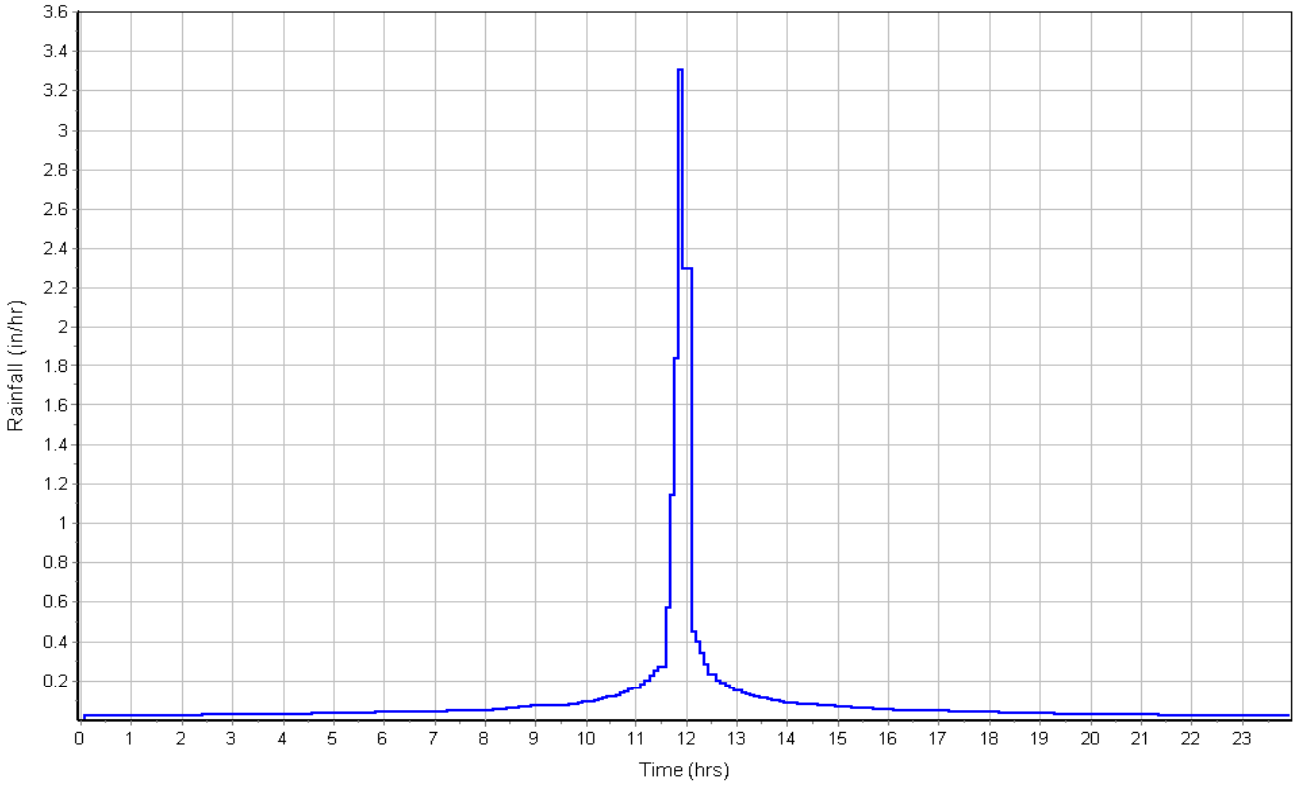
Total TOC (min) 12.22

Subbasin Runoff Results

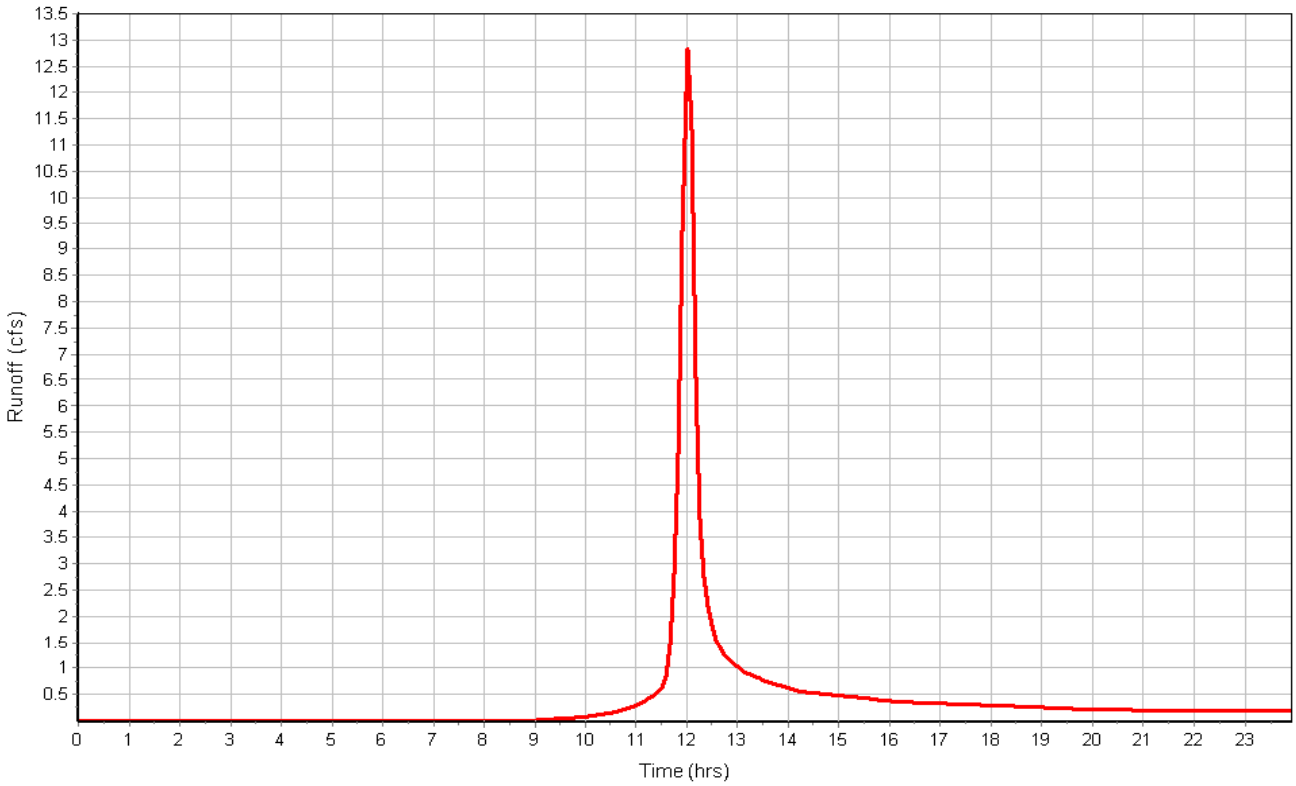
Total Rainfall (in)	2.41
Total Runoff (in)	1.17
Peak Runoff (cfs)	12.96
Weighted Curve Number	86.00
Time of Concentration (days hh:mm:ss)	0 00:12:13

Subbasin : Offsite-W-13

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-01

Input Data

Area (ac) 52.20
Peak Rate Factor 484.00
Weighted Curve Number 83.30
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	36.54	A	77.00
Paved roads with curbs & sewers	15.66	A	98.00
Composite Area & Weighted CN	52.20		83.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	0.50	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2914.50	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	6.76	0.00	0.00

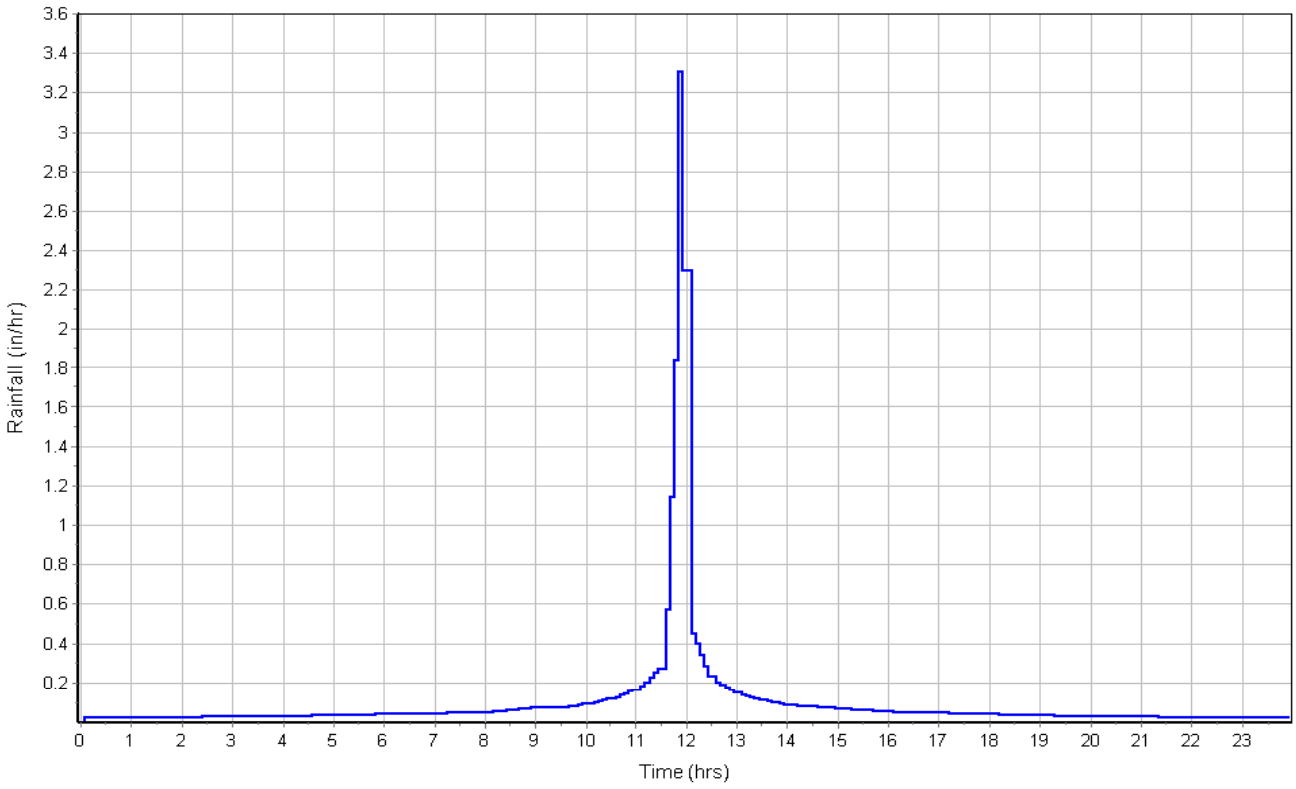
Total TOC (min) 7.26

Subbasin Runoff Results

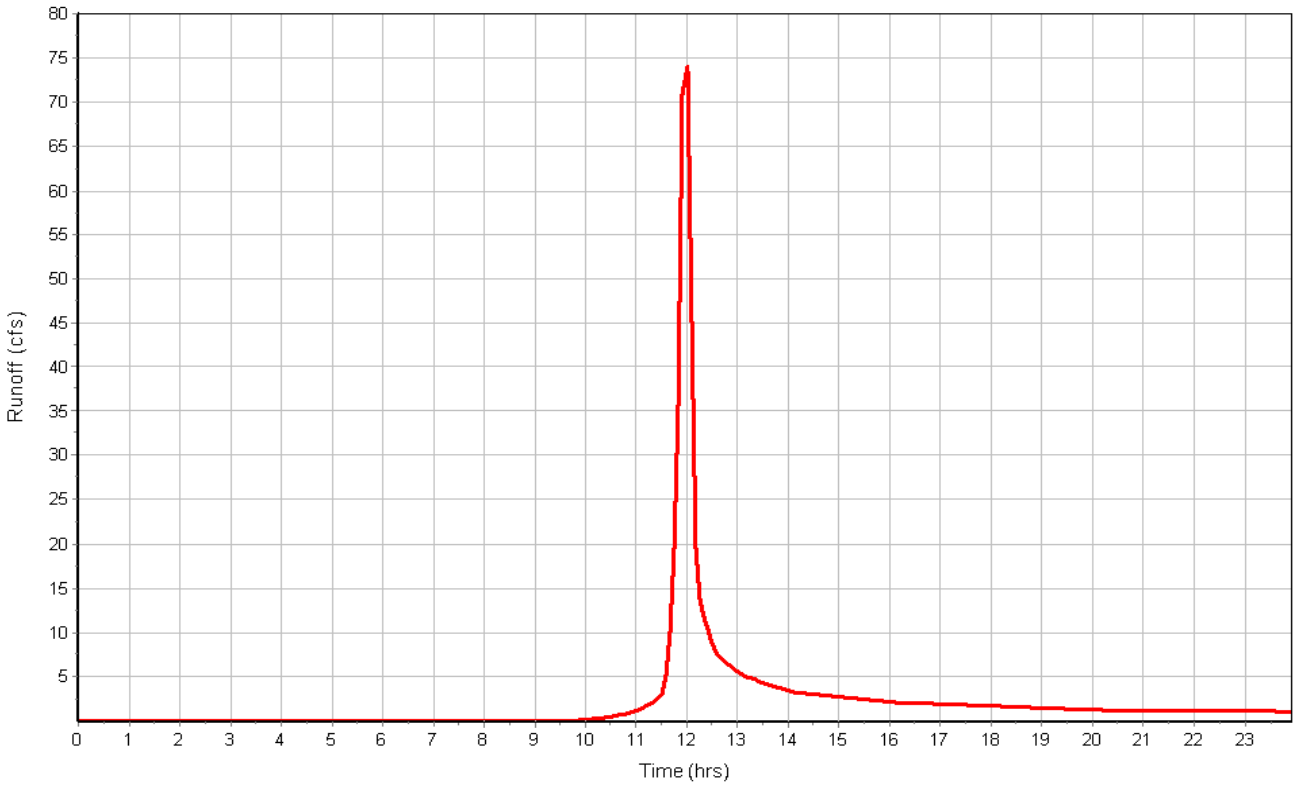
Total Rainfall (in) 2.41
Total Runoff (in) 1.01
Peak Runoff (cfs) 77.16
Weighted Curve Number 83.30
Time of Concentration (days hh:mm:ss) 0 00:07:16

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-02

Input Data

Area (ac) 32.89
Peak Rate Factor 484.00
Weighted Curve Number 78.05
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	14.80	A	61.00
1/4 acre lots, 38% impervious	9.87	D	87.00
Paved roads with curbs & sewers	8.22	D	98.00
Composite Area & Weighted CN	32.89		78.05

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	0.50	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2101.42	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	5.26	0.00	0.00

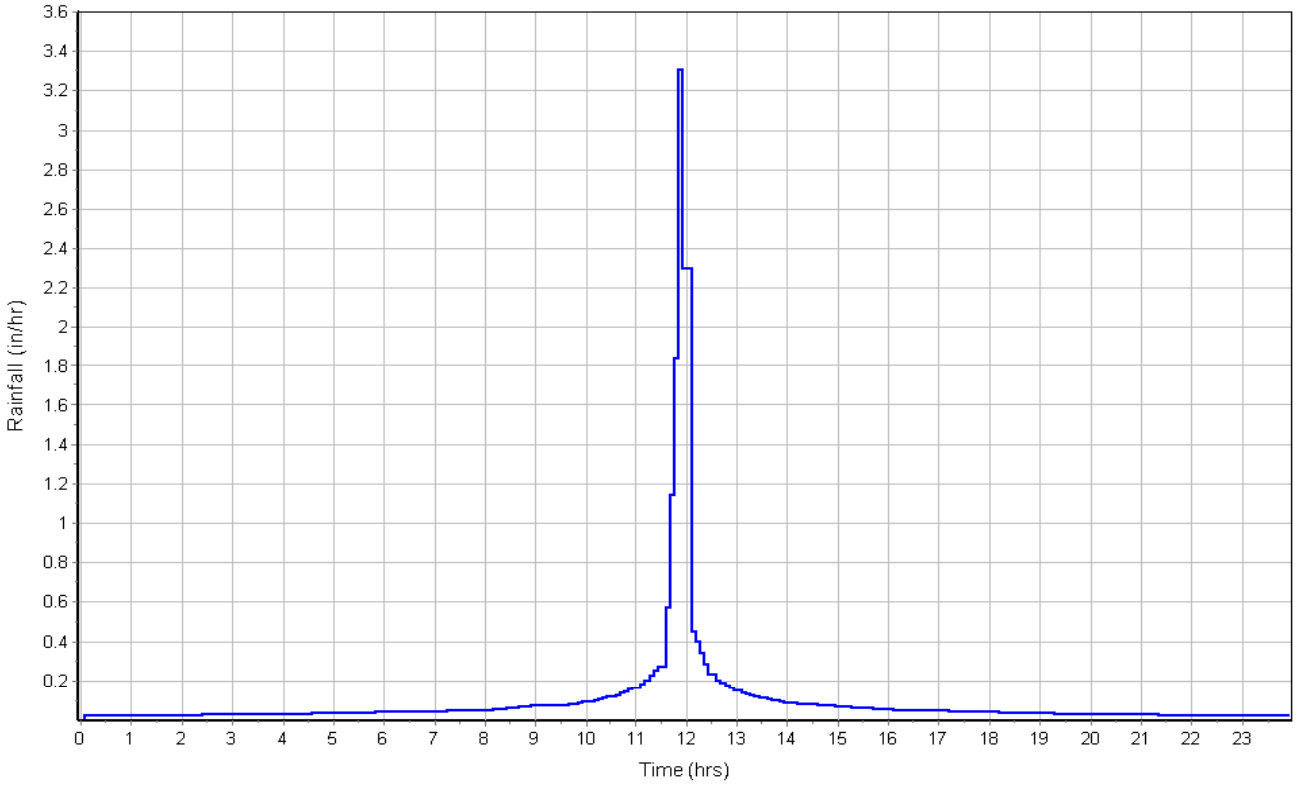
Total TOC (min) 5.76

Subbasin Runoff Results

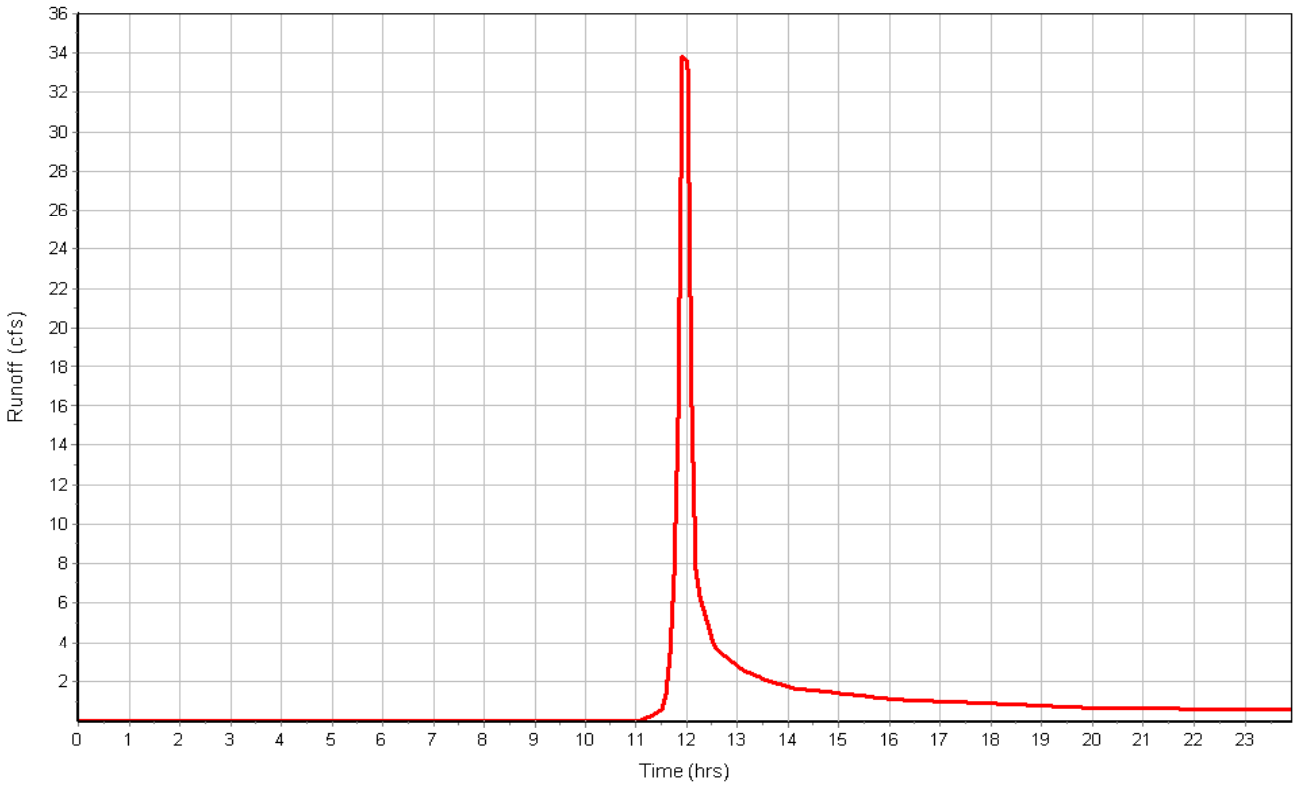
Total Rainfall (in) 2.41
Total Runoff (in) 0.73
Peak Runoff (cfs) 35.59
Weighted Curve Number 78.05
Time of Concentration (days hh:mm:ss) 0 00:05:46

Subbasin : Sub-02

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-03

Input Data

Area (ac) 30.60
Peak Rate Factor 484.00
Weighted Curve Number 72.85
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	3.06	D	87.00
1/4 acre lots, 38% impervious	19.89	A	61.00
Paved roads with curbs & sewers	7.65	D	98.00
Composite Area & Weighted CN	30.60		72.85

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	3810.41	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	8.83	0.00	0.00

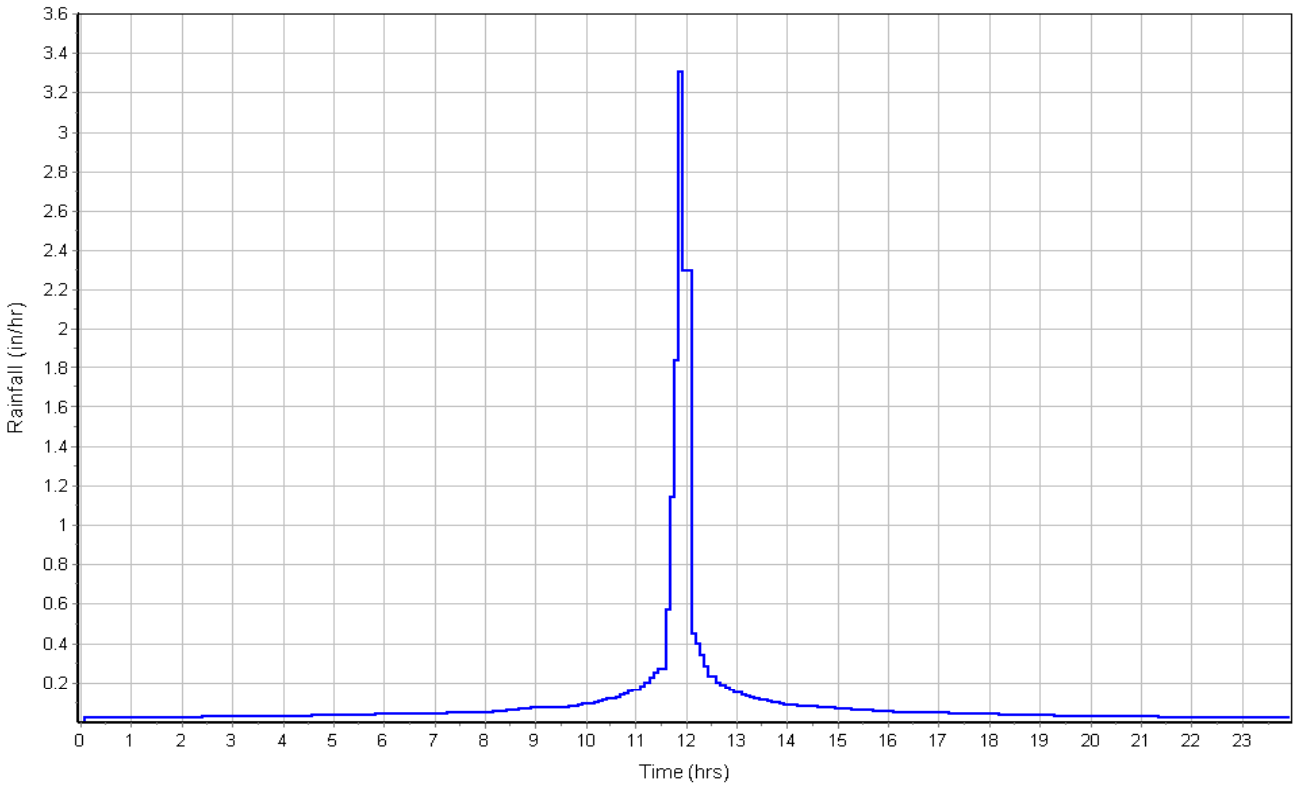
Total TOC (min) 9.47

Subbasin Runoff Results

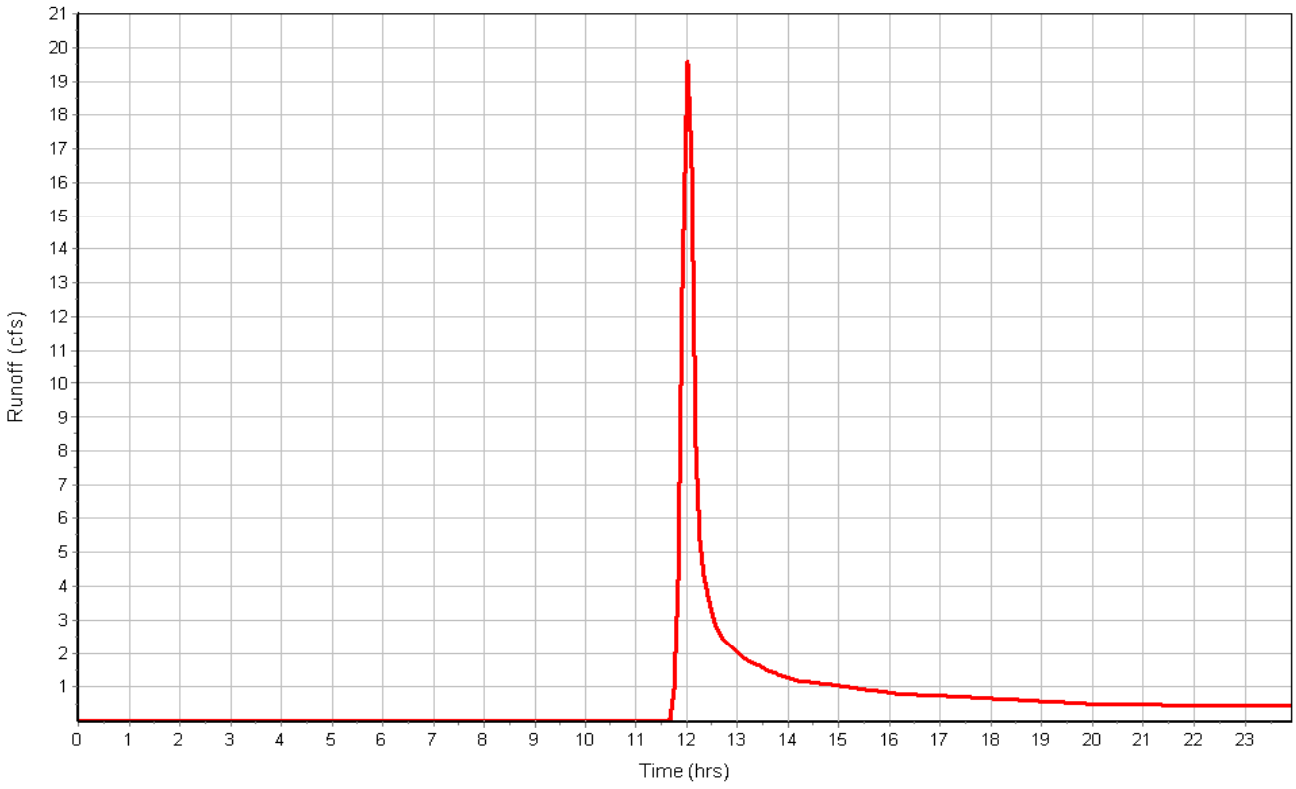
Total Rainfall (in) 2.41
Total Runoff (in) 0.51
Peak Runoff (cfs) 20.05
Weighted Curve Number 72.85
Time of Concentration (days hh:mm:ss) 0 00:09:28

Subbasin : Sub-03

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-04

Input Data

Area (ac)	27.51
Peak Rate Factor	484.00
Weighted Curve Number	70.25
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	20.63	A	61.00
Paved roads with curbs & sewers	6.88	A	98.00
Composite Area & Weighted CN	27.51		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	3080.46	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	7.14	0.00	0.00

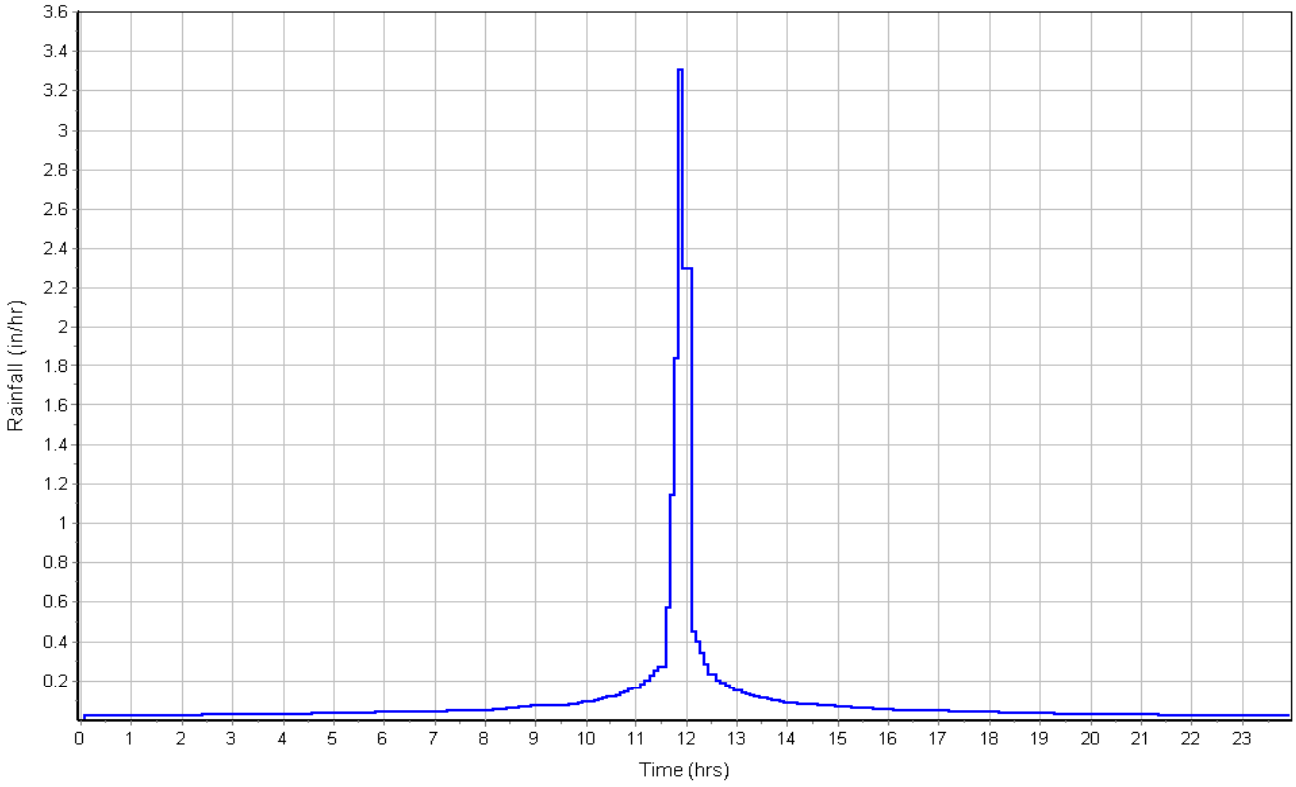
Total TOC (min) 7.77

Subbasin Runoff Results

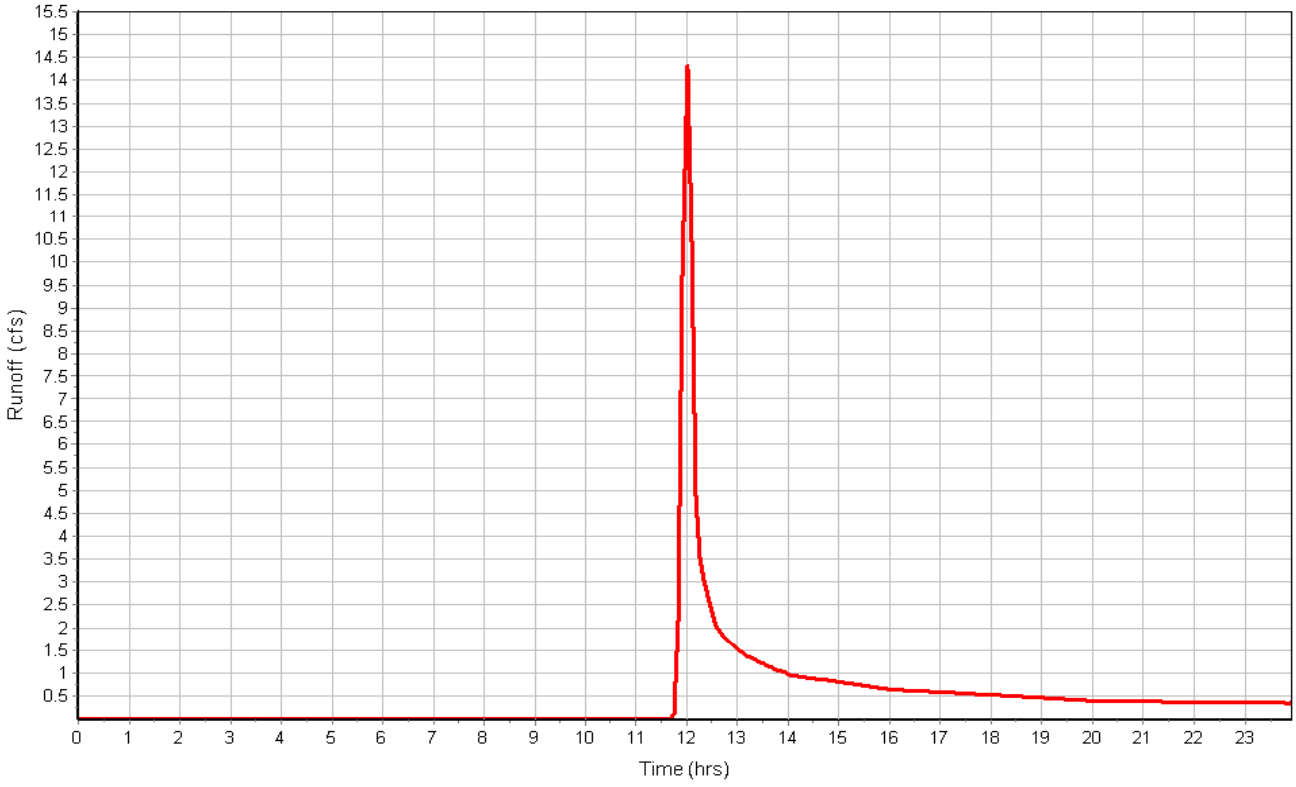
Total Rainfall (in)	2.41
Total Runoff (in)	0.42
Peak Runoff (cfs)	14.60
Weighted Curve Number	70.25
Time of Concentration (days hh:mm:ss)	0 00:07:46

Subbasin : Sub-04

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-05

Input Data

Area (ac) 26.84
Peak Rate Factor 484.00
Weighted Curve Number 82.20
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	5.37	A	98.00
1/8 acre lots, 65% impervious	16.10	A	77.00
< 50% grass cover, Poor	2.68	A	68.00
Artificial desert landscape	2.68	A	96.00
Composite Area & Weighted CN	26.83		82.20

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2061.62	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	4.78	0.00	0.00

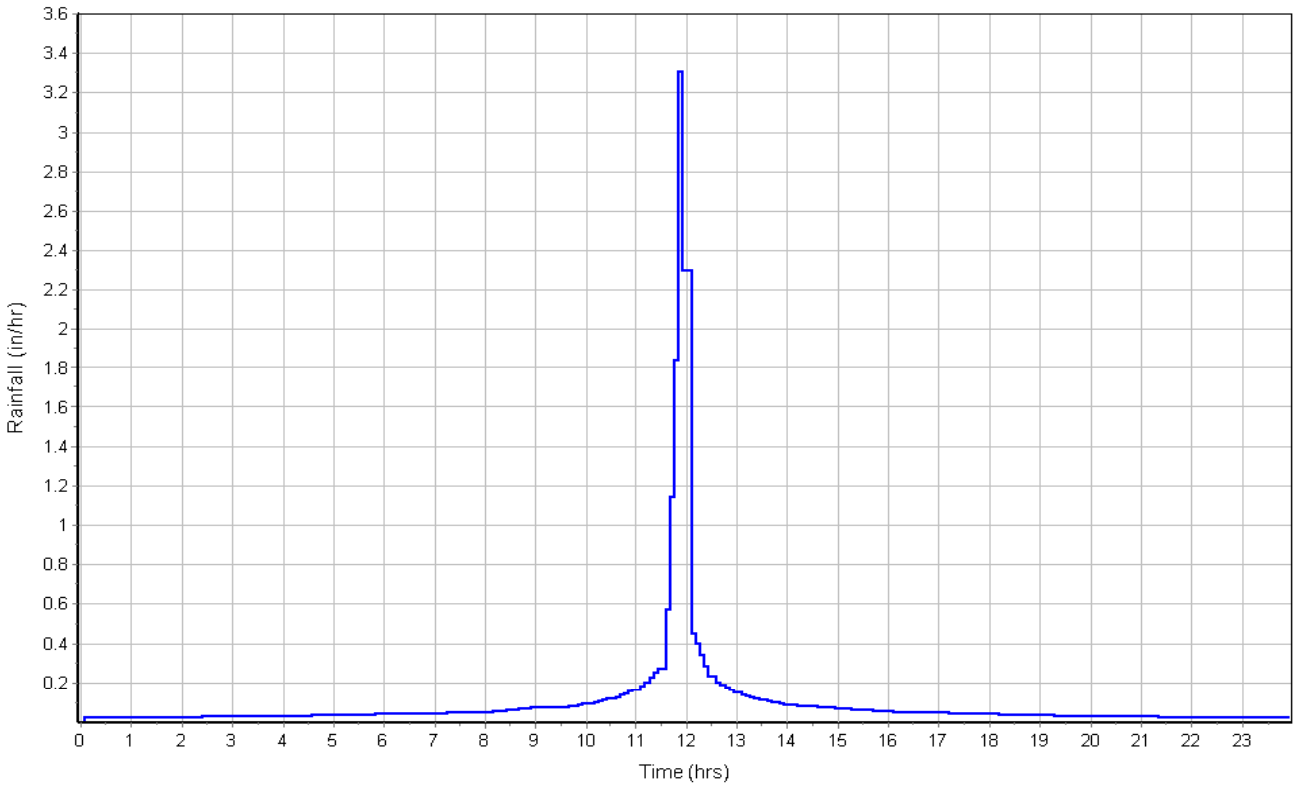
Total TOC (min) 5.41

Subbasin Runoff Results

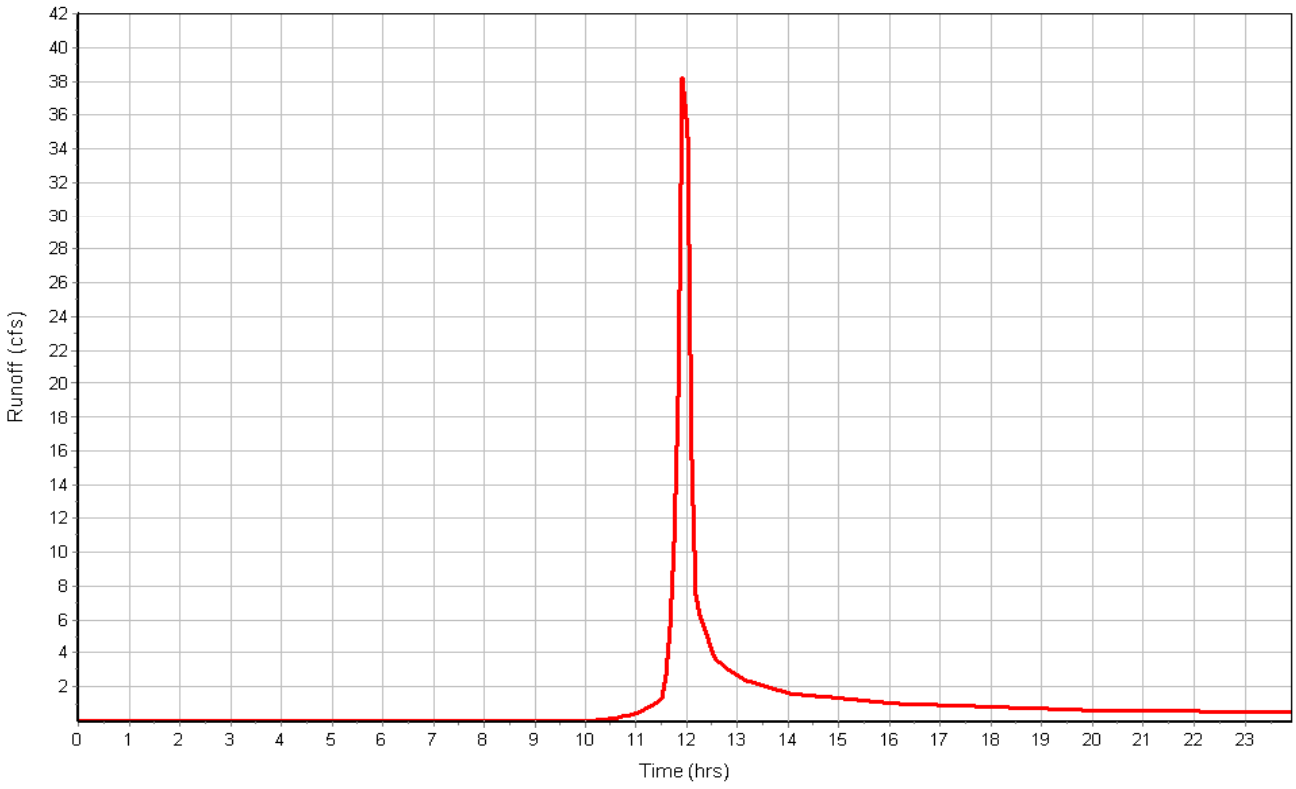
Total Rainfall (in) 2.41
Total Runoff (in) 0.94
Peak Runoff (cfs) 39.20
Weighted Curve Number 82.20
Time of Concentration (days hh:mm:ss) 0 00:05:25

Subbasin : Sub-05

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-06

Input Data

Area (ac) 21.15
Peak Rate Factor 484.00
Weighted Curve Number 82.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	15.86	A	77.00
Paved parking & roofs	5.29	A	98.00
Composite Area & Weighted CN	21.15		82.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	3836.69	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	9.61	0.00	0.00

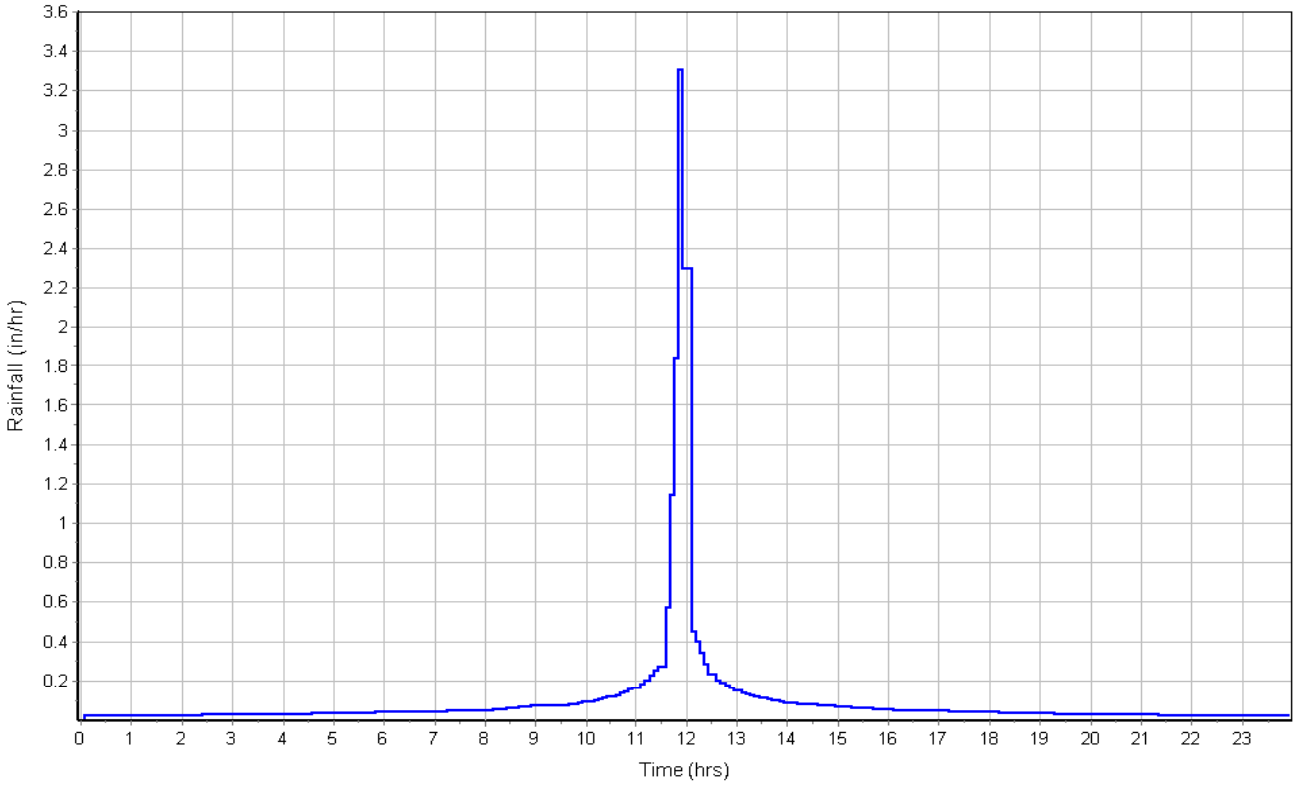
Total TOC (min) 10.24

Subbasin Runoff Results

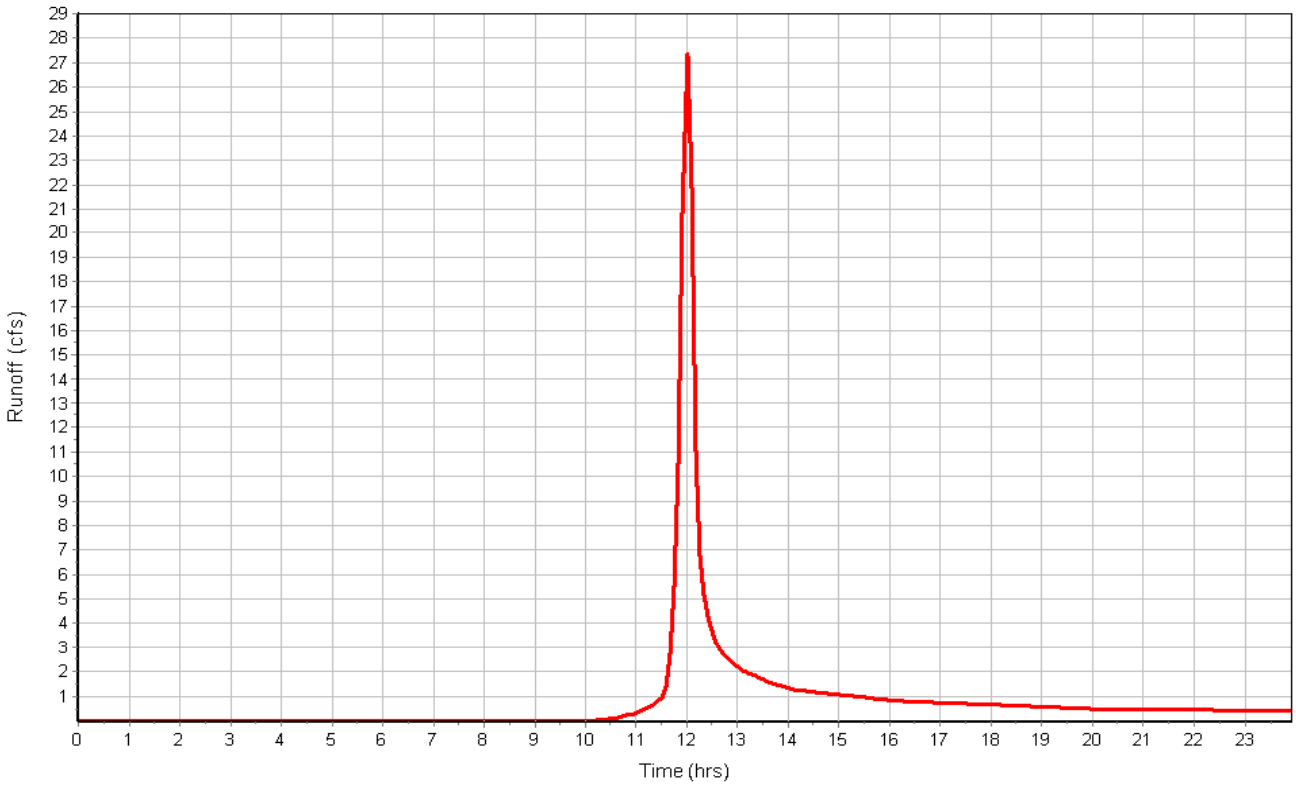
Total Rainfall (in) 2.41
Total Runoff (in) 0.95
Peak Runoff (cfs) 27.40
Weighted Curve Number 82.25
Time of Concentration (days hh:mm:ss) 0 00:10:14

Subbasin : Sub-06

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-07

Input Data

Area (ac) 12.31
Peak Rate Factor 484.00
Weighted Curve Number 70.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	9.23	A	61.00
Paved parking & roofs	3.08	A	98.00
Composite Area & Weighted CN	12.31		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	3800.94	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	8.81	0.00	0.00

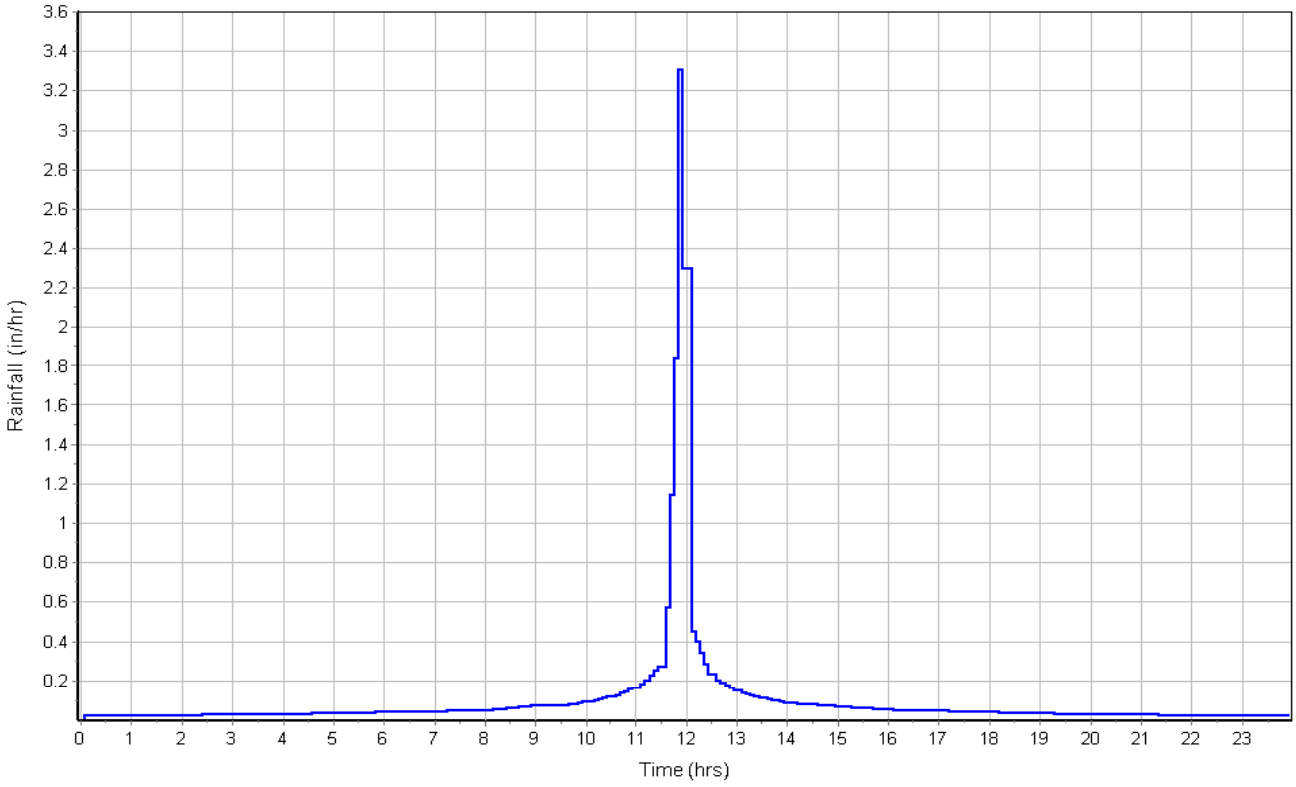
Total TOC (min) 9.44

Subbasin Runoff Results

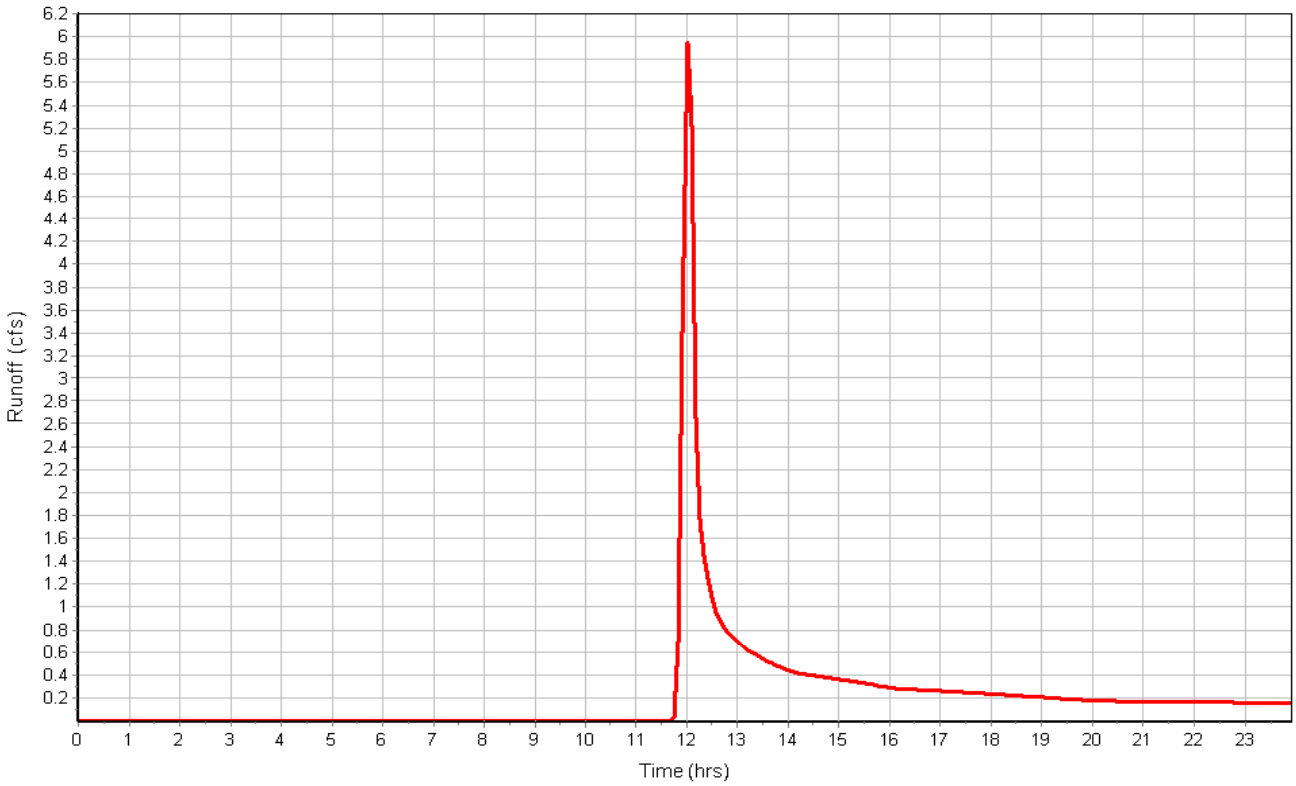
Total Rainfall (in) 2.41
Total Runoff (in) 0.42
Peak Runoff (cfs) 6.26
Weighted Curve Number 70.25
Time of Concentration (days hh:mm:ss) 0 00:09:26

Subbasin : Sub-07

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-08

Input Data

Area (ac) 49.32
Peak Rate Factor 484.00
Weighted Curve Number 75.65
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	22.20	A	61.00
Paved parking & roofs	12.33	A	98.00
1/4 acre lots, 38% impervious	9.86	B	75.00
1/4 acre lots, 38% impervious	4.93	D	87.00
Composite Area & Weighted CN	49.32		75.65

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2077.72	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	4.82	0.00	0.00

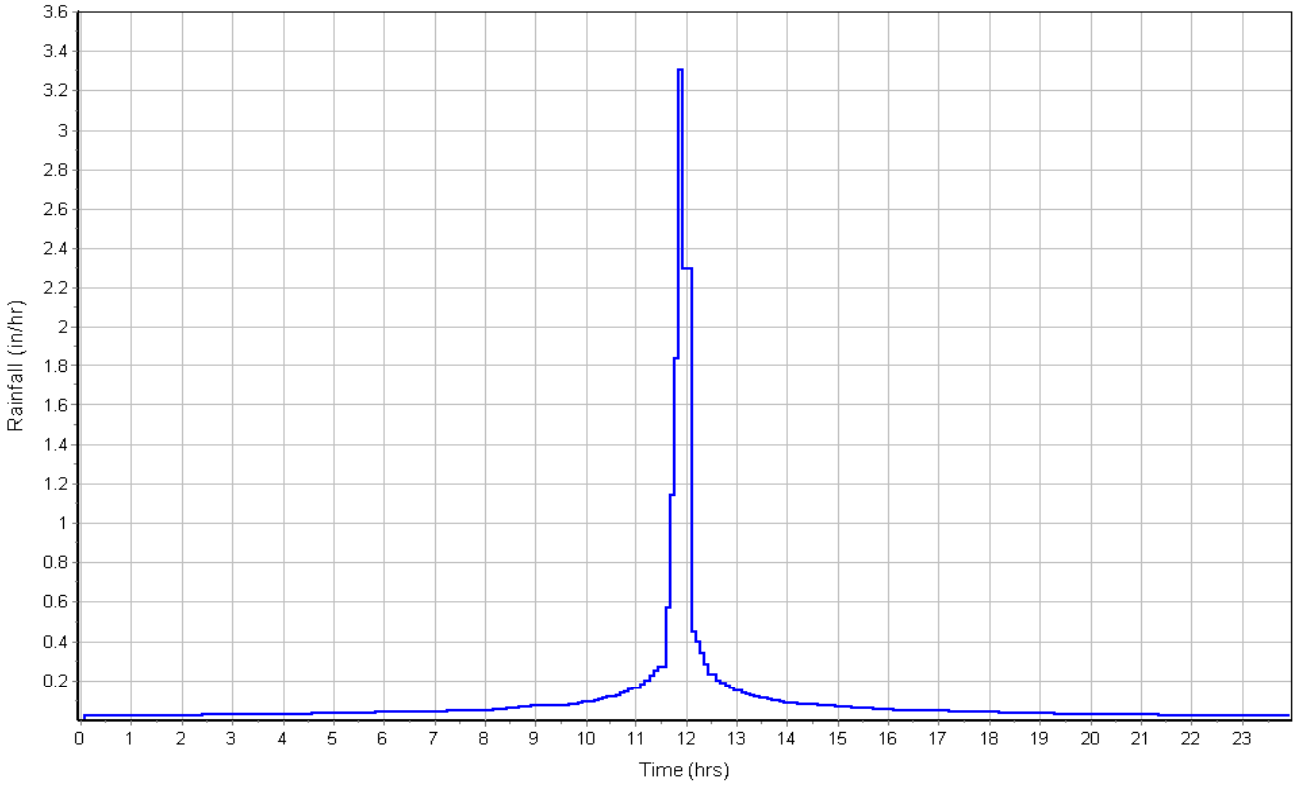
Total TOC (min) 5.45

Subbasin Runoff Results

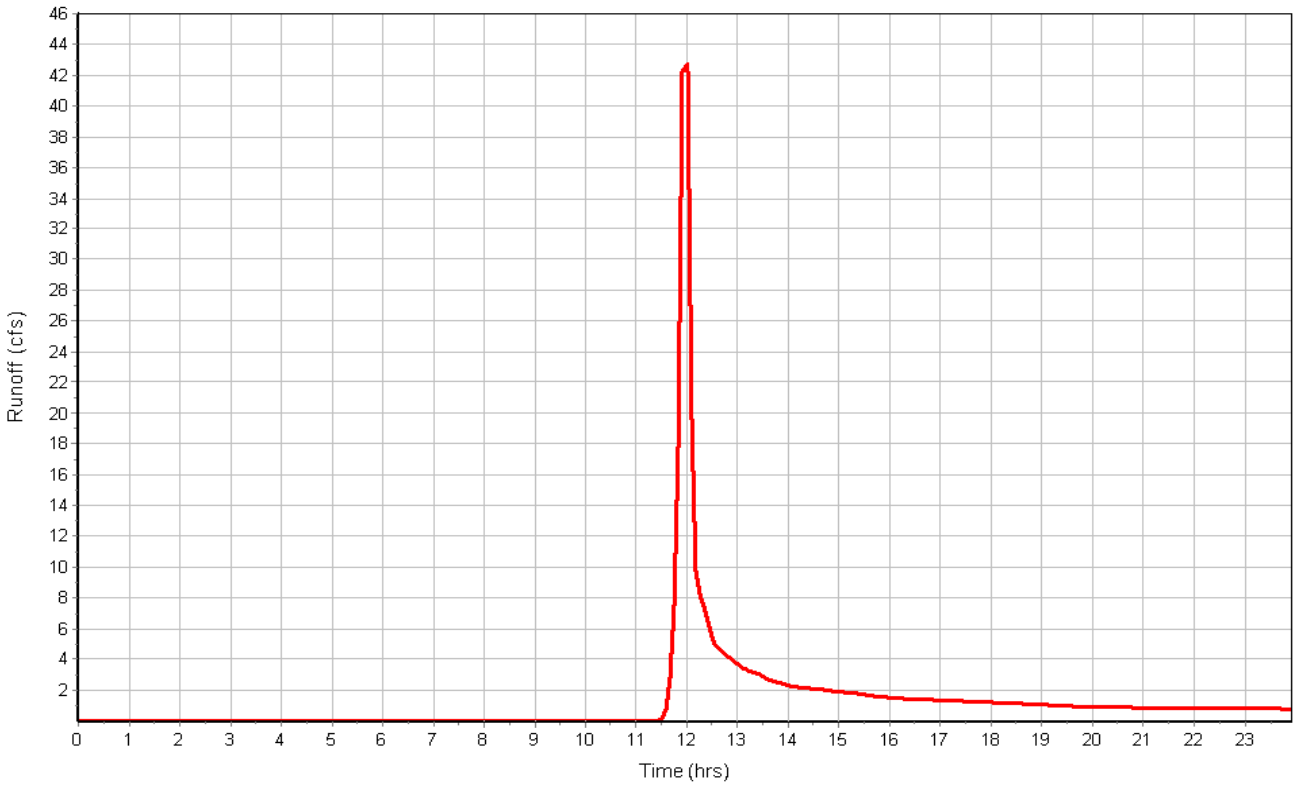
Total Rainfall (in) 2.41
Total Runoff (in) 0.63
Peak Runoff (cfs) 44.51
Weighted Curve Number 75.65
Time of Concentration (days hh:mm:ss) 0 00:05:27

Subbasin : Sub-08

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-09

Input Data

Area (ac) 7.61
Peak Rate Factor 484.00
Weighted Curve Number 86.30
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Gravel roads	6.85	B	85.00
Paved parking & roofs	0.76	B	98.00
Composite Area & Weighted CN	7.61		86.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	25	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.55	0.00	0.00
Computed Flow Time (min) :	0.76	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	85	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.62	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	912.85	0.00	0.00
Channel Slope (%) :	2	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	5.43	0.00	0.00
Computed Flow Time (min) :	2.80	0.00	0.00

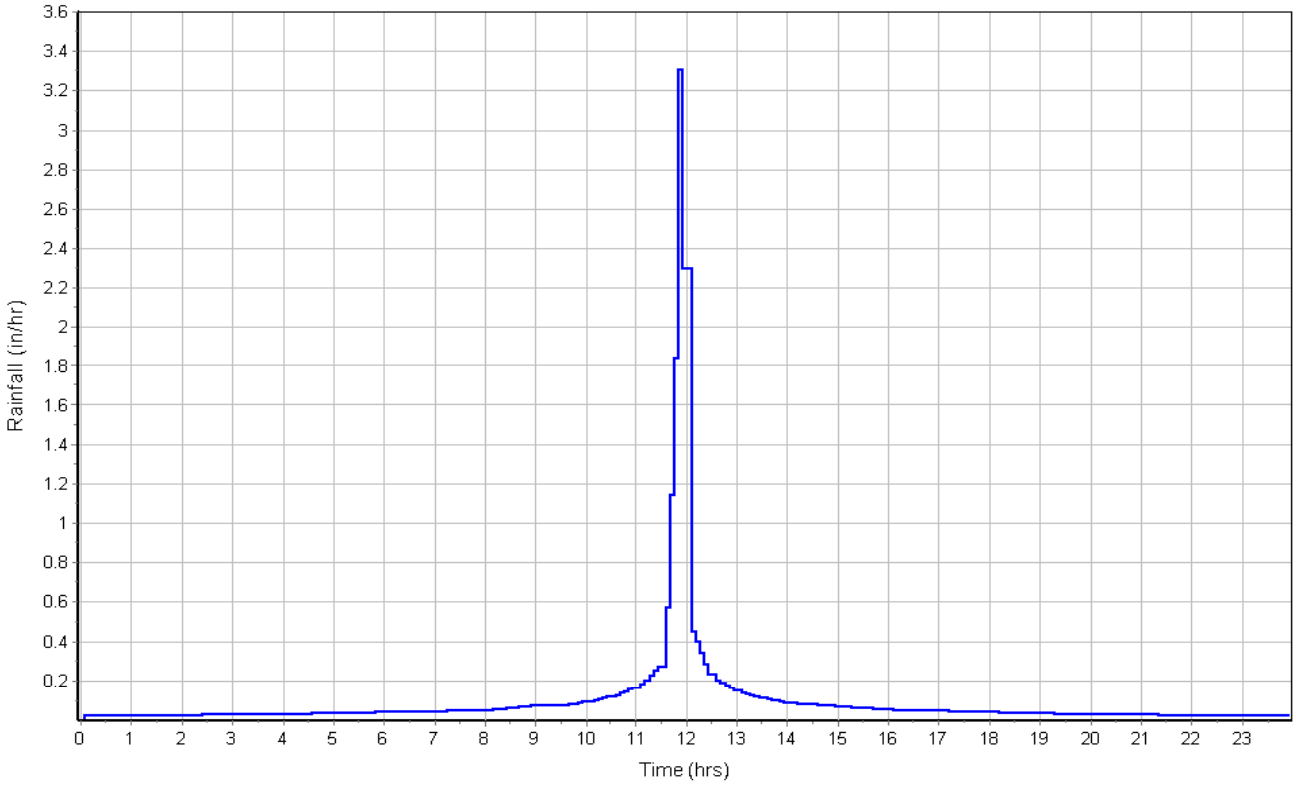
Total TOC (min) 4.18

Subbasin Runoff Results

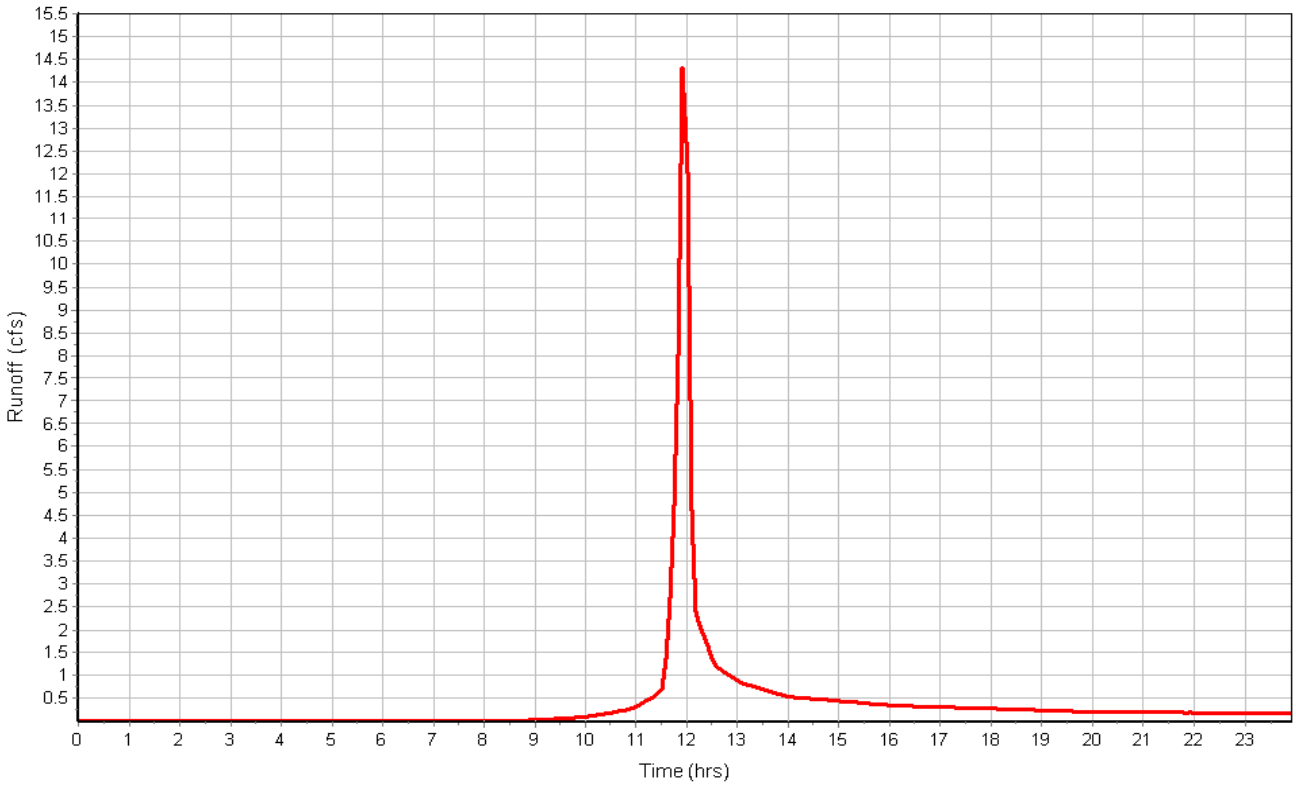
Total Rainfall (in) 2.41
Total Runoff (in) 1.19
Peak Runoff (cfs) 14.40
Weighted Curve Number 86.30
Time of Concentration (days hh:mm:ss) 0 00:04:11

Subbasin : Sub-09

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-10

Input Data

Area (ac) 14.98
Peak Rate Factor 484.00
Weighted Curve Number 88.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	11.23	B	85.00
Paved parking & roofs	3.74	B	98.00
Composite Area & Weighted CN	14.97		88.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.50	0.00	0.00
Computed Flow Time (min) :	0.50	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2274.12	0.00	0.00
Channel Slope (%) :	2	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	5.43	0.00	0.00
Computed Flow Time (min) :	6.97	0.00	0.00

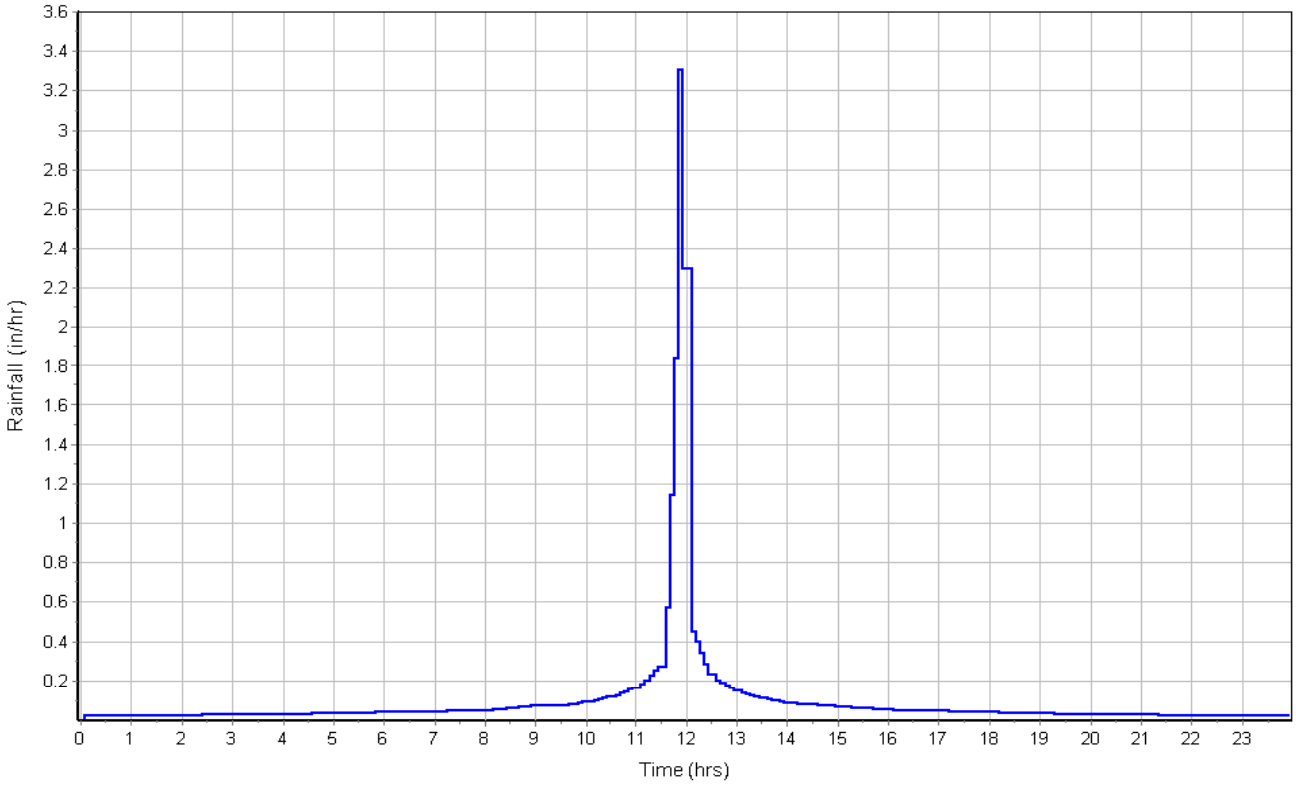
Total TOC (min) 7.48

Subbasin Runoff Results

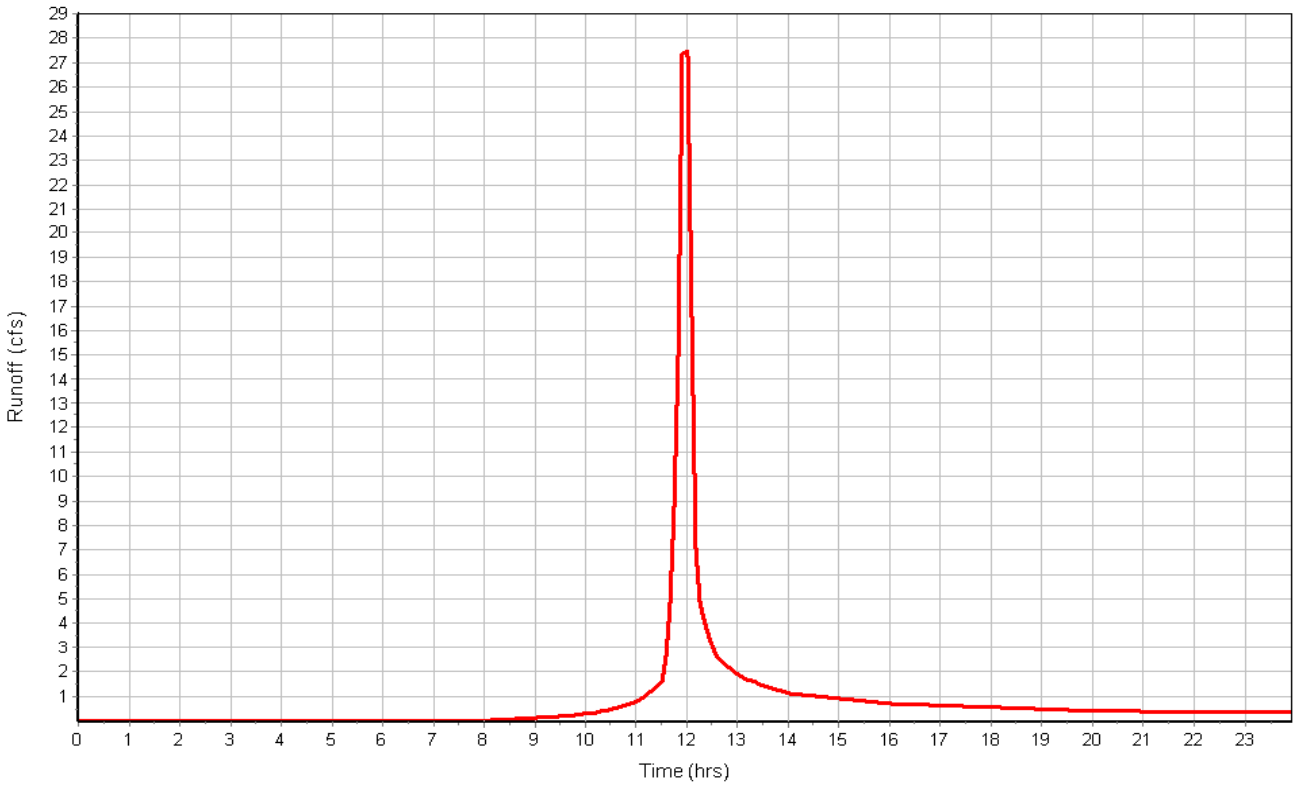
Total Rainfall (in) 2.41
Total Runoff (in) 1.32
Peak Runoff (cfs) 29.20
Weighted Curve Number 88.25
Time of Concentration (days hh:mm:ss) 0 00:07:29

Subbasin : Sub-10

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-11

Input Data

Area (ac) 30.21
Peak Rate Factor 484.00
Weighted Curve Number 79.35
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	19.63	B	75.00
Paved parking & roofs	7.55	B	98.00
1/4 acre lots, 38% impervious	3.02	A	61.00
Composite Area & Weighted CN	30.20		79.35

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	4630.96	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	11.60	0.00	0.00

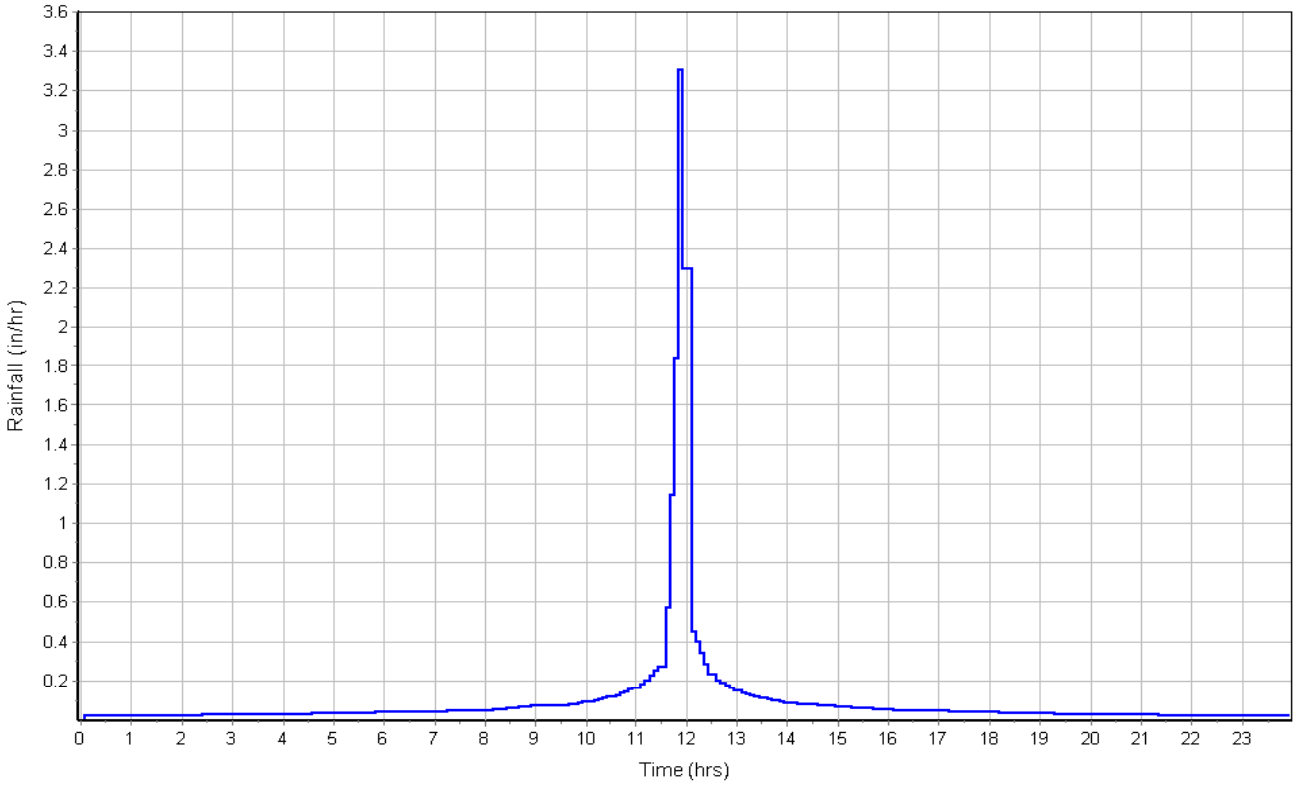
Total TOC (min) 12.37

Subbasin Runoff Results

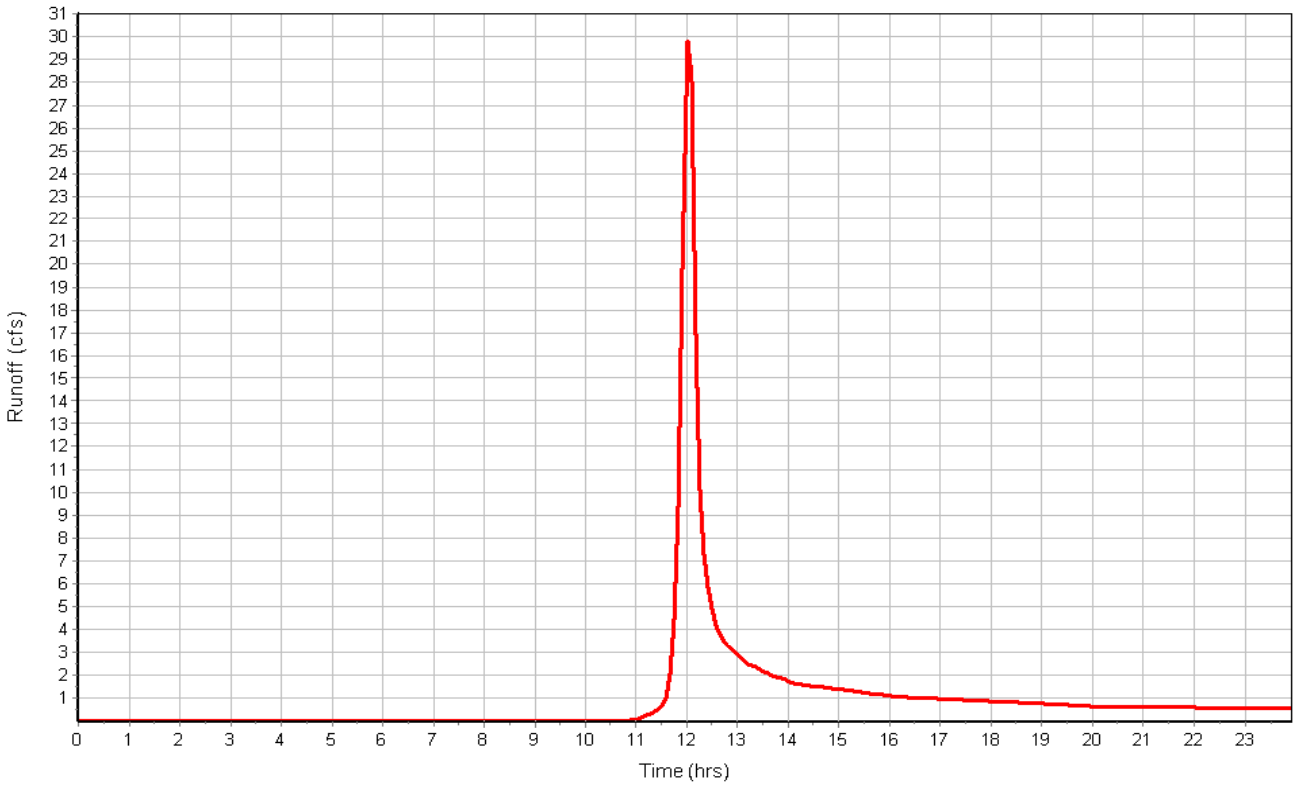
Total Rainfall (in) 2.41
Total Runoff (in) 0.80
Peak Runoff (cfs) 30.85
Weighted Curve Number 79.35
Time of Concentration (days hh:mm:ss) 0 00:12:22

Subbasin : Sub-11

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-12

Input Data

Area (ac) 9.99
Peak Rate Factor 484.00
Weighted Curve Number 70.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved roads with curbs & sewers	2.50	A	98.00
1/4 acre lots, 38% impervious	7.50	A	61.00
Composite Area & Weighted CN	10.00		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	2616.67	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	6.55	0.00	0.00

