AGENDA
CITY OF GLENWOOD SPRINGS
Planning and Zoning Commission
Regular Meeting
MAY 24, 2022
Council Chambers, First Floor
101 W. 8TH STREET
6:00 PM

1 Attendance Instructions

A. This meeting is being held IN PERSON as well as via zoom.
Please click the link below to join the webinar:
https://us02web.zoom.us/j/88316276291
Or One tap mobile :
US: +13462487799,,88316276291# or +16699006833,,88316276291#
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Dial(for higher quality, dial a number based on your current location):
US: +1 346 248 7799 or +1 669 900 6833 or +1 253 215 8782 or +1 312 626 6799 or +1 929 205 6099 or +1 301 715 8592
Webinar ID: 883 1627 6291
International numbers available: https://us02web.zoom.us/u/kgI38ht0v

The City of Glenwood Springs ensures meaningful access to City programs, services, and activities to comply with American Disabilities Act and reasonably provides: translation, interpretation, modifications, accommodations, alternative formats, auxiliary aids and services. To request these services, contact Bryana Starbuck, Public Information Officer.

2 Roll Call

3 Receipt of the Minutes

A. April 26, 2022 Planning and Zoning Commission Draft Minutes.
Minutes were not available at time of packet and will be reviewed at the next regularly scheduled meeting in June.

4 Comments from citizens appearing for items not on the agenda

5 New Items

A. Planning Item 14-22 Special Use Permit Amendment 2517 South Grand Avenue

B. Planning Item 76-21 Location and Extent Review 2307 Wulfsohn Road

6 Commissioner Comments

7 Director Comments

8 Adjournment

Planning and Zoning Commission Report

Date: May 24, 2022
To: Planning and Zoning Commission
From: Trent L. Hyatt, Long Range Senior Planner
Subject: #14-22 – Wanderlust Dog Ranch

REQUEST	Consideration of an amendment to a Special Use Permit allowing for a change in kennel ownership and a revision to the conditions of approval.
APPLICANT	Jason Hershman/Wanderlust Dog Ranch
OWNER	2517 South Grand, LLC
LOCATION	2517 South Grand (PINs: 2185-164-00-073)
ZONE	Commercial (CO) District
SURROUNDING LAND USES	North: Multi-family residential, commercial business/warehouse South: Vacant, future multi-family residential East: Roaring Fork River, multi-family residential complexes West: South Grand Avenue, Vacant property, mobile home park
LOT SIZE	Approximately 1.014 acres (43,143 square feet)

ACTION ITEM

Per Section 070.060.050(a)/Table 060.2 of the *Glenwood Springs Municipal Code* (Code), the Planning and Zoning Commission (Commission) is the reviewing body for Special Use Permits (SUP) and/or amendments thereto. Following any approval (with or without conditions) of a SUP, the applicant must still submit and receive approval of any applicable grading or building applications from the City.

Action 1 – <u>Special Use Permit Amendment</u> - allowing for a change in kennel ownership and an amendment to the conditions of approval.

<u>Staff recommendation</u>: *Staff recommends* ***approval (with conditions)*** *of the Special Use Permit Amendment application with the findings and conditions on pages 5-6.*

BACKGROUND/ANALYSIS

<u>Proposal</u>

In 2016, the Commission approved a SUP allowing for the use of the property as a kennel. As per Table 030.1 of the Code, a "kennel" is identified as a special review use in the CO zone district (C/3 General Commercial District at the time of approval). The kennel/doggie daycare, known as Dog Hollidays Pet Resort, was operated/owned by Drs. Lori Pohm and Bob Thorsen of All Dogs and Cats Veterinary Hospital until recently. Drs. Pohm and Thorsen found it difficult to operate the

kennel/doggie daycare alongside their fruitful veterinary hospital and are interested in selling the former at this time.

The applicant, Jason Hershman, owns and operates a similar use in Eagle, CO, Wanderlust Dog Ranch, and hopes to purchase the business/property in Glenwood Springs. While he intends to change the name of the business and to conduct limited interior remodeling, Mr. Hershman plans to operate and manage the kennel/dog doggie in a very similar fashion as the approved SUP. Please see the applicant's narrative and response to the SUP approval criteria attached. Also, please find documents related to the existing SUP approved in 2016.

Kennel Use Standards

Section 070.030.030(e)(1) of the Code provides the commercial use specific standards related to kennel as outlined in ***bold italics*** below. Additional language is provided by staff. The use previously has and will continue to operate in accordance with standards.

a. All animals shall be confined within an enclosed area or on a leash at all times.

All dogs are confined to either fenced, screened outdoor or indoor play areas.

b. All boarded animals shall be kept within a totally enclosed structure between the hours of 10:00 p.m. and 7:00 a.m.

All dogs are confined indoors during these hours.

c. Any open or exercise run shall be at least 50 feet from any adjoining property in a residential zoning district.

Outdoor exercise areas are a minimum of 200 feet from any adjacent residential districts.

Development Standards

Article 070.040 of the Glenwood Springs Municipal Code (Code) outlines the development standards applicable to developments within the City. However, these standards are not applicable to the current request since the applicant does not plan any changes to the site or existing exterior of the building.

Special Use Permit Approval Criteria

The SUP approval criteria are outlined in Section 070.060.050(e)(3)e.2 of the Code and are outlined in bold italics below. Additional language is provided by staff.

i. The use will be compatible with the surrounding area;

Dog Holliday's Pet Resort has proven to be compatible with the surrounding neighborhood. Significant concerns were brought forth during the review of the original application related to potential nuisances related to noise from barking and smells from dog urine and feces. All related conditions were included in the prior approval. One condition even requires reconsideration of the use if numerous complaints are received and prosecuted in municipal court. To date, the City has

only received one complaint related to noise since the kennel/daycare's inception which was never reviewed nor prosecuted in court.

ii. The impacts of the use on surrounding areas have been adequately minimized;

It appears the applicant has been able to minimize the impacts in the operation and management of the facility due to the limited complaints received.

iii. The use will be consistent with the general purpose and intent of this Code;

The use is consistent with the general intent and purpose as outlined in Section 070.010.030 to protect public health, safety, and welfare and to create the best built environment.

iv. The use will comply with all applicable standards of this Code;

The proposal is in compliance with applicable specific kennel use and other site/building aspects of the City's Code. No operational or site/building changes are requested as this time.

v. The use is in conformance with the Comprehensive Plan and other City plans and policies; and



As shown at left , Map 2.2 (Future Land Use – Central Portion of the City) of the Glenwood Springs Comprehensive Plan (Comp Plan) identifies the area as "Commercial" in red. Chapter Two of the Comp Plan explains that the "Commercial" designation "…provides a wide range of general retail goods and services for both regional and local markets, in attached and freestanding structures. Retail that would compete directly with Downtown retail is discouraged." The kennel use proposed is a service that is in compliance with the designation.

Numerous community goals and related objectives and strategies outlined in the Executive Summary and subsequent chapters of the Comp Plan support this proposal. These goals are outlined in the following table.