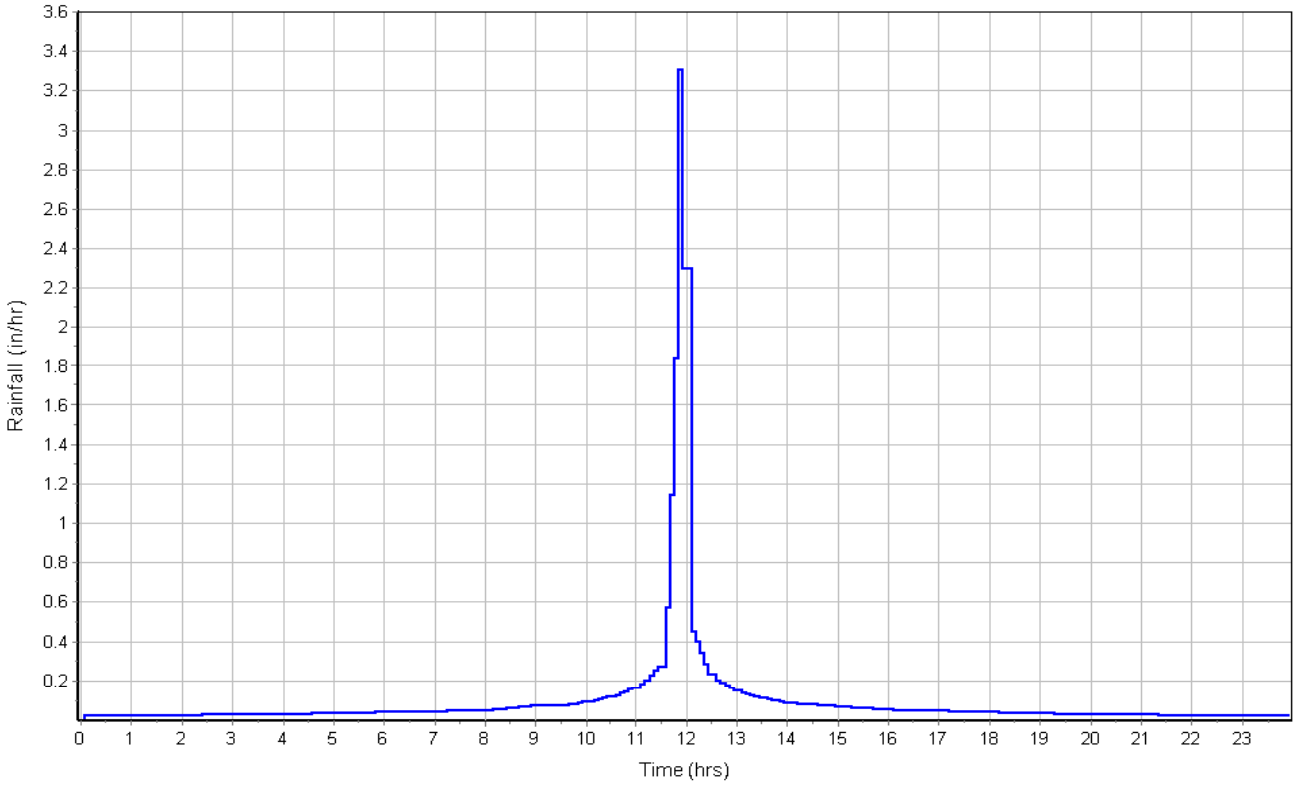
Total TOC (min) 7.33

Subbasin Runoff Results

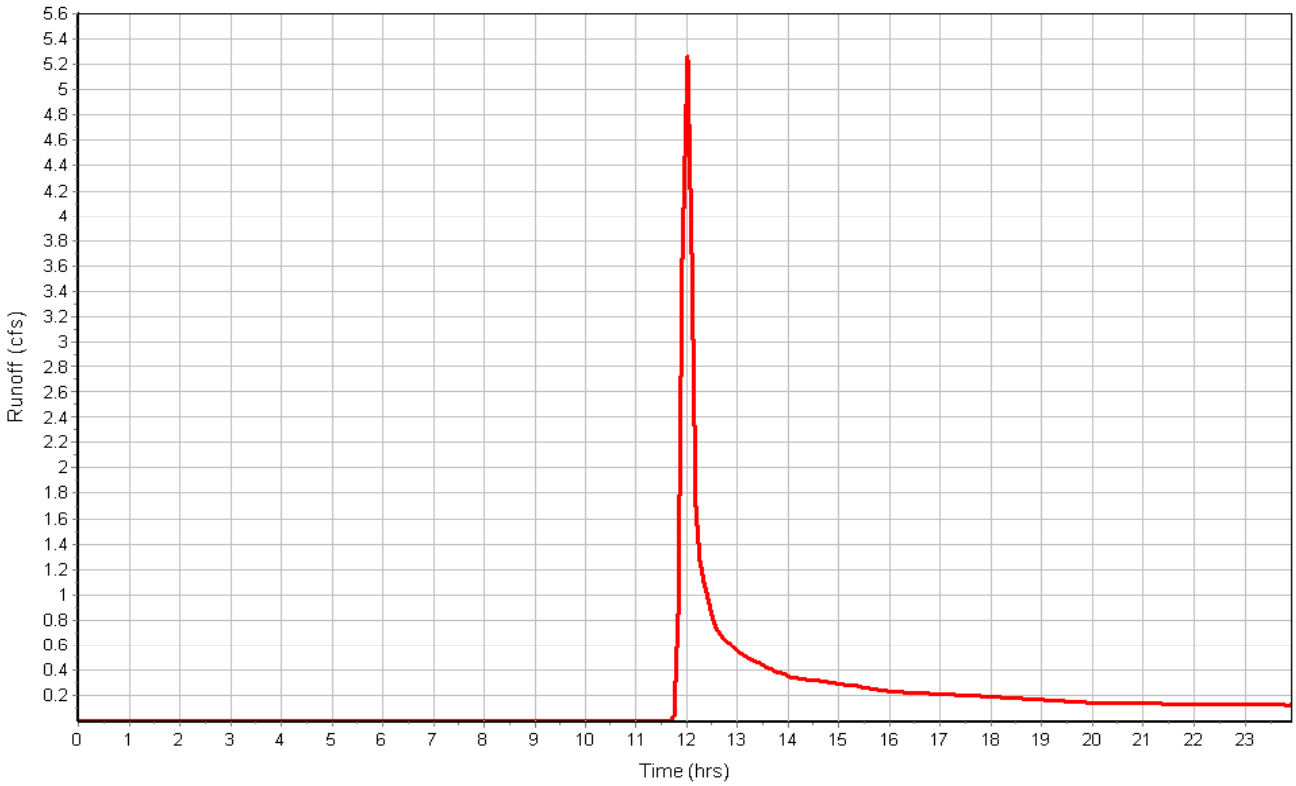
Total Rainfall (in) 2.41
Total Runoff (in) 0.42
Peak Runoff (cfs) 5.36
Weighted Curve Number 70.25
Time of Concentration (days hh:mm:ss) 0 00:07:20

Subbasin : Sub-12

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-13

Input Data

Area (ac)	27.58
Peak Rate Factor	484.00
Weighted Curve Number	70.25
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	20.68	A	61.00
Paved parking & roofs	6.89	A	98.00
Composite Area & Weighted CN	27.57		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	15	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.11	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2276.11	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	5.70	0.00	0.00

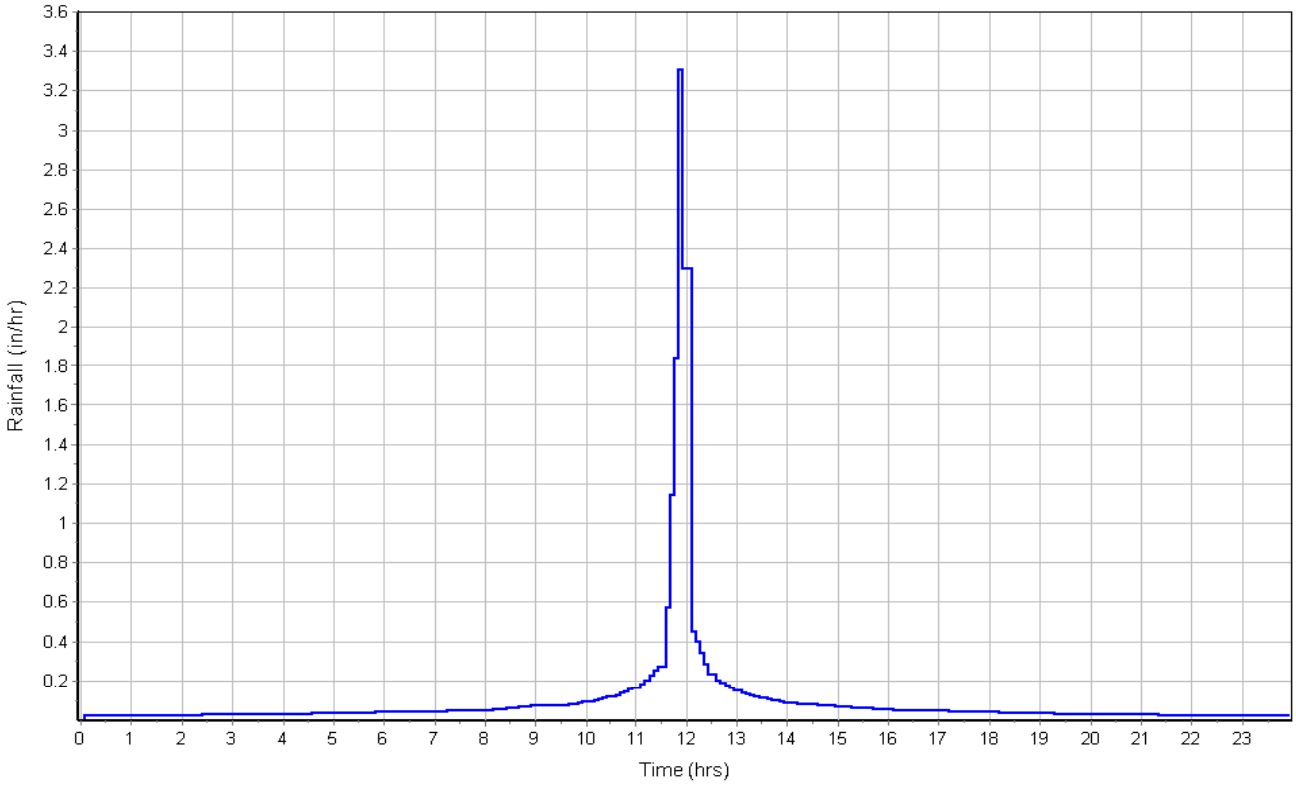
Total TOC (min) 6.44

Subbasin Runoff Results

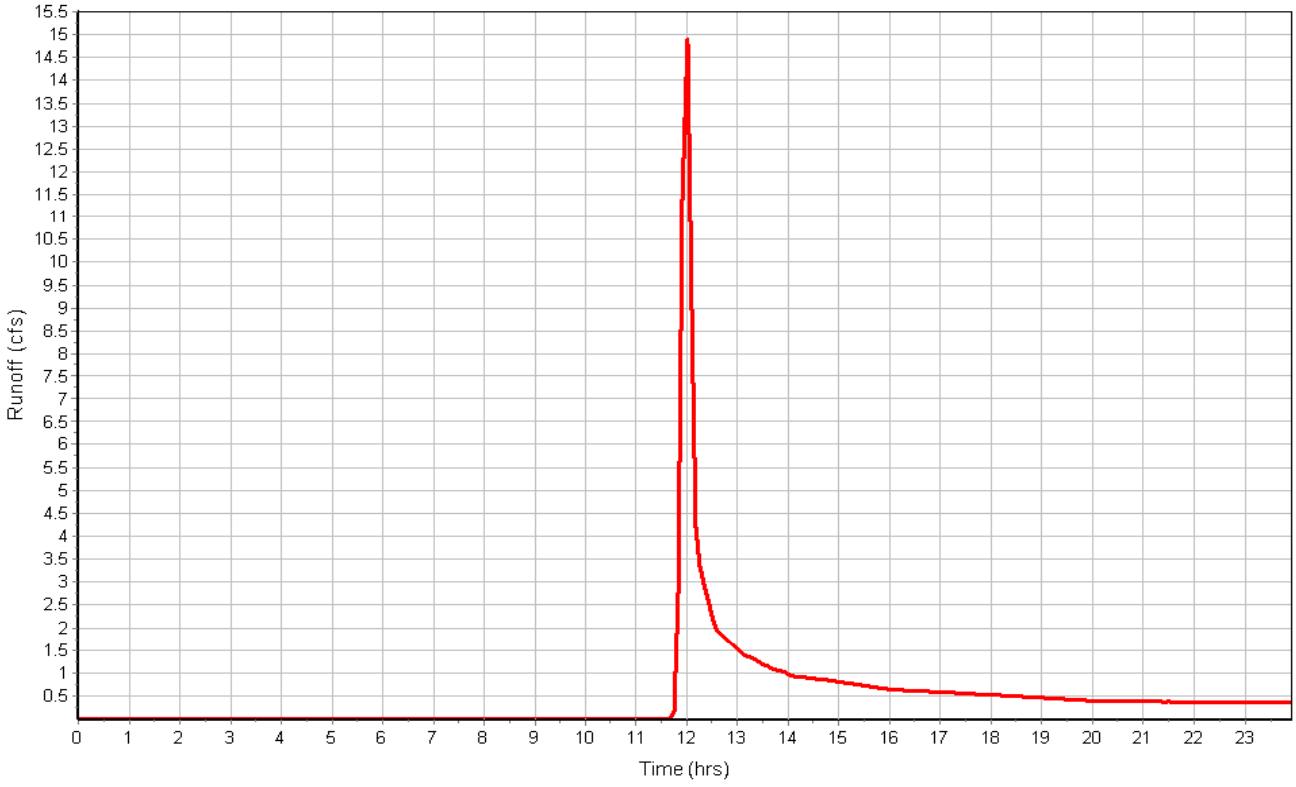
Total Rainfall (in)	2.41
Total Runoff (in)	0.42
Peak Runoff (cfs)	15.11
Weighted Curve Number	70.25
Time of Concentration (days hh:mm:ss)	0 00:06:26

Subbasin : Sub-13

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-14

Input Data

Area (ac) 13.43
Peak Rate Factor 484.00
Weighted Curve Number 88.90
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	9.40	B	85.00
Paved parking & roofs	4.03	B	98.00
Composite Area & Weighted CN	13.43		88.90

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2217.59	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	5.55	0.00	0.00

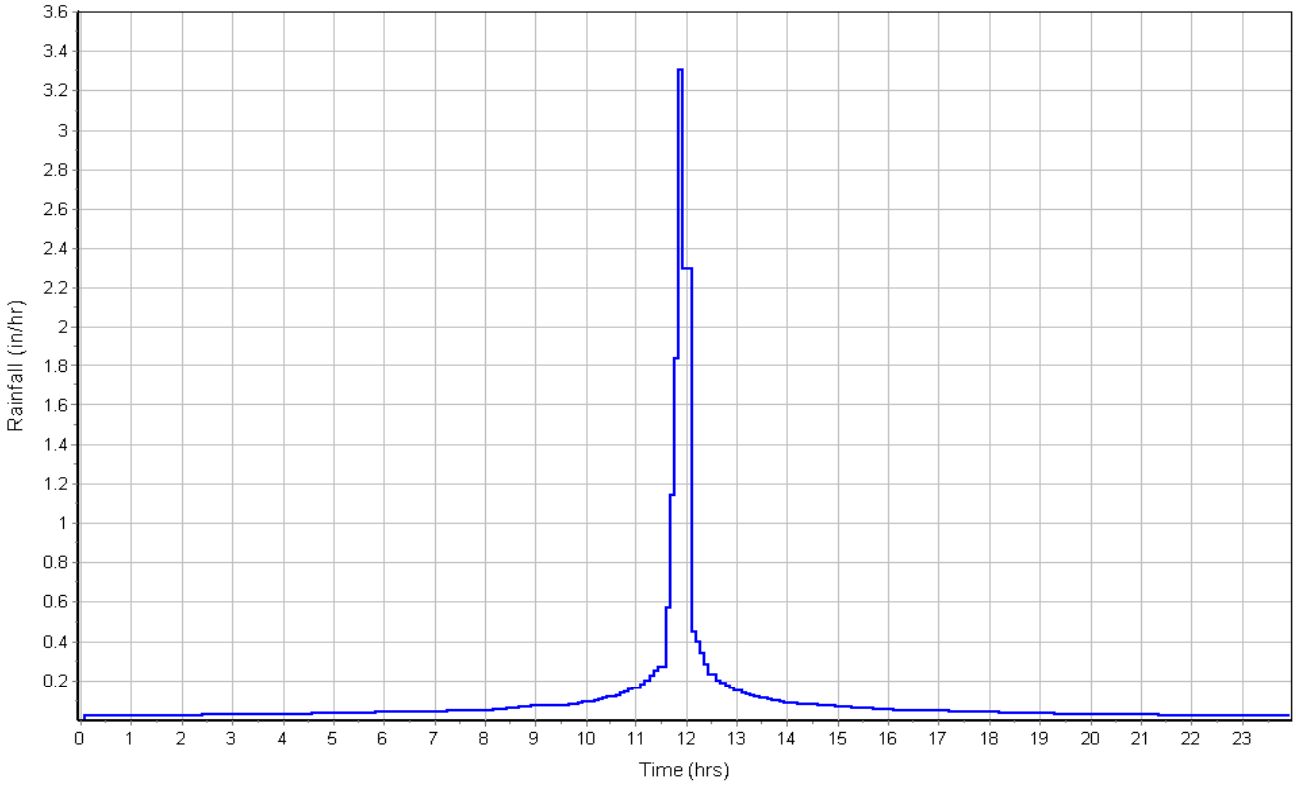
Total TOC (min) 6.33

Subbasin Runoff Results

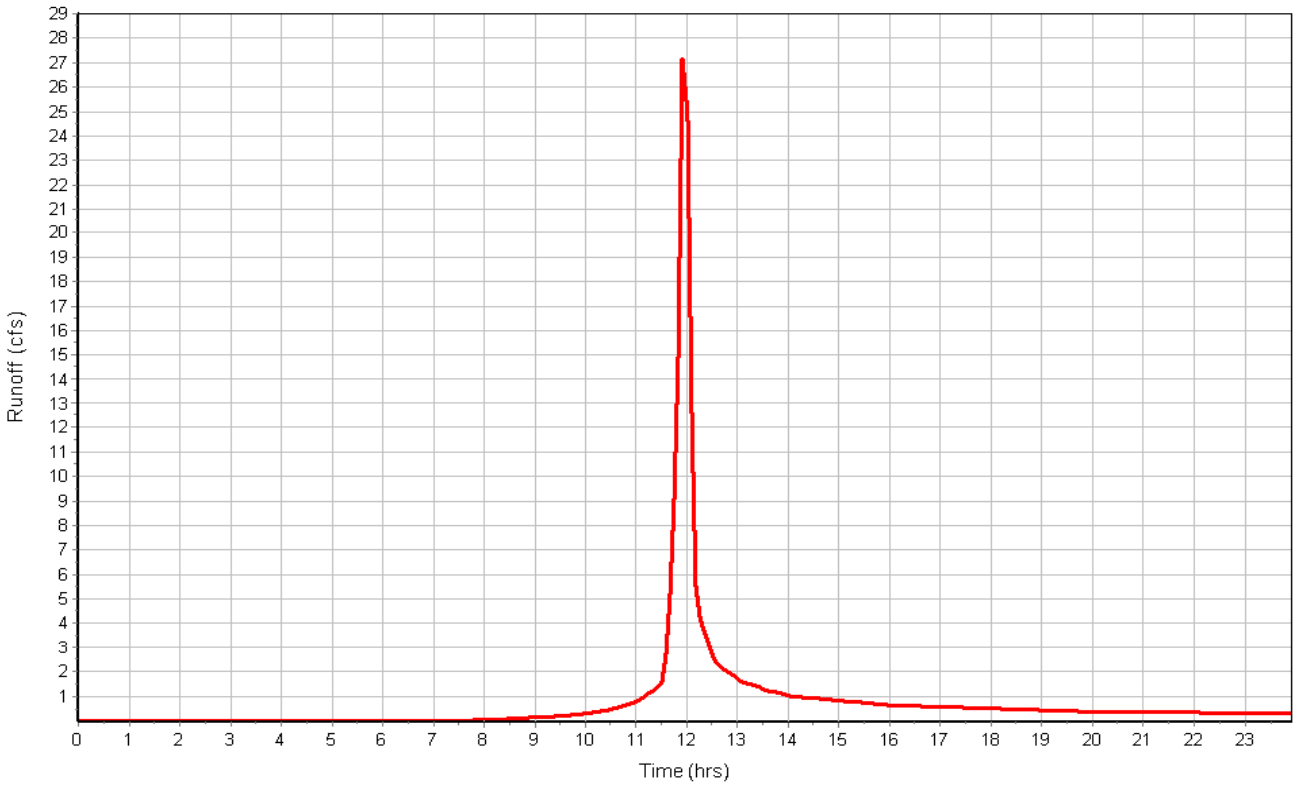
Total Rainfall (in) 2.41
Total Runoff (in) 1.37
Peak Runoff (cfs) 28.04
Weighted Curve Number 88.90
Time of Concentration (days hh:mm:ss) 0 00:06:20

Subbasin : Sub-14

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-15

Input Data

Area (ac) 11.59
Peak Rate Factor 484.00
Weighted Curve Number 83.30
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	8.11	A	77.00
Paved parking & roofs	3.48	A	98.00
Composite Area & Weighted CN	11.59		83.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	1639.20	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	3.80	0.00	0.00

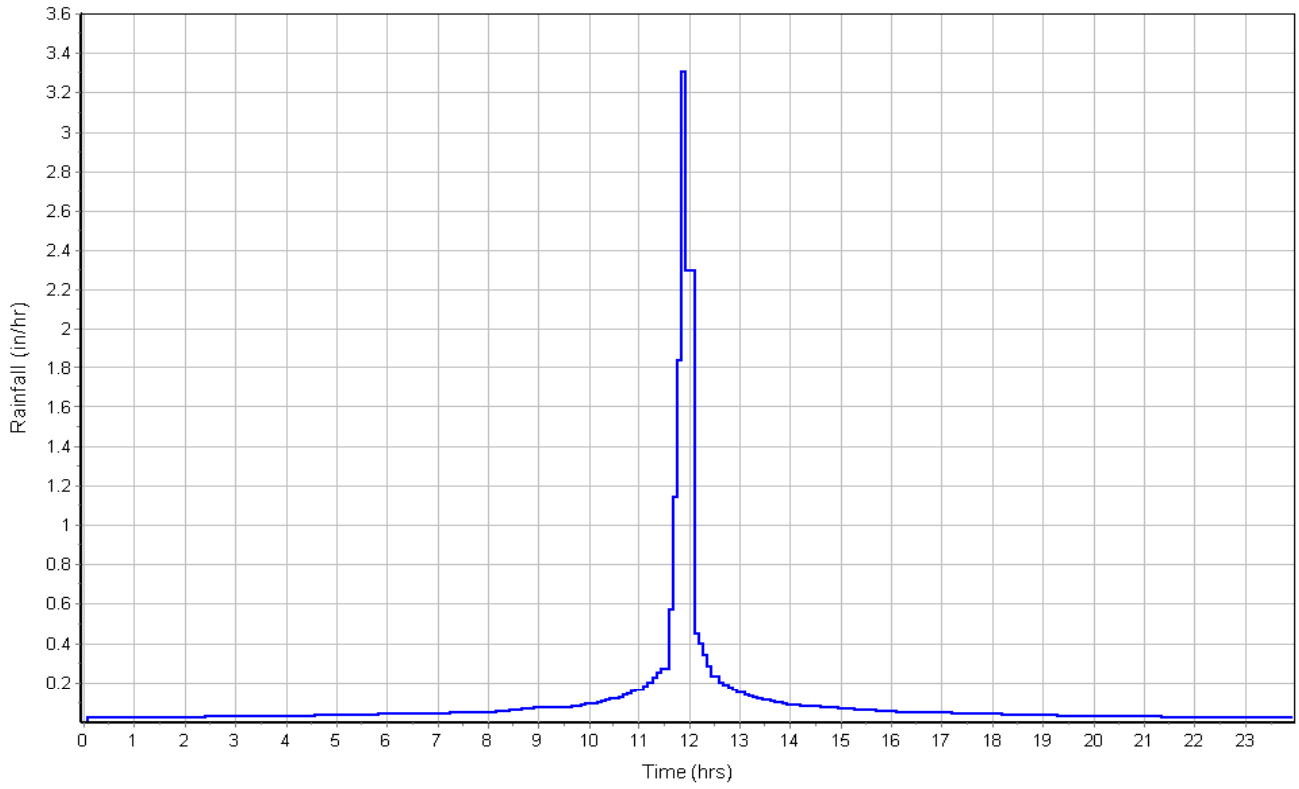
Total TOC (min) 4.43

Subbasin Runoff Results

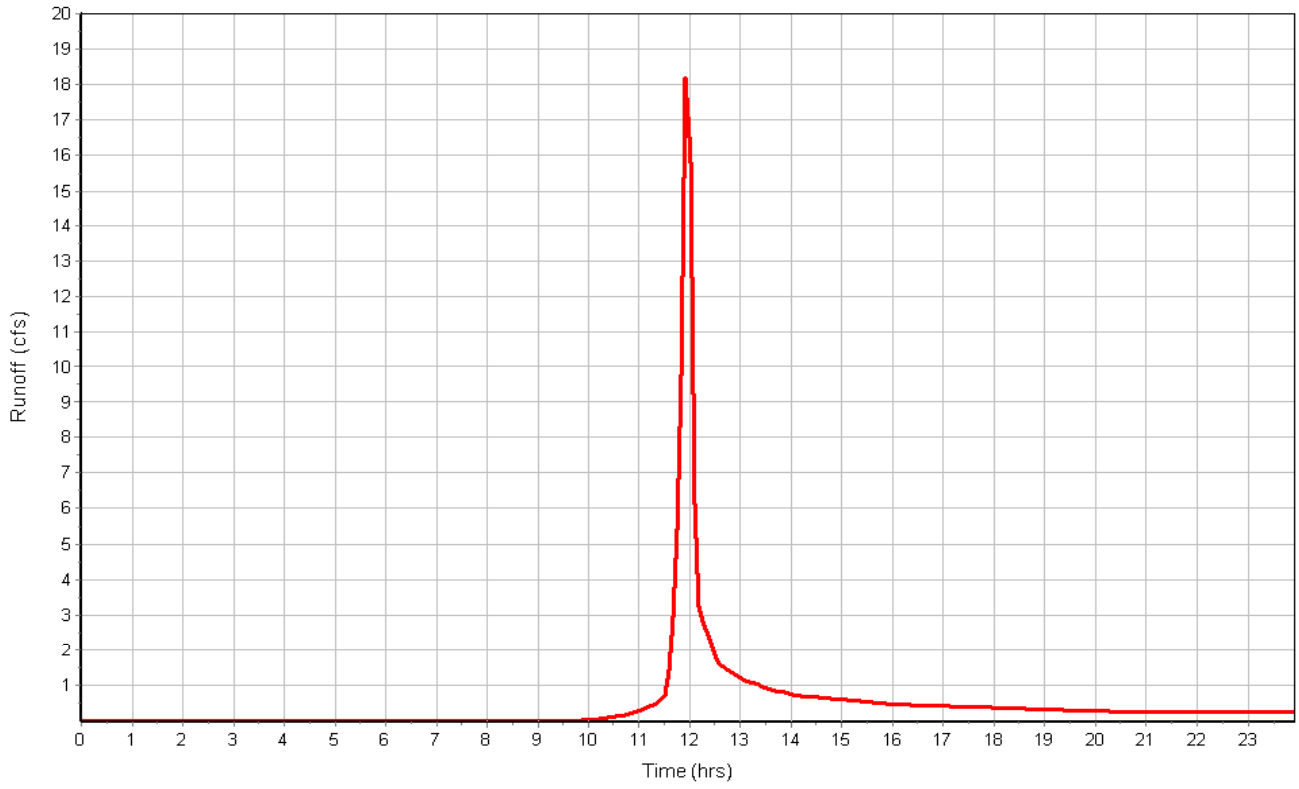
Total Rainfall (in) 2.41
Total Runoff (in) 1.01
Peak Runoff (cfs) 18.39
Weighted Curve Number 83.30
Time of Concentration (days hh:mm:ss) 0 00:04:26

Subbasin : Sub-15

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-16

Input Data

Area (ac) 31.96
Peak Rate Factor 484.00
Weighted Curve Number 70.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	23.97	A	61.00
Paved parking & roofs	7.99	A	98.00
Composite Area & Weighted CN	31.96		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	2012.47	0.00	0.00
Channel Slope (%) :	3	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.66	0.00	0.00
Computed Flow Time (min) :	5.04	0.00	0.00

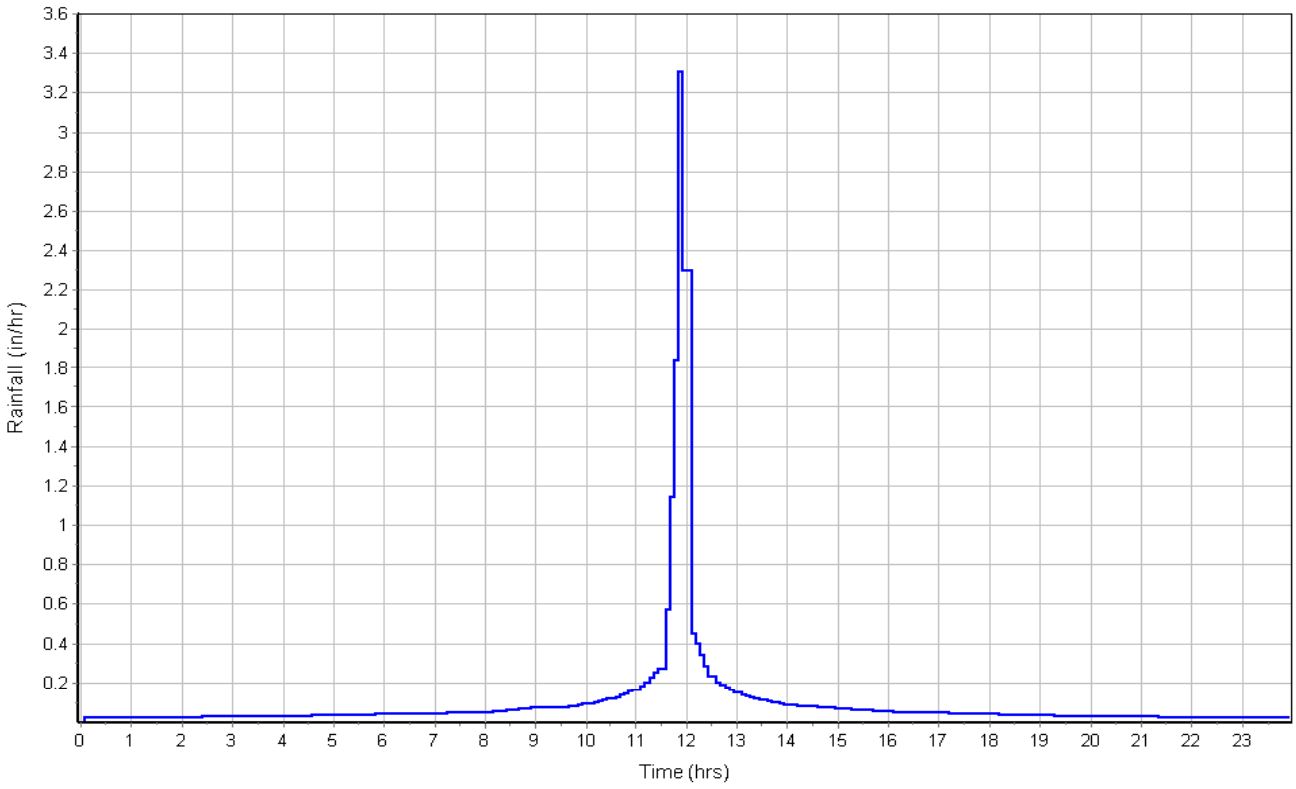
Total TOC (min) 5.82

Subbasin Runoff Results

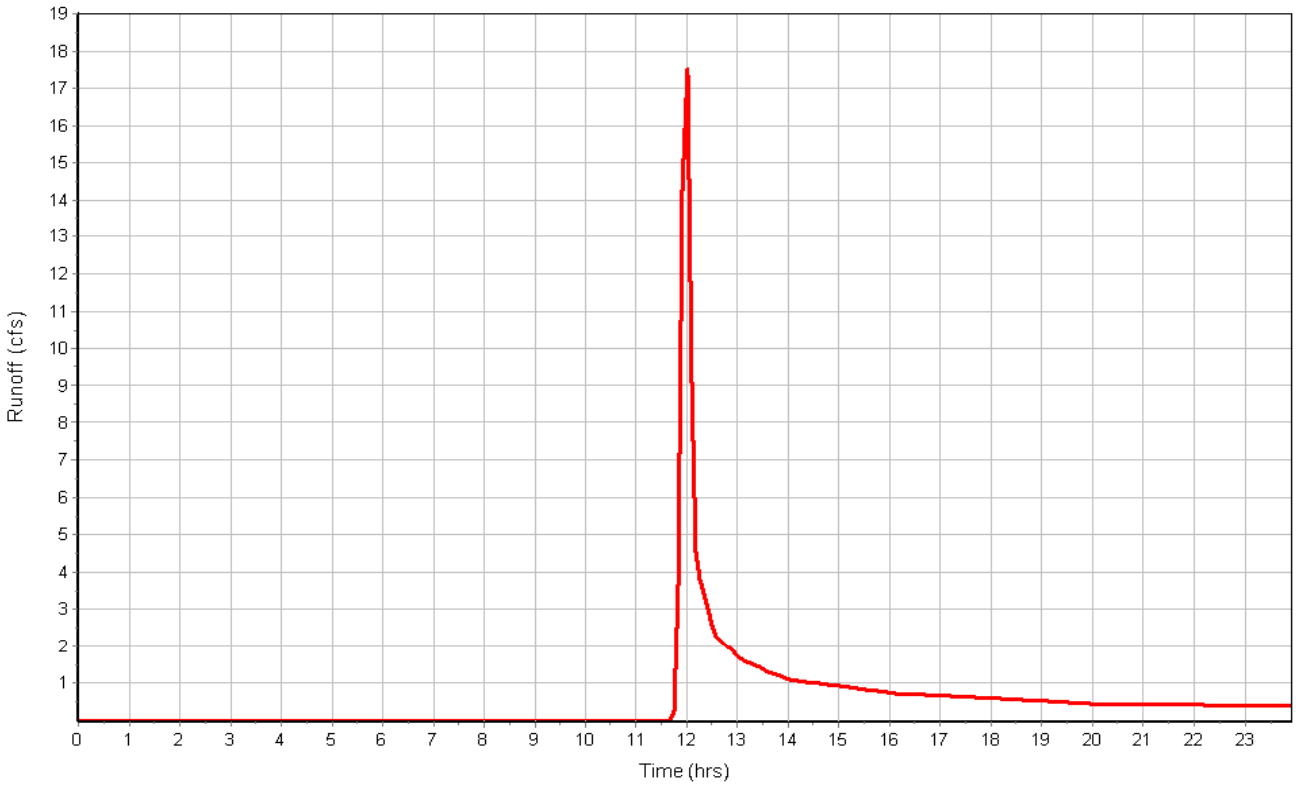
Total Rainfall (in) 2.41
Total Runoff (in) 0.42
Peak Runoff (cfs) 17.75
Weighted Curve Number 70.25
Time of Concentration (days hh:mm:ss) 0 00:05:49

Subbasin : Sub-16

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-17

Input Data

Area (ac) 24.52
Peak Rate Factor 484.00
Weighted Curve Number 77.85
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	6.13	B	85.00
Paved parking & roofs	2.45	B	98.00
Desert shrub range, Fair	15.94	B	72.00
Composite Area & Weighted CN	24.52		77.85

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	4299.75	0.00	0.00
Channel Slope (%) :	2.5	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.08	0.00	0.00
Computed Flow Time (min) :	11.79	0.00	0.00

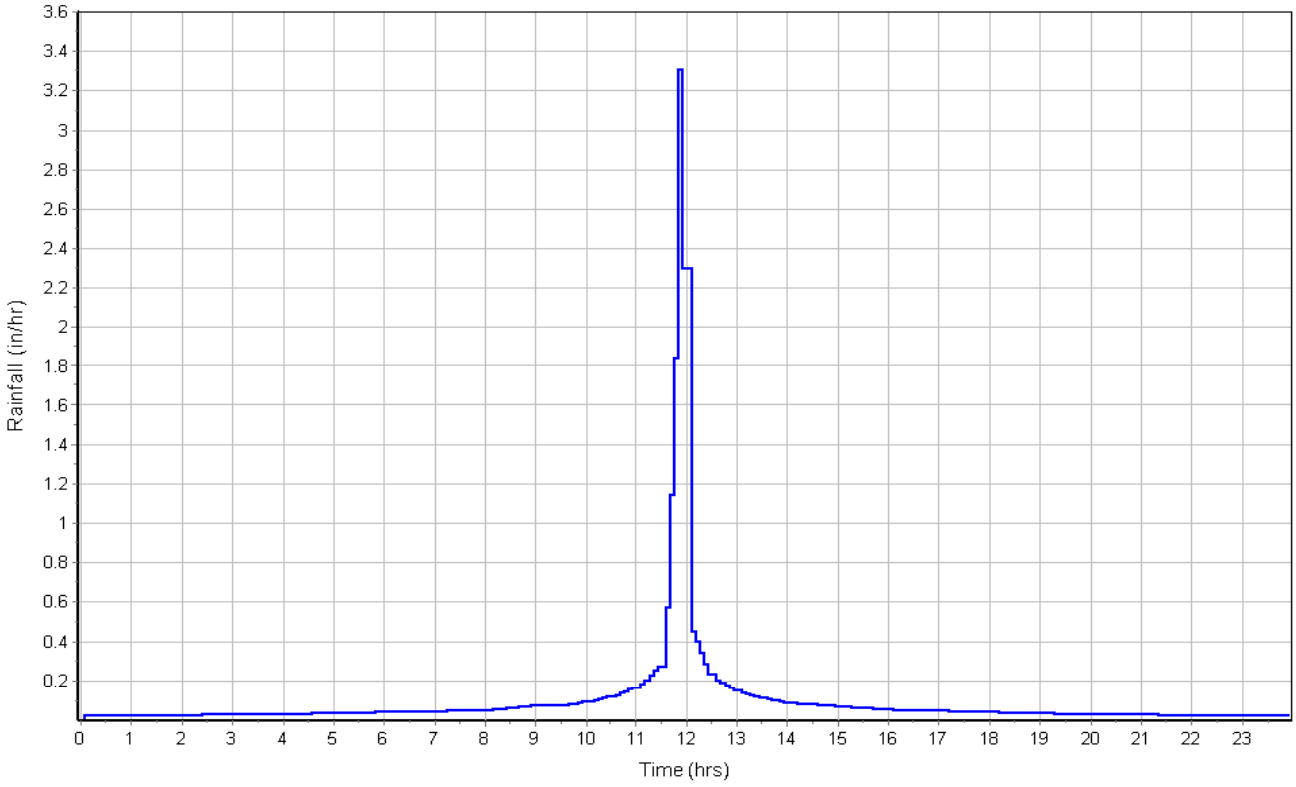
Total TOC (min) 12.57

Subbasin Runoff Results

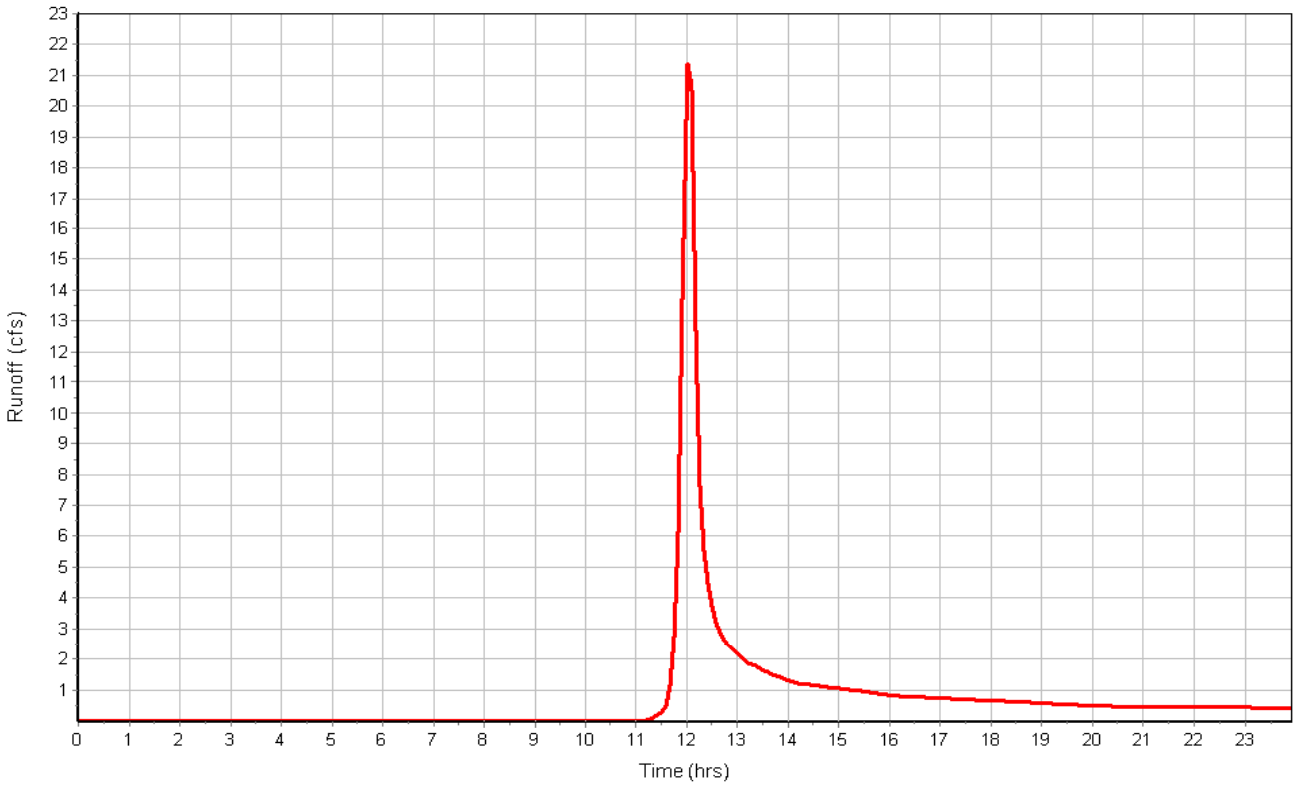
Total Rainfall (in) 2.41
Total Runoff (in) 0.72
Peak Runoff (cfs) 22.37
Weighted Curve Number 77.85
Time of Concentration (days hh:mm:ss) 0 00:12:34

Subbasin : Sub-17

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-18

Input Data

Area (ac) 21.55
Peak Rate Factor 484.00
Weighted Curve Number 70.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/4 acre lots, 38% impervious	16.16	A	61.00
Paved parking & roofs	5.39	A	98.00
Composite Area & Weighted CN	21.55		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	2011.17	0.00	0.00
Channel Slope (%) :	2.5	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.08	0.00	0.00
Computed Flow Time (min) :	5.52	0.00	0.00

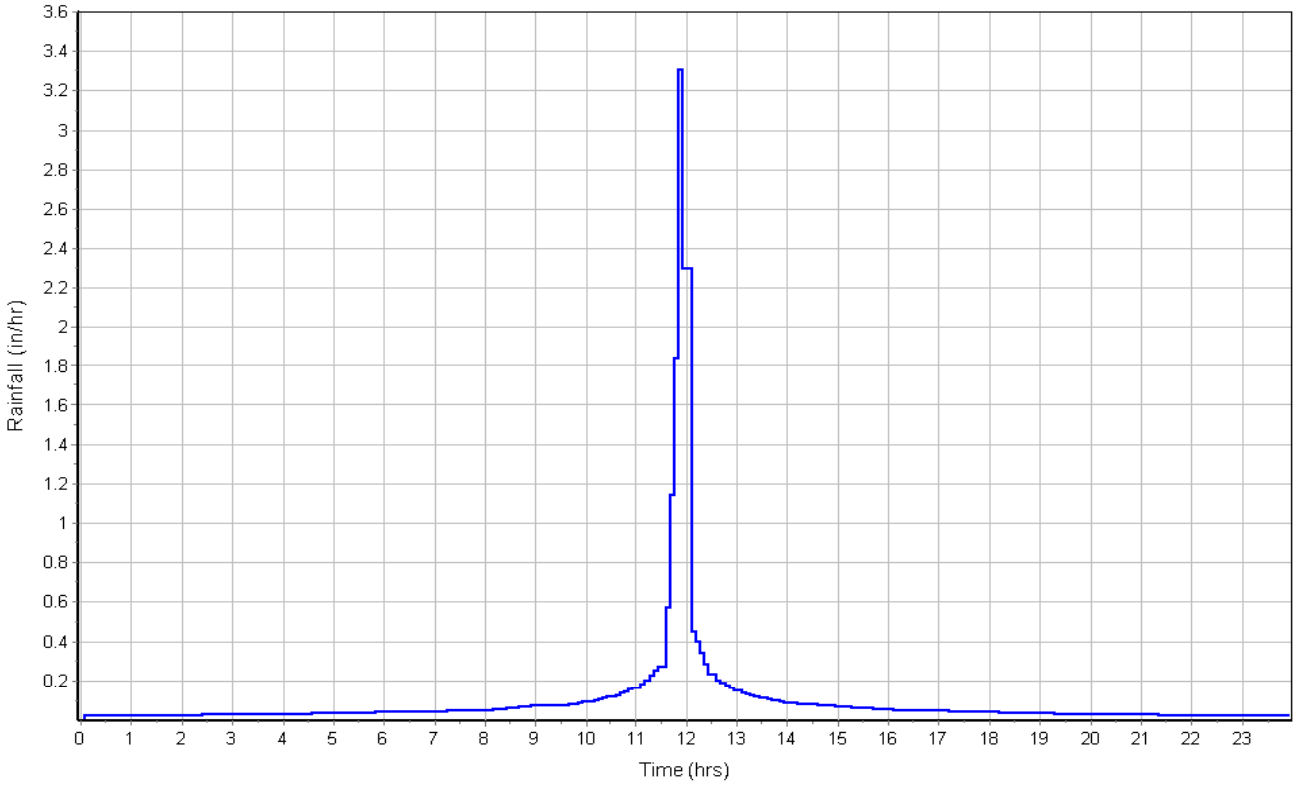
Total TOC (min) 6.29

Subbasin Runoff Results

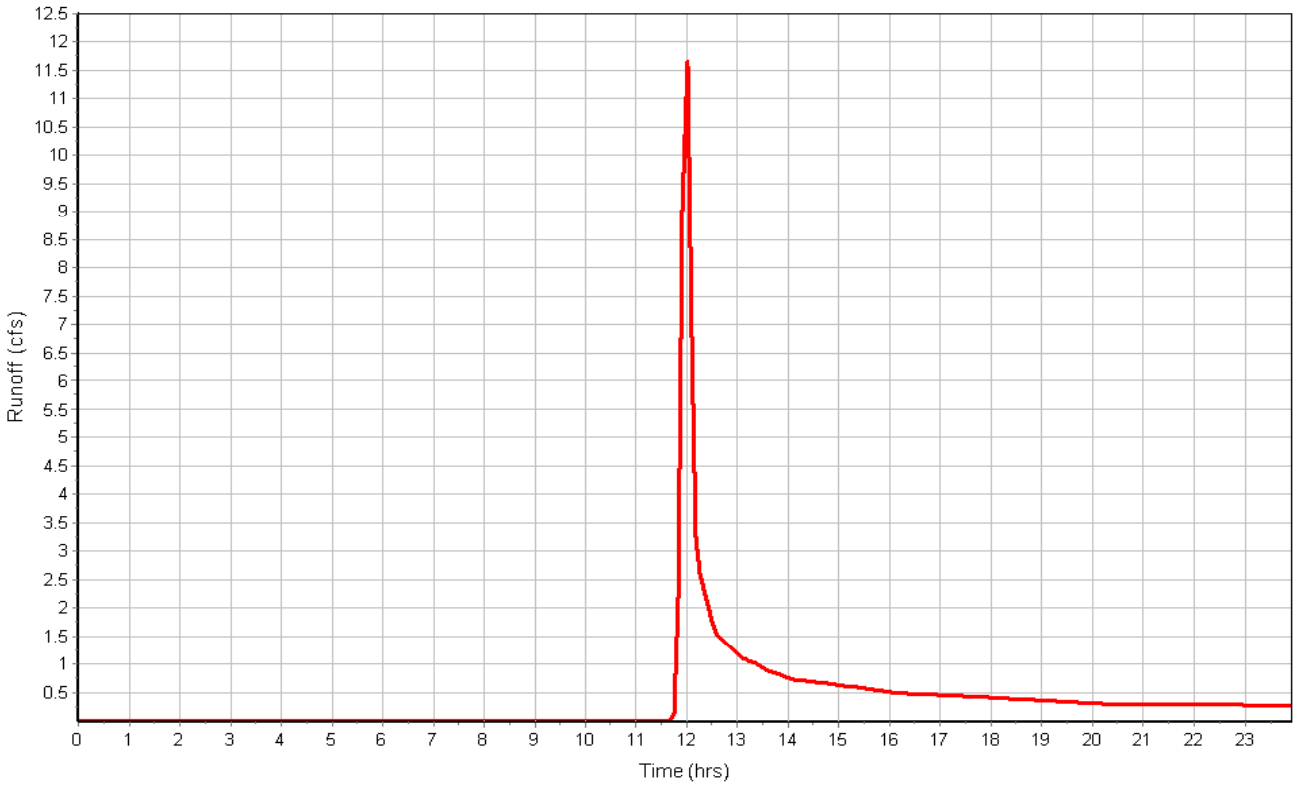
Total Rainfall (in) 2.41
Total Runoff (in) 0.42
Peak Runoff (cfs) 11.84
Weighted Curve Number 70.25
Time of Concentration (days hh:mm:ss) 0 00:06:17

Subbasin : Sub-18

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-19

Input Data

Area (ac) 9.91
Peak Rate Factor 484.00
Weighted Curve Number 83.30
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
1/8 acre lots, 65% impervious	6.94	A	77.00
Paved parking & roofs	2.97	A	98.00
Composite Area & Weighted CN	9.91		83.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.28	0.00	0.00
Computed Flow Time (min) :	0.15	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	2747.51	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	6.37	0.00	0.00

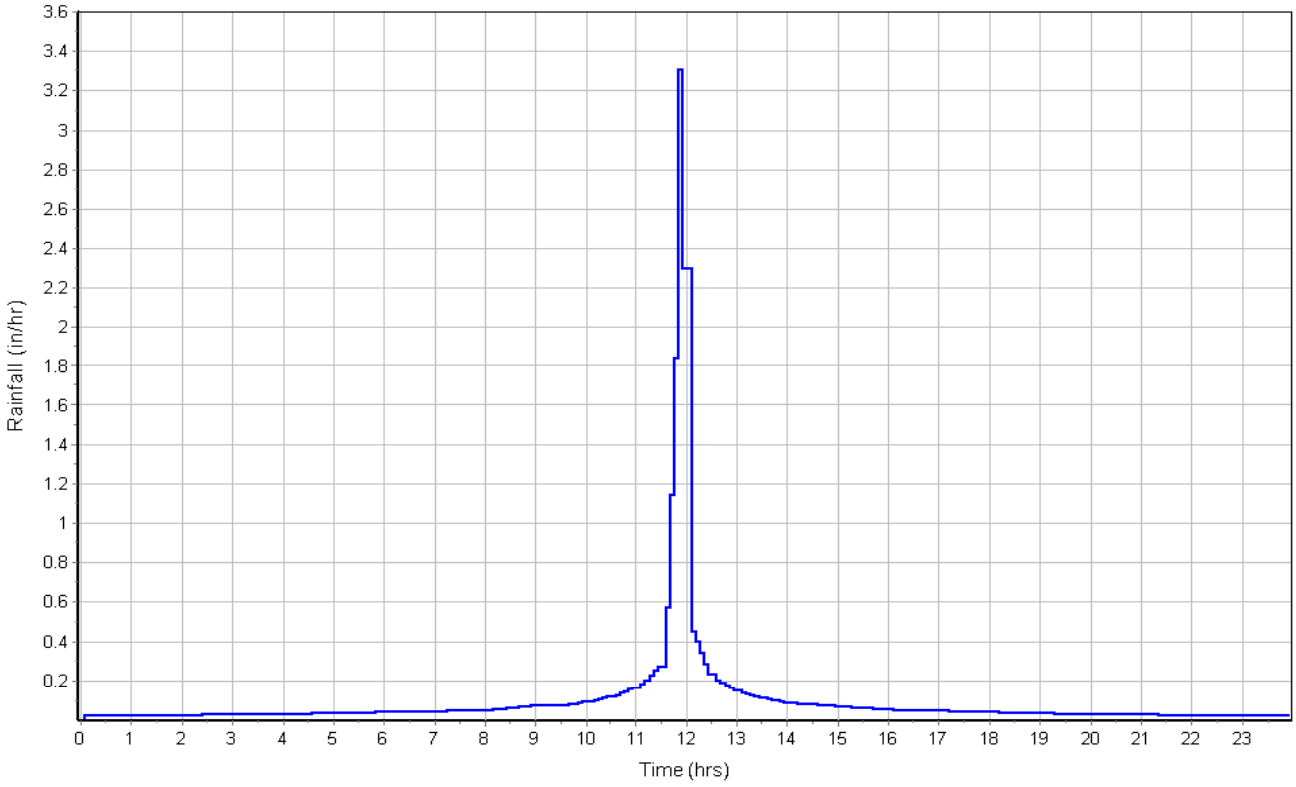
Total TOC (min) 7.15

Subbasin Runoff Results

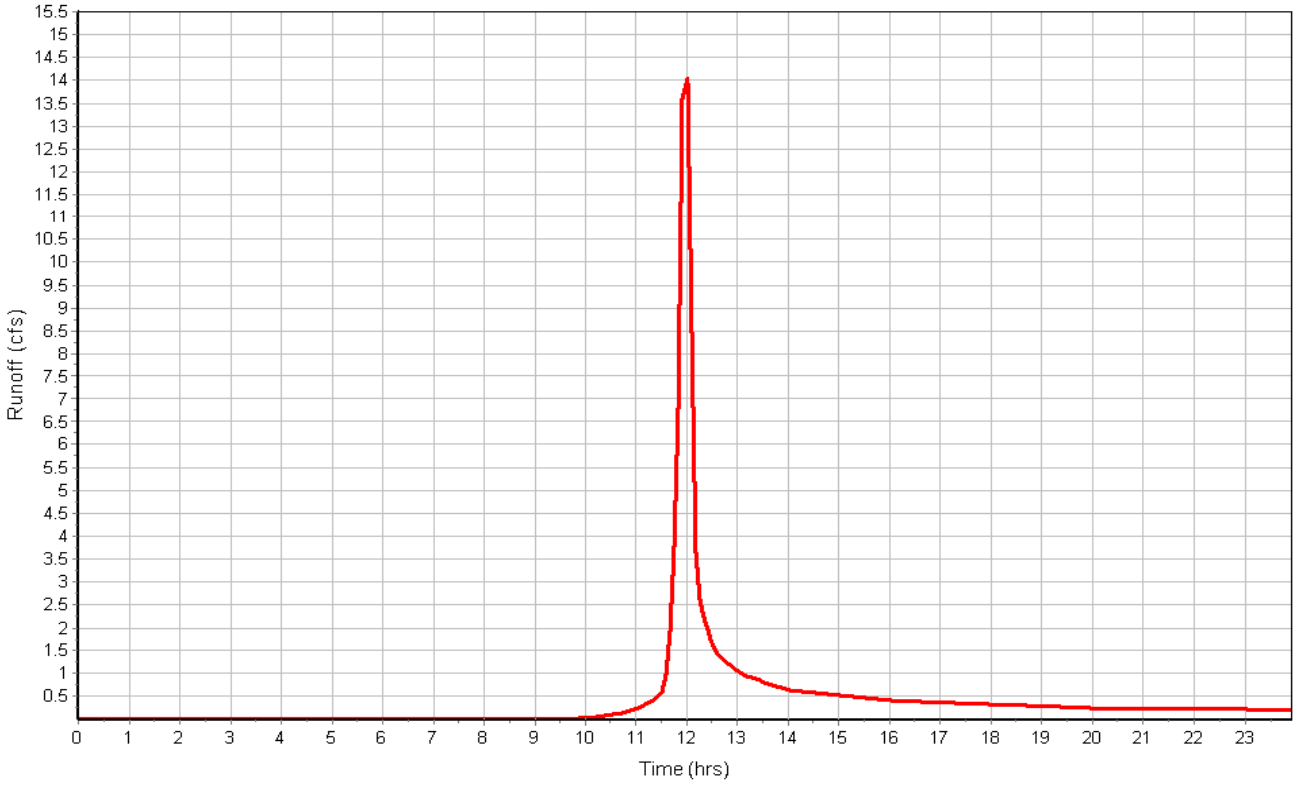
Total Rainfall (in) 2.41
Total Runoff (in) 1.01
Peak Runoff (cfs) 14.71
Weighted Curve Number 83.30
Time of Concentration (days hh:mm:ss) 0 00:07:09

Subbasin : Sub-19

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-20

Input Data

Area (ac)	11.97
Peak Rate Factor	484.00
Weighted Curve Number	76.45
Rain Gage ID	Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Urban industrial, 72% imp	7.78	A	81.00
< 50% grass cover, Poor	4.19	A	68.00
Composite Area & Weighted CN	11.97		76.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	40	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.61	0.00	0.00
Computed Flow Time (min) :	1.10	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	2	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	2.87	0.00	0.00
Computed Flow Time (min) :	0.58	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	2608.76	0.00	0.00
Channel Slope (%) :	3.5	0.00	0.00
Cross Section Area (ft^2) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	7.19	0.00	0.00
Computed Flow Time (min) :	6.05	0.00	0.00

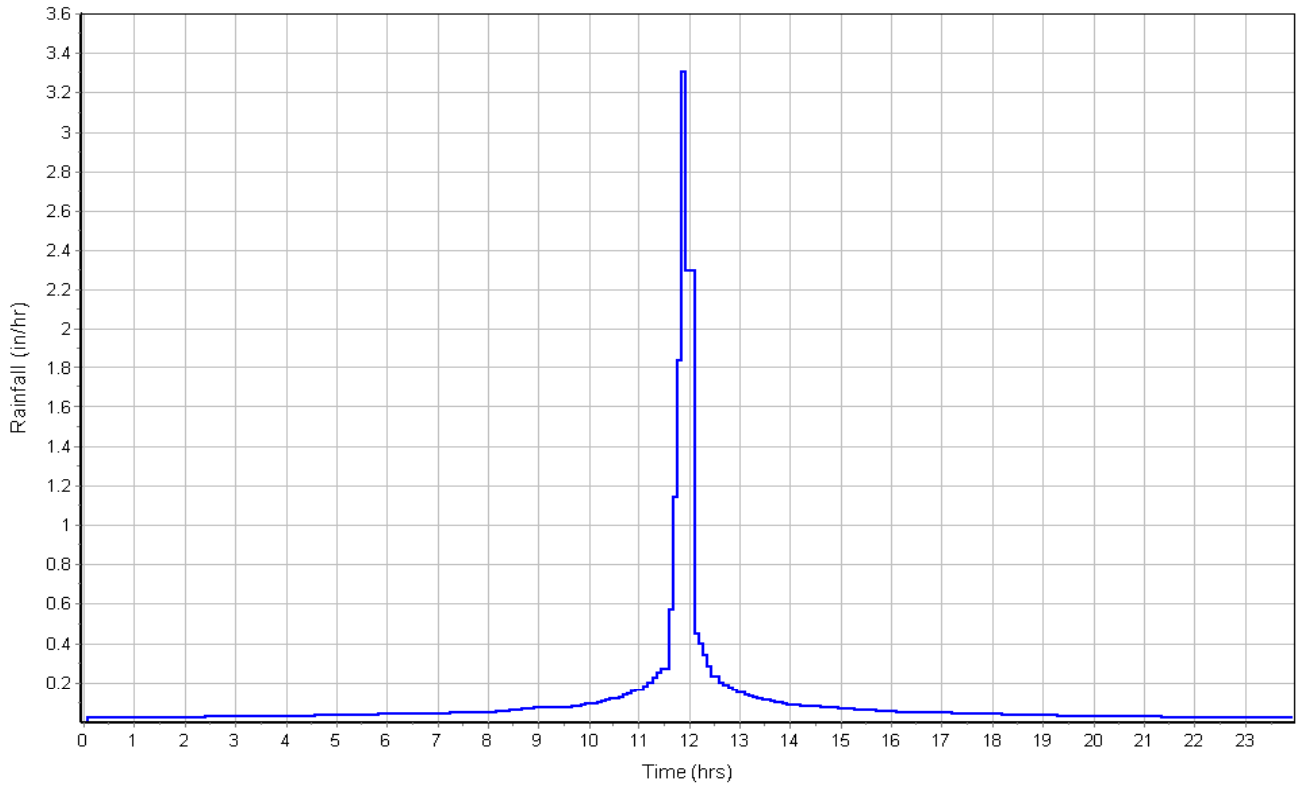
Total TOC (min) 7.73

Subbasin Runoff Results

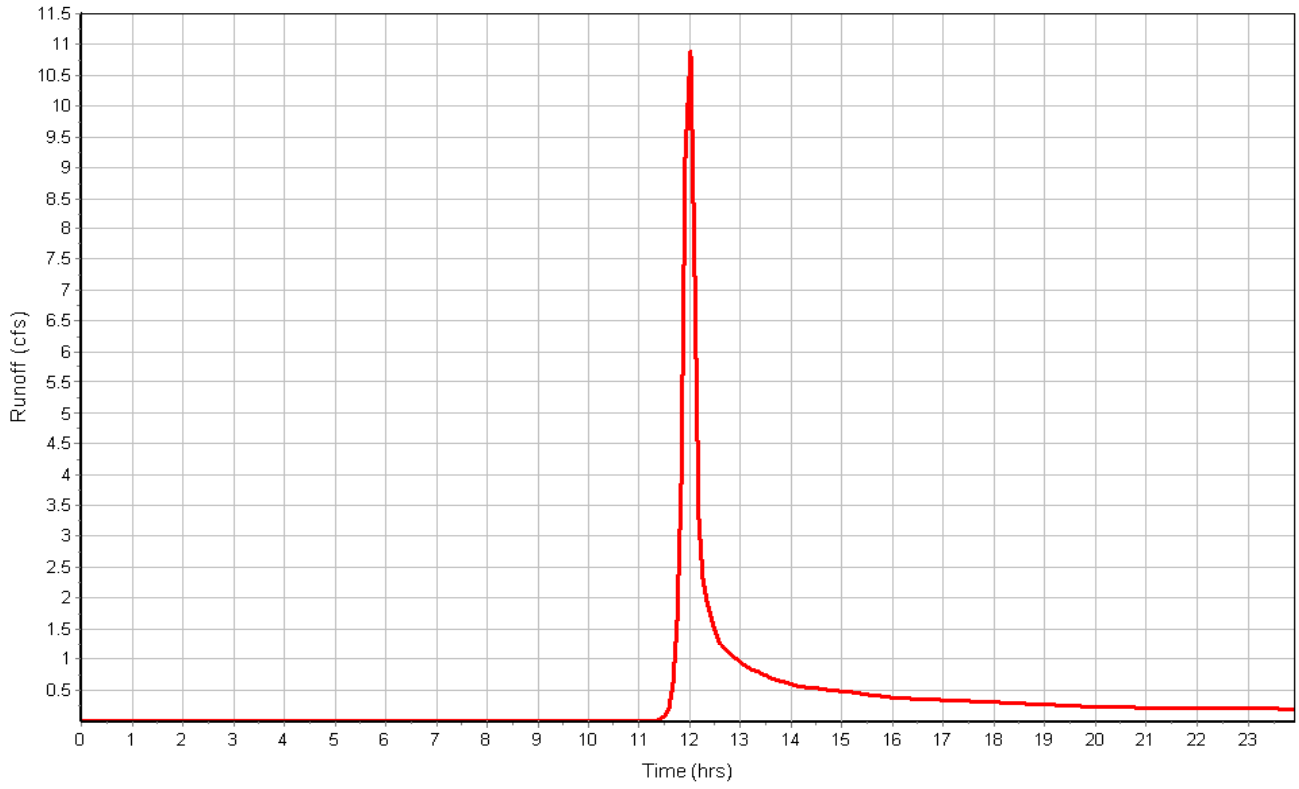
Total Rainfall (in)	2.41
Total Runoff (in)	0.66
Peak Runoff (cfs)	10.88
Weighted Curve Number	76.45
Time of Concentration (days hh:mm:ss)	0 00:07:44

Subbasin : Sub-20

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-21

Input Data

Area (ac) 9.70
Peak Rate Factor 484.00
Weighted Curve Number 70.25
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	2.43	A	98.00
1/4 acre lots, 38% impervious	7.28	A	61.00
Composite Area & Weighted CN	9.71		70.25

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.013	0.00	0.00
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	2	0.00	0.00
2 yr, 24 hr Rainfall (in) :	1.17	0.00	0.00
Velocity (ft/sec) :	0.53	0.00	0.00
Computed Flow Time (min) :	0.63	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	20	0.00	0.00
Slope (%) :	20	0.00	0.00
Surface Type :	Paved	Unpaved	Unpaved
Velocity (ft/sec) :	9.09	0.00	0.00
Computed Flow Time (min) :	0.04	0.00	0.00

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0.00	0.00
Flow Length (ft) :	1950.61	0.00	0.00
Channel Slope (%) :	2.5	0.00	0.00
Cross Section Area (ft²) :	3.050	0.00	0.00
Wetted Perimeter (ft) :	15.71	0.00	0.00
Velocity (ft/sec) :	6.08	0.00	0.00
Computed Flow Time (min) :	5.35	0.00	0.00

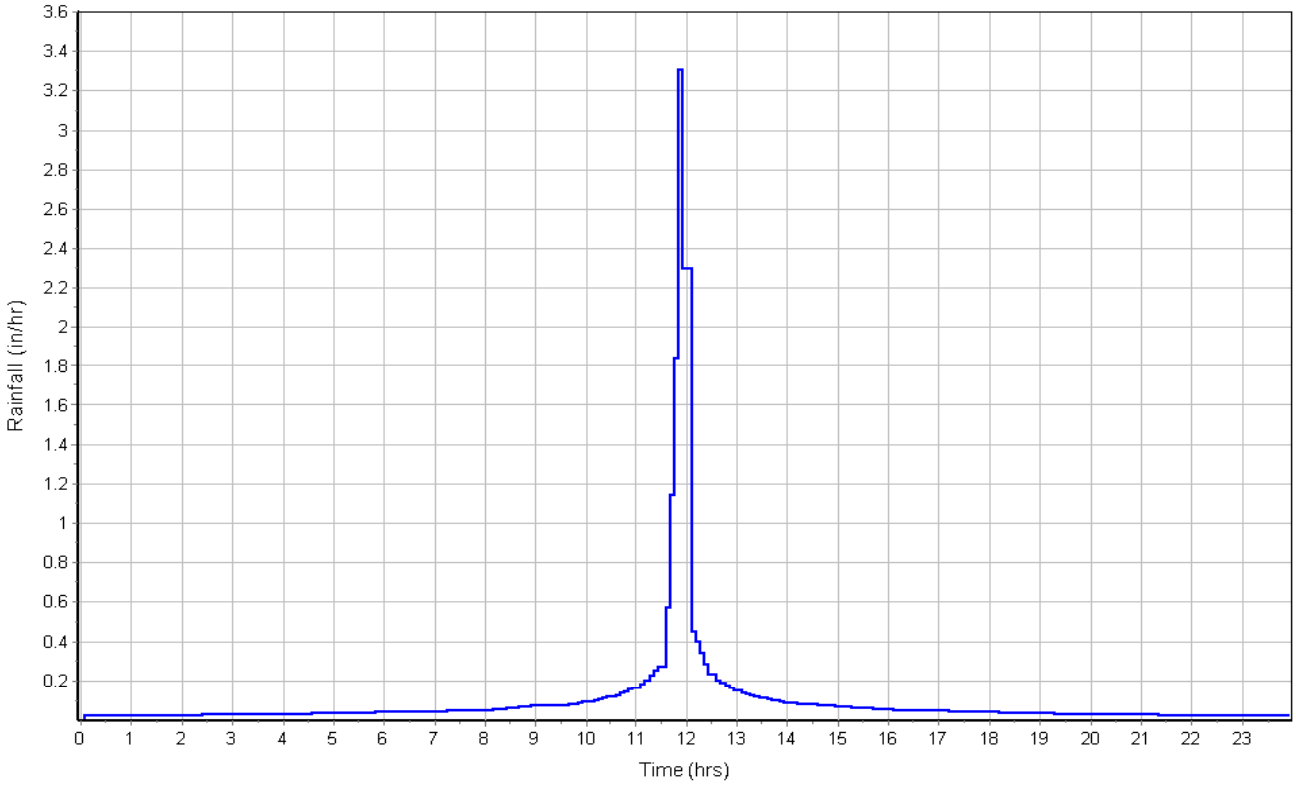
Total TOC (min) 6.02

Subbasin Runoff Results

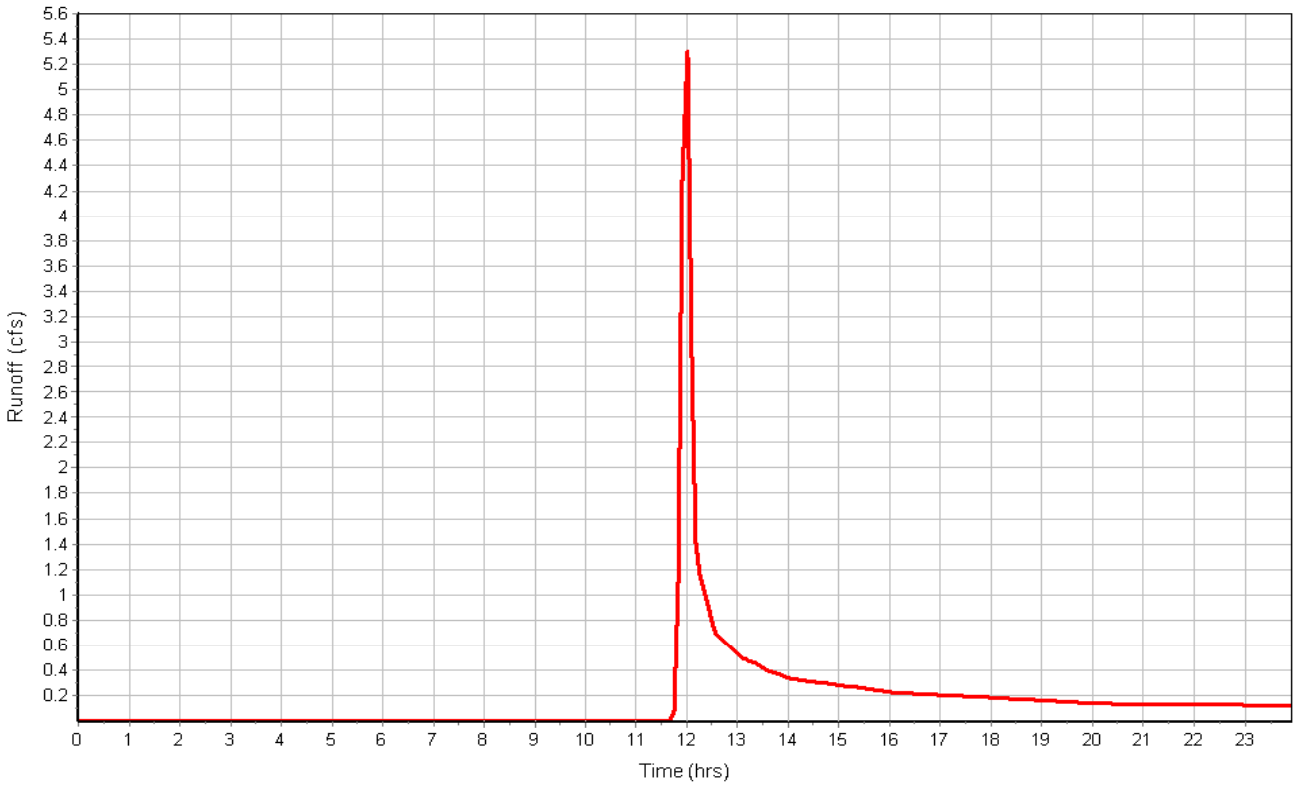
Total Rainfall (in) 2.41
Total Runoff (in) 0.42
Peak Runoff (cfs) 5.36
Weighted Curve Number 70.25
Time of Concentration (days hh:mm:ss) 0 00:06:01

Subbasin : Sub-21

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Jun-01	2730.00	2734.00	4.00	0.00	-2730.00	0.00	-2734.00	0.00	
2	Jun-02	2775.00	2782.00	7.00	0.00	-2775.00	0.00	-2782.00	0.00	
3	Jun-03	2795.00	2802.00	7.00	0.00	-2795.00	0.00	-2802.00	0.00	
4	Jun-04	2849.00	2856.00	7.00	0.00	-2849.00	0.00	-2856.00	0.00	
5	Jun-05	2905.00	2912.00	7.00	0.00	-2905.00	0.00	-2912.00	0.00	
6	Jun-06	2702.00	2708.00	6.00	0.00	-2702.00	0.00	-2708.00	0.00	
7	Jun-07	2689.97	2708.00	18.03	0.00	-2689.97	0.00	-2708.00	0.00	
8	Jun-08	2686.00	2698.00	12.00	0.00	-2686.00	0.00	-2698.00	0.00	
9	Jun-09	2657.82	2662.82	5.00	0.00	-2657.82	0.00	-2662.82	0.00	
10	Jun-10	2655.00	2660.00	5.00	0.00	-2655.00	0.00	-2660.00	0.00	

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	44.77	0.00	2731.22	1.22	0.00	5.78	2730.53	0.53	0 18:00	0 00:00	0.00	0.00
2	Jun-02	63.76	0.00	2775.95	0.95	0.00	6.05	2775.36	0.36	0 14:56	0 00:00	0.00	0.00
3	Jun-03	66.57	0.00	2796.44	1.44	0.00	5.56	2795.48	0.48	0 13:30	0 00:00	0.00	0.00
4	Jun-04	54.53	0.00	2850.03	1.03	0.00	5.97	2849.26	0.26	0 12:33	0 00:00	0.00	0.00
5	Jun-05	25.67	0.00	2905.65	0.65	0.00	6.35	2905.13	0.13	0 12:14	0 00:00	0.00	0.00
6	Jun-06	23.23	0.00	2702.90	0.90	0.00	9.10	2702.37	0.37	1 00:00	0 00:00	0.00	0.00
7	Jun-07	23.22	0.00	2690.87	0.90	0.00	17.13	2690.34	0.37	1 00:00	0 00:00	0.00	0.00
8	Jun-08	22.25	0.00	2686.75	0.75	0.00	11.25	2686.27	0.27	1 00:00	0 00:00	0.00	0.00
9	Jun-09	22.18	0.00	2659.46	1.64	0.00	3.36	2658.36	0.54	1 00:00	0 00:00	0.00	0.00
10	Jun-10	22.17	0.00	2656.64	1.64	0.00	3.36	2655.54	0.54	1 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-01	100.00	2730.00	0.00	2729.00	0.00	1.00	1.0000	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	Link-02	881.55	2775.00	0.00	2731.00	0.00	44.00	4.9900	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	Link-03	1575.06	2795.00	0.00	2776.00	0.00	19.00	1.2100	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	Link-04	1907.73	2849.00	0.00	2796.00	0.00	53.00	2.7800	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	Link-05	1753.28	2905.00	0.00	2850.00	0.00	55.00	3.1400	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	Link-20	312.10	2689.97	0.00	2686.00	0.00	3.97	1.2700	Trapezoidal	10.000	46.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-01	44.77	0 18:00	458.90	0.10	4.33	0.38	1.22	0.31	0.00		
2	Link-02	63.76	0 14:57	1025.24	0.06	8.45	1.74	0.95	0.24	0.00		
3	Link-03	66.57	0 13:34	504.02	0.13	5.20	5.05	1.44	0.36	0.00		
4	Link-04	54.52	0 12:36	764.90	0.07	6.58	4.83	1.03	0.26	0.00		
5	Link-05	25.57	0 12:18	812.79	0.03	5.41	5.40	0.65	0.16	0.00		
6	Link-20	23.22	1 00:00	4048.36	0.01	3.85	1.35	0.79	0.08	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-06	241.11	2655.00	0.00	2653.80	0.00	1.20	0.5000	CIRCULAR									
2	Link-07	400.03	2657.00	0.00	2655.00	0.00	2.00	0.5000	CIRCULAR									
3	Link-08	164.52	2657.82	0.00	2657.00	0.00	0.82	0.5000	CIRCULAR									
4	Link-09	399.10	2659.82	0.00	2657.82	0.00	2.00	0.5000	CIRCULAR									
5	Link-10	400.72	2661.82	0.00	2659.82	0.00	2.00	0.5000	CIRCULAR									
6	Link-11	399.35	2663.82	0.00	2661.82	0.00	2.00	0.5000	CIRCULAR									
7	Link-12	205.10	2664.83	0.00	2663.82	0.00	1.01	0.4900	CIRCULAR									
8	Link-13	400.62	2666.83	0.00	2664.83	0.00	2.00	0.5000	CIRCULAR									
9	Link-14	399.18	2668.83	0.00	2666.83	0.00	2.00	0.5000	CIRCULAR									
10	Link-15	104.18	2669.36	0.00	2668.83	0.00	0.53	0.5100	CIRCULAR									
11	Link-16	401.67	2671.36	0.00	2669.36	0.00	2.00	0.5000	CIRCULAR									
12	Link-17	296.85	2672.85	0.00	2671.36	0.00	1.49	0.5000	CIRCULAR									
13	Link-18	173.46	2686.00	0.00	2672.85	0.00	13.15	7.5800	CIRCULAR									
14	Link-19	476.71	2702.00	0.00	2689.97	0.00	12.03	2.5200	CIRCULAR									

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-06	22.16	1 00:00	28.94	0.77	6.50	0.62	1.64	0.66	0.00		Calculated
2	Link-07	22.17	1 00:00	29.00	0.76	6.51	1.02	1.64	0.65	0.00		Calculated
3	Link-08	22.18	1 00:00	28.96	0.77	6.50	0.42	1.64	0.66	0.00		Calculated
4	Link-09	22.18	1 00:00	29.04	0.76	6.51	1.02	1.64	0.65	0.00		Calculated
5	Link-10	22.19	1 00:00	28.98	0.77	6.50	1.03	1.64	0.66	0.00		Calculated
6	Link-11	22.20	1 00:00	29.03	0.76	6.51	1.02	1.64	0.66	0.00		Calculated
7	Link-12	22.21	1 00:00	28.78	0.77	6.47	0.53	1.65	0.66	0.00		Calculated
8	Link-13	22.21	1 00:00	28.98	0.77	6.51	1.03	1.64	0.66	0.00		Calculated
9	Link-14	22.22	1 00:00	29.03	0.77	6.52	1.02	1.64	0.66	0.00		Calculated
10	Link-15	22.23	1 00:00	29.26	0.76	6.56	0.26	1.63	0.65	0.00		Calculated
11	Link-16	22.23	1 00:00	28.94	0.77	6.50	1.03	1.64	0.66	0.00		Calculated
12	Link-17	22.24	1 00:00	29.06	0.77	6.52	0.76	1.64	0.66	0.00		Calculated
13	Link-18	22.25	1 00:00	112.94	0.20	17.88	0.16	0.75	0.30	0.00		Calculated
14	Link-19	23.22	1 00:00	159.83	0.15	11.84	0.67	0.90	0.26	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	5.00	0.00	0.00	2000.00	0.00
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	5.00	0.00	0.00	2000.00	0.00
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	5.00	0.00	0.00	2000.00	0.00
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	5.00	0.00	0.00	2000.00	0.00
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	5.00	0.00	0.00	2000.00	0.00
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	5.00	0.00	0.00	2000.00	0.00
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	5.00	0.00	0.00	2000.00	0.00
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	5.00	0.00	0.00	2000.00	0.00
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	5.00	0.00	0.00	2000.00	0.00
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	5.00	0.00	0.00	2000.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway ongitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	Inlet-01	N/A	0.0200	0.0160	0.0620	2.00		

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Inlet-01	0.00	0.00	N/A	N/A	N/A	0.00	2677.85	0.00	1 00:00	0.00	0.00
2	Inlet-02	0.00	0.00	N/A	N/A	N/A	0.00	2676.36	0.00	1 00:00	0.00	0.00
3	Inlet-03	0.00	0.00	N/A	N/A	N/A	0.00	2674.36	0.00	1 00:00	0.00	0.00
4	Inlet-04	0.00	0.00	N/A	N/A	N/A	0.00	2673.83	0.00	1 00:00	0.00	0.00
5	Inlet-05	0.00	0.00	N/A	N/A	N/A	0.00	2671.83	0.00	1 00:00	0.00	0.00
6	Inlet-06	0.00	0.00	N/A	N/A	N/A	0.00	2669.83	0.00	1 00:00	0.00	0.00
7	Inlet-07	0.00	0.00	N/A	N/A	N/A	0.00	2668.82	0.00	1 00:00	0.00	0.00
8	Inlet-08	0.00	0.00	N/A	N/A	N/A	0.00	2666.82	0.00	1 00:00	0.00	0.00
9	Inlet-09	0.00	0.00	N/A	N/A	N/A	0.00	2664.82	0.00	1 00:00	0.00	0.00
10	Inlet-10	0.00	0.00	N/A	N/A	N/A	0.00	2662.00	0.00	1 00:00	0.00	0.00

Storage Nodes

Storage Node : Stor-01

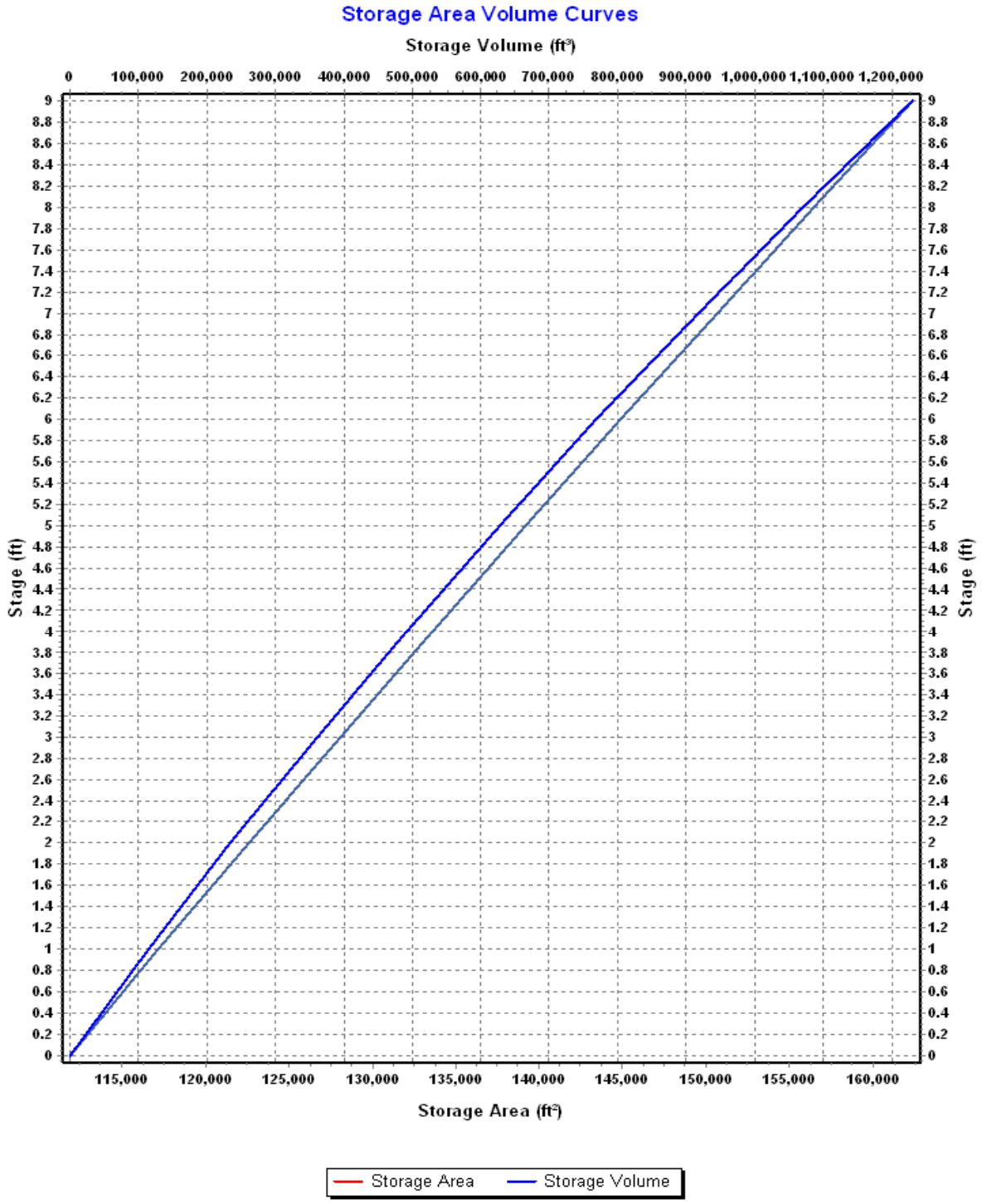
Input Data

Invert Elevation (ft)	2729.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	9.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2729.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	111884.1802	0.000
1	117199.7310	114541.96
2	122589.4743	234436.56
3	128053.1473	359757.87
4	133590.5081	490579.70
5	139201.3329	626975.62
6	144885.4142	769018.99
7	150642.5595	916782.98
8	156472.5891	1070340.55
9	162375.3357	1229764.51


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
1,100,000
1,200,000
Stage (ft)
Stage (ft)
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
155,000
160,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-01 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-01	Trapezoidal	No	2737.00	8.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-01	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	87.59
Peak Lateral Inflow (cfs)	84.91
Peak Outflow (cfs)	23.23
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2736.87
Max HGL Depth Attained (ft)	7.87
Average HGL Elevation Attained (ft)	2731.33
Average HGL Depth Attained (ft)	2.33
Time of Max HGL Occurrence (days hh:mm)	1 00:00
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-02

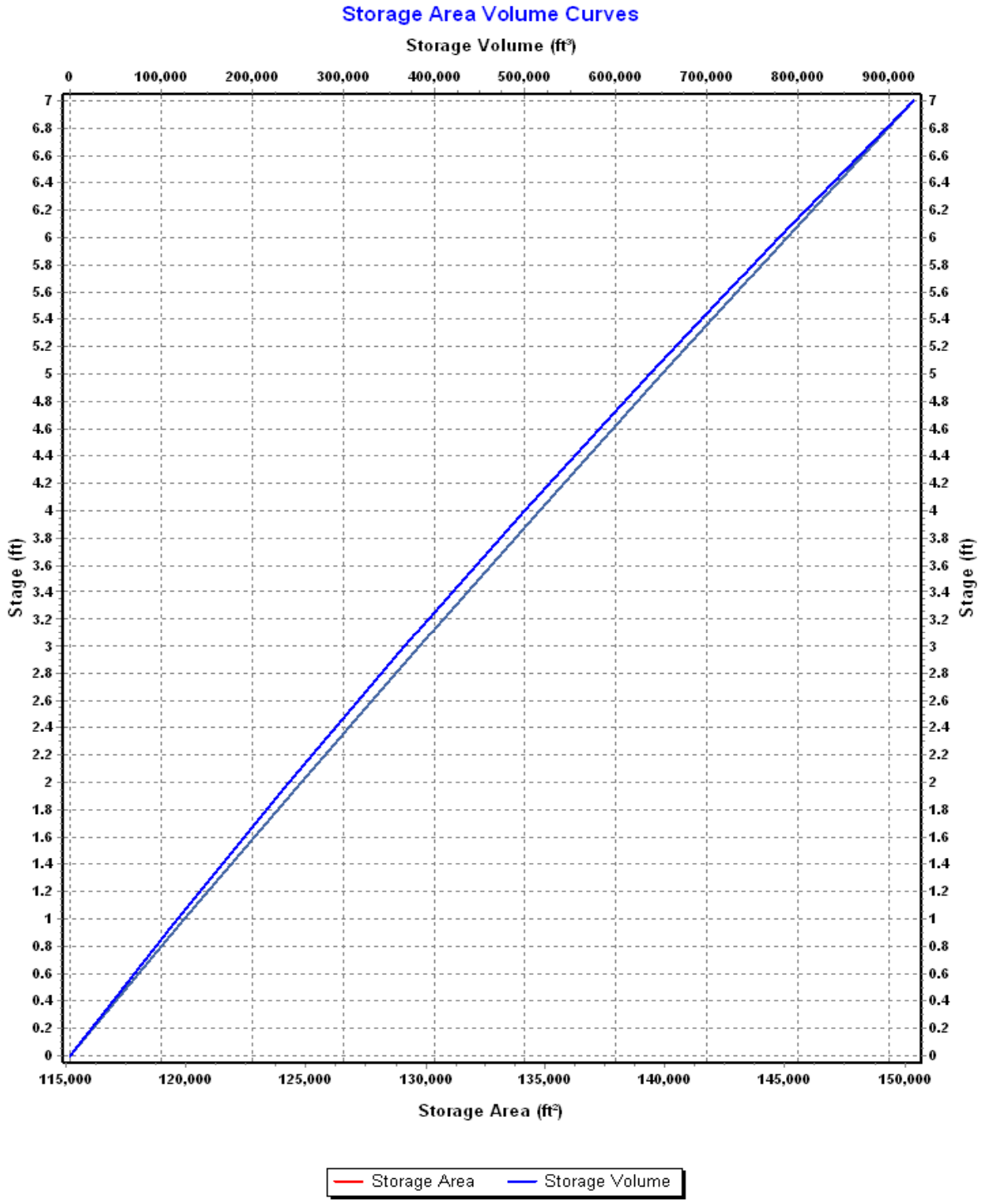
Input Data

Invert Elevation (ft)	2731.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	7.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2731.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-02

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	115183.3755	0.000
1	119948.4630	117565.92
2	124800.3987	239940.35
3	129738.8737	367209.99
4	134763.5929	499461.22
5	139874.2743	636780.15
6	145070.6482	779252.61
7	150352.4564	926964.16


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
Stage (ft)
Stage (ft)
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-02 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-02	Trapezoidal	No	2736.00	5.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-02	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	78.89
Peak Lateral Inflow (cfs)	71.90
Peak Outflow (cfs)	44.77
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2735.68
Max HGL Depth Attained (ft)	4.68
Average HGL Elevation Attained (ft)	2732.79
Average HGL Depth Attained (ft)	1.79
Time of Max HGL Occurrence (days hh:mm)	0 18:00
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-03

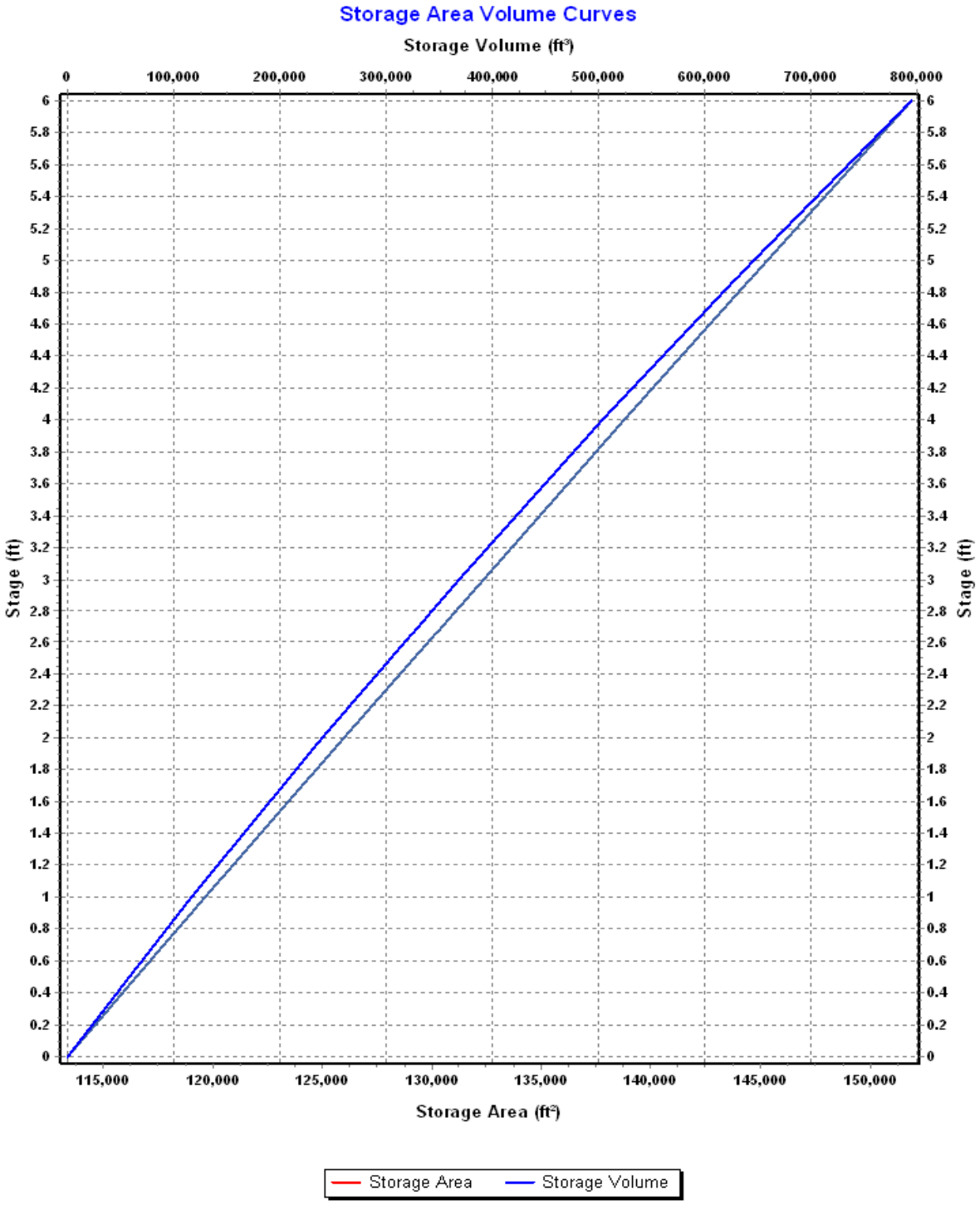
Input Data

Invert Elevation (ft)	2776.00
Max (Rim) Elevation (ft)	2782.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2776.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-03