Comprehensive Plan Goal Supported	**Objective and Strategies**
Promote long-term, sustainable, diverse,	-Direct development into a compact form:

economic development	infill and redevelopment (Chapter 3, Page 34) -Attract diverse businesses and industries (Chapter 4, Page 50) -Maintain the role as regional center (Chapter 4, Page 54) -Retain role as a regional center (Chapter 7, Page 83)
Staff Comment: A kennel is a diverse and needed business in the City. The objectives/strategies outlined above are supported by the current application and aid in attracting diverse businesses and maintaining/retaining our regional center.	
Maintain Glenwood Springs as the regional tourism, retail, commercial, and governmental center of Garfield County	-Attract diverse businesses and industries (Chapter 4, Page 50) -Retain the long-standing tourist market (Chapter 4, Page 54) -Build on role as a regional medical and education center (Chapter 4, Page 54) -Maintain the role as regional center (Chapter 4, Page 54) -Retain role as a governmental center (Chapter 4, 56)
Staff Comment: Continuing the kennel use is necessary to maintaining/enhancing the City's status as the regional center of Garfield County. The objectives/strategies outlined above are supported by the current proposal as it aids in attracting diverse businesses and supporting tourism.	
Direct development to locations and building forms that are cost effective to serve	-Direct development into a compact form: infill and redevelopment (Chapter 3, Page 34) -Direct growth to areas where utilities and services can be provided efficiently (Chapter 7, Page 82) -Retain role as a regional center (Chapter 7, Page 83) -Direct growth inward (Chapter 9, Page 102)
Staff Comment: The existing/proposed use is located in an area already served by City's utilities, which is cost effective. The objectives/strategies support the Comp Plan goal.	
Support social diversity	-Direct development into a compact form: infill and redevelopment (Chapter 3, Page 34) -Require good design for mixed-use and higher density projects (Chapter 6, Page 78) -Direct growth inward (Chapter 9, Page 102) -Retain role as a regional center (Chapter 7, Page 83) -Direct growth inward (Chapter 9, Page 102)

vi. The use minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the

surrounding areas and the city.

Potential impacts to public health, safety, and welfare were reviewed with the proposal in 2016 and were incorporated into the design of the project. Additional impacts are not associated with the current request.

Reviewing Agency Comments

Staff did not receive any questions or comments related to the proposal from any referral agencies.

ACTION ALTERNATIVES AND STAFF RECOMMENDATION:

Section 070.060.030(g)(1)d outlines the review and decision procedures for applications being considered by the Commission and/or City Council stating, "[T]he applicable review body shall approve, approve with conditions, or deny the application based on the applicable approval criteria listed in the application-specific procedures. The body may also continue the hearing or refer the application to another authority as provided in 070.060.050(a)(2)c, Referral and Call-Up Procedures."

Action 1 – Special Use Permit Amendment - allowing for a change in kennel ownership and an amendment to the conditions of approval.

Staff Recommendation/Suggested Motion

Staff recommends approval (with conditions) of the SUP Amendment with the following findings and conditions:

Recommended Findings:

1. The use is compatible with the surrounding area;
2. The impacts of the use on surrounding areas have been adequately minimized;
3. The use is consistent with the general purpose and intent of this Code;
4. The use complies with all applicable standards of this Code;
5. The use is in conformance with the Comprehensive Plan and other City plans and policies; and
6. The use minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city.

Recommended Conditions:

Please note, the condition recommended for deletion is ~~struck through~~ below. Staff is recommending removal of the condition as it does not seem necessary in order to protect adjacent properties or the health, safety, and welfare of the City. It seems that other conditions, namely 2 -7 and 9, adequately address potential issue.

1. The kennel use and property shall be operated in accordance with all application materials and representations made in the public hearing.
2. Noise, including but not limited to barking dogs, shall be actively managed at the property. Unruly dogs or barking dogs are not allowed to remain outside disturbing the peace of the neighborhood.

3. Operation of the facility is subject to all applicable State of Colorado and Glenwood Springs Municipal Code regulations, including but not limited to the boarding of animals, noise, odors, dog area space requirements, etc.
4. All pet feces shall be promptly picked up from outdoor play areas and discarded in the City's sanitary sewer.
5. If complaints are received from adjacent property owners regarding any nuisance associated with the business, the City shall have the ability to re-evaluate or revoke the special use permit. The special use permit shall be subject to reconsideration and revocation by the Planning and Zoning Commission within sixty day if the business owners are convicted by the City's Municipal Court of two Glenwood Springs Municipal Code nuisance violations pertaining to noise, odors, etc. emitting from the site within a six month period.
6. The maximum number of dogs allowed onsite for boarding is 30. A maximum of 8 dogs are allowed in the outdoor play areas at any given time. Outdoor dog activities shall only occur between the hours of 8:00 AM and 7:00 PM.
7. Dogs onsite shall be supervised 24 hours a day, seven days a week, 365 day a year. During business hours, staffing must maintain a ratio of not more than 8 to 1 dogs to human supervision.
8. The applicant shall apply and receive approval for any new sign on the property.
9. Fencing shall obscure all outdoor dog activities. All proposed landscaping and fencing shall remain orderly and regularly maintained.
10. The owners shall submit and receive approval of a snow removal plan by the Community Development Director prior to commencement of the kennel use on the subject property.
11. ~~Any transfer of ownership of the business or property shall trigger reconsideration and approval of the special use permit by the Planning and Zoning Commission.~~

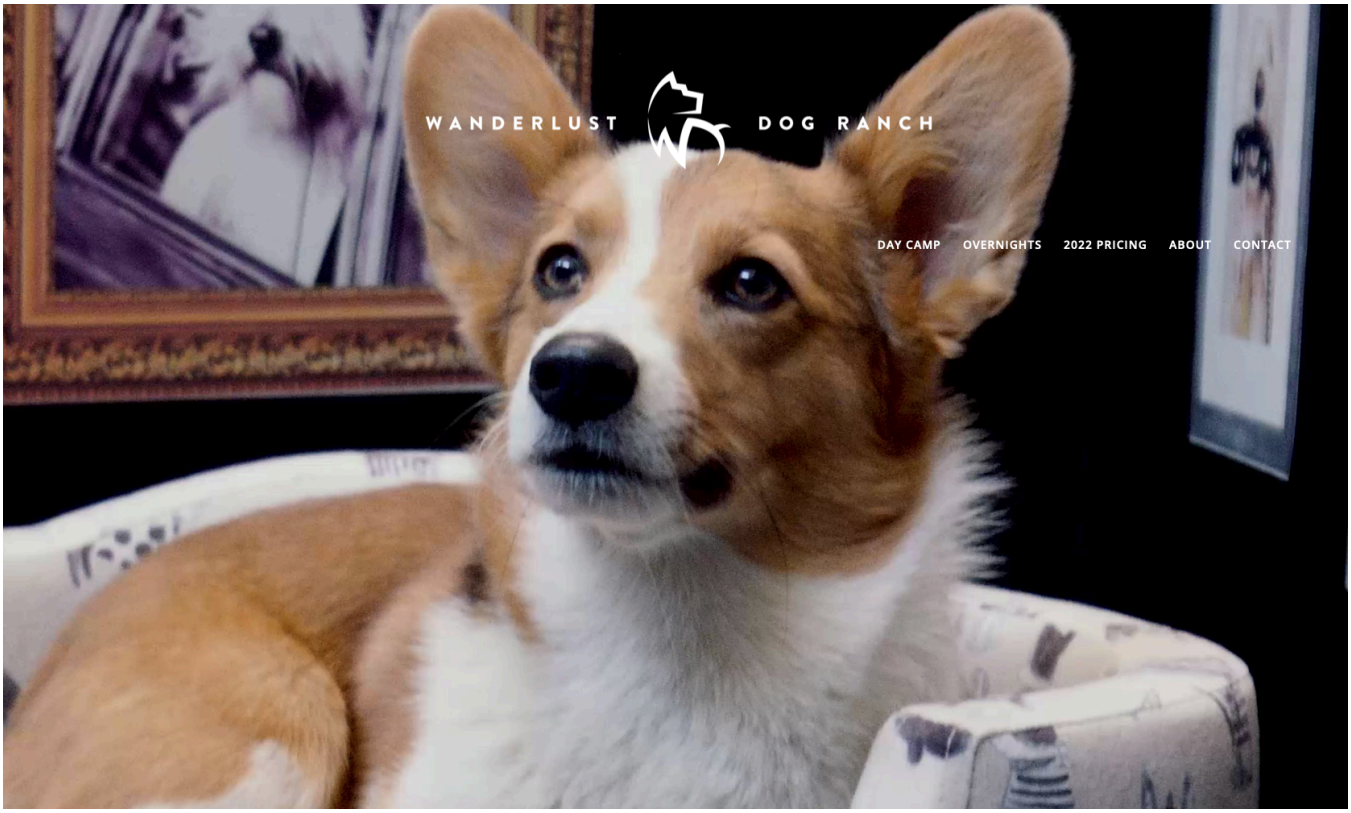
Alternate Motion for Denial

In most instances, staff has worked with the applicant to address requirements outlined in the Code. Therefore, we are generally in support of an application by the time it reaches the Commission for consideration. However, if Commission does not believe the application meets minimum approval criteria, your denial should be based on one or more of the same approval criteria applicable to the application. You should support your motion with findings outlining the shortcomings of the request as shown in the example below:

I move to **DENY** the Location and Extent Review application finding that [Insert one or more of the following findings here]:

1. The use is not compatible with the surrounding area [insert reasoning here];
2. The impacts of the use on surrounding have been adequately minimized [insert reasoning here];
3. The use is not consistent with the general purpose and intent of this Code [insert reasoning here];
4. The use does not comply with all applicable standards of this Code [insert reasoning here];;
5. The use is not in conformance with the Comprehensive Plan and other City plans and policies [insert reasoning here]; and
6. The use does not minimize adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city [insert reasoning here].

Amendment to Special Use Permit for the Wanderlust Dog Ranch 2517 S. Grand Avenue



May 2022

WANDERLUST DOG RANCH

Introduction

Wanderlust Dogs - GS, LLC who will operate the business as Wanderlust Dog Ranch, is requesting that the condition of approval of the 2016 Special Use Permit for a "kennel" on the subject property be removed to allow the property to be leased to Wanderlust who will take over the Special Use Permit.

Wanderlust Dog Ranch has been operating in Eagle, CO for over 8 years now. It's not a new concept but a proven entity. We started in February 2014 as a small 1,200 square foot operation and have since grown into a 20,000 square foot boutique dog care facility. Through the years we have done 5 expansions and build outs within Eagle, CO which have triggered us needing to apply for new SUP's in Eagle. We understand the process and have always respected the insight from our neighbors, but have never had any issues or complaints. We have approximately 2,500 active customers and approximately 25,000 dog visits per year. We have some long time customers that will fly in from other states specifically to use our facility and services, which speaks to the dedication and effort Wanderlust puts into the care of dogs. We strive to create the safest, cleanest, most loving environment a dog could possibly wish for.

What we feel separates us from all other dog care facilities is the combination of our approach to care and our meticulous facilities. We create a socially enriching environment by screening each dog that comes into Wanderlust to make sure they don't present any risk to the other dogs in our care. Wanderlust offers over 50% of our interior space to be utilized as controlled dog play areas. This takes away the majority of the stress associated with dog care. Most other facilities dedicate their space to kennels. Included in our interior play areas are Custom Lodging Cabins. These custom cabins provide a home away from home with security cameras, climate control, and Sonos Speakers to drown out any exterior noise and keep the dogs balanced and relaxed at night. Our staff provides constant supervision, they are skilled, knowledgeable, highly trained and most importantly, loving. Wanderlust believes that a dedicated overnight staff is optimal for the monitoring, safety and quality of experience. Dog Hollidays previously had 30+ overnight kennels, Wanderlust Dog Ranch will have just 12 Custom Cabins. This will significantly decrease any perceived impact.



Wanderlust Dog Ranch holds themselves to the highest standards in maintaining a clean environment 100% of the time. Through the use of non-hazardous cleaning products, paired

with air exchange systems throughout, we strive to keep the dogs healthy and odor free. All of our materials are specifically chosen based on their ability to be sanitized, and not destroyed, while remaining comfortable for our guests. The biggest compliment that we consistently get while giving human guests a tour of our facility is that it doesn't smell like dogs and it's so quiet.



Glenwood Springs has a very pet oriented demographic. Wanderlust Dog Ranch is a state of the art upgrade to the existing Dog Hollidays. Like the Glenwood Springs population, Wanderlust Dog Ranch is completely obsessed with your dog. As avid dog enthusiasts, we strive to help care and improve the lives of dogs and their owners every day. The main objective of our first-class Dog Hotel is to provide each dog with a safe place to exercise, socialize or just lounge around under the highest supervision and attention. Wanderlust Dog Ranch is not only unique and First-Class, but also a much-needed addition for the residents of Glenwood Springs.



Visit our website at https://wanderlustdogs.com to understand our approach and operation.

Background

In 2016 the owners of Dog Holiday's Pet Resort received approval of a special use permit to allow the facility at 2517 S. Grand Avenue to be operated as a "kennel" for the care, boarding, and training of dogs. The building is approximately 4,930 sq. ft. and the lot has an area of approximately 43,124 sq. ft. Following the approval in 2016 an appeal was filed by some of the neighbors and the City Council upheld the Planning and Zoning Commission approval. The business has operated for 6 years with few complaints.

The City Council upheld the approval and included the following conditions:

1. The kennel use and property shall be operated in accordance with all application materials and representations made in the public hearing.

2. Noise, including but not limited to barking dogs, shall be actively managed at the property. Unruly dogs or barking dogs are not allowed to remain outside disturbing the peace of the neighborhood.
3. Operation of the facility is subject to all applicable State of Colorado and Glenwood Springs Municipal Code regulations, including but not limited to the boarding of animals, noise, odors, dog area space requirements, etc.
4. All pet feces shall be promptly picked up from outdoor play areas and discarded in the City's sanitary sewer.
5. If complaints are received from adjacent property owners regarding any nuisance associated with the business, the City shall have the ability to reevaluate or revoke the special use permit. The special use permit shall be subject to reconsideration and approval by the Planning and Zoning Commission within sixty days if the business owners are convicted by the City's Municipal Court of two Glenwood Springs Municipal Code nuisance violations pertaining to noise, odors, etc. emitting from the site within a six month period.
6. The maximum number of dogs allowed onsite for boarding is 30. A maximum of 8 dogs are allowed in the outdoor play areas at any given time. Outdoor dog activities shall only occur between the hours of 8:00 AM and 7:00 PM.
7. Dogs onsite shall be supervised 24 hours a day, seven days a week, 365 day a year. During business hours, staffing must maintain a ratio of not more than 8 to 1 dogs to human supervision.
8. The applicant shall apply and receive approval for any new sign on the property.
9. Fencing shall obscure all outdoor dog activities. All proposed landscaping and fencing shall remain orderly and regularly maintained.
10. The owners shall submit and receive approval of a snow removal plan by the Community Development Director prior to commencement of the kennel use on the subject property.
11. **Any transfer of ownership of the business or property shall trigger reconsideration and approval of the special use permit by the Planning and Zoning Commission.**

The municipal code no longer requires reconsideration of a Special Use Permit when the ownership changes. As long as the permit is being operated per the conditions of approval, there doesn't need to be such a limitation and we request that this condition be removed.

Criteria for Review: SUP - Use Specific Criteria for Kennel

The applicant has provided a response to each of the use specific criteria for a kennel below:

a) All animals shall be confined within an enclosed area or on a leash at all times.

Applicant Response: This criterion will be met as the dogs will be enclosed within a confined area or on a leash at all times.

b) All boarded animals shall be kept within a totally enclosed structure between the hours of 10:00 p.m. and 7:00 a.m.

Applicant Response: This criterion will be met as the dogs will be kept within the structure at night.

c) Any open or exercise run shall be at least 50 feet from any adjoining property in a residential zoning district.

Applicant Response: This criterion will be met as no portion of the facility is within 50 feet of an adjoining property within a residential zone district.

Criteria for Review: SUP Criteria

The applicant has provided a response to each of the Special Use Permit criteria. It should be noted that the original special use permit use was found to be consistent with the review criteria and because the size and performance criteria for the facility are not changing, the proposed operation will also met these review criteria.