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	113393.5106	0.000
1	119634.4886	116514.00
2	125943.9100	239303.20
3	132321.8037	368436.06
4	138768.1994	503981.06
5	145283.1278	646006.72
6	151866.6201	794581.59


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-03 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-03	Trapezoidal	No	2780.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-03	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	178.45
Peak Lateral Inflow (cfs)	165.76
Peak Outflow (cfs)	63.76
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2779.56
Max HGL Depth Attained (ft)	3.56
Average HGL Elevation Attained (ft)	2777.27
Average HGL Depth Attained (ft)	1.27
Time of Max HGL Occurrence (days hh:mm)	0 14:56
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-04

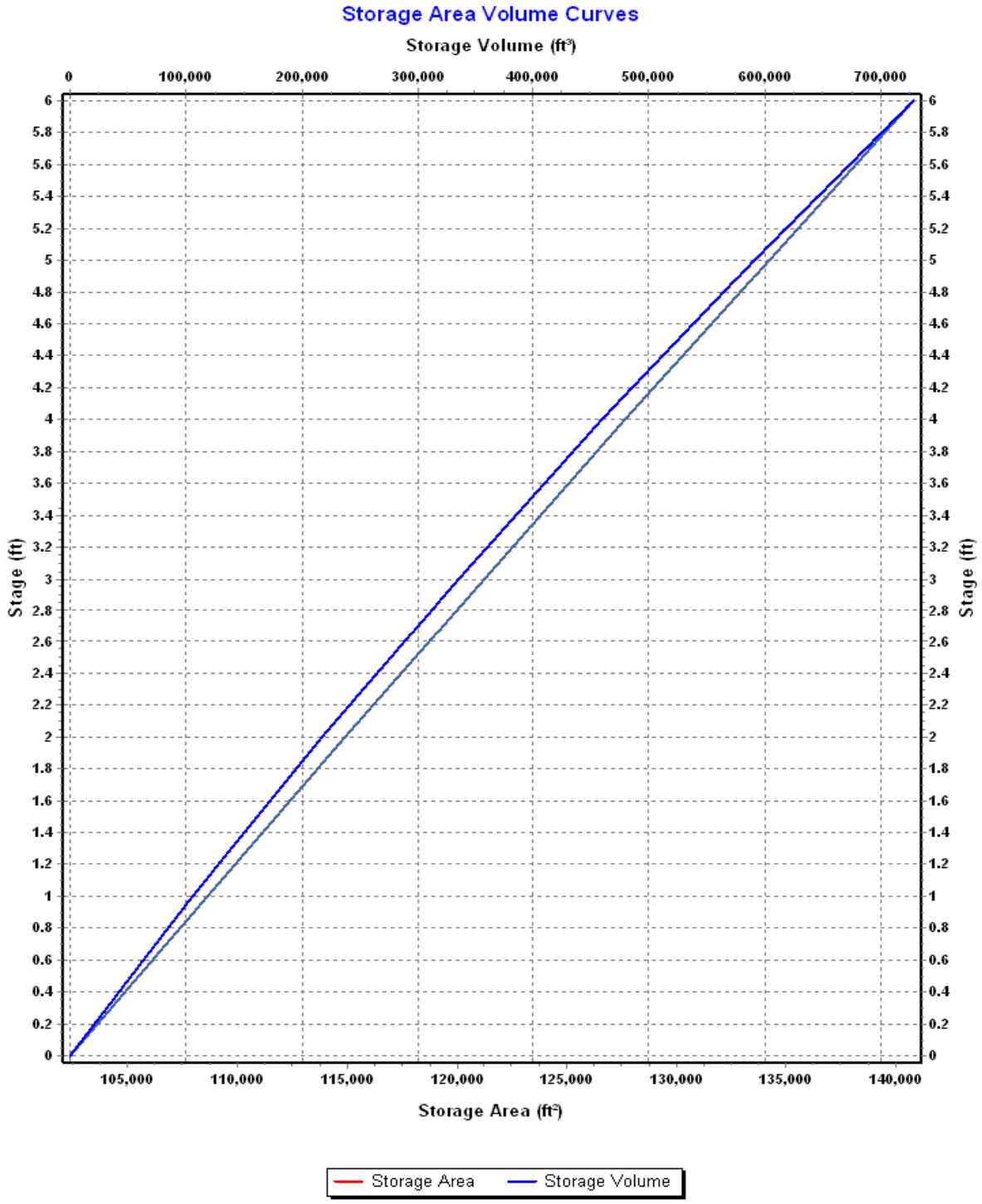
Input Data

Invert Elevation (ft)	2796.00
Max (Rim) Elevation (ft)	2802.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2796.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-04

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	102398.3443	0.000
1	108613.8701	105506.11
2	114903.5521	217264.82
3	121267.1633	335350.18
4	127702.1246	459834.82
5	134207.5337	590789.65
6	140783.2597	728285.05


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
105,000
110,000
115,000
120,000
125,000
130,000
135,000
140,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-04 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-04	Trapezoidal	No	2800.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-04	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	303.76
Peak Lateral Inflow (cfs)	279.68
Peak Outflow (cfs)	66.57
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2799.72
Max HGL Depth Attained (ft)	3.72
Average HGL Elevation Attained (ft)	2797.12
Average HGL Depth Attained (ft)	1.12
Time of Max HGL Occurrence (days hh:mm)	0 13:30
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-05

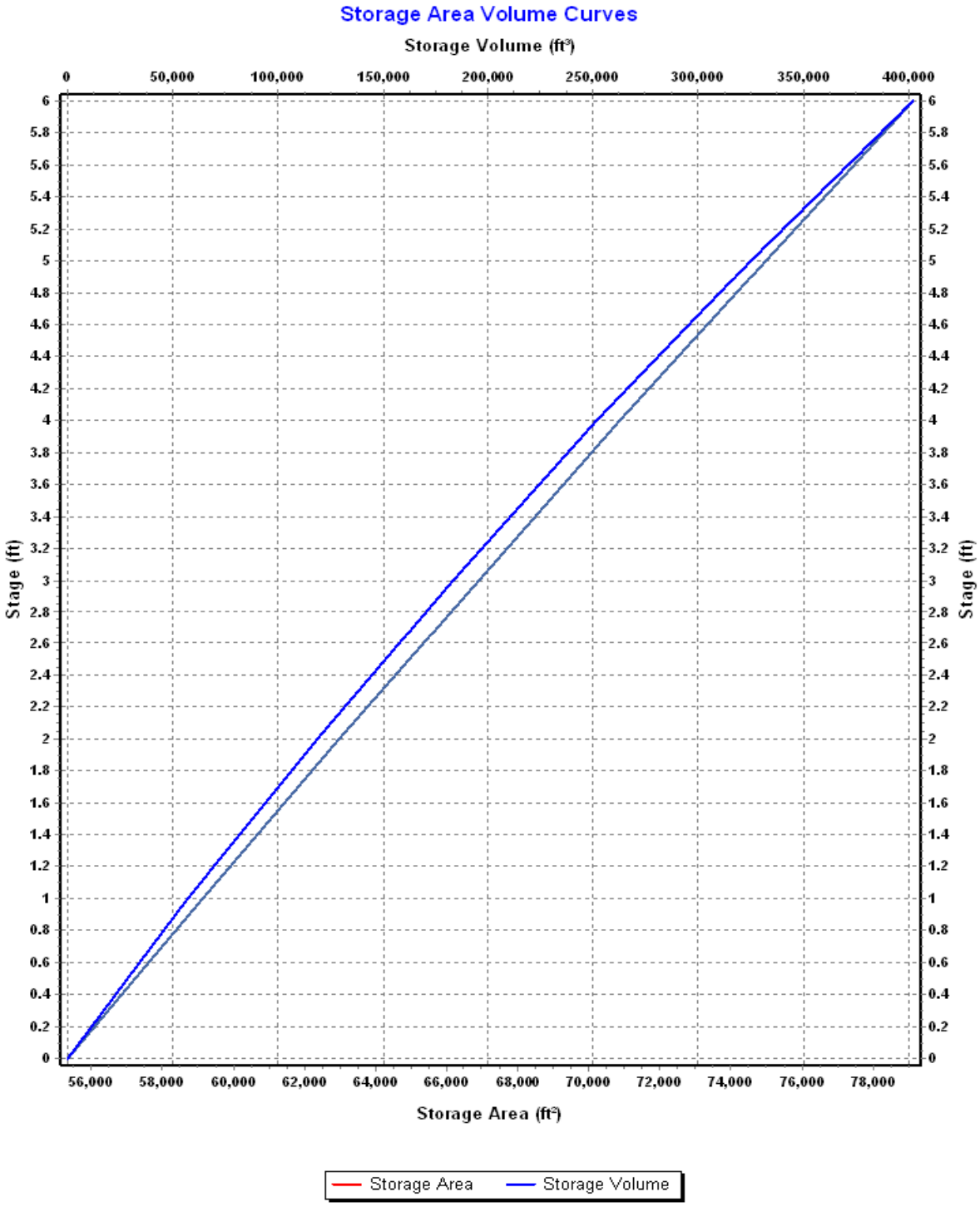
Input Data

Invert Elevation (ft)	2850.00
Max (Rim) Elevation (ft)	2856.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2850.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-05

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	55349.6785	0.000
1	59127.5202	57238.60
2	62977.5889	118291.15
3	66900.5752	183230.23
4	70897.2781	252129.16
5	74968.6317	325062.11
6	79115.7396	402104.30


Storage Area Volume Curves
Storage Volume (ft³)
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
Stage (ft)
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
56,000
58,000
60,000
62,000
64,000
66,000
68,000
70,000
72,000
74,000
76,000
78,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-05 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-05	Trapezoidal	No	2854.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-05	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	241.01
Peak Lateral Inflow (cfs)	223.23
Peak Outflow (cfs)	54.53
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2853.95
Max HGL Depth Attained (ft)	3.95
Average HGL Elevation Attained (ft)	2850.84
Average HGL Depth Attained (ft)	0.84
Time of Max HGL Occurrence (days hh:mm)	0 12:33
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-06

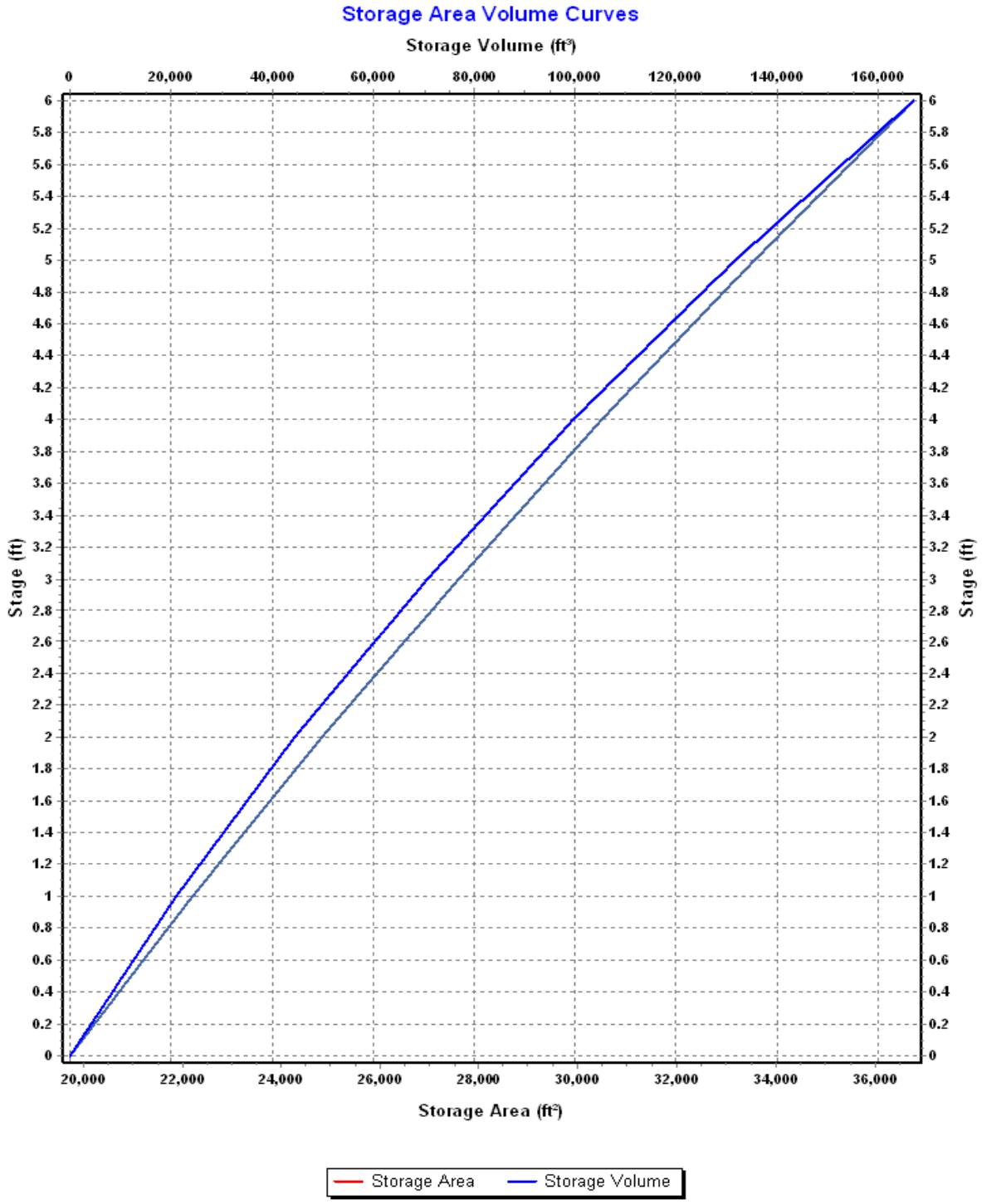
Input Data

Invert Elevation (ft)	2906.00
Max (Rim) Elevation (ft)	2912.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2906.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-06

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	19735.1183	0.000
1	22202.5968	20968.86
2	24818.6395	44479.48
3	27583.2464	70680.42
4	30496.4175	99720.25
5	33558.1527	131747.54
6	36768.4521	166910.84


Storage Area Volume Curves
Storage Volume (ft³)
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
Stage (ft)
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
20,000
22,000
24,000
26,000
28,000
30,000
32,000
34,000
36,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-06 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-06	Trapezoidal	No	2910.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-06	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	112.02
Peak Lateral Inflow (cfs)	112.02
Peak Outflow (cfs)	25.67
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2909.75
Max HGL Depth Attained (ft)	3.75
Average HGL Elevation Attained (ft)	2906.53
Average HGL Depth Attained (ft)	0.53
Time of Max HGL Occurrence (days hh:mm)	0 12:14
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-ex

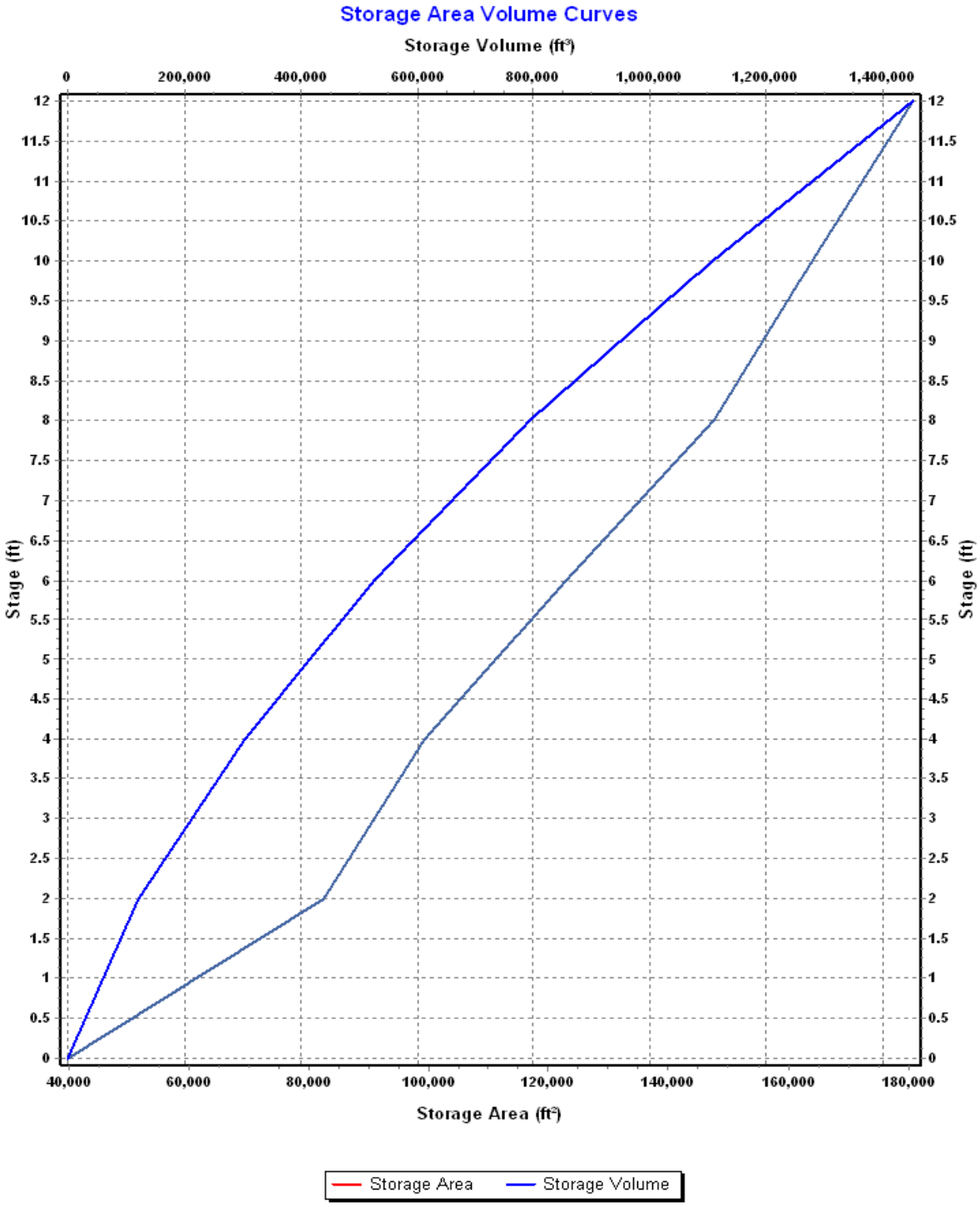
Input Data

Invert Elevation (ft)	2686.00
Max (Rim) Elevation (ft)	2698.00
Max (Rim) Offset (ft)	12.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2686.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-ex

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	39769.76	0.000
2	82351.77	122121.53
4	99196.63	303669.93
6	122898.73	525765.29
8	147582.30	796246.32
10	163896.98	1107725.60
12	180776.16	1452398.74


Storage Area Volume Curves
Storage Volume (ft³)
0
200,000
400,000
600,000
800,000
1,000,000
1,200,000
1,400,000
Stage (ft)
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Storage Area (ft²)
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
Storage Area
Storage Volume

Storage Node : Stor-ex (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-ex	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	23.22
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	22.25
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2688.19
Max HGL Depth Attained (ft)	2.19
Average HGL Elevation Attained (ft)	2686.72
Average HGL Depth Attained (ft)	0.72
Time of Max HGL Occurrence (days hh:mm)	1 00:00
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Hydrologic & Hydraulic summary sheets - 10 yr 24hr storm event

Project Description

File Name	161174-Master Drainage Model.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Sep 30, 2019	00:00:00
End Analysis On	Oct 01, 2019	00:00:00
Start Reporting On	Sep 30, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	39
Nodes	28
Junctions	10
Outfalls	1
Flow Diversions	0
Inlets	10
Storage Nodes	7
Links	33
Channels	6
Pipes	14
Pumps	0
Orifices	7
Weirs	6
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	10yr-24hr	Cumulative	inches	Utah	Washington	10	1.63	SCS Type II 24-hr

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	2730.00	2734.00	0.00	0.00	0.00	18.33	2730.74	0.00	6.26	0 00:00	0.00	0.00
2	Jun-02	Junction	2775.00	2782.00	0.00	0.00	0.00	21.54	2775.51	0.00	6.49	0 00:00	0.00	0.00
3	Jun-03	Junction	2795.00	2802.00	0.00	0.00	0.00	22.98	2795.80	0.00	6.20	0 00:00	0.00	0.00
4	Jun-04	Junction	2849.00	2856.00	0.00	0.00	0.00	20.07	2849.58	0.00	6.42	0 00:00	0.00	0.00
5	Jun-05	Junction	2905.00	2912.00	0.00	0.00	0.00	11.50	2905.41	0.00	6.59	0 00:00	0.00	0.00
6	Jun-06	Junction	2702.00	2708.00	0.00	0.00	0.00	12.56	2702.66	0.00	9.34	0 00:00	0.00	0.00
7	Jun-07	Junction	2689.97	2708.00	0.00	0.00	0.00	12.56	2690.63	0.00	17.37	0 00:00	0.00	0.00
8	Jun-08	Junction	2686.00	2698.00	0.00	0.00	0.00	11.92	2686.55	0.00	11.45	0 00:00	0.00	0.00
9	Jun-09	Junction	2657.82	2662.82	0.00	0.00	0.00	11.87	2658.94	0.00	3.88	0 00:00	0.00	0.00
10	Jun-10	Junction	2655.00	2660.00	0.00	0.00	0.00	11.86	2656.12	0.00	3.88	0 00:00	0.00	0.00
11	Out-01	Outfall	2653.80					11.86	2654.91					
12	Stor-01	Storage Node	2729.00	2738.00	0.00		0.00	37.94	2731.83				0.00	0.00
13	Stor-02	Storage Node	2731.00	2738.00	0.00		0.00	33.84	2732.93				0.00	0.00
14	Stor-03	Storage Node	2776.00	2782.00	0.00		0.00	66.06	2777.72				0.00	0.00
15	Stor-04	Storage Node	2796.00	2802.00	0.00		0.00	116.72	2797.79				0.00	0.00
16	Stor-05	Storage Node	2850.00	2856.00	0.00		0.00	99.50	2851.81				0.00	0.00
17	Stor-06	Storage Node	2906.00	2912.00	0.00		0.00	44.35	2907.64				0.00	0.00
18	Stor-ex	Storage Node	2686.00	2698.00	0.00		0.00	12.56	2687.45				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-06	Pipe	Jun-10	Out-01	241.11	2655.00	2653.80	0.5000			11.86	28.94	0.41	5.60	1.11	0.45	0.00	Calculated
2	Link-07	Pipe	Inlet-10	Jun-10	400.03	2657.00	2655.00	0.5000			11.86	29.00	0.41	5.61	1.11	0.45	0.00	Calculated
3	Link-08	Pipe	Jun-09	Inlet-10	164.52	2657.82	2657.00	0.5000			11.87	28.96	0.41	5.61	1.11	0.45	0.00	Calculated
4	Link-09	Pipe	Inlet-09	Jun-09	399.10	2659.82	2657.82	0.5000			11.87	29.04	0.41	5.62	1.11	0.45	0.00	Calculated
5	Link-10	Pipe	Inlet-08	Inlet-09	400.72	2661.82	2659.82	0.5000			11.88	28.98	0.41	5.61	1.11	0.45	0.00	Calculated
6	Link-11	Pipe	Inlet-07	Inlet-08	399.35	2663.82	2661.82	0.5000			11.88	29.03	0.41	5.62	1.11	0.45	0.00	Calculated
7	Link-12	Pipe	Inlet-06	Inlet-07	205.10	2664.83	2663.82	0.4900			11.89	28.78	0.41	5.58	1.12	0.45	0.00	Calculated
8	Link-13	Pipe	Inlet-05	Inlet-06	400.62	2666.83	2664.83	0.5000			11.89	28.98	0.41	5.61	1.12	0.45	0.00	Calculated
9	Link-14	Pipe	Inlet-04	Inlet-05	399.18	2668.83	2666.83	0.5000			11.90	29.03	0.41	5.62	1.11	0.45	0.00	Calculated
10	Link-15	Pipe	Inlet-03	Inlet-04	104.18	2669.36	2668.83	0.5100			11.91	29.26	0.41	5.65	1.11	0.44	0.00	Calculated
11	Link-16	Pipe	Inlet-02	Inlet-03	401.67	2671.36	2669.36	0.5000			11.91	28.94	0.41	5.61	1.12	0.45	0.00	Calculated
12	Link-17	Pipe	Inlet-01	Inlet-02	296.85	2672.85	2671.36	0.5000			11.91	29.06	0.41	5.63	1.12	0.45	0.00	Calculated
13	Link-18	Pipe	Jun-08	Inlet-01	173.46	2686.00	2672.85	7.5800			11.92	112.94	0.11	14.94	0.55	0.22	0.00	Calculated
14	Link-19	Pipe	Jun-06	Jun-07	476.71	2702.00	2689.97	2.5200			12.56	159.83	0.08	9.91	0.66	0.19	0.00	Calculated
15	Link-01	Channel	Jun-01	Stor-01	100.00	2730.00	2729.00	1.0000			18.33	458.90	0.04	3.29	0.74	0.19	0.00	
16	Link-02	Channel	Jun-02	Stor-02	881.55	2775.00	2731.00	4.9900			21.54	1025.24	0.02	5.96	0.51	0.13	0.00	
17	Link-03	Channel	Jun-03	Stor-03	1575.06	2795.00	2776.00	1.2100			22.98	504.02	0.05	3.77	0.80	0.20	0.00	
18	Link-04	Channel	Jun-04	Stor-04	1907.73	2849.00	2796.00	2.7800			20.06	764.90	0.03	4.79	0.58	0.15	0.00	
19	Link-05	Channel	Jun-05	Stor-05	1753.28	2905.00	2850.00	3.1400			11.32	812.79	0.01	4.13	0.40	0.10	0.00	
20	Link-20	Channel	Jun-07	Stor-ex	312.10	2689.97	2686.00	1.2700			12.56	4048.36	0.00	3.16	0.56	0.06	0.00	
21	Orifice-01	Orifice	Stor-01	Jun-06		2729.00	2702.00				12.56							
22	Orifice-02	Orifice	Stor-02	Jun-01		2731.00	2730.00				18.33							
23	Orifice-03	Orifice	Stor-03	Jun-02		2776.00	2775.00				21.54							
24	Orifice-04	Orifice	Stor-04	Jun-03		2796.00	2795.00				22.98							
25	Orifice-05	Orifice	Stor-05	Jun-04		2850.00	2849.00				20.07							
26	Orifice-06	Orifice	Stor-06	Jun-05		2906.00	2905.00				11.50							
27	Orifice-ex	Orifice	Stor-ex	Jun-08		2686.00	2686.00				11.92							
28	Weir-01	Weir	Stor-01	Jun-06		2729.00	2702.00				0.00							
29	Weir-02	Weir	Stor-02	Jun-01		2731.00	2730.00				0.00							
30	Weir-03	Weir	Stor-03	Jun-02		2776.00	2775.00				0.00							
31	Weir-04	Weir	Stor-04	Jun-03		2796.00	2795.00				0.00							
32	Weir-05	Weir	Stor-05	Jun-04		2850.00	2849.00				0.00							
33	Weir-06	Weir	Stor-06	Jun-05		2906.00	2905.00				0.00							

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2677.85
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2676.36
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2674.36
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2673.83
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2671.83
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2669.83
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2668.82
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2666.82
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2664.82
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2662.00

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Jun-01	2730.00	2734.00	4.00	0.00	-2730.00	0.00	-2734.00	0.00	
2	Jun-02	2775.00	2782.00	7.00	0.00	-2775.00	0.00	-2782.00	0.00	
3	Jun-03	2795.00	2802.00	7.00	0.00	-2795.00	0.00	-2802.00	0.00	
4	Jun-04	2849.00	2856.00	7.00	0.00	-2849.00	0.00	-2856.00	0.00	
5	Jun-05	2905.00	2912.00	7.00	0.00	-2905.00	0.00	-2912.00	0.00	
6	Jun-06	2702.00	2708.00	6.00	0.00	-2702.00	0.00	-2708.00	0.00	
7	Jun-07	2689.97	2708.00	18.03	0.00	-2689.97	0.00	-2708.00	0.00	
8	Jun-08	2686.00	2698.00	12.00	0.00	-2686.00	0.00	-2698.00	0.00	
9	Jun-09	2657.82	2662.82	5.00	0.00	-2657.82	0.00	-2662.82	0.00	
10	Jun-10	2655.00	2660.00	5.00	0.00	-2655.00	0.00	-2660.00	0.00	

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	18.33	0.00	2730.74	0.74	0.00	6.26	2730.30	0.30	0 18:59	0 00:00	0.00	0.00
2	Jun-02	21.54	0.00	2775.51	0.51	0.00	6.49	2775.21	0.21	0 16:03	0 00:00	0.00	0.00
3	Jun-03	22.98	0.00	2795.80	0.80	0.00	6.20	2795.30	0.30	0 14:01	0 00:00	0.00	0.00
4	Jun-04	20.07	0.00	2849.58	0.58	0.00	6.42	2849.16	0.16	0 12:45	0 00:00	0.00	0.00
5	Jun-05	11.50	0.00	2905.41	0.41	0.00	6.59	2905.08	0.08	0 12:14	0 00:00	0.00	0.00
6	Jun-06	12.56	0.00	2702.66	0.66	0.00	9.34	2702.25	0.25	1 00:00	0 00:00	0.00	0.00
7	Jun-07	12.56	0.00	2690.63	0.66	0.00	17.37	2690.21	0.24	1 00:00	0 00:00	0.00	0.00
8	Jun-08	11.92	0.00	2686.55	0.55	0.00	11.45	2686.17	0.17	1 00:00	0 00:00	0.00	0.00
9	Jun-09	11.87	0.00	2658.94	1.12	0.00	3.88	2658.15	0.33	1 00:00	0 00:00	0.00	0.00
10	Jun-10	11.86	0.00	2656.12	1.12	0.00	3.88	2655.32	0.32	1 00:00	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-01	100.00	2730.00	0.00	2729.00	0.00	1.00	1.0000	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	Link-02	881.55	2775.00	0.00	2731.00	0.00	44.00	4.9900	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	Link-03	1575.06	2795.00	0.00	2776.00	0.00	19.00	1.2100	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	Link-04	1907.73	2849.00	0.00	2796.00	0.00	53.00	2.7800	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	Link-05	1753.28	2905.00	0.00	2850.00	0.00	55.00	3.1400	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	Link-20	312.10	2689.97	0.00	2686.00	0.00	3.97	1.2700	Trapezoidal	10.000	46.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-01	18.33	0 18:59	458.90	0.04	3.29	0.51	0.74	0.19	0.00		
2	Link-02	21.54	0 16:05	1025.24	0.02	5.96	2.47	0.51	0.13	0.00		
3	Link-03	22.98	0 14:05	504.02	0.05	3.77	6.96	0.80	0.20	0.00		
4	Link-04	20.06	0 12:50	764.90	0.03	4.79	6.64	0.58	0.15	0.00		
5	Link-05	11.32	0 12:20	812.79	0.01	4.13	7.08	0.40	0.10	0.00		
6	Link-20	12.56	1 00:00	4048.36	0.00	3.16	1.65	0.56	0.06	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-06	241.11	2655.00	0.00	2653.80	0.00	1.20	0.5000	CIRCULAR									
2	Link-07	400.03	2657.00	0.00	2655.00	0.00	2.00	0.5000	CIRCULAR									
3	Link-08	164.52	2657.82	0.00	2657.00	0.00	0.82	0.5000	CIRCULAR									
4	Link-09	399.10	2659.82	0.00	2657.82	0.00	2.00	0.5000	CIRCULAR									
5	Link-10	400.72	2661.82	0.00	2659.82	0.00	2.00	0.5000	CIRCULAR									
6	Link-11	399.35	2663.82	0.00	2661.82	0.00	2.00	0.5000	CIRCULAR									
7	Link-12	205.10	2664.83	0.00	2663.82	0.00	1.01	0.4900	CIRCULAR									
8	Link-13	400.62	2666.83	0.00	2664.83	0.00	2.00	0.5000	CIRCULAR									
9	Link-14	399.18	2668.83	0.00	2666.83	0.00	2.00	0.5000	CIRCULAR									
10	Link-15	104.18	2669.36	0.00	2668.83	0.00	0.53	0.5100	CIRCULAR									
11	Link-16	401.67	2671.36	0.00	2669.36	0.00	2.00	0.5000	CIRCULAR									
12	Link-17	296.85	2672.85	0.00	2671.36	0.00	1.49	0.5000	CIRCULAR									
13	Link-18	173.46	2686.00	0.00	2672.85	0.00	13.15	7.5800	CIRCULAR									
14	Link-19	476.71	2702.00	0.00	2689.97	0.00	12.03	2.5200	CIRCULAR									

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-06	11.86	1 00:00	28.94	0.41	5.60	0.72	1.11	0.45	0.00		Calculated
2	Link-07	11.86	1 00:00	29.00	0.41	5.61	1.19	1.11	0.45	0.00		Calculated
3	Link-08	11.87	1 00:00	28.96	0.41	5.61	0.49	1.11	0.45	0.00		Calculated
4	Link-09	11.87	1 00:00	29.04	0.41	5.62	1.18	1.11	0.45	0.00		Calculated
5	Link-10	11.88	1 00:00	28.98	0.41	5.61	1.19	1.11	0.45	0.00		Calculated
6	Link-11	11.88	1 00:00	29.03	0.41	5.62	1.18	1.11	0.45	0.00		Calculated
7	Link-12	11.89	1 00:00	28.78	0.41	5.58	0.61	1.12	0.45	0.00		Calculated
8	Link-13	11.89	1 00:00	28.98	0.41	5.61	1.19	1.12	0.45	0.00		Calculated
9	Link-14	11.90	1 00:00	29.03	0.41	5.62	1.18	1.11	0.45	0.00		Calculated
10	Link-15	11.91	1 00:00	29.26	0.41	5.65	0.31	1.11	0.44	0.00		Calculated
11	Link-16	11.91	1 00:00	28.94	0.41	5.61	1.19	1.12	0.45	0.00		Calculated
12	Link-17	11.91	1 00:00	29.06	0.41	5.63	0.88	1.12	0.45	0.00		Calculated
13	Link-18	11.92	1 00:00	112.94	0.11	14.94	0.19	0.55	0.22	0.00		Calculated
14	Link-19	12.56	1 00:00	159.83	0.08	9.91	0.80	0.66	0.19	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	5.00	0.00	0.00	2000.00	0.00
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	5.00	0.00	0.00	2000.00	0.00
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	5.00	0.00	0.00	2000.00	0.00
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	5.00	0.00	0.00	2000.00	0.00
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	5.00	0.00	0.00	2000.00	0.00
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	5.00	0.00	0.00	2000.00	0.00
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	5.00	0.00	0.00	2000.00	0.00
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	5.00	0.00	0.00	2000.00	0.00
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	5.00	0.00	0.00	2000.00	0.00
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	5.00	0.00	0.00	2000.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway ongitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	Inlet-01	N/A	0.0200	0.0160	0.0620	2.00		

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Inlet-01	0.00	0.00	N/A	N/A	N/A	0.00	2677.85	0.00	1 00:00	0.00	0.00
2	Inlet-02	0.00	0.00	N/A	N/A	N/A	0.00	2676.36	0.00	1 00:00	0.00	0.00
3	Inlet-03	0.00	0.00	N/A	N/A	N/A	0.00	2674.36	0.00	1 00:00	0.00	0.00
4	Inlet-04	0.00	0.00	N/A	N/A	N/A	0.00	2673.83	0.00	1 00:00	0.00	0.00
5	Inlet-05	0.00	0.00	N/A	N/A	N/A	0.00	2671.83	0.00	1 00:00	0.00	0.00
6	Inlet-06	0.00	0.00	N/A	N/A	N/A	0.00	2669.83	0.00	1 00:00	0.00	0.00
7	Inlet-07	0.00	0.00	N/A	N/A	N/A	0.00	2668.82	0.00	1 00:00	0.00	0.00
8	Inlet-08	0.00	0.00	N/A	N/A	N/A	0.00	2666.82	0.00	1 00:00	0.00	0.00
9	Inlet-09	0.00	0.00	N/A	N/A	N/A	0.00	2664.82	0.00	1 00:00	0.00	0.00
10	Inlet-10	0.00	0.00	N/A	N/A	N/A	0.00	2662.00	0.00	1 00:00	0.00	0.00

Storage Nodes

Storage Node : Stor-01

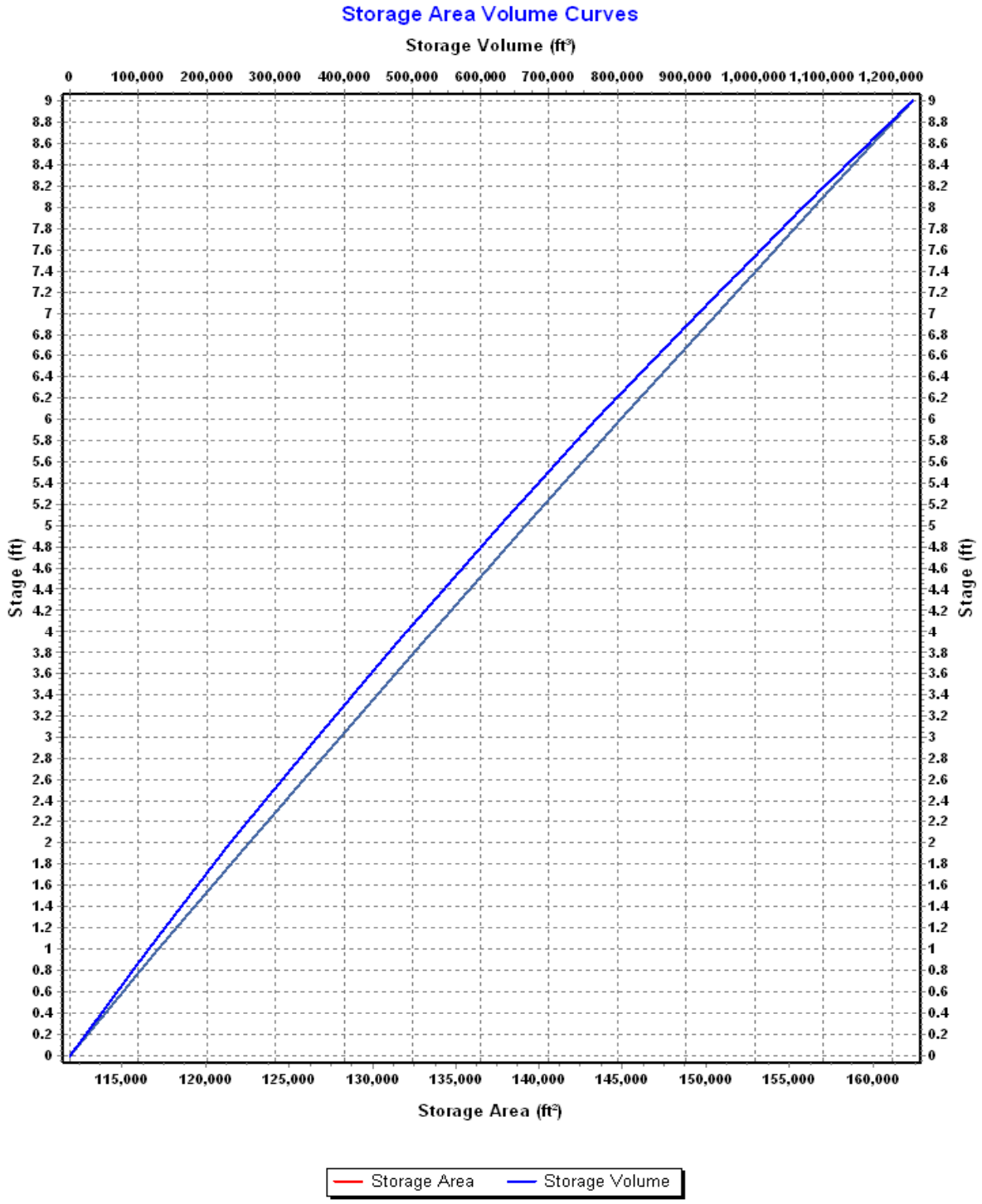
Input Data

Invert Elevation (ft)	2729.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	9.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2729.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	111884.1802	0.000
1	117199.7310	114541.96
2	122589.4743	234436.56
3	128053.1473	359757.87
4	133590.5081	490579.70
5	139201.3329	626975.62
6	144885.4142	769018.99
7	150642.5595	916782.98
8	156472.5891	1070340.55
9	162375.3357	1229764.51


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
1,100,000
1,200,000
Stage (ft)
Stage (ft)
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
155,000
160,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-01 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-01	Trapezoidal	No	2737.00	8.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-01	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	37.94
Peak Lateral Inflow (cfs)	37.38
Peak Outflow (cfs)	12.56
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2731.83
Max HGL Depth Attained (ft)	2.83
Average HGL Elevation Attained (ft)	2729.84
Average HGL Depth Attained (ft)	0.84
Time of Max HGL Occurrence (days hh:mm)	1 00:00
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-02

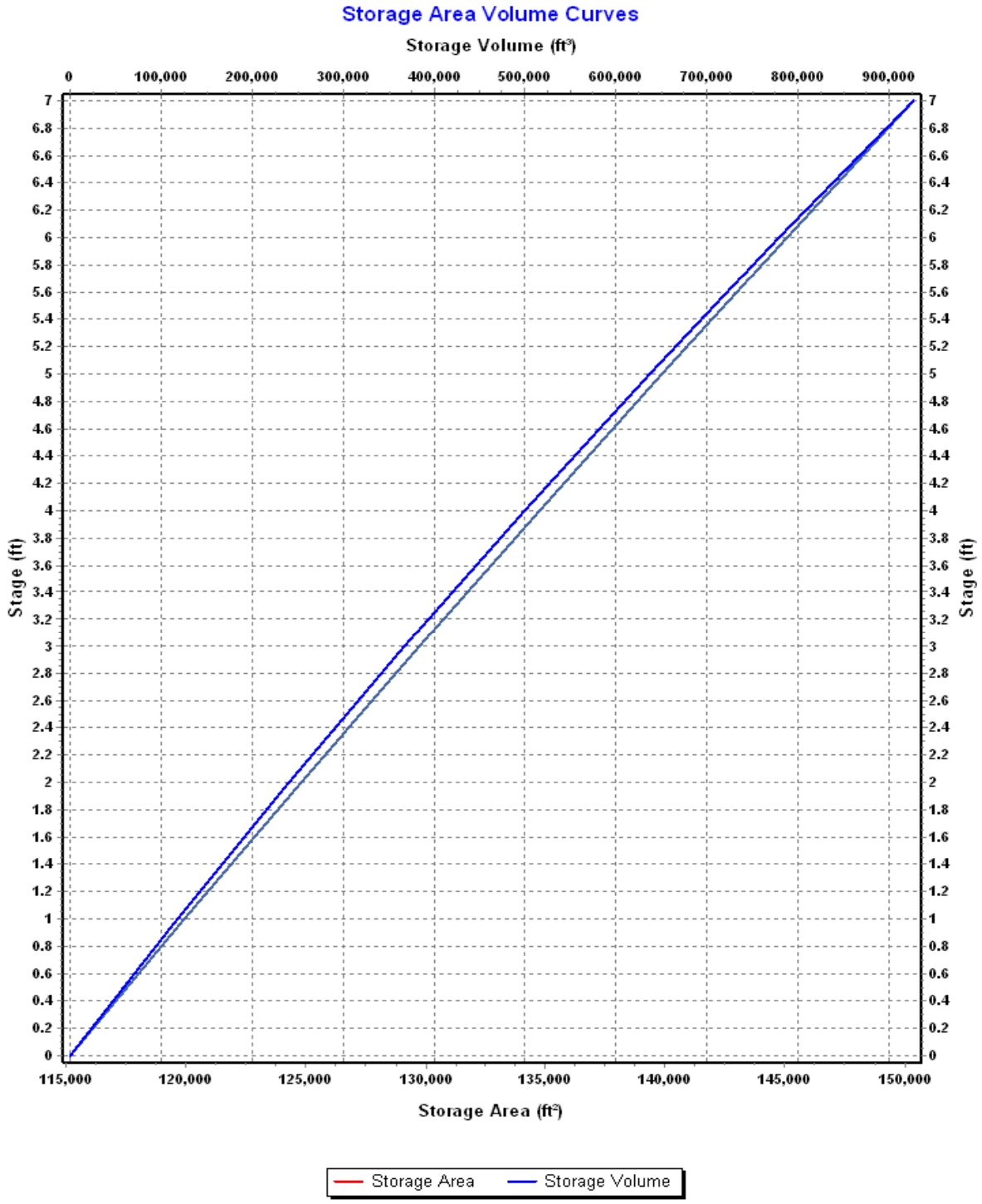
Input Data

Invert Elevation (ft)	2731.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	7.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2731.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-02

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	115183.3755	0.000
1	119948.4630	117565.92
2	124800.3987	239940.35
3	129738.8737	367209.99
4	134763.5929	499461.22
5	139874.2743	636780.15
6	145070.6482	779252.61
7	150352.4564	926964.16


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
Stage (ft)
Stage (ft)
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-02 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-02	Trapezoidal	No	2736.00	5.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-02	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	33.84
Peak Lateral Inflow (cfs)	32.79
Peak Outflow (cfs)	18.33
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2732.93
Max HGL Depth Attained (ft)	1.93
Average HGL Elevation Attained (ft)	2731.75
Average HGL Depth Attained (ft)	0.75
Time of Max HGL Occurrence (days hh:mm)	0 18:59
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-03

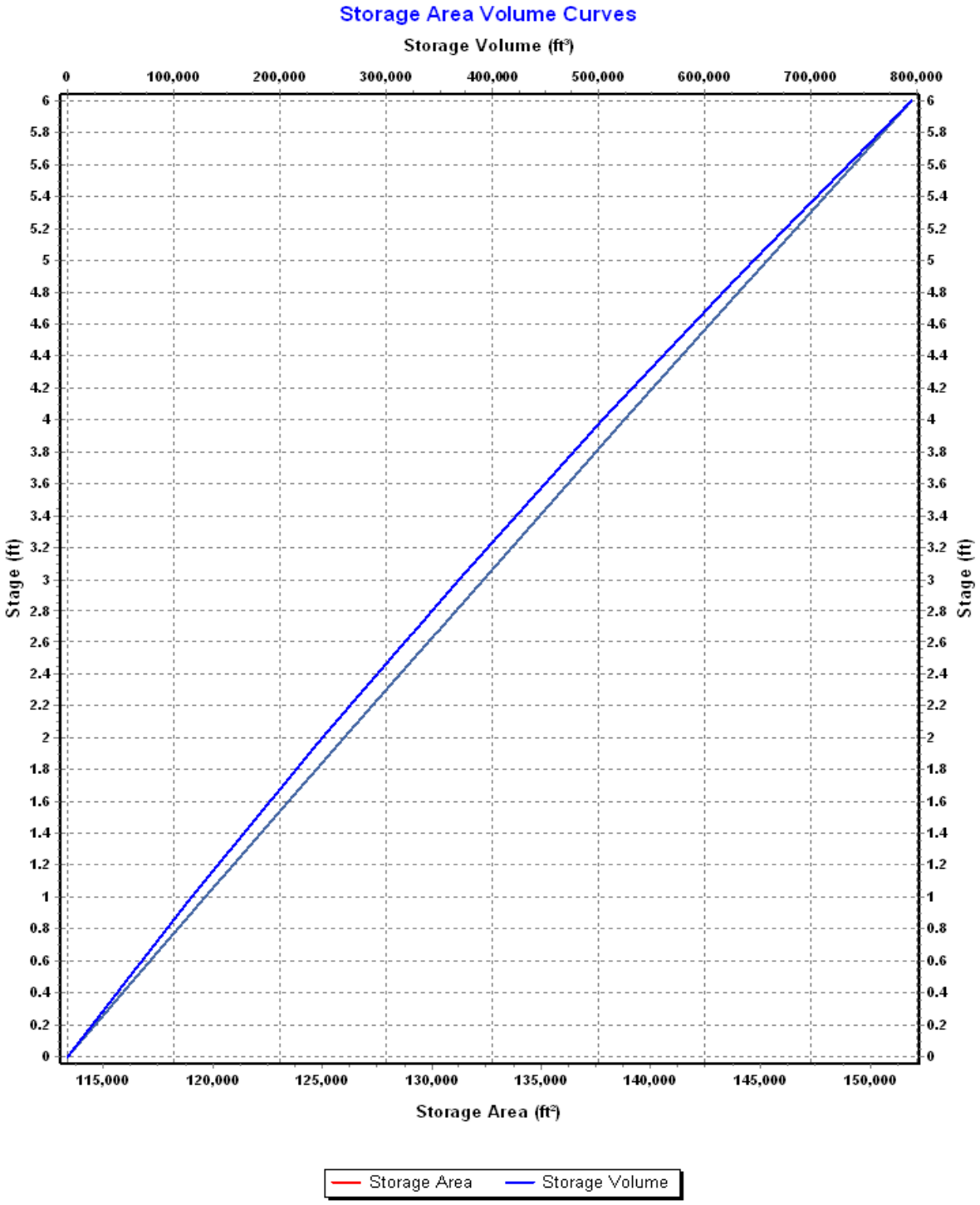
Input Data

Invert Elevation (ft)	2776.00
Max (Rim) Elevation (ft)	2782.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2776.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-03

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	113393.5106	0.000
1	119634.4886	116514.00
2	125943.9100	239303.20
3	132321.8037	368436.06
4	138768.1994	503981.06
5	145283.1278	646006.72
6	151866.6201	794581.59


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-03 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-03	Trapezoidal	No	2780.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-03	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	66.06
Peak Lateral Inflow (cfs)	65.46
Peak Outflow (cfs)	21.54
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2777.72
Max HGL Depth Attained (ft)	1.72
Average HGL Elevation Attained (ft)	2776.68
Average HGL Depth Attained (ft)	0.68
Time of Max HGL Occurrence (days hh:mm)	0 16:03
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-04

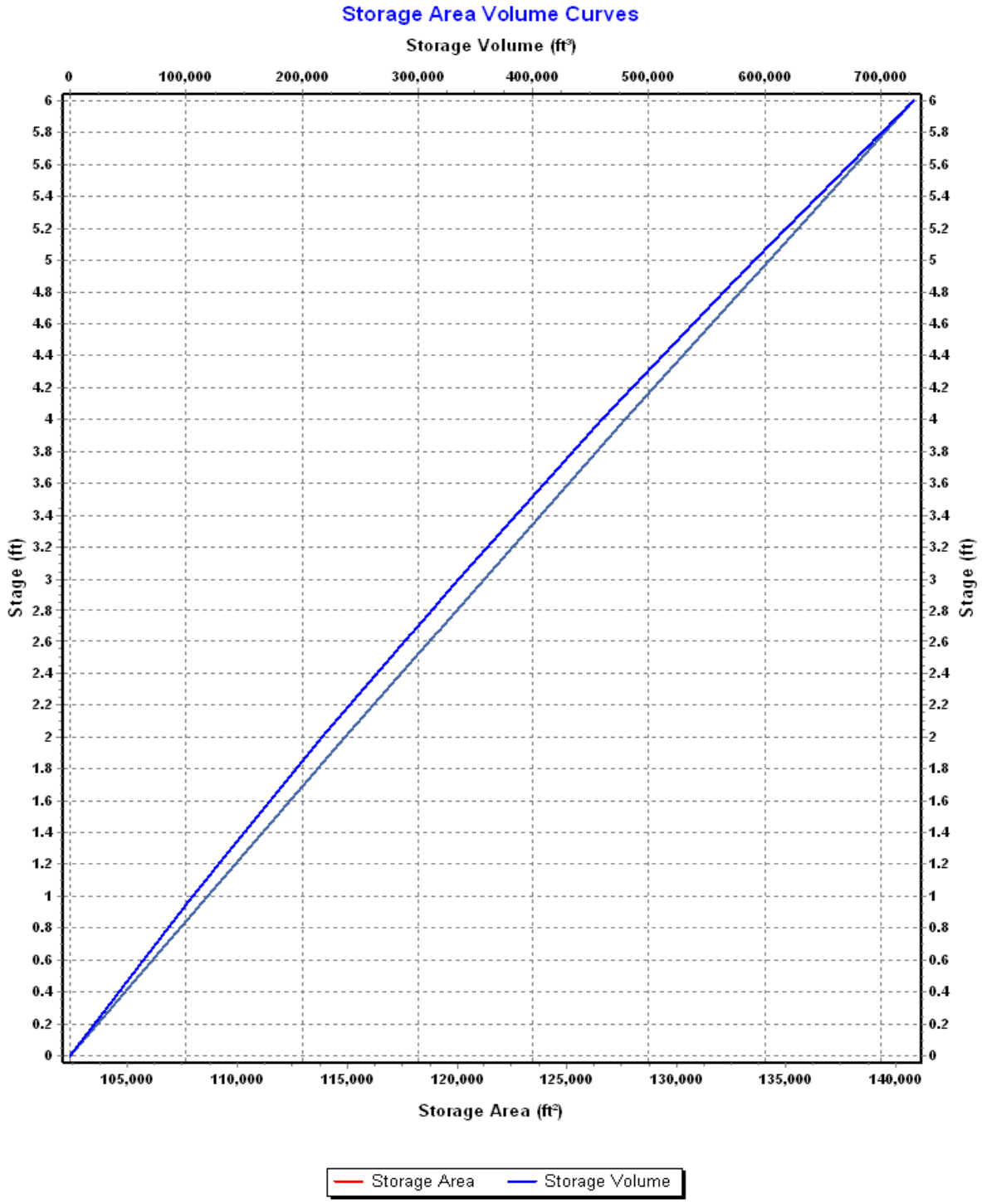
Input Data

Invert Elevation (ft)	2796.00
Max (Rim) Elevation (ft)	2802.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2796.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-04

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	102398.3443	0.000
1	108613.8701	105506.11
2	114903.5521	217264.82
3	121267.1633	335350.18
4	127702.1246	459834.82
5	134207.5337	590789.65
6	140783.2597	728285.05


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
105,000
110,000
115,000
120,000
125,000
130,000
135,000
140,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-04 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-04	Trapezoidal	No	2800.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-04	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	116.72
Peak Lateral Inflow (cfs)	114.71
Peak Outflow (cfs)	22.98
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2797.79
Max HGL Depth Attained (ft)	1.79
Average HGL Elevation Attained (ft)	2796.63
Average HGL Depth Attained (ft)	0.63
Time of Max HGL Occurrence (days hh:mm)	0 14:01
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-05

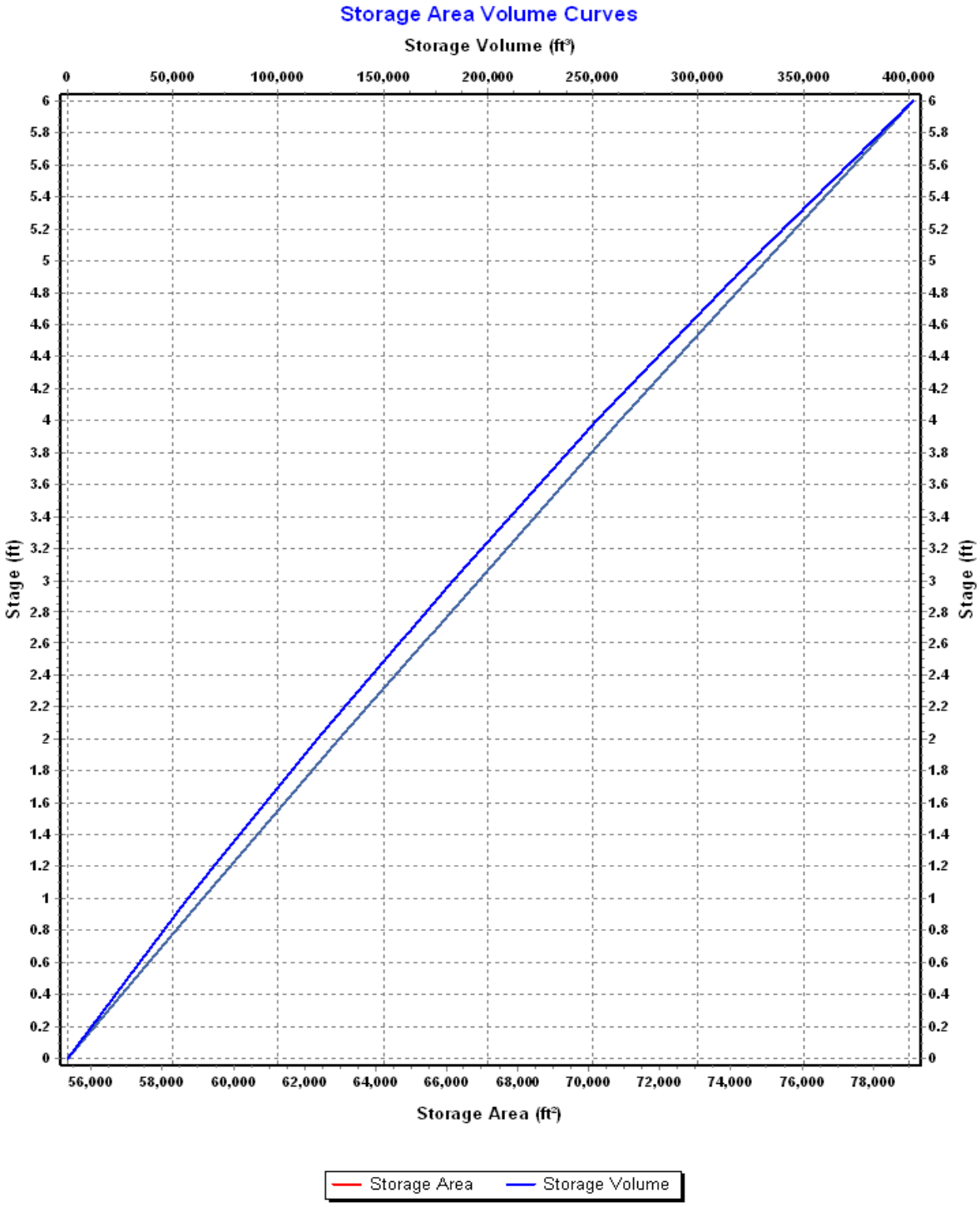
Input Data

Invert Elevation (ft)	2850.00
Max (Rim) Elevation (ft)	2856.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2850.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-05

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	55349.6785	0.000
1	59127.5202	57238.60
2	62977.5889	118291.15
3	66900.5752	183230.23
4	70897.2781	252129.16
5	74968.6317	325062.11
6	79115.7396	402104.30


Storage Area Volume Curves
Storage Volume (ft³)
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
Stage (ft)
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
56,000
58,000
60,000
62,000
64,000
66,000
68,000
70,000
72,000
74,000
76,000
78,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-05 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-05	Trapezoidal	No	2854.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-05	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	99.50
Peak Lateral Inflow (cfs)	96.73
Peak Outflow (cfs)	20.07
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2851.81
Max HGL Depth Attained (ft)	1.81
Average HGL Elevation Attained (ft)	2850.48
Average HGL Depth Attained (ft)	0.48
Time of Max HGL Occurrence (days hh:mm)	0 12:45
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-06

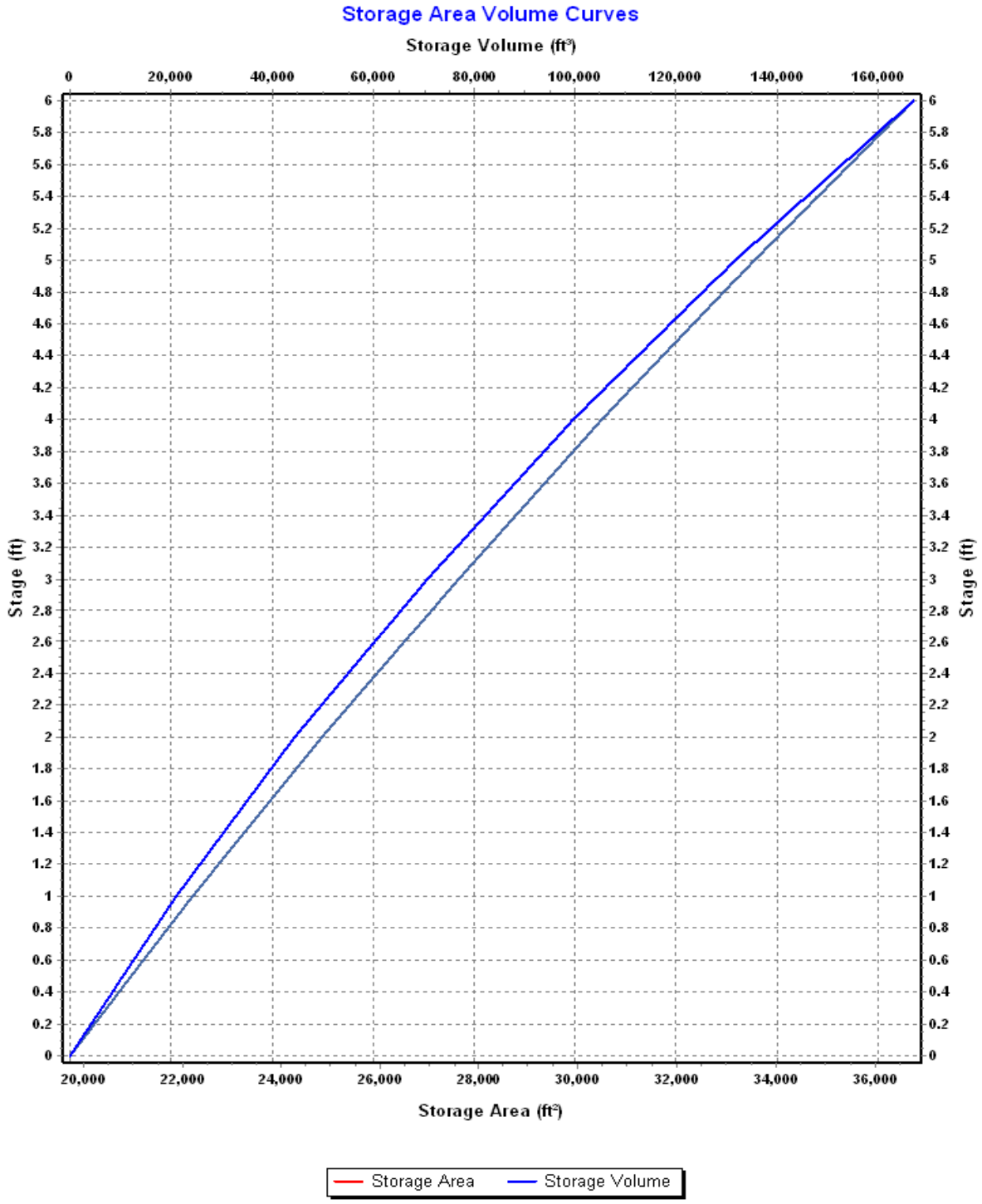
Input Data

Invert Elevation (ft)	2906.00
Max (Rim) Elevation (ft)	2912.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2906.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-06

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	19735.1183	0.000
1	22202.5968	20968.86
2	24818.6395	44479.48
3	27583.2464	70680.42
4	30496.4175	99720.25
5	33558.1527	131747.54
6	36768.4521	166910.84


Storage Area Volume Curves
Storage Volume (ft³)
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
Stage (ft)
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
20,000
22,000
24,000
26,000
28,000
30,000
32,000
34,000
36,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-06 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-06	Trapezoidal	No	2910.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-06	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	44.35
Peak Lateral Inflow (cfs)	44.35
Peak Outflow (cfs)	11.50
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2907.64
Max HGL Depth Attained (ft)	1.64
Average HGL Elevation Attained (ft)	2906.29
Average HGL Depth Attained (ft)	0.29
Time of Max HGL Occurrence (days hh:mm)	0 12:14
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-ex

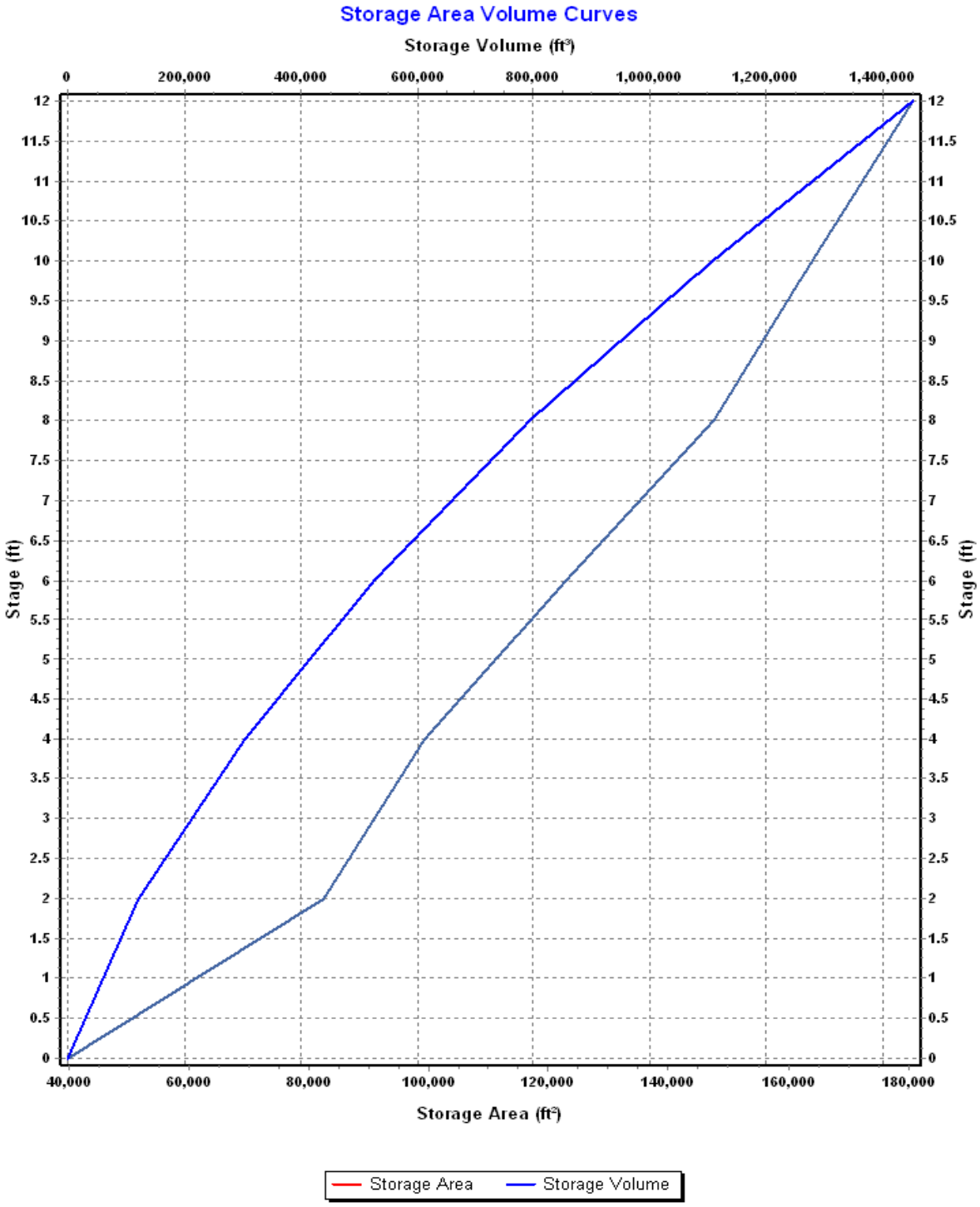
Input Data

Invert Elevation (ft)	2686.00
Max (Rim) Elevation (ft)	2698.00
Max (Rim) Offset (ft)	12.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2686.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-ex

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	39769.76	0.000
2	82351.77	122121.53
4	99196.63	303669.93
6	122898.73	525765.29
8	147582.30	796246.32
10	163896.98	1107725.60
12	180776.16	1452398.74


Storage Area Volume Curves
Storage Volume (ft³)
0
200,000
400,000
600,000
800,000
1,000,000
1,200,000
1,400,000
Stage (ft)
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Storage Area (ft²)
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
Storage Area
Storage Volume

Storage Node : Stor-ex (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-ex	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	12.56
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	11.92
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2687.45
Max HGL Depth Attained (ft)	1.45
Average HGL Elevation Attained (ft)	2686.40
Average HGL Depth Attained (ft)	0.4
Time of Max HGL Occurrence (days hh:mm)	1 00:00
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Hydrologic & Hydraulic summary sheets - 100 yr 3hr storm event - Farmer Fletcher

Project Description

File Name	161174-Master Drainage Model.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Sep 30, 2019	00:00:00
End Analysis On	Oct 01, 2019	00:00:00
Start Reporting On	Sep 30, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	39
Nodes	28
Junctions	10
Outfalls	1
Flow Diversions	0
Inlets	10
Storage Nodes	7
Links	33
Channels	6
Pipes	14
Pumps	0
Orifices	7
Weirs	6
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	100yr-3hr Farmer Fletcher	Cumulative	inches				0.00	

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	2730.00	2734.00	0.00	0.00	0.00	28.78	2730.96	0.00	6.04	0 00:00	0.00	0.00
2	Jun-02	Junction	2775.00	2782.00	0.00	0.00	0.00	40.05	2775.73	0.00	6.27	0 00:00	0.00	0.00
3	Jun-03	Junction	2795.00	2802.00	0.00	0.00	0.00	46.14	2796.18	0.00	5.82	0 00:00	0.00	0.00
4	Jun-04	Junction	2849.00	2856.00	0.00	0.00	0.00	43.21	2849.90	0.00	6.10	0 00:00	0.00	0.00
5	Jun-05	Junction	2905.00	2912.00	0.00	0.00	0.00	19.94	2905.56	0.00	6.44	0 00:00	0.00	0.00
6	Jun-06	Junction	2702.00	2708.00	0.00	0.00	0.00	15.12	2702.73	0.00	9.27	0 00:00	0.00	0.00
7	Jun-07	Junction	2689.97	2708.00	0.00	0.00	0.00	15.12	2690.70	0.00	17.30	0 00:00	0.00	0.00
8	Jun-08	Junction	2686.00	2698.00	0.00	0.00	0.00	14.82	2686.61	0.00	11.39	0 00:00	0.00	0.00
9	Jun-09	Junction	2657.82	2662.82	0.00	0.00	0.00	14.82	2659.09	0.00	3.73	0 00:00	0.00	0.00
10	Jun-10	Junction	2655.00	2660.00	0.00	0.00	0.00	14.82	2656.27	0.00	3.73	0 00:00	0.00	0.00
11	Out-01	Outfall	2653.80					14.82	2655.07					
12	Stor-01	Storage Node	2729.00	2738.00	0.00		0.00	55.97	2732.76				0.00	0.00
13	Stor-02	Storage Node	2731.00	2738.00	0.00		0.00	48.28	2733.67				0.00	0.00
14	Stor-03	Storage Node	2776.00	2782.00	0.00		0.00	97.66	2778.60				0.00	0.00
15	Stor-04	Storage Node	2796.00	2802.00	0.00		0.00	173.00	2798.85				0.00	0.00
16	Stor-05	Storage Node	2850.00	2856.00	0.00		0.00	144.52	2853.04				0.00	0.00
17	Stor-06	Storage Node	2906.00	2912.00	0.00		0.00	65.96	2908.66				0.00	0.00
18	Stor-ex	Storage Node	2686.00	2698.00	0.00		0.00	15.12	2687.67				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-06	Pipe	Jun-10	Out-01	241.11	2655.00	2653.80	0.5000			14.82	28.94	0.51	5.93	1.27	0.51	0.00	Calculated
2	Link-07	Pipe	Inlet-10	Jun-10	400.03	2657.00	2655.00	0.5000			14.82	29.00	0.51	5.94	1.27	0.51	0.00	Calculated
3	Link-08	Pipe	Jun-09	Inlet-10	164.52	2657.82	2657.00	0.5000			14.82	28.96	0.51	5.93	1.27	0.51	0.00	Calculated
4	Link-09	Pipe	Inlet-09	Jun-09	399.10	2659.82	2657.82	0.5000			14.82	29.04	0.51	5.94	1.27	0.51	0.00	Calculated
5	Link-10	Pipe	Inlet-08	Inlet-09	400.72	2661.82	2659.82	0.5000			14.82	28.98	0.51	5.94	1.27	0.51	0.00	Calculated
6	Link-11	Pipe	Inlet-07	Inlet-08	399.35	2663.82	2661.82	0.5000			14.82	29.03	0.51	5.94	1.27	0.51	0.00	Calculated
7	Link-12	Pipe	Inlet-06	Inlet-07	205.10	2664.83	2663.82	0.4900			14.82	28.78	0.51	5.91	1.27	0.51	0.00	Calculated
8	Link-13	Pipe	Inlet-05	Inlet-06	400.62	2666.83	2664.83	0.5000			14.82	28.98	0.51	5.94	1.27	0.51	0.00	Calculated
9	Link-14	Pipe	Inlet-04	Inlet-05	399.18	2668.83	2666.83	0.5000			14.82	29.03	0.51	5.94	1.27	0.51	0.00	Calculated
10	Link-15	Pipe	Inlet-03	Inlet-04	104.18	2669.36	2668.83	0.5100			14.82	29.26	0.51	5.98	1.26	0.50	0.00	Calculated
11	Link-16	Pipe	Inlet-02	Inlet-03	401.67	2671.36	2669.36	0.5000			14.82	28.94	0.51	5.93	1.27	0.51	0.00	Calculated
12	Link-17	Pipe	Inlet-01	Inlet-02	296.85	2672.85	2671.36	0.5000			14.82	29.06	0.51	5.95	1.27	0.51	0.00	Calculated
13	Link-18	Pipe	Jun-08	Inlet-01	173.46	2686.00	2672.85	7.5800			14.82	112.94	0.13	15.93	0.61	0.24	0.00	Calculated
14	Link-19	Pipe	Jun-06	Jun-07	476.71	2702.00	2689.97	2.5200			15.12	159.83	0.09	10.46	0.73	0.21	0.00	Calculated
15	Link-01	Channel	Jun-01	Stor-01	100.00	2730.00	2729.00	1.0000			28.78	458.90	0.06	3.79	0.96	0.24	0.00	
16	Link-02	Channel	Jun-02	Stor-02	881.55	2775.00	2731.00	4.9900			40.04	1025.24	0.04	7.30	0.73	0.18	0.00	
17	Link-03	Channel	Jun-03	Stor-03	1575.06	2795.00	2776.00	1.2100			46.14	504.02	0.09	4.68	1.18	0.30	0.00	
18	Link-04	Channel	Jun-04	Stor-04	1907.73	2849.00	2796.00	2.7800			43.18	764.90	0.06	6.14	0.90	0.23	0.00	
19	Link-05	Channel	Jun-05	Stor-05	1753.28	2905.00	2850.00	3.1400			19.90	812.79	0.02	4.98	0.56	0.14	0.00	
20	Link-20	Channel	Jun-07	Stor-ex	312.10	2689.97	2686.00	1.2700			15.12	4048.36	0.00	3.36	0.62	0.06	0.00	
21	Orifice-01	Orifice	Stor-01	Jun-06		2729.00	2702.00				15.12							
22	Orifice-02	Orifice	Stor-02	Jun-01		2731.00	2730.00				28.78							
23	Orifice-03	Orifice	Stor-03	Jun-02		2776.00	2775.00				40.05							
24	Orifice-04	Orifice	Stor-04	Jun-03		2796.00	2795.00				46.14							
25	Orifice-05	Orifice	Stor-05	Jun-04		2850.00	2849.00				43.21							
26	Orifice-06	Orifice	Stor-06	Jun-05		2906.00	2905.00				19.94							
27	Orifice-ex	Orifice	Stor-ex	Jun-08		2686.00	2686.00				14.82							
28	Weir-01	Weir	Stor-01	Jun-06		2729.00	2702.00				0.00							
29	Weir-02	Weir	Stor-02	Jun-01		2731.00	2730.00				0.00							
30	Weir-03	Weir	Stor-03	Jun-02		2776.00	2775.00				0.00							
31	Weir-04	Weir	Stor-04	Jun-03		2796.00	2795.00				0.00							
32	Weir-05	Weir	Stor-05	Jun-04		2850.00	2849.00				0.00							
33	Weir-06	Weir	Stor-06	Jun-05		2906.00	2905.00				0.00							

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2677.85
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2676.36
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2674.36
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2673.83
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2671.83
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2669.83
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2668.82
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2666.82
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2664.82
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2662.00

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Jun-01	2730.00	2734.00	4.00	0.00	-2730.00	0.00	-2734.00	0.00	
2	Jun-02	2775.00	2782.00	7.00	0.00	-2775.00	0.00	-2782.00	0.00	
3	Jun-03	2795.00	2802.00	7.00	0.00	-2795.00	0.00	-2802.00	0.00	
4	Jun-04	2849.00	2856.00	7.00	0.00	-2849.00	0.00	-2856.00	0.00	
5	Jun-05	2905.00	2912.00	7.00	0.00	-2905.00	0.00	-2912.00	0.00	
6	Jun-06	2702.00	2708.00	6.00	0.00	-2702.00	0.00	-2708.00	0.00	
7	Jun-07	2689.97	2708.00	18.03	0.00	-2689.97	0.00	-2708.00	0.00	
8	Jun-08	2686.00	2698.00	12.00	0.00	-2686.00	0.00	-2698.00	0.00	
9	Jun-09	2657.82	2662.82	5.00	0.00	-2657.82	0.00	-2662.82	0.00	
10	Jun-10	2655.00	2660.00	5.00	0.00	-2655.00	0.00	-2660.00	0.00	

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	28.78	0.00	2730.96	0.96	0.00	6.04	2730.52	0.52	0 05:36	0 00:00	0.00	0.00
2	Jun-02	40.05	0.00	2775.73	0.73	0.00	6.27	2775.29	0.29	0 03:23	0 00:00	0.00	0.00
3	Jun-03	46.14	0.00	2796.18	1.18	0.00	5.82	2795.35	0.35	0 02:22	0 00:00	0.00	0.00
4	Jun-04	43.21	0.00	2849.90	0.90	0.00	6.10	2849.16	0.16	0 01:28	0 00:00	0.00	0.00
5	Jun-05	19.94	0.00	2905.56	0.56	0.00	6.44	2905.07	0.07	0 01:10	0 00:00	0.00	0.00
6	Jun-06	15.12	0.00	2702.73	0.73	0.00	9.27	2702.60	0.60	0 10:36	0 00:00	0.00	0.00
7	Jun-07	15.12	0.00	2690.70	0.73	0.00	17.30	2690.57	0.60	0 10:36	0 00:00	0.00	0.00
8	Jun-08	14.82	0.00	2686.61	0.61	0.00	11.39	2686.48	0.48	0 12:31	0 00:00	0.00	0.00
9	Jun-09	14.82	0.00	2659.09	1.27	0.00	3.73	2658.79	0.97	0 12:38	0 00:00	0.00	0.00
10	Jun-10	14.82	0.00	2656.27	1.27	0.00	3.73	2655.96	0.96	0 12:39	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-01	100.00	2730.00	0.00	2729.00	0.00	1.00	1.0000	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	Link-02	881.55	2775.00	0.00	2731.00	0.00	44.00	4.9900	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	Link-03	1575.06	2795.00	0.00	2776.00	0.00	19.00	1.2100	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	Link-04	1907.73	2849.00	0.00	2796.00	0.00	53.00	2.7800	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	Link-05	1753.28	2905.00	0.00	2850.00	0.00	55.00	3.1400	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	Link-20	312.10	2689.97	0.00	2686.00	0.00	3.97	1.2700	Trapezoidal	10.000	46.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-01	28.78	0 05:37	458.90	0.06	3.79	0.44	0.96	0.24	0.00		
2	Link-02	40.04	0 03:24	1025.24	0.04	7.30	2.01	0.73	0.18	0.00		
3	Link-03	46.14	0 02:25	504.02	0.09	4.68	5.61	1.18	0.30	0.00		
4	Link-04	43.18	0 01:32	764.90	0.06	6.14	5.18	0.90	0.23	0.00		
5	Link-05	19.90	0 01:14	812.79	0.02	4.98	5.87	0.56	0.14	0.00		
6	Link-20	15.12	0 10:37	4048.36	0.00	3.36	1.55	0.62	0.06	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-06	241.11	2655.00	0.00	2653.80	0.00	1.20	0.5000	CIRCULAR									
2	Link-07	400.03	2657.00	0.00	2655.00	0.00	2.00	0.5000	CIRCULAR									
3	Link-08	164.52	2657.82	0.00	2657.00	0.00	0.82	0.5000	CIRCULAR									
4	Link-09	399.10	2659.82	0.00	2657.82	0.00	2.00	0.5000	CIRCULAR									
5	Link-10	400.72	2661.82	0.00	2659.82	0.00	2.00	0.5000	CIRCULAR									
6	Link-11	399.35	2663.82	0.00	2661.82	0.00	2.00	0.5000	CIRCULAR									
7	Link-12	205.10	2664.83	0.00	2663.82	0.00	1.01	0.4900	CIRCULAR									
8	Link-13	400.62	2666.83	0.00	2664.83	0.00	2.00	0.5000	CIRCULAR									
9	Link-14	399.18	2668.83	0.00	2666.83	0.00	2.00	0.5000	CIRCULAR									
10	Link-15	104.18	2669.36	0.00	2668.83	0.00	0.53	0.5100	CIRCULAR									
11	Link-16	401.67	2671.36	0.00	2669.36	0.00	2.00	0.5000	CIRCULAR									
12	Link-17	296.85	2672.85	0.00	2671.36	0.00	1.49	0.5000	CIRCULAR									
13	Link-18	173.46	2686.00	0.00	2672.85	0.00	13.15	7.5800	CIRCULAR									
14	Link-19	476.71	2702.00	0.00	2689.97	0.00	12.03	2.5200	CIRCULAR									

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-06	14.82	0 12:40	28.94	0.51	5.93	0.68	1.27	0.51	0.00		Calculated
2	Link-07	14.82	0 12:39	29.00	0.51	5.94	1.12	1.27	0.51	0.00		Calculated
3	Link-08	14.82	0 12:38	28.96	0.51	5.93	0.46	1.27	0.51	0.00		Calculated
4	Link-09	14.82	0 12:38	29.04	0.51	5.94	1.12	1.27	0.51	0.00		Calculated
5	Link-10	14.82	0 12:37	28.98	0.51	5.94	1.12	1.27	0.51	0.00		Calculated
6	Link-11	14.82	0 12:36	29.03	0.51	5.94	1.12	1.27	0.51	0.00		Calculated
7	Link-12	14.82	0 12:35	28.78	0.51	5.91	0.58	1.27	0.51	0.00		Calculated
8	Link-13	14.82	0 12:35	28.98	0.51	5.94	1.12	1.27	0.51	0.00		Calculated
9	Link-14	14.82	0 12:34	29.03	0.51	5.94	1.12	1.27	0.51	0.00		Calculated
10	Link-15	14.82	0 12:33	29.26	0.51	5.98	0.29	1.26	0.50	0.00		Calculated
11	Link-16	14.82	0 12:33	28.94	0.51	5.93	1.13	1.27	0.51	0.00		Calculated
12	Link-17	14.82	0 12:32	29.06	0.51	5.95	0.83	1.27	0.51	0.00		Calculated
13	Link-18	14.82	0 12:32	112.94	0.13	15.93	0.18	0.61	0.24	0.00		Calculated
14	Link-19	15.12	0 10:36	159.83	0.09	10.46	0.76	0.73	0.21	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	5.00	0.00	0.00	2000.00	0.00
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	5.00	0.00	0.00	2000.00	0.00
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	5.00	0.00	0.00	2000.00	0.00
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	5.00	0.00	0.00	2000.00	0.00
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	5.00	0.00	0.00	2000.00	0.00
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	5.00	0.00	0.00	2000.00	0.00
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	5.00	0.00	0.00	2000.00	0.00
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	5.00	0.00	0.00	2000.00	0.00
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	5.00	0.00	0.00	2000.00	0.00
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	5.00	0.00	0.00	2000.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway ongitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	Inlet-01	N/A	0.0200	0.0160	0.0620	2.00		

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Inlet-01	0.00	0.00	N/A	N/A	N/A	0.00	2677.85	0.00	0 12:32	0.00	0.00
2	Inlet-02	0.00	0.00	N/A	N/A	N/A	0.00	2676.36	0.00	0 12:32	0.00	0.00
3	Inlet-03	0.00	0.00	N/A	N/A	N/A	0.00	2674.36	0.00	0 12:33	0.00	0.00
4	Inlet-04	0.00	0.00	N/A	N/A	N/A	0.00	2673.83	0.00	0 12:33	0.00	0.00
5	Inlet-05	0.00	0.00	N/A	N/A	N/A	0.00	2671.83	0.00	0 12:34	0.00	0.00
6	Inlet-06	0.00	0.00	N/A	N/A	N/A	0.00	2669.83	0.00	0 12:35	0.00	0.00
7	Inlet-07	0.00	0.00	N/A	N/A	N/A	0.00	2668.82	0.00	0 12:35	0.00	0.00
8	Inlet-08	0.00	0.00	N/A	N/A	N/A	0.00	2666.82	0.00	0 12:36	0.00	0.00
9	Inlet-09	0.00	0.00	N/A	N/A	N/A	0.00	2664.82	0.00	0 12:37	0.00	0.00
10	Inlet-10	0.00	0.00	N/A	N/A	N/A	0.00	2662.00	0.00	0 12:38	0.00	0.00

Storage Nodes

Storage Node : Stor-01

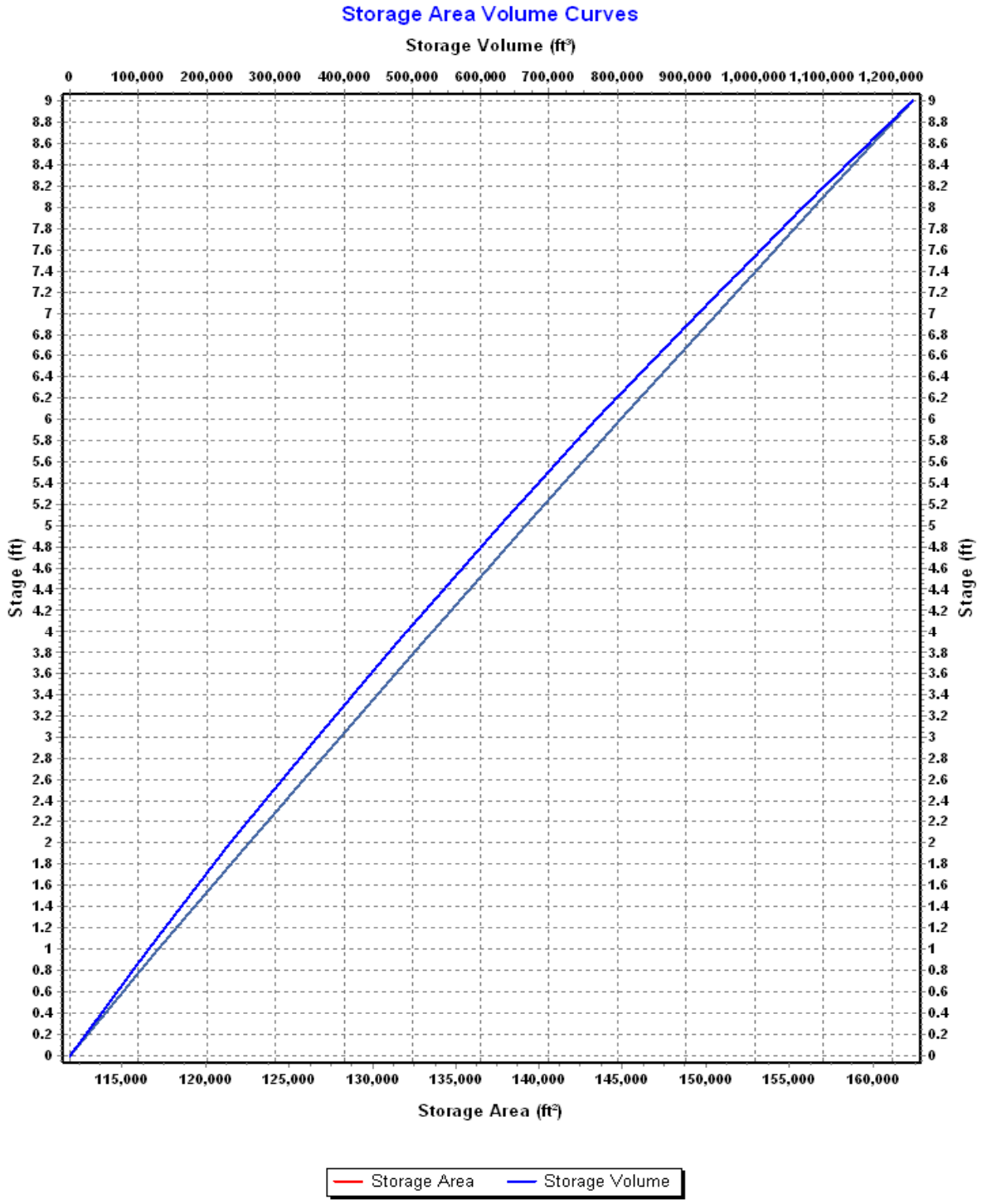
Input Data

Invert Elevation (ft)	2729.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	9.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2729.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	111884.1802	0.000
1	117199.7310	114541.96
2	122589.4743	234436.56
3	128053.1473	359757.87
4	133590.5081	490579.70
5	139201.3329	626975.62
6	144885.4142	769018.99
7	150642.5595	916782.98
8	156472.5891	1070340.55
9	162375.3357	1229764.51