In reviewing a proposed special use permit application, the Planning Commission shall consider whether:

i. The use will be compatible with the surrounding area;

Applicant Response: This use will remain compatible with the surrounding area as has been proven for the last 6 years. The area is primarily commercially zoned with substantial separation to residential areas. Additionally, Wanderlust has a proven track record as a quality operator and will operate the facility so that it complies with all of the City's regulations and requirements to further ensure its compatibility.

ii. The impacts of the use on surrounding areas have been adequately minimized;

Applicant Response: Impacts to the surrounding area have been adequately minimized based on the indoor and fenced area of the facility. The facility will be operated to respect the neighbors in the surrounding area. Adequate separation has been provided between this facility and residential areas.

iii. The use will be consistent with the general purpose and intent of this Code;

Applicant Response: The purpose of the Special Use Permit section is stated as "The special use permit procedure provides a mechanism for the City to evaluate proposed development and land uses that have unique or widely varying operating characteristics or unusual features. This procedure is intended to ensure compatibility with surrounding areas and that adequate mitigation is provided for anticipated impacts." As stated above the proposed operation will continue to maintain compatibility with the neighborhood through the prior performance conditions of approval and general municipal codes.

iv. The use will comply with all applicable standards of this Code;

Applicant Response: The proposed use will continue to comply with all applicable standards of the Code.

v. The use is in conformance with the Comprehensive Plan and other City plans and policies; and

Applicant Response: The property is zoned Commercial what was found to be consistent with the Comprehensive Plan by the City and therefore the proposed commercial use is also consistent with the Comprehensive plan. The proposed use provides a needed and welcome service to the community implementing the economic development objectives of the City.

vi. The use minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city.

Applicant Response: The proposed use will continue to minimize adverse impacts to the health, safety, and welfare of the community by complying the the performance related conditions of approval and other standards within the municipal code.



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LAND USE APPLICATION

City of Glenwood Springs
Economic and Community Development Dept.
101 West 8th Street
Glenwood Springs, CO 81601
970-384-6411

Ordinance Amendments		Development Permits	
☐	Rezoning		Site/Architectural Plan Review
☐	Rezoning to Planned Unit Development (PUD)		☐ Administrative
☐	Annexation		☐ Minor
☐	Condominiumization		☐ Major
☐	Annexation	☐	Master Plan
☐	Street Vacation	☐	Construction Plans
		☐	Location & Extent
Subdivisions		☐	Right of Way Encroachment License
☐	Minor Subdivision	☐	Floodplain Development Permit
☐	Preliminary Plat	☐	Special Use Permit
☐	Final Plat		**Flexibility and Relief Procedures**
☐	Vacation of Right-of-Way	☐	Variance
		☐	Administrative Adjustment
Other Land Use Applications		☐	Appeal
☐	Outdoor Seating		

Applicant/Property Owner Information:

Applicant JASON HERSHMAN	Owner Lori D Pohm DVM
Wanderlust DOG RANCH	
Relationship to Owner BUSINESS	Owner Robert F Thorsen DVM
Applicant Address PO BOX 5366	Owner Address 1607 Grand Ave Suite 11
EAGLE, CO 81631	Glenwood Springs, CO 81601
Phone 970-471-9061 Email Address JMHershman80@gmail.com	Phone 970-945-6762 Email Address ldpohm@live.com

Property Information:

Address 2517 S. Grand Ave.	Parcel Number 218516400073
Glenwood Springs, CO 81602	
Subdivision N/A	Lot and Block Number
Zone District C/3 - General Commercial	Existing Land Use Kennel

General Project Description:

SPECIAL USE PERMIT CONDITION #11: Any transfer of ownership of the business or property shall trigger reconsideration and approval of the SUP.

Signatures:

The owner or applicant must be present at the hearing. All public hearings must be property noticed according to G.S.M.C. Section 070.010.030. Signatures of all owners of the property must appear before the application is accepted. Partnerships or corporations may have the authorized general partner or corporate officer sign the

Applicant	4-26-22 Date
Owner Lori D Pohm DVM	4/26/2022 Date
Owner Robert Thorsen DVM	

Reception#: 879479
07/11/2016 10:46:28 AM Jean Alberico
1 of 2 Rec Fee:$16.00 Doc Fee:0.00 GARFIELD COUNTY CO

Special Use Permit

Effective
Date: June 2, 2016

Permit
Number: #1-16

Permit Issued for:	Planning Item: #07-16
Project Name:	Dog Holliday's Pet Resort
Parcel Number:	218516400073
Subdivision:	N/A
Address:	2517 South Grand Avenue
Project Description:	Kennel (special review use in the C/3 General Commercial District)

GENERAL CONDITIONS

This Special Use Permit is issued following and pursuant to the Glenwood Springs City Council upholding the decision the City of Glenwood Springs Planning and Zoning Commission decision of April 26, 2016 at a publicly noticed Appeal Hearing held on June 2, 2016. This permit shall not be valid until signed by the Community Development Director, signed and accepted by the Applicant and signed by the City Attorney as to form. The use shall be governed by any and all conditions imposed by the Planning and Zoning Commission and City Council as well as all other applicable City Codes and Ordinances.

SPECIAL USE PERMIT CONDITIONS

1. The kennel use and property shall be operated in accordance with all application materials and representations made in the public hearing.
2. Noise, including but not limited to barking dogs, shall be actively managed at the property. Unruly dogs or barking dogs are not allowed to remain outside disturbing the peace of the neighborhood.
3. Operation of the facility is subject to all applicable State of Colorado and *Glenwood Springs Municipal Code* regulations, including but not limited to the boarding of animals, noise, odors, dog area space requirements, etc.
4. All pet feces shall be promptly picked up from outdoor play areas and discarded in the City's sanitary sewer.
5. If complaints are received from adjacent property owners regarding any nuisance associated with the business, the City shall have the ability to re-evaluate or revoke the special use permit. The special use permit shall be subject to reconsideration and revocation by the Planning and Zoning Commission within sixty day if the business owners are convicted by the City's Municipal Court of two *Glenwood Springs Municipal Code* nuisance violations pertaining to noise, odors, etc. emitting from the site within a six month period.
6. The maximum number of dogs allowed onsite for boarding is 30. A maximum of 8 dogs are allowed in the outdoor play areas at any given time. Outdoor dog activities shall only occur between the hours of 8:00 AM and 7:00 PM.
7. Dogs onsite shall be supervised 24 hours a day, seven days a week, 365 day a year. During business hours, staffing must maintain a ratio of not more than 8 to 1 dogs to human supervision.
8. The applicant shall apply and receive approval for any new sign on the property.
9. Fencing shall obscure all outdoor dog activities. All proposed landscaping and fencing shall remain orderly and regularly maintained.

2

Reception#: 879479
07/11/2016 10:46:28 AM Jean Alberico
2 of 2 Rec Fee:$16.00 Doc Fee:0.00 GARFIELD COUNTY CO

10. The owners shall submit and receive approval of a snow removal plan by the Community Development Director prior to commencement of the kennel use on the subject property.
11. Any transfer of ownership of the business or property shall trigger reconsideration and approval of the special use permit by the Planning and Zoning Commission.

APPROVAL OF COMMUNITY DEVELOPMENT DIRECTOR

Andrew Mc Gregor DATE: 7.11.16

APPROVAL OF CITY ATTORNEY AS TO FORM:

Karl Hanlon DATE: 7/11/16

APPROVED AS RECEIVED:

Lori Pohm, Owner/Applicant DATE: 6/21/2016

Robert Thorsen, Owner/Applicant DATE: 6/21/2016

Incident Report

Print Date/Time: 04/26/2022 14:56
Login ID: kmulkey

Glenwood Springs Police Department
ORI Number: CO0230100

Incident: **2020-00008156**

Incident Date/Time:	5/31/2020 3:04:06 PM	**Incident Type:**	Noise Complaint
Location:	2517 S GRAND AVE GLENWOOD SPRINGS CO 81601	**Venue:**	GS
Phone Number:	379-4319	**Source:**	Dispatch Phone
Report Required:	No	**Priority:**	1
Prior Hazards:	No	**Status:**	In Progress
LE Case Number:		**Nature of Call:**	

Unit/Personnel

Unit	Personnel
709	lspringer-Springer

Person(s)

No.	Role	Name	Address	Phone	Race	Sex	DOB
1	NCIC Inquiry	long, phil		379-4319			

Vehicle(s)

Role	Type	Year	Make	Model	Color	License	State

Disposition(s)

Disposition	Count
CallServiced	1

Property

Date	Code	Type	Make	Model	Description	Tag No.	Item No.