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
1,100,000
1,200,000
Stage (ft)
Stage (ft)
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
155,000
160,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-01 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-01	Trapezoidal	No	2737.00	8.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-01	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	55.97
Peak Lateral Inflow (cfs)	55.20
Peak Outflow (cfs)	15.12
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2732.76
Max HGL Depth Attained (ft)	3.76
Average HGL Elevation Attained (ft)	2731.50
Average HGL Depth Attained (ft)	2.5
Time of Max HGL Occurrence (days hh:mm)	0 10:36
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-02

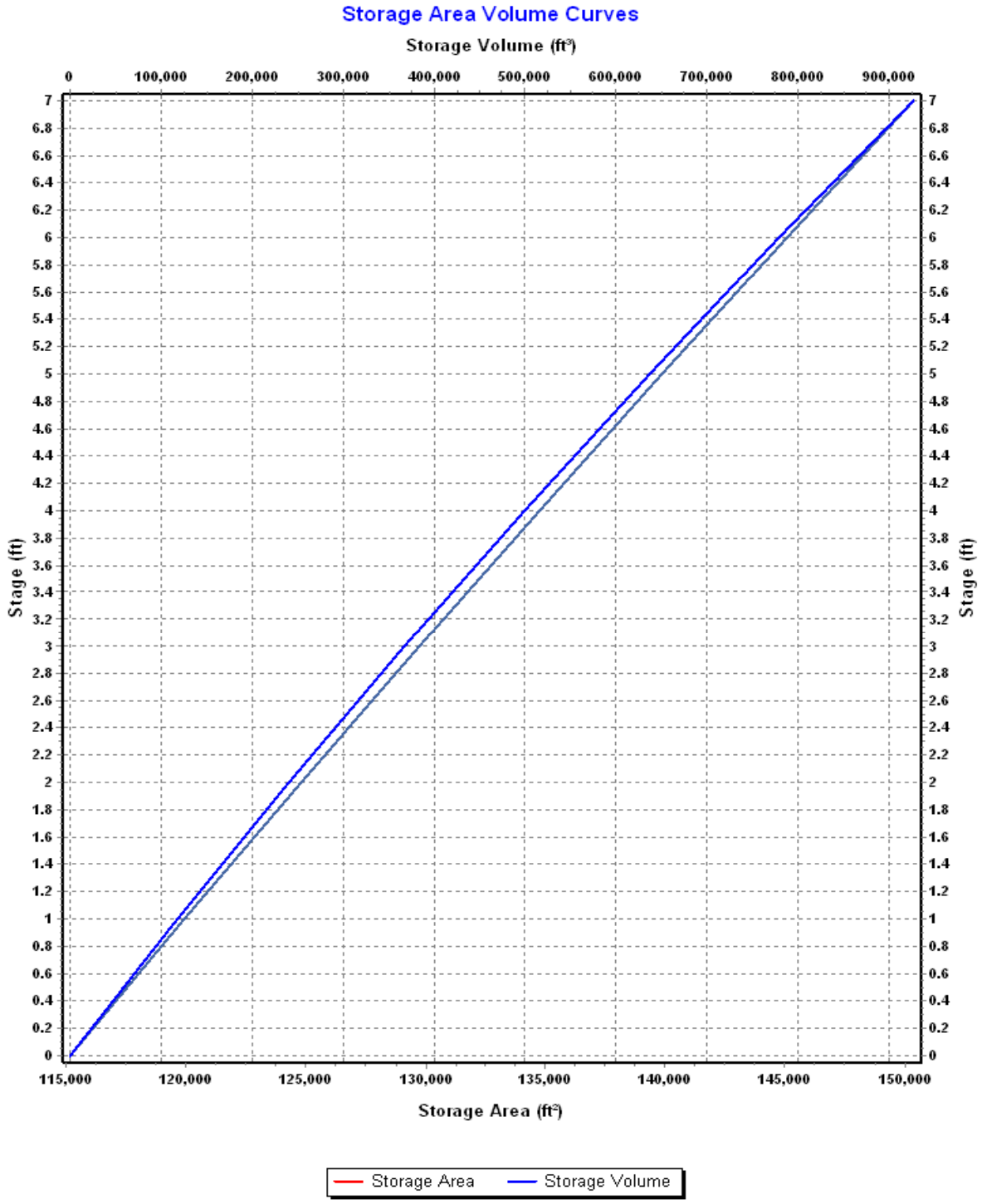
Input Data

Invert Elevation (ft)	2731.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	7.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2731.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-02

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	115183.3755	0.000
1	119948.4630	117565.92
2	124800.3987	239940.35
3	129738.8737	367209.99
4	134763.5929	499461.22
5	139874.2743	636780.15
6	145070.6482	779252.61
7	150352.4564	926964.16


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
Stage (ft)
Stage (ft)
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-02 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-02	Trapezoidal	No	2736.00	5.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-02	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	48.28
Peak Lateral Inflow (cfs)	47.68
Peak Outflow (cfs)	28.78
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2733.67
Max HGL Depth Attained (ft)	2.67
Average HGL Elevation Attained (ft)	2732.32
Average HGL Depth Attained (ft)	1.32
Time of Max HGL Occurrence (days hh:mm)	0 05:36
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-03

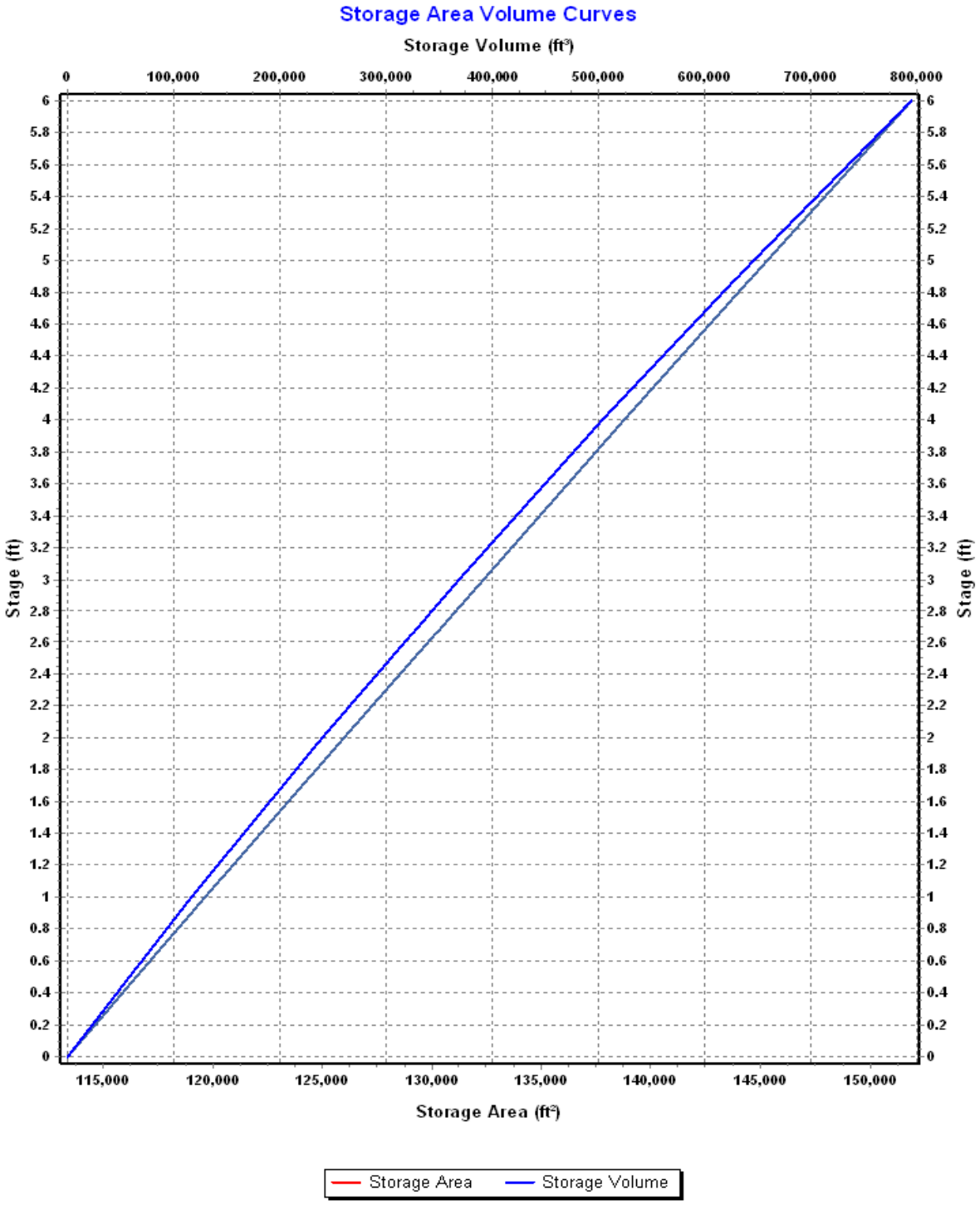
Input Data

Invert Elevation (ft)	2776.00
Max (Rim) Elevation (ft)	2782.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2776.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-03

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	113393.5106	0.000
1	119634.4886	116514.00
2	125943.9100	239303.20
3	132321.8037	368436.06
4	138768.1994	503981.06
5	145283.1278	646006.72
6	151866.6201	794581.59


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-03 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-03	Trapezoidal	No	2780.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-03	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	97.66
Peak Lateral Inflow (cfs)	97.02
Peak Outflow (cfs)	40.05
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2778.60
Max HGL Depth Attained (ft)	2.6
Average HGL Elevation Attained (ft)	2776.95
Average HGL Depth Attained (ft)	0.95
Time of Max HGL Occurrence (days hh:mm)	0 03:23
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-04

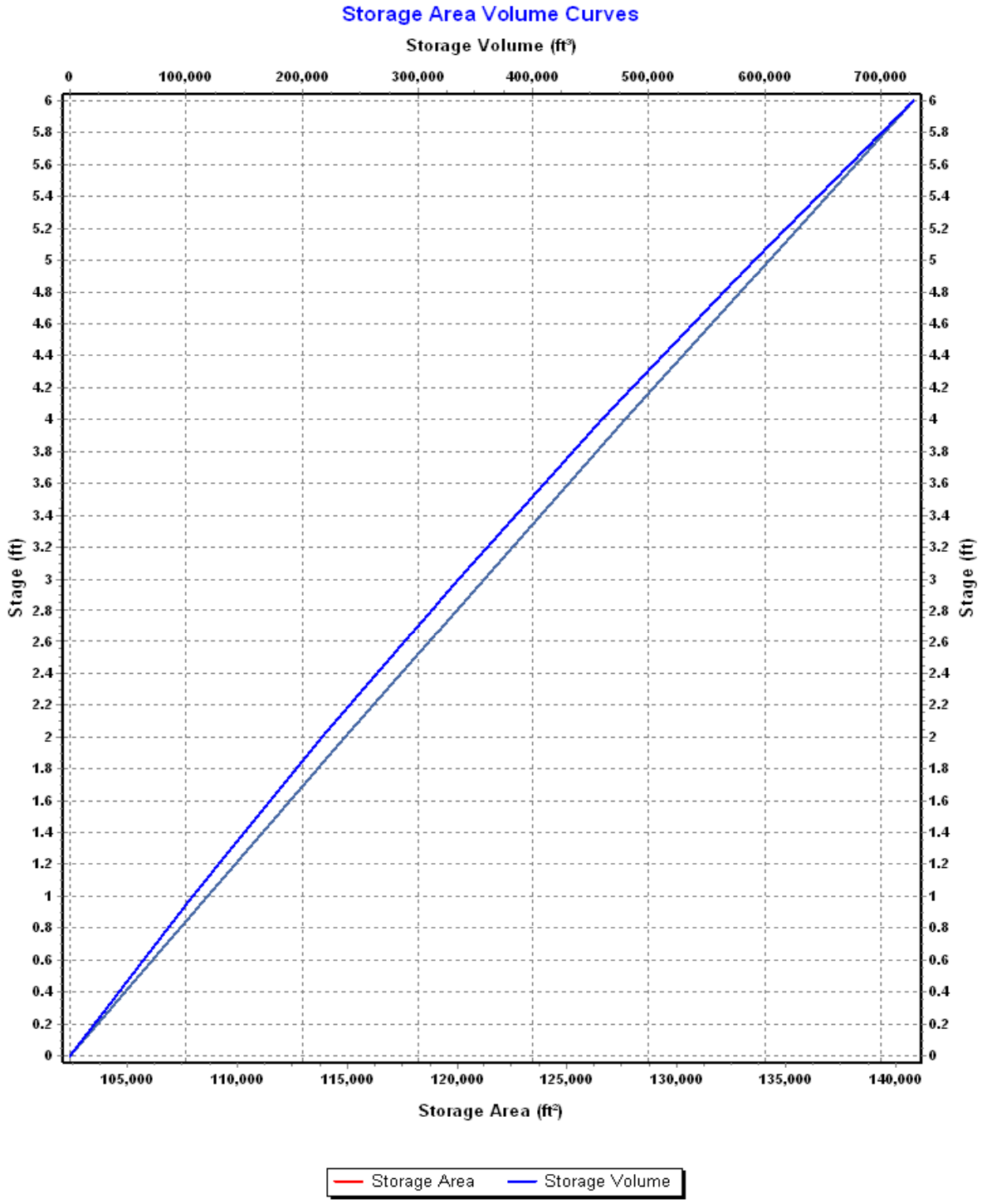
Input Data

Invert Elevation (ft)	2796.00
Max (Rim) Elevation (ft)	2802.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2796.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-04

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	102398.3443	0.000
1	108613.8701	105506.11
2	114903.5521	217264.82
3	121267.1633	335350.18
4	127702.1246	459834.82
5	134207.5337	590789.65
6	140783.2597	728285.05


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
105,000
110,000
115,000
120,000
125,000
130,000
135,000
140,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-04 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-04	Trapezoidal	No	2800.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-04	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	173.00
Peak Lateral Inflow (cfs)	170.37
Peak Outflow (cfs)	46.14
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2798.85
Max HGL Depth Attained (ft)	2.85
Average HGL Elevation Attained (ft)	2796.75
Average HGL Depth Attained (ft)	0.75
Time of Max HGL Occurrence (days hh:mm)	0 02:22
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-05

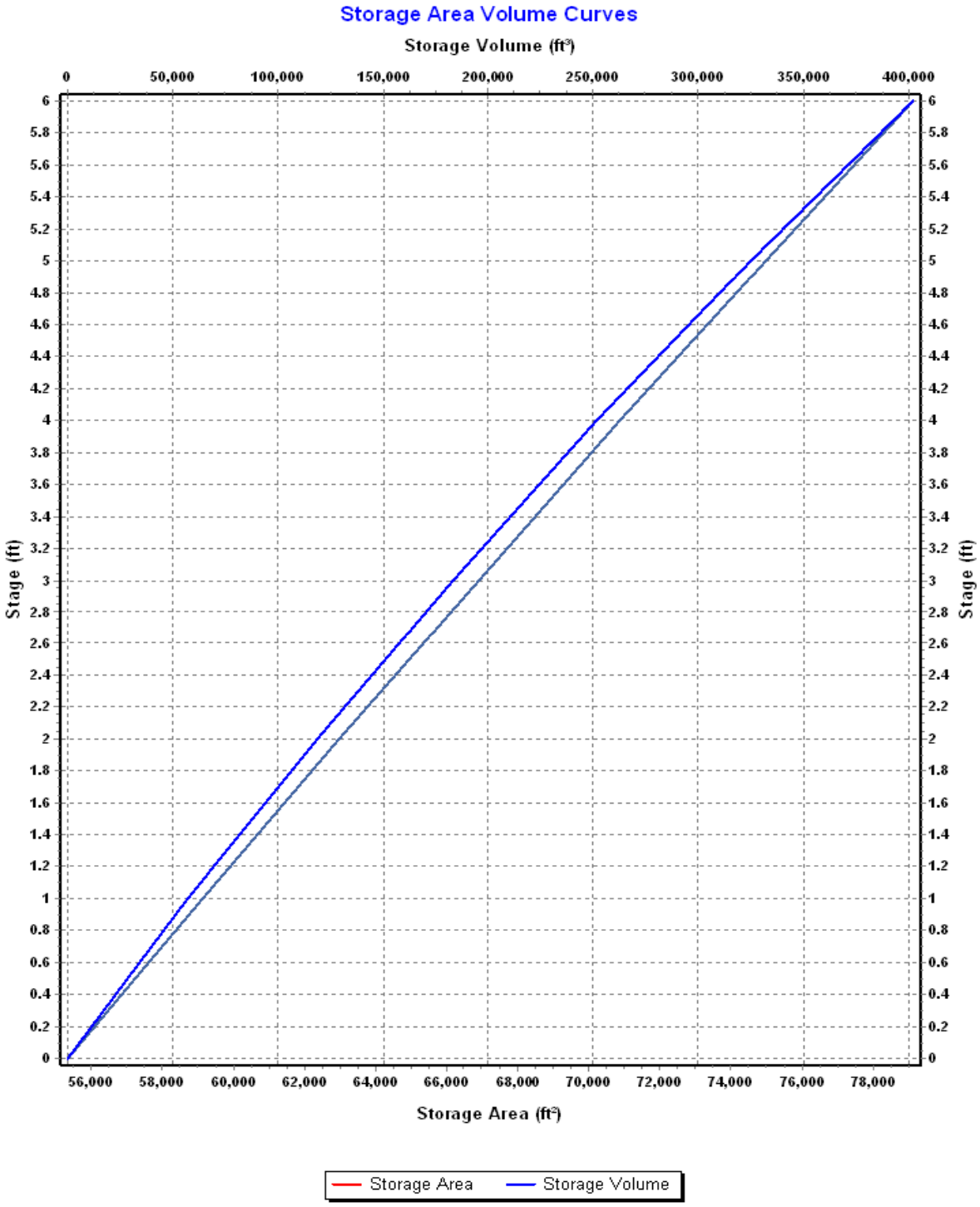
Input Data

Invert Elevation (ft)	2850.00
Max (Rim) Elevation (ft)	2856.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2850.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-05

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	55349.6785	0.000
1	59127.5202	57238.60
2	62977.5889	118291.15
3	66900.5752	183230.23
4	70897.2781	252129.16
5	74968.6317	325062.11
6	79115.7396	402104.30


Storage Area Volume Curves
Storage Volume (ft³)
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
Stage (ft)
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
56,000
58,000
60,000
62,000
64,000
66,000
68,000
70,000
72,000
74,000
76,000
78,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-05 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-05	Trapezoidal	No	2854.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-05	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	144.52
Peak Lateral Inflow (cfs)	140.64
Peak Outflow (cfs)	43.21
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2853.04
Max HGL Depth Attained (ft)	3.04
Average HGL Elevation Attained (ft)	2850.48
Average HGL Depth Attained (ft)	0.48
Time of Max HGL Occurrence (days hh:mm)	0 01:28
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-06

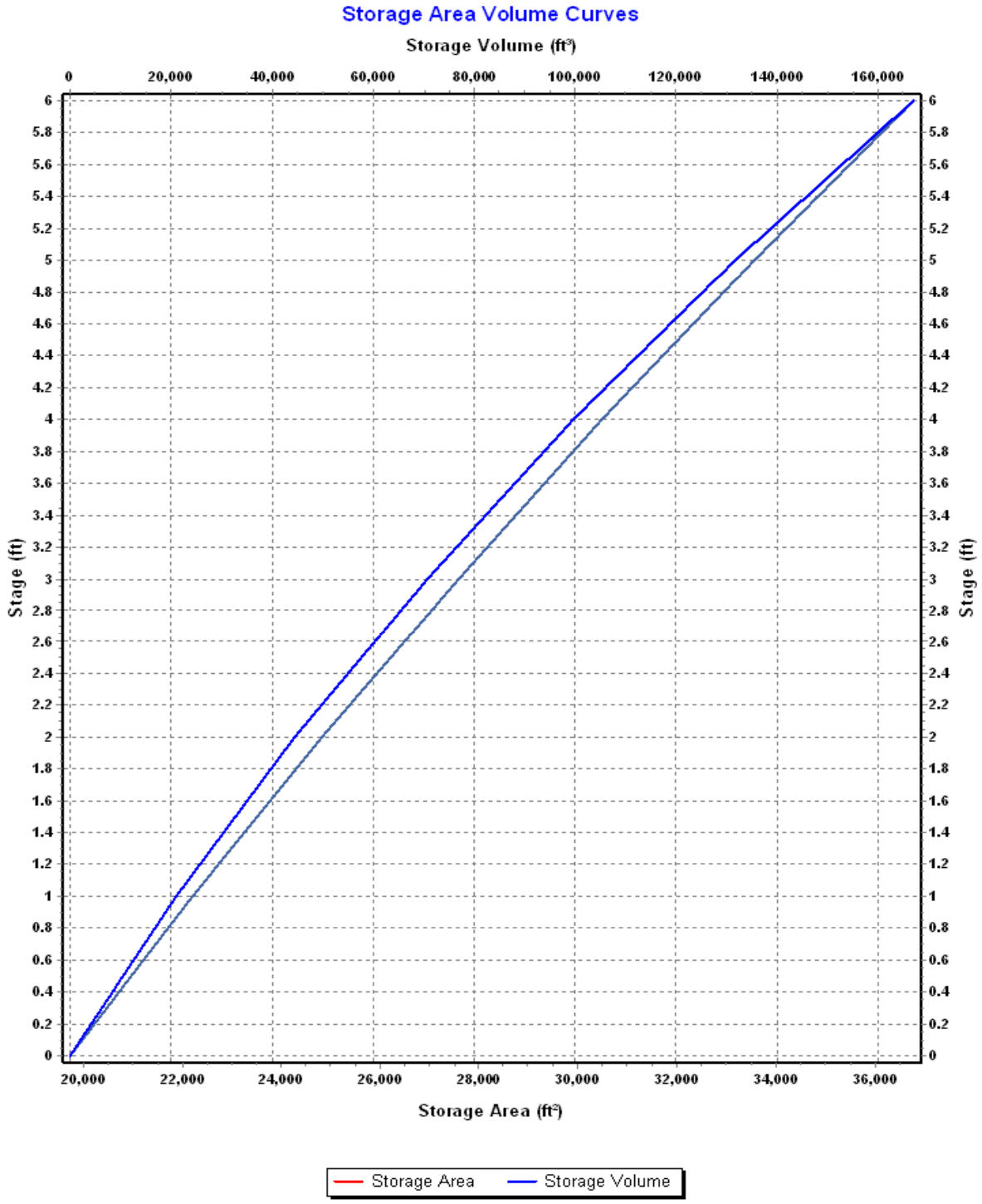
Input Data

Invert Elevation (ft)	2906.00
Max (Rim) Elevation (ft)	2912.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2906.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-06

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	19735.1183	0.000
1	22202.5968	20968.86
2	24818.6395	44479.48
3	27583.2464	70680.42
4	30496.4175	99720.25
5	33558.1527	131747.54
6	36768.4521	166910.84


Storage Area Volume Curves
Storage Volume (ft³)
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
Stage (ft)
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
20,000
22,000
24,000
26,000
28,000
30,000
32,000
34,000
36,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-06 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-06	Trapezoidal	No	2910.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-06	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	65.96
Peak Lateral Inflow (cfs)	65.96
Peak Outflow (cfs)	19.94
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2908.66
Max HGL Depth Attained (ft)	2.66
Average HGL Elevation Attained (ft)	2906.26
Average HGL Depth Attained (ft)	0.26
Time of Max HGL Occurrence (days hh:mm)	0 01:10
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-ex

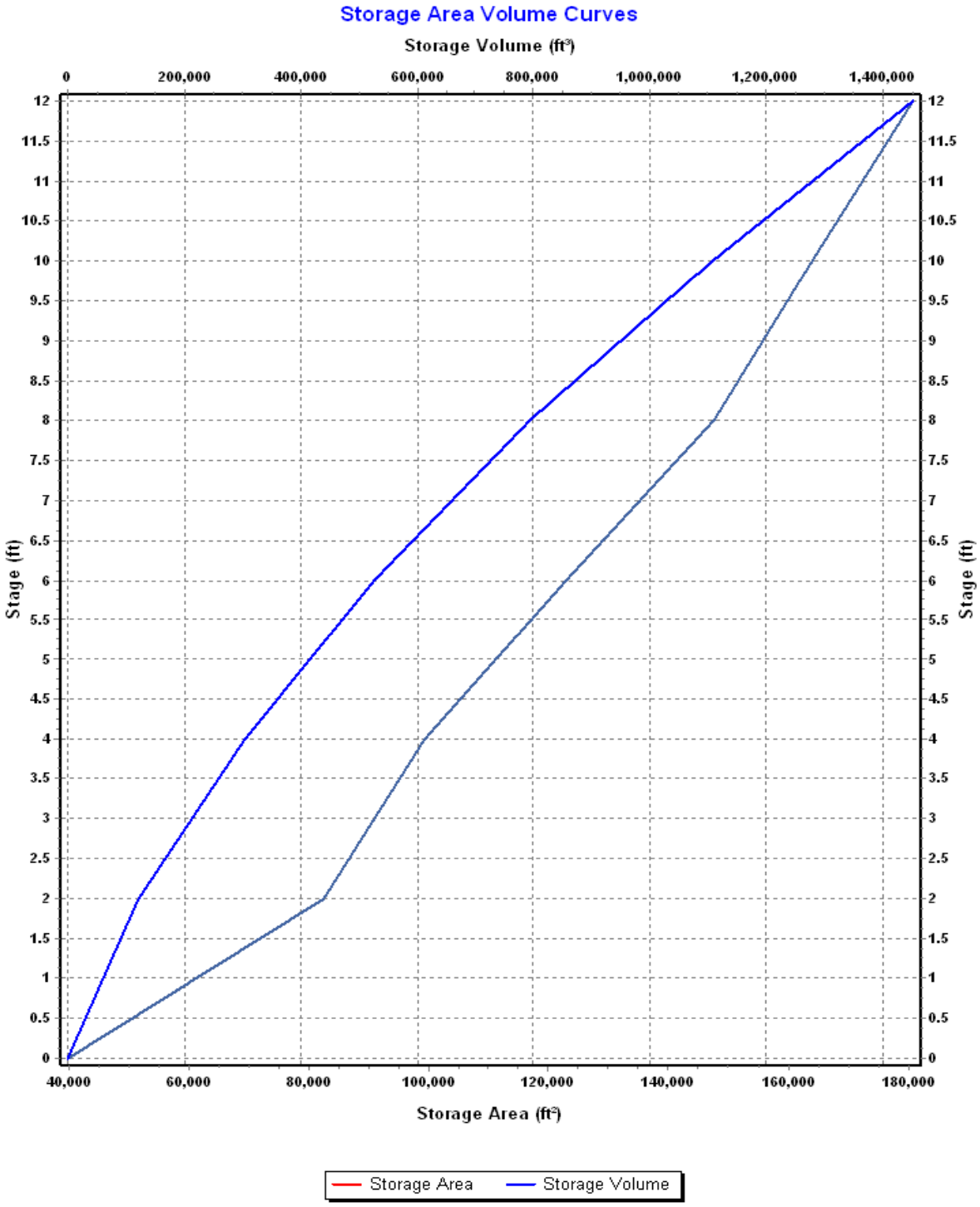
Input Data

Invert Elevation (ft)	2686.00
Max (Rim) Elevation (ft)	2698.00
Max (Rim) Offset (ft)	12.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2686.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-ex

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	39769.76	0.000
2	82351.77	122121.53
4	99196.63	303669.93
6	122898.73	525765.29
8	147582.30	796246.32
10	163896.98	1107725.60
12	180776.16	1452398.74


Storage Area Volume Curves
Storage Volume (ft³)
0
200,000
400,000
600,000
800,000
1,000,000
1,200,000
1,400,000
Stage (ft)
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Storage Area (ft²)
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
Storage Area
Storage Volume

Storage Node : Stor-ex (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-ex	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	15.12
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	14.82
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2687.67
Max HGL Depth Attained (ft)	1.67
Average HGL Elevation Attained (ft)	2687.25
Average HGL Depth Attained (ft)	1.25
Time of Max HGL Occurrence (days hh:mm)	0 12:31
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Hydrologic & Hydraulic summary sheets - 10 yr 3hr storm event - Farmer Fletcher

Project Description

File Name	161174-Master Drainage Model.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Sep 30, 2019	00:00:00
End Analysis On	Oct 01, 2019	00:00:00
Start Reporting On	Sep 30, 2019	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	39
Nodes	28
Junctions	10
Outfalls	1
Flow Diversions	0
Inlets	10
Storage Nodes	7
Links	33
Channels	6
Pipes	14
Pumps	0
Orifices	7
Weirs	6
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	10yr-3hr Farmer Fletcher	Cumulative	inches				0.00	

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	2730.00	2734.00	0.00	0.00	0.00	4.41	2730.33	0.00	6.67	0 00:00	0.00	0.00
2	Jun-02	Junction	2775.00	2782.00	0.00	0.00	0.00	6.10	2775.25	0.00	6.75	0 00:00	0.00	0.00
3	Jun-03	Junction	2795.00	2802.00	0.00	0.00	0.00	8.30	2795.45	0.00	6.55	0 00:00	0.00	0.00
4	Jun-04	Junction	2849.00	2856.00	0.00	0.00	0.00	7.52	2849.33	0.00	6.67	0 00:00	0.00	0.00
5	Jun-05	Junction	2905.00	2912.00	0.00	0.00	0.00	4.22	2905.23	0.00	6.77	0 00:00	0.00	0.00
6	Jun-06	Junction	2702.00	2708.00	0.00	0.00	0.00	3.17	2702.35	0.00	9.65	0 00:00	0.00	0.00
7	Jun-07	Junction	2689.97	2708.00	0.00	0.00	0.00	3.17	2690.31	0.00	17.69	0 00:00	0.00	0.00
8	Jun-08	Junction	2686.00	2698.00	0.00	0.00	0.00	3.07	2686.29	0.00	11.71	0 00:00	0.00	0.00
9	Jun-09	Junction	2657.82	2662.82	0.00	0.00	0.00	3.07	2658.37	0.00	4.45	0 00:00	0.00	0.00
10	Jun-10	Junction	2655.00	2660.00	0.00	0.00	0.00	3.07	2655.55	0.00	4.45	0 00:00	0.00	0.00
11	Out-01	Outfall	2653.80					3.07	2654.35					
12	Stor-01	Storage Node	2729.00	2738.00	0.00		0.00	12.38	2729.84				0.00	0.00
13	Stor-02	Storage Node	2731.00	2738.00	0.00		0.00	13.46	2731.75				0.00	0.00
14	Stor-03	Storage Node	2776.00	2782.00	0.00		0.00	21.61	2776.74				0.00	0.00
15	Stor-04	Storage Node	2796.00	2802.00	0.00		0.00	41.26	2796.91				0.00	0.00
16	Stor-05	Storage Node	2850.00	2856.00	0.00		0.00	33.68	2850.94				0.00	0.00
17	Stor-06	Storage Node	2906.00	2912.00	0.00		0.00	14.19	2906.84				0.00	0.00
18	Stor-ex	Storage Node	2686.00	2698.00	0.00		0.00	3.17	2686.59				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-06	Pipe	Jun-10	Out-01	241.11	2655.00	2653.80	0.5000			3.07	28.94	0.11	3.84	0.55	0.22	0.00	Calculated
2	Link-07	Pipe	Inlet-10	Jun-10	400.03	2657.00	2655.00	0.5000			3.07	29.00	0.11	3.84	0.55	0.22	0.00	Calculated
3	Link-08	Pipe	Jun-09	Inlet-10	164.52	2657.82	2657.00	0.5000			3.07	28.96	0.11	3.84	0.55	0.22	0.00	Calculated
4	Link-09	Pipe	Inlet-09	Jun-09	399.10	2659.82	2657.82	0.5000			3.07	29.04	0.11	3.84	0.55	0.22	0.00	Calculated
5	Link-10	Pipe	Inlet-08	Inlet-09	400.72	2661.82	2659.82	0.5000			3.07	28.98	0.11	3.84	0.55	0.22	0.00	Calculated
6	Link-11	Pipe	Inlet-07	Inlet-08	399.35	2663.82	2661.82	0.5000			3.07	29.03	0.11	3.84	0.55	0.22	0.00	Calculated
7	Link-12	Pipe	Inlet-06	Inlet-07	205.10	2664.83	2663.82	0.4900			3.07	28.78	0.11	3.82	0.55	0.22	0.00	Calculated
8	Link-13	Pipe	Inlet-05	Inlet-06	400.62	2666.83	2664.83	0.5000			3.07	28.98	0.11	3.84	0.55	0.22	0.00	Calculated
9	Link-14	Pipe	Inlet-04	Inlet-05	399.18	2668.83	2666.83	0.5000			3.07	29.03	0.11	3.84	0.55	0.22	0.00	Calculated
10	Link-15	Pipe	Inlet-03	Inlet-04	104.18	2669.36	2668.83	0.5100			3.07	29.26	0.10	3.86	0.55	0.22	0.00	Calculated
11	Link-16	Pipe	Inlet-02	Inlet-03	401.67	2671.36	2669.36	0.5000			3.07	28.94	0.11	3.84	0.55	0.22	0.00	Calculated
12	Link-17	Pipe	Inlet-01	Inlet-02	296.85	2672.85	2671.36	0.5000			3.07	29.06	0.11	3.85	0.55	0.22	0.00	Calculated
13	Link-18	Pipe	Jun-08	Inlet-01	173.46	2686.00	2672.85	7.5800			3.07	112.94	0.03	9.99	0.28	0.11	0.00	Calculated
14	Link-19	Pipe	Jun-06	Jun-07	476.71	2702.00	2689.97	2.5200			3.17	159.83	0.02	6.48	0.34	0.10	0.00	Calculated
15	Link-01	Channel	Jun-01	Stor-01	100.00	2730.00	2729.00	1.0000			4.41	458.90	0.01	2.04	0.33	0.08	0.00	
16	Link-02	Channel	Jun-02	Stor-02	881.55	2775.00	2731.00	4.9900			6.10	1025.24	0.01	3.83	0.25	0.06	0.00	
17	Link-03	Channel	Jun-03	Stor-03	1575.06	2795.00	2776.00	1.2100			8.28	504.02	0.02	2.70	0.45	0.11	0.00	
18	Link-04	Channel	Jun-04	Stor-04	1907.73	2849.00	2796.00	2.7800			7.52	764.90	0.01	3.44	0.33	0.08	0.00	
19	Link-05	Channel	Jun-05	Stor-05	1753.28	2905.00	2850.00	3.1400			4.19	812.79	0.01	2.91	0.22	0.06	0.00	
20	Link-20	Channel	Jun-07	Stor-ex	312.10	2689.97	2686.00	1.2700			3.17	4048.36	0.00	1.95	0.25	0.02	0.00	
21	Orifice-01	Orifice	Stor-01	Jun-06		2729.00	2702.00				3.17							
22	Orifice-02	Orifice	Stor-02	Jun-01		2731.00	2730.00				4.41							
23	Orifice-03	Orifice	Stor-03	Jun-02		2776.00	2775.00				6.10							
24	Orifice-04	Orifice	Stor-04	Jun-03		2796.00	2795.00				8.30							
25	Orifice-05	Orifice	Stor-05	Jun-04		2850.00	2849.00				7.52							
26	Orifice-06	Orifice	Stor-06	Jun-05		2906.00	2905.00				4.22							
27	Orifice-ex	Orifice	Stor-ex	Jun-08		2686.00	2686.00				3.07							
28	Weir-01	Weir	Stor-01	Jun-06		2729.00	2702.00				0.00							
29	Weir-02	Weir	Stor-02	Jun-01		2731.00	2730.00				0.00							
30	Weir-03	Weir	Stor-03	Jun-02		2776.00	2775.00				0.00							
31	Weir-04	Weir	Stor-04	Jun-03		2796.00	2795.00				0.00							
32	Weir-05	Weir	Stor-05	Jun-04		2850.00	2849.00				0.00							
33	Weir-06	Weir	Stor-06	Jun-05		2906.00	2905.00				0.00							

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2677.85
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2676.36
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2674.36
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2673.83
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2671.83
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2669.83
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2668.82
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2666.82
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2664.82
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	0.00	2000.00	0.00	N/A	N/A	N/A	7.00	0.00	2662.00

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Jun-01	2730.00	2734.00	4.00	0.00	-2730.00	0.00	-2734.00	0.00	
2	Jun-02	2775.00	2782.00	7.00	0.00	-2775.00	0.00	-2782.00	0.00	
3	Jun-03	2795.00	2802.00	7.00	0.00	-2795.00	0.00	-2802.00	0.00	
4	Jun-04	2849.00	2856.00	7.00	0.00	-2849.00	0.00	-2856.00	0.00	
5	Jun-05	2905.00	2912.00	7.00	0.00	-2905.00	0.00	-2912.00	0.00	
6	Jun-06	2702.00	2708.00	6.00	0.00	-2702.00	0.00	-2708.00	0.00	
7	Jun-07	2689.97	2708.00	18.03	0.00	-2689.97	0.00	-2708.00	0.00	
8	Jun-08	2686.00	2698.00	12.00	0.00	-2686.00	0.00	-2698.00	0.00	
9	Jun-09	2657.82	2662.82	5.00	0.00	-2657.82	0.00	-2662.82	0.00	
10	Jun-10	2655.00	2660.00	5.00	0.00	-2655.00	0.00	-2660.00	0.00	

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	4.41	0.00	2730.33	0.33	0.00	6.67	2730.23	0.23	0 08:45	0 00:00	0.00	0.00
2	Jun-02	6.10	0.00	2775.25	0.25	0.00	6.75	2775.14	0.14	0 05:03	0 00:00	0.00	0.00
3	Jun-03	8.30	0.00	2795.45	0.45	0.00	6.55	2795.18	0.18	0 03:04	0 00:00	0.00	0.00
4	Jun-04	7.52	0.00	2849.33	0.33	0.00	6.67	2849.09	0.09	0 01:47	0 00:00	0.00	0.00
5	Jun-05	4.22	0.00	2905.23	0.23	0.00	6.77	2905.03	0.03	0 01:24	0 00:00	0.00	0.00
6	Jun-06	3.17	0.00	2702.35	0.35	0.00	9.65	2702.27	0.27	0 14:16	0 00:00	0.00	0.00
7	Jun-07	3.17	0.00	2690.31	0.34	0.00	17.69	2690.23	0.26	0 14:17	0 00:00	0.00	0.00
8	Jun-08	3.07	0.00	2686.29	0.29	0.00	11.71	2686.20	0.20	0 19:35	0 00:00	0.00	0.00
9	Jun-09	3.07	0.00	2658.37	0.55	0.00	4.45	2658.20	0.38	0 16:37	0 00:00	0.00	0.00
10	Jun-10	3.07	0.00	2655.55	0.55	0.00	4.45	2655.38	0.38	0 16:38	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	Link-01	100.00	2730.00	0.00	2729.00	0.00	1.00	1.0000	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	Link-02	881.55	2775.00	0.00	2731.00	0.00	44.00	4.9900	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	Link-03	1575.06	2795.00	0.00	2776.00	0.00	19.00	1.2100	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	Link-04	1907.73	2849.00	0.00	2796.00	0.00	53.00	2.7800	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	Link-05	1753.28	2905.00	0.00	2850.00	0.00	55.00	3.1400	Trapezoidal	4.000	22.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	Link-20	312.10	2689.97	0.00	2686.00	0.00	3.97	1.2700	Trapezoidal	10.000	46.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-01	4.41	0 08:45	458.90	0.01	2.04	0.82	0.33	0.08	0.00		
2	Link-02	6.10	0 05:06	1025.24	0.01	3.83	3.84	0.25	0.06	0.00		
3	Link-03	8.28	0 03:10	504.02	0.02	2.70	9.72	0.45	0.11	0.00		
4	Link-04	7.52	0 01:52	764.90	0.01	3.44	9.24	0.33	0.08	0.00		
5	Link-05	4.19	0 01:30	812.79	0.01	2.91	10.04	0.22	0.06	0.00		
6	Link-20	3.17	0 14:18	4048.36	0.00	1.95	2.67	0.25	0.02	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-06	241.11	2655.00	0.00	2653.80	0.00	1.20	0.5000	CIRCULAR									
2	Link-07	400.03	2657.00	0.00	2655.00	0.00	2.00	0.5000	CIRCULAR									
3	Link-08	164.52	2657.82	0.00	2657.00	0.00	0.82	0.5000	CIRCULAR									
4	Link-09	399.10	2659.82	0.00	2657.82	0.00	2.00	0.5000	CIRCULAR									
5	Link-10	400.72	2661.82	0.00	2659.82	0.00	2.00	0.5000	CIRCULAR									
6	Link-11	399.35	2663.82	0.00	2661.82	0.00	2.00	0.5000	CIRCULAR									
7	Link-12	205.10	2664.83	0.00	2663.82	0.00	1.01	0.4900	CIRCULAR									
8	Link-13	400.62	2666.83	0.00	2664.83	0.00	2.00	0.5000	CIRCULAR									
9	Link-14	399.18	2668.83	0.00	2666.83	0.00	2.00	0.5000	CIRCULAR									
10	Link-15	104.18	2669.36	0.00	2668.83	0.00	0.53	0.5100	CIRCULAR									
11	Link-16	401.67	2671.36	0.00	2669.36	0.00	2.00	0.5000	CIRCULAR									
12	Link-17	296.85	2672.85	0.00	2671.36	0.00	1.49	0.5000	CIRCULAR									
13	Link-18	173.46	2686.00	0.00	2672.85	0.00	13.15	7.5800	CIRCULAR									
14	Link-19	476.71	2702.00	0.00	2689.97	0.00	12.03	2.5200	CIRCULAR									

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-06	3.07	0 16:39	28.94	0.11	3.84	1.05	0.55	0.22	0.00		Calculated
2	Link-07	3.07	0 16:38	29.00	0.11	3.84	1.74	0.55	0.22	0.00		Calculated
3	Link-08	3.07	0 16:37	28.96	0.11	3.84	0.71	0.55	0.22	0.00		Calculated
4	Link-09	3.07	0 16:37	29.04	0.11	3.84	1.73	0.55	0.22	0.00		Calculated
5	Link-10	3.07	0 16:35	28.98	0.11	3.84	1.74	0.55	0.22	0.00		Calculated
6	Link-11	3.07	0 16:34	29.03	0.11	3.84	1.73	0.55	0.22	0.00		Calculated
7	Link-12	3.07	0 16:33	28.78	0.11	3.82	0.89	0.55	0.22	0.00		Calculated
8	Link-13	3.07	0 16:32	28.98	0.11	3.84	1.74	0.55	0.22	0.00		Calculated
9	Link-14	3.07	0 16:31	29.03	0.11	3.84	1.73	0.55	0.22	0.00		Calculated
10	Link-15	3.07	0 16:30	29.26	0.10	3.86	0.45	0.55	0.22	0.00		Calculated
11	Link-16	3.07	0 16:30	28.94	0.11	3.84	1.74	0.55	0.22	0.00		Calculated
12	Link-17	3.07	0 16:28	29.06	0.11	3.85	1.29	0.55	0.22	0.00		Calculated
13	Link-18	3.07	0 16:27	112.94	0.03	9.99	0.29	0.28	0.11	0.00		Calculated
14	Link-19	3.17	0 14:17	159.83	0.02	6.48	1.23	0.34	0.10	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	Inlet-01	FHWA HEC-22 GENERIC	N/A	On Sag	2	2672.85	2677.85	5.00	0.00	0.00	2000.00	0.00
2	Inlet-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	2671.36	2676.36	5.00	0.00	0.00	2000.00	0.00
3	Inlet-03	FHWA HEC-22 GENERIC	N/A	On Sag	1	2669.36	2674.36	5.00	0.00	0.00	2000.00	0.00
4	Inlet-04	FHWA HEC-22 GENERIC	N/A	On Sag	2	2668.83	2673.83	5.00	0.00	0.00	2000.00	0.00
5	Inlet-05	FHWA HEC-22 GENERIC	N/A	On Sag	1	2666.83	2671.83	5.00	0.00	0.00	2000.00	0.00
6	Inlet-06	FHWA HEC-22 GENERIC	N/A	On Sag	1	2664.83	2669.83	5.00	0.00	0.00	2000.00	0.00
7	Inlet-07	FHWA HEC-22 GENERIC	N/A	On Sag	2	2663.82	2668.82	5.00	0.00	0.00	2000.00	0.00
8	Inlet-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	2661.82	2666.82	5.00	0.00	0.00	2000.00	0.00
9	Inlet-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	2659.82	2664.82	5.00	0.00	0.00	2000.00	0.00
10	Inlet-10	FHWA HEC-22 GENERIC	N/A	On Sag	2	2657.00	2662.00	5.00	0.00	0.00	2000.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway ongitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	Inlet-01	N/A	0.0200	0.0160	0.0620	2.00		

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Inlet-01	0.00	0.00	N/A	N/A	N/A	0.00	2677.85	0.00	0 16:27	0.00	0.00
2	Inlet-02	0.00	0.00	N/A	N/A	N/A	0.00	2676.36	0.00	0 16:28	0.00	0.00
3	Inlet-03	0.00	0.00	N/A	N/A	N/A	0.00	2674.36	0.00	0 16:30	0.00	0.00
4	Inlet-04	0.00	0.00	N/A	N/A	N/A	0.00	2673.83	0.00	0 16:30	0.00	0.00
5	Inlet-05	0.00	0.00	N/A	N/A	N/A	0.00	2671.83	0.00	0 16:31	0.00	0.00
6	Inlet-06	0.00	0.00	N/A	N/A	N/A	0.00	2669.83	0.00	0 16:32	0.00	0.00
7	Inlet-07	0.00	0.00	N/A	N/A	N/A	0.00	2668.82	0.00	0 16:33	0.00	0.00
8	Inlet-08	0.00	0.00	N/A	N/A	N/A	0.00	2666.82	0.00	0 16:34	0.00	0.00
9	Inlet-09	0.00	0.00	N/A	N/A	N/A	0.00	2664.82	0.00	0 16:35	0.00	0.00
10	Inlet-10	0.00	0.00	N/A	N/A	N/A	0.00	2662.00	0.00	0 16:37	0.00	0.00

Storage Nodes

Storage Node : Stor-01

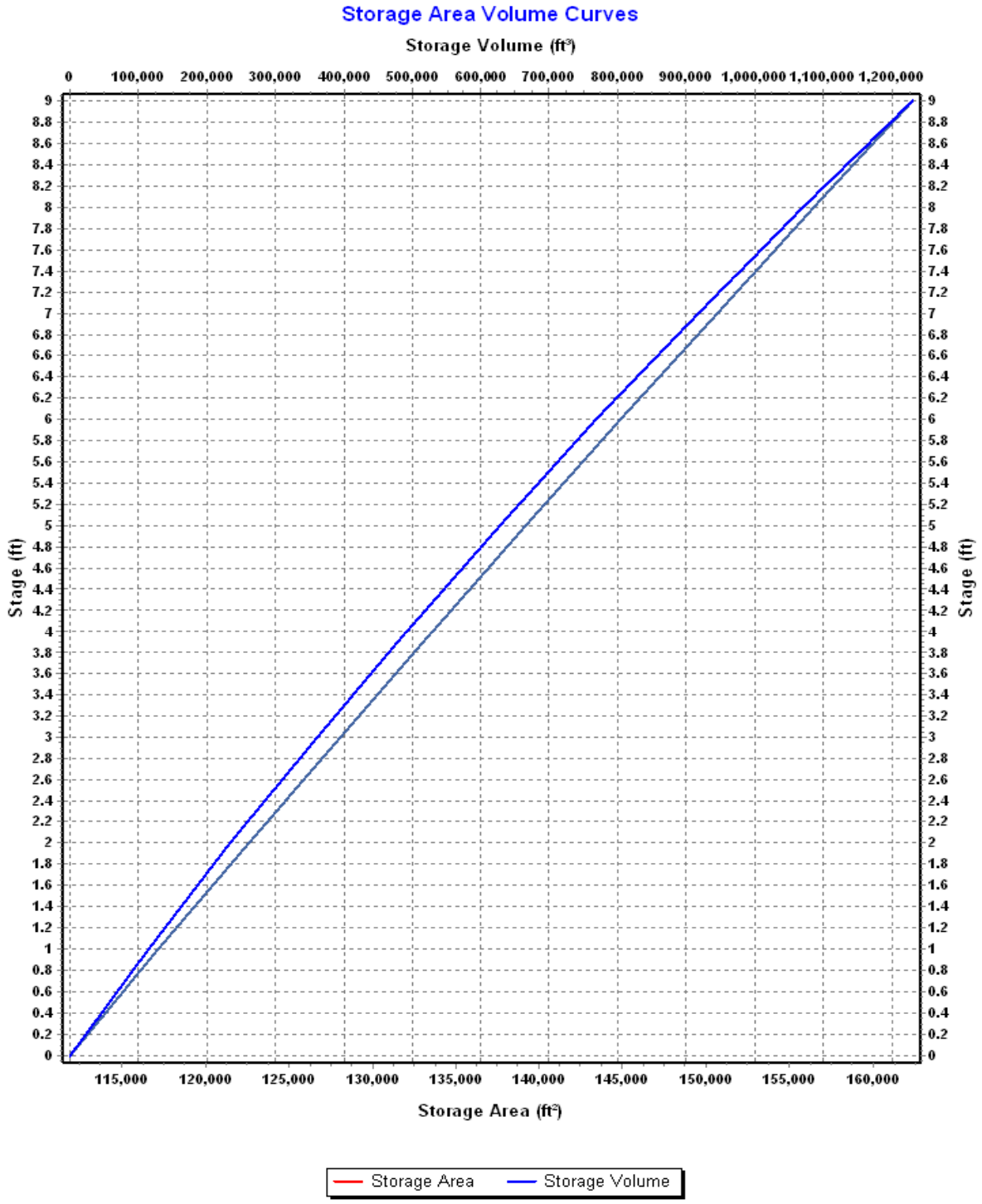
Input Data

Invert Elevation (ft)	2729.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	9.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2729.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	111884.1802	0.000
1	117199.7310	114541.96
2	122589.4743	234436.56
3	128053.1473	359757.87
4	133590.5081	490579.70
5	139201.3329	626975.62
6	144885.4142	769018.99
7	150642.5595	916782.98
8	156472.5891	1070340.55
9	162375.3357	1229764.51


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
1,100,000
1,200,000
Stage (ft)
Stage (ft)
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
155,000
160,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-01 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-01	Trapezoidal	No	2737.00	8.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-01	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	12.38
Peak Lateral Inflow (cfs)	12.25
Peak Outflow (cfs)	3.17
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2729.84
Max HGL Depth Attained (ft)	0.84
Average HGL Elevation Attained (ft)	2729.61
Average HGL Depth Attained (ft)	0.61
Time of Max HGL Occurrence (days hh:mm)	0 14:16
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-02

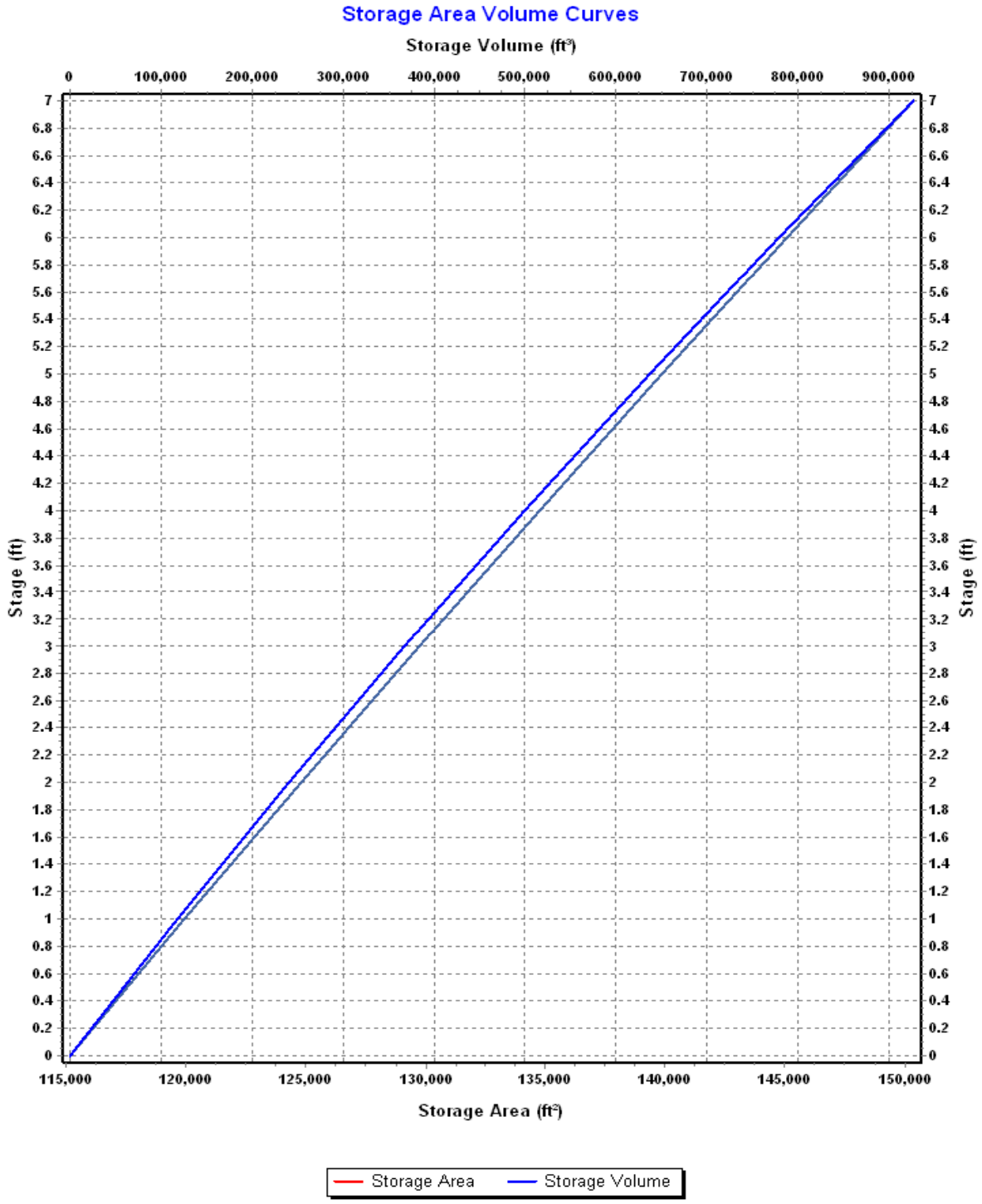
Input Data

Invert Elevation (ft)	2731.00
Max (Rim) Elevation (ft)	2738.00
Max (Rim) Offset (ft)	7.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2731.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-02

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	115183.3755	0.000
1	119948.4630	117565.92
2	124800.3987	239940.35
3	129738.8737	367209.99
4	134763.5929	499461.22
5	139874.2743	636780.15
6	145070.6482	779252.61
7	150352.4564	926964.16


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
Stage (ft)
Stage (ft)
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-02 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-02	Trapezoidal	No	2736.00	5.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-02	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	13.46
Peak Lateral Inflow (cfs)	13.46
Peak Outflow (cfs)	4.41
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2731.75
Max HGL Depth Attained (ft)	0.75
Average HGL Elevation Attained (ft)	2731.51
Average HGL Depth Attained (ft)	0.51
Time of Max HGL Occurrence (days hh:mm)	0 08:45
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-03

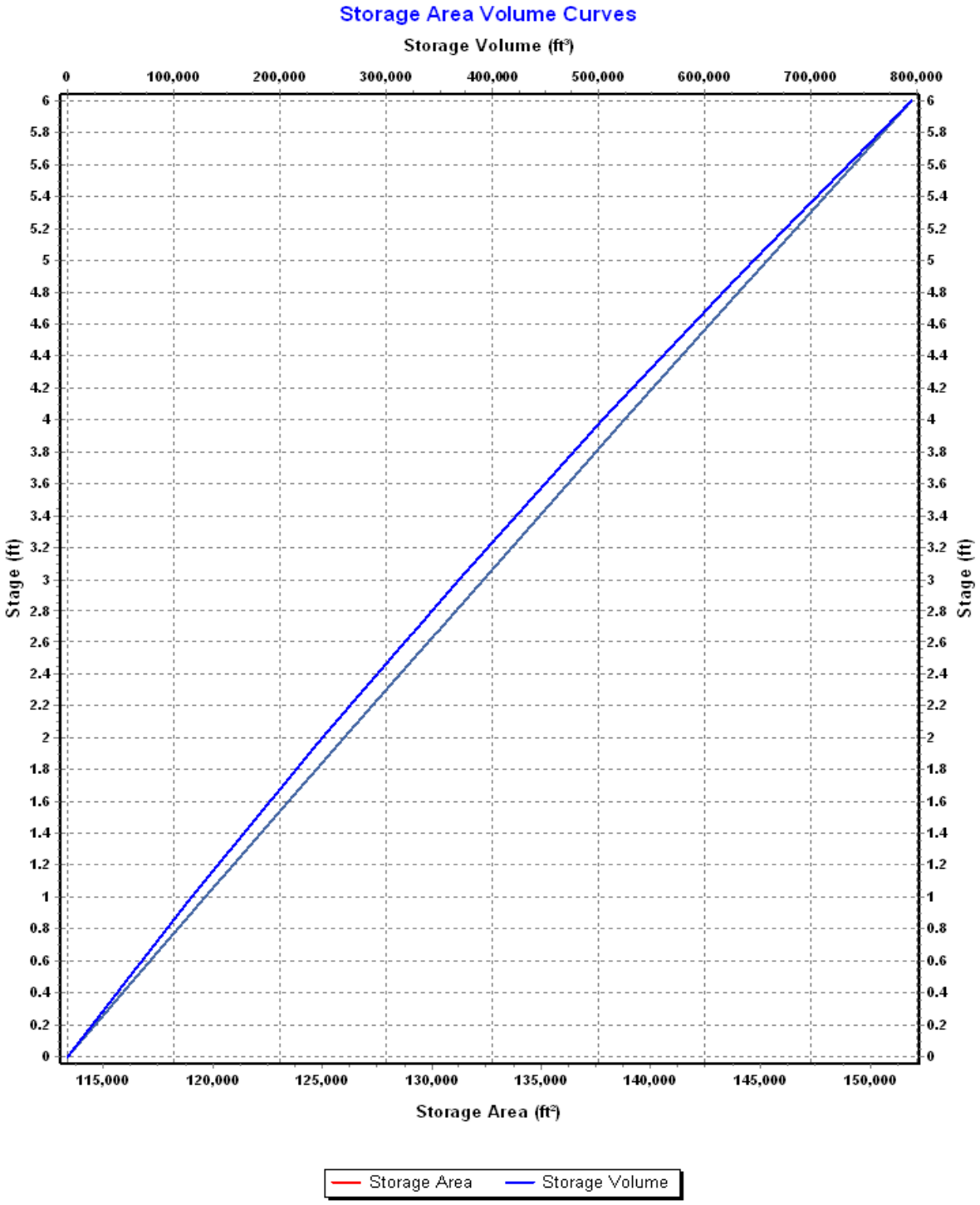
Input Data

Invert Elevation (ft)	2776.00
Max (Rim) Elevation (ft)	2782.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2776.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-03

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	113393.5106	0.000
1	119634.4886	116514.00
2	125943.9100	239303.20
3	132321.8037	368436.06
4	138768.1994	503981.06
5	145283.1278	646006.72
6	151866.6201	794581.59


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
115,000
120,000
125,000
130,000
135,000
140,000
145,000
150,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-03 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-03	Trapezoidal	No	2780.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-03	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	21.61
Peak Lateral Inflow (cfs)	21.61
Peak Outflow (cfs)	6.10
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2776.74
Max HGL Depth Attained (ft)	0.74
Average HGL Elevation Attained (ft)	2776.40
Average HGL Depth Attained (ft)	0.4
Time of Max HGL Occurrence (days hh:mm)	0 05:03
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-04

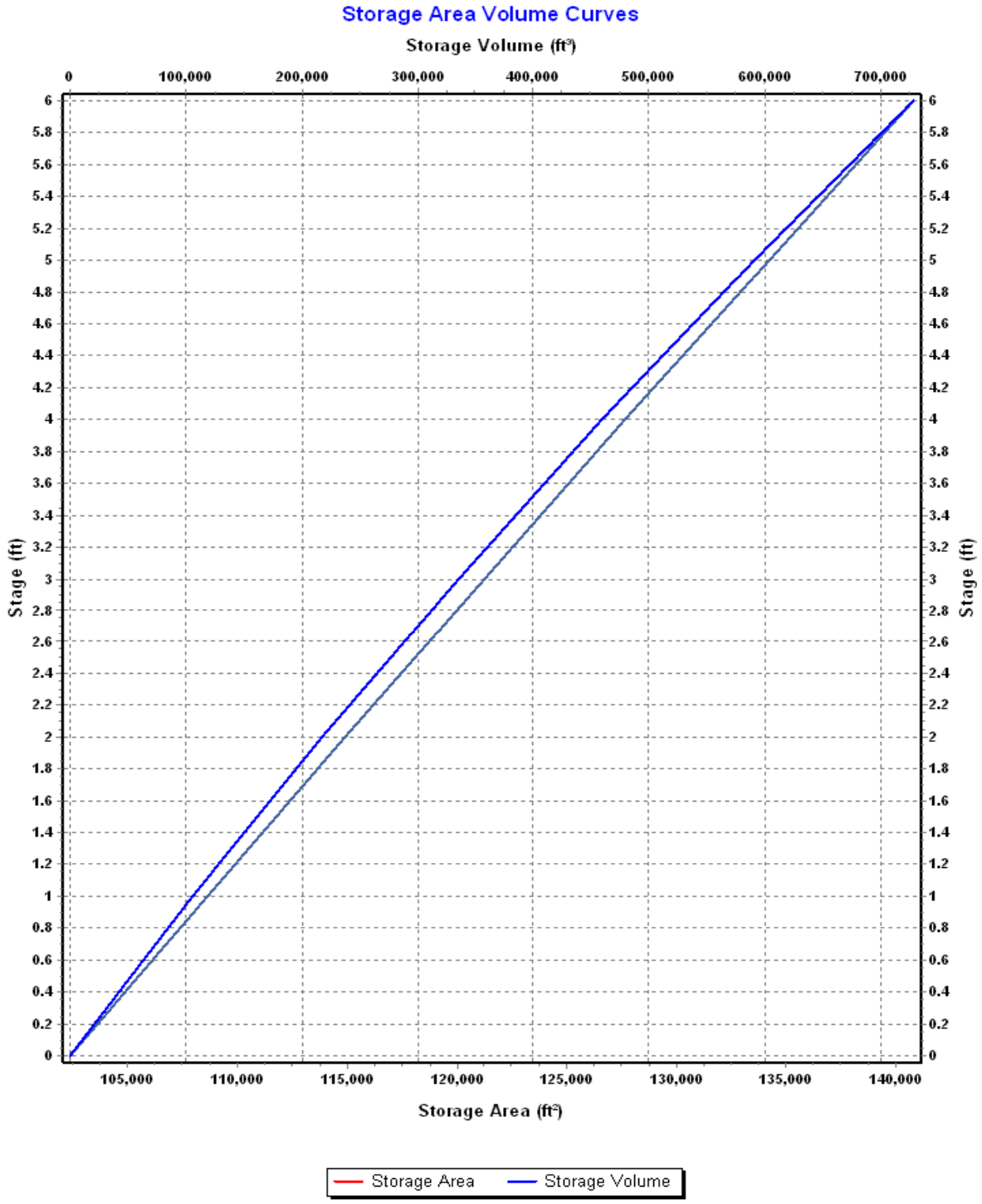
Input Data

Invert Elevation (ft)	2796.00
Max (Rim) Elevation (ft)	2802.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2796.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-04

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	102398.3443	0.000
1	108613.8701	105506.11
2	114903.5521	217264.82
3	121267.1633	335350.18
4	127702.1246	459834.82
5	134207.5337	590789.65
6	140783.2597	728285.05


Storage Area Volume Curves
Storage Volume (ft³)
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
105,000
110,000
115,000
120,000
125,000
130,000
135,000
140,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-04 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-04	Trapezoidal	No	2800.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-04	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	41.26
Peak Lateral Inflow (cfs)	41.26
Peak Outflow (cfs)	8.30
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2796.91
Max HGL Depth Attained (ft)	0.91
Average HGL Elevation Attained (ft)	2796.34
Average HGL Depth Attained (ft)	0.34
Time of Max HGL Occurrence (days hh:mm)	0 03:04
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-05

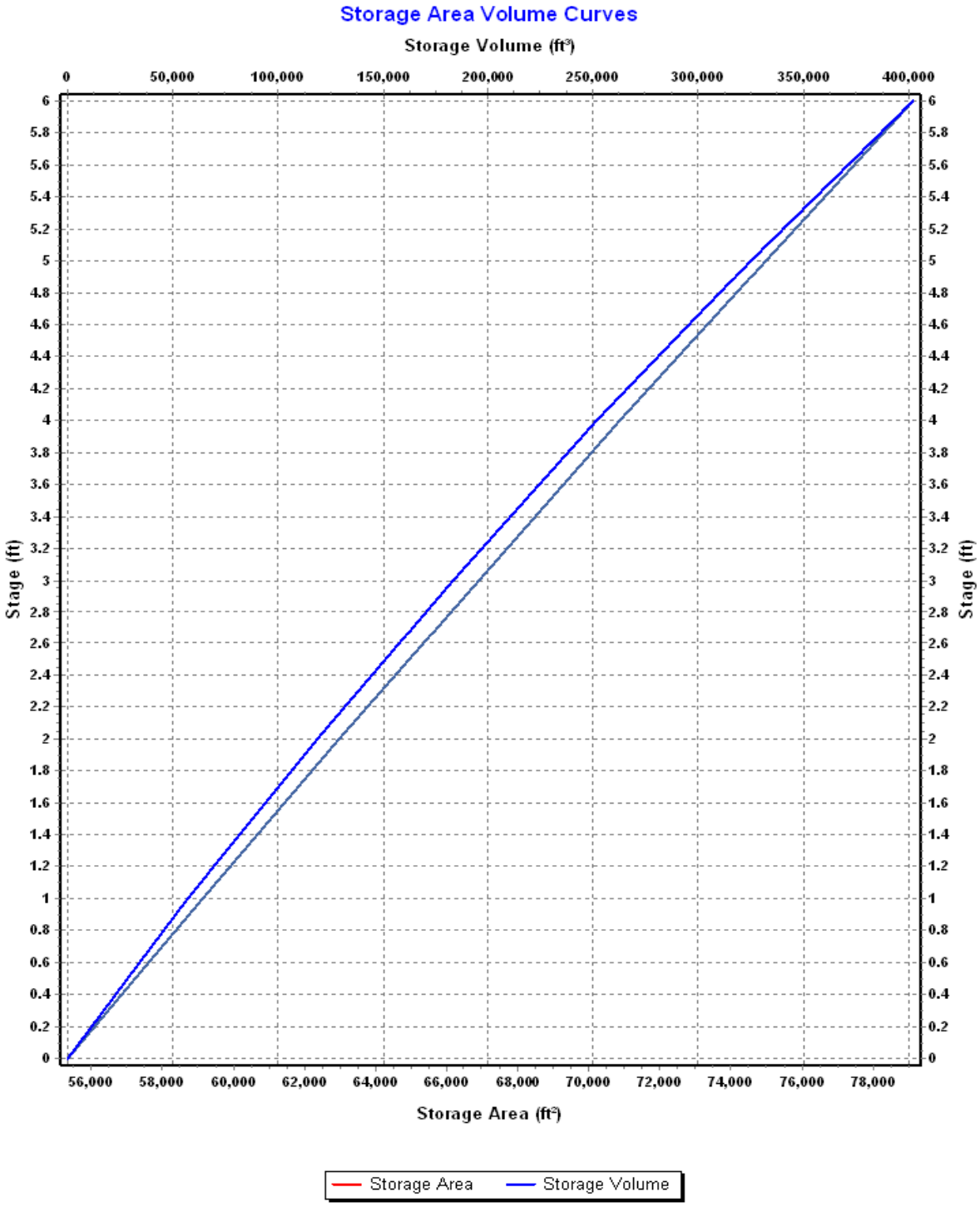
Input Data

Invert Elevation (ft)	2850.00
Max (Rim) Elevation (ft)	2856.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2850.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-05

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	55349.6785	0.000
1	59127.5202	57238.60
2	62977.5889	118291.15
3	66900.5752	183230.23
4	70897.2781	252129.16
5	74968.6317	325062.11
6	79115.7396	402104.30


Storage Area Volume Curves
Storage Volume (ft³)
0
50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
Stage (ft)
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
56,000
58,000
60,000
62,000
64,000
66,000
68,000
70,000
72,000
74,000
76,000
78,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-05 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-05	Trapezoidal	No	2854.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-05	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	33.68
Peak Lateral Inflow (cfs)	33.68
Peak Outflow (cfs)	7.52
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2850.94
Max HGL Depth Attained (ft)	0.94
Average HGL Elevation Attained (ft)	2850.22
Average HGL Depth Attained (ft)	0.22
Time of Max HGL Occurrence (days hh:mm)	0 01:47
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-06

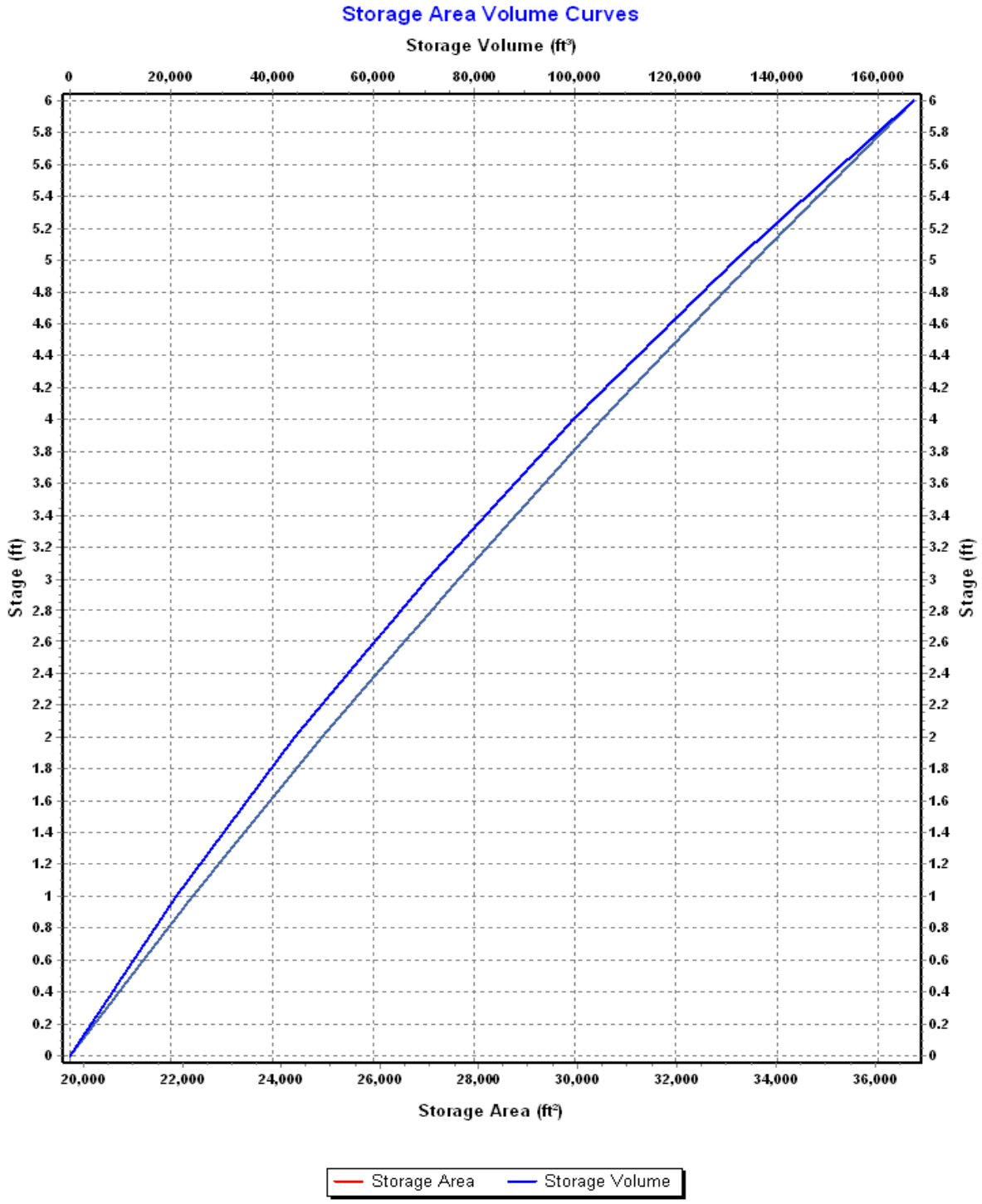
Input Data

Invert Elevation (ft)	2906.00
Max (Rim) Elevation (ft)	2912.00
Max (Rim) Offset (ft)	6.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2906.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-06

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	19735.1183	0.000
1	22202.5968	20968.86
2	24818.6395	44479.48
3	27583.2464	70680.42
4	30496.4175	99720.25
5	33558.1527	131747.54
6	36768.4521	166910.84


Storage Area Volume Curves
Storage Volume (ft³)
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
Stage (ft)
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
20,000
22,000
24,000
26,000
28,000
30,000
32,000
34,000
36,000
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : Stor-06 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Weir Total Height (ft)	Discharge Coefficient
1	Weir-06	Trapezoidal	No	2910.00	4.00	100.00	2.00	3.33

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-06	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	14.19
Peak Lateral Inflow (cfs)	14.19
Peak Outflow (cfs)	4.22
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2906.84
Max HGL Depth Attained (ft)	0.84
Average HGL Elevation Attained (ft)	2906.12
Average HGL Depth Attained (ft)	0.12
Time of Max HGL Occurrence (days hh:mm)	0 01:24
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : Stor-ex

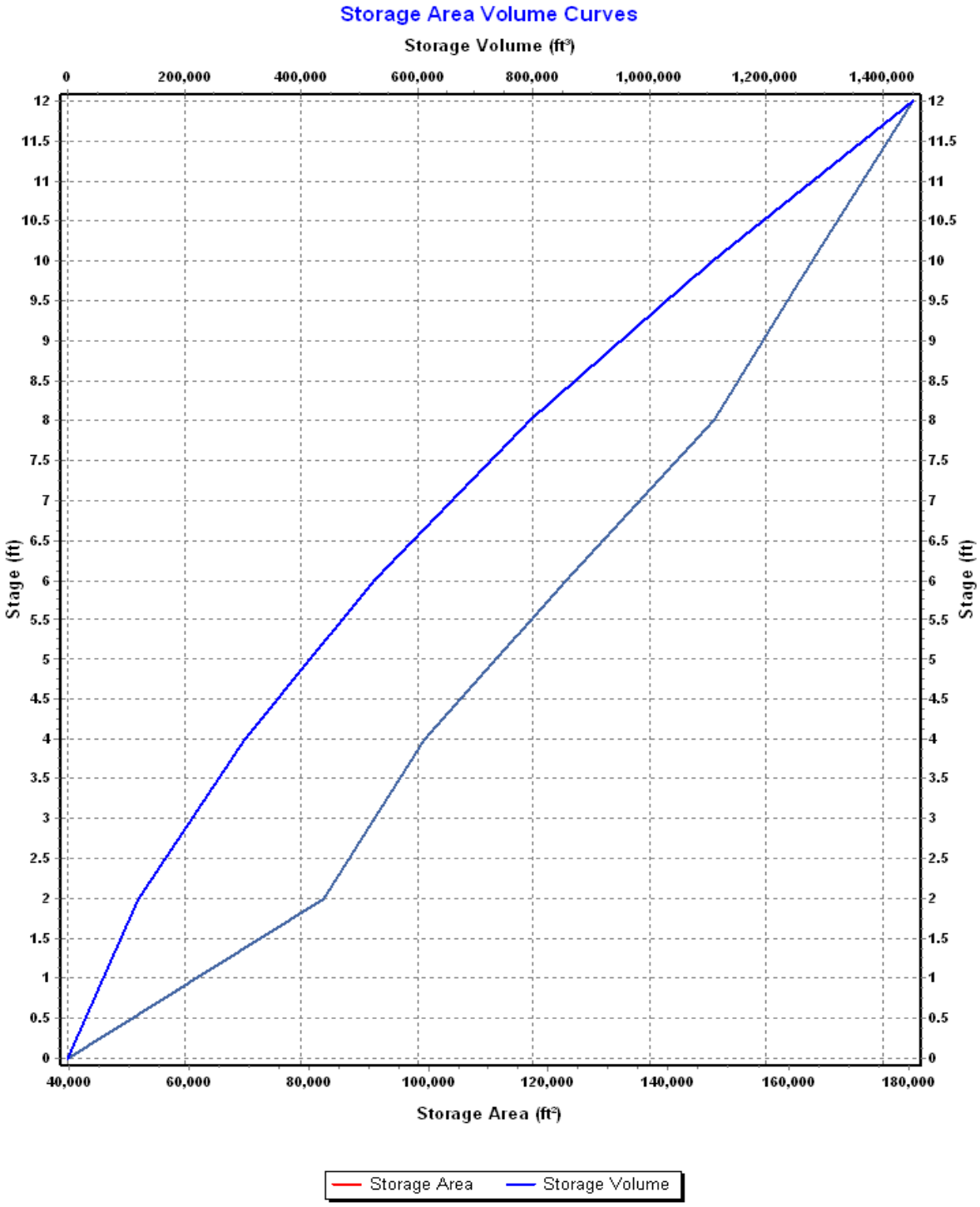
Input Data

Invert Elevation (ft)	2686.00
Max (Rim) Elevation (ft)	2698.00
Max (Rim) Offset (ft)	12.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	-2686.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-ex

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	39769.76	0.000
2	82351.77	122121.53
4	99196.63	303669.93
6	122898.73	525765.29
8	147582.30	796246.32
10	163896.98	1107725.60
12	180776.16	1452398.74


Storage Area Volume Curves
Storage Volume (ft³)
0
200,000
400,000
600,000
800,000
1,000,000
1,200,000
1,400,000
Stage (ft)
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Storage Area (ft²)
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
Storage Area
Storage Volume

Storage Node : Stor-ex (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	Orifice-ex	Side	CIRCULAR	No					

Output Summary Results

Peak Inflow (cfs)	3.17
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	3.07
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	2686.59
Max HGL Depth Attained (ft)	0.59
Average HGL Elevation Attained (ft)	2686.39
Average HGL Depth Attained (ft)	0.39
Time of Max HGL Occurrence (days hh:mm)	0 16:27
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

LONG VALLEY TRAILS

Project Traffic Study

Section 10

Long Valley Trails Traffic Study

Introduction:

Long Valley Trails has conducted a comprehensive project Traffic Study. This study has been revised, amended and updated at each phase of the development process. Independent of the results of the traffic study the master developer has agreed to fully improve Washington Dam Road to its ultimate cross section. These improvements will provide the ability to service Long Valley Trails with a 5-lane roadway and will meet the regional transportation needs of Washington City. The ROW for the extension of Washington Parkway to the planned 3650 South Interchange has been obtain from the BLM. This ROW provides Long Valley Trails with the ability to connect to two major Interchanges on the Southern Parkway as well as access to two main arterial roadways within Washington City.

Washington Dam Road:

Washington Dam Road is a master planned Arterial Road for Washington City. This PCD plan and related Development Agreement outlines the improvements that are being made in conjunction with Long Valley Trails. Washington Dam Road will be built to it full cross section which will accommodate 5 traffic lanes. The cost for these improvements will be paid by the Master Developer (Brennan Family Holdings, LLC) for Long Valley Trails.

Long Valley Parkway Extension:

Long Valley Trails Development has obtained and will provide the Right of Way for the Extension of Long Valley Parkway over and through the BLM controlled lands to the location of the planned 3650 Interchange on the Southern Parkway. Washington City was the applicant for the ROW and Brennan Family Holdings, LLC has paid all costs associated with obtaining the ROW. The master developer, builder and City have agreed to monitor the timeframe in which this road will be paved. The paving of this roadway will be dictated by the funding and construction of the 3650 South Interchange on the Southern Parkway. Upon construction of the 3650 South Interchange, the master developer, builder and City will meet to set the schedule for the completion of the pavement extension of Long Valley Parkway to the completed Interchange. This roadway will be improved to the rural road cross section as shown in this PCD Plan. The paving of this roadway will not, in any case, be required before the construction of the 3650 Interchange nor will it be delayed longer than the traffic demands of the development shall dictate

Onsite Roads and Streets:

The initial improvements to Washington Dam Road will meet the traffic demands for the majority of the Long Valley Trails Development. It has been agreed that the traffic generated by this development will be reviewed once 66% of the units within Long Valley Trails have been occupied. It has also been agreed that upon construction of the 3650 South Interchange that the City and the developer will review the need and the timing to connect Long Valley Trails to this Interchanged.

Furthermore, additional offsite improvements have been identified and are outlined starting on Page 25 of the attached Traffic Impact Study. The items outlined therein could help resolve traffic issues that may need to be addressed by the project developer in the future.

Final Long Valley Trails Traffic Impact Study

Respectfully submitted to

Washington City
Where Dixie Begins

By JLN Solutions
556 West 800 North #2
Provo, Utah 84601
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September 7, 2020

Final Traffic Impact Study

for

Long Valley Trails Project

Completed By
Jay Nelson
President/Senior Transportation Planner
JLN Solutions



Looking south from the northern part of the Long Valley Trials Project Site

September 7, 2020

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Appendix B - Trip Generation Information

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I. EXECUTIVE SUMMARY

1. Purpose of Traffic Study and Report Objectives

The purpose of this Traffic Impact Study (TIS) is to evaluate the potential traffic impacts of the Long Valley Trails Master Planned Community proposed on 605.61 acres east of the Southern Parkway (SR-7) from the Long Valley Interchange south about two thirds of the way to the future unfunded Interchange on the Southern Parkway with 3560 South. The project site was recently annexed into Washington City. Three of the principal objectives of this traffic study are:

1) to determine if the entire development can be supported with a single interchange from the Southern Parkway,
2) when roadway improvements will be required on adjacent roads to accommodate traffic from the proposed Long Valley Trails Master Planned Community, and
3) the appropriate width of roads and number of required traffic lanes at the study intersections and within the project, plus any required transportation related improvements to support the project.

This traffic study evaluates the potential impacts of Long Valley Trails Project in three phases with approximately one third of the development completed in each phase. For traffic analysis purposes Phase 1 is assumed to be completed in 2025, Phase 2 in 2030, and the final Phase (Phase 3) in 2035. The actual time frame to complete each phase will be determined by market forces and could take more or less time to complete. A Category III Traffic Study was completed because the project is expected to generate over 1,000 peak hour trips. Washington City may require additional traffic analysis if the 3650 South/SR-7 Interchange is not at least started construction prior to the completion of two thirds (66.7%) of the Long Valley Trails Project. The updated traffic analysis could evaluate the impact of additional development in the area; the design and completion of the 3650 South/SR-7 interchange; and specific Long Valley Project trip generation and trip distribution characteristics.

2. Site Location and Study Area

The Long Valley Trails Project will be located south and east of the Southern Parkway (SR-7) on a 605.61 acre parcel of undeveloped land. The project is located in Sections 20-29-30-31 Township 42 South, Range 14 West Salt Lake Base and Meridian. This Master Planned Community will be served from the Long Valley Road interchange on SR-7.

Washington City staff has identified the following study intersections:

1) Southern Parkway (SR-7) Eastbound Ramps/Long Valley Parkway (stop sign on off-ramp),
2) Southern Parkway (SR-7) Westbound Ramps/Long Valley Parkway (stop sign on off-ramp),
3) Washington Fields Road/Washington Dam Road (signalized intersection),
4) 3650 South/Washington Fields Road (stop signs on 3650 South),
5) Southern Parkway (SR-7) Southbound Ramps/Warner Valley Road (stop sign on off-ramp), and
6) Southern Parkway (SR-7) Northbound Ramps/Warner Valley Road (stop sign on off-ramp).

Weekday morning and evening peak period traffic counts were collected in September 2017 by JLN Solutions. JLN Solutions evaluated the Level of Service (LOS) during the weekday AM and PM peak hour for the following traffic scenarios:

1) Existing Traffic Conditions,
2) Background 2025 Traffic Conditions,
3) Background 2025 Plus Long Valley Trails Phase 1 Traffic,
4) Background 2030 Traffic Conditions,
5) Background 2030 Plus Long Valley Trails Phase 2 Traffic,
6) Background 2035 Traffic Conditions,
7) Background 2035 Plus Long Valley Trails Phase 3 **(**Full Project Build Out), and
8) Total 2035 Traffic with a road connection from the Long Valley Project to 3650 South.

3. Development Description

This TIS evaluates the potential traffic impacts of the Long Valley Trails Project through 2035. The proposed project includes 1,111 single family homes with various lot sizes, and 1,250 townhomes and condominiums for a total of 2,361 residential dwelling units in the proposed project.

The project will also include an extensive trail system throughout the project with hillside/open space, and parks. An RV and boat storage area for residents in the project will be located in a triangular shaped lot located on the southwest edge of the project.

The Long Valley Trails Project will be developed by Brennan Holdings, LLC which has an office in St. George. D.R. Horton Inc. is currently expected to build a large portion of the project. Since 2002, D.R. Horton has been the largest homebuilder by volume in the United State.

4. Principal Findings

The Long Valley Trails Project is expected to generate 17,840 total daily trips (half inbound and half outbound), with 1,385 trips during the am peak hour (305 inbound and 1,080 outbound) and 1,760 pm peak hour trips (1,135 inbound and 625 outbound) with full build out of the project. This traffic forecast is based on the 2013 standard Institute of Transportation Engineers (ITE) trip generation rates. About one-third of the project was assumed to be completed every five years.

Traffic counts were completed from 7:00 to 9:00 am and from 4:00 to 6:00 pm in fifteen minute intervals. The manual intersection traffic count data is included in Appendix A. Currently there is little traffic at the study intersections at the Southern Parkway Interchanges with higher volumes at the two study intersections on Washington Fields Road. Each intersection operates at a very good level of service today. All movements currently operate at Level of Service (LOS) B or better during both the AM and PM peak hours.

Background traffic volumes at the study intersections were calculated by increasing the existing traffic volumes by three percent per year to account for additional traffic growth throughout the study area and surrounding region and for the anticipated traffic from the Heritage Place project planned at the northwest corner of Washington Fields Road and 2000 South. In some cases the volumes were increased more based on the local Dixie Travel Demand Model (see the future traffic volumes calculations sheets included in Appendix C of this report). Then the anticipated traffic from the Long Valley Trails Project was added to each study year.

5. Conclusions and Recommendations

This traffic analysis indicates that with the development of the first and second phase of the Long Valley Trails Project no off-sight traffic improvements are required to maintain an acceptable level of service at the six study intersections. However, at sometime during the final phase for the project improvements will be required at the following three intersections.

SR-7 Eastbound Ramps/Long Valley Parkway Potential Improvements

- Add two lanes on the off-ramp and stripe the off-ramp with one left-turn lane; one through/right-lane; and a free right-turn lane
- Add a northbound right-turn lane
- Add a southbound left-turn lane

SR-7 Westbound Ramps/Long Valley Parkway Potential Improvements

- Add a westbound left-turn lane on the off-ramp
- Add a northbound left-turn lane from Long Valley Parkway to the on-ramp
- Add a second southbound lane on Long Valley Parkway

Washington Fields Road/3650 South Potential Improvements

- Add an eastbound right-turn lane on 3650 South
- Add a northbound left-turn lane on Washington Fields Road
- Add a southbound right-turn lane on Washington Fields Road
- At some point the intersection may need to be converted to a 4-way stop controlled intersection and at a later date a traffic signal may be warranted at this intersection.

Long Valley Parkway is planned as a major arterial with a 110-foot right-of-way from the Southern Parkway (SR-7) south to the first roundabout in the project and south of the second roundabout. It will be constructed with two traffic lanes in each direction with a center left turn lane or median, and curb and gutter on each side. Long Valley Parkway and the other key north south road between the two roundabouts are planned as a major collector with an 80-foot right-of-way. These two roads will be constructed with a single travel lane in each direction, plus left and right turn lanes at intersections, and curb/gutter on each side of the road. The other roads in the project will be residential collector roads with a right-of-way of 55 feet or residential local roads with right-of-way of 34 feet (see Figure 23 at the end of the report that illustrates the cross sections for the roads in the project). All roads will be constructed in accordance with Washington City design standards.

The project will also install traffic signal and ATMS conduit along Washington Dam Road from Country Way to the project. Additional traffic analysis may be required by Washington City if the 3650 South/ SR-7 Interchange is not under construction prior to completing two thirds of the Long Valley Trails Project. No additional off-site roadway or intersection improvements are required to accommodate anticipated traffic from the proposed Long Valley Trails development.

I. PROPOSED DEVELOPMENT

Land Use and Intensity

The Long Valley Trails Project is currently planned with 1,111 single family homes with lots ranging from 4,050 square feet to 7,000 square feet. The project will also include 698 condos, 356 townhomes, and 196 club-cottages for a total of 2,361residential units. The actual time to build and occupy all the planned development will be determined by market forces, but the owners anticipate that the entire project could be constructed in about 15 years (by 2035). One third of the project was assumed to be completed each five years with the first one third of the development completed in 2025.