CAD Narrative

05/31/2020 : 15:27:03 1075 Narrative: rp is reg another call
05/31/2020 : 15:06:53 1075 Narrative: dogs been barking all day long
05/31/2020 : 15:06:40 1075 Narrative: right next to rivers restaurant, there is a animal felicity

Incident Report

Print Date/Time: 04/26/2022 14:54
Login ID: kmulkey

Glenwood Springs Police Department
ORI Number: CO0230100

Incident: 2021-00008931

Incident Date/Time:	5/28/2021 1:26:30 PM	**Incident Type:**	Code Violation
Location:	2517 S GRAND AVE GLENWOOD SPRINGS CO 81601	**Venue:**	GS
Phone Number:	(720) 308-1493	**Source:**	Dispatch Phone
Report Required:	No	**Priority:**	1
Prior Hazards:	No	**Status:**	In Progress
LE Case Number:		**Nature of Call:**	

Unit/Personnel

Unit	Personnel
703	croberts-Roberts

Person(s)

No.	Role	Name	Address	Phone	Race	Sex	DOB
1	NCIC Inquiry	Bryant, Jeff		(720) 308-1493			

Vehicle(s)

Role	Type	Year	Make	Model	Color	License	State

Disposition(s)

Disposition	Count
CallServiced	1

Property

Date	Code	Type	Make	Model	Description	Tag No.	Item No.

CAD Narrative

05/28/2021 : 14:14:46 croberts Narrative: Spoke with Deni at front desk. She is aware of problem. complainant shouts from across at Woodberry. She will talk again to owner and manager and check they are in compliance. May need to talk to Zoning and planning if problem continues
05/28/2021 : 13:28:02 littlei Narrative: rp does not need a call
05/28/2021 : 13:27:00 littlei Narrative: and they keep leaving it open
05/28/2021 : 13:26:55 littlei Narrative: rp adv that resort is supposed to keep door shut

Incident Report

Print Date/Time: 04/26/2022 14:49
Login ID: kmulkey

Glenwood Springs Police Department
ORI Number: CO0230100

Incident: **2021-00013850**

Incident Date/Time:	8/3/2021 9:06:27 AM	**Incident Type:**	Animal-Pet
Location:	2517 S GRAND AVE GLENWOOD SPRINGS CO 81601	**Venue:**	GS
Phone Number:	319-5584	**Source:**	Dispatch Phone
Report Required:	No	**Priority:**	1
Prior Hazards:	No	**Status:**	In Progress
LE Case Number:		**Nature of Call:**	

Unit/Personnel

Unit	Personnel
724	tfarnham-Hurst-Farnham

Person(s)

No.	Role	Name	Address	Phone	Race	Sex	DOB
1	NCIC Inquiry	Helling, Pat		319-5584			

Vehicle(s)

Role	Type	Year	Make	Model	Color	License	State

Disposition(s)

Disposition	Count
CallServiced	2

Property

Date	Code	Type	Make	Model	Description	Tag No.	Item No.

CAD Narrative

08/03/2021 : 09:07:42 1056 Narrative: and was told there is an ordinance and neighbors shouldn't be able to hear the barking
08/03/2021 : 09:07:22 1056 Narrative: adv she has called the business 5 or 6 times this summer
08/03/2021 : 09:06:51 1056 Narrative: adv dogs have been barking since 8 am
08/03/2021 : 09:06:44 1056 Narrative: RP lives across the river

Incident Report

Print Date/Time: 04/26/2022 14:49
Login ID: kmulkey

Glenwood Springs Police Department
ORI Number: CO0230100

Incident: **2022-00000009**

Incident Date/Time:	1/1/2022 10:55:58 AM	**Incident Type:**	Animal-Pet
Location:	2517 S GRAND AVE GLENWOOD SPRINGS CO 81601	**Venue:**	GS
Phone Number:	(720) 308-1493	**Source:**	Dispatch Phone
Report Required:	No	**Priority:**	1
Prior Hazards:	No	**Status:**	In Progress
LE Case Number:		**Nature of Call:**	

Unit/Personnel

Unit	Personnel
738	dscott-Scott

Person(s)

No.	Role	Name	Address	Phone	Race	Sex	DOB
1	NCIC Inquiry	** Non-Disclosure Subject					

Vehicle(s)

Role	Type	Year	Make	Model	Color	License	State

Disposition(s)

Disposition	Count
CallServiced	1

Property

Date	Code	Type	Make	Model	Description	Tag No.	Item No.

** Non-Disclosure Subject

CAD Narrative

01/01/2022 : 10:57:09 littlei Narrative: did not confirm phone number
01/01/2022 : 10:57:01 littlei Narrative: rp req to be anon
01/01/2022 : 10:56:19 littlei Narrative: on going issue
01/01/2022 : 10:56:14 littlei Narrative: barking dog

Planning and Zoning Commission Report

To: Planning and Zoning Commission
From: Trent L. Hyatt, Planner II
Date: April 22, 2016
Subject: #07-16 – Dog Holliday's Pet Resort

REQUEST	Consideration of a special use permit for a dog/cat kennel facility.
APPLICANT	Bruce Barth for Lori Pohm and Bob Thorsen
OWNERS	Grand GP, LLC
LOCATION	2517 South Grand Avenue
ZONE	C/3 General Commercial District
SURROUNDING LAND USES AND ZONING	North: Multi-family residential, Commercial business/warehouse South: Restaurant East: Roaring Fork River, multi-family residential complexes West: South Grand Avenue, Vacant property, mobile home park
LOT SIZE	Approximately 1.014 acres (43,143 square feet)

ACTION ITEM

The Planning and Zoning Commission (Commission) is authorized to take action on the special use permit subject to appeal to City Council by any aggrieved party in accordance with Section 070.010.050(e) of the *Glenwood Springs Municipal Code* (Municipal Code or Code)

Action 1 – **Special Use Permit** for the operation of a dog and cat kennel facility in the C/3 General Commercial District.

Staff recommendation: *Staff recommends **approval** of the special use permit with the findings and conditions provided on pages 4-5.*

BACKGROUND/ANALYSIS

Proposal

Bruce Barth of Red House Architecture, P.C, on behalf of Lori Pohm and Bob Thorsen of All Dogs and Cats Veterinary Hospital, requests the approval of a special use permit to operate a dog and cat kennel facility at 2517 South Grand Avenue. An existing steel building is located on the subject property which was the former location of an office for Western Petroleum. The applicants plan to add a 960 square foot addition to the rear/west façade of the building for an enclosed outdoor dog play area. This square footage is under the threshold which requires a development permit from the City. Additional private outdoor areas for each dog suite are proposed along the south façade of the building.

As per Section 070.040.030(i)(2)a of the Municipal Code, the C/3 General Commercial District (C/3) zoning of the property allows a kennel as a special review use. The Commercial Design Standards of Section 070.150 also apply to construction at the site.

Special Review Use Considerations
As indicated above the subject property is zoned C/3. The proposed kennel use is identified as a special review use in said zone and is subject to the special review use criteria in Section 070.040.040(a)(1) of the Code outlined in ***bold italics*** below. Other language is provided by staff. The applicant also provides a response to the applicable guidelines in the attached narrative.

a. ***The applicant has demonstrated safe pedestrian access to and across the site.***

An existing sidewalk along South Grand Avenue provides access to the site. Pedestrian access to the public entrance of the facility is provided through the existing parking lot.

b. The applicant has demonstrated safe and adequate vehicular circulation, parking and access for the proposed use.