Location and Site Plan

The Long Valley Trails Project will be located south and east of the Southern Parkway (SR-7)/ Long Valley Parkway Interchange. The project is located on a 605.61 acre site of undeveloped land. The Vicinity Map is presented in Figure 1. All of the figures for this traffic study are located at the end of the report and before the appendix. The current conceptual site plan of the Long Valley Trails Development is presented in Figure 2. This Master Planned Community will be located in Sections 20-29-30-31 Township 42 South, Range 14 West Salt Lake Base and Meridian. The project will be located in Washington City.

Zoning and Project Phasing

The project site is currently zoned PCD (planned community development) by Washington City. The project will begin construction as soon as possible. The specific phasing for the project has not been determined at this time; but the entire project is expected to be completed in about 15 years or by 2035. Therefore, future traffic volumes with and without the Long Valley Trails project were calculated in five year increments and years 2025, 2030 and 2035 were evaluated in this study. A Category III Traffic Study was completed because the project is expected to generate over 1,000 peak hour trips.

II. STUDY AREA CONDITIONS

Study Area

A total of six study intersections have been selected to evaluate potential traffic impacts associated with the proposed project. The study intersections are:

1) Southern Parkway (SR-7) Eastbound Ramps/Long Valley Parkway,
2) Southern Parkway (SR-7) Westbound Ramps/Long Valley Parkway,

3) Washington Fields Road/Washington Dam Road,

4) 3650 South/Washington Fields Road,

5) Southern Parkway (SR-7) Southbound Ramps/Warner Valley Road, and

6) Southern Parkway (SR-7) Northbound Ramps/Warner Valley Road.

The majority of the project traffic is expected to pass through these study intersections.

Site Accessibility

All of the project traffic will use Long Valley Parkway a new north/south road that will be constructed through the project. Within the project, Long Valley Parkway will be constructed as a major arterial with a 110-foot right-of-way with two travel lanes in each direction, and curb/gutter on each side of the road north of the northernmost roundabout in the project and south of the southernmost roundabout in the project. Between the two roundabouts Long Valley Parkway will be constructed as a major collector with an 80-foot right-of-way. A second major collector road will also be constructed between the two roundabouts. The project traffic is also expected to use the Southern Parkway, Washington Dam Road, Washington Fields Road, and 3650 South. The site plan also shows a number of other streets connecting to Long Valley Parkway. Street and driveway connections to collector and arterial streets should be minimized as much as possible to decrease conflicts along these roads that are planned to carry more traffic than the local streets. The remainder of the roads in the project will be local roads.

III. ANALYSIS OF EXISTING CONDITIONS

1. Roadway Characteristics

Southern Parkway (SR-7) is currently a two lane road, with a posted speed of 65 miles per hour near the project. It connects to Interstate 15 south of St. George and extends east to Sand Hollow Reservoir. It is planned to continue east of the reservoir and then bend north and connect to SR-9 in Washington City. It is classified as a major arterial and there are existing interchanges on the Southern Parkway at Long Valley Parkway and at Warner Valley Road. A future interchange is planned at 3650 South but the timing and funding for this improvement have not yet been identified.

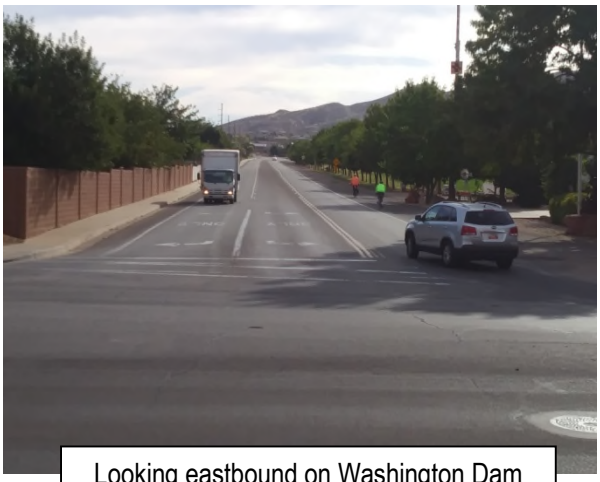
Washington Dam Road is classified as a minor arterial on the City of Washington Road Master Plan. It serves the residential areas south of the Virgin River and east of Washington Fields Road. Washington

Dam Road is currently a two lane east/west road east of 1900 East and a three lane road between 1900 East and Washington Field Road.

Washington Fields Road is one of the few roads in Washington City that cross the Virgin River. It is a north/south road that is classified as major arterial which will eventually be five to seven lanes wide. The posted speed limit on Washington Fields Road in the study area is 40 miles per hour. It has a five lane cross section at the signalized intersection with Washington Dam Road (see pictures below and on the next page). The road then narrows to three lanes and then two lanes as it continues south. Based on counts completed by Washington City in May 2017 there are 2,590 vehicles on an average weekday north of 3650 South, with 2,240 vehicles south of this intersection and 1,530 vehicles near Warner Valley Road. Traffic volumes are expected to continue to increase as development continues.



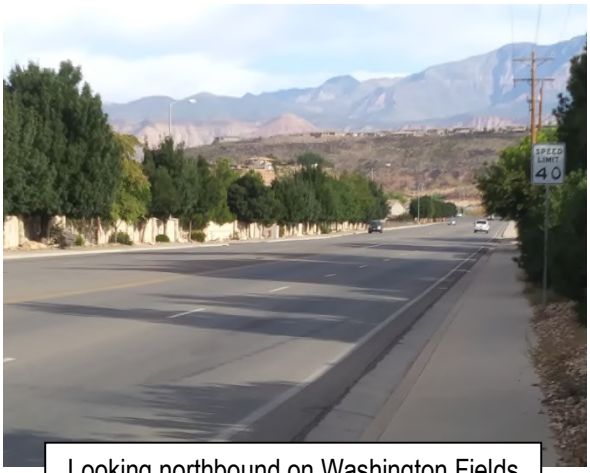
Looking westbound at traffic signal heads on Washington Fields Rd. at Washington Dam Rd.



Looking eastbound on Washington Dam Rd. from Washington Fields Rd



Looking southbound on Washington Fields Rd. from north of Washington Dam



Looking northbound on Washington Fields Rd. from north of Washington Dam Rd.

3650 South is a two lane east/west road that extends west into St. George from the residential development east of Washington Fields Road. It is stop controlled at Washington Fields Road. It has 3,770 vehicles on an average weekday near this intersection. The posted speed limit on 3650 South is 35 miles per hour in the study area and this road is classified as a minor arterial.



Looking eastbound from west side of Washington Fields Road at 3650 South

Looking westbound from just west of SR-7 Southbound Off-Ramp at Warner Valley Rd.





Washington Fields Road near 3650 South



Looking eastbound from west side of Washington Fields Road at 3650 South

Long Valley Road is currently a two-lane road located just north of the project to Washington Dam Road. Long Valley Road has an interchange with the Southern Parkway at Exit 15. The off-ramps at this interchange are stop controlled.

Warner Valley Road is currently a two-lane road located south of the project. Warner Valley Road has an interchange with the Southern Parkway. The off-ramps at this interchange are stop controlled. Warner Valley Road becomes Washington Fields Road west of the Southern Parkway.



Looking southbound from Washington Dam Road towards SR-7/Long Valley Road Interchange (Exit 15)



Looking northbound from SR-7/ Long Valley Rd.



Looking Southbound through Project Site



SR-7 Westbound off-ramp at Long Valley Road (Exit 15)



Looking eastbound from Long Valley Road eastbound SR-7 Off-Ramp - a right turn at the stop sign will enter Long Valley Trails Master Planned Community



2. Traffic Volumes

Manual traffic counts were collected at the study intersections by JLN Solutions on September 25 and 26, 2017 for the original traffic study for the Long Valley Project we completed in January 2018. Counts were completed on October 29, 2018 at Washington Fields Road/Washington Dam Road intersection for the traffic study we completed for the Heritage Place project located northwest of the Washington Fields Road/2000 South intersection. The most recent traffic counts available at each study intersection were used. The counts were collected in 15 minute increments from 7:00 to 9:00 am and from 4:00 to 6:00 pm, and the highest one hour volume during each count period was used in this traffic analysis. The manual peak period traffic counts are presented in Appendix A. The existing AM and PM peak hour traffic volumes at the six study intersections are presented in Figures 3 and 4, respectively at the end of this report.

The traffic volume at the Southern Parkway Interchange at both Warner Valley Road and Long Valley Road are very low with only a couple of vehicles going through these intersections in a minute during the am and pm peak hour. The peak hour volume between 7:00 and 9:00 am at the Washington Fields Road/Washington Dam Road intersection occurred from 7:45 am to 8:45 am and it occurred between 8:00 and 9:00 am for the Washington Fields Road/3650 South intersection. The highest hourly volume between 4:00 pm and 6:00 pm was from 5:00 pm to 6:00 pm at the Washington Fields Road/Washington Dam Road intersection and from 4:00 pm to 5:00 pm at the Washington Fields Road/3650 South intersection.

The existing am peak hour traffic volumes are generally lower than the pm peak hour volume. At the Washington Fields Road/Washington Dam Road intersection the am peak hour traffic volume is 1,367 and the pm peak hour volume is 1,555. Since the proposed development is a residential development, the critical peak periods are the weekday morning and evening peak hours when the majority of residents are commuting to and from work. The weekend peak periods were not evaluated because these periods typically have less traffic than weekdays.

Warner Valley/Southern Parkway (SR-7) Interchange Pictures











Warner Valley Road looking eastbound towards SR-7

3. Level of Service

A Level of Service (LOS) analysis was performed to evaluate traffic conditions at the study intersections during the critical AM and PM peak hours. The analysis is based on procedures outlined in the *Highway Capacity Manual* published by the Transportation Research Board. The LOS represents the average delay experienced by vehicles by an assigned letter value. The letter values assigned range from A to F, with A providing the best service with little or no delay and F representing congested conditions with delays longer than 50 seconds per vehicle for unsignalized intersections and 80 second per vehicle for signalized intersections. A summary of the general definitions of each level of service is shown in Table 1.

At stop controlled intersections the LOS is only calculated for the stop controlled movements and the movements that must yield to other traffic, but not for the entire intersection. The through movements on the major street never have to stop so they have zero delay and by definition operate at LOS A at all times.

Table 1 - General Definitions of Levels of Service for Intersections

Level Of Service (LOS)	Unsignalized Intersection Control Delay (seconds/vehicle)	Signalized Intersection Control Delay (seconds/vehicle)	Definition
A	0 – 10	0 – 10	Very Little Delay Free Flow
B	>10 – 15	>10 – 20	Little Delay Reasonably Free Flow
C	>15 – 25	>20 – 35	Average Delays Stable Flow
D	> 25 – 35	> 35 – 55	Approaching Unstable Flow During Peak Periods
E	> 35 – 50	> 55 – 80	Unstable Flow During Peak Periods
F	> 50	> 80	Long Delays, and Forced or Breakdown Flow

Source: *Highway Capacity Manual*, Transportation Research Board

The LOS analysis was performed for the study intersections according to the Highway Capacity Manual 2010 methodology for Two Way Stop Controlled intersections (TWSC) and signalized intersections using the Synchro traffic analysis software. The calculated peak hour factor based on the existing traffic counts varies and will change in the future. As traffic volumes continue to increase it is expected that the peak

hour values will be close to the default value of 0.92. Therefore, to accurately evaluate the change in the LOS between the various analysis scenarios the same peak hour value of 0.92 was used for each scenario.

A summary of the existing LOS and delay at the study intersections is presented in Table 2. As shown in Table 2 all the restricted movements at the study intersections currently operate at LOS B or better during all time periods. As discussed earlier, the movements not presented in Table 2 experience no delay and therefore operate at LOS A.

Table 2 - Level of Service Summary for Existing AM and PM Peak Hours

	AM Peak Hour			PM Peak Hour		
Intersection	Movement	Delay (seconds/ vehicle)	Level of Service (LOS)	Movement	Delay (seconds/ vehicle)	Level of Service (LOS)
SR-7 EB Ramps/ Long Valley Parkway	EB	9.4	A	EB	10.4	B
	SB	7.3	(A)	SB	7.3	(A)
SR-7 WB Ramps/ Long Valley Parkway	WB	8.7	A	WB	8.6	A
Washington Fields Road/ Washington Dam Road	WB	8.6	A	WB	10.5	B
	NB	4.1	A	NB	3.1	A
	SB	10.6	B	SB	9.5	A
	Total	7.9	A	Total	7.6	A
Washington Fields Road/ 3650 South	EB	12.4	B	EB	11.5	B
	WB	11.7	B	WB	11.3	B
	NB	4.2	(A)	NB	4.2	(A)
	SB	0.6	(A)	SB	0.7	(A)
SR-7 SB Ramps/ Warner Valley Road	WB	0.2	(A)	WB	0.4	(A)
	SB	8.7	A	SB	8.8	A
SR-7 NB Ramps/ Warner Valley Road	EB	5.7	(A)	EB	5.6	(A)
	NB	9.2	A	NB	9.7	A

IV. PROJECTED TRAFFIC

1. Non-Site Traffic Forecast

The non-site or background traffic is the traffic that would occur on the roadway network without the proposed development. The future non-site traffic volumes were forecast to 2025 for the Phase 1 analysis; to 2030 for Phase 2; and 2035 the expected completion year for the entire Long Valley Trails Project. Future traffic volumes were developed from past growth trends in the area and regional travel demand model data for 2025 and 2035. A yearly growth rate of three percent (3%) per year was used to calculate the background traffic volumes. Additionally, traffic from the Heritage Place Project planned on the northwest corner of Washington Fields Road and 2000 South intersection was added to the study intersections.

2. Site Traffic Forecast

Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual was used to forecast traffic generated by the proposed development. The anticipated daily and peak hour project trip generation rates and anticipated number of trips are presented in Table 3 for the proposed Long Valley Trails project.

Table 3 - Project Traffic Generation Forecast

Description	Daily Total	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
1,111 S.F. Homes (ITE Land Use Code 210)							
Trip Rates (trip ends/D.U.)	9.52	25%	75%	0.75	63%	37%	1.00
Number of Trips	10,580	210	625	835	700	410	1,110
1,250 Townhomes/Condo (ITE Land Use Code 230)							
Trip Rates (trip ends/D.U.)	5.81	17%	83%	0.44	67%	33%	0.52
Number of Trips	7,260	95	455	550	435	215	650
2,361 Total Residential Units Total Trips	17,840	305	1,080	1,385	1,135	625	1,760

As shown in Table 3, the project is expected to generate 17,840 total daily trips (half inbound and half outbound), with 1,385 trips during the AM peak hour (305 inbound and 1,080 outbound) and 1,760 PM peak hour trips (1,135 inbound and 625 outbound) with full build out the project.
More detailed traffic generation data is included in Appendix B of this report, including the range of the traffic rates for the two residential land use categories used to forecast the traffic expected to be generated by the Long Valley Trails Master Planned Community Project.

Trip Distribution

The project trips were distributed based on anticipated travel patterns and discussions with Washington City. It was decided that the trips generated by the proposed development would be fairly evenly distributed in the four compass directions with 30% oriented to the east on the Southern Parkway; 26% oriented to the south on the Southern Parkway; with 20% to the north on Washington Fields Road; 19% to the west on 3650 South; and the remaining 5% to the Washington Fields or Warner Valley area. This is a worst case traffic analysis that assumes all of the project traffic goes through the Long Valley Parkway/Southern Parkway Interchange. The build-out project traffic volumes during the AM and PM peak hour are presented in Figures 7 and 8. A new interchange is planned on the Southern Parkway at 3650 South. When this interchange is constructed most of the traffic oriented to and from the City of St. George, the new airport, and Las Vegas would use this interchange significantly reducing the traffic volumes at the Long Valley Parkway Interchange.

Washington City recently hired a new City Engineer and he requested that a revised project trip distribution with a direct connection from the project to 3650 South should be evaluated and added to the prior traffic study. The revised distribution is presented on page B3 in Appendix B. This distribution assumes 65 percent of the project traffic is oriented to the north and 35% is oriented to the south via an extension of 3650 South to the east and under SR-7 to the Long Valley Project. The figure presented on page B3 illustrates the project trip distribution pattern at the six study intersections if 65 percent of the Long Valley Trails Project traffic passes through the Long Valley Parkway/SR-7 Interchange and the remaining 35 percent of the project traffic uses 3650 South.

Trip Assignment

The project trips expected to be generated by the proposed development presented in Table 3 were assigned to the study intersections according to the anticipated travel patterns in the study area.

3. Total 2025, 2030 and 2035 Traffic

The total 2025 peak hour traffic volumes were calculated by increasing the background traffic volume by 15 percent (three percent for five years) and adding traffic from Phase 1 of the Long Valley Trails Project. A similar procedure was used to calculate the traffic volumes for the 2030 and 2035 traffic analysis scenarios for Phase 2 and Phase 3, respectively. Each phase of development was assumed to include one third of the total anticipated project development. The detailed spreadsheets used to calculate the future traffic volumes at each of the six study intersections for all the traffic analysis scenarios during the AM and PM peak hours are presented in Appendix C. These traffic volumes are illustrated graphically in Figures 3 – 22 located at the end of this report.

This traffic analysis is assumed to be the worst case traffic analysis because another interchange is planned on the Southern Parkway at 3650 South. The timing and funding for this interchange in not currently determined so this traffic study was completed assuming all of the Long Valley Trails project traffic would pass through the Southern Parkway/ Long Valley Parkway interchange. However, sometime in the future when the Southern Parkway/3650 South interchange is completed a large portion of the project traffic will use the new interchange. Because the specific design and timing for this new interchange south of the project is not know no traffic analysis was completed beyond 2035. Potential traffic related impacts from the project beyond 2035 will be significantly less when the Southern Parkway/3650 South interchange is completed and the project traffic is distributed to two interchanges instead of just one.

Washington City staff has requested that an additional traffic analysis be completed that assigned 65 percent of the project traffic north of the project through the Long Valley/SR-7 interchange and the remaining 35 percent of the project traffic to 3650 South. For this additional analysis the project traffic forecast was also increased by five percent as requested by the Washington City Engineer. Figures 19 and 20 present the AM and PM peak hour traffic volumes at the study intersections with 35 percent of the project traffic assigned to 3650 South. Figures 21 and 22 illustrate the total anticipated AM and PM peak hour traffic volumes with a direct project connection to 3650 South. See Appendix C to view the detailed spreadsheets used to forecast the future traffic volumes for each of the analysis scenarios.

VI. TRAFFIC AND IMPROVEMENT ANALYSIS

1. Site Access

The Long Valley Trails Master Planned Community will have good access from Long Valley Parkway and the internal roads planned in the project. The adjacent Southern Parkway and Washington Dam Road have significant available capacity to accommodate the planned project traffic; and they both will be widened and improved as development continues in Washington City and Washington County. Additionally, the project applicant is working with Washington City to help them improve Washington Dam Road to a full 5-lane cross section from west of Country Way to the project. A secondary/emergency only access will be provided to the project by extending Long Valley Parkway south from the project as a two lane graded road to the 3650 South/SR-7 Interchange (see Figure 24 at the end of this report).

2. Capacity and Level of Service Analysis

The peak hour delay and LOS at the study intersections are presented in Table 4 for the AM and PM peak hours for the 2025 traffic conditions with and without the anticipated traffic from the Long Valley Trails Development. As shown in Table 4, the proposed development will not significantly change the delay or LOS at any of the study intersections. All of the traffic movements at the study intersections will continue to operate at LOS B or better in 2025 with or without the addition of anticipated Phase 1 project traffic during both the AM and PM peak hours, except the eastbound traffic on 3650 South at Washington Fields Road during the AM peak hour where the average delay per vehicle is expected to increase by about four seconds resulting in LOS C.

Table 4 - Level of Service Summary for 2025 AM and PM Peak Hours

Intersection	App.	AM Peak Hour				PM Peak Hour			
		Background 2025		BG 2025 Plus Phase 1 Project		Background 2025		BG 2025 Plus Phase 1 Project	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR-7 EB Ramps/ Long Valley Parkway	EB	9.7	A	9.9	A	10.9	B	11.4	B
	SB	7.4	(A)	5.1	(A)	7.4	(A)	3.6	(A)
SR-7 WB Ramps/ Long Valley Parkway	WB	8.8	A	10.7	A	8.7	A	13.5	B
	NB	-	-	4.7	(A)	-	-	4.5	(A)
Washington Fields Road/ Washington Dam Road	WB	13.2	B	13.6	B	11.8	B	12.2	B
	NB	3.8	A	3.7	A	12.6	B	12.4	B
	SB	15.4	B	19.5	B	10.0	A	14.8	B
	Total	10.9	B	12.7	B	11.3	B	13.3	B
Washington Fields Road/ 3650 South	EB	14.9	B	18.7	C	12.9	B	14.5	B
	WB	12.8	B	14.7	B	12.4	B	13.5	B
	NB	4.1	(A)	5.0	(A)	4.1	(A)	4.7	(A)
	SB	0.6	(A)	0.5	(A)	0.7	(A)	0.6	(A)
SR-7 SB Ramps/ Warner Valley Road	WB	0.1	(A)	0.1	(A)	0.4	(A)	0.4	(A)
	SB	8.7	A	8.9	A	8.9	A	9.1	A
SR-7 NB Ramps/ Warner Valley Road	EB	5.7	(A)	5.2	(A)	5.6	(A)	6.1	(A)
	NB	9.1	A	9.3	A	9.8	A	10.8	B

Table 5 summarizes the 2030 traffic analysis during the AM and PM peak hours at the six study intersections. As shown in Table 5, during both the AM and PM peak hours all the movements at the SR-7 ramps are expected to continue to operate at LOS B or better based on anticipated background 2030 traffic volumes. The eastbound stop controlled movements on 3650 South at Washington Fields Road are expected to operate at LOS D during the AM peak hour and LOS C during the PM peak hour for the 2030 Background scenario. The westbound stop controlled movements on 3650 South at Washington Fields Road are expected to operate at LOS C during the AM peak hour and LOS B during the PM peak hour for the Background 2030 scenario. The westbound movement on Washington Dam Road at Washington Fields Road is forecast to operate at LOS C during the AM peak hour for this scenario.

Table 5 – Level of Service Summary for 2030 AM and PM Peak Hours

Intersection	App.	AM Peak Hour				PM Peak Hour			
		Background 2030		BG 2030 Plus Phase 2 Project		Background 2030		BG 2030 Plus Phase 2 Project	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR-7 EB Ramps/ Long Valley Parkway	EB	10.2	B	11.5	B	11.6	B	23.5	C
	SB	5.5	(A)	5.3	(A)	4.0	(A)	3.7	(A)
SR-7 WB Ramps/ Long Valley Parkway	WB	10.7	B	20.1	C	13.6	B	**115.6** [13.8]	**F** [B]
	NB	4.7	(A)	5.7	(A)	4.5	(A)	5.5 [15.8]	(A) [C]
	SB	-	-	-	-	-	-	- 19.0	- [C]
	Total	-	-	-	-	-	-	- [16.3]	- [C]
Washington Fields Road/ Washington Dam Road	WB	26.2	C	31.0	C	12.8	B	13.6	B
	NB	2.8	A	2.8	A	16.2	B	16.4	B
	SB	18.7	B	24.1	C	16.1	B	28.5	C
	Total	15.6	B	19.7	B	15.3	B	20.7	C
Washington Fields Road/ 3650 South	EB	28.7	D	**54.7**	**F**	17.6	C	22.5	C
	WB	16.8	C	20.3	C	15.0	B	16.9	C
	NB	5.1	(A)	5.7	(A)	4.7	(A)	5.2	(A)
	SB	0.5	(A)	0.4	(A)	0.6	(A)	0.6	(A)
SR-7 SB Ramps/ Warner Valley Road	WB	2.1	(A)	2.1	(A)	1.4	(A)	1.4	(A)
	SB	9.5	A	9.6	A	10.3	B	10.5	B
SR-7 NB Ramps/ Warner Valley Road	EB	3.8	(A)	4.0	(A)	4.5	(A)	5.1	(A)
	NB	10.1	B	10.4	B	11.9	B	13.5	B

As shown in Table 5, the addition of Phase 2 project traffic during the AM peak hour is expected to change the LOS for eastbound traffic on 3650 South at Washington Fields Road from LOS D to LOS F which. All other movements are forecast to operate at LOS C or better with anticipated project traffic during the AM peak hour in 2030. The PM peak hour volumes are higher than the AM peak hour volumes; however, all traffic movements are still forecast to operate at LOS C or better except the westbound SR-7 off-ramp at Long Valley Parkway that is expected to change from LOS B with an average delay per vehicle of 13.6 seconds to LOS F with an average delay

of 115.6 seconds per vehicle with no improvements to the intersection. The other movements are all expected to operate at LOS C or better during the PM peak hour in 2030 with two-thirds of the Project constructed.

Table 6 summarizes the average delay per vehicle and the level of service during the AM and PM peak hours based on anticipated 2035 volumes. As shown in Table 6, by 2035 minor intersection improvements are going to be required at three of the six study intersections to obtain an acceptable level of service. The values shown in brackets [xx] in Table 6 represent the values with potential improvements at these intersections. The potential intersection improvements are minor and are summarized in the next section of this report.

All the roads in the project will be constructed in accordance with City Standards. The city of Washington requires the installation of deceleration lanes on roads that meet all three of the following conditions: 1) over 5,000 vehicles per day are using or expected to use the road; 2) the 85th percentile speed is 35 miles per hour or greater or 40 miles per hour for a two lane roadway (one lane in each direction); and 3) 50 or more vehicles making a right turn. Eventually based on anticipated development in the Long Valley Trails Project the daily volume on Long Valley Parkway is expected to exceed 5,000 vehicles per day. Arterial roads typically have a posted speed limits of 35 miles per hour or higher. Further, at full build out of the Long Valley Trails Project the number of right and left turns at intersections along Long Valley Parkway and the other north/south major collector between the two roundabouts are expected to exceed 50 vehicles in the peak hour. Therefore, we recommend the installation of right and left turn lanes on these two major collectors throughout the project.

Table 6 - Level of Service Summary for 2035 AM and PM Peak Hours

Intersection	App.	AM Peak Hour				PM Peak Hour			
		Background 2035		BG 2035 Plus Phase 3 Project		Background 2035		BG 2035 Plus Phase 3 Project	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
SR-7 EB Ramps/ Long Valley Parkway	EB	12.2	B	15.6	C	24.8	C	**214.2 [53.1]**	**F [F]**
	SB	5.8	(A)	6.8	(A)	4.2	(A)	5.2 [2.1]	(A) [A]
SR-7 WB Ramps/ Long Valley Parkway	WB	19.9	C	**150.2** [11.0]	**F** [B]	- [14.0]	- [B]	- [31.4]	- [D]
	NB	5.7	(A)	7.0 [23.9]	(A) [C]	- [16.4]	- [B]	- [18.6]	- [C]
	SB	-	-	- [13.7]	- [B]	- [21.6]	- [C]	- 24.4	- [C]
	Total	-	-	- [19.6]	- [C]	- [17.6]	- [C]	- 24.8	- [C]
Washington Fields Road/ Washington Dam Road	WB	17.5	B	20.1	C	19.5	B	18.2	B
	NB	16.1	B	16.1	B	26.2	C	17.4	B
	SB	14.6	B	16.6	B	20.9	C	25.9	C
	Total	16.0	B	17.6	B	22.3	C	21.2	C
Washington Fields Road/ 3650 South	EB	[13.4]	[B]	[14.6]	[B]	36.3	E	[15.3]	[C]
	WB	[10.7]	[B]	[11.3]	[B]	19.8	C	[10.3]	[B]
	NB	[12.1]	[B]	[14.0]	[B]	5.2	(A)	[12.4]	[B]
	SB	[12.6]	[B]	[14.4]	[B]	0.6	(A)	[10.7]	[B]
	Total	[12.5]	[B]	[14.0]	[B]	-	-	[13.2]	[B]
SR-7 SB Ramps/ Warner Valley Road	WB	3.2	(A)	3.2	(A)	2.2	(A)	2.3	(A)
	SB	11.5	B	11.6	B	14.5	B	15.2	C
SR-7 NB Ramps/ Warner Valley Road	EB	2.9	(A)	3.1	(A)	4.1	(A)	4.7	(A)
	NB	11.9	B	12.3	B	17.0	C	20.7	C

Table 7 summarizes the level of service analysis at full build-out of the project with a project connection to 3650 South, and 35 percent of the project traffic assigned to use 3650 South to travel to and from the project. The SR-7/Long Valley Parkway Interchange would operate better with this project trip distribution. However, slightly more congestion would be anticipated at the two study intersections on Washington Fields Road since more traffic is assigned to them. At these two intersections three movements are expected to operate at LOS E. During the PM peak

Table 7 - Level of Service Summary for Project Build-out with Connection to 3650 South

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		Delay (sec./veh.)	LOS	Delay (sec./veh.)	LOS
SR-7 EB Ramps/ Long Valley Parkway	EB	26.7	D	41.1	E
	SB	5.0	(A)	4.3	(A)
SR-7 WB Ramps/ Long Valley Parkway	WB	19.2	C	35.8	E
	NB	1.3	(A)	1.4	(A)
Washington Fields Road/ Washington Dam Road	WB	25.6	C	39.8	D
	NB	19.6	B	59.5	E
	SB	23.0	C	41.1	D
	Total	23.0	C	46.5	C
Washington Fields Road/ 3650 South	EB	15.3	C	44.4	E
	WB	45.0	E	21.6	C
	NB	12.7	B	14.0	B
	SB	13.6	B	15.1	C
	Total	25.9	D	27.7	D
SR-7 SB Ramps/ Warner Valley Road	WB	3.0	(A)	1.7	(A)
	SB	12.2	B	15.1	C
SR-7 NB Ramps/ Warner Valley Road	EB	2.1	(A)	2.5	(A)
	NB	11.5	B	14.9	B

hour the northbound approach at Washington Dam Road and the eastbound approach at 3650 South are forecast to operate at LOS E. The westbound approach at 3650 South is expected to operate at LOS E during the AM peak hour. All other movements will operate at LOS D or better.

1. Traffic Safety

The proposed project is not expected to create any significant traffic safety issues. The roads and intersections in the project will be constructed in accordance with City Standards. Care should be taken to provide adequate sight distance at the intersections and the roads that will be constructed as part of this project. The proposed street system for the project is adequate and internal site circulation is expected to function properly.

We recommend that both roundabouts on Long Valley Parkway be constructed as a two lane roundabouts. The anticipated traffic volumes at full build-out of the project can properly be accommodated by a properly designed two lane roundabout at both of these locations.

The project will construct sidewalks along the streets in the Long Valley Trails Project. The project will also construct a ten foot paved pedestrian/trail that will loop through the project as shown on the site plan. These improvements will provide safe routes for pedestrians and bicyclists.

VII. RECOMMENDATIONS AND CONCLUSIONS

1. Site Access/Circulation Plan

Site access and on site circulation is appropriate for the proposed project. Many interchanges in Utah currently have significantly more traffic than is anticipated at the SR-7/Long Valley Parkway interchange at full build out of the project without a second access for the project. A second emergency only access will be provided to the project by extending Long Valley Parkway south to the future SR-7/3650 South Interchange as shown in Figure 24.

2. Roadway/Intersection Improvements

On-Site Roadway Improvements

Roads will be constructed as shown on the project site plan to provide good circulation and access to the project (see Figure 2 which illustrates the Conceptual Site Plan for the project, and Figure 23 that presents the cross sections for roads within the project).

Off-Site Intersection Improvements

This traffic analysis indicates that with the development of the first and second phase of the Long Valley Trails Project no off-sight traffic improvements are required to maintain an acceptable level of service at the six study intersections.

However, at sometime during the final phase for the project improvements may be required at the following three intersections.

SR-7 Eastbound Ramps/Long Valley Parkway Potential Improvements

- Add two lanes on the off-ramp and stripe the off-ramp with one left-turn lane; one through/right-lane; and a free right-turn lane
- Add a northbound right-turn lane
- Add a southbound left-turn lane

SR-7 Westbound Ramps/Long Valley Parkway Potential Improvements

- Add a westbound left-turn lane on the off-ramp
- Add a northbound left-turn lane from Long Valley Parkway to the on-ramp
- Add a second southbound lane on Long Valley Parkway
- To decrease the delay for the off-ramp traffic further a traffic signal could be installed if it meets traffic signal warrant criteria. A signal would not probably be warranted if the SR-7/3650 South Interchanges is completed. If a signal was installed with no other improvements all movements would operate at LOS B or better and the total intersections would operate at LOS A during the critical PM peak hour.

Washington Fields Road/3650 South Potential Improvements

- Add an eastbound right-turn lane on 3650 South
- Add a northbound left-turn lane on Washington Fields Road
- Add a southbound right-turn lane on Washington Fields Road
- At some point the intersection may need to be converted to a 4-way stop controlled intersection and at a later date a traffic signal may be warranted at this intersection.

These potential improvements that have been identified are consistent with Washington City's plans and street classification for Washington Fields Road and 3650 South.

The LOS at the Washington Fields Road/Washington Dam Road intersection could be improved from LOS D to LOS C during the PM peak hour by modifying the signal phasing and providing a protected overlap phase for the westbound right turn and a permitted/protected southbound left turn phase as illustrated in the Synchro Level of Service calculations sheets included in Appendix D.

Long Valley Parkway is planned as a major arterial with a 110 foot right-of-way from the Southern Parkway (SR-7) at both the north and south ends of the project. It will be constructed with two traffic lanes in each direction with a center left turn lane or median, and curb and gutter on each side. The two primary north/south roads between the two roundabouts in the project will have an 80 foot right-of-way and will be classified as major collector roads. Each of these roads will be constructed with a single travel lane in each direction, plus left and right turn lanes at intersections, and curb/gutter on each side of the road. The other roads in the project will be residential collector roads with a right-of-way of 55 feet or residential local roads with right-of-way of 34 feet (see Figure 23 at the end of the report that illustrates the cross sections for the roads in the project). All roads will be constructed in accordance with Washington City design standards.

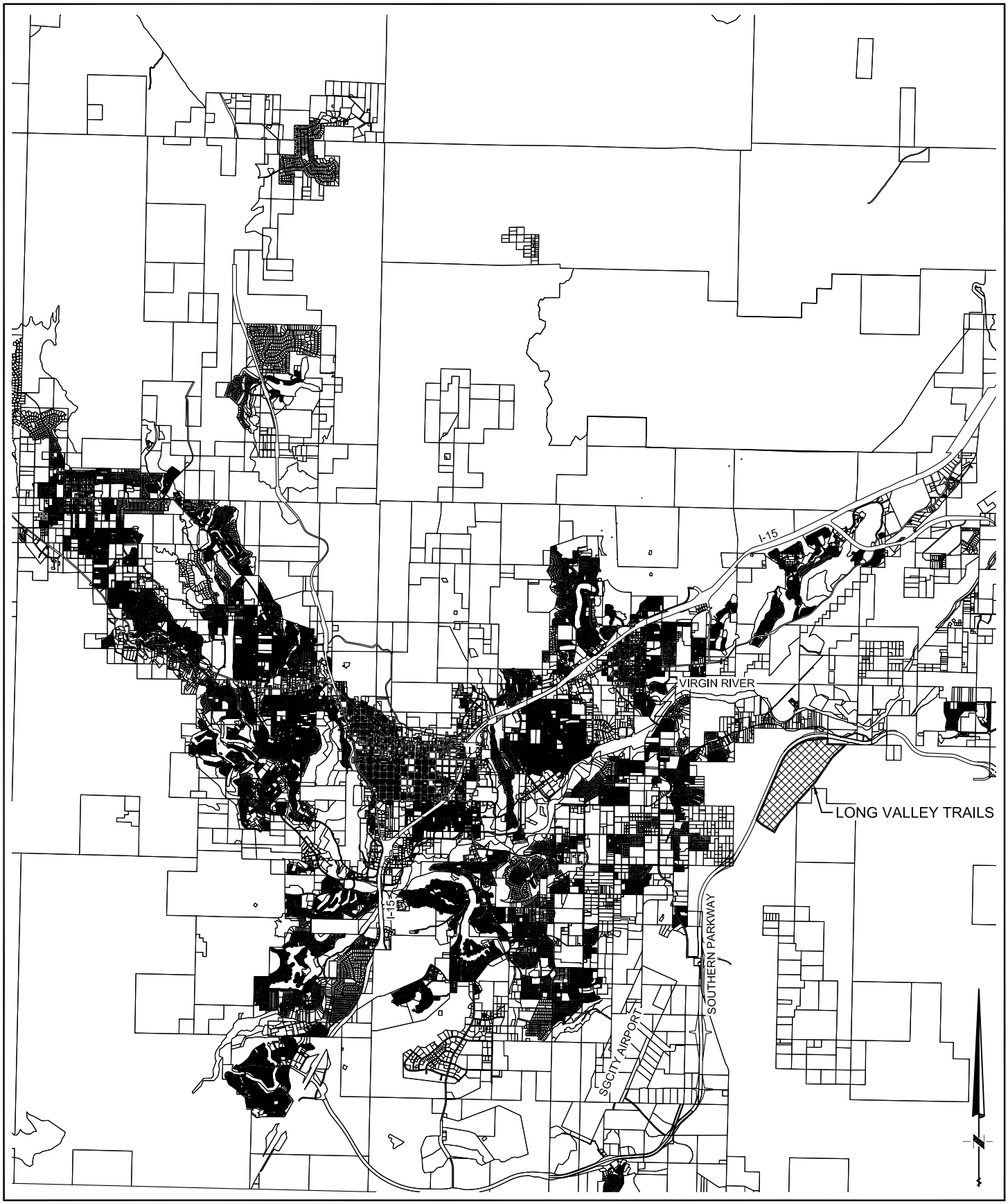
Crashes can be reduced significantly by providing turn lanes so turning traffic can move from the through lane before slowing down to turn, thus decreasing potential traffic conflicts that can cause crashes when drivers are inattentive.

The project will also install traffic signal and ATMS conduit along Washington Dam Road from Country Way to the project. It is anticipated that the 3650 South/SR-7 Interchange will be constructed prior to the completion of Phase 2 of the Long Valley Trails Project. However, if this interchange is not completed or at least under construction by the time two thirds of the Long Valley Trails development is completed additional traffic analysis may be required by Washington City.

No additional off-site roadway or intersection improvements are required to accommodate anticipated traffic from the proposed Long Valley Trails Project.

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VICINITY MAP

LONG VALLEY TRAILS
WASHINGTON COUNTY, UTAH

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
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HP Job No:161174-Vicinity Map

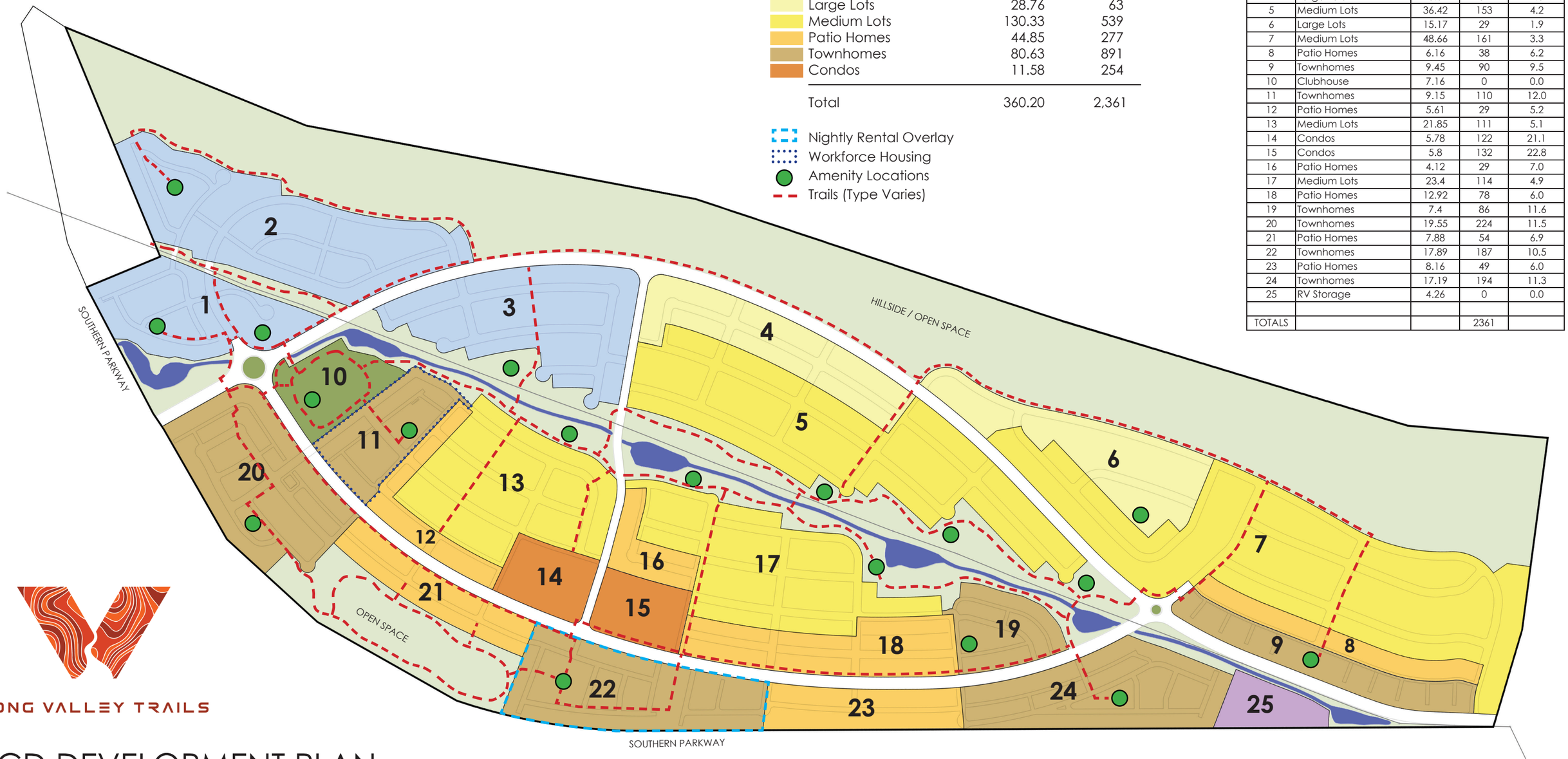
Legend

Total Area	**605.61 ac**	
Land Uses	**Acres**	**Units**
Active Adult	64.05	337
Large Lots	28.76	63
Medium Lots	130.33	539
Patio Homes	44.85	277
Townhomes	80.63	891
Condos	11.58	254
Total	360.20	2,361

Nightly Rental Overlay
Workforce Housing
Amenity Locations
Trails (Type Varies)

Statistical Summary

POD	Land Use	Acres	Units	DU/AC
1	Active Adult	14.35	62	4.3
2	Active Adult	27.98	165	5.9
3	Active Adult	21.72	110	5.1
4	Large Lots	13.59	34	2.5
5	Medium Lots	36.42	153	4.2
6	Large Lots	15.17	29	1.9
7	Medium Lots	48.66	161	3.3
8	Patio Homes	6.16	38	6.2
9	Townhomes	9.45	90	9.5
10	Clubhouse	7.16	0	0.0
11	Townhomes	9.15	110	12.0
12	Patio Homes	5.61	29	5.2
13	Medium Lots	21.85	111	5.1
14	Condos	5.78	122	21.1
15	Condos	5.8	132	22.8
16	Patio Homes	4.12	29	7.0
17	Medium Lots	23.4	114	4.9
18	Patio Homes	12.92	78	6.0
19	Townhomes	7.4	86	11.6
20	Townhomes	19.55	224	11.5
21	Patio Homes	7.88	54	6.9
22	Townhomes	17.89	187	10.5
23	Patio Homes	8.16	49	6.0
24	Townhomes	17.19	194	11.3
25	RV Storage	4.26	0	0.0
TOTALS			2361	



LONG VALLEY TRAILS

PCD DEVELOPMENT PLAN

Long Valley Trails

October 7, 2020

North

BH

D·R·HORTON
America's Builder

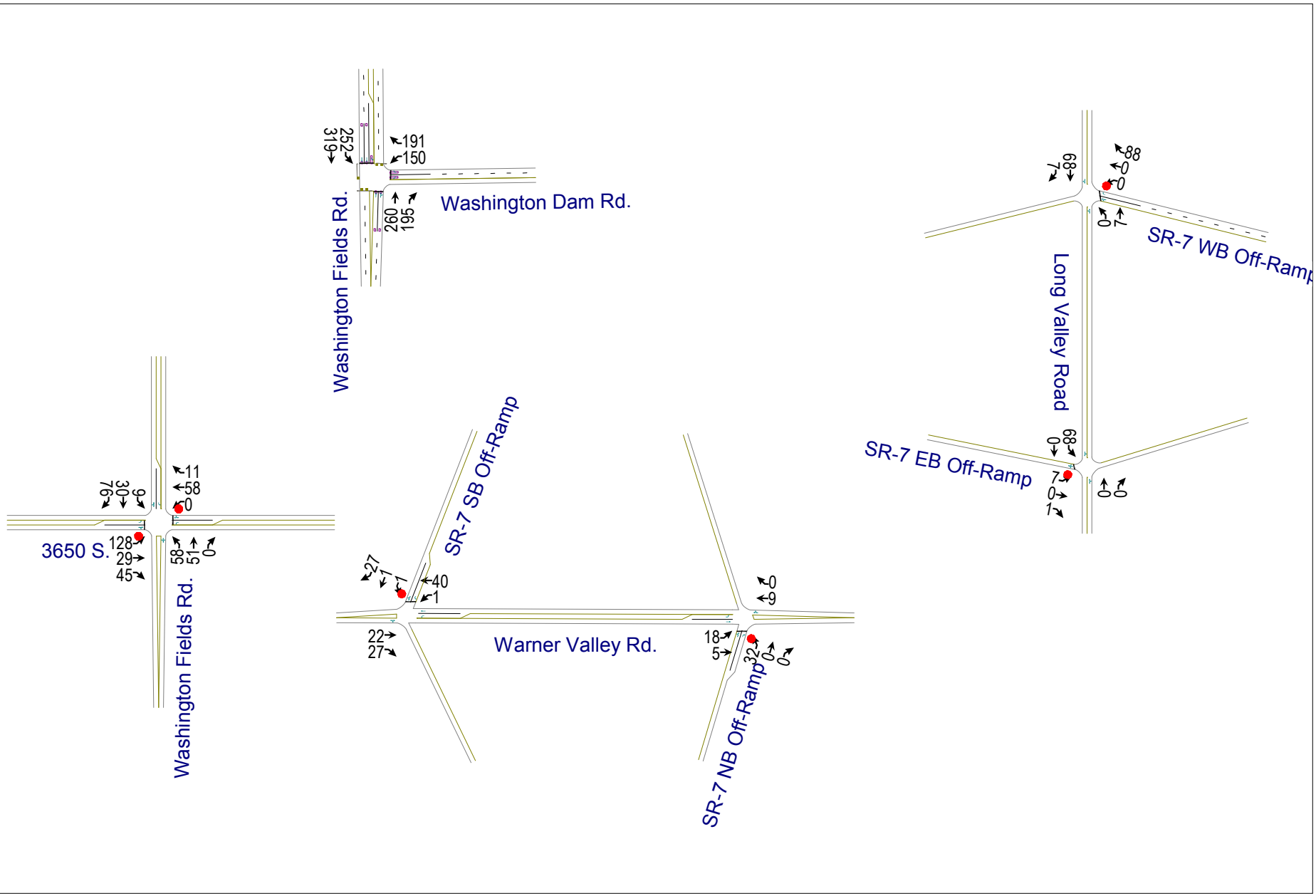


Figure 3
Existing AM Peak Hour Traffic

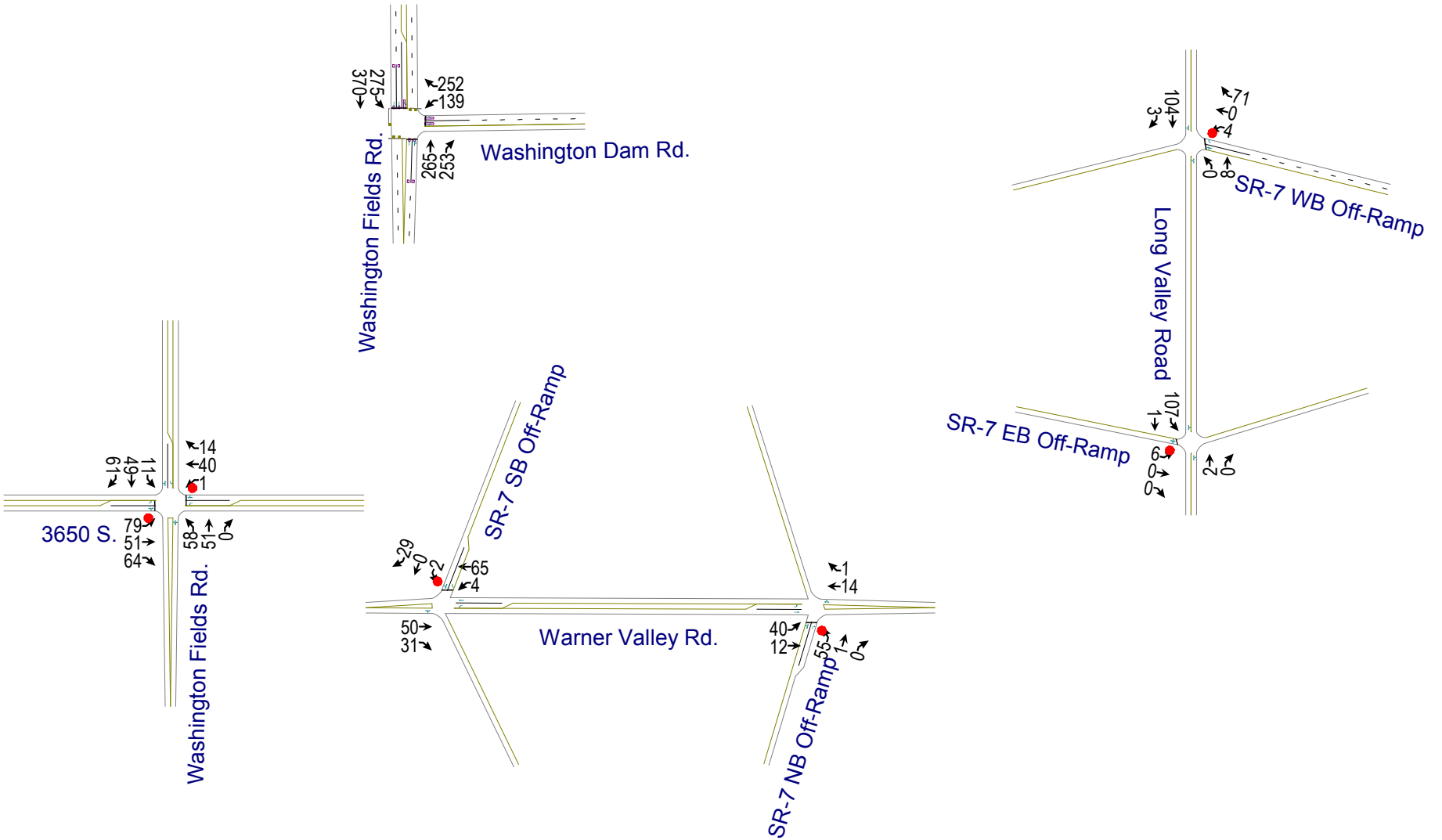


Figure 4
Existing PM Peak Hour Traffic

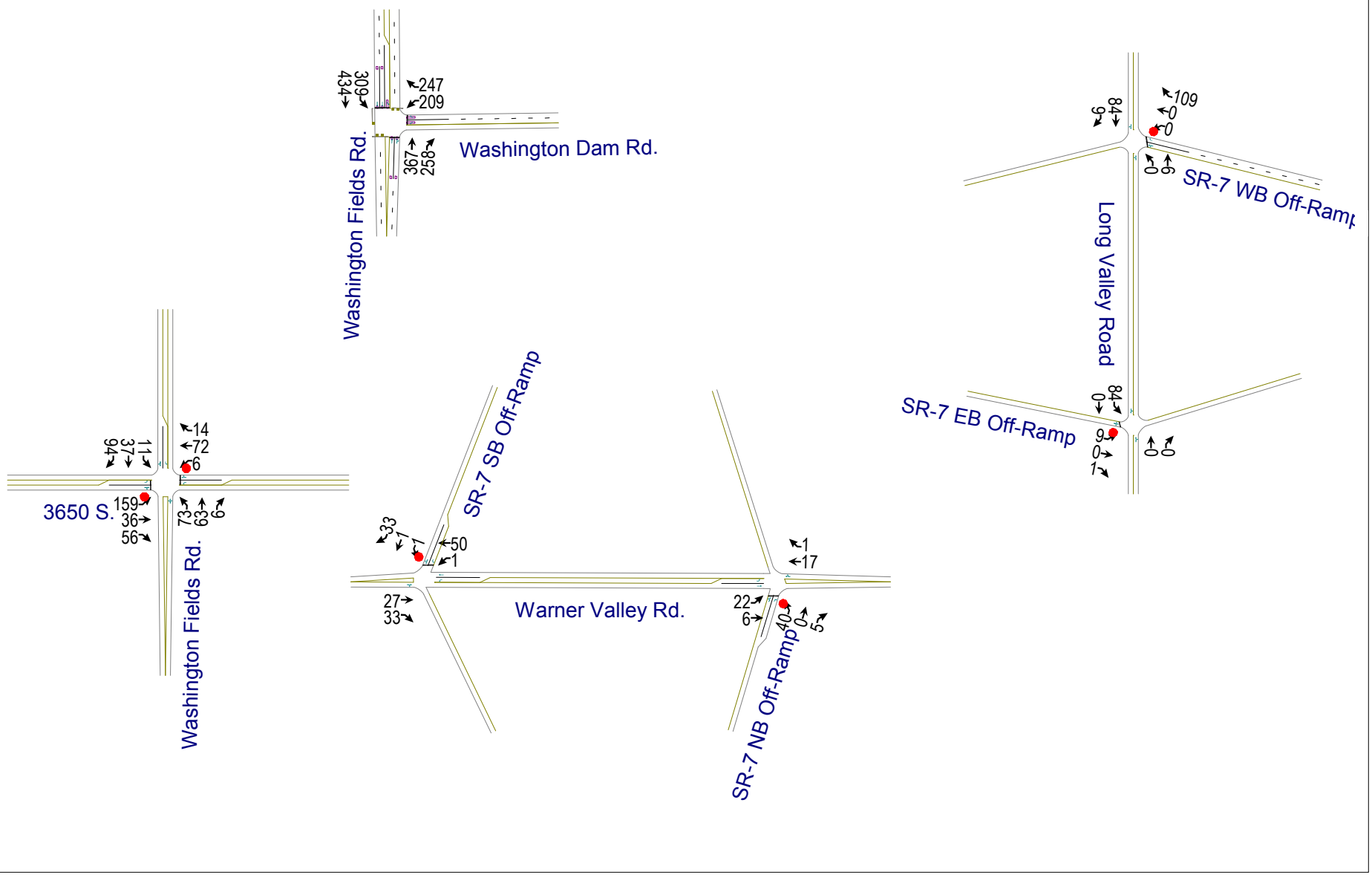


Figure 5
Background 2025 AM Peak Hour Traffic

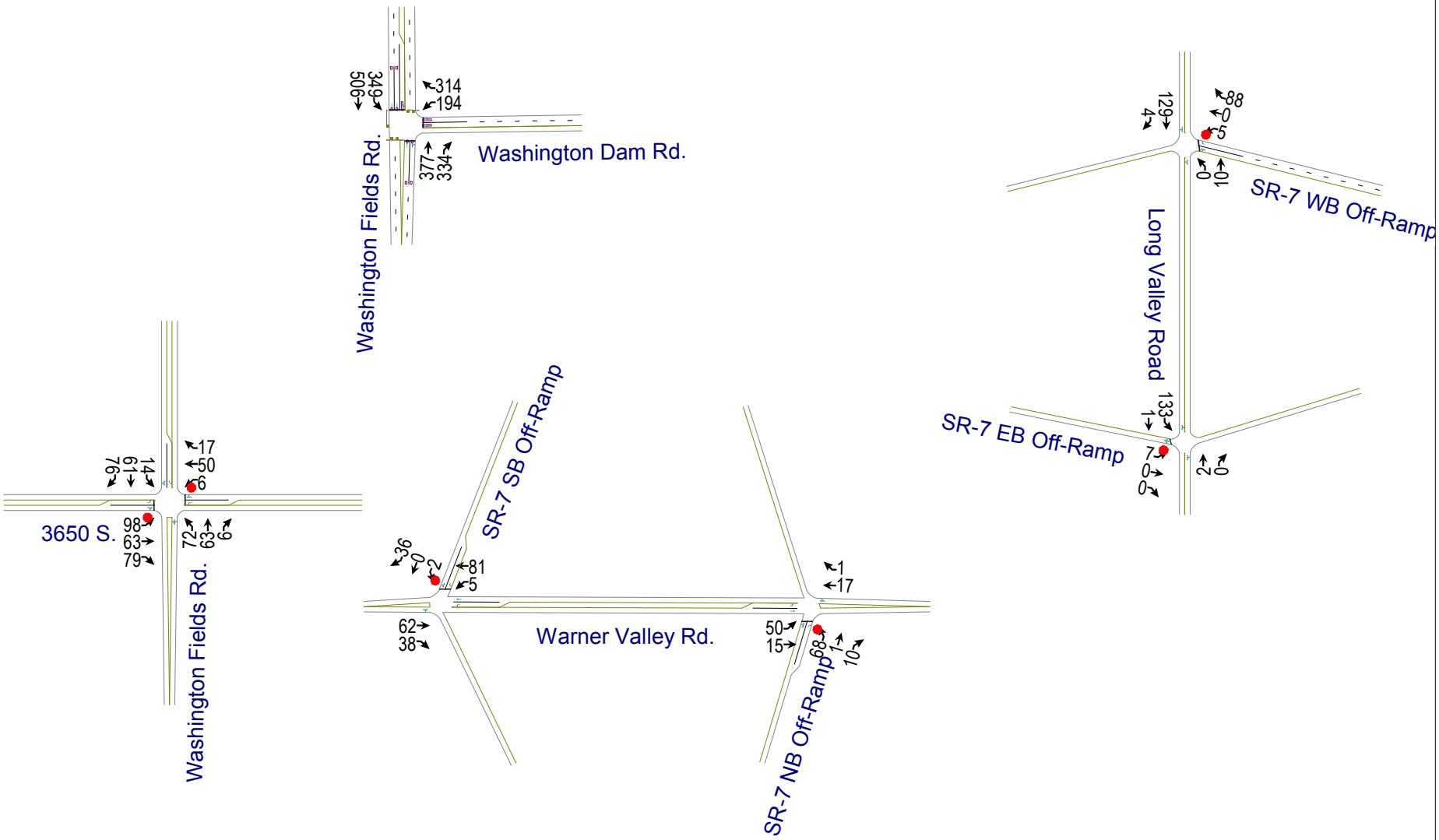


Figure 6
Background 2025 PM Peak Hour Traffic

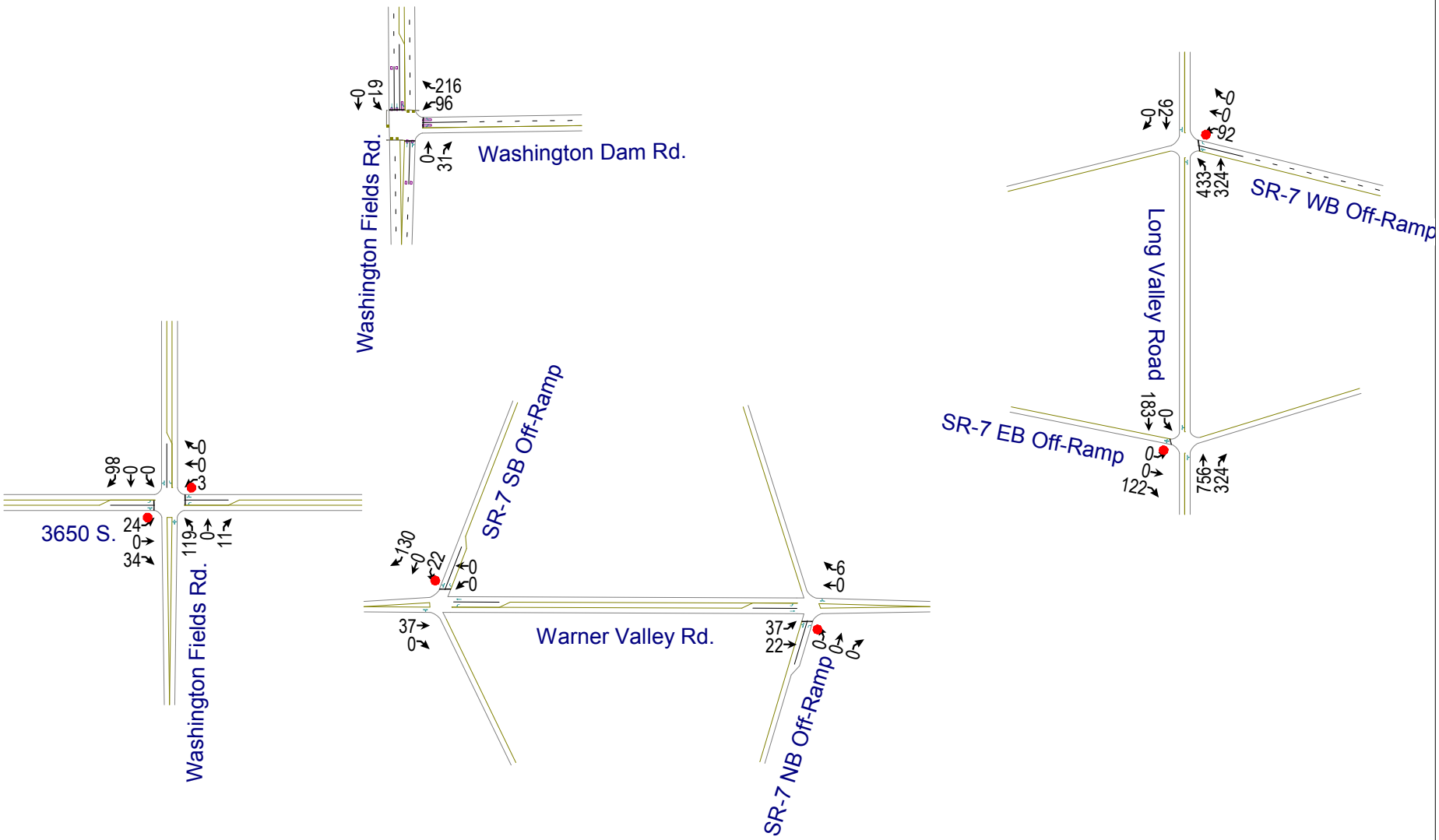


Figure 7
Total AM Peak Hour Project Traffic At Full Build-Out

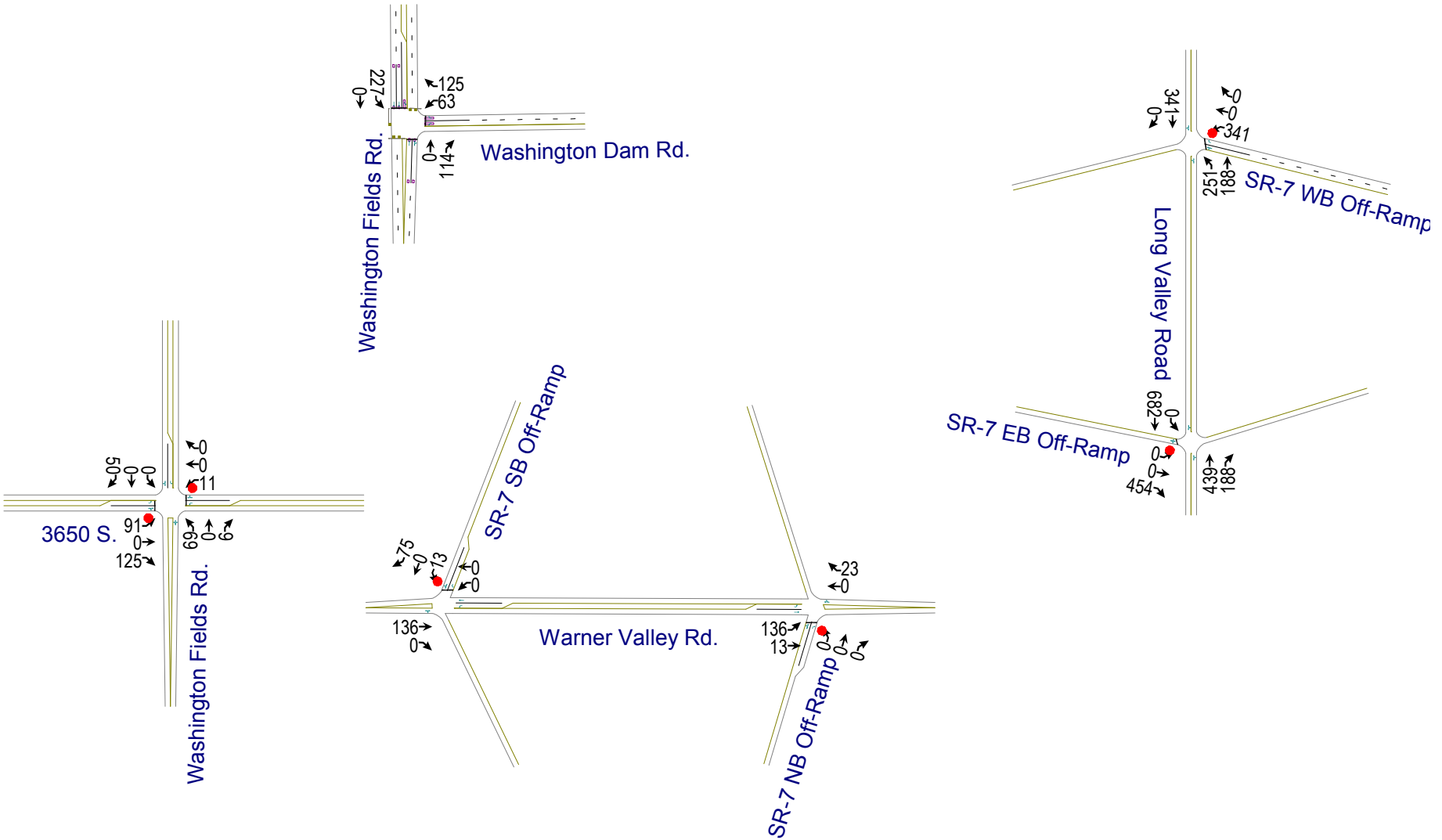


Figure 8
Total Project Traffic At Full Build-Out PM Peak Hour Traffic

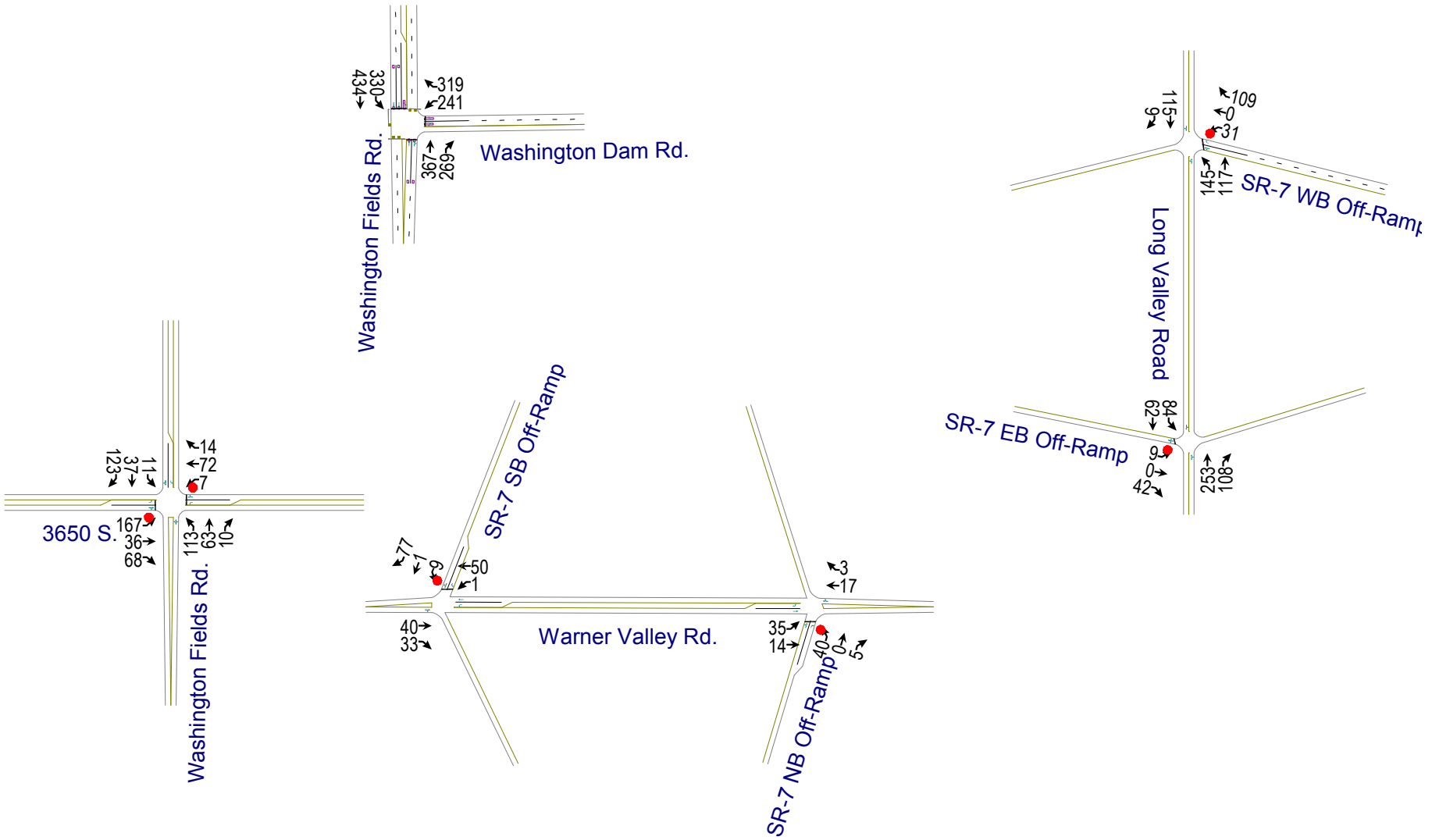


Figure 9
Total 2025 (Background 2025 Plus Phase 1 Project Traffic) AM Peak Hour Traffic

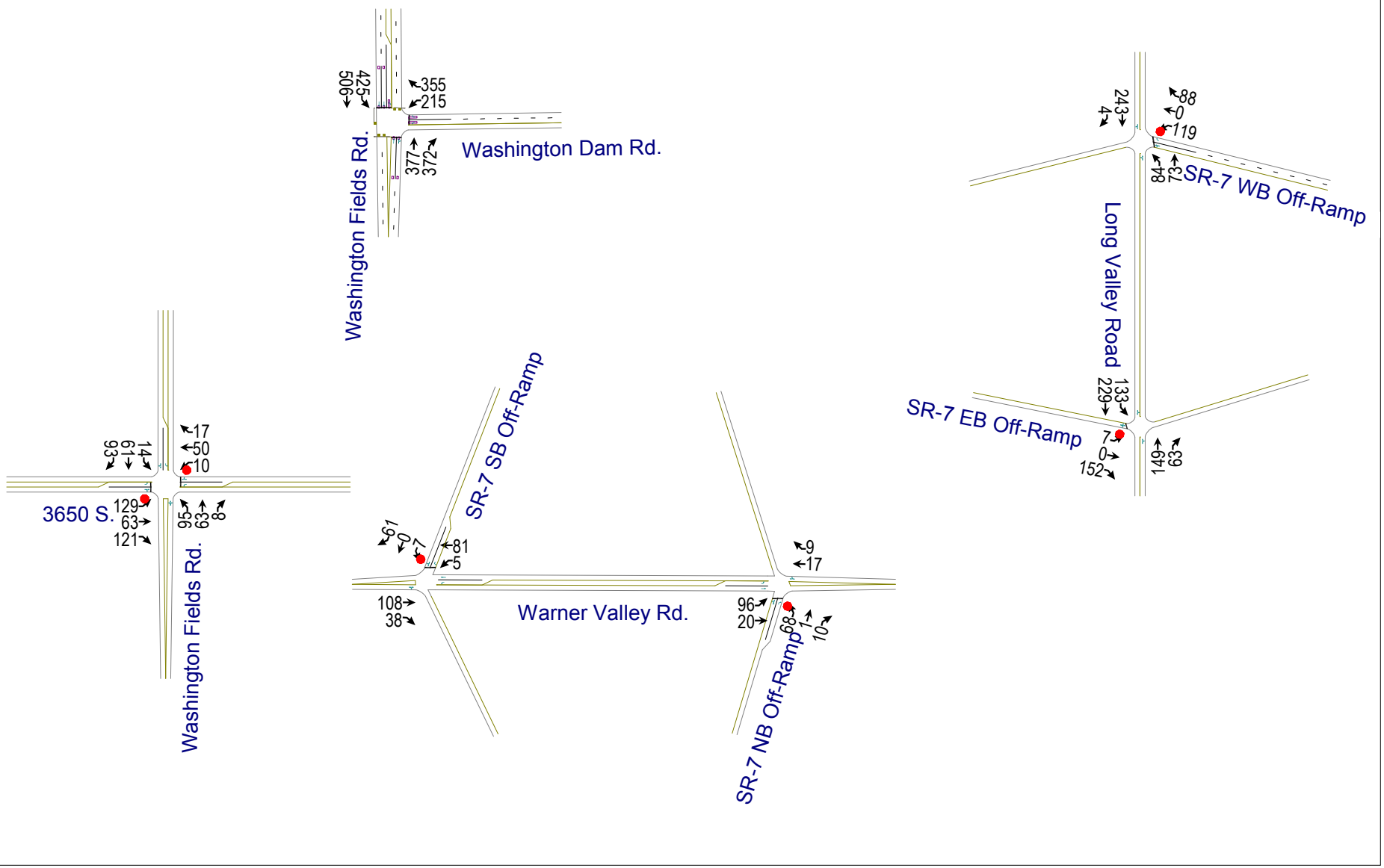


Figure 10
Total 2025 (Background 2025 Plus Phase 1 Project Traffic) PM Peak Hour Traffic

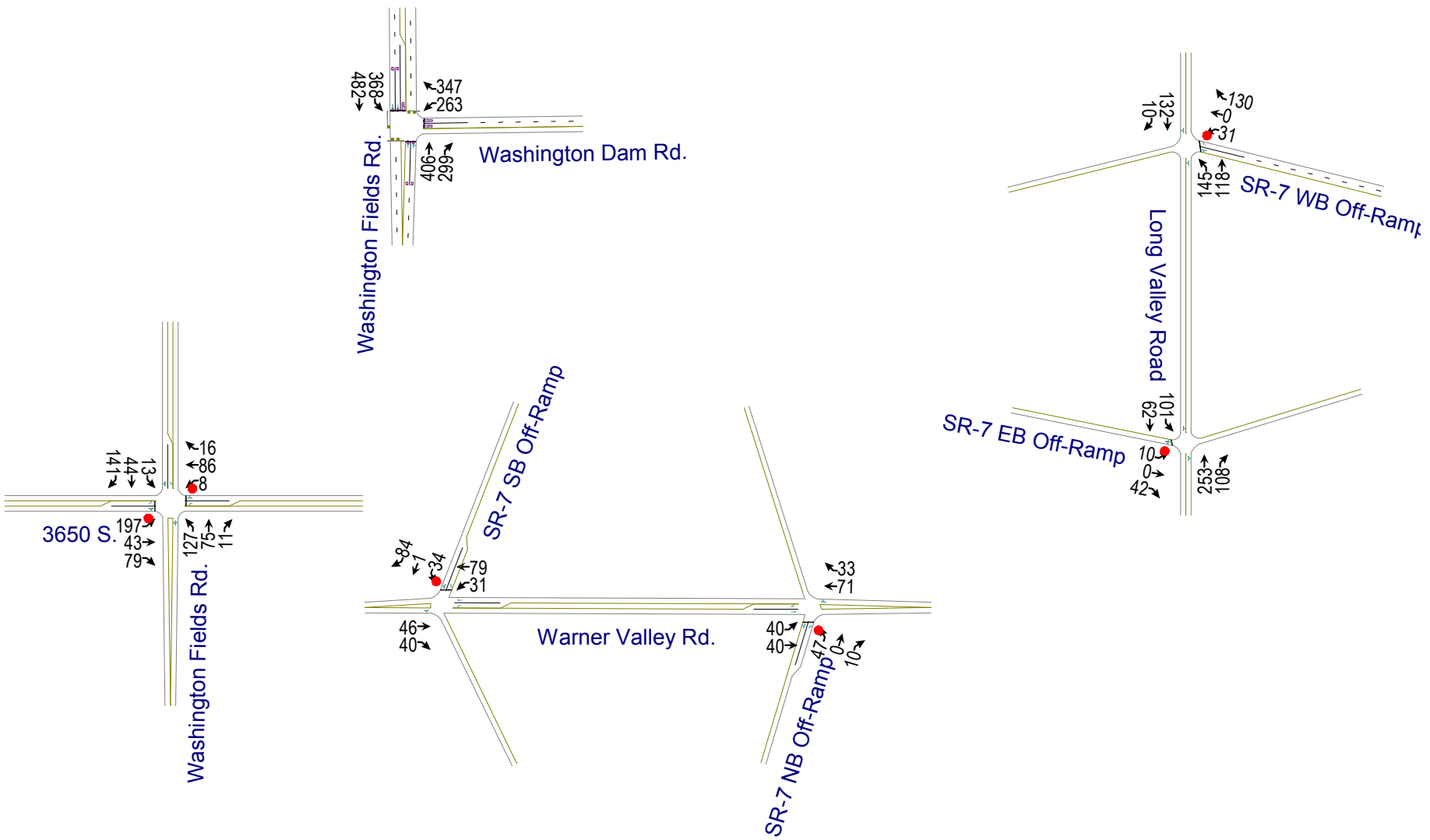


Figure 11
Background 2030 AM Peak Hour Traffic

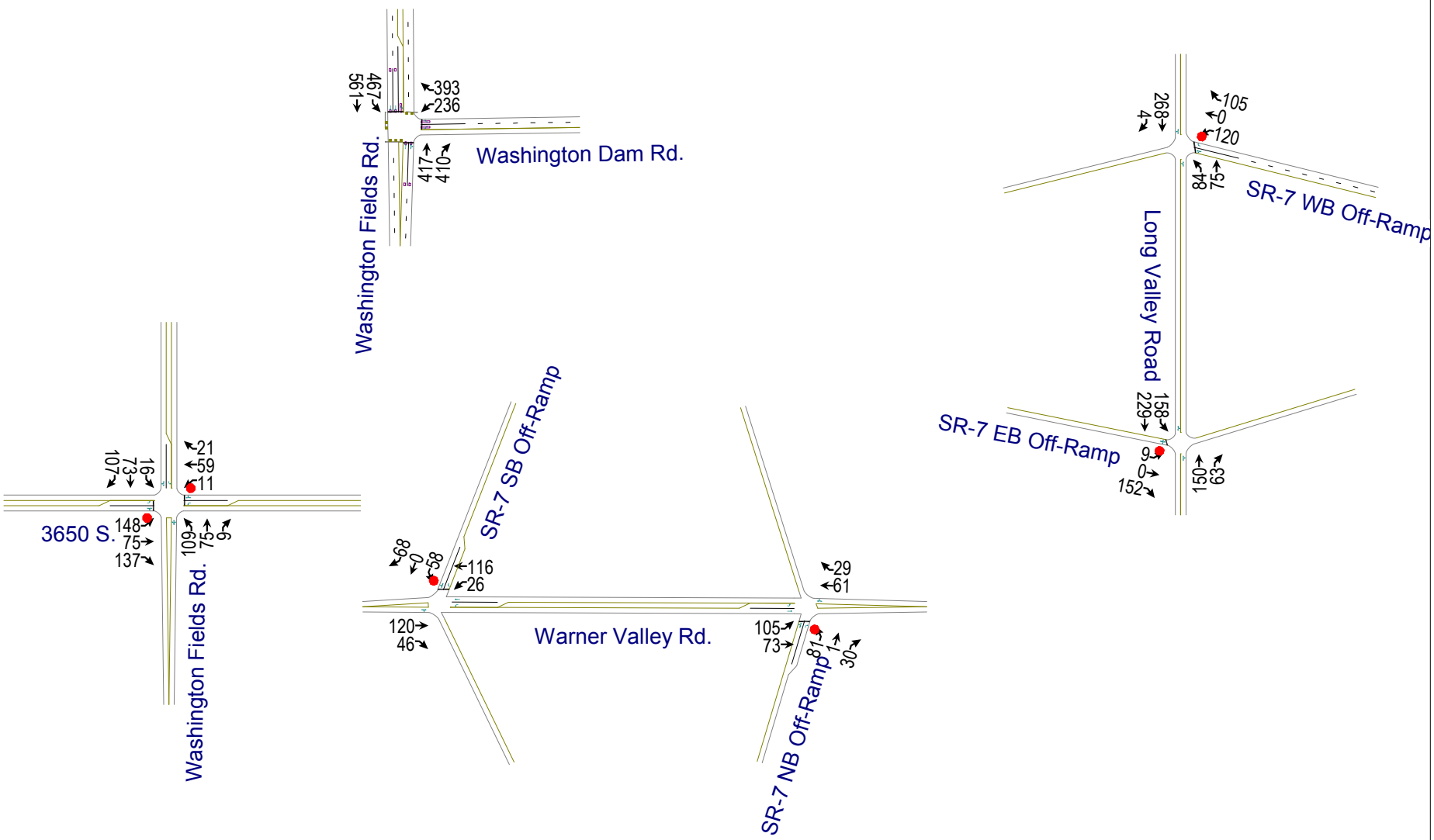


Figure 12
Background 2030 PM Peak Hour Traffic

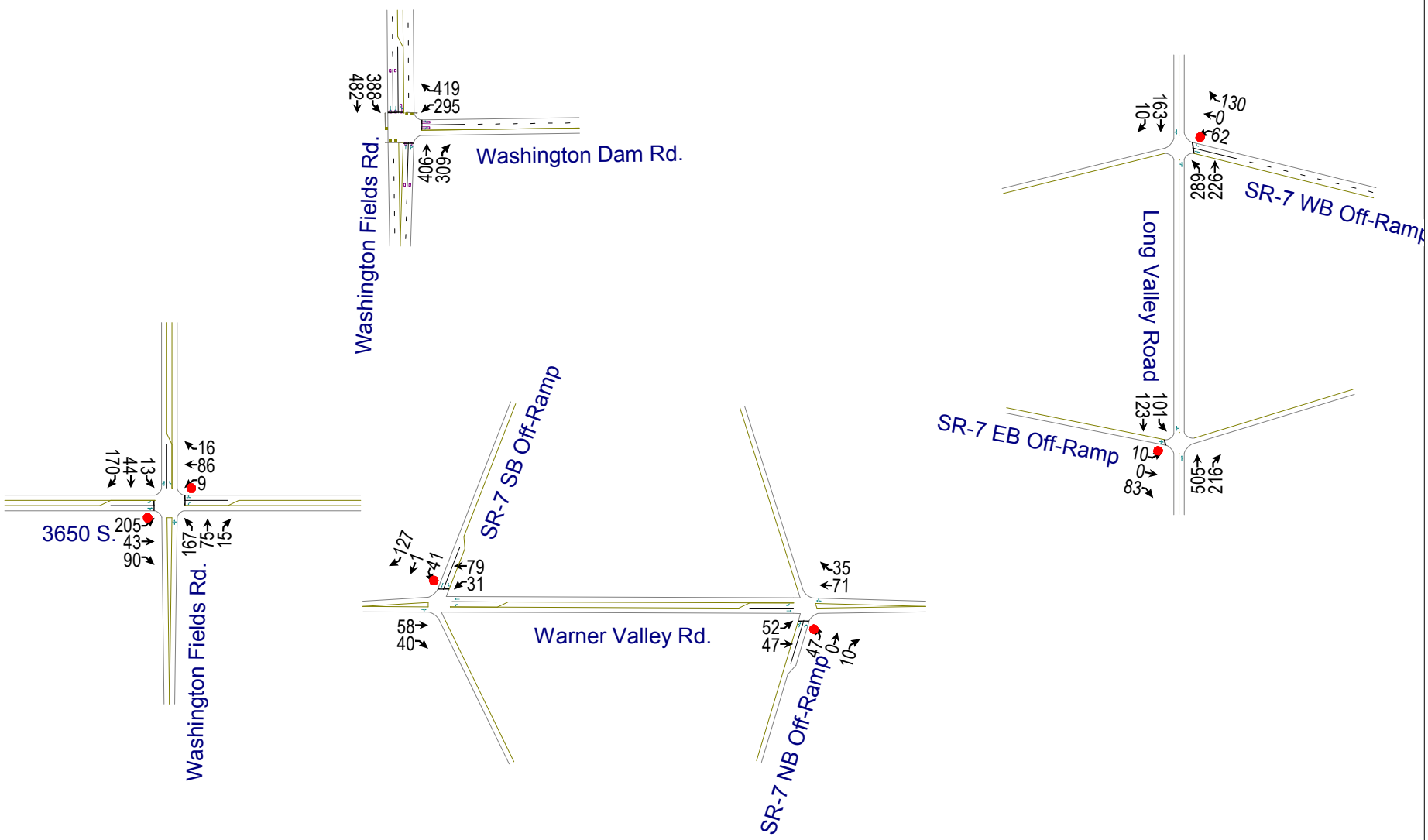


Figure 13
Total 2030 (Background 2030 Plus Phase 2 Project Traffic) AM Peak Hour Traffic

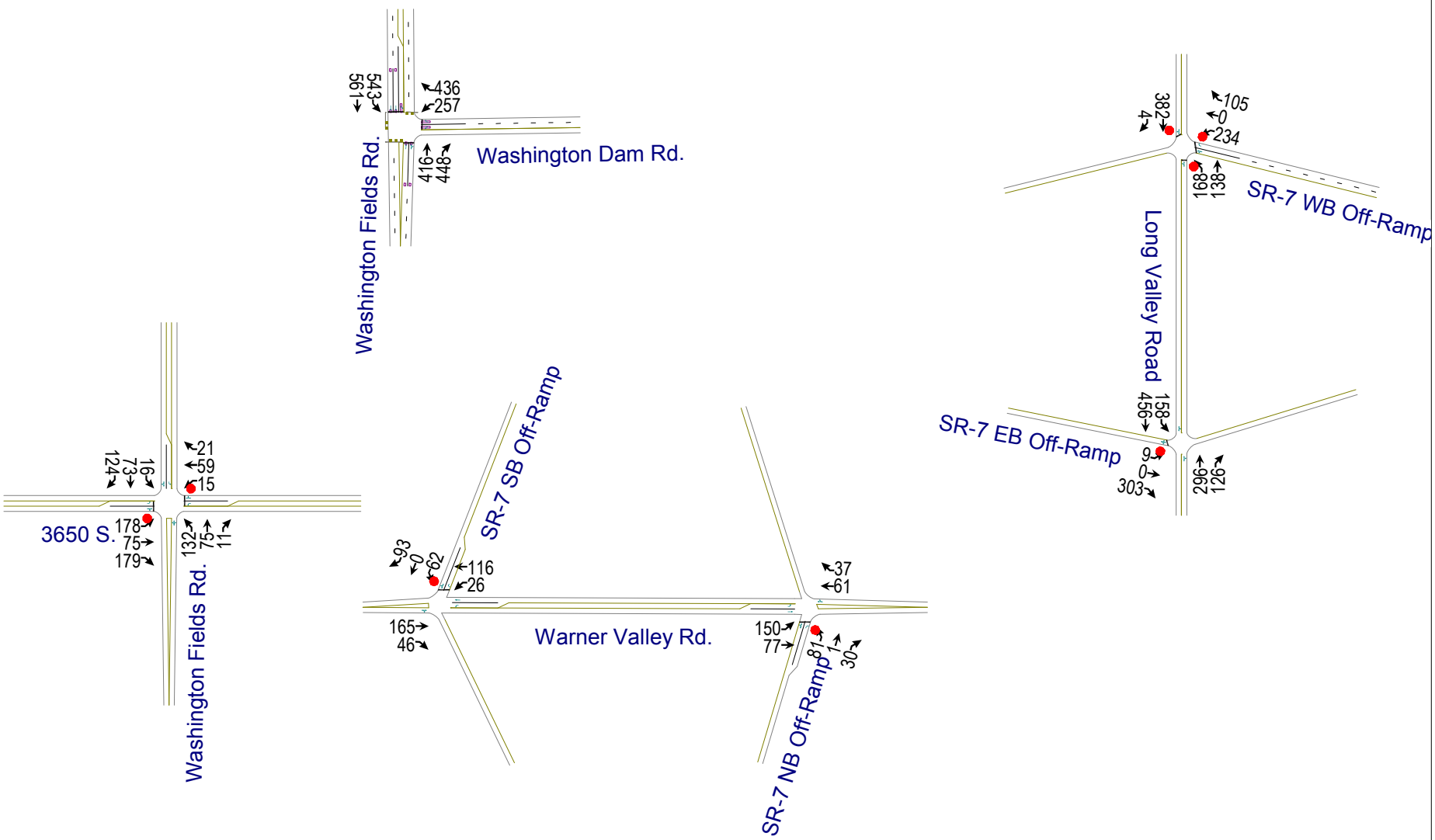


Figure 14
Total 2030 (Background 2010 Plus Phase 2 Project Traffic) PM Peak Hour Traffic

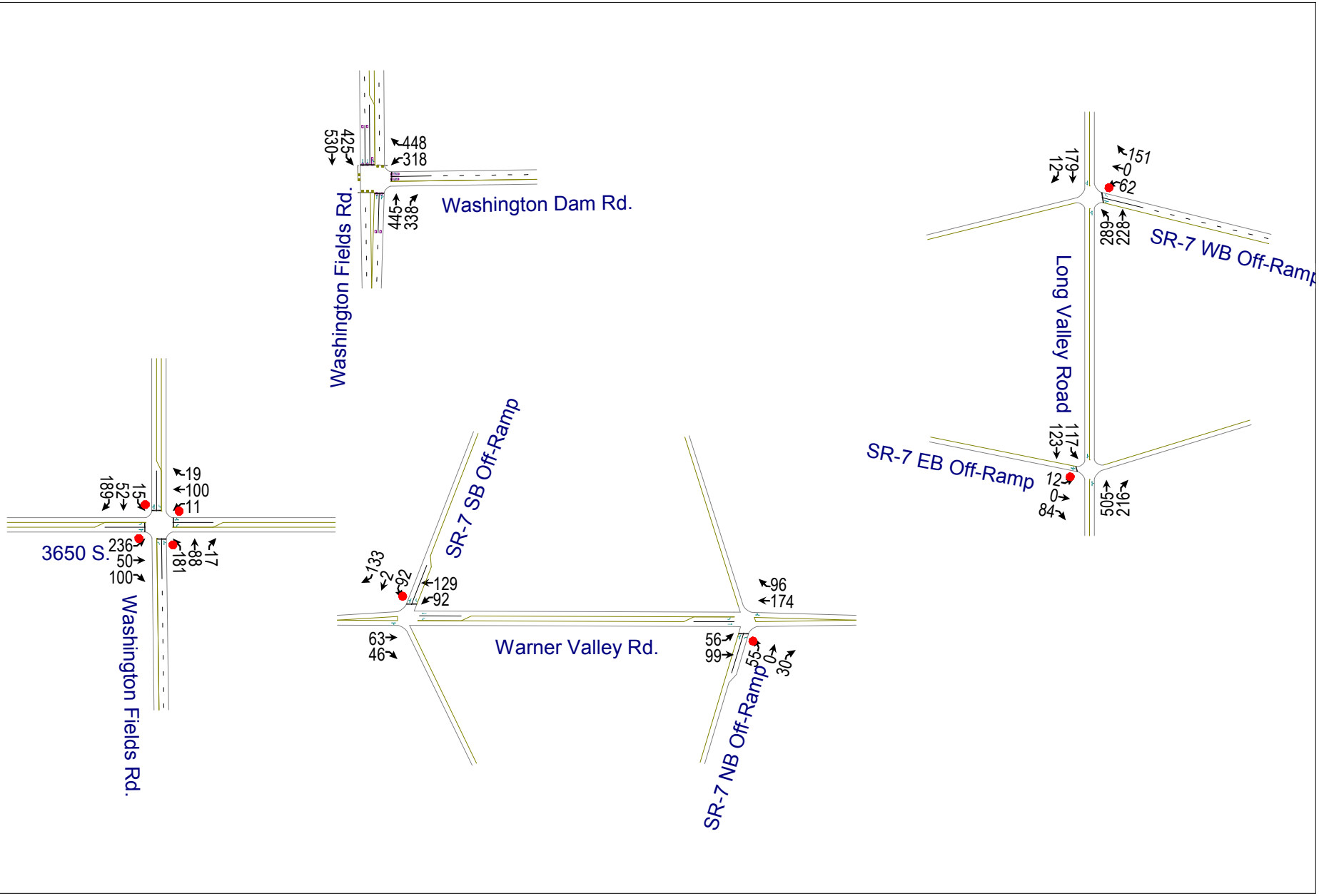


Figure 15
Background 2035 AM Peak Hour Traffic

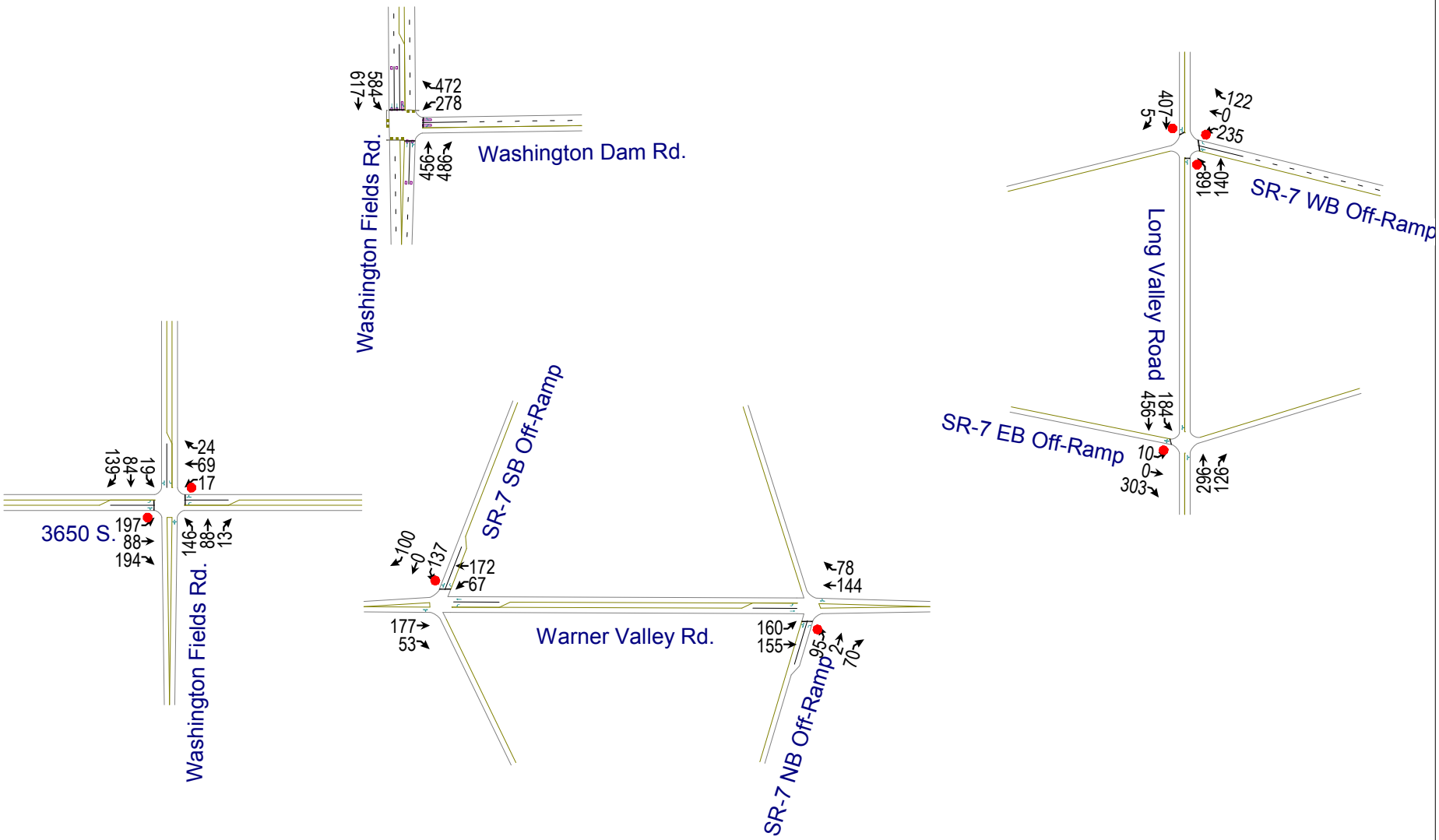


Figure 16
Background 2035 PM Peak Hour Traffic

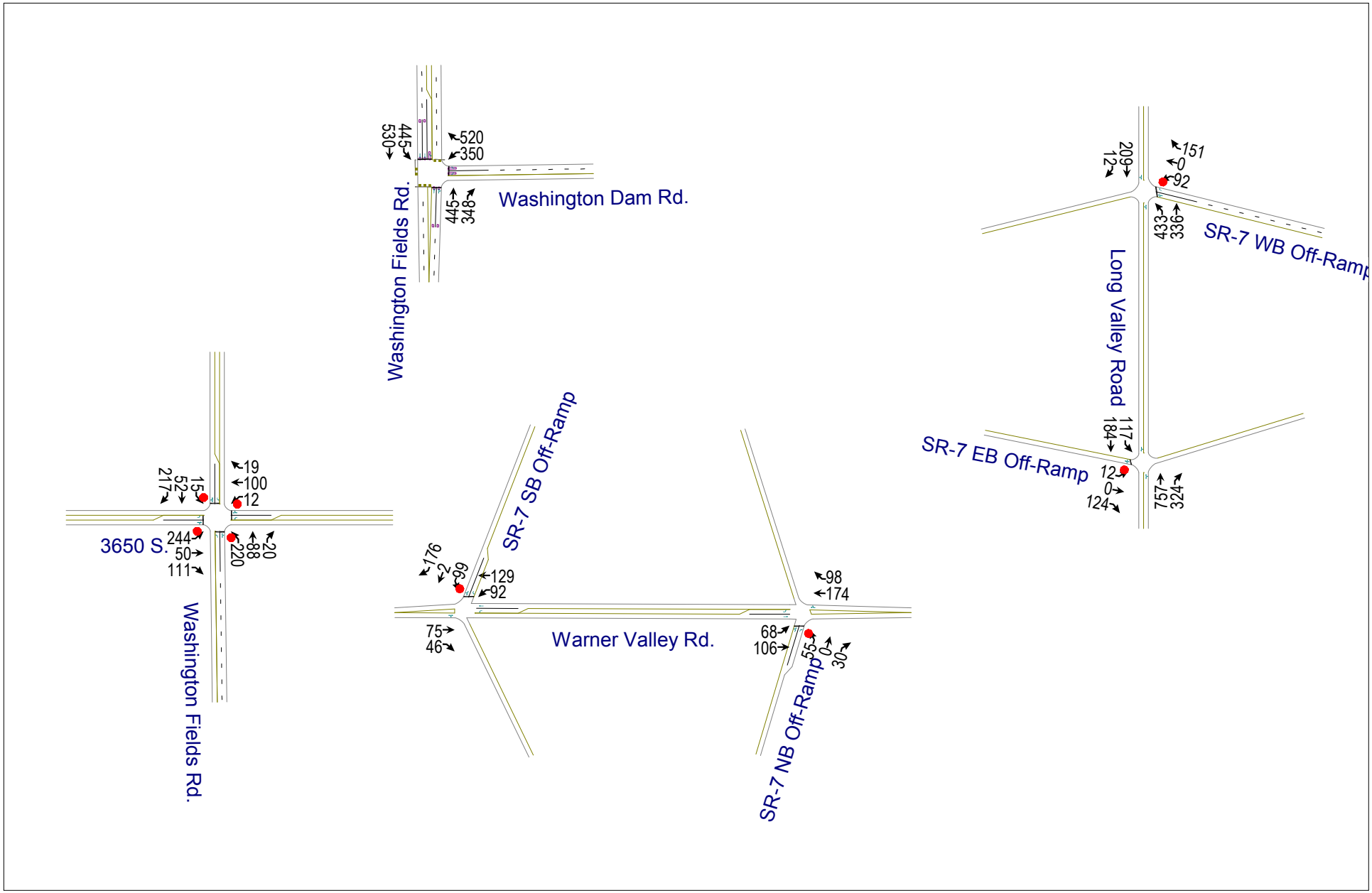


Figure 17
Total 2035 (Background 2035 Plus Phase 3 Project Traffic) AM Peak Hour Traffic

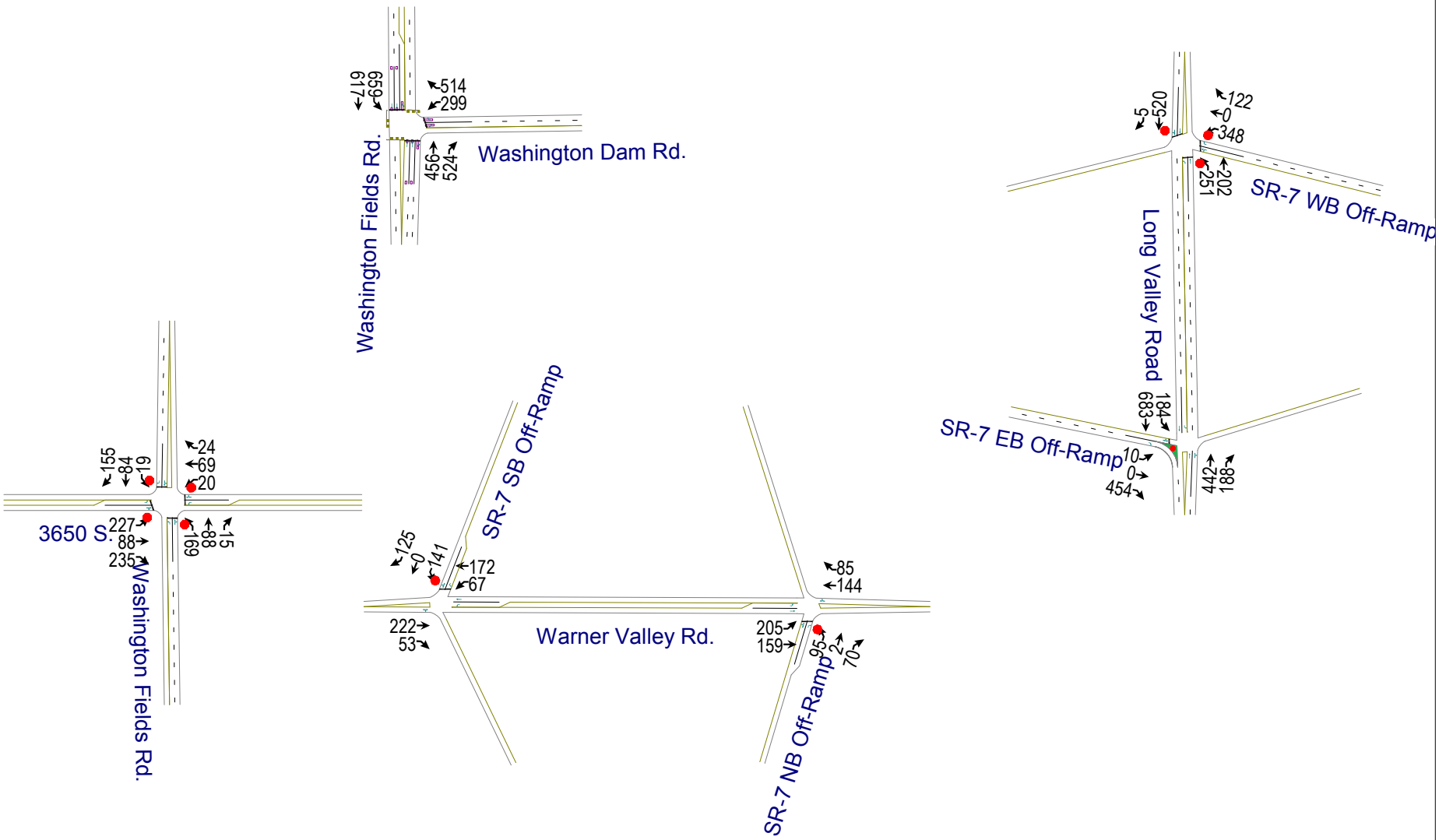


Figure 18
Total 2035 (Background 2035 Plus Phase 3 Project Traffic) PM Peak Hour Traffic

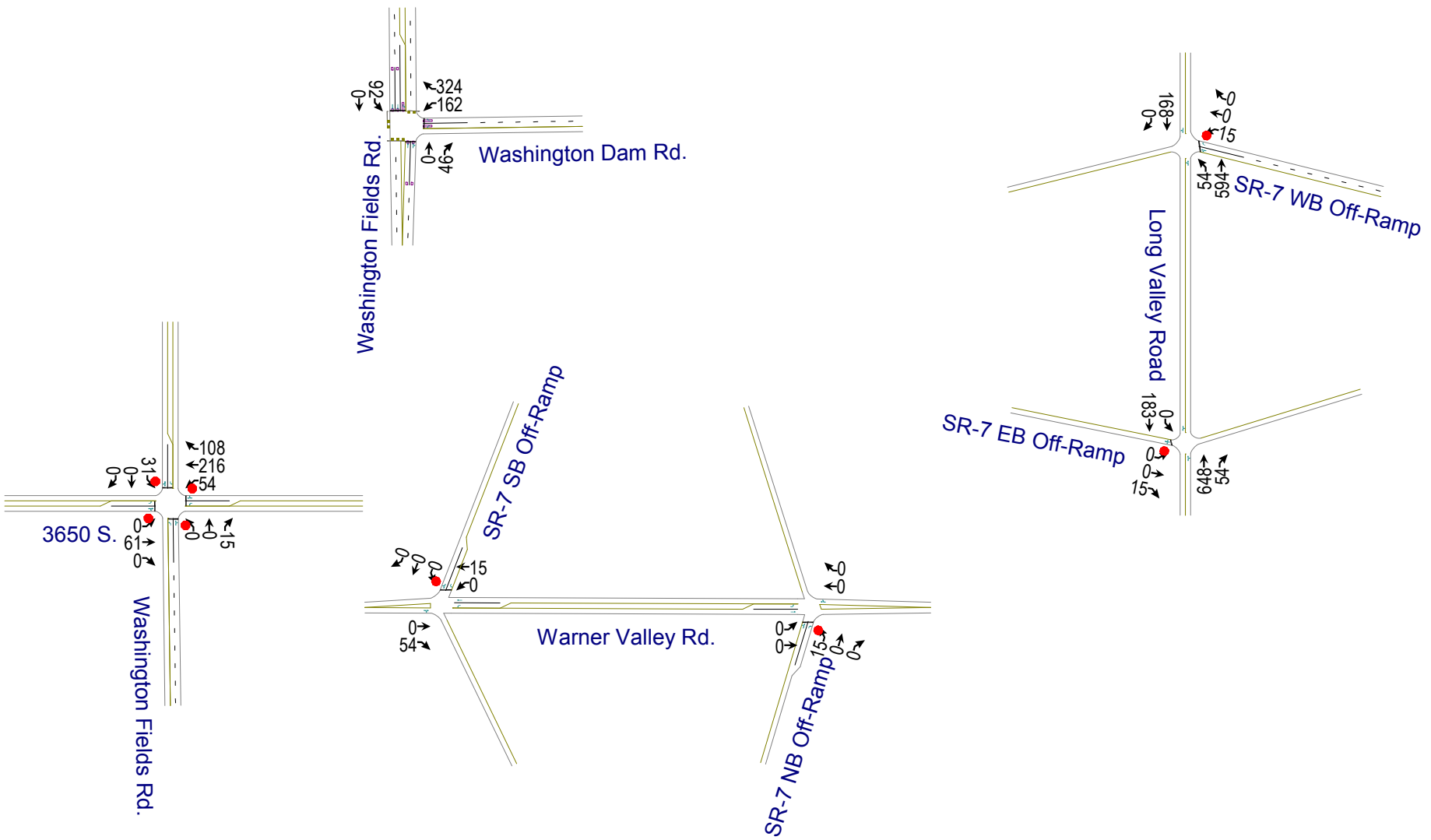


Figure 19
Total AM Peak Hour Project Traffic With Connection to 3650 South

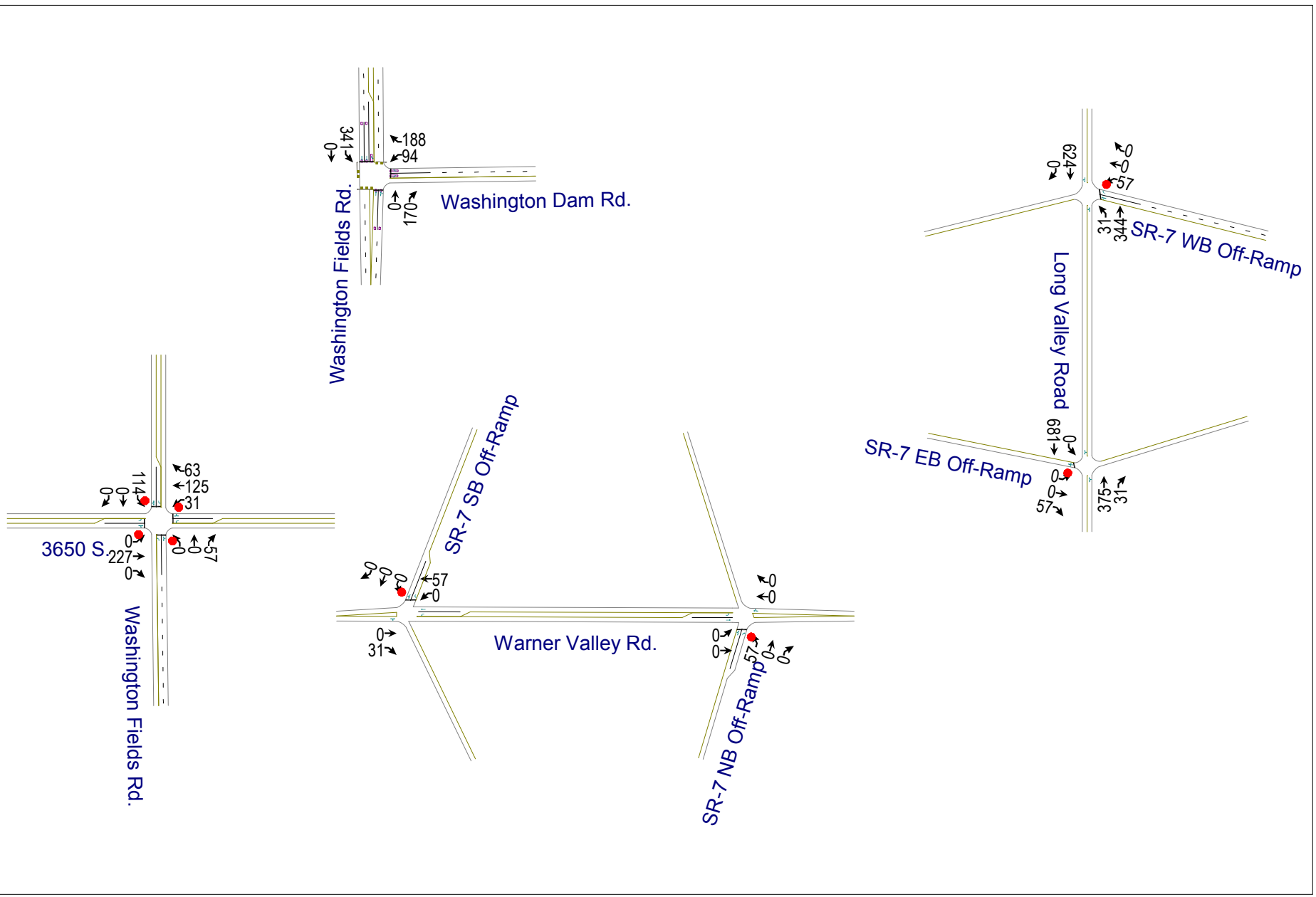


Figure 20
Total PM Peak Hour Project Traffic With Connection to 3650 South

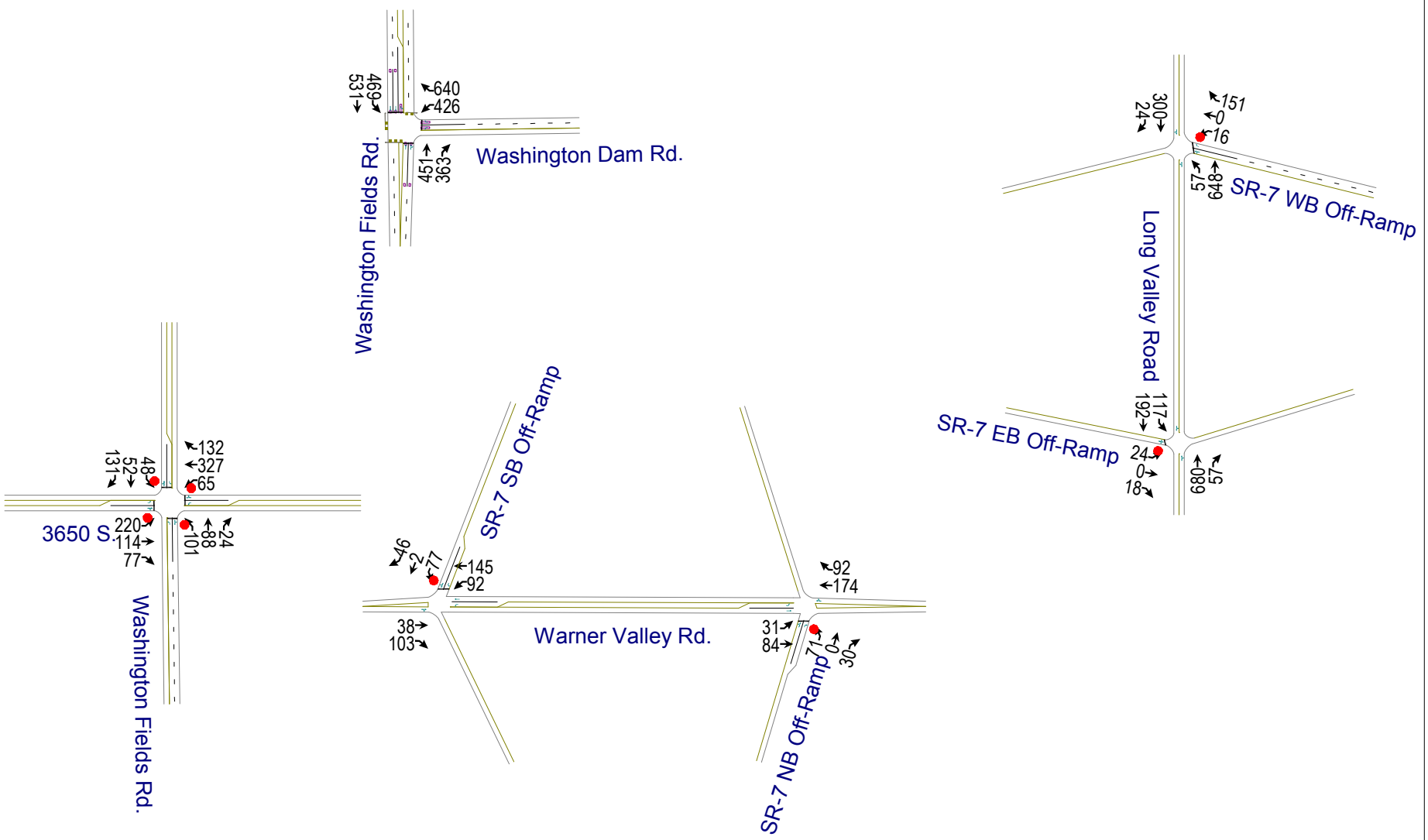


Figure 21
Total 2035 AM Peak Hour Traffic With Connection to 3650 South

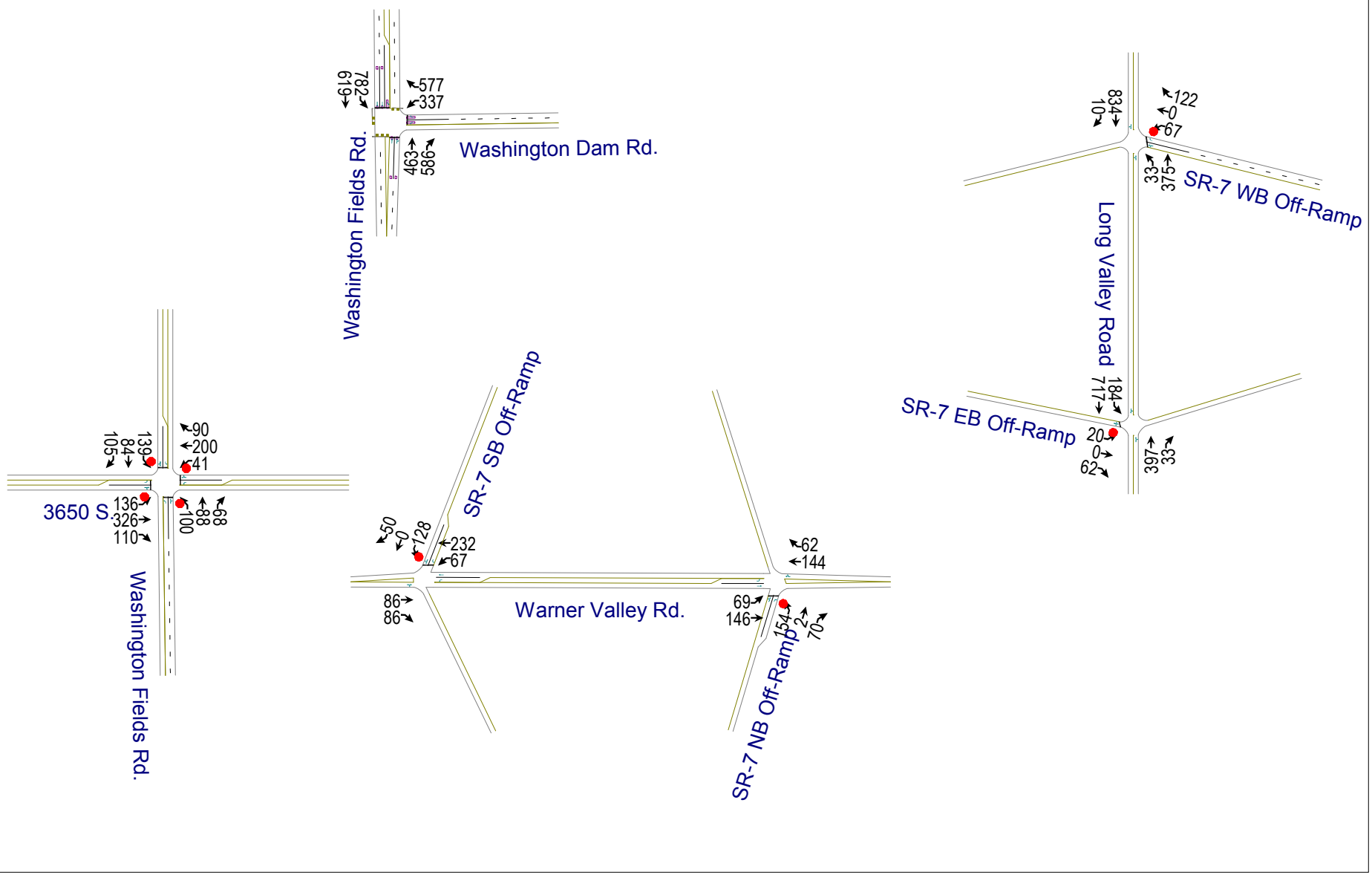
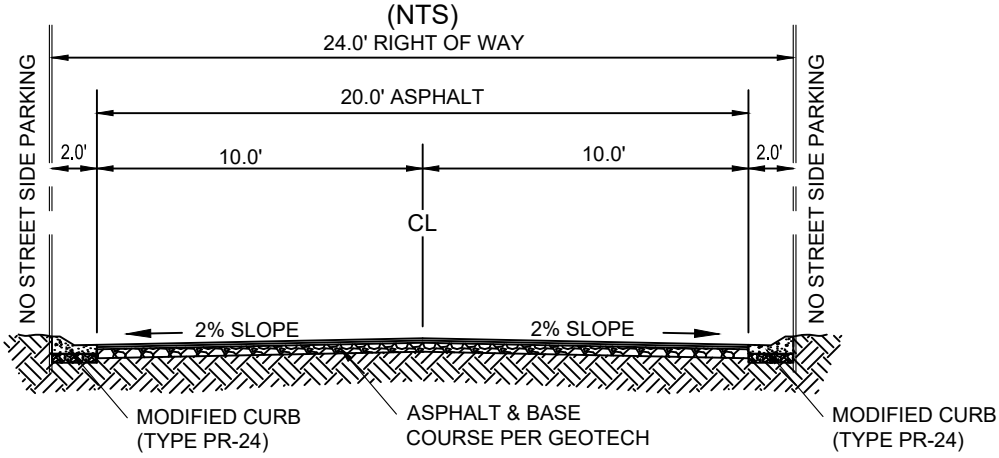


Figure 22
Total 2035 PM Peak Hour Traffic With Connection to 3650 South

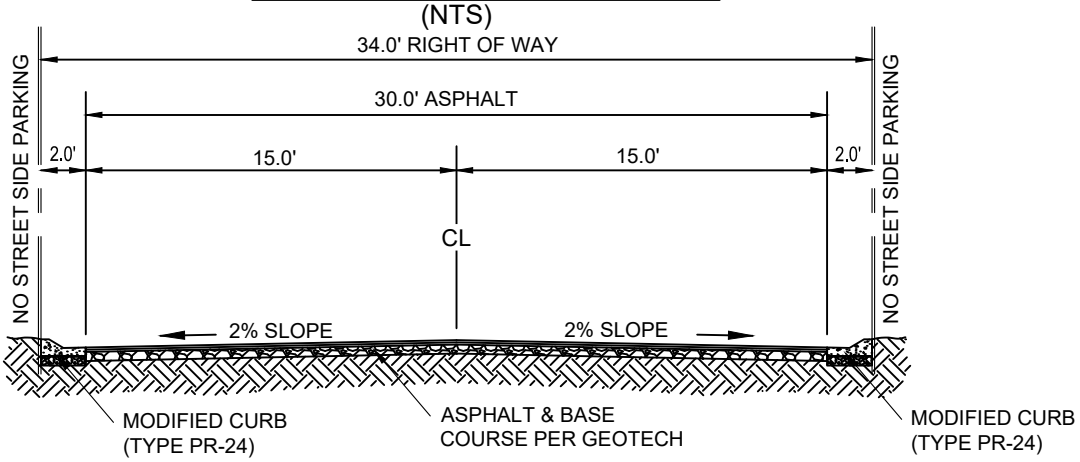
TYPICAL 24' PRIVATE LANE

(NTS)



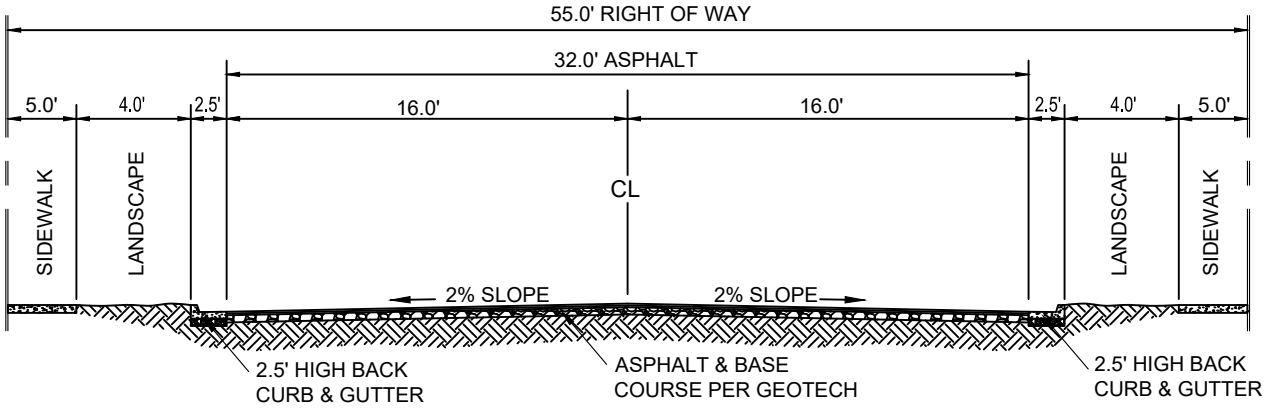
TYPICAL 34' PRIVATE STREET

(NTS)



RESIDENTIAL STANDARD
TYPICAL 55' STREET SECTION

(NTS)



STREET CROSS SECTIONS - EXHIBIT 1

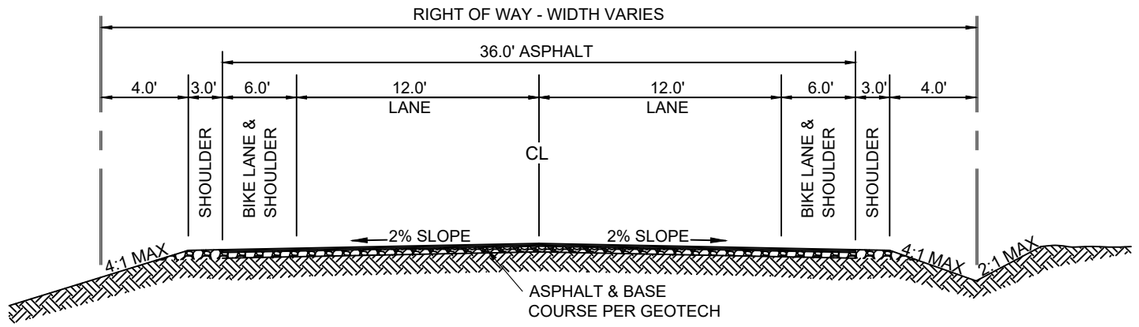
LONG VALLEY TRAILS
BRENNAN HOLDINGS, LLC

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

BG JOB# 161174 Road Cross Section

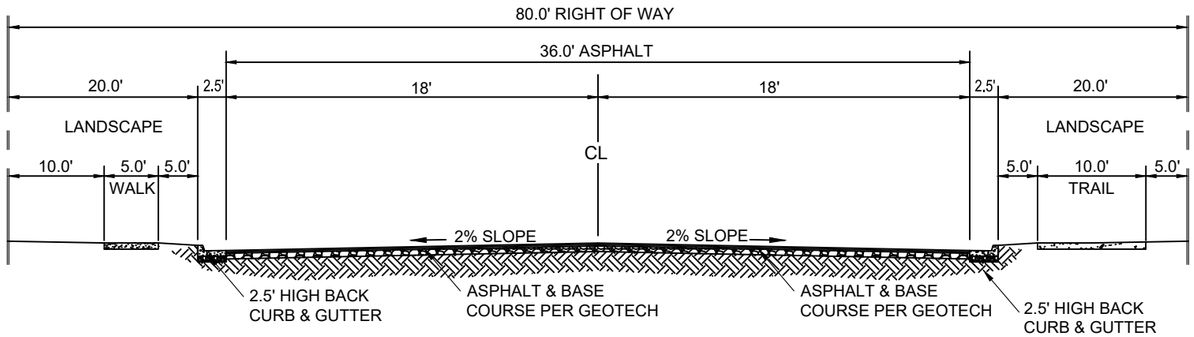
TYPICAL RURAL STREET SECTION

(NTS)



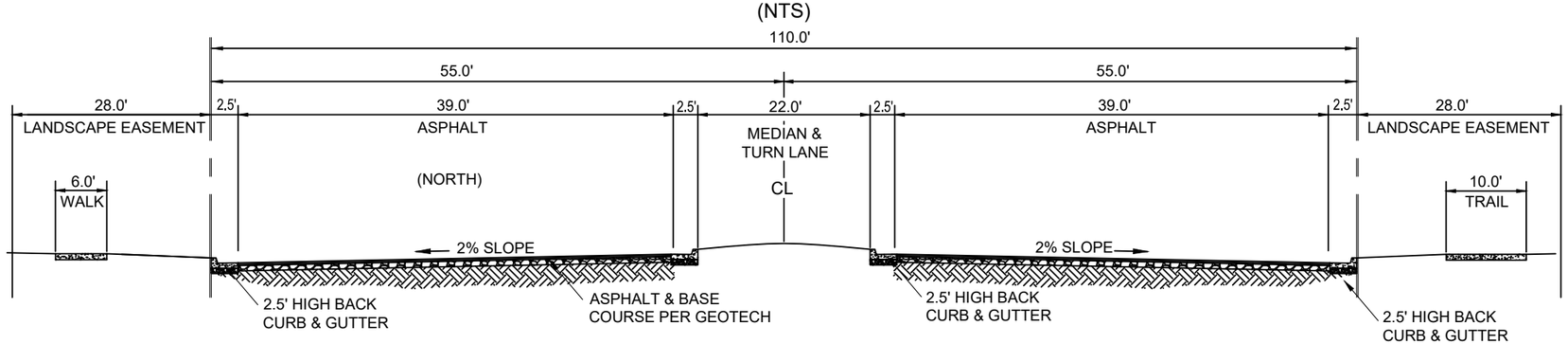
MINOR ARTERIAL
80' STREET SECTION

(NTS)



MAJOR ARTERIAL
110' STREET SECTION

(NTS)



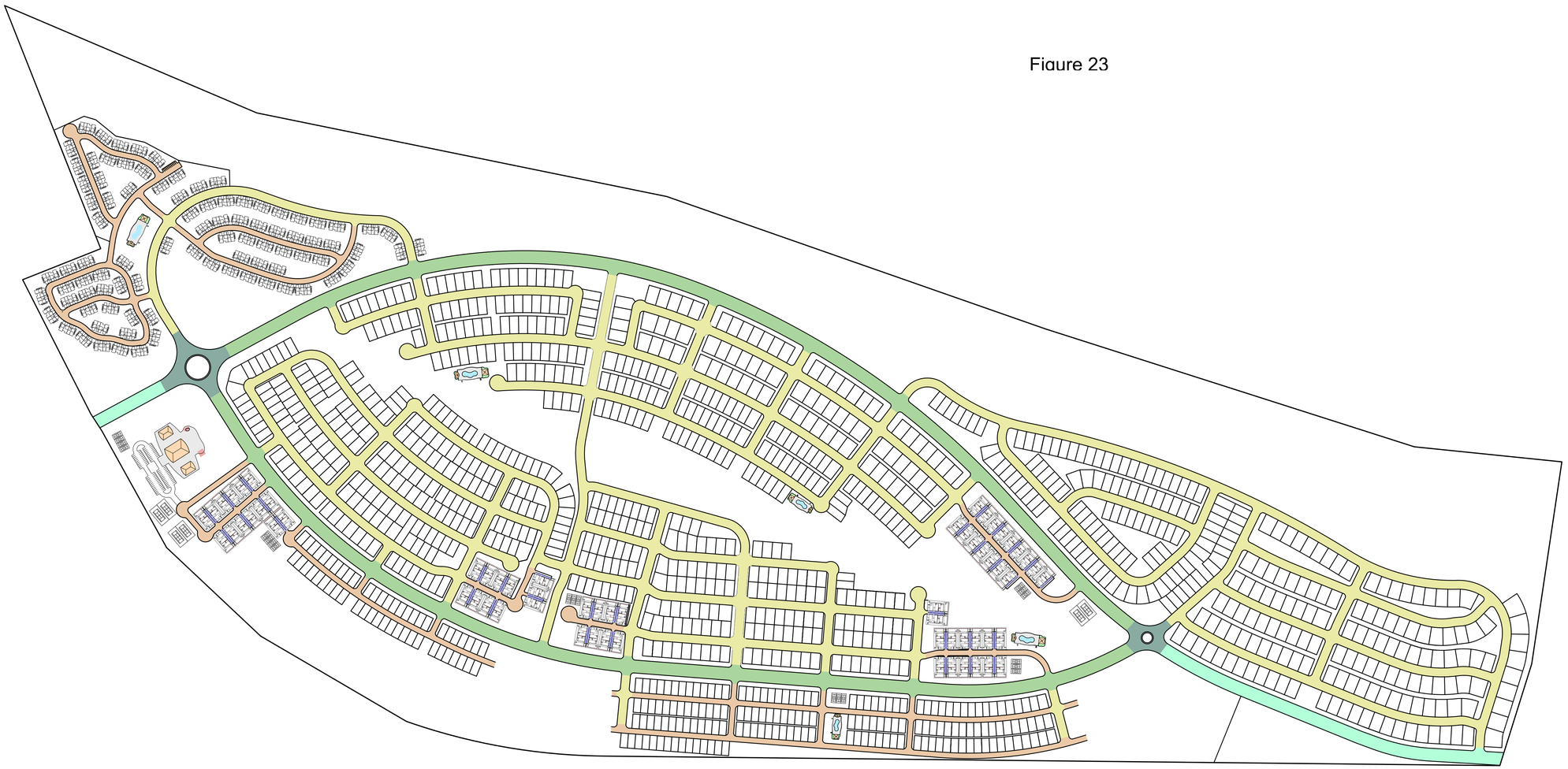
STREET CROSS SECTIONS - EXHIBIT 2

LONG VALLEY TRAILS
BRENNAN HOLDINGS, LLC

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

BG JOB# 161174 Rood Cross Section

Figure 23



STREET CLASSIFICATION

- 110 FOOT - RIGHT OF WAY
- 80 FOOT - RIGHT OF WAY
- 59 FOOT - RIGHT OF WAY
- 55 FOOT - RIGHT OF WAY
- 34 FOOT - RIGHT OF WAY
- 24 FOOT - RIGHT OF WAY
- 2 LANE ROUNDABOUT

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)

1 inch = 350 ft.

Figure 23

STREET CLASSIFICATION MAP

LONG VALLEY TRAILS

No	Date	By	Revision

HIGH POINT ENGINEERING & SURVEYING

ENGINEERING - PLANNING - SURVEYING

1360 WEST 2130 SOUTH

ST. GEORGE UT 84770

OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

DATE: SEP. 2020 DRAWN: MDR APPROVED: MDR SCALE: 1" = 350' JOB NO. 161174

STREET CLASSIFICATION MAP

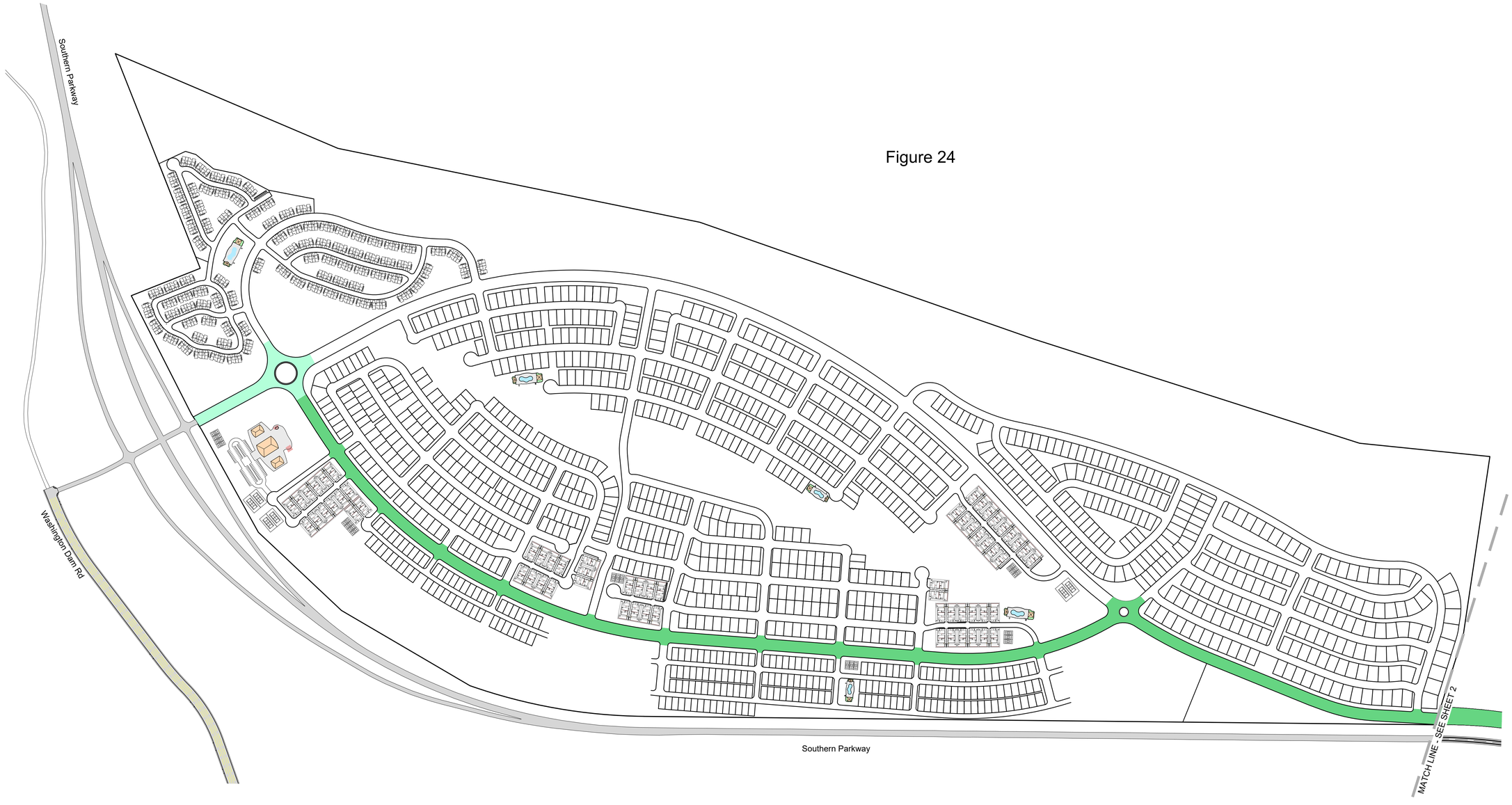
LONG VALLEY TRAILS

LOCATED IN WASHINGTON COUNTY, UT

SHEET 1 OF 1 SHEETS

FILE: 161174EC SLOPEMAP

Figure 24



LEGEND

PRIMARY ACCESS

SECONDARY EMERGENCY ACCESS

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)

1 inch = 350 ft.

Figure 24
PROJECT ACCESS PLAN - SHEET 1
LONG VALLEY TRAILS

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

No	Date	By	Revision

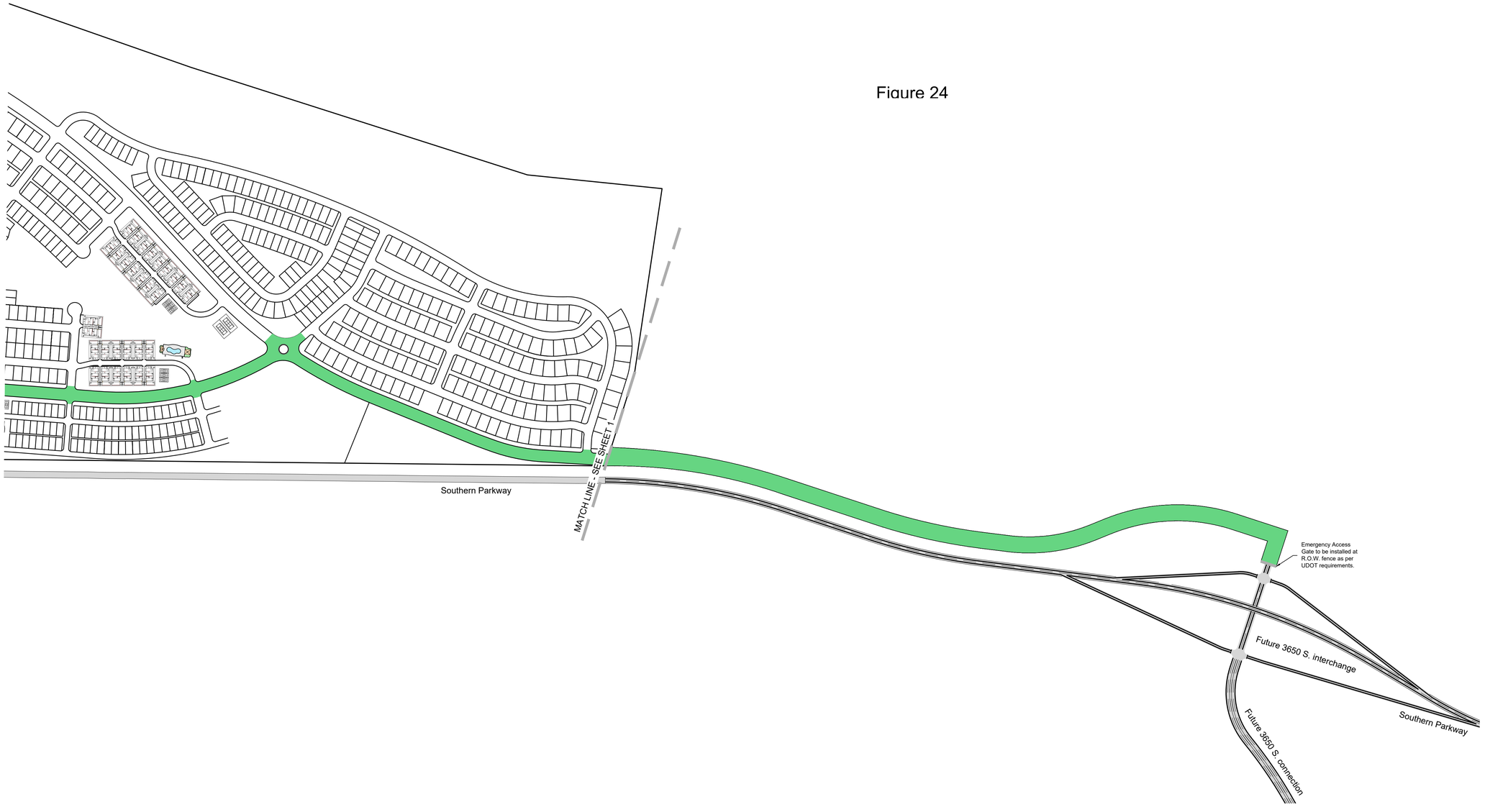
DATE: SEP. 2020
DRAWN: MDR
APPROVED: MDR
SCALE: 1" = 350'
JOB NO.: 161174

PROJECT ACCESS PLAN
LONG VALLEY TRAILS
LOCATED IN WASHINGTON COUNTY, UT
SHEET 1

SHEET 1 OF 2 SHEETS

FILE: 16174 - Access Plan

Figure 24



LEGEND

PRIMARY ACCESS

SECONDARY EMERGENCY ACCESS

GRAPHIC SCALE

350 0 175 350 700

(IN FEET)
1 inch = 350 ft.

Figure 24
PROJECT ACCESS PLAN - SHEET 2
LONG VALLEY TRAILS

HIGH POINT ENGINEERING & SURVEYING
ENGINEERING - PLANNING - SURVEYING
1360 WEST 2130 SOUTH
ST. GEORGE UT 84770
OFFICE:(435) 668-5293 - SURVEY SCHEDULE:(435) 256-2109

No	Date	By	Revision

DATE: SEP. 2020
DRAWN: MDR
APPROVED: MDR
SCALE: 1" = 350'
JOB NO. 161174

PROJECT ACCESS PLAN
LONG VALLEY TRAILS
LOCATED IN WASHINGTON COUNTY, UT
SHEET 2

SHEET 2 OF 2 SHEETS

FILE: 16174 - Access Plan

APPENDIX A

Existing 2017 and 2018 Peak Hour and Daily Traffic Counts

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 1

N-S STREET: Connection from Washington Dam Rd. Weather: Clear

E-W STREET: Exit 15 Southern Parkway (SR-7) EB off-ramp

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 76 PEAK HOUR FACTOR: 0.70

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM		0	0	1	0	0	5	0					6
7:15 AM	7:30 AM		0	0	0	0	0	10	0					10
7:30 AM	7:45 AM		0	0	1	0	0	13	0					14
7:45 AM	8:00 AM		0	0	1	0	0	10	0					11
8:00 AM	8:15 AM		0	0	2	0	0	9	0					11
8:15 AM	8:30 AM		0	0	0	0	0	11	0					11
8:30 AM	8:45 AM		0	0	0	0	1	10	0					11
8:45 AM	9:00 AM		0	0	2	0	0	18	0					20

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM		0	0	0	0	0	1	0					1
7:15 AM	7:30 AM		0	0	0	0	0	5	0					5
7:30 AM	7:45 AM		0	0	0	0	0	6	0					6
7:45 AM	8:00 AM		0	0	1	0	0	6	0					7
8:00 AM	8:15 AM		0	0	0	0	0	5	0					5
8:15 AM	8:30 AM		0	0	0	0	0	6	0					6
8:30 AM	8:45 AM		0	0	1	0	0	4	0					5
8:45 AM	9:00 AM		0	0	2	0	0	5	0					7

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM		0	0	1	0	0	6	0					7
7:15 AM	7:30 AM		0	0	0	0	0	15	0					15
7:30 AM	7:45 AM		0	0	1	0	0	19	0					20
7:45 AM	8:00 AM		0	0	2	0	0	16	0					18
8:00 AM	8:15 AM		0	0	2	0	0	14	0					16
8:15 AM	8:30 AM		0	0	0	0	0	17	0					17
8:30 AM	8:45 AM		0	0	1	0	1	14	0					16
8:45 AM	9:00 AM		0	0	4	0	0	23	0					27

TOTAL AM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	0	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
8:00 AM	9:00 AM		0	0	7	0	1	68	0					76

The peak 15 minute volume occurred from 8:45 AM to 9:00 AM when 27 total vehicles passed through the intersection.

30% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 1

N-S STREET: Connection from Washington Dam Rd. Weather: Clear

E-W STREET: Exit 15 Southern Parkway (SR-7) EB off-ramp

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 116 PEAK HOUR FACTOR: 0.74

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		0	0	0	0	0	25	0					25
4:15 PM	4:30 PM		0	0	1	0	0	24	0					25
4:30 PM	4:45 PM		1	0	5	0	0	15	0					21
4:45 PM	5:00 PM		0	0	1	0	0	22	0					23
5:00 PM	5:15 PM		1	0	1	0	0	25	1					28
5:15 PM	5:30 PM		1	0	4	0	0	33	0					38
5:30 PM	5:45 PM		0	0	0	0	0	23	0					23
5:45 PM	6:00 PM		0	0	0	0	0	16	0					16

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		0	0	0	0	0	2	0					2
4:15 PM	4:30 PM		0	0	0	0	0	2	0					2
4:30 PM	4:45 PM		0	0	1	0	0	1	0					2
4:45 PM	5:00 PM		0	0	0	0	0	0	0					0
5:00 PM	5:15 PM		0	0	0	0	0	1	0					1
5:15 PM	5:30 PM		0	0	0	0	0	1	0					1
5:30 PM	5:45 PM		0	0	0	0	0	2	0					2
5:45 PM	6:00 PM		0	0	0	0	0	1	0					1

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		0	0	0	0	0	27	0					27
4:15 PM	4:30 PM		0	0	1	0	0	26	0					27
4:30 PM	4:45 PM		1	0	6	0	0	16	0					23
4:45 PM	5:00 PM		0	0	1	0	0	22	0					23
5:00 PM	5:15 PM		1	0	1	0	0	26	1					29
5:15 PM	5:30 PM		1	0	4	0	0	34	0					39
5:30 PM	5:45 PM		0	0	0	0	0	25	0					25
5:45 PM	6:00 PM		0	0	0	0	0	17	0					17

TOTAL PM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:45 PM	5:45 PM		2	0	6	0	0	107	1					116

The peak 15 minute volume occurred from 5:15 PM to 5:30 PM when 39 total vehicles passed through the intersection.

3% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 2

N-S STREET: Connection from Washington Dam Rd. Weather: Clear

E-W STREET: Exit 15 Southern Parkway (SR-7) WB off-ramp

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 170 PEAK HOUR FACTOR: 0.97

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM	0	1						5	0	0	0	10	16
7:15 AM	7:30 AM	0	0						10	0	0	0	9	19
7:30 AM	7:45 AM	0	1						13	1	0	0	23	38
7:45 AM	8:00 AM	0	2						10	0	0	0	21	33
8:00 AM	8:15 AM	0	2						11	2	0	0	21	36
8:15 AM	8:30 AM	0	1						11	2	0	0	18	32
8:30 AM	8:45 AM	0	0						10	1	0	0	20	31
8:45 AM	9:00 AM	0	2						18	0	0	0	18	38

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM	0	0						1	1	1	0	1	4
7:15 AM	7:30 AM	0	0						5	1	0	0	0	6
7:30 AM	7:45 AM	0	0						6	0	0	0	0	6
7:45 AM	8:00 AM	0	1						6	0	0	0	3	10
8:00 AM	8:15 AM	0	0						5	2	0	0	1	8
8:15 AM	8:30 AM	0	0						6	0	0	0	1	7
8:30 AM	8:45 AM	0	1						4	1	0	0	0	6
8:45 AM	9:00 AM	0	2						5	0	0	0	0	7

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM	0	1						6	1	1	0	11	20
7:15 AM	7:30 AM	0	0						15	1	0	0	9	25
7:30 AM	7:45 AM	0	1						19	1	0	0	23	44
7:45 AM	8:00 AM	0	3						16	0	0	0	24	43
8:00 AM	8:15 AM	0	2						16	4	0	0	22	44
8:15 AM	8:30 AM	0	1						17	2	0	0	19	39
8:30 AM	8:45 AM	0	1						14	2	0	0	20	37
8:45 AM	9:00 AM	0	4						23	0	0	0	18	45

TOTAL AM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	0	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:30 AM	8:30 AM	0	7						68	7	0	0	88	170

The peak 15 minute volume occurred from 8:45 AM to 9:00 AM when 45 total vehicles passed through the intersection.

19% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 2

N-S STREET: Connection from Washington Dam Rd. Weather: Clear

E-W STREET: Exit 15 Southern Parkway (SR-7) WB off-ramp

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 190 PEAK HOUR FACTOR: 0.91

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	0	0						25	0	0	0	4	29
4:15 PM	4:30 PM	0	1						24	3	0	0	12	40
4:30 PM	4:45 PM	0	6						15	2	0	0	17	40
4:45 PM	5:00 PM	0	1						22	2	0	0	9	34
5:00 PM	5:15 PM	0	1						25	2	2	0	17	47
5:15 PM	5:30 PM	0	4						33	1	0	0	13	51
5:30 PM	5:45 PM	0	2						25	0	0	0	19	46
5:45 PM	6:00 PM	0	1						16	0	0	0	22	39

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	0	0						2	0	0	0	0	2
4:15 PM	4:30 PM	0	0						2	0	1	0	3	6
4:30 PM	4:45 PM	0	1						1	0	0	0	3	5
4:45 PM	5:00 PM	0	0						0	0	0	0	0	0
5:00 PM	5:15 PM	0	0						1	0	2	0	0	3
5:15 PM	5:30 PM	0	0						1	0	0	0	0	1
5:30 PM	5:45 PM	0	0						2	0	0	0	0	2
5:45 PM	6:00 PM	0	0						1	0	0	0	0	1

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	0	0						27	0	0	0	4	31
4:15 PM	4:30 PM	0	1						26	3	1	0	15	46
4:30 PM	4:45 PM	0	7						16	2	0	0	20	45
4:45 PM	5:00 PM	0	1						22	2	0	0	9	34
5:00 PM	5:15 PM	0	1						26	2	4	0	17	50
5:15 PM	5:30 PM	0	4						34	1	0	0	13	52
5:30 PM	5:45 PM	0	2						27	0	0	0	19	48
5:45 PM	6:00 PM	0	1						17	0	0	0	22	40

TOTAL PM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
5:00 PM	6:00 PM	0	8						104	3	4	0	71	190

The peak 15 minute volume occurred from 5:15 AM to 5:30 PM when 52 total vehicles passed through the intersection.

4% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 25, 2017 Study Intersection 3

N-S STREET: Washington Fields Road Weather: Clear

E-W STREET: Washington Dam Road

DAY OF WEEK: Monday PEAK HOUR VOLUME: 1138 PEAK HOUR FACTOR: 0.88

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM		42	21				39	35		13		27	177
7:15 AM	7:30 AM		25	11				30	35		24		29	154
7:30 AM	7:45 AM		51	13				26	41		18		39	188
7:45 AM	8:00 AM		85	17				45	56		24		45	272
8:00 AM	8:15 AM		72	14				44	61		14		29	234
8:15 AM	8:30 AM		68	14				45	53		11		27	218
8:30 AM	8:45 AM		50	22				56	70		14		52	264
8:45 AM	9:00 AM		69	15				62	63		20		65	294

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM		0	3				4	1		3		8	19
7:15 AM	7:30 AM		4	1				5	2		0		9	21
7:30 AM	7:45 AM		0	2				11	7		2		8	30
7:45 AM	8:00 AM		4	0				5	4		8		16	37
8:00 AM	8:15 AM		3	0				7	4		3		14	31
8:15 AM	8:30 AM		5	2				6	8		2		7	30
8:30 AM	8:45 AM		1	7				13	4		1		12	38
8:45 AM	9:00 AM		1	2				4	7		2		13	29

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM		42	24				43	36		16		35	196
7:15 AM	7:30 AM		29	12				35	37		24		38	175
7:30 AM	7:45 AM		51	15				37	48		20		47	218
7:45 AM	8:00 AM		89	17				50	60		32		61	309
8:00 AM	8:15 AM		75	14				51	65		17		43	265
8:15 AM	8:30 AM		73	16				51	61		13		34	248
8:30 AM	8:45 AM		51	29				69	74		15		64	302
8:45 AM	9:00 AM		70	17				66	70		22		78	323

TOTAL AM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
8:00 AM	9:00 AM		269	76				237	270		67		219	1138

The peak 15 minute volume occurred from 8:45 AM to 9:00 AM when 323 total vehicles passed through the intersection.

11% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 25, 2017 Study Intersection 3

N-S STREET: Washington Fields Road Weather: Clear

E-W STREET: Washington Dam Road

DAY OF WEEK: Monday PEAK HOUR VOLUME: 1320 PEAK HOUR FACTOR: 0.96

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		53	19				58	73		37		50	290
4:15 PM	4:30 PM		60	23				35	67		14		55	254
4:30 PM	4:45 PM		77	26				52	72		25		52	304
4:45 PM	5:00 PM		64	13				61	79		28		36	281
5:00 PM	5:15 PM		61	28				43	112		12		57	313
5:15 PM	5:30 PM		83	28				47	103		17		41	319
5:30 PM	5:45 PM		75	15				62	97		18		46	313
5:45 PM	6:00 PM		67	23				50	80		27		30	277

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		1	1				3	2		1		11	19
4:15 PM	4:30 PM		1	4				6	4		3		11	29
4:30 PM	4:45 PM		2	3				12	10		0		2	29
4:45 PM	5:00 PM		1	1				8	5		0		7	22
5:00 PM	5:15 PM		2	2				4	4		2		7	21
5:15 PM	5:30 PM		2	3				6	7		2		5	25
5:30 PM	5:45 PM		1	5				7	7		0		6	26
5:45 PM	6:00 PM		0	3				12	4		0		3	22

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		54	20				61	75		38		61	309
4:15 PM	4:30 PM		61	27				41	71		17		66	283
4:30 PM	4:45 PM		79	29				64	82		25		54	333
4:45 PM	5:00 PM		65	14				69	84		28		43	303
5:00 PM	5:15 PM		63	30				47	116		14		64	334
5:15 PM	5:30 PM		85	31				53	110		19		46	344
5:30 PM	5:45 PM		76	20				69	104		18		52	339
5:45 PM	6:00 PM		67	26				62	84		27		33	299

TOTAL PM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:45 PM	5:45 PM		289	95				238	414		79		205	1320

The peak 15 minute volume occurred from 5:15 PM to 5:30 PM when 344 total vehicles passed through the intersection.

7% of the total traffic during the PM peak hour were trucks

CITY: Washington, Utah COUNT DATE: Oct. 29, 2018 Study Intersection 3

N-S STREET: Washington Fields Road Weather: Clear

E-W STREET: Washinton Dam Road

DAY OF WEEK: Monday AM PEAK HOUR VOLUME: 1367 AM PEAK HOUR FACTOR: 0.87

Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM			28				35	14				26	103
7:15 AM	7:30 AM		43	29				40	53		35		40	240
7:30 AM	7:45 AM		54	32				49	59		44		52	290
7:45 AM	8:00 AM		79	45				78	94		43		56	395
8:00 AM	8:15 AM		83	50				52	83		39		34	341
8:15 AM	8:30 AM		62	58				56	74		29		56	335
8:30 AM	8:45 AM		36	42				66	68		39		45	296
8:45 AM	9:00 AM		80	31				71	59		40		50	331

TOTAL AM PEAK HOUR TRAFFIC

Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:45 AM	8:45 AM		260	195				252	319		150		191	1367

The peak 15 minute volume occurred from 7:45 AM to 8:00 AM when 395 total vehicles passed through the intersection.

CITY: Washington, Utah COUNT DATE: Oct. 29, 2018

N-S STREET: Washington Fields Road Weather: Clear

E-W STREET: Washinton Dam Road

DAY OF WEEK: Monday PEAK HOUR VOLUME: 1555 PEAK HOUR FACTOR: 0.88

Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM		57	36				77	73		34		65	342
4:15 PM	4:30 PM		66	61				68	73		26		41	335
4:30 PM	4:45 PM		58	70				69	83		28		43	351
4:45 PM	5:00 PM		60	63				70	90		18		30	331
5:00 PM	5:15 PM		58	56				73	78		41		70	376
5:15 PM	5:30 PM		95	92				81	97		34		45	444
5:30 PM	5:45 PM		47	39				64	93		25		70	338
5:45 PM	6:00 PM		65	66				57	103		39		67	397

Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
5:00 PM	6:00 PM		265	253				275	371		139		252	1555

The peak 15 minute volume occurred from 5:15 PM to 5:30 PM when 444 total vehicles passed through the intersection.

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 4

N-S STREET: Washington Fields Road Weather: Clear

E-W STREET: 3650 South

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 496 PEAK HOUR FACTOR: 0.73

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM	10	5	2	7	9	13	0	7	6	0	5	2	66
7:15 AM	7:30 AM	18	5	0	7	3	15	1	3	10	0	8	3	73
7:30 AM	7:45 AM	13	10	0	12	6	9	0	4	9	0	17	0	80
7:45 AM	8:00 AM	16	12	0	28	4	10	1	3	12	0	21	6	113
8:00 AM	8:15 AM	16	7	0	20	8	9	0	6	13	0	15	0	94
8:15 AM	8:30 AM	13	5	0	16	6	12	3	6	17	0	9	5	92
8:30 AM	8:45 AM	10	12	0	29	4	7	4	1	18	0	12	2	99
8:45 AM	9:00 AM	16	22	0	46	10	7	1	13	22	0	19	2	158

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM	0	1	0	3	0	3	0	1	1	0	0	0	9
7:15 AM	7:30 AM	0	1	0	0	0	1	0	1	4	0	0	0	7
7:30 AM	7:45 AM	1	2	0	2	0	0	0	1	0	0	0	0	6
7:45 AM	8:00 AM	0	1	0	1	1	3	1	4	0	0	0	0	11
8:00 AM	8:15 AM	1	2	0	3	1	3	0	1	2	0	3	1	17
8:15 AM	8:30 AM	0	0	0	3	0	1	0	0	2	0	0	0	6
8:30 AM	8:45 AM	1	2	0	6	0	5	1	1	1	0	0	0	17
8:45 AM	9:00 AM	2	1	0	5	0	1	0	2	1	0	0	1	13

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM	10	6	2	10	9	16	0	8	7	0	5	2	75
7:15 AM	7:30 AM	18	6	0	7	3	16	1	4	14	0	8	3	80
7:30 AM	7:45 AM	14	12	0	14	6	9	0	5	9	0	17	0	86
7:45 AM	8:00 AM	16	13	0	29	5	13	2	7	12	0	21	6	124
8:00 AM	8:15 AM	17	9	0	23	9	12	0	7	15	0	18	1	111
8:15 AM	8:30 AM	13	5	0	19	6	13	3	6	19	0	9	5	98
8:30 AM	8:45 AM	11	14	0	35	4	12	5	2	19	0	12	2	116
8:45 AM	9:00 AM	18	23	0	51	10	8	1	15	23	0	19	3	171

TOTAL AM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
8:00 AM	9:00 AM	59	51	0	128	29	45	9	30	76	0	58	11	496

The peak 15 minute volume occurred from 8:45 AM to 9:00 AM when 171 total vehicles passed through the intersection.

11% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 4

N-S STREET: Washington Fields Road Weather: Clear

E-W STREET: 3650 South

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 479 PEAK HOUR FACTOR: 0.84

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	18	13	0	21	11	16	3	13	11	0	5	4	115
4:15 PM	4:30 PM	10	14	0	20	10	10	3	12	12	0	4	4	99
4:30 PM	4:45 PM	15	13	0	20	18	22	4	12	18	1	14	1	138
4:45 PM	5:00 PM	14	9	0	11	10	15	1	7	18	0	13	4	102
5:00 PM	5:15 PM	15	14	0	14	15	18	4	11	7	0	8	4	110
5:15 PM	5:30 PM	8	13	0	18	12	23	11	13	2	0	6	2	108
5:30 PM	5:45 PM	16	12	1	13	7	16	18	7	2	0	13	3	108
5:45 PM	6:00 PM	18	11	0	16	20	23	14	9	2	0	4	0	117

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	0	1	0	2	1	0	0	3	1	0	3	0	11
4:15 PM	4:30 PM	0	0	0	3	1	1	0	0	1	0	0	1	7
4:30 PM	4:45 PM	0	1	0	0	0	0	0	2	0	0	1	0	4
4:45 PM	5:00 PM	1	0	0	2	0	0	0	0	0	0	0	0	3
5:00 PM	5:15 PM	0	1	0	2	1	1	0	0	0	0	0	0	5
5:15 PM	5:30 PM	1	0	0	1	0	0	0	1	1	0	0	0	4
5:30 PM	5:45 PM	2	1	0	0	0	1	0	0	0	0	0	0	4
5:45 PM	6:00 PM	2	0	0	2	0	1	0	0	2	0	0	0	7

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	18	14	0	23	12	16	3	16	12	0	8	4	126
4:15 PM	4:30 PM	10	14	0	23	11	11	3	12	13	0	4	5	106
4:30 PM	4:45 PM	15	14	0	20	18	22	4	14	18	1	15	1	142
4:45 PM	5:00 PM	15	9	0	13	10	15	1	7	18	0	13	4	105
5:00 PM	5:15 PM	15	15	0	16	16	19	4	11	7	0	8	4	115
5:15 PM	5:30 PM	9	13	0	19	12	23	11	14	3	0	6	2	112
5:30 PM	5:45 PM	18	13	1	13	7	17	18	7	2	0	13	3	112
5:45 PM	6:00 PM	20	11	0	18	20	24	14	9	4	0	4	0	124

TOTAL PM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	5:00 PM	58	51	0	79	51	64	11	49	61	1	40	14	479

The peak 15 minute volume occurred from 4:30 AM to 4:45 AM when 142 total vehicles passed through the intersection.

5% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 5

N-S STREET: NB off-Ramp Southern Parkway SR-7 Weather: Clear

E-W STREET: Washington Fields Road

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 70 PEAK HOUR FACTOR: 0.83

		Cars												
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	CARS
7:00 AM	7:15 AM	3	0	0	6	0						5	0	14
7:15 AM	7:30 AM	7	0	0	5	1						2	1	16
7:30 AM	7:45 AM	8	0	0	2	1						3	0	14
7:45 AM	8:00 AM	10	0	0	3	1						3	0	17
8:00 AM	8:15 AM	6	0	0	1	0						0	0	7
8:15 AM	8:30 AM	2	0	0	5	1						1	0	9
8:30 AM	8:45 AM	12	0	0	3	2						2	0	19
8:45 AM	9:00 AM	8	0	0	2	2						2	0	14

		Trucks												
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	TRUCKS
7:00 AM	7:15 AM	2	0	0	0	0						0	0	2
7:15 AM	7:30 AM	1	0	0	1	1						0	0	3
7:30 AM	7:45 AM	0	0	0	0	0						0	0	0
7:45 AM	8:00 AM	1	0	0	1	1						1	0	4
8:00 AM	8:15 AM	1	0	0	1	0						0	0	2
8:15 AM	8:30 AM	0	0	0	0	0						0	0	0
8:30 AM	8:45 AM	1	0	0	0	0						0	0	1
8:45 AM	9:00 AM	1	0	0	1	2						0	0	4

		All Vehicles by Movement												
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	TRAFFIC
7:00 AM	7:15 AM	5	0	0	6	0						5	0	16
7:15 AM	7:30 AM	8	0	0	6	2						2	1	19
7:30 AM	7:45 AM	8	0	0	2	1						3	0	14
7:45 AM	8:00 AM	11	0	0	4	2						4	0	21
8:00 AM	8:15 AM	7	0	0	2	0						0	0	9
8:15 AM	8:30 AM	2	0	0	5	1						1	0	9
8:30 AM	8:45 AM	13	0	0	3	2						2	0	20
8:45 AM	9:00 AM	9	0	0	3	4						2	0	18

TOTAL AM PEAK HOUR TRAFFIC														
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	0	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	TRAFFIC
7:00 AM	8:00 AM	32	0	0	18	5						14	1	70

The peak 15 minute volume occurred from 7:15 to 7:30 AM and from 7:45 to 8:00 AM when 19 total vehicles passed through the intersection; 14% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 5

N-S STREET: NB off-Ramp Southern Parkway SR-7 Weather: Clear

E-W STREET: Washington Fields Road

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 123 PEAK HOUR FACTOR: 0.72

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	15	0	0	5	4						4	0	28
4:15 PM	4:30 PM	8	0	0	5	1						2	0	16
4:30 PM	4:45 PM	10	0	0	2	1						2	1	16
4:45 PM	5:00 PM	6	0	0	3	2						1	0	12
5:00 PM	5:15 PM	11	0	0	6	0						1	0	18
5:15 PM	5:30 PM	7	0	0	11	9						4	1	32
5:30 PM	5:45 PM	9	1	0	8	1						6	0	25
5:45 PM	6:00 PM	24	0	0	10	2						3	0	39

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	2	0	0	0	0						0	0	2
4:15 PM	4:30 PM	1	1	0	2	0						0	0	4
4:30 PM	4:45 PM	0	0	0	0	1						0	0	1
4:45 PM	5:00 PM	0	0	0	0	3						0	0	3
5:00 PM	5:15 PM	0	0	0	2	0						0	0	2
5:15 PM	5:30 PM	1	0	0	1	0						0	0	2
5:30 PM	5:45 PM	1	0	0	0	0						0	0	1
5:45 PM	6:00 PM	2	0	0	2	0						0	0	4

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
4:00 PM	4:15 PM	17	0	0	5	4						4	0	30
4:15 PM	4:30 PM	9	1	0	7	1						2	0	20
4:30 PM	4:45 PM	10	0	0	2	2						2	1	17
4:45 PM	5:00 PM	6	0	0	3	5						1	0	15
5:00 PM	5:15 PM	11	0	0	8	0						1	0	20
5:15 PM	5:30 PM	8	0	0	12	9						4	1	34
5:30 PM	5:45 PM	10	1	0	8	1						6	0	26
5:45 PM	6:00 PM	26	0	0	12	2						3	0	43

TOTAL PM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
5:00 PM	6:00 PM	55	1	0	40	12						14	1	123

The peak 15 minute volume occurred from 5:45 PM to 6:00 PM when 41 total vehicles passed through the intersection.

6% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 6

N-S STREET: SB off-Ramp Southern Parkway SR-7 Weather: Clear

E-W STREET: Washington Fields Road

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 119 PEAK HOUR FACTOR: 0.83

Start Time	End Time	Cars												TOTAL CARS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM					4	1	0	0	3	0	4		12
7:15 AM	7:30 AM					4	1	0	0	7	0	8		20
7:30 AM	7:45 AM					1	6	0	0	6	0	8		21
7:45 AM	8:00 AM					3	7	0	0	7	0	11		28
8:00 AM	8:15 AM					4	7	0	1	7	0	8		27
8:15 AM	8:30 AM					5	5	0	0	5	0	5		20
8:30 AM	8:45 AM					6	6	1	0	6	1	14		34
8:45 AM	9:00 AM					4	8	0	0	8	0	9		29

Start Time	End Time	Trucks												TOTAL TRUCKS
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM					0	0	0	0	0	0	0		0
7:15 AM	7:30 AM					0	0	0	0	0	0	0		0
7:30 AM	7:45 AM					1	1	0	0	1	0	0		3
7:45 AM	8:00 AM					1	0	0	0	0	0	1		2
8:00 AM	8:15 AM					1	1	0	0	1	0	0		3
8:15 AM	8:30 AM					0	0	0	0	0	0	1		1
8:30 AM	8:45 AM					0	0	0	0	0	0	2		2
8:45 AM	9:00 AM					2	0	0	0	0	0	1		3

Start Time	End Time	All Vehicles by Movement												TOTAL TRAFFIC
		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			
		NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	
7:00 AM	7:15 AM					4	1	0	0	3	0	4		12
7:15 AM	7:30 AM					4	1	0	0	7	0	8		20
7:30 AM	7:45 AM					2	7	0	0	7	0	8		24
7:45 AM	8:00 AM					4	7	0	0	7	0	12		30
8:00 AM	8:15 AM					5	8	0	1	8	0	8		30
8:15 AM	8:30 AM					5	5	0	0	5	0	6		21
8:30 AM	8:45 AM					6	6	1	0	6	1	16		36
8:45 AM	9:00 AM					6	8	0	0	8	0	10		32

TOTAL AM PEAK HOUR TRAFFIC														
Start Time	End Time	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL TRAFFIC
		NBL	NBT	0	EBL	EBT	EBR	1	1	26	WBL	WBT	WBR	
8:00 AM	9:00 AM					22	27	1	1	27	1	40		119

The peak 15 minute volume occurred from 8:45 AM to 9:00 AM when 22 total vehicles passed through the intersection.

6% of the total traffic during the AM peak hour were trucks

CITY: Washington, Utah COUNT DATE: September 26, 2017 Study Intersection 6

N-S STREET: SB off-Ramp Southern Parkway SR-7 Weather: Clear

E-W STREET: Washington Fields Road

DAY OF WEEK: Tuesday PEAK HOUR VOLUME: 181 PEAK HOUR FACTOR: 0.89

		Cars												
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	CARS
4:00 PM	4:15 PM					9	13	0	0	4	0	20		46
4:15 PM	4:30 PM					6	5	0	0	8	0	10		29
4:30 PM	4:45 PM					8	10	0	0	9	0	12		39
4:45 PM	5:00 PM					11	7	0	0	7	0	7		32
5:00 PM	5:15 PM					7	10	0	0	6	0	13		36
5:15 PM	5:30 PM					20	10	2	0	5	3	10		50
5:30 PM	5:45 PM					11	6	0	0	8	1	15		41
5:45 PM	6:00 PM					10	3	0	0	6	0	27		46

		Trucks												
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	TRUCKS
4:00 PM	4:15 PM					4	2	0	0	0	0	0		6
4:15 PM	4:30 PM					2	0	0	0	0	1	0		3
4:30 PM	4:45 PM					0	0	0	0	0	1	0		1
4:45 PM	5:00 PM					0	0	0	0	0	0	0		0
5:00 PM	5:15 PM					0	0	0	0	1	0	0		1
5:15 PM	5:30 PM					0	1	0	0	0	0	0		1
5:30 PM	5:45 PM					0	1	0	0	0	0	0		1
5:45 PM	6:00 PM					2	0	0	0	3	0	0		5

		All Vehicles by Movement												
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	TRAFFIC
4:00 PM	4:15 PM					13	15	0	0	4	0	20		52
4:15 PM	4:30 PM					8	5	0	0	8	1	10		32
4:30 PM	4:45 PM					8	10	0	0	9	1	12		40
4:45 PM	5:00 PM					11	7	0	0	7	0	7		32
5:00 PM	5:15 PM					7	10	0	0	7	0	13		37
5:15 PM	5:30 PM					20	11	2	0	5	3	10		51
5:30 PM	5:45 PM					11	7	0	0	8	1	15		42
5:45 PM	6:00 PM					12	3	0	0	9	0	27		51

TOTAL PM PEAK HOUR TRAFFIC														
Start	End	NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
Time	Time	NBL	NBT	NBR	EBL	EBT	EBR	SBL	SBT	SBR	WBL	WBT	WBR	TRAFFIC
5:00 PM	6:00 PM					50	31	2	0	29	4	65		181

The peak 15 minute volume occurred from 5:15 PM to 5:30 PM when 42 total vehicles passed through the intersection.