The existing parking lot provides adequate vehicular circulation, parking, and access. Restriping of spaces will better delineate the required parking.

c. The proposed use is compatible with the character of the neighborhood.

As mentioned above, the subject property is located within the C/3 zone district but is adjacent to or near existing multi-family residential developments (zoned C/3 and PUD Planned Unit Development) and businesses (zoned C/3) which could deem the proposed kennel use as incompatible therewith. An attached map depicts adjacent properties and their zoning. Potential negative impacts are addressed below.

d. The proposal mitigates any potential negative impacts to surrounding properties. Mitigation techniques will be specific to the proposed use and the character of the surrounding properties, but may include techniques such as restrictions on hours of operation; screening with walls, fencing and/or landscaping; sound reduction techniques; modifications to light levels and fixtures; and compatible architecture.

Potential negative impacts to surrounding properties include noise from barking dogs, water quality and foul odors associated with dog waste, and visual impacts. Each of these issues is addressed below.

Of greatest concern is the potential for uncontrolled barking dogs on a parcel located adjacent to existing residences and businesses (including residences, businesses, and a restaurant with outdoor seating). The applicants are certainly aware of this concern and propose to implement multiple mitigation techniques to address the matter. They expect to occasionally board dogs that bark excessively and believe the most important technique to mitigate the associated noise is the day to day management of the facility. The business will employ multiple persons and will maintain a staff to dog ratio of 8 to 1 during regular business hours (whereas state standards only require a

ratio of 15:1). One staff person will man the site throughout the night daily. As depicted on the attached floor plan sheet A2.1, multiple play areas are proposed for the dogs, one completely out of doors, an enclosed outdoor play area (with doors openable to the outdoor play area), and an indoor play area. The applicant will also manage the number of dogs allowed in each play area at various times. Staff will also have the ability to separate from the pack unruly dogs or those that bark excessively in a "time out area" located within the indoor play area. Dogs will not be allowed outside of the building during evening hours. Section 100.020.110 of the Code also addresses loud animals and states: "[I]t shall be unlawful for any person to keep or maintain any animal or fowl within the City which disturbs the peace and quiet of the neighborhood."

Another concern is the potential for the use to emit odors from dog waste, both feces and urine. In terms of urine, the proposed K-9 grass is specifically designed to drain appropriately. Feces, if not promptly removed can lead to foul odors. However, the operators are committed to prompt removal and plan to have dumpsters emptied two to three time weekly.

Water quality impacts from dog feces and urine are an additional potential impact. Again, the applicants state that management of the business and its K-9 inhabitants is crucial to address the issue. Outdoor pet feces is to be picked immediately up and not allowed to accumulate. In addition, the City's Engineering Department recommends that dumpsters containing pet feces be covered to limit interaction with stormwater. Otherwise, the K-9 grass proposed for the outdoor and enclosed outdoor play areas is designed to drain dog urine effectively. Overall, the project will reduce the amount of impervious surface at the site as the project will involve removing some of the existing asphalt allowing for greater stormwater infiltration. Therefore, the City Engineering Department believes water quality is improved by the project if pet feces is addressed as proposed.

Existing and proposed landscaping as well as fencing is proposed to buffer/screen/and obscure the proposed kennel use from adjacent properties. These features will help to reduce the potential noise and visual impacts associated with the proposed kennel use as dog activity will occur out of sight of adjacent uses.

As mentioned above, the applicants operate All Dog and Cats Veterinary Hospital which is located in a heavily occupied commercial area and shares walls with other businesses at 1617 Grand Avenue. The City is not aware of any complaints received from adjacent business within the same complex or adjacent properties relating to their operation.

Section 070.040.040(b) states ***"[R]estrictions on approval. In granting a special use permit, the Planning Commission shall impose such restrictions on the proposed use as it finds necessary to protect the public health, safety and welfare, including but not limited to restrictions equal to or more restrictive than requirements of the zone district regulations for said district regarding area, setback, coverage, height of proposed structures, off-street parking, safety of ingress and egress, physical separation in terms of distance from similar uses and other provisions necessary to protect the public health, safety and welfare."***

The issues outlined above have the potential to negatively impact adjacent property owners if not appropriately mitigated. Staff has provided a list of recommended conditions on page 5 should the Commission chose to approve the proposal.

Commercial Design Standards
As mentioned above, the Commercial Design Standards of Section 070.150 apply to improvements at the site. The existing site building is most visible from South Grand Avenue. While the addition is proposed along the west/rear of the existing metal building, the applicant proposes multiple architectural design elements to improve the other façades including to a steel trellis, stone veneers, corrugated steel fencing, barn wood siding, windows, etc which comply with the standards.

Reviewing Agency Comments
No official comments were received from reviewing agencies regarding the proposal. However, staff worked closely with multiple departments including Engineering, Police, and Public Works. No necessary revisions to the application have been identified by reviewing agencies.

Impacts to Surrounding Properties
The proposal is causing a great deal of angst in the neighborhood. On Monday, April 18, 2016, the applicants held a meeting with adjacent and nearby property owners where they heard concerns regarding noise and impacts to property values. Staff has received a letter from five nearby homeowners associations objecting to the proposal. The letter is attached and outlines concerns regarding the proximity to dense residential areas and businesses, noise, wildlife, incompatibility with the Municipal Code. In addition, staff have received letters from adjacent businesses objecting to the proposed use. Letters received by staff are attached.

ACTION ALTERNATIVES AND STAFF RECOMMENDATIONS:

Action 1 – <u>Special Use Permit</u> for the operation of a dog and cat kennel and grooming facility in the C/3 General Commercial District.

Should the Commission find that additional information and/or changes to the application are necessary that may result in changes to overall site, landscape design, operation of the business, etc., the Commission may wish to recommend a continuance of the action associated with the application. If, however, the Commission has an overall comfort level with the proposed application staff recommends the following actions on the application:

The Commission may take one of the following actions on the Special Use Permit per Section 070.040.040:

1. Grant the special review use and authorize issuance of a special use permit subject to any conditions which it finds necessary to protect the public health, safety and welfare or to ensure compliance with this Code and the City's goals and policies;
2. Deny the special review use stating the specific reasons for denial; or
3. Continue the hearing to a regular Planning and Zoning Commission meeting in the future. The date of the meeting shall be determined by the Planning and Zoning Commission upon recommendations from staff, the applicant and members of the public present at the meeting. Nothing herein shall prohibit the Planning and Zoning Commission from continuing a matter more than once. In the event the applicant or members of the public disagree with the number of continuances granted by the Planning and Zoning Commission or the overall length of a particular special review, such person may appeal to the City Council. The City Council shall