6% of the total traffic during the AM peak hour were trucks

APPENDIX B

Project Trip Generation
and
Trip Distribution Information

Detailed Land Use Data
For 1,111 Dwelling Units of SF HOUSE 1
(210) Single-Family Detached Housing

Project: Long Valley Trails
Description: 2,361 Total Residential Units

Open Date: 10/1/2020
Analysis Date: 10/1/2030

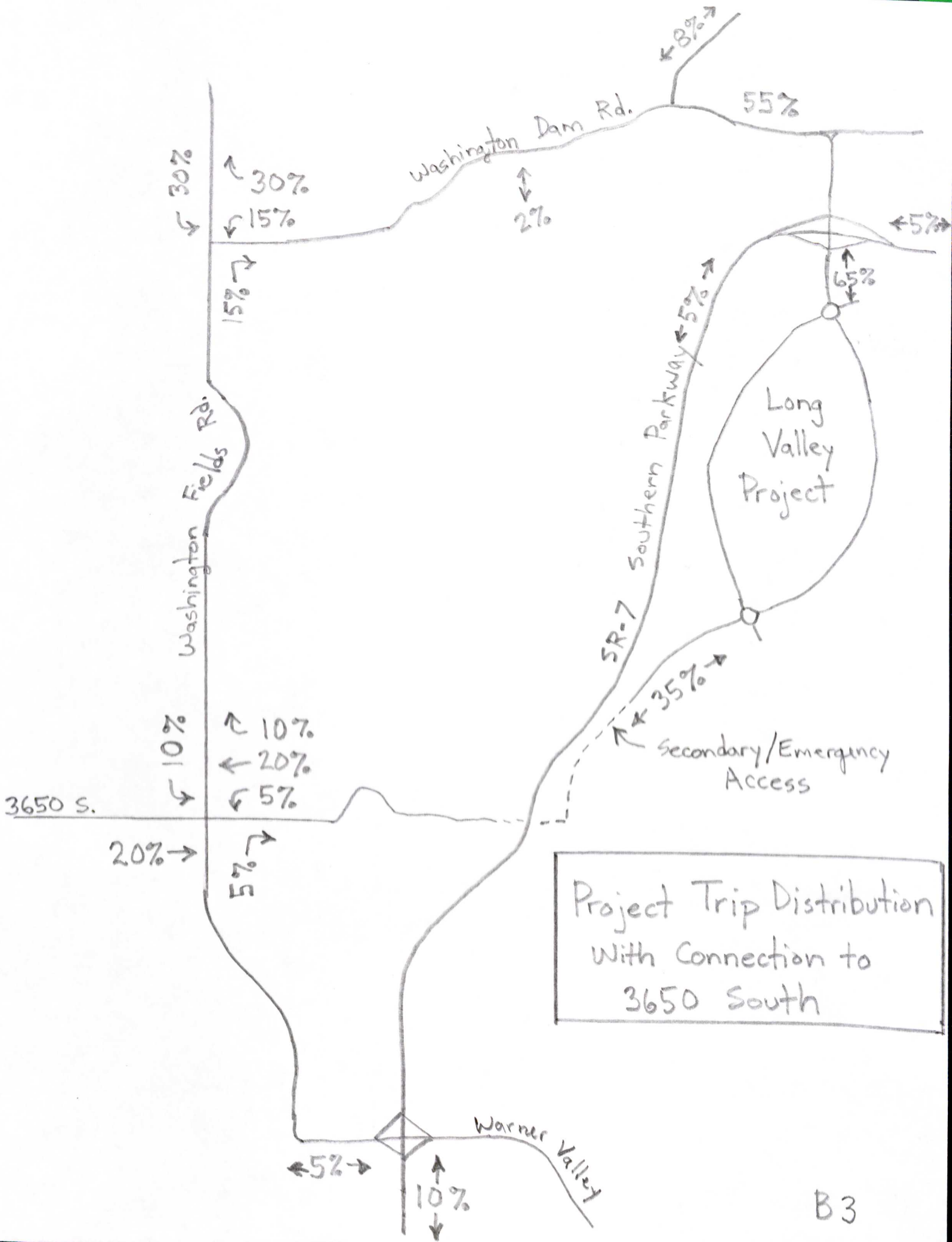
Day / Period	Total Trips	Pass-By Trips	Avg Rate	Min Rate	Max Rate	Std Dev	Avg Size	% Enter	% Exit	Use Eq.	Equation	R2
Weekday Average Daily Trips	10577	0	9.52	4.31	21.85	3.7	198	50	50	False	Ln(T) = 0.92 Ln(X) + 2.72	0.95
Weekday AM Peak Hour of Generator	855	0	0.77	0.33	2.27	0.91	180	26	74	False	T = 0.70(X) + 12.12	0.89
Weekday AM Peak Hour of Adjacent Street Traffic	833	0	0.75	0.33	2.27	0.9	194	25	75	False	T = 0.70(X) + 9.74	0.89
Weekday PM Peak Hour of Generator	1133	0	1.02	0.42	2.98	1.05	174	64	36	False	Ln(T) = 0.88 Ln(X) + 0.62	0.91
Weekday PM Peak Hour of Adjacent Street Traffic	1111	0	1	0.42	2.98	1.05	207	63	37	False	Ln(T) = 0.90 Ln(X) + 0.51	0.91
Saturday Average Daily Trips	11010	0	9.91	5.32	15.25	3.72	215	50	50	False	Ln(T) = 0.93 Ln(X) + 2.64	0.92
Saturday Peak Hour of Generator	1033	0	0.93	0.5	1.75	0.99	215	54	46	False	T = 0.89(X) + 8.77	0.91
Sunday Average Daily Trips	9577	0	8.62	4.74	12.31	3.36	218	50	50	False	T = 8.63(X) - 0.63	0.93
Sunday Peak Hour of Generator	955	0	0.86	0.55	1.48	0.95	212	53	47	False	Ln(T) = 0.91 Ln(X) + 0.31	0.88

Detailed Land Use Data
For 1250 Dwelling Units of CONDO 1
(230) Residential Condominium/Townhouse

Project: Long Valley Trails
Description: 2,361 Total Residential Units

Open Date: 10/1/2020
Analysis Date: 10/1/2030

Day / Period	Total Trips	Pass-By Trips	Avg Rate	Min Rate	Max Rate	Std Dev	Avg Size	% Enter	% Exit	Use Eq.	Equation	R2
Weekday Average Daily Trips	7263	0	5.81	1.53	11.79	3.11	179	50	50	False	Ln(T) = 0.87 Ln(X) + 2.46	0.8
Weekday AM Peak Hour of Generator	550	0	0.44	0.15	0.97	0.68	196	19	81	False	Ln(T) = 0.82 Ln(X) + 0.15	0.8
Weekday AM Peak Hour of Adjacent Street Traffic	550	0	0.44	0.15	1.61	0.69	213	17	83	False	Ln(T) = 0.80 Ln(X) + 0.26	0.76
Weekday PM Peak Hour of Generator	650	0	0.52	0.18	1.24	0.75	199	64	36	False	T = 0.34(X) + 35.87	0.82
Weekday PM Peak Hour of Adjacent Street Traffic	650	0	0.52	0.18	1.24	0.75	205	67	33	False	Ln(T) = 0.82 Ln(X) + 0.32	0.8
Saturday Average Daily Trips	7088	0	5.67	1.17	11.4	3.1	209	50	50	False	T = 3.62(X) + 427.93	0.84
Saturday Peak Hour of Generator	588	0	0.47	0.14	0.93	0.71	228	54	46	False	T = 0.29(X) + 42.63	0.84
Sunday Average Daily Trips	6050	0	4.84	1.36	8.56	2.71	209	50	50	False	T = 3.13(X) + 357.26	0.88
Sunday Peak Hour of Generator	563	0	0.45	0.16	1.07	0.7	228	49	51	False	T = 0.23(X) + 50.01	0.78


8%
Washington Dam Rd.
55%
30%
30%
15%
2%
5%
65%
15%
5%
Southern Parkway
5R-7
Long Valley Project
Washington Fields Rd.
35%
Secondary/Emergency Access
10%
10%
20%
5%
3650 S.
20%
5%
Warner Valley
5%
10%
Project Trip Distribution With Connection to 3650 South
B3

APPENDIX C

Future AM and PM Peak Hour Traffic Volume Forecast at Six Study Intersections

1) SR-7 EB Ramps/Long Valley Parkway
2) SR-7 WB Ramps/Long Valley Parkway
3) Washington Fields Road/Washington Dam Road
4) Washington Fields Road/3650 South
5) SR-7 SB Ramps/Warner Valley Road
6) SR-7 NB Ramps/ Warner Valley Road

#1 Long Valley Parkway/SR-7 Eastbound Off-Ramp - AM Peak Hour Traffic										
Description	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL
2017 Existing	**7**	**0**	**1**		**0**	**0**	**68**	**0**		**76**
24% Growth	2	0	0		0	0	16	0		**18**
2025 BK (+24%)	**9**	**0**	**1**		**0**	**0**	**84**	**0**		**94**
Phase 1 Project			41		253	108		62		**464**
2025 BK + Phase 1	**9**	**0**	**42**		**253**	**108**	**84**	**62**		**558**
2030 BK	**10**	**0**	**42**		**253**	**108**	**101**	**62**		**576**
Phase 2 Project			41		252	108		61		462
2030 BK + Project	**10**	**0**	**83**		**505**	**216**	**101**	**123**		**1038**
2035 BK	**12**	**0**	**84**		**505**	**216**	**117**	**123**		**1057**
Revised 2035 no Project	24	0	2		0	0	117	0		143
Phase 3 Project			40		252	108		61		**461**
2035 BK + Project	**12**	**0**	**26**		**757**	**324**	**117**	**184**		**1420**
Total Project Traffic			122		757	324		184		1387
Revised Project Distribution			15		648	54		183		900
Revised Project Traffic + 5%			**16**		**680**	**57**		**192**		
Total Revised 2035	**24**	**0**	**18**		**680**	**57**	**117**	**192**		**1088**

#1 Long Valley Parkway/SR-7 Eastbound Off-Ramp - PM Peak Hour Traffic										
Description	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL
2017 Existing	**6**	**0**	**0**		**2**	**0**	**107**	**1**		**116**
24% Growth	1	0	0		0	0	26	0		**28**
2025 BK (+24%)	**7**	**0**	**0**		**2**	**0**	**133**	**1**		**144**
Phase 1 Project			152		147	63		228		**590**
2025 BK + Phase 1	**7**	**0**	**152**		**149**	**63**	**133**	**229**		**734**
2030 BK	**9**	**0**	**152**		**150**	**63**	**158**	**229**		**761**
Phase 2 Project			151		146	63		227		587
2030 BK + Project	**9**	**0**	**303**		**296**	**126**	**158**	**456**		**1348**
2035 BK	**10**	**0**	**303**		**296**	**126**	**184**	**456**		**1376**
Revised 2035 no Project	20	0	2		3	0	184	2		211
Phase 3 Project			151		146	62		227		**586**
2035 BK + Project	**10**	**0**	**454**		**442**	**188**	**184**	**683**		**1962**
Total Project Traffic			454		439	188		682		1763
Revised Project Distribution			57		375	31		681		1144
Revised Project Traffic + 5%			**60**		**394**	**33**		**715**		
Total Revised 2035	**20**	**0**	**62**		**397**	**33**	**184**	**717**		**1412**

#2 Long Valley Parkway/SR-7 Westbound Off-Ramp - AM Peak Hour Traffic										
Description	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL
2017 Existing	**0**	**0**	**88**	**0**	**7**			**68**	**7**	**170**
24% Growth	0	0	21	0	2			16	2	**41**
2025 BK (+24%)	**0**	**0**	**109**	**0**	**9**			**84**	**9**	**211**
Phase 1 Project	31			145	108			31		**315**
2025 BK + Phase 1	**31**	**0**	**109**	**145**	**117**			**115**	**9**	**526**
2030 BK	**31**	**0**	**130**	**145**	**118**			**132**	**10**	**567**
Phase 2 Project	31			144	108			31		314
2030 BK + Project	**62**	**0**	**130**	**289**	**226**			**163**	**10**	**881**
2035 BK	**62**	**0**	**151**	**289**	**228**			**179**	**12**	**921**
Revised 2035 no Project	**0**		**151**	**0**	**12**			**117**	**24**	**304**
Phase 3 Project	30			144	108			30		**312**
2035 BK + Project	**92**	**0**	**151**	**433**	**336**			**209**	**12**	**1233**
Total Project Traffic	92			433	324			92		941
Revised Project Distribution	15			54	594			168		831
Revised Project Traffic + 5%	**16**			**57**	**648**			**183**		**903**
Total Revised 2035	**16**		**151**	**57**	**660**			**300**	**24**	**1207**

#2 Long Valley Parkway/SR-7 Westbound Off-Ramp - PM Peak Hour Traffic										
Description	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL
2017 Existing	**4**	**0**	**71**	**0**	**8**			**104**	**3**	**190**
24% Growth	1	0	17	0	2			25	1	**46**
2025 BK (+24%)	**5**	**0**	**88**	**0**	**10**			**129**	**4**	**236**
Phase 1 Project	114			84	63			114		**375**
2025 BK + Phase 1	**119**	**0**	**88**	**84**	**73**			**243**	**4**	**611**
2030 BK	**120**	**0**	**105**	**84**	**75**			**268**	**4**	**656**
Phase 2 Project	114			84	63			114		375
2030 BK + Project	**234**	**0**	**105**	**168**	**138**			**382**	**4**	**1031**
2035 BK	**235**	**0**	**122**	**168**	**140**			**407**	**5**	**1077**
Revised 2035 no Project	**7**	**0**	**122**	**0**	**14**			**179**	**10**	**332**
Phase 3 Project	113			83	62			113		**371**
2035 BK + Project	**348**	**0**	**122**	**251**	**202**			**520**	**5**	**1448**
Total Project Traffic	**341**			**251**	**188**			**341**		**1121**
Revised Project Distribution	**57**			**31**	**344**			**624**		**1056**
Revised Project Traffic + 5%	**60**			**33**	**361**			**655**		**1109**
Total Revised 2035	**67**	**0**	**122**	**33**	**375**			**834**	**10**	**1441**

#3 Washington Fields Road/Washington Dam Road - AM Peak Hour Traffic							
Description	WBL	WBR	NBT	NBR	SBL	SBT	TOTAL
2017 Existing	67	219	269	76	237	270	1138
2018 Existing	150	191	260	195	252	319	1367
2020 Total Prior TIS	**186**	**218**	**328**	**229**	**271**	**386**	**1618**
15% Growth (3% for 5 yrs)	23	29	39	29	38	48	205
2025 BK (+15%)	**209**	**247**	**367**	**258**	**309**	**434**	**1823**
Phase 1 Project	32	72		11	21		**136**
2025 BK + Phase 1	**241**	**319**	**367**	**269**	**330**	**434**	**1959**
2030 BK	**263**	**347**	**406**	**299**	**368**	**482**	**2164**
Phase 2 Project	32	72		10	20		**134**
2030 BK + Project	**295**	**419**	**406**	**309**	**388**	**482**	**2298**
2035 BK	**318**	**448**	**445**	**338**	**425**	**530**	**2503**
2035 BG no Project Traffic	**256**	**300**	**451**	**315**	**373**	**531**	**2225**
Phase 3 Project	32	72		10	20		**134**
2035 BK + Project	**350**	**520**	**445**	**348**	**445**	**530**	**2637**
Total Project Traffic	**96**	**216**		**31**	**61**		**404**
Revised Project Distribution	**162**	**324**		**46**	**92**		**624**
Revised Project Traffic + 5%	**170**	**340**		**48**	**97**		**655**
Total Revised 2035	**426**	**640**	**451**	**363**	**469**	**531**	**2880**

#3 Washington Fields Road/Washington Dam Road - PM Peak Hour Traffic							
Description	WBL	WBR	NBT	NBR	SBL	SBT	TOTAL
2017 Existing	**79**	**205**	**289**	**95**	**238**	**414**	**1320**
2018 Existing	**139**	**252**	**265**	**253**	**275**	**370**	**1554**
2020 Total Prior TIS	**173**	**276**	**337**	**296**	**308**	**450**	**1840**
15% Growth (3% for 5 yrs)	21	38	40	38	41	56	233
2025 BK (+15%)	**194**	**314**	**377**	**334**	**349**	**506**	**2073**
Phase 1 Project	21	41		38	76		**176**
2025 BK + Phase 1	**215**	**355**	**377**	**372**	**425**	**506**	**2249**
2030 BK	**236**	**393**	**417**	**410**	**467**	**561**	**2482**
Phase 2 Project	21	42		38	76		**177**
2030 BK + Project	**257**	**435**	**417**	**448**	**543**	**561**	**2659**
2035 BK	**278**	**472**	**456**	**486**	**584**	**617**	**2892**
2035 BG no Project Traffic	**238**	**380**	**463**	**407**	**424**	**619**	**2530**
Phase 3 Project	21	42		38	75		**176**
2035 BK + Project	**299**	**514**	**456**	**524**	**659**	**617**	**3068**
Total Project Traffic	**63**	**125**		**114**	**227**		**529**
Revised Project Distribution	**94**	**188**		**170**	**341**		**793**
Revised Project Traffic + 5%	**99**	**197**		**179**	**358**		**833**
Total Revised 2035	**337**	**577**	**463**	**586**	**782**	**619**	**3363**

#4 3650 South/Washington Fields Road - AM Peak Hour Traffic													
Description	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL
2017 Existing	**128**	**29**	**45**	**5**	**58**	**11**	**59**	**51**	**5**	**9**	**30**	**76**	**506**
24% Growth	31	7	11	1	14	3	14	12	1	2	7	18	**121**
2025 BK (+24%)	**159**	**36**	**56**	**6**	**72**	**14**	**73**	**63**	**6**	**11**	**37**	**94**	**627**
Phase 1 Project	8		12	1			40		4			29	**94**
2025 BK + Phase 1	**167**	**36**	**68**	**7**	**72**	**14**	**113**	**63**	**10**	**11**	**37**	**123**	**721**
2030 BK	**197**	**43**	**79**	**8**	**86**	**16**	**127**	**75**	**11**	**13**	**44**	**141**	**843**
Phase 2 Project	8		11	1			40		4			29	93
2030 BK + Project	**205**	**43**	**90**	**9**	**86**	**16**	**167**	**75**	**15**	**13**	**44**	**170**	**936**
2035 BK	**236**	**50**	**100**	**11**	**100**	**19**	**181**	**88**	**17**	**15**	**52**	**189**	**1057**
2035 BG no Project Traffic	220	50	77	9	100	19	101	88	9	15	52	131	870
Phase 3 Project	8		11	1			39		3			28	**90**
2035 BK + Project	**244**	**50**	**111**	**12**	**100**	**19**	**220**	**88**	**20**	**15**	**52**	**217**	**1147**
Total Project Traffic	24		34	3			119		11			86	277
Revised Project Distribution		61		54	216	108			15	31			485
Revised Project Traffic + 5%		64		57	227	113			16	33			509
Total Revised 2035	**220**	**114**	**77**	**65**	**327**	**132**	**101**	**88**	**24**	**48**	**52**	**131**	**1380**

Note: the 2017 Exisitng NBR and WBL were increased to 5 to forecast more realistic future traffic volumes with the 3%/yr. growth

#4 3650 South/Washington Fields Road - PM Peak Hour Traffic													
Description	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL
2017 Existing	79	51	64	5	40	14	58	51	5	11	49	61	**488**
24% Growth	19	12	15	1	10	3	14	12	1	3	12	15	**117**
2025 BK (+24%)	**98**	**63**	**79**	**6**	**50**	**17**	**72**	**63**	**6**	**14**	**61**	**76**	**605**
Phase 1 Project	31		42	4			23		2			17	**119**
2025 BK + Phase 1	**129**	**63**	**121**	**10**	**50**	**17**	**95**	**63**	**8**	**14**	**61**	**93**	**724**
2030 BK	**148**	**75**	**137**	**11**	**59**	**21**	**109**	**75**	**9**	**16**	**73**	**107**	**841**
Phase 2 Project	30		42	4			23		2			17	118
2030 BK + Project	**178**	**75**	**179**	**15**	**59**	**21**	**132**	**75**	**11**	**16**	**73**	**124**	**959**
2035 BK	**197**	**88**	**194**	**17**	**69**	**24**	**146**	**88**	**13**	**19**	**84**	**139**	**1076**
2035 BG no Project Traffic	136	88	110	9	69	24	100	88	9	19	84	105	839
Phase 3 Project	30		41	3			23		2			16	**115**
2035 BK + Project	**227**	**88**	**235**	**20**	**69**	**24**	**169**	**88**	**15**	**19**	**84**	**155**	**1191**
Total Project Traffic	91		125	11			69		6			50	352
Revised Project Distribution		227		31	125	63			57	114			617
Revised Project Traffic + 5%		238		33	131	66			60	120			648
Total Revised 2035	**136**	**326**	**110**	**41**	**200**	**90**	**100**	**88**	**68**	**139**	**84**	**105**	**1487**

#5 Washington Fields Road/Warner Valley Road/SR-7 Southbound Off-Ramp - AM Peak Hour Traffic										
Description	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBT	SBR	TOTAL
2017 Existing		**22**	**27**	**1**	**40**		**1**	**1**	**27**	**119**
24% Growth		5	6	0	10		0	0	6	**29**
2025 BK (+24%)		**27**	**33**	**1**	**50**		**1**	**1**	**33**	**148**
Phase 1 Project		13					8		44	**65**
2025 BK + Phase 1		**40**	**33**	**1**	**50**		**9**	**1**	**77**	**213**
2030 BK		**46**	**40**	**31**	**79**		**34**	**1**	**84**	**316**
Phase 2 Project		12					7		43	62
2030 BK + Project		**58**	**40**	**31**	**79**		**41**	**1**	**127**	**378**
2035 BK		**63**	**46**	**92**	**129**		**92**	**2**	**133**	**557**
2035 BG no Project Traffic		38	46	92	129		77	2	46	**430**
Phase 3 Project		12					7		43	**62**
2035 BK + Project		**75**	**46**	**92**	**129**		**99**	**2**	**176**	**619**
Total Project Traffic		37					22		130	189
Revised Project Distribution			54		15					69
Revised Project Traffic + 5%			57		16					72
Total Revised 2035		**38**	**103**	**92**	**145**		**77**	**2**	**46**	**502**

#5 Washington Fields Road/Warner Valley Road/SR-7 Southbound Off-Ramp - PM Peak Hour Traffic										
Description	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBT	SBR	TOTAL
2017 Existing		**50**	**31**	**4**	**65**		**2**	**0**	**29**	181
24% Growth		12	7	1	16		0	0	7	43
2025 BK (+24%)		**62**	**38**	**5**	**81**		**2**	**0**	**36**	224
Phase 1 Project		46					5		25	76
2025 BK + Phase 1		**108**	**38**	**5**	**81**		**7**	**0**	**61**	300
2030 BK		**120**	**46**	**26**	**116**		**58**	**0**	**68**	434
Phase 2 Project		45					4		25	74
2030 BK + Project		**165**	**46**	**26**	**116**		**62**	**0**	**93**	508
2035 BK		**177**	**53**	**67**	**172**		**137**	**0**	**100**	706
2035 BG no Project Traffic		86	53	67	172		128	0	50	556
Phase 3 Project		45					4		25	74
2035 BK + Project		**222**	**53**	**67**	**172**		**141**	**0**	**125**	780
Total Project Traffic		136					13		75	224
Revised Project Distribution			31		57					
Revised Project Traffic + 5%			33		60					92
Total Revised 2035		**86**	**86**	**67**	**232**		**128**	**0**	**50**	**649**

#6 Washington Fields Road/Warner Valley Road/SR-7 Northbound Off-Ramp - AM Peak Hour Traffic										
Description	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	TOTAL
2017 Existing	**18**	**5**			**14**	**1**	**32**	**0**	**0**	**70**
24% Growth	4	1			3	0	8	0	0	**17**
2025 BK (+24%)	**22**	**6**			**17**	**1**	**40**	**0**	**5**	**92**
Phase 1 Project	13	8				2				**23**
2025 BK + Phase 1	**35**	**14**			**17**	**3**	**40**	**0**	**5**	**115**
2030 BK	**40**	**40**			**71**	**33**	**47**	**0**	**10**	**242**
Phase 2 Project	12	7				2				21
2030 BK + Project	**52**	**47**			**71**	**35**	**47**	**0**	**10**	**263**
2035 BK	**56**	**99**			**174**	**96**	**55**	**0**	**30**	**509**
2035 BG no Project Traffic	31	84			174	92	55	0	30	465
Phase 3 Project	12	7				2				21
2035 BK + Project	**68**	**106**			**174**	**98**	**55**	**0**	**30**	**530**
Total Project Traffic	37	22				6				65
Revised Project Distribution							15			15
Revised Project Traffic + 5%							16			16
Total Revised 2035	**31**	**84**			**174**	**92**	**71**	**0**	**30**	**481**

#6 Washington Fields Road/Warner Valley Road/SR-7 Northbound Off-Ramp - PM Peak Hour Traffic										
Description	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	TOTAL
2017 Existing	**40**	**12**			**14**	**1**	**55**	**1**	**0**	**123**
24% Growth	10	3			3	0	13	0	0	**30**
2025 BK (+24%)	**50**	**15**			**17**	**1**	**68**	**1**	**10**	**163**
Phase 1 Project	46	5				8				**59**
2025 BK + Phase 1	**96**	**20**			**17**	**9**	**68**	**1**	**10**	**222**
2030 BK	**105**	**73**			**61**	**29**	**81**	**1**	**30**	**381**
Phase 2 Project	45	4				8				57
2030 BK + Project	**150**	**77**			**61**	**37**	**81**	**1**	**30**	**438**
2035 BK	**160**	**155**			**144**	**78**	**95**	**2**	**70**	**703**
2035 BG no Project Traffic	69	146			144	62	95	2	70	587
Phase 3 Project	45	4				7				**56**
2035 BK + Project	**205**	**159**			**144**	**85**	**95**	**2**	**70**	**759**
Total Project Traffic	136	13				23				172
Revised Project Distribution							57			57
Revised Project Traffic + 5%							60			
Total Revised 2035	**69**	**146**			**144**	**62**	**154**	**2**	**70**	**646**

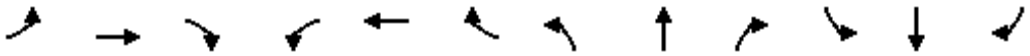
Long Valley Project Traffic				
Distribution Percentage	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
	305	1080	1135	625
5%	15	54	57	31
60%	183	648	681	375
65%	198	702	738	406
40%	122	432	454	250
15%	46	162	170	94
10%	31	108	114	63
20%	61	216	227	125
26%	79	281	295	163
30%	92	324	341	188
55%	168	594	624	344
70%	214	756	795	438
90%	275	972	1022	563

Percent of Project Completed	Number of Dwelling Units Completed	Anticipated Average Weekday Peak Hour Trips Based on Standard ITE Trip Generation Rates			
		AM Peak Hour Trips		PM Peak Hour Trips	
		Inbound	Outbound	Inbound	Outbound
10%	236	31	108	114	63
20%	472	61	216	227	125
30%	708	92	324	341	188
33%	779	101	356	375	206
40%	944	122	432	454	250
50%	1181	153	540	568	313
60%	1417	183	648	681	375
66%	1558	201	713	749	413
70%	1653	214	756	795	438
80%	1889	244	864	908	500
90%	2125	275	972	1022	563
100%	2361	305	1080	1135	625

APPENDIX D

Synchro LOS Calculations Sheets for the AM and PM Peak Hours for the Following Scenarios

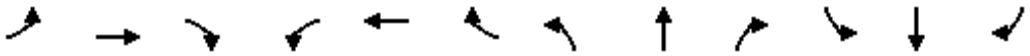
1) Existing Conditions
2) Background 2025 Conditions
3) Total 2025 Conditions (Background 2025 Plus Phase 1 Project Traffic)
4) Background 2030 Conditions
5) Total 2030 Conditions (Background 2030 Plus Phase 2 Project Traffic)
6) Background 2035 Conditions
7) Total 2035 Conditions (Background 2035 Plus Phase 3 Project Traffic)
8) Total 2035 Conditions with Connection to3650 South



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	1	0	0	0	0	0	0	68	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	1	0	0	0	0	0	0	74	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	148	148	0	149	148	0	0			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	148	148	0	149	148	0	0			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			95		
cM capacity (veh/h)	792	710	1085	790	710	1085	1623			1623		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	9	0	74
Volume Left	8	0	74
Volume Right	1	0	0
cSH	820	1700	1623
Volume to Capacity	0.01	0.00	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	9.4	0.0	7.3
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	7.3
Approach LOS	A		

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	88	0	7	0	0	68	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	96	0	8	0	0	74	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								670				
pX, platoon unblocked												
vC, conflicting volume	181	85	78	85	89	8	82			8		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	181	85	78	85	89	8	82			8		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	91	100			100		
cM capacity (veh/h)	711	805	983	901	801	1075	1516			1613		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	96	8	82
Volume Left	0	0	0	0
Volume Right	0	96	0	8
cSH	1700	1075	1516	1700
Volume to Capacity	0.00	0.09	0.00	0.05
Queue Length 95th (ft)	0	7	0	0
Control Delay (s)	0.0	8.7	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.7		0.0	0.0
Approach LOS	A			

Intersection Summary				
Average Delay	4.5			
Intersection Capacity Utilization	15.4%	ICU Level of Service	A	
Analysis Period (min)	15			



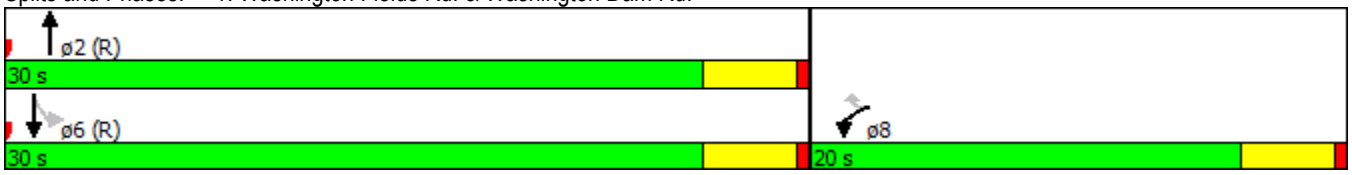
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	150	191	260	195	252	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200		0	100	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.936			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3313	0	1770	3539
Flt Permitted	0.950				0.470	
Satd. Flow (perm)	1770	1583	3313	0	875	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		208	212			
Link Speed (mph)	30		40			40
Link Distance (ft)	365		1135			237
Travel Time (s)	8.3		19.3			4.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	208	283	212	274	347
Shared Lane Traffic (%)						
Lane Group Flow (vph)	163	208	495	0	274	347
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0
Total Split (s)	20.0	20.0	30.0		30.0	30.0
Total Split (%)	40.0%	40.0%	60.0%		60.0%	60.0%
Maximum Green (s)	16.0	16.0	26.0		26.0	26.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	16.0	16.0	26.0		26.0	26.0
Actuated g/C Ratio	0.32	0.32	0.52		0.52	0.52
v/c Ratio	0.29	0.32	0.27		0.60	0.19
Control Delay	14.5	4.0	4.1		15.4	6.7

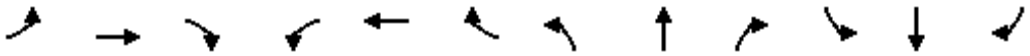


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	14.5	4.0	4.1		15.4	6.7
LOS	B	A	A		B	A
Approach Delay	8.6		4.1			10.6
Approach LOS	A		A			B

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 50			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 7.9		Intersection LOS: A	
Intersection Capacity Utilization 45.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Washington Fields Rd. & Washington Dam Rd.

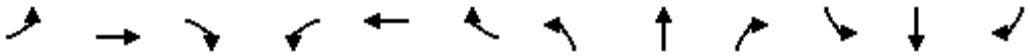




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	128	29	45	0	58	11	58	51	0	9	30	76
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	32	49	0	63	12	63	55	0	10	33	83
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	318	275	74	298	316	55	115			55		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	318	275	74	298	316	55	115			55		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	95	95	100	89	99	96			99		
cM capacity (veh/h)	553	601	988	575	570	1011	1474			1549		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	139	80	0	75	118	10	115
Volume Left	139	0	0	0	63	10	0
Volume Right	0	49	0	12	0	0	83
cSH	553	789	1700	613	1474	1549	1700
Volume to Capacity	0.25	0.10	0.00	0.12	0.04	0.01	0.07
Queue Length 95th (ft)	25	8	0	10	3	0	0
Control Delay (s)	13.7	10.1	0.0	11.7	4.2	7.3	0.0
Lane LOS	B	B	A	B	A	A	
Approach Delay (s)	12.4		11.7		4.2	0.6	
Approach LOS	B		B				

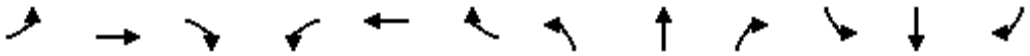
Intersection Summary				
Average Delay	7.7			
Intersection Capacity Utilization	33.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	22	27	1	40	0	0	0	0	1	1	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	24	29	1	43	0	0	0	0	1	1	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					829							
pX, platoon unblocked												
vC, conflicting volume	43			53			114	84	39	84	99	43
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	43			53			114	84	39	84	99	43
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	97
cM capacity (veh/h)	1565			1552			837	805	1033	902	791	1027

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	53	1	43	1	30
Volume Left	0	1	0	1	0
Volume Right	29	0	0	0	29
cSH	1700	1552	1700	902	1016
Volume to Capacity	0.03	0.00	0.03	0.00	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	7.3	0.0	9.0	8.7
Lane LOS		A		A	A
Approach Delay (s)	0.0	0.2		8.7	
Approach LOS				A	

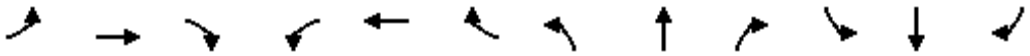
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	5	0	0	9	0	32	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	5	0	0	10	0	35	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	10			5			54	54	5	54	54	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			5			54	54	5	54	54	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			96	100	100	100	100	100
cM capacity (veh/h)	1610			1616			935	827	1078	935	827	1072

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	20	5	10	35
Volume Left	20	0	0	35
Volume Right	0	0	0	0
cSH	1610	1700	1700	897
Volume to Capacity	0.01	0.00	0.01	0.04
Queue Length 95th (ft)	1	0	0	3
Control Delay (s)	7.3	0.0	0.0	9.2
Lane LOS	A			A
Approach Delay (s)	5.7		0.0	9.2
Approach LOS				A

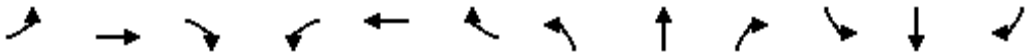
Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	0	0	0	0	0	0	2	0	107	1	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	0	0	0	0	0	2	0	116	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	236	236	1	236	236	2	1			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	236	236	1	236	236	2	1			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			93		
cM capacity (veh/h)	679	617	1083	679	617	1082	1622			1620		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	7	2	117
Volume Left	7	0	116
Volume Right	0	0	0
cSH	679	1700	1620
Volume to Capacity	0.01	0.00	0.07
Queue Length 95th (ft)	1	0	6
Control Delay (s)	10.4	0.0	7.3
Lane LOS	B		A
Approach Delay (s)	10.4	0.0	7.3
Approach LOS	B		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	4	0	71	0	8	0	0	104	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	4	0	77	0	9	0	0	113	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								670				
pX, platoon unblocked												
vC, conflicting volume	201	123	115	123	125	9	116			9		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201	123	115	123	125	9	116			9		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	93	100			100		
cM capacity (veh/h)	703	767	938	851	765	1073	1472			1611		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	4	77	9	116
Volume Left	4	0	0	0
Volume Right	0	77	0	3
cSH	851	1073	1472	1700
Volume to Capacity	0.01	0.07	0.00	0.07
Queue Length 95th (ft)	0	6	0	0
Control Delay (s)	9.3	8.6	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.6		0.0	0.0
Approach LOS	A			

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	15.7%	ICU Level of Service	A	
Analysis Period (min)	15			



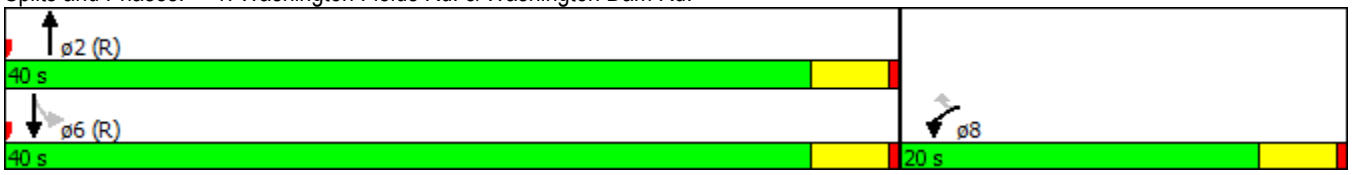
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	139	252	265	253	275	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	200		0	100	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.927			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3281	0	1770	3539
Flt Permitted	0.950				0.432	
Satd. Flow (perm)	1770	1583	3281	0	805	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		274	275			
Link Speed (mph)	30		40			40
Link Distance (ft)	365		1135			237
Travel Time (s)	8.3		19.3			4.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	274	288	275	299	403
Shared Lane Traffic (%)						
Lane Group Flow (vph)	151	274	563	0	299	403
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0
Total Split (s)	20.0	20.0	40.0		40.0	40.0
Total Split (%)	33.3%	33.3%	66.7%		66.7%	66.7%
Maximum Green (s)	16.0	16.0	36.0		36.0	36.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	16.0	16.0	36.0		36.0	36.0
Actuated g/C Ratio	0.27	0.27	0.60		0.60	0.60
v/c Ratio	0.32	0.44	0.27		0.62	0.19
Control Delay	20.0	5.3	3.1		14.7	5.7

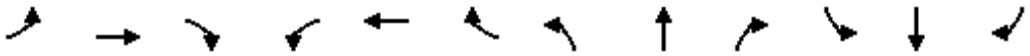


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.0	5.3	3.1		14.7	5.7
LOS	B	A	A		B	A
Approach Delay	10.5		3.1			9.5
Approach LOS	B		A			A

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 7.6		Intersection LOS: A	
Intersection Capacity Utilization 48.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Washington Fields Rd. & Washington Dam Rd.

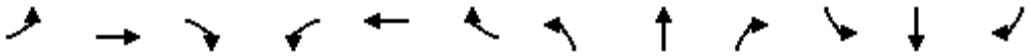




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	79	51	64	1	40	14	58	51	0	11	49	61
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	55	70	1	43	15	63	55	0	12	53	66
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	329	292	86	356	325	55	120			55		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	329	292	86	356	325	55	120			55		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	91	93	100	92	98	96			99		
cM capacity (veh/h)	557	588	972	497	563	1011	1468			1549		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	86	125	1	59	118	12	120
Volume Left	86	0	1	0	63	12	0
Volume Right	0	70	0	15	0	0	66
cSH	557	754	497	636	1468	1549	1700
Volume to Capacity	0.15	0.17	0.00	0.09	0.04	0.01	0.07
Queue Length 95th (ft)	14	15	0	8	3	1	0
Control Delay (s)	12.6	10.7	12.3	11.2	4.2	7.3	0.0
Lane LOS	B	B	B	B	A	A	
Approach Delay (s)	11.5		11.3		4.2	0.7	
Approach LOS	B		B				

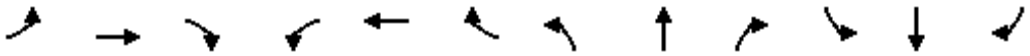
Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	30.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	50	31	4	65	0	0	0	0	2	0	29
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	34	4	71	0	0	0	0	2	0	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					829							
pX, platoon unblocked												
vC, conflicting volume	71			88			182	151	71	151	167	71
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	71			88			182	151	71	151	167	71
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	97
cM capacity (veh/h)	1530			1508			753	739	991	815	723	992

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	88	4	71	2	32
Volume Left	0	4	0	2	0
Volume Right	34	0	0	0	32
cSH	1700	1508	1700	815	992
Volume to Capacity	0.05	0.00	0.04	0.00	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	7.4	0.0	9.4	8.7
Lane LOS		A		A	A
Approach Delay (s)	0.0	0.4		8.8	
Approach LOS				A	

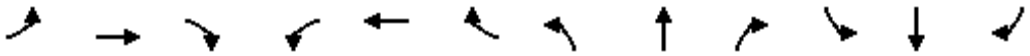
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	12	0	0	14	1	55	1	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	13	0	0	15	1	60	1	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	16			13			116	116	13	116	116	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			13			116	116	13	116	116	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			93	100	100	100	100	100
cM capacity (veh/h)	1601			1605			843	753	1067	841	753	1064

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	43	13	16	61
Volume Left	43	0	0	60
Volume Right	0	0	1	0
cSH	1601	1700	1700	821
Volume to Capacity	0.03	0.01	0.01	0.07
Queue Length 95th (ft)	2	0	0	6
Control Delay (s)	7.3	0.0	0.0	9.7
Lane LOS	A			A
Approach Delay (s)	5.6		0.0	9.7
Approach LOS				A

Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	21.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	0	1	0	0	0	0	0	0	84	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	1	0	0	0	0	0	0	91	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	183	183	0	184	183	0	0			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	183	183	0	184	183	0	0			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			94		
cM capacity (veh/h)	745	671	1085	743	671	1085	1623			1623		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	11	0	91
Volume Left	10	0	91
Volume Right	1	0	0
cSH	769	1700	1623
Volume to Capacity	0.01	0.00	0.06
Queue Length 95th (ft)	1	0	4
Control Delay (s)	9.7	0.0	7.4
Lane LOS	A		A
Approach Delay (s)	9.7	0.0	7.4
Approach LOS	A		

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	14.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	109	0	9	0	0	84	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	118	0	10	0	0	91	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	224	106	96	106	111	10	101			10		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	224	106	96	106	111	10	101			10		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	89	100			100		
cM capacity (veh/h)	650	784	960	874	779	1072	1491			1610		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	118	10	101
Volume Left	0	0	0	0
Volume Right	0	118	0	10
cSH	1700	1072	1491	1700
Volume to Capacity	0.00	0.11	0.00	0.06
Queue Length 95th (ft)	0	9	0	0
Control Delay (s)	0.0	8.8	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.8		0.0	0.0
Approach LOS	A			

Intersection Summary				
Average Delay	4.5			
Intersection Capacity Utilization	16.7%	ICU Level of Service	A	
Analysis Period (min)	15			



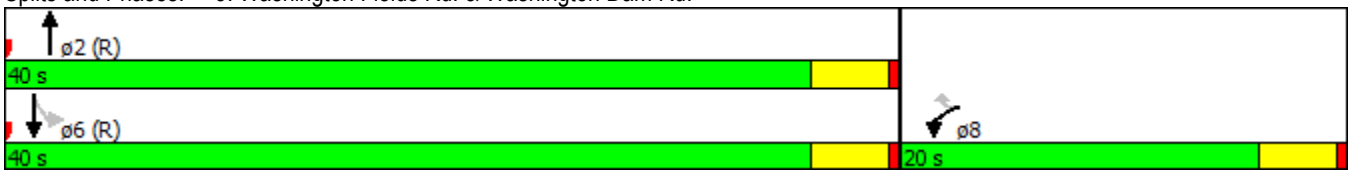
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	209	247	367	258	309	434
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.938			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3320	0	1770	3539
Flt Permitted	0.950				0.372	
Satd. Flow (perm)	1770	1583	3320	0	693	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		268	280			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	227	268	399	280	336	472
Shared Lane Traffic (%)						
Lane Group Flow (vph)	227	268	679	0	336	472
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0
Total Split (s)	20.0	20.0	40.0		40.0	40.0
Total Split (%)	33.3%	33.3%	66.7%		66.7%	66.7%
Maximum Green (s)	16.0	16.0	36.0		36.0	36.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	16.0	16.0	36.0		36.0	36.0
Actuated g/C Ratio	0.27	0.27	0.60		0.60	0.60
v/c Ratio	0.48	0.43	0.32		0.81	0.22
Control Delay	22.6	5.3	3.8		28.7	5.9

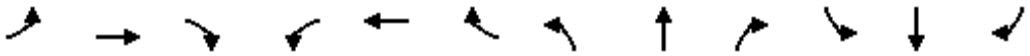


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	22.6	5.3	3.8		28.7	5.9
LOS	C	A	A		C	A
Approach Delay	13.2		3.8			15.4
Approach LOS	B		A			B

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 57.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.

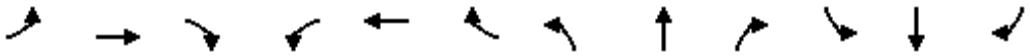




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	159	36	56	6	72	14	73	63	6	11	37	94
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	173	39	61	7	78	15	79	68	7	12	40	102
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	400	349	91	375	397	72	142			75		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	400	349	91	375	397	72	142			75		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	63	93	94	99	85	98	94			99		
cM capacity (veh/h)	464	539	966	491	507	991	1440			1524		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	173	100	7	93	154	12	142
Volume Left	173	0	7	0	79	12	0
Volume Right	0	61	0	15	7	0	102
cSH	464	738	491	551	1440	1524	1700
Volume to Capacity	0.37	0.14	0.01	0.17	0.06	0.01	0.08
Queue Length 95th (ft)	43	12	1	15	4	1	0
Control Delay (s)	17.3	10.6	12.4	12.9	4.1	7.4	0.0
Lane LOS	C	B	B	B	A	A	
Approach Delay (s)	14.9		12.8		4.1	0.6	
Approach LOS	B		B				

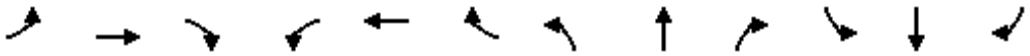
Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	40.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	27	33	1	50	0	0	0	0	1	1	33
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	29	36	1	54	0	0	0	0	1	1	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	54			65			140	104	47	104	122	54
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	54			65			140	104	47	104	122	54
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	96
cM capacity (veh/h)	1551			1537			799	786	1022	876	768	1013

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	65	1	54	1	37
Volume Left	0	1	0	1	0
Volume Right	36	0	0	0	36
cSH	1700	1537	1700	876	1003
Volume to Capacity	0.04	0.00	0.03	0.00	0.04
Queue Length 95th (ft)	0	0	0	0	3
Control Delay (s)	0.0	7.3	0.0	9.1	8.7
Lane LOS		A		A	A
Approach Delay (s)	0.0	0.1		8.7	
Approach LOS				A	

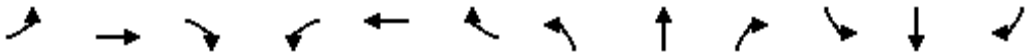
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	20.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	22	6	0	0	17	1	40	0	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	7	0	0	18	1	43	0	5	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	20			7			73	74	7	76	73	19
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	20			7			73	74	7	76	73	19
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			95	100	99	100	100	100
cM capacity (veh/h)	1597			1614			907	804	1076	898	805	1059

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	24	7	20	49
Volume Left	24	0	0	43
Volume Right	0	0	1	5
cSH	1597	1700	1700	1020
Volume to Capacity	0.01	0.00	0.01	0.05
Queue Length 95th (ft)	1	0	0	4
Control Delay (s)	7.3	0.0	0.0	9.1
Lane LOS	A			A
Approach Delay (s)	5.7		0.0	9.1
Approach LOS				A

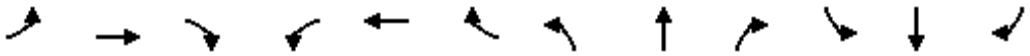
Intersection Summary				
Average Delay	6.3			
Intersection Capacity Utilization	20.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	0	42	0	0	0	0	253	108	84	62	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	46	0	0	0	0	275	117	91	67	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	584	642	67	629	584	334	67			392		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	584	642	67	629	584	334	67			392		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	95	100	100	100	100			92		
cM capacity (veh/h)	398	361	996	354	390	708	1534			1166		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	55	392	159
Volume Left	10	0	91
Volume Right	46	117	0
cSH	787	1700	1166
Volume to Capacity	0.07	0.23	0.08
Queue Length 95th (ft)	6	0	6
Control Delay (s)	9.9	0.0	5.1
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	5.1
Approach LOS	A		

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	41.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	31	0	109	145	117	0	0	115	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	34	0	118	158	127	0	0	125	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	691	572	130	572	577	127	135			127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	691	572	130	572	577	127	135			127		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	91	100	87	89			100		
cM capacity (veh/h)	287	383	920	395	381	923	1450			1459		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	34	118	285	135
Volume Left	34	0	158	0
Volume Right	0	118	0	10
cSH	395	923	1450	1700
Volume to Capacity	0.09	0.13	0.11	0.08
Queue Length 95th (ft)	7	11	9	0
Control Delay (s)	15.0	9.5	4.7	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.7		4.7	0.0
Approach LOS	B			

Intersection Summary				
Average Delay	5.2			
Intersection Capacity Utilization	34.1%	ICU Level of Service	A	
Analysis Period (min)	15			



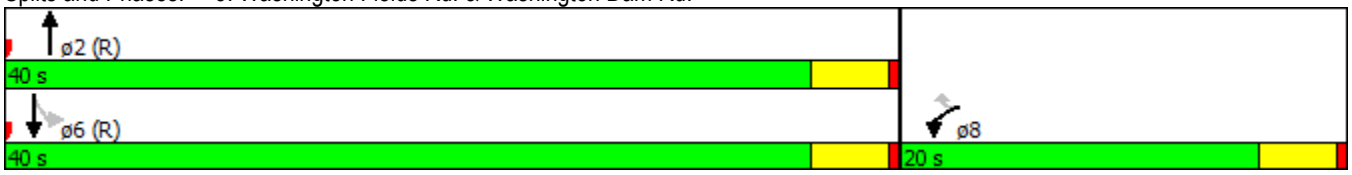
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	241	319	367	269	330	434
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.937			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3316	0	1770	3539
Flt Permitted	0.950				0.366	
Satd. Flow (perm)	1770	1583	3316	0	682	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		347	292			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	262	347	399	292	359	472
Shared Lane Traffic (%)						
Lane Group Flow (vph)	262	347	691	0	359	472
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0
Total Split (s)	20.0	20.0	40.0		40.0	40.0
Total Split (%)	33.3%	33.3%	66.7%		66.7%	66.7%
Maximum Green (s)	16.0	16.0	36.0		36.0	36.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	16.0	16.0	36.0		36.0	36.0
Actuated g/C Ratio	0.27	0.27	0.60		0.60	0.60
v/c Ratio	0.56	0.51	0.33		0.88	0.22
Control Delay	24.3	5.5	3.7		37.3	5.9



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	24.3	5.5	3.7		37.3	5.9
LOS	C	A	A		D	A
Approach Delay	13.6		3.7			19.5
Approach LOS	B		A			B

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 12.7		Intersection LOS: B	
Intersection Capacity Utilization 60.4%		ICU Level of Service B	
Analysis Period (min) 15			

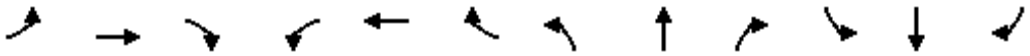
Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	36	68	7	72	14	113	63	10	11	37	123
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	182	39	74	8	78	15	123	68	11	12	40	134
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	505	456	107	477	517	74	174			79		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	505	456	107	477	517	74	174			79		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	52	91	92	98	81	98	91			99		
cM capacity (veh/h)	374	453	947	398	418	988	1403			1519		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	182	113	8	93	202	12	174
Volume Left	182	0	8	0	123	12	0
Volume Right	0	74	0	15	11	0	134
cSH	374	688	398	462	1403	1519	1700
Volume to Capacity	0.48	0.16	0.02	0.20	0.09	0.01	0.10
Queue Length 95th (ft)	64	15	1	19	7	1	0
Control Delay (s)	23.3	11.3	14.2	14.8	5.0	7.4	0.0
Lane LOS	C	B	B	B	A	A	
Approach Delay (s)	18.7		14.7		5.0	0.5	
Approach LOS	C		B				

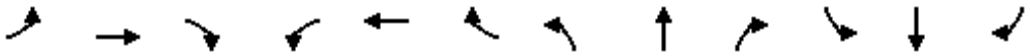
Intersection Summary				
Average Delay	10.3			
Intersection Capacity Utilization	45.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	40	33	1	50	0	0	0	0	9	1	77
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	43	36	1	54	0	0	0	0	10	1	84
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	54			79			202	118	61	118	136	54
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	54			79			202	118	61	118	136	54
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	92
cM capacity (veh/h)	1551			1519			692	772	1004	858	754	1013

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	79	1	54	10	85
Volume Left	0	1	0	10	0
Volume Right	36	0	0	0	84
cSH	1700	1519	1700	858	1008
Volume to Capacity	0.05	0.00	0.03	0.01	0.08
Queue Length 95th (ft)	0	0	0	1	7
Control Delay (s)	0.0	7.4	0.0	9.2	8.9
Lane LOS		A		A	A
Approach Delay (s)	0.0	0.1		8.9	
Approach LOS				A	

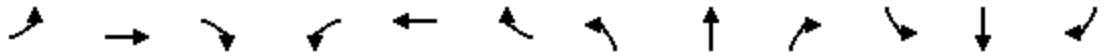
Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	22.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	14	0	0	17	3	40	0	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	15	0	0	18	3	43	0	5	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	22			15			111	113	15	114	111	20
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	22			15			111	113	15	114	111	20
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			95	100	99	100	100	100
cM capacity (veh/h)	1594			1603			851	759	1064	843	760	1058

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	38	15	22	49
Volume Left	38	0	0	43
Volume Right	0	0	3	5
cSH	1594	1700	1700	957
Volume to Capacity	0.02	0.01	0.01	0.05
Queue Length 95th (ft)	2	0	0	4
Control Delay (s)	7.3	0.0	0.0	9.3
Lane LOS	A			A
Approach Delay (s)	5.2		0.0	9.3
Approach LOS				A

Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	22.3%	ICU Level of Service		A
Analysis Period (min)	15			

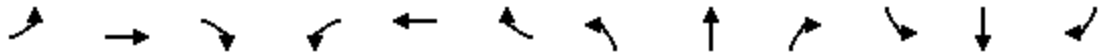


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	152	0	0	0	0	149	63	133	229	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	165	0	0	0	0	162	68	145	249	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	734	768	249	899	734	196	249			230		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	734	768	249	899	734	196	249			230		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	79	100	100	100	100			89		
cM capacity (veh/h)	308	296	790	188	310	845	1317			1337		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	173	230	393
Volume Left	8	0	145
Volume Right	165	68	0
cSH	739	1700	1337
Volume to Capacity	0.23	0.14	0.11
Queue Length 95th (ft)	23	0	9
Control Delay (s)	11.4	0.0	3.6
Lane LOS	B		A

Approach Delay (s)	11.4	0.0	3.6
Approach LOS	B		

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	119	0	88	84	73	0	0	243	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	129	0	96	91	79	0	0	264	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	624	528	266	528	530	79	268			79		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	624	528	266	528	530	79	268			79		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	70	100	90	93			100		
cM capacity (veh/h)	340	423	772	436	422	981	1295			1519		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	129	96	171	268
Volume Left	129	0	91	0
Volume Right	0	96	0	4
cSH	436	981	1295	1700
Volume to Capacity	0.30	0.10	0.07	0.16
Queue Length 95th (ft)	31	8	6	0
Control Delay (s)	16.7	9.1	4.5	0.0
Lane LOS	C	A	A	

Approach Delay (s)	13.5	4.5	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

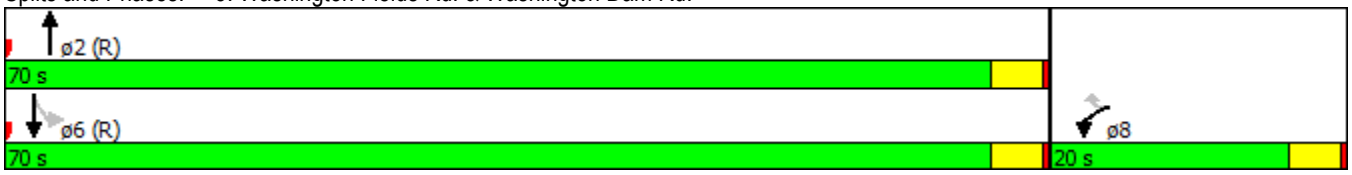


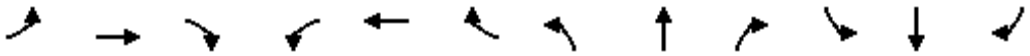
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	215	355	377	372	425	506
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.926			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3277	0	1770	3539
Flt Permitted	0.950				0.326	
Satd. Flow (perm)	1770	1583	3277	0	607	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		386	404			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	386	410	404	462	550
Shared Lane Traffic (%)						
Lane Group Flow (vph)	234	386	814	0	462	550
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0
Total Split (s)	20.0	20.0	70.0		70.0	70.0
Total Split (%)	22.2%	22.2%	77.8%		77.8%	77.8%
Maximum Green (s)	16.0	16.0	66.0		66.0	66.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	16.0	16.0	66.0		66.0	66.0
Actuated g/C Ratio	0.18	0.18	0.73		0.73	0.73
v/c Ratio	0.75	0.65	0.32		1.04	0.21
Control Delay	51.2	9.3	2.3		69.2	4.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	51.2	9.3	2.3		69.2	4.0
LOS	D	A	A		E	A
Approach Delay	25.1		2.3			33.8
Approach LOS	C		A			C

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Pretimed			
Maximum v/c Ratio: 1.04			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.

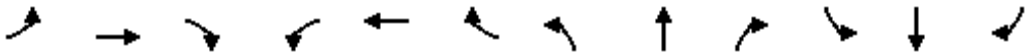




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	129	63	121	10	50	17	95	63	8	14	61	93
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	140	68	132	11	54	18	103	68	9	15	66	101
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	472	431	117	542	477	73	167			77		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	472	431	117	542	477	73	167			77		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	67	86	86	97	88	98	93			99		
cM capacity (veh/h)	419	474	935	324	447	989	1410			1521		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	140	200	11	73	180	15	167
Volume Left	140	0	11	0	103	15	0
Volume Right	0	132	0	18	9	0	101
cSH	419	702	324	519	1410	1521	1700
Volume to Capacity	0.33	0.28	0.03	0.14	0.07	0.01	0.10
Queue Length 95th (ft)	36	29	3	12	6	1	0
Control Delay (s)	17.8	12.2	16.5	13.1	4.7	7.4	0.0
Lane LOS	C	B	C	B	A	A	
Approach Delay (s)	14.5		13.5		4.7	0.6	
Approach LOS	B		B				

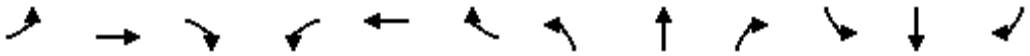
Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	41.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	108	38	5	81	0	0	0	0	7	0	61
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	117	41	5	88	0	0	0	0	8	0	66
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	88			159			303	237	138	237	258	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			159			303	237	138	237	258	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	93
cM capacity (veh/h)	1508			1421			603	661	910	715	644	970

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	159	5	88	8	66
Volume Left	0	5	0	8	0
Volume Right	41	0	0	0	66
cSH	1700	1421	1700	715	970
Volume to Capacity	0.09	0.00	0.05	0.01	0.07
Queue Length 95th (ft)	0	0	0	1	5
Control Delay (s)	0.0	7.5	0.0	10.1	9.0
Lane LOS		A		B	A
Approach Delay (s)	0.0	0.4		9.1	
Approach LOS				A	

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	25.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	96	20	0	0	17	9	68	1	10	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	104	22	0	0	18	10	74	1	11	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	28			22			254	259	22	260	254	23
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	28			22			254	259	22	260	254	23
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			89	100	99	100	100	100
cM capacity (veh/h)	1585			1594			664	603	1055	651	607	1053

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	104	22	28	86
Volume Left	104	0	0	74
Volume Right	0	0	10	11
cSH	1585	1700	1700	759
Volume to Capacity	0.07	0.01	0.02	0.11
Queue Length 95th (ft)	5	0	0	10
Control Delay (s)	7.4	0.0	0.0	10.8
Lane LOS	A			B
Approach Delay (s)	6.1		0.0	10.8
Approach LOS				B

Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	25.1%	ICU Level of Service		A
Analysis Period (min)	15			

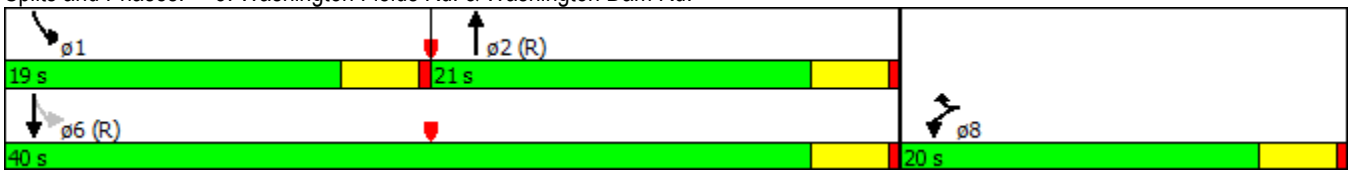


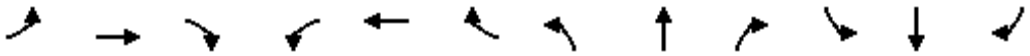
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	215	355	377	372	425	506
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.926			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3277	0	1770	3539
Flt Permitted	0.950				0.190	
Satd. Flow (perm)	1770	1583	3277	0	354	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		386	404			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	386	410	404	462	550
Shared Lane Traffic (%)						
Lane Group Flow (vph)	234	386	814	0	462	550
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Prot	NA		pm+pt	NA
Protected Phases	8	8	2		1	6
Permitted Phases					6	
Minimum Split (s)	20.0	20.0	20.0		8.0	20.0
Total Split (s)	20.0	20.0	21.0		19.0	40.0
Total Split (%)	33.3%	33.3%	35.0%		31.7%	66.7%
Maximum Green (s)	16.0	16.0	17.0		15.0	36.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.0	16.0	17.0		36.0	36.0
Actuated g/C Ratio	0.27	0.27	0.28		0.60	0.60
v/c Ratio	0.50	0.55	0.67		0.82	0.26
Control Delay	22.9	5.7	12.4		25.2	6.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	22.9	5.7	12.4		25.2	6.1
LOS	C	A	B		C	A
Approach Delay	12.2		12.4			14.8
Approach LOS	B		B			B

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 13.3		Intersection LOS: B	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.

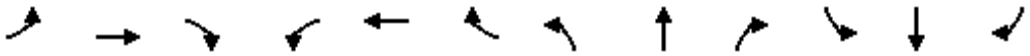




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	0	0	0	0	0	2	0	133	1	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	0	0	0	0	0	0	2	0	145	1	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	292	292	1	292	292	2	1			2		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	292	292	1	292	292	2	1			2		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			91		
cM capacity (veh/h)	615	563	1083	615	563	1082	1622			1620		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	8	2	146
Volume Left	8	0	145
Volume Right	0	0	0
cSH	615	1700	1620
Volume to Capacity	0.01	0.00	0.09
Queue Length 95th (ft)	1	0	7
Control Delay (s)	10.9	0.0	7.4
Lane LOS	B		A
Approach Delay (s)	10.9	0.0	7.4
Approach LOS	B		

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	24.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	5	0	88	0	10	0	0	129	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	5	0	96	0	11	0	0	140	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	249	153	142	153	155	11	145			11		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	249	153	142	153	155	11	145			11		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	91	100			100		
cM capacity (veh/h)	642	739	905	814	736	1070	1438			1608		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	5	96	11	145
Volume Left	5	0	0	0
Volume Right	0	96	0	4
cSH	814	1070	1438	1700
Volume to Capacity	0.01	0.09	0.00	0.09
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	9.5	8.7	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.7		0.0	0.0
Approach LOS	A			

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	17.0%	ICU Level of Service	A	
Analysis Period (min)	15			

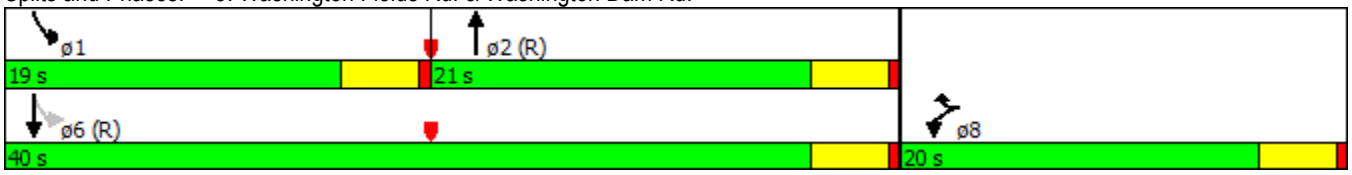


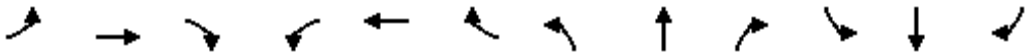
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	194	314	377	334	349	506
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.930			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3291	0	1770	3539
Flt Permitted	0.950				0.190	
Satd. Flow (perm)	1770	1583	3291	0	354	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		341	363			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	341	410	363	379	550
Shared Lane Traffic (%)						
Lane Group Flow (vph)	211	341	773	0	379	550
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Prot	NA		pm+pt	NA
Protected Phases	8	8	2		1	6
Permitted Phases					6	
Minimum Split (s)	20.0	20.0	20.0		8.0	20.0
Total Split (s)	20.0	20.0	21.0		19.0	40.0
Total Split (%)	33.3%	33.3%	35.0%		31.7%	66.7%
Maximum Green (s)	16.0	16.0	17.0		15.0	36.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	5.0	5.0	5.0			5.0
Flash Dont Walk (s)	11.0	11.0	11.0			11.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.0	16.0	17.0		36.0	36.0
Actuated g/C Ratio	0.27	0.27	0.28		0.60	0.60
v/c Ratio	0.45	0.51	0.65		0.67	0.26
Control Delay	22.0	5.5	12.6		15.6	6.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	22.0	5.5	12.6		15.6	6.1
LOS	C	A	B		B	A
Approach Delay	11.8		12.6			10.0
Approach LOS	B		B			A

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 60			
Control Type: Pretimed			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 11.3		Intersection LOS: B	
Intersection Capacity Utilization 61.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.

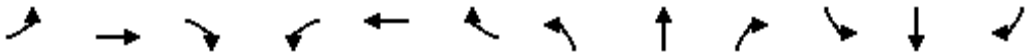




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	98	63	79	6	50	17	72	63	6	14	61	76
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	107	68	86	7	54	18	78	68	7	15	66	83
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	412	370	108	445	408	72	149			75		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	412	370	108	445	408	72	149			75		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	87	91	98	89	98	95			99		
cM capacity (veh/h)	471	524	946	408	499	991	1433			1524		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	107	154	7	73	153	15	149
Volume Left	107	0	7	0	78	15	0
Volume Right	0	86	0	18	7	0	83
cSH	471	697	408	571	1433	1524	1700
Volume to Capacity	0.23	0.22	0.02	0.13	0.05	0.01	0.09
Queue Length 95th (ft)	22	21	1	11	4	1	0
Control Delay (s)	14.9	11.6	14.0	12.2	4.1	7.4	0.0
Lane LOS	B	B	B	B	A	A	
Approach Delay (s)	12.9		12.4		4.1	0.7	
Approach LOS	B		B				

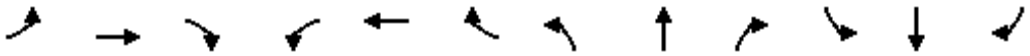
Intersection Summary				
Average Delay	7.8			
Intersection Capacity Utilization	37.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	62	38	5	81	0	0	0	0	2	0	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	67	41	5	88	0	0	0	0	2	0	39
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	88			109			226	187	88	187	208	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			109			226	187	88	187	208	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	96
cM capacity (veh/h)	1508			1482			698	705	970	771	687	970

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	109	5	88	2	39
Volume Left	0	5	0	2	0
Volume Right	41	0	0	0	39
cSH	1700	1482	1700	771	970
Volume to Capacity	0.06	0.00	0.05	0.00	0.04
Queue Length 95th (ft)	0	0	0	0	3
Control Delay (s)	0.0	7.4	0.0	9.7	8.9
Lane LOS		A		A	A
Approach Delay (s)	0.0	0.4		8.9	
Approach LOS				A	

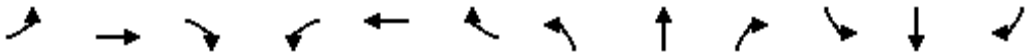
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	15	0	0	17	1	68	1	10	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	16	0	0	18	1	74	1	11	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	20			16			144	145	16	150	144	19
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	20			16			144	145	16	150	144	19
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			91	100	99	100	100	100
cM capacity (veh/h)	1597			1601			804	721	1063	787	722	1059

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	54	16	20	86
Volume Left	54	0	0	74
Volume Right	0	0	1	11
cSH	1597	1700	1700	919
Volume to Capacity	0.03	0.01	0.01	0.09
Queue Length 95th (ft)	3	0	0	8
Control Delay (s)	7.3	0.0	0.0	9.8
Lane LOS	A			A
Approach Delay (s)	5.6		0.0	9.8
Approach LOS				A

Intersection Summary				
Average Delay	7.0			
Intersection Capacity Utilization	22.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	0	18	0	0	0	0	680	57	117	192	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	0	20	0	0	0	0	739	62	127	209	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1233	1264	209	1253	1233	770	209			801		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1233	1264	209	1253	1233	770	209			801		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	100	98	100	100	100	100			85		
cM capacity (veh/h)	135	143	832	128	149	401	1362			822		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	46	801	336
Volume Left	26	0	127
Volume Right	20	62	0
cSH	211	1700	822
Volume to Capacity	0.22	0.47	0.15
Queue Length 95th (ft)	20	0	14
Control Delay (s)	26.7	0.0	5.0
Lane LOS	D		A
Approach Delay (s)	26.7	0.0	5.0
Approach LOS	D		

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	69.2%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	16	0	151	57	648	0	0	300	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	17	0	164	62	704	0	0	326	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1332	1167	339	1167	1180	704	352			704		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1332	1167	339	1167	1180	704	352			704		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	89	100	62	95			100		
cM capacity (veh/h)	79	184	703	164	180	437	1207			893		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	17	164	766	352
Volume Left	17	0	62	0
Volume Right	0	164	0	26
cSH	164	437	1207	1700
Volume to Capacity	0.11	0.38	0.05	0.21
Queue Length 95th (ft)	9	43	4	0
Control Delay (s)	29.6	18.1	1.3	0.0
Lane LOS	D	C	A	
Approach Delay (s)	19.2		1.3	0.0
Approach LOS	C			

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	67.8%	ICU Level of Service	C	
Analysis Period (min)	15			

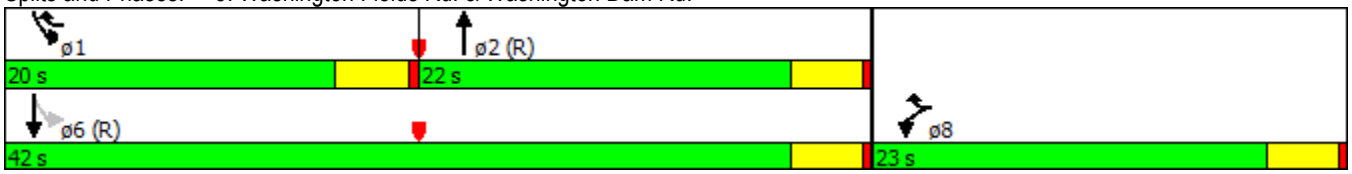


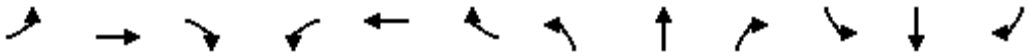
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	426	640	451	363	469	531
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.933			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3302	0	1770	3539
Flt Permitted	0.950				0.182	
Satd. Flow (perm)	1770	1583	3302	0	339	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		105	309			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	463	696	490	395	510	577
Shared Lane Traffic (%)						
Lane Group Flow (vph)	463	696	885	0	510	577
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases					6	
Minimum Split (s)	20.0		20.0		8.0	20.0
Total Split (s)	23.0		22.0		20.0	42.0
Total Split (%)	35.4%		33.8%		30.8%	64.6%
Maximum Green (s)	19.0		18.0		16.0	38.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	0.5		0.5		0.5	0.5
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		4.0	4.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	5.0		5.0			5.0
Flash Dont Walk (s)	11.0		11.0			11.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	19.0	39.0	18.0		38.0	38.0
Actuated g/C Ratio	0.29	0.60	0.28		0.58	0.58
v/c Ratio	0.90	0.70	0.78		0.93	0.28
Control Delay	45.6	12.3	19.6		41.0	7.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	45.6	12.3	19.6		41.0	7.1
LOS	D	B	B		D	A
Approach Delay	25.6		19.6			23.0
Approach LOS	C		B			C

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 23.0		Intersection LOS: C	
Intersection Capacity Utilization 83.7%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.

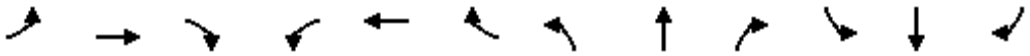




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	220	114	77	65	327	132	101	88	24	48	52	131
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	124	84	71	355	143	110	96	26	52	57	142

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	239	208	71	499	110	122	52	199
Volume Left (vph)	239	0	71	0	110	0	52	0
Volume Right (vph)	0	84	0	143	0	26	0	142
Hadj (s)	0.53	-0.25	0.53	-0.17	0.53	-0.12	0.53	-0.47
Departure Headway (s)	7.7	6.9	7.5	6.8	8.4	7.8	8.4	7.4
Degree Utilization, x	0.51	0.40	0.15	0.94	0.26	0.26	0.12	0.41
Capacity (veh/h)	453	503	465	527	413	445	413	470
Control Delay (s)	17.2	13.2	10.5	49.9	13.1	12.3	11.3	14.1
Approach Delay (s)	15.3		45.0		12.7		13.6	
Approach LOS	C		E		B		B	

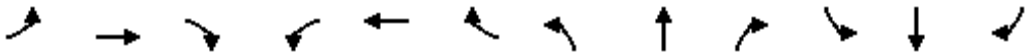
Intersection Summary				
Delay	25.9			
Level of Service	D			
Intersection Capacity Utilization	67.2%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	38	103	92	145	0	0	0	0	77	2	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	41	112	100	158	0	0	0	0	84	2	50
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	158			153			506	455	97	455	511	158
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	158			153			506	455	97	455	511	158
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			100	100	100	83	99	94
cM capacity (veh/h)	1422			1427			424	466	959	488	433	888

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	153	100	158	84	52
Volume Left	0	100	0	84	0
Volume Right	112	0	0	0	50
cSH	1700	1427	1700	488	851
Volume to Capacity	0.09	0.07	0.09	0.17	0.06
Queue Length 95th (ft)	0	6	0	15	5
Control Delay (s)	0.0	7.7	0.0	13.9	9.5
Lane LOS		A		B	A
Approach Delay (s)	0.0	3.0		12.2	
Approach LOS				B	

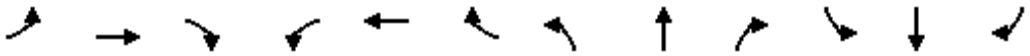
Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	32.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	84	0	0	174	92	71	0	30	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	91	0	0	189	100	77	0	33	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	289			91			398	448	91	414	398	239
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	289			91			398	448	91	414	398	239
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			86	100	97	100	100	100
cM capacity (veh/h)	1273			1504			551	493	966	519	526	800

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	34	91	289	110
Volume Left	34	0	0	77
Volume Right	0	0	100	33
cSH	1273	1700	1700	784
Volume to Capacity	0.03	0.05	0.17	0.14
Queue Length 95th (ft)	2	0	0	12
Control Delay (s)	7.9	0.0	0.0	11.5
Lane LOS	A			B
Approach Delay (s)	2.1		0.0	11.5
Approach LOS				B

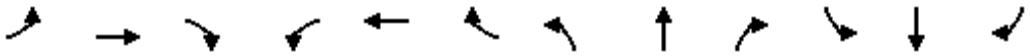
Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	32.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	0	62	0	0	0	0	397	33	184	717	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	0	67	0	0	0	0	432	36	200	779	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1629	1647	779	1696	1629	449	779			467		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1629	1647	779	1696	1629	449	779			467		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	83	100	100	100	100			82		
cM capacity (veh/h)	70	81	396	52	83	610	838			1094		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	89	467	979
Volume Left	22	0	200
Volume Right	67	36	0
cSH	186	1700	1094
Volume to Capacity	0.48	0.27	0.18
Queue Length 95th (ft)	58	0	17
Control Delay (s)	41.1	0.0	4.3
Lane LOS	E		A
Approach Delay (s)	41.1	0.0	4.3
Approach LOS	E		

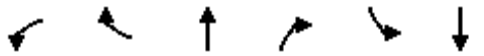
Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	85.7%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	67	0	122	33	375	0	0	834	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	73	0	133	36	408	0	0	907	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1524	1391	912	1391	1397	408	917			408		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1524	1391	912	1391	1397	408	917			408		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	37	100	79	95			100		
cM capacity (veh/h)	74	135	332	115	134	644	744			1151		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	73	133	443	917
Volume Left	73	0	36	0
Volume Right	0	133	0	11
cSH	115	644	744	1700
Volume to Capacity	0.63	0.21	0.05	0.54
Queue Length 95th (ft)	80	19	4	0
Control Delay (s)	79.1	12.0	1.4	0.0
Lane LOS	F	B	A	
Approach Delay (s)	35.8		1.4	0.0
Approach LOS	E			

Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	57.4%	ICU Level of Service	B	
Analysis Period (min)	15			



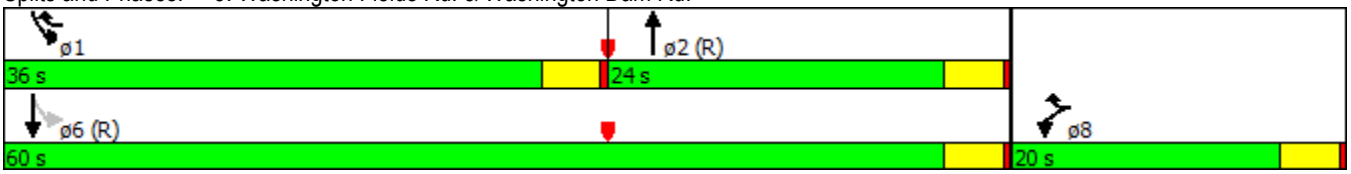
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	337	577	463	586	782	619
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.916			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3242	0	1770	3539
Flt Permitted	0.950				0.167	
Satd. Flow (perm)	1770	1583	3242	0	311	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		75	382			
Link Speed (mph)	30		30			30
Link Distance (ft)	408		270			270
Travel Time (s)	9.3		6.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	366	627	503	637	850	673
Shared Lane Traffic (%)						
Lane Group Flow (vph)	366	627	1140	0	850	673
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA		pm+pt	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases					6	
Minimum Split (s)	20.0		20.0		8.0	20.0
Total Split (s)	20.0		24.0		36.0	60.0
Total Split (%)	25.0%		30.0%		45.0%	75.0%
Maximum Green (s)	16.0		20.0		32.0	56.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	0.5		0.5		0.5	0.5
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		4.0	4.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	5.0		5.0			5.0
Flash Dont Walk (s)	11.0		11.0			11.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	16.0	52.0	20.0		56.0	56.0
Actuated g/C Ratio	0.20	0.65	0.25		0.70	0.70
v/c Ratio	1.03	0.59	1.04		1.06	0.27
Control Delay	91.3	9.7	59.5		69.9	4.8

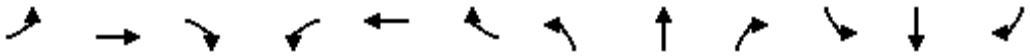


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	91.3	9.7	59.5		69.9	4.8
LOS	F	A	E		E	A
Approach Delay	39.8		59.5			41.1
Approach LOS	D		E			D

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 46.5		Intersection LOS: D	
Intersection Capacity Utilization 103.6%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 3: Washington Fields Rd. & Washington Dam Rd.

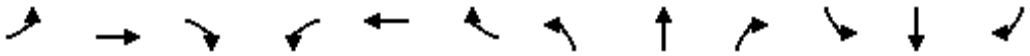




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	136	326	110	41	200	90	100	88	68	139	84	105
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	354	120	45	217	98	109	96	74	151	91	114

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	148	474	45	315	109	170	151	205
Volume Left (vph)	148	0	45	0	109	0	151	0
Volume Right (vph)	0	120	0	98	0	74	0	114
Hadj (s)	0.53	-0.14	0.53	-0.18	0.53	-0.27	0.53	-0.35
Departure Headway (s)	7.9	7.2	8.3	7.6	8.7	7.9	8.5	7.6
Degree Utilization, x	0.32	0.95	0.10	0.66	0.26	0.37	0.36	0.44
Capacity (veh/h)	444	487	419	456	401	441	410	457
Control Delay (s)	13.4	54.1	11.0	23.1	13.6	14.3	15.0	15.2
Approach Delay (s)	44.4		21.6		14.0		15.1	
Approach LOS	E		C		B		C	

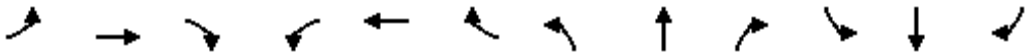
Intersection Summary				
Delay	27.7			
Level of Service	D			
Intersection Capacity Utilization	57.0%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	86	86	67	232	0	0	0	0	128	0	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	93	93	73	252	0	0	0	0	139	0	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	252			187			592	538	140	538	585	252
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	252			187			592	538	140	538	585	252
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			100	100	100	68	100	93
cM capacity (veh/h)	1313			1387			373	426	908	436	401	786

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	187	73	252	139	54
Volume Left	0	73	0	139	0
Volume Right	93	0	0	0	54
cSH	1700	1387	1700	436	786
Volume to Capacity	0.11	0.05	0.15	0.32	0.07
Queue Length 95th (ft)	0	4	0	34	6
Control Delay (s)	0.0	7.7	0.0	17.1	9.9
Lane LOS		A		C	A
Approach Delay (s)	0.0	1.7		15.1	
Approach LOS				C	

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	32.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	146	0	0	144	62	154	2	70	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	159	0	0	157	67	167	2	76	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	224			159			499	533	159	538	499	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	224			159			499	533	159	538	499	190
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			64	99	91	100	100	100
cM capacity (veh/h)	1345			1421			461	428	887	396	447	852

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	75	159	224	246
Volume Left	75	0	0	167
Volume Right	0	0	67	76
cSH	1345	1700	1700	668
Volume to Capacity	0.06	0.09	0.13	0.37
Queue Length 95th (ft)	4	0	0	42
Control Delay (s)	7.8	0.0	0.0	14.9
Lane LOS	A			B
Approach Delay (s)	2.5		0.0	14.9
Approach LOS				B

Intersection Summary				
Average Delay	6.0			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			

LONG VALLEY TRAILS

Noise Impacts

Section 11

Noise Impacts:

The Long Valley Trails Development is made up entirely of Residential Units. These units include predominately single-family detached homes with two areas of Condominiums and several Townhome developments disbursed throughout the planned development. All neighborhoods within the development will be accessed from Residential Collector streets which do not have any living units fronting the street. These roadways all have large landscape buffers located between the traffic and the residential developments. A combination of landscape berms, trees and fencing will be used to shield the residential units from the interior project traffic.

It is not anticipated that the development of Long Valley Trails will have any noise impacts to the land surrounding the planned development. The Southern Parkway runs along the entire Westerly and Southernly boundaries of the entire development. A large ridgeline runs along the entire Easterly boundary, effectively isolating any noise impacts from the development. The Southerly boundary is the only un-buffered adjoining land. This land is owned by the BLM and has been designated as an area of Critical Environmental Concern (ACEC) and is restricted from any improvements or development.

Long Valley residents can potentially be impacted by traffic noise from the Southern Parkway. The project plan uses a combination of open space, buffer zones and higher density units to mitigate the noise impact to this project. Long Valley lies within the approach path to the St. George Regional Airport. The over-flight of planes occur at a sufficient elevation to make their noise impacts minimal to the Long Valley Residents.

Noise impact the affect the proposed dwelling units and may affect adjoining properties have been mitigated with the design of the project.

LONG VALLEY TRAILS

Project Phasing Plan

Section 12

Section 12 Executive Summary

1. Overall Project takedowns:

Long Valley Trails is currently under contract to a single national builder. The builder will purchase all of Long Valley Trails in 3 separate takedowns over a 2-year period. Each of these takedowns will be designated with preliminary plats which will define the units in each takedown. The first group of Preliminary Plats will include 787 units over approximately 201 acres.

2. Project Phasing:

Each Preliminary Plat will include a portion of each Product type, including single family lots, Patio Homes, Townhomes and Condominiums. It is the builder's intention to build between 200 to 300 units per year. These units will be spread over the various unit types and the actual number of each unit will be determined by market demand. Based on the current housing market in Washington County it is estimated that the build out of this project will take approximately 10 years. Since market demand for each type of unit will vary from year to year it is impractical to submit a detailed phasing plan. In order to assist Washington City, the following linear breakdown of units is shown. Please note that this is **not** a detailed phasing plan but rather an example for illustration purposes only. Actual phasing will be determined by the submittal of final plats for each type of units in accordance with the approved Preliminary Plat.

Unit Types	Unit Sizes	Total Units	1st Takedown	2nd Takedown	3rd Takedown
Active Adult	Varies	337	227	110	0
Medium Lots	6,000+ sq. ft.	539	111	153	275
Large Lots	7,000+ sq. ft	63	6	57	0
Patio Homes	4,000+ sq. ft	277	54	176	47
Townhomes	Attached	891	267	194	430
Condos/Apartments	Attached	254	122	97	35
Totals		**2361**	**787**	**787**	**787**

3. Project Infrastructure Triggers:

Long Valley Trails is a large multi-year project. The infrastructure needed for this project includes roads, water, sewer, power, natural gas, telephone, TV, solid waste collection and mail delivery. Each one of those needs have been addressed in these PCD documents. All of these required services will be provided to meet the needs of all the homes within Long Valley Trails. The following table outlines the key trigger points for each required service:

Services	Phase 1 Units	Phase 2 Units	Total Units Served
Roads*	1568	793	2361
Water*	1030	1331	2361
Sanitary Sewer*	2361	N/A	2361
Sewer Natural Gas	2361	N/A	2361
Telephone	2361	N/A	2361
TV	2361	N/A	2361
Solid Waste	2361	N/A	2361
Mail Delivery	2361	N/A	2361
* See Engineering Studies for specific details			

Notes:

1. Sanitary Sewer is proposing a lift station, pressure line and gravity flow line back to the regional sewer system located in 3650 South. This system will handle the entire Long Valley Development

2. The master developer is improving Washington Dam Road to a full 5 lane Arterial road. Washington Dam Road along with the existing Southern Parkway have the potential of meeting the demand created by Long Valley Trails. After 1568 units have been complete the actual traffic distribution may need to be re-evaluated as outlined in the project Traffic Study.

3. Culinary water development is outlined in the master water study prepared by Sunrise Engineering. That study outlines 3 phases, however, the water infrastructure will be constructed in just 2 phases. The water tank and related improvements will be completed well in advance of the build out of the 1030 units support with the phase 1 improvements.

Legend

Total Area	**605.61 ac**	
Land Uses	**Acres**	**Units**
Active Adult	64.05	337
Large Lots	28.76	63
Medium Lots	130.33	539
Patio Homes	44.85	277
Townhomes	80.63	891
Condos	11.58	254
Total	360.20	2,361

Club Cottage/Nightly Rental Overlay
Amenity Locations
Trails (Type Varies)

Statistical Summary

POD	Land Use	Acres	Units	DU/AC
1	Active Adult	14.35	62	4.3
2	Active Adult	27.98	165	5.9
3	Active Adult	21.72	110	5.1
4	Large Lots	13.59	34	2.5
5	Medium Lots	36.42	153	4.2
6	Large Lots	15.17	29	1.9
7	Medium Lots	48.66	161	3.3
8	Patio Homes	6.16	38	6.2
9	Townhomes	9.45	90	9.5
10	Clubhouse	7.16	0	0.0
11	Townhomes	9.15	110	12.0
12	Patio Homes	5.61	29	5.2
13	Medium Lots	21.85	111	5.1
14	Condos	5.78	122	21.1
15	Condos	5.8	132	22.8
16	Patio Homes	4.12	29	7.0
17	Medium Lots	23.4	114	4.9
18	Patio Homes	12.92	78	6.0
19	Townhomes	7.4	86	11.6
20	Townhomes	19.55	224	11.5
21	Patio Homes	7.88	54	6.9
22	Townhomes	17.89	187	10.5
23	Patio Homes	8.16	49	6.0
24	Townhomes	17.19	194	11.3
25	RV Storage	4.26	0	0.0
TOTALS			2361	

Takedown #1

Takedown #2

Takedown #3

SOUTHERN PARKWAY

HILLSIDE / OPEN SPACE

OPEN SPACE

SOUTHERN PARKWAY

Takedown #1

Takedown #2

Takedown #3

LONG VALLEY TRAILS

PCD DEVELOPMENT PLAN

Long Valley Trails

Sept 16, 2020

North

BH

D·R·HORTON America's Builder

Conceptual Project Phasing Plan

LONG VALLEY TRAILS

Adjacent Property

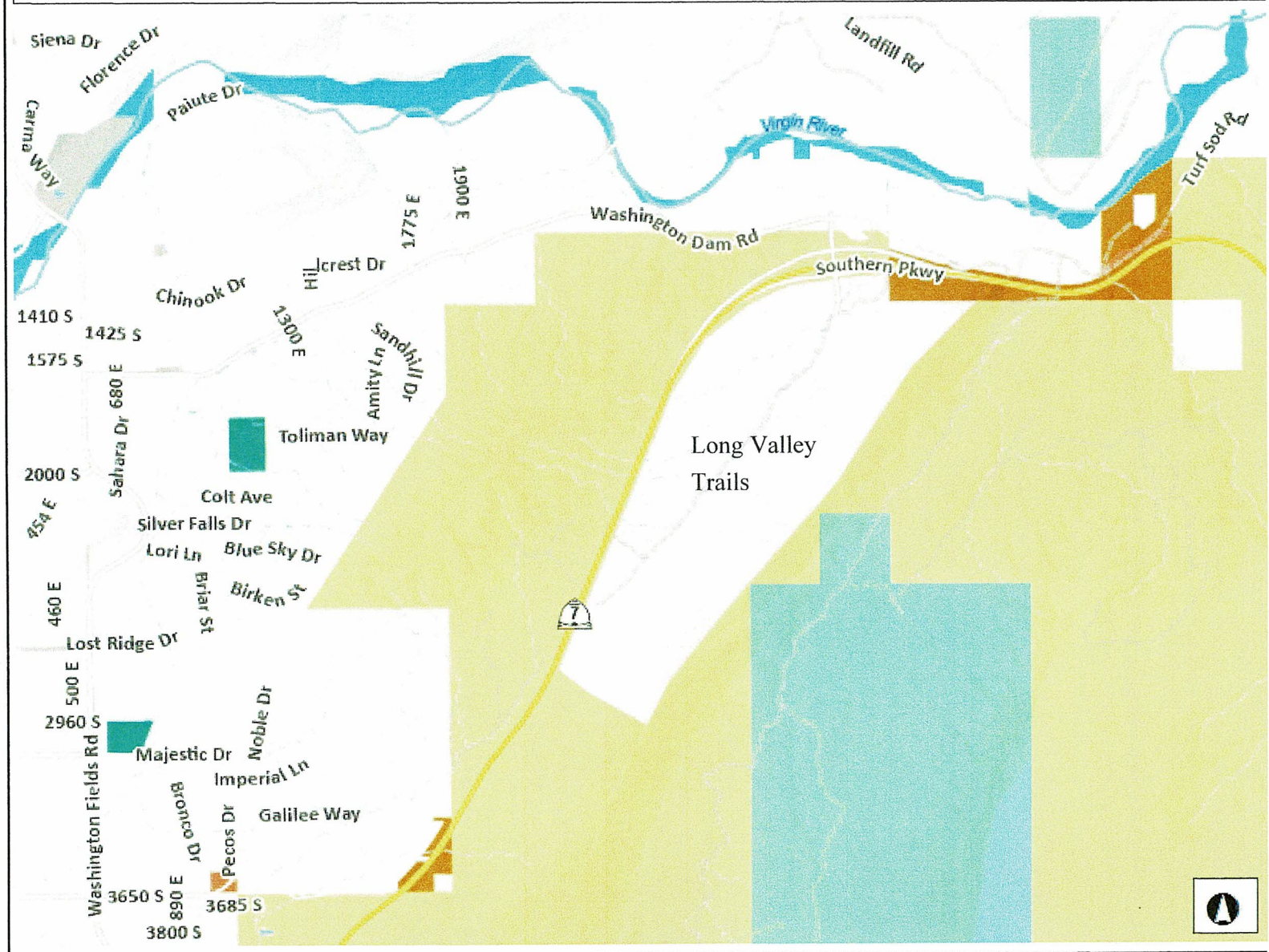
Section 13

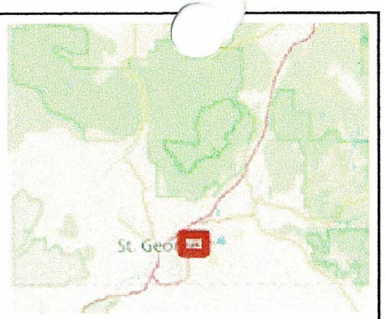
Adjacent Property:

The Long Valley Trails parcel was obtained from the BLM through a property exchange for lands within the Red Cliffs Desert Reserve. Brennan Family Holdings was the largest private landowner in the Red Cliffs Desert Reserve and has work with the stakeholders of the Washington County HCP to preserve the Red Cliffs NCA and to allow Washington County to renew its Section 10 Incidental Take Permit. This permit has allowed lands in Washington County to be utilized without the need to meet the stringent requirements of the Endangered Species Act. Brennan Family Holdings has provided a significant portion of the mitigation for the Mohave Desert Tortoise and other species in Washington County. As part of the process to resolve its lands in the Red Cliffs Desert Reserve Brennan Family Holdings has donated millions of dollars of property to the stakeholders of the Washington County HCP. Washington City has or will receive over 80 acres of this donated land.

Due to the Land Exchange, the majority of the adjoining land to Long Valley Trails are owned by the BLM. The entire Western and Southern boundary border the ROW for the Southern Parkway. Only the land directly north of Long Valley Trails and on the other side of the Southern Parkway are private. The attached maps and annexation plat show the relationship of Long Valley Trails to the region.

Long Valley Trails Vicinity Map





Legend

Ownership

- U.S. Forest Service
- U.S. Forest Service Wilderness
- Bureau of Land Management
- Bureau of Land Management Wilde
- National Park Service
- Shivwits Reservation
- Utah Division of Wildlife Resources
- Utah Division of Transportation
- State Park
- State of Utah
- Washington County
- Municipally Owned
- School District
- Privately Owned
- Water
- Water Conservancy District
- State Assessed Oil and Gas
- Mining Claim

Notes

6,969.4 0 3,484.68 6,969.4 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

DISCLAIMER: The information shown on this map was compiled from different GIS sources. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Washington County, Utah will not be held responsible for any claims, losses or damages resulting from the use of this map.

LONG VALLEY ADDITION TO WASHINGTON CITY, UTAH

LOCATED IN

SECTION 20, 29, 30 AND 31 TOWNSHIP 42 SOUTH, RANGE 14 WEST,
SALT LAKE BASE AND MERIDIAN
PREPARED FOR: BRENNAN HOLDINGS LLC

NARRATIVE

THE PURPOSE OF THIS SURVEY IS TO ESTABLISH THE BOUNDARY OF AN AREA TO BE ANNEXED INTO WASHINGTON CITY, UTAH. THE SURVEY WAS PERFORMED AT THE REQUEST OF OUR CLIENT. THE BASIS OF BEARING FOR THIS SURVEY IS S 89°20'29" E ALONG THE NORTH LINE OF SECTION 30, TOWNSHIP 42 SOUTH, RANGE 14 WEST, SALT LAKE BASE AND MERIDIAN, BETWEEN TWO FOUND MONUMENTS, TYPE AND LOCATIONS OF WHICH ARE SHOWN ON THIS PLAT.

THE SOUTH, WEST AND PART OF THE NORTH BOUNDARY WAS ESTABLISHED BY RECORD SECTION DATA, THE NORTH LINE WAS ESTABLISHED BY THE NORTH RIGHT OF WAY LINE OF SOUTHERN PARKWAY, THE EAST LINE WAS ESTABLISHED BY SURVEY PERFORMED BY THE BUREAU OF LAND MANAGEMENT AND FURTHER DESCRIBED IN PATENT UTU–88966FD, RECORDED AS DOCUMENT NO. 20160047271, AT WASHINGTON COUNTY RECORDERS OFFICE, STATE OF UTAH.

THE FOLLOWING DOCUMENTS OF RECORD WERE REVIEWED AND CONSIDERED AS A PART OF THIS SURVEY. THERE MAY EXIST OTHER DOCUMENTS EITHER PRIVATE OR OF RECORD THAT WOULD AFFECT THIS SURVEY. ANY NEW EVIDENCE CONTRADICTORY TO THIS SURVEY SHOULD BE PRESENTED TO BUSH & GUDGELL, INC. FOR REVIEW AND CONSIDERATION.

RECORD OF SURVEY RS006214–14, SOUTHERN PARKWAY PROJECT NO. S0007(14), PREPARED BY BUSH & GUDGELL, INC
RECORD OF SURVEY RS006760–16, SOUTHERN PARKWAY PROJECT NO. S0007(18), PREPARED BY BUSH & GUDGELL, INC
US PATENT UTU–88966FD, DOCUMENT NO. 20160047271, RECORDED DATE 12–12–2016
DEPENDENT RESURVEY, SECTIONS 19, 20, 29, 30 AND 31, TOWNSHIP 42 SOUTH, RANGE 15 WEST, SLB&M, SIGNED BY DANIEL W. WEBB, SEPTEMBER 30, 2014

SURVEYOR'S CERTIFICATE

I, D. GREGG MEYERS, DO HEREBY CERTIFY THAT I AM A PROFESSIONAL LAND SURVEYOR AND THAT I HOLD CERTIFICATE OF REGISTRATION (LICENSE) NUMBER 312770, AS PRESCRIBED UNDER THE LAWS OF THE STATE OF UTAH. I FURTHER CERTIFY THAT BY AUTHORITY OF THE OWNER'S I HAVE SUPERVISED A SURVEY OF THE TRACT OF LAND SHOWN ON THIS PLAT AND DESCRIBED BELOW.

PROFESSIONAL LAND SURVEYOR
LICENSE #312770
D. GREGG MEYERS
STATE OF UTAH

DATE:
BUSH AND GUDGELL INC.

D. GREGG MEYERS
PROFESSIONAL LAND SURVEYOR
UTAH LICENSE NUMBER 312770

BOUNDARY DESCRIPTION

BEGINNING AT THE NORTHWEST CORNER OF SECTION 30, TOWNSHIP 42 SOUTH, RANGE 14 WEST, SALT LAKE BASE AND MERIDIAN, AND RUNNING THENCE SOUTH 88°29'55" EAST ALONG THE NORTH LINE OF SAID SECTION 30, 3028.89 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 30, THENCE SOUTH 89°20'26" EAST ALONG THE NORTH LINE OF SAID SECTION 30, 2617.03 FEET TO THE NORTHEAST CORNER SAID SECTION; THENCE NORTH 01°08'40" EAST ALONG THE WEST LINE OF SECTION 20, TOWNSHIP 42 SOUTH, RANGE 14 WEST, SALT LAKE BASE AND MERIDIAN 1322.68 FEET TO THE SOUTH SIXTEENTH LINE OF THE SOUTHWEST QUARTER SAID SECTION 20; THENCE SOUTH 88°53'17" EAST ALONG SAID LINE 1521.74 FEET MORE OR LESS, TO THE WEST RIGHT–OF–WAY OF SOUTHERN PARKWAY, (UDOT PROJECT NO. S–0007(14)), THENCE NORTH 01°16'18" EAST ALONG SAID LINE, 195.30 FEET MORE OR LESS, TO THE SOUTH LINE OF WASHINGTON DAM ROAD, THENCE ALONG SAID LINE THE FOLLOWING THREE (3) COURSES AND DISTANCES: 1– SOUTH 89°17'26" EAST 220.36 FEET, 2– EASTERLY ALONG A 1415.00 FOOT RADIUS CURVE TO THE RIGHT, (LONG CHORD BEARS SOUTH 74°18'46" EAST A DISTANCE OF 731.39 FEET, CENTER POINT LIES SOUTH 00°42'34" WEST), THROUGH A CENTRAL ANGLE OF 29°57'19" A DISTANCE OF 739.79 FEET AND 3– SOUTH 59°20'07" EAST 25.94 FEET TO SAID SIXTEENTH LINE, THENCE SOUTH 88°53'17" EAST ALONG SAID LINE 172.33 FEET TO A POINT ON THE SOUTH CENTER SECTION LINE SAID SECTION 20, THENCE SOUTH 01°08'27" WEST ALONG SAID LINE 335.02 FEET TO A POINT ON THE NORTH HIGHWAY RIGHT–OF–WAY AND NO ACCESS LINE OF SAID SOUTHERN PARKWAY, THENCE ALONG SAID RIGHT–OF–WAY AND NO ACCESS LINE THE FOLLOWING TWO (2) COURSES AND DISTANCES: 1– SOUTH 72°03'59" EAST 905.37 FEET AND 2– SOUTH 78°13'39" EAST 877.94 FEET; THENCE SOUTH 11°46'21" WEST 579.55 FEET; THENCE SOUTH 45°54'13" WEST 1700.91 FEET; THENCE SOUTH 34°22'24" WEST 2596.65 FEET; THENCE SOUTH 42°07'06" WEST 2490.37 FEET; THENCE SOUTH 49°31'33" WEST 46.39 FEET; THENCE SOUTH 40°23'40" WEST 2355.73 FEET; THENCE SOUTH 28°39'35" WEST 2410.32 FEET TO THE SOUTH CENTER SECTION LINE OF SECTION 31, TOWNSHIP 42 SOUTH, RANGE 14 WEST, SALT LAKE BASE AND MERIDIAN, THENCE SOUTH 00°57'18" WEST ALONG SAID LINE 1326.36 FEET TO THE SOUTH QUARTER CORNER SAID SECTION 31, THENCE NORTH 88°58'00" WEST ALONG THE SOUTH LINE OF SAID SECTION 31 2952.81 FEET TO THE SOUTHWEST CORNER SAID SECTION, THENCE NORTH 00°36'38" EAST ALONG THE EAST LINE OF SECTION 36, TOWNSHIP 42 SOUTH, RANGE 15 WEST, SALT LAKE BASE AND MERIDIAN, 2217.25 FEET TO THE EAST QUARTER CORNER SAID SECTION 36, THENCE NORTH 00°47'08" EAST ALONG THE EAST LINE SAID SECTION 2651.14 FEET TO THE NORTHEAST CORNER ; THENCE NORTH 00°42'39" EAST ALONG THE EAST LINE OF SECTION 25, TOWNSHIP 42 SOUTH, RANGE 15 WEST, SALT LAKE BASE AND MERIDIAN, 2640.07 FEET TO THE EAST QUARTER CORNER SAID SECTION 25, THENCE NORTH 00°54'03" EAST ALONG THE EAST LINE SAID SECTION 25, 2687.21 FEET TO THE NORTH EAST CORNER SAID SECTION 25, TOWNSHIP 42 SOUTH, RANGE 15 WEST, SALT LAKE BASE AND MERIDIAN, THENCE NORTH 00°28'08" EAST ALONG THE EAST LINE OF SECTION 24, TOWNSHIP 42 SOUTH, RANGE 15 WEST, SALT LAKE BASE AND MERIDIAN 390.13 FEET, TO THE NORTHWEST CORNER OF SAID SECTION 30 BEING THE POINT OF BEGINNING.

CONTAINING 66,092,858 SQUARE FEET OR 1517.28 ACRES.

LEGEND

SECTIONAL MONUMENTATION
(TYPE, LOCATION ETC. AS NOTED ON THE PLAT).

CURVE TABLE					
CURVE NO.	RADIUS	LENGTH	DELTA	CHORD BEARING	CHORD LENGTH
C1	1415.00'	739.79'	29°57'19"	N 74°18'46" W	731.39'

LINE TABLE		
LINE NO.	DIRECTION	LENGTH
L1	S 88°53'17" E	1521.74'
L2	N 1°16'18" E	195.30'
L3	S 89°17'26" E	220.36'
L4	S 59°20'07" E	25.94'
L5	S 88°53'17" E	172.33'
L6	S 1°08'27" W	335.02'
L7	S 72°03'59" E	905.37'
L8	S 78°13'39" E	877.94'
L9	S 11°46'21" W	579.55'
L10	N 49°31'33" E	46.39'

GRAPHIC SCALE
500 0 250 500 1000
(IN FEET)
1 inch = 500 ft.

COUNTY SURVEYOR'S APPROVAL	APPROVAL AS TO FORM	APPROVAL AND ACCEPTANCE BY THE WASHINGTON CITY, UTAH	RECORDED No.
I, RONALD G. WHITEHEAD, PROFESSIONAL UTAH LAND SURVEYOR NO. 171303 AND THE WASHINGTON COUNTY SURVEYOR, HEREBY CERTIFY THAT I HAVE EXAMINED AND APPROVED THIS ANNEXATION PLAT, THIS _____ DAY OF _____, 20___	APPROVED AS TO FORM, THIS THE _____ DAY OF _____, A.D. 20_____.	WE, THE MAYOR AND CITY COUNCIL OF THE WASHINGTON, UT, HAVE REVIEWED THE ABOVE SUBDIVISION FINAL PLAT AND BY AUTHORIZATION OF SAID CITY COUNCIL, RECORD IN THE MINUTES OF ITS MEETING OF THE _____ DAY OF _____, A.D. 20_____ HEREBY ACCEPT SAID FINAL PLAT WITH ALL COMMITMENTS AND OBLIGATIONS PERTAINING THERETO.	
SURVEYOR WASHINGTON COUNTY	CITY ATTORNEY, WASHINGTON CITY	ATTEST: CITY RECORDER, WASHINGTON CITY — MAYOR, WASHINGTON CITY	WASHINGTON COUNTY RECORDER

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle Suite #4
St. George, Utah 84770
Phone (435) 673-2337 Fax (435) 673-3161
www.bushandgudgell.com

No.	Date	By	Revision

Drawn : PJW
Date : 3–28–2018
Email : GMeyers@bushandgudgell.com
Checked : DGM
Approved : DGM
Scale : 1" = 500'
Job No : 161174

LONG VALLEY ADDITION TO WASHINGTON CITY, UTAH
LOCATED IN
SECTIONS 20, 29, 30 AND 31, TOWNSHIP 42 SOUTH, RANGE 14 WEST,
SALT LAKE BASE & MERIDIAN

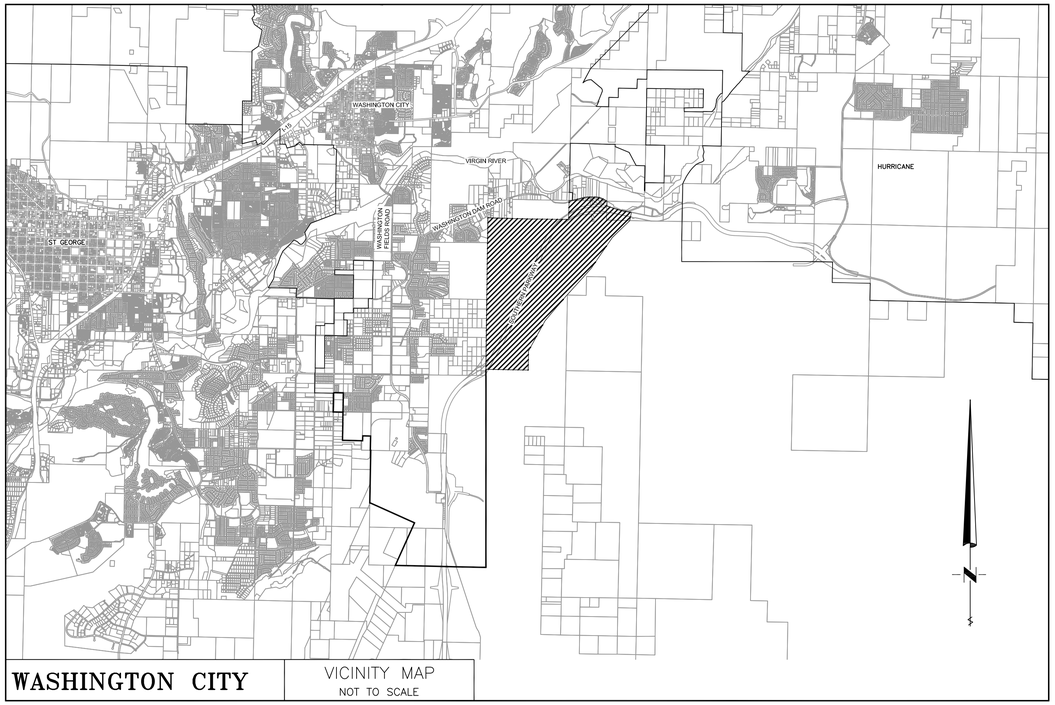
SHEET 1
2 SHEETS
FILE: 161174ANNEX

LONG VALLEY ADDITION TO WASHINGTON CITY, UTAH

LOCATED IN

SECTION 20, 29, 30 AND 31 TOWNSHIP 42 SOUTH, RANGE 14 WEST,
SALT LAKE BASE AND MERIDIAN
PREPARED FOR: BRENNAN HOLDINGS LLC

PROPERTY OWNER TABLE		
OWNER NO.	OWNER	PARCEL NO.
PO-1	TYLER & SUZETTE HOSKINS, HERMAN A HOSKINS	4191-A-3-B-HV
PO-2	BASILE FAMILY PROPERTIES LC	4191-A-3-A-HV
PO-3	L J RANCHES LTD	4191-A-7-HV
PO-4	L J RANCHES LTD	4191-A-6-HV
PO-5	L J RANCHES LTD	4191-A-2-K-HV
PO-6	BRIAN & SARAH PRISBEY	4191-A-2-N-HV
PO-7	HARLEY P & MERNA B IVERSON TRUST	4191-A-2-G-HV
PO-8	GENESIS LTD #A57571	4191-A-2-C-HV
PO-9	DAEMON J BASILE	4191-A-2-D-HV
PO-10	DAEMON J & NIKKI LYNN BASILE	4191-B-HV
PO-11	DOYLE CLINTON JR & THERESA LYNN SAMPSON TRUST, LLOYD C CARTER	4191-A-2-A-HV1
PO-12	JAY D & ANGELA SMITH	W-4-2-20-341
PO-13	JOSH & REAGAN BASTIAN	W-4-2-19-33011
PO-14	RICK CHRISTY	W-4-2-19-3306
PO-15	PAUL & PATRICIA A BIGGS	W-4-2-19-3302
PO-16	R SHAWN & JACKIE L BARNSON TRUST	W-4-2-19-3305
PO-17	SHARON F ROBINSON TRUST	W-4-2-19-33321
PO-18	S G C G LLC	W-DEIP-7
PO-19	D & G PROPERTY HOLDINGS, LLC	W-MAHA-2-A
PO-20	DANIEL KAY & JANIS NELSON BUNDY TRUST	W-5-2-25-1101
PO-21	SS PHASE 4, INC.	W-5-2-25-1100
PO-22	WESTERN STATES VENTURES SG, LLC	W-5-2-25-130
PO-23	HHTC LLC, ROBERT E WAGNER	W-5-2-36-111
PO-24	BURNY J & CATHY S BURRUS TRUST	W-5-2-36-118
PO-25	ROBERT J & MARILYN A OEHLER	W-5-2-36-122
PO-26	VON & MONA HASLEM TRUST, RICHARD O PETTY TRUST, QUALITY DEVELOPMENT LLC	W-5-2-36-121
PO-27	VON & MONA HASLEM TRUST, RICHARD O PETTY TRUST, QUALITY DEVELOPMENT LLC	W-5-2-36-2111
PO-28	ROBERT M & JUNE S LEWIS	W-5-2-36-2119
PO-29	UTAH DEPARTMENT OF TRANSPORTATION	W-5-2-36-21201
PO-30	BARBARA WILLIAMS	4191-A-5-HV
PO-31	KRISTIN HINCKLEY YEAGER	4191-A-1-A-2-B-HV



WASHINGTON CITY — VICINITY MAP
NOT TO SCALE

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LONG VALLEY ANNEXATION TO WASHINGTON CITY, UTAH
SECTIONS 20, 29, 30 AND 31, TOWNSHIP 42 SOUTH, RANGE 14 WEST, LOCATED IN SALT LAKE BASE & MERIDIAN

SHEET 2
2 SHEETS
FILE: 161174ANNEX

LONG VALLEY TRAILS

Section 14

Offsite Construction & Project Maintainence

Long Valley Offsite Infrastructure Construction

Introduction:

The offsite improvements for Long Valley Trails are being design and constructed as a joint effort with Washington City. The offsite improvements are designed and planned to service the Washington City residents living within and adjacent to the Long Valley Trails development. Completion of Washington Dam Road will enhance the City's overall traffic facilities and will fulfill a regional transportation demand for the entire region. The master storm drainage facilities for Long Valley Trails will resolve existing storm drainage problems in this area and will correct impacts to downstream properties along Washington Dam Road. The planned culinary water and sanitary sewer facilities will provide services to areas that cannot currently be serviced and will enhance the reliability and sustainability of those services.

Offsite Roads:

Washington Dam Road is a master planned Arterial Road for Washington City. This PCD plan and related Development Agreement outlines the improvements that are being made in conjunction with Long Valley Trails. The cost for these improvements will be paid by the Master Developer (Brennan Family Holdings, LLC) for Long Valley Trails.

In addition to Washington Dam Road the Long Valley Trails Development will obtain and provide the Right of Way for the Extension of Long Valley Parkway over and through the BLM controlled lands to the location of the planned 3650 Interchange on the Southern Parkway. Washington City will be the applicant for the ROW and Brennan Family Holdings, LLC will pay all costs associated with obtaining the ROW.

Offsite Sanitary Sewer:

The Sanitary Sewer Study conducted by Sunrise Engineering and contained in Section 5 of this PCD Plan outlines the capacity of the downstream sewer system if Long Valley Trails were to extend a line within Washington Dam Road. Due to the limited capacity of the downstream system and the un-known timeframe when that capacity would be exceeded. The Master Developer of Long Valley Trails, Brennan Family Holdings has agreed to not pursue using those facilities and to instead install the solution that would handle 100% of the needs of the proposed Long Valley Trails Development. Brennan in conjunction with Washington City will construct a sewer lift station, pressure line and gravity fed outfall line to the regional lines located at approximately 3650 South and the Southern Parkway. This system would collect the projects sewer as outlined in the Sunrise Study. Those flows would flow to a new lift station located at the lower end of Long Valley Trails near the Long Valley Interchange. The lift station would pump those flows to the South boundary of Long Valley Trails where they would discharge into

a new gravity flow line running to the large capacity line located in 3650 South. Washington City has agreed to use the funds that have been identified in their Capital Facilities plan towards this regional system and Brennan Family Holdings will cover the additional costs to complete this system.

Offsite Culinary Water:

The initial culinary water demands for Long Valley Trails will be handled by the extension of a water transmission line along Washington Dam Road. This line will service approximately the lower 1/3 of the proposed Long Valley Trails Development. Once the capacity and design parameters of that line have been reached a new water storage facility will be required. It is anticipated that that water tank will be located west of the Long Valley Trails development. The construction of the initial water transmission line and the future water tank and additional offsite water transmission lines will be paid for by Washington City. All onsite facilities will be paid by the developer of Long Valley Trails. These facilities will be provided in a time and manner that will not delay the development of the Long Valley Trails Development.

Sunrise Engineering currently provides Washington City with the overall Culinary Water and Sanitary Sewer master plans. Brennan Family Holdings, LLC with the authorization of Washington City has engaged Sunrise Engineering to provide the sanitary sewer and the culinary water feasibility reports for the proposed Long Valley Trails Development. Those reports are contained in this PCD Project Plan.

Offsite Storm Water and Drainage:

All post development storm water flows will be detained within the boundary of the Long Valley Trails Development. These facilities will limit all offsite flows, as not to exceed the allowed historical flows from the pre-developed lands within Long Valley Trails. Currently the natural and historical flows from Long Valley have been altered directly south of the Long Valley Trails property. The historic and natural flows where dammed by an old irrigation pond and that pond did not provide any outlet for those flows. Furthermore, the dam and pond were not properly engineered to adequately contain those flow. The dam and pond sit on private land and those landowners have planned uses for their property that do not maintain the dam and pond. Further compounding these problems are that the Utah Department of Transportation (UDOT) has discharged the drainage off the Southern Parkway into this pond without any consent of the property owners.

To resolve the storm drainage issues related to the historic and lawful flows from the Long Valley Trails property, Brennan Family Holdings has voluntary agreed to work with the pond and dam land owners to obtain an easement to pipe the Long Valley Trails flows only (this does not include the UDOT flows) through their property and to further pipe these flows in the storm

drainage system required by the improvements to Washington Dam Road. These flows will be discharged into the Virgin River according to those requirements. Brennan Family Holdings, LLC will pay the cost to complete these improvements. Since Brennan Holdings is not adding any post development flows to the City system, Washington City agrees to waive the Storm Water Impact fee for the entire Long Valley Trails Development.

In July 2020 the State of Utah adopted the revised UPDES storm water compliance standards and added the LID (Low Impact Development) compliance standards. The Dixie Storm Water Coalition which Washington City is a member has developed a flow chart and matrix for determining the direction a development needs to follow to address the LID requirement. This flow chart and matrix has been addressed in both the project drainage plan and the project Geotechnical study for Long Valley Trails.

Long Valley Construction and Maintenance Summary

Activity	Developer/Builder	Residents/Homeowners Association	Washington City
Construction and Installation of Improvements	• All onsite & offsite Public Roads & Streets • All Private Roads & Alleys • All onsite Public Utilities Water, Sewer, Natural Gas, Power, TV-Telephone, etc. • All onsite and offsite Storm Drain Facilities • All Trails & Walkways • All natural & enhanced open spaces • All Parks & Trailheads • Road & Common area Landscape • Front Yard Landscaping	• Rear and side-yard Landscaping	• Offsite Sewer lines and related improvements as outlined in the Development Agreement • Offsite Waterlines, water storage tanks and related improvement as per the Development Agreement
Maintenance and Repairs		• All Private Roadways & Alleys • Some Storm Drain Facilities • Private Trails & Walkways • All natural & enhanced open spaces • Private Parks & Trailheads • All Road & Common area Landscape • Front Yard Landscaping • Rear and side-yard Landscaping	• All onsite & offsite Public Roads & Streets • Public Utilities limited to Water, • Sewer and some Storm Drain • Facilities • (Private utilities such as gas, power etc. maintained by private provider) • Public Parks & Trails (if any) • Public Trails & Walkways

LONG VALLEY TRAILS

Development Agreement

Section 15

Development Agreement

The attached Development Agreement is the signed and recorded document that ties all elements of the Long Valley PCD Plan to the requirements, restrictions and obligations of all parties associated with Long Valley Trails. The Development Agreement is a legal document and as such outlines the legal parameters of the Long Valley Trails PCD. The Development Agreement is not a stand-alone document and requires the entire Long Valley PCD Plan as approved by Washington City to be considered.

The Long Valley PCD Plan provides the details and implementation of the terms agreed to in the Development Agreement. In no case are the terms, conditions and obligations of the entire Long Valley PCD Plan eliminated or waived by their exclusion within the Development Agreement. The signed Development Agreement and Long Valley PCD Plan are one and the same and their association cannot be considered separately.

Development Agreement

by and between

Washington City,
a Utah municipal corporation

and

Brennan Family Holdings, LLC,
an Idaho Limited Liability Company

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DEVELOPMENT AGREEMENT

This Development Agreement ("**Agreement**") is made this _____ day of _____, 2020 (the "**Effective Date**") by and between Washington City, a Utah municipal corporation (the "**City**") and Brennan Family Holdings, LLC an Idaho Limited Liability Company ("**Brennan**"). City and Brennan may hereinafter be referred to individually as a "**Party**" and collectively as the "**Parties**."

Recitals

A. Brennan is the owner of approximately 605 acres of property located in Washington City, Utah in the vicinity of the Southern Parkway and accessed off the Long Valley Road Interchange of the Southern Parkway. The property is described with specificity in Exhibit "A", attached to this Agreement and incorporated by reference (the "**Property**"). The Property is to be developed and known as "Long Valley Trails". Brennan desires to develop the Property as a planned community development in a manner consistent with the City's Planned Community Development Ordinance (the "**PCD Ordinance**"), *Washington City Ord* §9-13A-1 *et seq.* (2020).

B. On or about [_____ ___], 2020, the City Council granted final approval for a planned community development project plan for the Project (the "**PCD Plan**"). The PCD Plan is with the City and includes a Master Plan (the "**Master Plan**"), which was also approved by the City Council on or about [_____ __], 2020.

C. Brennan and the City desire to enter into this Agreement in order to implement the PCD Plan and the Master Plan to more fully set forth the covenants and commitments of each Party, while giving effect to applicable State law. The Parties understand and intend that this Agreement is a "development agreement" within the meaning of, and entered into pursuant to the terms of, *Utah Code Ann.* § 10-9a-102 (2020).

Agreement

NOW THERFORE, in consideration of the terms, conditions, covenants and agreements set forth below and other good and valuable and consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Definitions.

"**Administrative Amendment**" means and includes any amendment to this Agreement or other action that may be approved by the Administrator as provided in Section 22.

"**Administrator**" means the person designated by the City as the Administrator of this Agreement.

"Agreement" means this Development Agreement including all of its Exhibits.

"**Applicant**" means a person or entity submitting a Development Application or a request for an Administrative Amendment.

"**BLM**" means the United States Department of the Interior, Bureau of Land Management.

"**Brennan**" means Brennan Family Holdings, LLC an Idaho Limited Liability Company, and its respective assignees or transferees as permitted by this Agreement.

"**Brennan Municipal Improvements**" means the improvements described in Section 11.

"**Building Permit**" means a permit issued by the City to allow construction, erection or structural alteration of any building, structure, private or public infrastructure on any portion of the Project, or to construct any of the Brennan Municipal Improvements.

"**Buildout**" means the completion of all of the development on all of the Project.

"**Capital Facilities Plan**" means a plan to be adopted by the City in the future to substantiate the collection of Impact Fees as required by State law.

"**CC&Rs**" means the Conditions, Covenants and Restrictions regarding certain aspects of design and construction on the Property to be recorded in the chain of title on the Property.

"**City**" means the Washington City, a Utah municipal corporation.

"**City Consultants**" means those outside consultants employed by the City in various specialized disciplines such as traffic, hydrology or drainage for reviewing certain aspects of the development of the Project.

"**City Council**" means the elected City Council of the City.

"**City Improvements**" means the improvements described in Section 17.

"**City's Future Laws**" means the ordinances, policies, standards, procedures and processing fee schedules of the City which may be in effect as of a particular time in the future when a Development Application is submitted for a part of the Project and which may or may not be applicable to the Development Application depending upon the provisions of this Agreement.

"**City's Vested Laws**" means the ordinances, policies, standards and procedures of the City related to zoning, subdivisions, development, public improvements and other similar or related matters that were in effect as of the date of this Agreement, a digital copy of which is attached as Exhibit "B".

"**Community Home Owners Association**" means one or more associations formed pursuant to State law to perform the functions of an association of property owners.

"**Denial**" means a formal denial issued by the final decision-making body of the City for a particular type of Development Application but does not include review comments or "redlines" by City staff.

"**Densit[y][ies]**" means the number of Residential Dwelling Units allowed per acre.

"**Development Applications**" means an application to the City for development of a portion of the Project including a Final Plat, a Building Permit or any other permit, certificate or other authorization from the City required for development of the Project.

"**Development Report**" means a report containing the information specified in Sections 6.4, 6.5.1 and/or 6.5.2 submitted to the City by Brennan for the development by Brennan of any Parcel or for the sale of any Parcel to a Subdeveloper or the submittal of a Development Application by a Subdeveloper pursuant to an assignment from Brennan.

"**Dixie REA**" means the Dixie Rural Electric Association.

"**Final Plat**" means the recordable map or other graphical representation of land prepared in accordance with *Utah Code Ann*. § 10-9a-603 (2020), and approved by the City, effectuating a Subdivision of any portion of the Project.

"**General Plan**" means a plan approved by the City that sets forth general guidelines for the proposed future development of the property in the City, including the Property.

"**Impact Fees**" means those fees, assessments, exactions or payments of money imposed by the City as a condition on development activity as specified in *Utah Code Ann*. § 11-36a-101, *et seq*. (2020).

"**Intended Uses**" means the use of all or portions of the Project for single-family, townhomes, condominiums and multi-family apartments, public/private facilities, businesses, commercial areas, RV storage, pool(s), professional and other offices, services, open spaces, parks, trails, recreation courts and other uses as more fully specified in the PCD Plan and as generally depicted in the Master Plan.

"**Land Use Act**" *Utah Code Ann*. § 10-9a-101, *et seq.* (2020).

"**Long Valley Trail System**" means the trail system that is planned and designed as an amenity to serve the Project, as further described in the PCD Plan.

"**Master Plan**" shall have the meaning set forth in Recital B.

"**Maximum Residential Units**" means the development on the Property of Two Thousand Three Hundred Sixty One (2,361) Residential Dwelling Units.

"**Modification Application**" means an application to amend this Agreement (but not including those changes which may be made by Administrative Action).

"**Non-City Agency**" means a governmental or quasi-governmental entity, other than those of the City, which has jurisdiction over the approval of any aspect of the Project.

"**Outsourc[e][ed][ling]**" means the process of the City contracting with City Consultants or paying overtime to City employees to provide technical support in the review and approval of the various aspects of a Development Application as is more fully set out in this Agreement.

"**Parcels**" means an area identified on the PCD Plan for development of a particular type of Intended Use that is not an individually developable lot.

"**PCD Ordinance**" shall have the meaning set forth in Recital A.

"**PCD Plan**" means the planned community development project plan for the Project approved for the Property on [_____ ___], 2020 a copy of which is attached as Exhibit "C".

"**Planning Commission**" means the City's Planning Commission established by the Zoning Ordinance.

"**Project**" means the development to be constructed on the Property pursuant to this Agreement with the associated Intended Uses, Densities, and all of the other aspects approved as part of this Agreement.

"**Property**" shall have the meaning set forth in Recital A.

"**Public Lot**" shall have the meaning set forth in Section 34.

"**Residential Dwelling Units**" means, for purposes of calculating Density, a unit intended to be occupied for residential living purposes; one single-family residential dwelling and each separate unit in a multifamily dwelling, apartment building or condominium equals one Residential Dwelling Unit.

"**State**" means the State of Utah.

"**Subdeveloper**" means an entity not "related" (as defined by Internal Revenue Service regulations) to Brennan which purchases a Parcel for development.

"Subdivision" means the division of any portion of the Project into a subdivision pursuant to State law and/or the Zoning Ordinance.

"**System Improvement**" means those elements of infrastructure that are defined as System Improvements pursuant to *Utah Code Ann*. § 11-36a-102(21) (2019).

"**Transfer Deed**" shall have the meaning set forth in Section 6.5.

"**UDOT**" means the Utah Department of Transportation.

"**Zoning Ordinance**" means the City's Zoning Ordinance adopted pursuant to the Land Use Act that was in effect as of the date of this Agreement as a part of the City's Vested Laws.

2. Recitals Incorporated. The recitals are incorporated fully into this Agreement as if set forth fully herein.

3. Findings and Authority.

3.1 Findings. The City finds that: (a) the PCD plan, the Master Plan and this Agreement are consistent with the City's General Plan, the PCD Ordinance and all other applicable ordinances, rules, regulations and policies of the City; and (b) development of the Property pursuant to this Agreement and the PCD Plan will result in significant planning and economic benefits to the City and will further the health, safety and welfare of the City and its residents by, among other things: (i) requiring development of the Property in a manner consistent with the applicable rules, regulations and policies of the City; (ii) providing for the dedication of infrastructure improvements to be completed in several phases as set forth herein; (iii) increasing property tax and other revenues to the City derived from improvements to be constructed on the Property, (iv) creating jobs from the construction and development activities located on the Property.

3.2 Acknowledgments. The City acknowledges Brennan is relying on the PCD Plan, the Master Plan, the execution and continuing validity of this Agreement and the City's performance of its obligations hereunder. Brennan has expended substantial funds in the development of the Property and, in reliance upon this Agreement, will continue to expend additional funds. Brennan acknowledges that the City is relying on the PCD Plan, the Master Plan, and the execution and continuing validity of this Agreement, and Brennan's performance of its obligations under this Agreement, in continuing to perform the obligations of Brennan hereunder. The City has expended substantial funds in the development of the Property and, in reliance of this Agreement, will continue to expend additional funds.

4. Master Plan; Development Pursuant to PCD, Master Plan and Design Guidelines.

4.1 PCD Plan. City acknowledges that the PCD Plan satisfies the requirements of the PCD Ordinance for the development of the Project. Upon approval by the City Council, the PCD Plan became incorporated into and part of the City's Zoning Ordinance and the City's General Plan. The PCD Plan governs all zoning matters with respect to the Property. The PCD Plan describes the Project as a phased master planned community which will include residential and community-related development. The Master Plan included in the PCD Plan shows the portions of the Project that will be developed as well as natural open spaces. The residential component of the Project will provide various types of housing ranging from single-family homes to townhomes, condominiums and possibly apartments. Community-related facilities will include without limitation, a community center, RV storage, pool(s), recreation courts, and connecting trails and park(s). The PCD Plan is an integral part of this Agreement and is fully incorporated into this Agreement.

4.2 Master Plan. The Master Plan generally depicts the Intended Uses, Densities, drainage, major roads and community facilities that will be installed and constructed upon the Property. The Master Plan is an integral part of this Agreement and is fully incorporated into this Agreement.

4.3 Design Guidelines. The PCD Plan provides a detailed set of Design Guidelines and Standards (the "**Design Guidelines**"), which will govern development on the Property. Several builders may be designing and constructing homes and units upon different Parcels at the same time, and the Design Guidelines are intended to guide development and construction over the entire project area and to ensure continuity in community.

4.4 Purpose; Authorization to Develop. The Parties desire that the City has reasonable certainty concerning the manner in which the Property will he developed, and that Brennan will have reasonable certainty in proceeding with development of the Property. Brennan shall comply with terms and conditions of the PCD Plan, the Master Plan and this Agreement and the City authorizes Brennan to develop the Property as set forth in the PCD Plan and this Agreement.

5. Vested Rights; Exceptions.

5.1 Vested Rights. To the maximum extent permissible under the laws of the State and the United States and at equity, the City and Brennan intend that this Agreement grants Brennan all rights to develop the Property in fulfillment of this Agreement, the City's Vested Laws and the PCD Plan except as specifically provided herein. The Parties intend that the rights granted to Brennan under this Agreement are contractual, unless specifically described as rights that exist under statute, common law and at equity. The Parties specifically intend that this Agreement and the PCD Plan grant to Brennan "vested rights" as that term is construed in the State's common law and pursuant to *Utah Code Ann*. § 10-9a-509 (2019).

5.2 Exceptions. The restrictions on the applicability of the City's Future Laws to the Project as specified in Section 5.1 are subject to only the following exceptions:

5.2.1 Development Agreement. City's Future Laws that Brennan agrees in writing to the application thereof to the Project.

5.2.2 Compliance with State and Federal Laws. City's Future Laws which are generally applicable to all properties in the City and which are required to comply with State and federal laws and regulations affecting the Project.

5.2.3 Safety Code Updates. City's Future Laws that are updates or amendments to existing building, plumbing, mechanical, electrical, dangerous buildings, drainage, or similar construction or safety related codes, such as the International Building Code, the APWA Specifications, AAHSTO

Standards, the Manual of Uniform Traffic Control Devices or similar standards that are generated by a nationally or statewide recognized construction/safety organization, or by the State or federal governments and are required to meet legitimate concerns related to public health, safety or welfare.

5.2.4 Taxes. Taxes, or modifications thereto, so long as such taxes are lawfully imposed and charged uniformly by the City to all properties, applications, persons and entities similarly situated.

5.2.5 Fees. Changes to the amounts of fees (but not changes to the times provided in the City's Vested Laws for the imposition or collection of such fees) for the processing of Development Applications that are generally applicable to all development within the City (or a portion of the City as specified in the lawfully adopted fee schedule) and which are adopted pursuant to State law.

5.2.6 Countervailing, Compelling Public Interest. Laws, rules or regulations that the City Council finds, on the record, are necessary to avoid jeopardizing a compelling, countervailing public interest pursuant to *Utah Code Ann*. § 10-9a-509(1)(a)(ii) (2020).

5.2.7 Impact Fees. Impact Fees or modifications thereto which are lawfully adopted, imposed and collected.

5.3 Invalidity. Brennan covenants not to bring suit to have any of the City's Vested Laws declared to be unlawful, unconstitutional or otherwise unenforceable. if any of the City's Vested Laws are declared to be unlawful, unconstitutional or otherwise unenforceable then Brennan will, nonetheless comply with the terms of this Agreement. Brennan shall also in that event cooperate with the City in adopting and agreeing to comply with a new enactment by the City which is materially similar to any such stricken provisions and which implements the intent of the Parties in that regard as manifested by this Agreement.

5.4 Exclusion from Moratoria. The Project shall be excluded from any moratorium adopted pursuant to *Utah Code Ann*. § l0-9a-504 (2020) unless such a moratorium is found on the record by the City Council to be necessary to avoid jeopardizing a compelling, countervailing public interest.

5.5 Most Favored Nation. Should any property immediately adjacent to the Property or the Project (excluding road rights of way, including interstates) receive a zoning use or development entitlement not included in City's Vested Laws, and which use or entitlement could facilitate development within the Project, City agrees to cooperate with Brennan to promptly obtain the same use or entitlements for the Property.

6. Development of the Project.

6.1 Project Maximum Density. At Buildout of the Project, Brennan shall be entitled to have developed the Maximum Residential Units and to have developed the other Intended Uses, as specified in the PCD Plan and the Master Plan.

6.2 Parcels Intended Uses and Densities. The Property will consist of a number of "Parcels," however, the precise locations and details of the Parcels' configuration and design, public improvements and any other similar items regarding development of the Parcels are not definitively known as of the date of this Agreement. Intended Uses and Densities are generally shown on the Master Plan, however the Parties acknowledge that the most efficient and economic development of the Project depends on numerous factors, such as market orientation and demand, interest rates, competition, and similar factors. Accordingly, the timing, sequencing, and phasing of development of the various Parcels in the Project shall be as determined

by Brennan, and so long as a Development Application is generally consistent with the PCD Plan, the same may be approved as an Administrative Amendment.

6.3 Use of Density. Intended Uses and Densities are generally shown on the Master Plan, and the Design Guidelines have established the allowable building heights, building setbacks and other requirements for each type of Intended Use. Brennan may adjust the relative location of all Intended Uses and may use any of the Maximum Residential Units in the development of any Parcel so long as adjusted Density within a Parcel does not exceed 150% of the Density designated for such Parcel in the Master Plan. In no event shall the Maximum Residential Units be exceeded. Any of these adjustments constitute an Administrative Amendment.

6.4 Accounting for Density for Parcels Developed by Brennan. At the recordation of a Final Plat for any Parcel(s) developed by Brennan, Brennan shall provide City a Development Report showing any Density used with the Parcel(s) and the Density remaining with Brennan for the remaining Project.

6.5 Parcel Sales. City agrees that, consistent with the provisions of *Utah Code Ann.* § 10-9a-103(64)(c)(v) (2020), Brennan may convey portions of the Project by metes and bounds prior to recordation of a plat of subdivision for such portion and City agrees to execute an acknowledgment on such deeds of conveyance (each a "**Transfer Deed**") for the purposes of acknowledging only City's consent to the conveyance by metes and bounds of the real property that is the subject of the applicable Transfer Deed. The Parties expressly acknowledge that City's execution of a Transfer Deed shall not in any way be deemed a waiver of the requirement that the property transferred pursuant to such Transfer Deed shall be subject to the approval process set forth in this Agreement, including without limitation, the requirement regarding recordation of a Final Plat. Approval and recording of a Transfer Deed shall not result in any requirement in the City's Vested Laws to complete any Brennan Municipal Improvements under *Utah Code Ann.* § 10-9a-604.5 (2020).

6.5.1 Accounting for Density for Parcels Conveyed to Subdevelopers. Any Parcel sold by Brennan to a Subdeveloper without a Final Plat recorded shall include the transfer of a specified portion of the Maximum Residential Units and, for any non-residential use, shall specify the amount and type of any such other use sold with the Parcel. At the recordation of a Final Plat or other document of conveyance for any such Parcel sold to a Subdeveloper, Brennan shall provide City a Sub-Development Report showing the portion of the Maximum Residential Units and/or other type of use for the Parcel(s), and any unused portion of the transferred Maximum Residential Units.

6.5.2 Return of Unused Density. If any portion of the Maximum Residential Units transferred to a Subdeveloper are unused by the Subdeveloper at the time the Parcel(s) transferred with such Density receives approval for a Final Plat for the final portion of such transferred Parcels, the unused portion of the transferred Maximum Residential Units shall automatically revert back to Brennan and Brennan shall file with the City a Development Report.

7. Approval Process for Development Applications.

7.1 Phasing. The City acknowledges that Applicants who have purchased Parcels of the Project may submit multiple applications from time-to-time to develop Parcels or portions thereof.

7.2 Processing Under City's Vested Laws. Approval processes for Development Applications shall be as provided in the City's Vested Laws except as otherwise provided in this Agreement. Development Applications shall be approved by the City if they comply with the City's Vested Laws and conform to this Agreement.

7.3 City's Cooperation in Processing Development Applications. The City shall cooperate reasonably in promptly and fairly processing Development Applications.

7.4 Planning Commission Review of Development Applications.

7.4.1 Unless Applicant consents to a different schedule, all aspects of a Development Application subject to review by the Planning Commission pursuant to the City's Vested Laws and this Agreement shall be considered by the Planning Commission at no more than the minimum number of Public Hearings required by Utah State Statutes. .

7.4.2 Hearing Schedule. Unless Applicant consents to a different schedule, the first public hearing shall be scheduled no later than the next regularly scheduled public hearing for which any legally required notice may be given after the Development Application is deemed complete or submitted over any objection to alleged incompleteness. Any second public hearing shall be scheduled no later than the next regularly scheduled public hearing for which any legally required notice may be given after the Applicant requests it be scheduled. The Planning Commission may not refuse to consider the Development Application on the basis of any alleged incompleteness and may not table or otherwise extend its consideration of the Development Application beyond the second allowed hearing without the consent of the Applicant.

7.4.3 Recommendation. At the conclusion of public hearing(s) the Planning Commission shall recommend by majority vote whether the Development Application complies with this Agreement. The Planning Commission's decision shall be only a recommendation and shall not have any binding effect on the consideration of the Development Application by the City Council.

7.5 City Council Review of Development Applications.

7.5.1 Consideration by the City Council. After the Planning Commission has made or been deemed to have made its recommendation of the Development Application, if required under the City's Vested Laws and this Agreement, the City Council shall consider the Development Application.

7.5.2 Hearing Schedule. Unless otherwise agreed to by Applicant, the City Council shall do so at the next regularly scheduled hearing for which any required notice may be lawfully given. Unless otherwise agreed to by Applicant, any subsequent consideration of the same Development Application shall also be at the next regularly scheduled meeting of the body for which any required notice may be lawfully given. Applicant shall respond in good faith to any requests for additional information by the City Council during its consideration of any Development Application.

7.5.3 Decision of the City Council. At the conclusion of the City Council's second meeting considering any Development Application, or at any time during any subsequent meeting if agreed to by Applicant, Applicant may require the City Council to make a final determination on the granting or denial of the Development Application.

7.6 Outsourcing of Processing of Development Applications. Within fifteen (15) business days after receipt of a Development Application upon the request of either Party, the Parties will confer and determine whether the City and/or the Applicant wishes the City to Outsource the review of any aspect of the Development Application to ensure that it is processed on a timely basis. If either Party determines that Outsourcing is appropriate, then the City shall promptly estimate the reasonably anticipated differential cost of Outsourcing in the manner selected by the City in good faith consultation with Brennan (either overtime to City employees or the hiring of a City Consultant). If Brennan notifies the City that it desires to proceed with the Outsourcing based on the City's estimate of costs, then Applicant shall deposit in

advance with the City the estimated differential cost and the City shall then promptly precede with the Outsourced work. Upon completion of the Outsourcing services and the provision by the City of an invoice (with such reasonable supporting documentation as may be requested by Applicant) for the actual differential cost (whether by way of paying a City Consultant or paying overtime to City employees) of Outsourcing, Applicant shall, within ten (10) business days pay or receive credit (as the case may be) for any difference between the estimated differential cost deposited for the Outsourcing and the actual cost differential.

7.7 Non-City Agency Reviews. If any aspect or a portion of a Development Application is governed exclusively by a Non-City Agency an approval for these aspects does not need to be submitted by Applicant for review by any body or agency of the City. The Applicant shall timely notify the City of any such submittals and promptly provide the City with a copy of the requested submissions. The City may only grant final approval for any Development Application subject to compliance by Applicant with any conditions required for such Non-City Agency's approval.

7.8 Acceptance of Certifications Required for Development Applications. Any Development Application requiring the signature, endorsement, or certification and/or stamping by a person holding a license or professional certification required by the State in a particular discipline shall be so signed, endorsed, certified or stamped signifying that the contents of the Development Application comply with the applicable regulatory standards of the City. The Development Application shall thus generally be deemed to meet the specific standards which are the subject of the opinion or certification without further objection or required review by the City or any other agency of the City. It is not the intent of this Section to preclude the normal process of the City's "redlining", commenting on or suggesting alternatives to the proposed designs or specifications in the Development Application. Generally, the City should endeavor to make all of its redlines, comments or suggestions at the time of the first review of the Development Application unless and changes to the Development Application raise new issues that need to be addressed.

7.9 Expert Review of Certifications Required for Development Applications. If the City, notwithstanding such a certification by Applicant's experts, subjects the Development Application to a review by City Consultants, the City shall bear the costs of such review if the City Consultants determine that the Applicant's expert certification was materially correct and that the City's requiring a review of the certification in the Development Application was unreasonable and not made in good faith. If the City Consultants determine that the City's requirement of a review was reasonable and made in good faith, then payment of the reasonable and actual costs of the City Consultants' review shall be the responsibility of Applicant.

7.9.1 Selection of City Consultants for Review of Certifications Required for Development Applications. The City Consultant undertaking any review by the City required or permitted by this Agreement shall be selected from a list generated by the City for each such City review pursuant to a "request for proposal" process or as otherwise allowed by City ordinances or regulations. Applicant may, in its sole discretion, strike from the list of qualified proposers any of such proposed consultants so long as at least three (3) qualified proposers remain for selection. The anticipated cost and timeliness of such review may be a factor in choosing the expert.

7.10 Independent Technical Analyses for Development Applications. If the City needs technical expertise beyond the City's internal resources to determine impacts of a Development Application such as for structures, water tanks, "threatened and endangered species" and other similar matters which are not required by the City's Vested Laws to be certified by such experts as part of a Development Application, the City may engage such experts as City Consultants under the processes specified in Section 7.9.1 with the actual and reasonable costs being the responsibility of Applicant. If the City needs any other technical expertise other than as specified above, under extraordinary circumstances specified in writing by

the City, the City may engage such experts as City Consultants under the processes in Section 7.9.1 with the actual and reasonable costs being the responsibility of Applicant.

7.11 City Denial of a Development Application. If the City denies a Development Application the City shall provide a written determination advising the Applicant of the reasons for denial including specifying the reasons the City believes that the Development Application is not consistent with this Agreement, the PCD Plan and/or the City's Vested Laws (or, if applicable, the City's Future Laws).

7.12 Meet and Confer regarding Development Application Denials. The City and Applicant shall meet within fifteen (15) business days of any Denial to resolve the issues specified in the Denial of a Development Application.

7.13 City Denials of Development Applications Based on Denials from Non-City Agencies. If the City's denial of a Development Application is based on the denial of the Development Application by a Non-City Agency, Applicant shall appeal any such denial through the appropriate procedures for such a decision and not through the processes specified below.

7.14 Mediation of Development Application Denials.

7.14.1 Issues Subject to Mediation. Issues resulting from the City's Denial of a Development Application that are not subject to arbitration provided in Section 7.15 shall be mediated.

7.14.2 Mediation Process. If the City and Applicant are unable to resolve a disagreement subject to mediation, the Parties shall attempt within ten (10) business days to appoint a mutually acceptable mediator with knowledge of the issue in dispute. If the Parties are unable to agree on a single acceptable mediator they shall each, within ten (10) business days, appoint their own representative. These two representatives shall, between them, choose the single mediator. Applicant shall pay the fees of the chosen mediator. The chosen mediator shall within fifteen (15) business days, review the positions of the Parties regarding the mediation issue and promptly attempt to mediate the issue between the Parties. If the Parties are unable to reach agreement, the mediator shall notify the Parties in writing of the resolution that the mediator deems appropriate. The mediator's opinion shall not be binding on the Parties.

7.15 Arbitration of Development Application Objections.

7.15.1 Issues Subject to Arbitration. Issues regarding the City's Denial of a Development Application that are subject to resolution by scientific or technical experts such as traffic impacts, water quality impacts, pollution impacts, etc. are subject to arbitration. The failure of a Development Application to comply with an applicable federal or State laws, or City Vested Law (or, if applicable, a City Future Law) is not an issue subject to arbitration.

7.15.2 Mediation Required Before Arbitration. Prior to any arbitration the Parties shall first attempt mediation as specified in Section 7.14.

7.15.3 Arbitration Process. If the City and Applicant are unable to resolve an issue through mediation, the Parties shall attempt within ten (10) business days to appoint a mutually acceptable expert in the professional discipline(s) of the issue in question. If the Parties are unable to agree on a single acceptable arbitrator they shall each, within ten (10) business days, appoint their own individual appropriate expert. These two experts shall, between them, choose the single arbitrator. Applicant shall pay the fees of the chosen arbitrator. The chosen arbitrator shall within fifteen (15) business days, review the positions of the Parties regarding the arbitration issue and render a decision. The arbitrator shall ask the prevailing Party to draft a proposed order for consideration and objection by the other side. Upon adoption by the arbitrator,

and consideration of such objections, the arbitrator's decision shall be final and binding upon both Parties. If the arbitrator determines as a part of the decision that the City's position was not only incorrect but was also maintained unreasonably and not in good faith, then the arbitrator may order the City to pay the arbitrator's fees.

8. **Application Under City's Future Laws**. Without waiving any rights granted by this Agreement, Brennan may at any time, choose to submit a Development Application for some or all of the Project under the City's Future Laws in effect at the time of the Development Application. Any Development Application filed for consideration under the City's Future Laws shall be governed by all portions of the City's Future Laws related to the Development Application. The election by Brennan at any time to submit a Development Application under the City's Future Laws shall not be construed to prevent Brennan from relying on the City's Vested Laws for other Development Applications.

9. **Washington Dam Road Improvements**. In anticipation of developing the Property, Brennan has entered into several agreements under which it has made financial contributions and assisted in acquiring the dedication of lands in connection with the construction of Washington Dam Road and underlying infrastructure, including storm drain, water sanitary sewer telephone, cable TV and natural gas lines. These agreements outline Brennan's responsibility to construct the roadway, including design, grading, asphalt paving, curb and gutters, storm drain improvements and to facilitate the installation of natural gas, TV and telephone improvements. The City agrees to install the culinary water facilities within and along the roadway. In consideration of Brennan's construction of Washington Dam Road, Washington City agrees to contribute the Sanitary Sewer funds outlined in its Capital Facilities Plan for this area towards the construction of a Sewer lift Station, pressure line and gravity flow outfall line to the existing line located in 3650 South. This Agreement shall not be interpreted to modify any provision of those agreements.

10. **Southern Parkway Storm Drainage Issues**. The recently constructed Southern Parkway as shown on the Master Plan has caused storm water flows from the improved roadway to travel under the Southern Parkway onto and through the Property. The City acknowledges that the Property has a bona fide right to allow the historical natural stormwater flows to continue to flow as they naturally have. Brennan acknowledges that all additional storm water flows or changes in the characteristics of the historical storm water flows are its responsibility.

Currently, the storm water flows to an old, undocumented and abandoned irrigation pond located on private land parcels, identified with Washington County tax identification #W-4191-C, W-4191-A-3-B-HV and 4191-A-3-B-HV. To the best of Brennan and the City's knowledge, UDOT has not obtained any agreement or written documentation allowing the storm water generated by the Southern Parkway to flow onto either the Project and/or the privately owned irrigation pond. Brennan's improvement plans, as shown in the PCD Plan, propose that the historical natural storm water flows be piped as they exist through the Project and that the pipe be extend through the private parcels and along Washington Dam Road to a suitable location that it can be discharge into the Virgin River. Brennan agrees to make its best efforts to obtain the required easements from the private landowners and to work with UDOT to address the storm water flows created by the construction of the Southern Parkway. Brennan does not agree to incur any expenses related to the construction of any such improvements required by the Southern Parkway including without limitation, the foregoing storm water improvements. The City agrees to assist Brennan in its efforts to obtain the required easements and to work with UDOT to resolve the issues related to the Southern Parkway.

Brennan further agrees to adhere to the master drainage plan and report contained within the PCD Plan. The PCD Plan shows that all "post development flows" defined as any additional flows or changes in the characteristic of flows caused by the Project's planned improvements be totally contained and addressed within the Project. Since the Property has not added to or changed the historical flows and since Brennan is willing to make its best efforts to resolve the issues related to the historical flows, in the event that

Brennan install and construct portions of the Brennan Municipal Improvements which are System Improvements, the City shall ensure that Brennan is either not charged Impact Fees in connection with such System Improvements or that Brennan otherwise receives credits, adjustments or reimbursements for such System Improvements as required by State law.

11. Brennan Municipal Improvements. The improvements depicted in the PCD Plan, and set forth in this section, represent additional infrastructure improvements intended to service the Project. This section is intended to obligate Brennan to bring the major infrastructure from the perimeter of the Property internally to the boundary of each individual Parcel. Subject to the performance by the City of its obligations hereunder, Brennan shall cause improvements to be installed, constructed and completed, in conformance with applicable governmental standards (the "**Brennan Municipal Improvements**") and the PCD Plan. The Brennan Municipal Improvements will be installed and constructed in stages or phases as necessary to support development of each Parcel. Brennan shall be responsible for the costs to install, construct and complete the Brennan Municipal Improvements. The Brennan Municipal Improvements to be constructed include:

11.1 Water Distribution Systems. All pipes, valves, fittings, pressure reducing valve stations, air release valves and other distribution facilities within the Project for the purpose of distributing water to and within the Parcels.

11.2 Sewer Collection System. All pipes, manholes, clean outs and other collection facilities within the Project for the purpose of collecting and transporting sanitary sewer from and within the Parcels

11.3 Electrical Distribution System. The Project will be serviced by the Dixie REA. Brennan agrees to enter into all required contracts and agreements with Dixie REA to provide electrical service to all lots, units and amenities within the Project. Brennan has already completed an agreement to upgrade the existing transmission line running through the Project and Dixie REA has already completed the required infrastructure to serve the entire Project.

11.4 Roadways. All roadways contained within the Project and shown on the Master Plan and addressed in the transportation plan and traffic study portion of the PCD Plan, will be constructed by Brennan. All roadways shown will be public roadways, with the exception of the private alleyways used in the Club Cottages (as shown on the Master Plan).

11.5 Washington Dam Road. That portion of Washington Dam Road extending from the existing improved section to the perimeter boundary of the Project for approximately 7,179 feet will be partially constructed as shown on the approved plans for "Washington Dam Road" as approved by the City's Public Works Department. Brennan will initially pay all costs for these improvements. The City shall agree to enter into an agreement with Brennan to grant Brennan a credit for road Impact Fees within the Project up to an amount consistent with the construction of the such Washington Dam Road improvements paid for by Brennan.

11.6 Long Valley Parkway Extension. The construction of the extension of Long Valley Parkway from the southern boundary of the Project to the proposed 3650 South Interchange on the Southern Parkway will only be required to meet the need for an emergency secondary access or to comply with future traffic needs as determined by subsequent Traffic Impact Studies and agreed to by Brennan. Brennan has agreed to assist City in acquiring the required right of way from the BLM and to pay any reasonable costs to acquire this right of way including an environmental assessment and the reasonable costs associated with providing any mitigation required by the BLM.

11.7 Community Trail System. The Long Valley Trail System depicted on the Master Plan which includes a variety of paved, gravel and natural trails shall be constructed by Brennan and subsequently dedicated to the public. Upon completion and dedication of these trails the City shall agree to enter into an agreement to own and maintain these trail systems. The Trail system shall be an integrated part of the City's public park system. The City reserves the right to accept or reject the dedication of these trails only if it is found that these trails do not meet the City's standards.

11.8 Storm Water Drainage/Detention Basins. The offsite storm water issues have been addressed in Section 10 of this Agreement. All storm water flows generated by the development of the Project will be controlled and contained within onsite detention basins, the details of which are contained in the storm water drainage plan and report included in the PCD Plan. All improvements including pipe, inlet and outlet structures, manholes and detention basins will be constructed by Brennan. Upon completion and approval of these facilities, Brennan will convey and/or dedicate these facilities to the City at which time the City will assume ownership and maintenance of these facilities.

11.9 Community Parks. The Project will include a variety of private and public community parks as described and depicted in the PCD Plan. These parks and integrated trails will meet the recreational needs of the entire Project. Therefore, after the completion of any public park, Brennan shall dedicate the underlying park property and the park improvements to City, at which time the City shall grant park Impact Fee credits to Brennan. The amount of the park Impact Fee credits shall be equal to ninety percent (90%) of the value for the land and the actual cost purchasing and installing the park improvements. The per acre value land for the park parcel shall be equivalent to the per acre value of the Parcels, as set forth in an appraisal completed by a licensed and certified appraiser or by a mutually agreed value between Brennan and the City. Brennan shall have responsibility for designing and constructing the parks, in consultation and cooperation with the City; provided, however, the design and construction of the parks shall be subject to reasonable approval by the City's Parks Director. The City reserves the right to accept or reject the dedication of these parks if it is found that these parks do not meet the City's standards.

12. Financial Assurance. To the extent permissible under applicable State law, the City agrees that this Agreement constitutes the written undertaking of Brennan to cause the offsite improvements that Brennan is required to make under this Agreement to be installed, constructed and completed. To extent that City has adopted or does adopt an amendment to the Planned Community Development Ordinance, Chapter 13A of the Zoning Ordinance, so allowing, the City shall not require Brennan to bond for such offsite improvements. Bonding required under the normal City Subdivision process shall be required.

13. Builder/Developer Performance of Brennan Municipal Improvements, bonding by Builder/developer. Brennan may offer, for sale or lease, Parcels to builders or Subdevelopers in a phased manner. Brennan may enter into different types of transactions, including without limitation, sales, development leases or ground leases. As a condition of such transactions, Brennan may contractually obligate the builder or developer to install, complete and dedicate all or any portion of any of the Brennan Municipal Improvements. Such builders or Subdevelopers shall not be permitted to further assign such obligations. The City may require of such builders or Subdevelopers a bond or any other financial assurance allowed by its ordinances for any such Brennan's Municipal Improvements. At such time as the City either receives or declines to require such financial assurance, Brennan obligation shall terminate with respect to such Brennan Municipal Improvements. Anything in the Zoning Ordinance notwithstanding, Brennan may obtain building permits and/or temporary Certificates of Occupancy for model homes, homes shows, sales offices, construction trailers or similar temporary uses in accordance with *Utah Code Ann*. §10-9a-802(2)(d) (2020) prior to the installation of all Brennan Municipal Improvements required to be eventually completed so long as such installation is secured pursuant to the City's Vested Laws.

14. Dedication of Brennan Municipal Improvements.

14.1 Process and Conditions. Brennan intends to dedicate, and the City intends to accept the dedication, of the Brennan Municipal Improvements. Brennan shall satisfy the obligation to dedicate the Brennan Municipal Improvements by causing: i) the filing of a dedication plat; ii) the filing of a final subdivision plat; or iii) a builder/developer to be contractually bound to post a satisfactory bond with the City or to complete and perform the improvements in accordance with *Utah Code Ann*. §10-9a-604.5 (2020). The City shall approve and accept for dedication any Brennan Municipal Improvements, in whole or in part, as necessary to support the phase of development as long as the Brennan Municipal Improvements are generally consistent with the PCD Plan and the applicable Final Plat. The City shall own, operate and maintain the dedicated Brennan Municipal Improvements without further charge or cost to Brennan; provided, however, at the request of the City, and to the extent not prohibited by law or contract, Brennan shall assign to the City any contractual warranty rights existing for such Brennan Municipal Improvements. As necessary, Brennan will contractually obligate its Subdevelopers/builders to dedicate any applicable portion of the Brennan Municipal Improvements. In any event, the following plat dedication language shall be acceptable to the City:

> KNOW ALL MEN BY THESE PRESENTS that the undersigned owner of all the hereon described tract of land hereafter known as _____for good and valuable consideration received does hereby dedicate and convey to Washington City for perpetual use of the public, all parcels land shown on this plat as Roadway, and does hereby dedicate and convey to Washington City and to each public utility providing utility services, non-exclusive easements for installation and maintenance of public utilities and drainage facilities over, on, under and across the utility easements as shown on this plat. (or other language required by the City at time of recording)

14.2 Storm Water Drainage Systems. Any storm water facilities not accepted by City shall be dedicated to the Community Home Owners Association. Brennan will dedicate an easement to the City for both the major drainage systems and detention areas as shown on the Master Plan. The dedication will occur either by dedication plat or upon subdivision platting. Thereafter, the City shall maintain any portion of the storm water drainage system located within its easement or right of way that have been accepted by the City and not owned by the HOA.

15. Community Association's Responsibilities for Improvements. The PCD Plan calls for the establishment of a Community Home Owners Association to govern and enforce the CC&Rs for each community. The CC&Rs are the mechanism for transferring ongoing maintenance related obligations to the Community Home Owners Association, such items as landscaping within the City's right of way, private roadways, yards, neighborhood parks, ponds and certain open spaces. Upon such transfer or dedication, Brennan shall have no further obligations with respect to such items. The CC&Rs may be amended by the processes specified in the CC&Rs without any requirement of approval of such amendments by the City.

16. Open Space. The PCD Plan and the Master Plan designate certain areas of the Property as open space. Some of these areas will not be developed except for certain storm water and detention improvements. Brennan intends to convey the open space to Community Home Owners Association and the City shall have no obligation toward such areas, with the exception, of the major drainage systems, as identified in the PCD Plan. The Home Owners association shall be responsible for the maintenance of these open space areas.

The boundaries of the open space as depicted on the Master Plan are approximate and the boundaries will be more specifically described at such time as the Parcels or roadways are sold or otherwise developed and capable of being described and dedicated by Final Plat.

17. City Improvements. The City shall cause the following improvements for the Property to be installed, constructed and maintained, at such time as it becomes necessary for the development of the Project (collectively, the "**City Improvements**"):

17.1 Electrical Power System. The electrical power for the Project will be provided by Dixie REA. The City shall have no obligation to provide electrical service beyond their existing agreements with Dixie REA.

17.2 Culinary Water Supply and Storage. The City shall cause a sufficient supply of culinary water with adequate flow, quantity, pressure, capacity and quality to service the uses contemplated in the PCD Plan, together with adequate facilities for storage of such water to be delivered to the Project. These improvements may include but are not limited to transmission lines from both the North, along Washington Dam Road and from the South from the 3650 Interchange on the Southern Parkway. A new water storage tank that will also be provided by the City. The initial planned connection point is anticipated to be at the intersection of Washington Dam Road and Long Valley Parkway with additional connections from the South required during the later phases of the development plan.

17.3 Secondary Irrigation Water. There currently is no secondary irrigation water available for the Project. However, the City is currently developing a secondary water system master plan which may identify a source of secondary water. Both Parties covenant to work together in good faith to implement this system if it becomes available.

17.4 Sanitary Sewer. The city shall make available a sewer collection system of adequate size and capacity to service the Maximum Residential Units and other Intended Uses in the Project. This system will include outfall sewer lines, lift stations, high pressure lines and other facilities to accommodate the sanitary sewer requirements of the Project. Some of the City provided Sanitary Sewer facilities will be located within the Long Valley Project Development Plan area. Brennan shall be responsible for all onsite sewer collection system and delivery to the City installed facilities within the Project. These improvements may include but are not limited to outfall sewer lines, lift stations, high pressure lines and other facilities

18. No Further Exactions. Subject to the obligations of Brennan set forth herein, the City shall not, directly or indirectly, charge Brennan (excluding a Subdeveloper) any development fees, Impact Fees, water hookup fees, or any similar fees, charges, assessments or exactions for the development of the Project except as may be otherwise allowed by law.

19. Impact Fees. The City may only charge Impact fees at the time and in the course of development of the Property as the City customarily charges to other developers or builders, in a non-discriminatory manner. As a part of the approval of a Development Application the City may require Brennan or a Subdeveloper to build portions of the Brennan Municipal Improvements as shown on the Capital Facilities Plan instead of as shown on the PCD Plan. However, Brennan or a Subdeveloper shall not be required to build any such Brennan Municipal Improvements pursuant to the Capital Facilities Plans that exceeds the facilities shown on the PCD Plan unless the City and Brennan or a Subdeveloper have executed an agreement providing for the reimbursement of the pro rata costs and the time-value-of-money (which may be included in the pricing of the improvement in the Impact Fees) for the construction of any level of Brennan Municipal Improvements in excess of that needed to serve the development proposed by the Development Application. If the Parties cannot reach agreement on the terms of a reimbursement agreement then the terms of such a reimbursement agreement shall be subject to the mediation and arbitration provisions of Sections 7.14 and 7.15. If any variation in the level of required Brennan Municipal Improvements is necessitated by an erroneous sizing by Brennan in the creation of the PCD Plan or by changes to the demand needs caused by a material change by Brennan or a Subdeveloper in the intensity of a proposed development, then the above provision requiring a reimbursement agreement shall not be

applicable to the differences caused by Brennan and/or a Subdeveloper. With respect to the Project, the following conditions with regards to Impact Fees shall apply:

19.1 Storm Drain Impact Fees. Neither Brennan nor Subdevelopers will be charged Impact Fees related to storm drainage or water management after the offsite storm drain piping is secured and installed as outlined in Section 10 of this Agreement.

19.2 Park Impact Fees. Brennan will be charged Impact Fees for parks, but Brennan shall receive Impact Fee credits in accordance with Section 11.9.

19.3 Assignment and Payment of Impact Fee Credits. Brennan Impact Fee credits are assignable in whole or in part. To evidence the transfer of Impact Fee credits, Brennan will issue certificates to Subdevelopers or builders. Each certificate will state the specific dollar amount it represents and will set forth the type of Impact Fee credit being utilized thereunder. The Impact Fee will not be allocated on a pro rata basis across all units to be developed, amounting to a partial Impact Fee payment, but rather, shall be utilized as a full Impact Fee payment until the total dollar amount credit available is exhausted. The City and Brennan shall independently maintain ledgers accounting for the Impact Fee credits and agree to reconcile their ledgers annually, commencing 1 year from the first Impact Fee due date.

20. Term; Extension.

20.1 Term. The term of this Agreement shall be until December 31, 2035. If as of that date Brennan has not been declared to be in default as provided in Section 26, or if any such declared default has been or is being cured as provided therein, then this Agreement shall be automatically extended until December 31, 2040, and, thereafter, for up to two (2) additional periods of five (5) years each. This Agreement shall also terminate automatically at Buildout.

20.2 Initial Development Application. Brennan must submit a Development Application for approval within at least 18 months from the date of entering into this Agreement or this Agreement will expire automatically at that time.

20.3 Extension. The term of this Agreement may be modified upon mutual agreement in writing by the Parties.

21. On-Site Processing of Natural Materials. Brennan may use the natural materials located on the Property such as sand, gravel and rock, and may process such natural materials into construction materials such as aggregate or topsoil for use in the construction of infrastructure, homes or other buildings or improvements located in the Project and other locations outside the Project. Brennan shall make an application for the appropriate permit for all such uses pursuant to the processes provided in the City's Vested Laws. In connection with the foregoing, City will approve the temporary grading and exporting of excess dirt material for development of the Project, as necessary to effectuate, and in accordance with, the PCD Plan. Brennan or its grading contractor may export and engage in incidental sales of the excess dirt materials resulting from such activities. Brennan may also make an application for the appropriate permit for the production of concrete and asphalt pursuant to the processes as if it were a conditional use as provided in the City's Vested Laws. Conditional uses for all uses contemplated in this section shall terminate at Buildout or at the termination or expiration of this Agreement.

22. Administrative Amendments.

22.1 Allowable Administrative Applications: The following modifications to this Agreement and the PCD Plan may be considered and approved by the Administrator.

22.1.1 Infrastructure. Modification of the location and/or sizing of the infrastructure for the Project that does not materially change the functionality of the infrastructure.

22.1.2 Design Guidelines. Modifications of the Design Guidelines that affect only aesthetic components of the Project.

22.1.3 Parcel Density and Intended Use. Modifications of the Intended Uses, Densities or Parcel Configuration, as provided for in Sections 6.2 and 6.3.

22.2 Application to Administrator. Applications for Administrative Amendments shall be filed with the Administrator

22.2.1 Referral by Administrator. If the Administrator determines for any reason that it would be inappropriate for the Administrator to determine any the Administrative Amendment the Administrator may require the Administrative Amendment to be processed as a Modification Application.

22.2.2 Administrator's Review of Administrative Amendment. The Administrator shall consider and decide upon the Administrative Amendment within a reasonable time.

22.2.3 Notification Regarding Administrator's Approval. If the Administrator approves any Administrative Amendment the Administrator shall notify the City Council in writing of the proposed approval. Unless the Administrator receives a notice pursuant to Section 22.2.4 requiring that the proposed Administrative Amendment be considered by the City Council as a Modification Application then approval of the Administrative Amendment by the Administrator shall be conclusively deemed binding on the City.

22.2.4 City Council Requirement of Modification Application Processing. The City Council may, within ten (10) business days after notification by the Administrator, notify the Administrator that the Administrative Amendment must be processed as a Modification Application.

22.2.5 Appeal of Administrator's Denial of Administrative Amendment. If the Administrator denies any proposed Administrative Amendment the Applicant may process the proposed Administrative Amendment as a Modification Application.

23. Amendment. Except for Administrative Amendments, any future amendments to this Agreement and the PCD Plan shall be considered as Modification Applications subject to the following processes.

23.1 Who may Submit Modification Applications. Only the City and Brennan or an assignee that succeeds to all of the rights and obligations of Brennan under this Agreement (excluding a Subdeveloper) may submit a Modification Application.

23.2 Modification Application Contents. Modification Applications shall:

23.2.1 Identification of Property. Identify the property or properties affected by the Modification Application.

23.2.2 Description of Effect. Describe the effect of the Modification Application on the affected portions of the Project.

23.2.3 Identification of Non-City Agencies. Identify any Non-City Agencies potentially having jurisdiction over the Modification Application.

23.2.4 Map. Provide a map of any affected property and all property within three hundred feet (300') showing the present or Intended Use and Density of all such properties.

23.2.5 Fee. Modification Applications shall be accompanied by a fee in an amount reasonably estimated by the City to cover the costs of processing the Modification Application.

23.3 City Cooperation in Processing Modification Applications. The City shall cooperate reasonably in promptly and fairly processing Modification Applications. The PCD Plan and this Agreement shall not be amended by a Modification Application in a manner that eliminates the vested rights of Brennan as set forth in this Agreement, except as agreed by Brennan.

23.4 Planning Commission Review of Modification Applications.

23.4.1 Review. All aspects of a Modification Application required by law to be reviewed by the Planning Commission shall be considered by the Planning Commission as soon as reasonably possible in light of the nature and/or complexity of the Modification Application, in accordance with the procedures outlined in Section 7.4.

23.4.2 Recommendation. The Planning Commission's vote on the Modification Application shall he only a recommendation and shall not have any binding or evidentiary effect on the consideration of the Modification Application by the City Council.

23.5 City Council Review of Modification Application. After the Planning Commission, if required by law, has made or been deemed to have made its recommendation of the Modification Application the City Council shall consider the Modification Application, in accordance with the procedures outlined in Section 7.5.

23.6 City Council's Objections to Modification Applications. If the City Council objects to the Modification Application, the City Council shall provide a written determination advising Brennan of the reasons for denial including specifying the reasons the City believes that the Modification Application is not consistent with the intent of this Agreement and/or the PCD Plan (or, if applicable, the City's Future Laws).

23.7 Meet and Confer regarding Modification Applications. The City Council and Brennan shall meet within fourteen (14) calendar days of any objection to resolve the issues presented by the Modification Application and any of the City Council's objections.

23.8 Mediation of City Council's Objections to Modification Applications. If the City Council and Brennan are unable to resolve a dispute regarding a Modification Application, the Parties shall attempt within seven (7) days to appoint a mutually acceptable expert in land planning or such other discipline as may be appropriate. If the Parties are unable to agree on a single acceptable mediator they shall each, within seven (7) days, appoint their own individual appropriate expert. These two experts shall, between them, choose the single mediator. Brennan shall pay the fees of the chosen mediator. The chosen mediator shall within fourteen (14) days, review the positions of the Parties regarding the mediation issue and promptly attempt to mediate the issue between the Parties. If the Parties are unable to reach agreement, the mediator shall notify the Parties in writing of the resolution that the mediator deems appropriate. The mediator's opinion shall not be binding on the Parties.

24. Separate Development Agreements. Brennan, Subdevelopers or successors in title may elect to propose and enter into separate agreements with City to govern the construction or development of a

particular Parcel within the Project. Nothing in any separate agreement may conflict with the entitlements obtained by Brennan in this Agreement without the express written consent of City and Brennan.

25. **Assignment and Transfer of Development**. If Brennan assigns, transfers, or otherwise conveys the entire Project or any portion thereof to a subsequent owner, then this Development Agreement shall inure to the benefit and detriment of the subsequent owner, and shall not relieve the subsequent owner from any responsibilities or duties set forth herein. The obligations of Brennan shall automatically be assigned and assumed by subsequent purchasers of the Project or any portion thereof, and Brennan shall be released from the obligations related to such portion as a result of the assignment and the assumption by subsequent purchasers. Subsequent purchasers of the Project or any portion thereof shall expressly assume the obligations of Brennan pursuant to this Agreement. However, in the event that subsequent purchasers of the Project do not expressly assume the obligations of this Agreement, they shall still be bound to the terms of, and obligations of this Agreement.

26. **Default**. Failure by a Party to perform any such Party's obligation under this Agreement for a period of 30 days (the "**Cure Period**") after written notice thereof from the other Party shall constitute a default by such failing Party under this Agreement; provided however, that if the failure cannot reasonably be cured within 30 days, the Cure Period shall be extended for the time period to reasonably required to cure such failure, so long as the failing Party commences its efforts to cure within the initial 30 days period and thereafter diligently proceeds to complete the cure. Said notice shall specify the nature of the alleged default and the manner in which said default may be satisfactorily cured, if possible.

27. **Notice and Filings**. All notice, filings, consents, approvals and other communications provided for or given in connection herewith shall be validly given, filed, made, delivered or served if in writing and delivered personally, sent prepaid, or by a national overnight delivery service, freight prepaid, to:

The City:

City Manager
WASHINGTON CITY
111 North 100 East
Washington City, Utah 84780
Attention: City Manager

With a copy to:

City Attorney
WASHINGTON CITY
111 North 100 East
Washington City, UT 84780
Attention: City Attorney

Brennan:

Robert M. Brennan
Brennan
P.O. Box 1991
Sun Valley, ID 83353

With a copy to:

John Andrews, Esq.
Snell and Wilmer
Gateway Tower West
15 West South Temple, Suite 1200
Salt Lake City, UT 84101-1547

or to such other addresses as either Party hereto may from time to time designate in writing and deliver in a like manner. Notices, filings, consents, approvals and communication by delivery or overnight delivery shall be effective upon receipt and if given by mail shall be deemed delivered 72 hours following deposit in the U.S. mail, postage prepaid as set forth above.

28. **Waiver**. No delay in exercising any right or remedy shall constitute a waiver thereof, and no waiver by the City or Brennan of the breach of any covenant of this Agreement shall be construed as a waiver of any preceding or succeeding breach of the same or any other covenant or condition of this Agreement.

29. **Counterparts**. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The signature pages from one or more may be removed from such counterparts and such signature pages all attached to a single instrument so that the signatures of all Parties may be physically attached to a single document.

30. **Captions and Construction**. This Agreement shall be construed according to its fair and plain meaning and as if prepared by all Parties hereto and shall be interpreted in accordance with State law. The descriptive heading of the sections of this Agreement are inserted for convenience only and shall not control the meaning or construction of any of the provisions hereof. As used in this Agreement, masculine, feminine or neuter gender and the singular or plural number shall each be deemed to include the others wherever and whenever the context so dictates. Furthermore, this Agreement shall be construed so as to effectuate the public purposes, objectives and benefits set forth herein. As used in this Agreement, the words "include" and "including" shall mean "including, but not limited to" and shall not be interpreted to limit the generality of the terms preceding such word. To the extent a general provision of City's Vested Laws or City's Future Laws, or any other law, conflicts with a specific provision of this Agreement or an interpretation necessary to give effect to the Agreement, then this Agreement shall control.

31. **Further Acts**. Each of the Parties shall execute and deliver all such documents and perform all such acts as reasonably necessary to carry out the matters contemplated by this Agreement.

32. **Estoppel Certificate**. Upon twenty (20) days prior written request by Brennan, City will execute an estoppel certificate to any third party certifying that Brennan at that time is not in default of the terms of this Agreement.

33. **Time of the Essence: Force Majeure**. Except as otherwise provided in this section, time is of the essence for this Agreement. If either Party is delayed or hindered in or prevented from the performance of any act required hereunder by reason or inability to procure materials, acts of God, failure of power, riots, insurrection, war or other reason of a like nature (other than labor disputes) not the fault of the Party delayed in performing work or doing acts required under this Agreement, the performance of such acts will be extended for a period equivalent to the period of such delay.

34. **Termination on Sale to the Public**. In order to alleviate any concern as to the effect of this Agreement on the status of title to any of the Property, this Agreement shall terminate without the execution or recordation of any further document or instrument as to any lot which has been finally subdivided and individually leased (for a period longer than one year) or sold to the purchaser or user thereof (a "**Public**

Lot") and thereupon such Public Lot shall be released from and no longer be to or burdened by the provisions of this Agreement.

35. **No Partnership or Third Party Beneficiaries**. It is not intended this Agreement to and nothing contained in this Agreement shall, create any partnership, joint venture or other arrangement between Brennan and the City. No term or provision of this Agreement is intended to, or shall, be for the of any person, firm, or corporation not a party hereto, and no such other person, organization or corporation shall have any right or cause of action hereunder.

36. **Names and Plans**. Brennan shall be the sole owner of all plans, drawings, specifications, ideas, programs, designs and work products of every nature developed, formulated or prepared by or at the request of City in connection with the Property and the Project.

37. **Good Standing Authority**.

37.1 Brennan hereby represents and warrants to the City that: (i) Brennan is a duly registered limited liability company; (ii) the individual(s) executing this Agreement on behalf of Brennan are duly authorized and empowered to bind Brennan; and (iii) this Agreement is valid, binding, and enforceable against Brennan in its terms.

37.2 City hereby represents and warrants to Brennan that: (i) the City is a Utah municipal corporation; (ii) the City has power and authority pursuant to the Land Use Act and the Zoning Ordinance to enter into and be bound by this Agreement; (iii) the individual(s) executing this on behalf of the City are duly authorized and empowered to bind the City; and (iv) this Agreement is valid, binding and enforceable against the City, in accordance with its terms.

38. **Severability**. If any provision of this Agreement is declared void or unenforceable, such provision shall be severed from this Agreement and the Agreement shall otherwise remain in full force and effect.

39. **Governing Law**. This Agreement is entered into in the State and shall be construed and interpreted under the laws of the State.

40. **Recordation**. No later than 10 days after this Agreement has been executed by the City and Brennan, it shall be recorded in its entirety at Brennan's expense in the Official Records of Washington County, Utah. Each commitment and restriction on development set forth herein shall be a burden on the Property, shall be appurtenant to and for the benefit of City and Brennan and shall run with the land.

41. **No Waiver of Governmental Immunity**. Nothing in this Agreement is intended to, or shall be deemed, a waiver of the City's governmental immunity.

42. **Attorney's Fees**. In addition to any other relief, the prevailing Party in any action, whether at law, in equity or by arbitration, to enforce any provision of this Agreement shall be entitled to its costs of action including a reasonable attorneys' fee.

43. **Entire Agreement**. This Agreement, together with the PCD Plan, constitute the entire Agreement between the Parties pertaining to the subject matter hereof. All other prior and contemporaneous agreements, representations and understandings of the Parties, oral or written, are hereby superseded and merged herein. All amendments shall be in writing and signed by the City and Brennan and shall be recorded.

IN WITNESS WHEREOF, the Parties have executed this Agreement the day and year first above written.

BRENNAN FAMILY HOLDINGS, LLC
an Idaho Limited Liability Company

_____
Robert M. Brennan
Managing Member

WASHINGTON CITY
A Utah municipal corporation

Attest:

_____
Kenneth Neilson
Mayor

_____
Denise Bulloch
City Recorder

STATE OF UTAH)
:
COUNTY OF WASHINGTON)

On the _____ day of _____, 2020, personally appeared before me Robert M. Brennan, who being by me duly sworn did say that he is the Managing Member of Brennan Family Holdings, LLC and has the authority to sign for said limited liability company and is the signer of the above instrument, who duly acknowledged that he executed the same.

Given under my hand and seal this _____ day of _____ 2020.

_____
Notary Public

STATE OF UTAH)
:
COUNTY OF WASHINGTON)

On the _____ day of _____, 2020, personally appeared before me Kenneth Neilson, who being by me duly sworn did say that he is the Mayor of Washington City and the signer of the above instrument, who duly acknowledged that he executed the same.

Given under my hand and seal this _____ day of _____ 2020.

_____
Notary Public

Exhibit "A"

Legal Description of the Property

Salt Lake Meridian, Utah

Township 42 South., Range 14 West

Section 20, lots 13 and 14;
Section 29, lots 2, 4, 5, 7, 9, 12, 14, and 15, NE1/4NW1/4, SW1/4NW1/4; Section 30, lots 13, 16, 18, 19, 22, 24, and 25, NE1/4SE1/4;
Section 31, lots 14, 15, 18, 20, and 22, NW1/4NE1/4.

Acreage: 605.61

Exhibit "B"

Legal Description of the Property

The Complete City Code of Washington City, Utah, Current [_____ ___], 2020.

Exhibit "C"
PCD Plan

LONG VALLEY TRAILS

Project Written Statement

Section 16

PROJECT WRITTEN STATEMENT

1. PLANNING GOALS AND OBJECTIVES

Long Valley Trails is a master-planned community located on the west side of Washington City, directly adjacent to the Washington Fields area. Long Valley Trails consists of a variety of planned single family and multi-family residential subdivisions, open-space, parkland, trail systems, Community Center, and churches. The 605-acre master planned community has been planned to be a sustainable and affordable community.

Long Valley Trails lies within a strikingly beautiful landscape and the land planning process, sensitive site planning, and careful building and development methods assure this beauty will remain. Setting aside sensitive lands and building in appropriate areas will assure the lasting value of this desert landscape. Preservation of these natural assets is very important to the Long Valley Trails environmentally planned community. Development in Long Valley Trails should be reflective of, and enhanced by, the colors, textures, lines, and forms of the surrounding natural terrain.

Utilizing the setting of the Mojave (southwest desert) environment with correlated parks, open space, and trail systems, Long Valley Trails beckons a lifestyle utilizing the outdoors and openness. Representative architecture for the project shall include traditional and contemporary southwestern and Mediterranean styled homes, Townhomes and Condominiums. Stucco, brick, blocks, stone, tile and other complementary materials with compatible colors that complement each-other and the desert oasis theme are to be utilized. Elements of this architectural theme are encouraged throughout the community in the design of signage and street furniture.

Long Valley Trails is a water-efficient community. Due to the arid desert environment, responsible management of our water resources is most appropriate. Water conservation is a priority and is a course of consideration that is intertwined in the Development Plan of Long Valley Trails.

Design Guidelines were created to ensure that the high standards, which are the product of this extensive planning effort, are consistently applied to help residents and builders understand the concepts and intent behind Long Valley Trails. These Guidelines are binding upon each owner of real property ("Owner") and any other individual or entity ("Builder") who is developing a single family residential of multi-family residential projects within Long Valley Trails.

2.0 DESIGN THEMES AND GUIDELINES

It is anticipated that a single large-scale builder will construct all the project units. It is important to assure that there is continuity in the community as it develops and, therefore, certain standards and requirements must be set to guide current and future construction. These standards and requirements have been defined by the Master Developer of Long Valley Trails, which is Brennan Family Holdings, LLC (the "Master Developer").

Project Guidelines:

The Master Developer will record the Master CC&Rs. The Master CC&Rs authorize a Residential Design Review Committee (the "DRC"). It is intended that the DRC will consider and act upon all proposals or plans submitted pursuant to the Design Guidelines. The DRC is also authorized to interpret and amend the Design Guidelines. The “Master Developer” shall serve as the “DRC” until such time that the Master Developer has sold all parcels, lots or other interest in Long Valley Trails.

In addition, the Master CC&R’s set limits on the use of the property within the Long Valley Trails, common areas and provide mechanisms for long-term maintenance of all common areas. The Master CC&R’s and the Design Guidelines are binding upon all Owners of property in the community and should be consulted prior to any intended construction, reconstruction or modifications to any improvements in Long Valley Trails. Some parcels or lots within Long Valley Trails may also have ancillary CC&R’s which are subsequent to the Master CC&R’s.

The Design Guidelines are intended to include the standards that the DRC will consider when reviewing all proposals or plans submitted. Since it is not the Master Developer's intent to inhibit architectural creativity, exact architectural requirements are not contained herein. The Design Guidelines, therefore, shall contain specific requirements whenever possible and conceptual information and standards in other instances. The DRC shall have the authority to interpret these Design Guidelines on behalf of the Association. In the event there is an inconsistency in the interpretation between an Owner and the DRC, the interpretation of the Master Developer will control.

3.0 STATEMENT OF OWNERSHIP:

Long Valley Trails is owned in its entirety and without any financial encumbrances by:
Brennan Family Holdings, LLC
Robert M. (Bob) Brennan, Manager
P.O. Box 1991
Sun Valley, ID 83353
208-720-4065
brennanholdings@gmail.com

Long Valley Trails is locally represented and managed by:
James A. (Jim) Raines
2382 South 1340 West
St. George, UT 84770
435-668-3641
jraines56@msn.com

Long Valley Trails Master Builder will be DR Horton their representative is:

D·R·HORTON America's Builder

Matt Relei CRS, CSP

D.R. HORTON

12351 So. Gateway Park Place, Suite D-100, Draper UT 84020

m: 385.335.4854, Matthew David Relei <MDRelei@drhorton.com>

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4.0 PROJECT LEGAL DESRIPTION:

All of those lands contained in the land patent from the United States of America and recorded as Document # 20160047271 records of Washington County, Utah and more particularly described as follows:

Salt Lake Base and Meridian, Utah

Township 42 South, Range 14 West
Section 20, Lots 13 and 14;
Section 29, 2,4,5,7,9,12,14 and 15, NE1/4NW1/4, SW1/4NW1/4;
Section 30, Lots 13, 16, 18, 19, 22, 24 and 25, NE1/4SE1/4;
Section 31, Lots 14,15,18,20 and 22, NW1/4NE1/4.

This area contains 605.61 Acres

5.0 REGULATING LAND USE STANDARDS:

A. Washington City Development Requirements:

(1) Conditions: The approved Planned Community Development ("P.C.D.") zoning stipulations for Long Valley Trails (Ordinance dated _____) include the following requirements:

1. Compliance with the PCD Zoning District criteria and with all State, County and City Codes and Ordinances in place at the time of adoption of this P.C.D. plan;

2. Compliance with a Development Agreement to be entered into between Brennan Family Holdings and Washington City;

3. Compliance with the development concepts contained in the Planned Community Development Master Plan, and made part of the zoning request;

4. Approval of the Public Utility Master Plan, or any amendments thereto, by the Washington City;

5. Approval of the Master Drainage Report, or any amendments thereto;

6. The dedication of all necessary rights-of-way, easements, open space and parks, retention areas and drainageways as required by the City;

7. Approval of the Traffic Analysis Report, or any amendments thereto;

8. Approval of other Master reports and amendments thereto which may be submitted from time to time and which pertain to the rezoned property;

9. Project Concept Plan includes sites for but not limited to temporary construction staging sites, recreational vehicle storage. Undisturbed open spaces, natural open spaces and trails, community center and project sales sites and signage;

10. Project Concept Plan also includes sites for medium to high-density residential uses including single family detached home sites, townhouses, condominiums and apartments;

6.0 RESIDENTIAL UNIT BREAKDOWN:

Pod #	Land Use	Acres	Units	Density
1	Active Adult	14.35	62	4.3
2	Active Adult	27.98	165	5.9
3	Active Adult	21.72	110	5.1
Total Active Adult		**64.05**	**337**	**5.3**
4	Large Lots	13.59	34	2.5
6	Large Lots	15.17	29	1.9
Total Large Lots		**28.76**	**63**	**2.2**
5	Medium Lots	36.42	153	4.2
7	Medium Lots	48.66	161	3.3
13	Medium Lots	21.85	111	5.1
17	Medium Lots	23.4	114	4.9
Total Medium Lots		**130.33**	**539**	**4.1**
8	Patio Homes	6.16	38	6.2
12	Patio Homes	5.61	29	5.2
16	Patio Homes	4.12	29	7.0
18	Patio Homes	12.92	78	6.0
21	Patio Homes	7.8	54	6.9
23	Patio Homes	8.16	49	6.0
Total Patio Homes		**44.77**	**277**	**6.2**
9	Townhomes	9.45	90	9.5
11	Townhomes	9.15	110	12.0
19	Townhomes	7.4	86	11.6
20	Townhomes	19.55	224	11.5
22	Townhomes	17.89	187	10.5
24	Townhomes	17.19	194	11.3
Total Townhomes		**80.63**	**891**	**11.1**
14	Condos	5.78	122	21.1
15	Condos	5.8	132	22.8
Total Condos		**11.58**	**254**	**21.9**
25	RV Storage	4.26	0	0.0
10	Clubhouse	7.16	0	0.0
	Open Space and Hillside	234.07	0	0.0
Totals		**605.61**	**2361**	**3.9**

7.0 RELATED INFORMATION:

See Section 2, Project Plan for additional maps and tables that outline the various uses in greater detail.