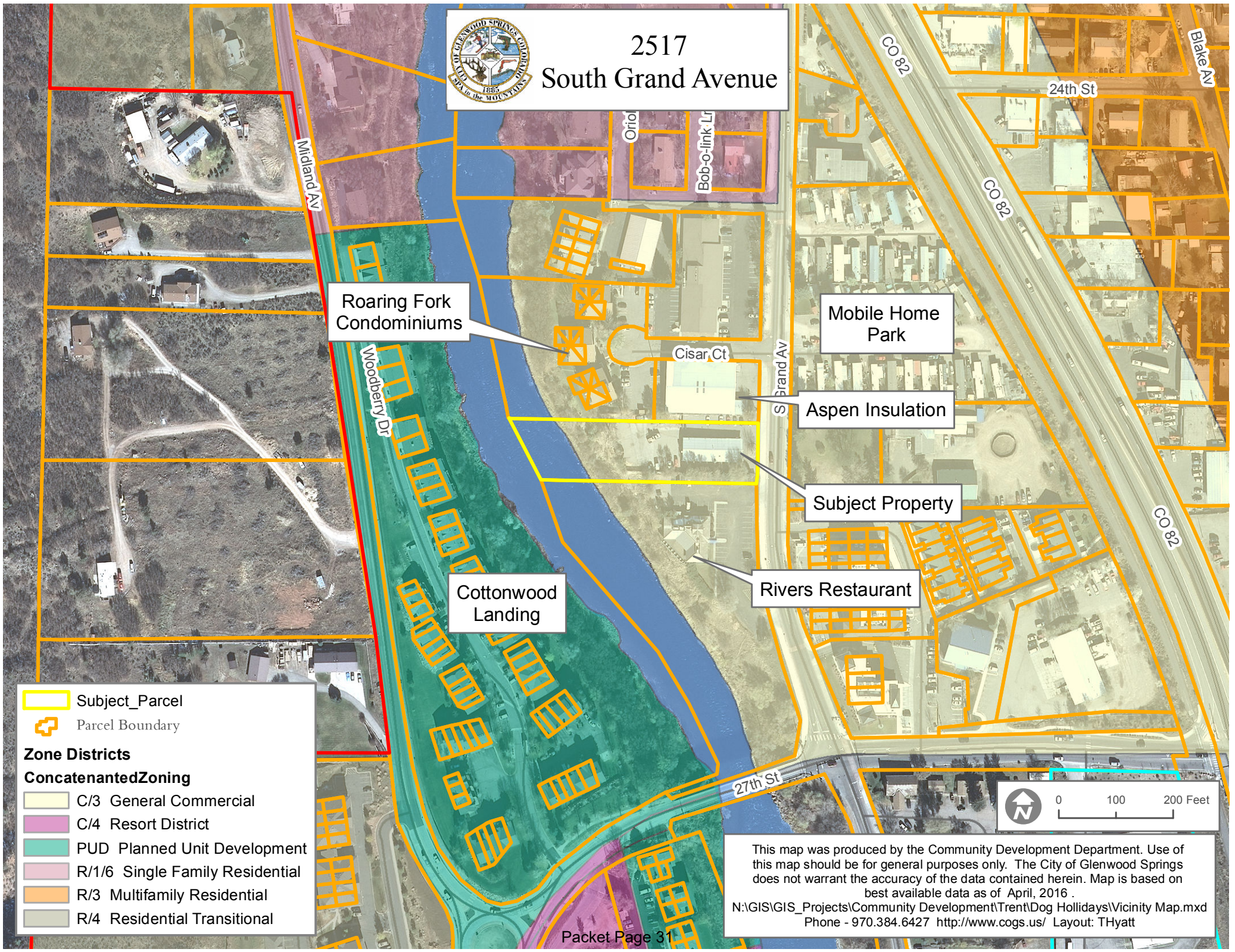
have the authority to direct the Planning and Zoning Commission to change the review period. The Planning and Zoning Commission shall comply with the City Council directive.

Staff Recommendation

Staff recommends **approval** of the application **finding** that it meets the guidelines for a special review use as per Section 070.040.040(a)(1) of the *Glenwood Spring Municipal Code* as detailed on pages 2-3 of the staff report with the following recommended conditions:

Recommended conditions:

1. The kennel use and property shall be operated in accordance with all application materials and representations made in the public hearing.
2. Noise, including but not limited to barking dogs, shall be actively managed at the property. Unruly dogs or barking dogs are not allowed to remain outside disturbing the peace of the neighborhood.
3. Operation of the facility is subject to all applicable State of Colorado and *Glenwood Springs Municipal Code* regulations, including but not limited to the boarding of animals, noise, odors, dog area space requirements, etc.
4. All pet feces shall be promptly picked up from outdoor play areas and discarded in a covered outdoor refuse container. The refuse container shall be emptied a minimum of two times weekly.
5. If complaints are received from adjacent property owners regarding any nuisance associated with the business, the City shall have the ability to re-evaluate or even revoke the special use permit. The special use permit shall be subject to reconsideration by the Planning and Zoning Commission within sixty day if two written complaints pertaining to noise, odors, etc. emitting from the site are filed by separate property owners within a six month period of each other.
6. The maximum number of dogs allowed onsite is 30. A maximum of 8 dogs are allowed outside at any given time. Outdoor dog activities shall only occur between the hours of 8:00 AM and 7:00 PM.
7. Dogs onsite shall be supervised 24 hours a day, seven days a week, 365 day a year. During business hours, staffing must maintain a ratio of 8 to 1 humans to dogs.
8. The applicant shall apply and receive approval for any new sign on the property.
9. Fencing shall obscure all outdoor dog activities. All proposed landscaping and fencing shall remain orderly and regularly maintained.


2517
South Grand Avenue
Midland Av
Oriol
Bob-o-link Ln
CO 82
24th St
Blake Av
Roaring Fork Condominiums
Mobile Home Park
Cisar Ct
Woodberry Dr
S Grand Av
Aspen Insulation
Subject Property
Rivers Restaurant
Cottonwood Landing
27th St
Subject_Parcel
Parcel Boundary
Zone Districts
ConcatenantedZoning
C/3 General Commercial
C/4 Resort District
PUD Planned Unit Development
R/1/6 Single Family Residential
R/3 Multifamily Residential
R/4 Residential Transitional
0
100
200 Feet
This map was produced by the Community Development Department. Use of this map should be for general purposes only. The City of Glenwood Springs does not warrant the accuracy of the data contained herein. Map is based on best available data as of April, 2016 .
N:\GIS\GIS_Projects\Community Development\Trent\Dog Hollidays\Vicinity Map.mxd
Phone - 970.384.6427 http://www.cogs.us/ Layout: THyatt

GILLESPIE LAW OFFICES, LLC ~ ATTORNEYS AND COUNSELORS AT LAW
Riverview Plaza, 100 Elk Run Drive, Suite 129, Basalt, Colorado 81621
Phone: 970.927.6549 / Fax: 970.927.6568 / Email: gillespielawoffices@gmail.com

April 15, 2016

VIA Email:
Trent.hyatt@cogs.us

Glenwood Springs
City Planning & Zoning Board
Atten: Trent Hyatt, City Planner
101 West 8th Street
Glenwood Springs, CO 81601

RE: Letter of Record for
2517 South Grand Avenue, Glenwood Springs, CO 81601

Dear Mr. Hyatt and Glenwood Springs City Planning and Zoning Board,

By way of introduction my office represents Roberts & Company, Inc. of 2509 South Grand Avenue, Glenwood Springs, in relation to the Special Review Application of 2517 South Grand Avenue, Glenwood Springs, (Dog Holliday's Kennel Application) and have been requested to write this Letter of Record on behalf of our client, a concerned neighbor and citizen. While our client and other neighbors they have spoken with welcome new businesses, there are some major concerns with the scope, size, logistics, noise levels (barking) and overall scheme and appropriateness of the project.

As I am sure you are aware, the immediate neighborhood consists of largely multifamily residential homes and also neighborhood business and restaurants. We have reviewed the letter provided by Mr. Bruce Bath, a representative of the Applicant and would like to bring the following concerns to the Boards attention:

1. There will be significant traffic impact on the drop off and pick up of dogs every morning and afternoon as up valley commuters are dropping off and picking up their pets. This could lead to significant congestion in this part of town. A traffic impact study should be done and provided to the public.

2. The noise level of possibly 40+ dogs all in one area may be disturbing to all the immediate neighborhood businesses and residents, and would negatively impact the real estate values in the area. The applicant should address this concern in more specificity or be limited to the amount of outside pets at certain times of day.

3. The daily waste generated from 40+ dogs will undoubtedly result in smells and odors that could permeate the neighborhood and surrounding businesses. There should be

4. There has never been a "pet resort" of this size and scope proposed in Glenwood Springs to the best of our knowledge. The town may wish to consider a special ordinance to regulate the hours, noise level, number of dogs, and other factors.

GILLESPIE LAW OFFICES, LLC ~ ATTORNEYS AND COUNSELORS AT LAW
Riverview Plaza, 100 Elk Run Drive, Suite 129, Basalt, Colorado 81621
Phone: 970.927.6549 / Fax: 970.927.6568 / Email: gillespielawoffices@gmail.com

In summary, we would respectfully request your careful consideration of all the negative impacts a large scale "Pet Resort" will have in this area of the town. We hope that the Board will determine that this "Special Use" is not appropriate for this area of Glenwood Springs.

Please consider this a Letter of Record and please call me directly if you have any questions.

Sincerely,
GILLESPIE LAW OFFICES, LLC



W. ADAM GILLESPIE

CC: Roberts & Company

CHARLES H. WILLMAN, P.C.
ATTORNEY AT LAW

April 21, 2016

Mr. Andrew McGregor
Director Community Development Department
City of Glenwood Springs, Colorado

via email only to andrew.mcgregor@cogs.us

Re: Special Review Use Application #7-16

Dear Andrew:

I represent the Cottonwood Landing Homeowner's Association (HOA) who is opposed to this special review use application. A letter from the HOA and the other adjacent or nearby residential properties was delivered to your office this afternoon.

The purpose of my letter is to discuss the legal aspects of the proposed special review use.

As you know, the subject property is located in the C-3 Zone District and allows, with a special review use permit, an animal kennel and/or a veterinarian hospital. There is no allowance as a special review use for a dog grooming facility. Further, as you are aware, a special review use is, by its nature, an exception to the norm. In order for the Planning and Zoning Commission (Commission) to approve the application the Commission must consider and find that all the factors noted in 070.040.040 have been met by the applicant. They have not and the applicant cannot meet these.

The two upon which I want to focus in this letter are (a)(1)(c) and (d).

(1)(c) Neighborhood Compatibility

It is critical to the Commission's consideration that the proposed use is compatible with the character of the neighborhood. As noted in the HOA's letter the character of this neighborhood, once general commercial/industrial, has changed significantly since Western Petroleum and its predecessors built their facilities. This area has become primarily residential to the South, West and East and all recent development has been residential or mixed residential and commercial (Penrose). The proposed outdoor play area is immediately adjacent to the Roaring Fork Condominiums and immediately across the Roaring Fork River from Cottonwood Landing. To the immediate North is the old Pepsi warehouse which has little active (daily) use and then to the South is River's Restaurant which has a large numbers of customers coming into and out of the parking area. Everything else is residential. The immediate past use of this building has been office space with little or no commercial activity. The City has allowed and encourage multi-family types of use in this area which is the most appropriate use for the subject property as well.

While the Comprehensive Plan notes this area as commercial - this commercial area is immediately adjacent to "single family residential." Likely this part of the plan was simply accepting the reality

811 Blake Avenue, Glenwood Springs, Colorado 81601
E-mail: charlie@chwpclawoffices.com * Tele: (970) 945-8571 * Fax: (970) 945-4981

of what was already in place. Normally there is a more gradual change in zone districts - such as a transition from single family to multi family and then to more limited commercial. The abrupt transition from single family to commercial should not be encouraged and this is a good opportunity to place a more compatible multi family use on this property. A redevelopment of this property and the adjacent warehouse into multi family would encourage this transition and would meet the current needs of the City for more apartment and/or multi family residential units.

The proposed use is not compatible with the existing neighborhood and this criteria cannot be met by the applicant.

(1)(d) Mitigation of Potential Negative Impacts

This proposed special review use must mitigate the potential negative impacts and it cannot do so.

First and foremost is noise. As even the applicant's architect noted at the recent meeting with the neighbors, nothing is going to stop barking and noise pollution from this proposed operation. Noise is not an acceptable impact to the either the residential or office/commercial neighbors.

While residential dogs are an accepted part of most residential neighborhoods, bringing in a facility which could allow for 23 to 46 or more large and small dogs to be outside at all hours of the day is not compatible with normal residential uses. The applicant has promised that it will have staff members sufficient (under USDA/APHIS guidelines) to "remove" noisy dogs, reality dictates otherwise. First, the applicant did not indicate the number of dogs allowed per staff member under these guidelines. While I cannot say I conducted an exhaustive search, I did not locate any such guideline. What happens if the staff person or persons is/are bringing one or more noisy dog(s) inside and the other dogs begin to bark while that staff person is gone? It is a disruption to the neighborhood. Staffing is expensive and there is no commitment to a sufficient level of staffing in the proposal.

Further, dogs typically do not bark alone. Dogs tend to bark in conjunction with other dogs. Thus it would more normally take the removal of all the dogs to alleviate the noise issue. That is not practical and would take time. The many causes for the dogs to bark, especially in this area, are noted the HOA letter already delivered to the Community Development Office. There are also likely scenarios where dogs are barking at each other as customers arrive each day to deliver their dogs for day care.

Further, the proposed special review use suggests that waste will be collected and taken from the immediate area twice weekly. Particularly in warm months, the location of that dumpster and its contents is going to be important. Dog waste is very noxious and the waste for 46 or more dogs (day care plus boarding) can quickly permeate the neighborhood. Summer afternoon winds common in this area will quickly carry this to the neighboring residential areas. While the outdoor play area sounds like an attempt to mitigate dog smell from waste, urine and other dog byproducts, these wastes will quickly penetrate any surfaces and over a short amount of time, the smells from this will waft into the neighborhoods at all hours.

Given these and other factors, it is clear that the applicants cannot properly mitigate the negative

impacts this operation will have on the surrounding properties.

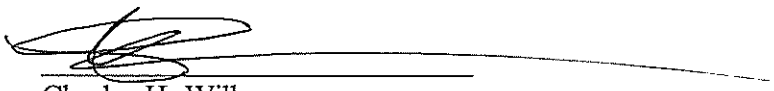
Cottonwood Landing, and the other residential uses, respect the intent and desire of the applicant to be a good neighbor. But despite their best intentions this use will have a significant, negative impact to the neighborhood and should be denied. It is simply not compatible with the surrounding area and the negative impacts cannot be appropriately and sufficiently mitigated.

Granting a special review use permit for this project would violate the Municipal Code provisions noted above.

Thank you for your consideration of this letter and the letter delivered to your office by the HOA and other neighboring properties.

Sincerely,

CHARLES H. WILLMAN, P.C.



Charles H. Willman

April 21, 2016

To: Andrew McGregor, Community Development Director, City of Glenwood Springs
Re: Planning & Zoning Special Review Use, Project #7-16, Dog Holliday Boarding Kennel

The following organizations, representing numerous homeowners, are ***FIRMLY AGAINST*** the proposed dog kennel and ask the Planning and Zoning Commission to ***REJECT*** the planned development of the ***Dog Holliday Boarding Kennel*** at 2517 South Grand Avenue:

- Cottonwood Landing Homeowner's Association
- Roaring Fork Condominiums Homeowner's Association
- Storey Enterprises, Inc. (Valley Mobile Park)
- Terrace Condominium Home Owners Association
- Penrose Townhomes

WE ARE NOT ANTI-BUSINESS. Our ***OPPOSITION IS TO THE PROPOSED LOCATION*** of the kennel because of its impact on (1) the quality of life in our residential neighborhood and (2) the future development of this part of Glenwood Springs. The overwhelming feedback we've heard from our residents is to ***REJECT THIS DEVELOPMENT***. Here are the issues:

Even though the proposed kennel location is zoned C-3, ***the project is situated in a DENSE RESIDENTIAL AREA***. Please see the diagram on the following page, taken from the Garfield County Tax Map.

The ***immediate surrounding residences number 146*** and include:

- Cottonwood Landing PUD, across the river (55 town homes located 105 feet west);
- Roaring Fork Condominiums (21 condos located 15 feet north)
- Roaring Fork Manor Condominiums (10 condos located 240 feet north)
- Valley Mobile Park (36 residences located 77 feet northeast);
- The Penrose Plaza Condominiums (8 units located 186 feet to the southeast); and
- The Penrose Townhouses (16 units located 271 feet to the southeast).

Beyond these are ***126 additional residences*** which include:

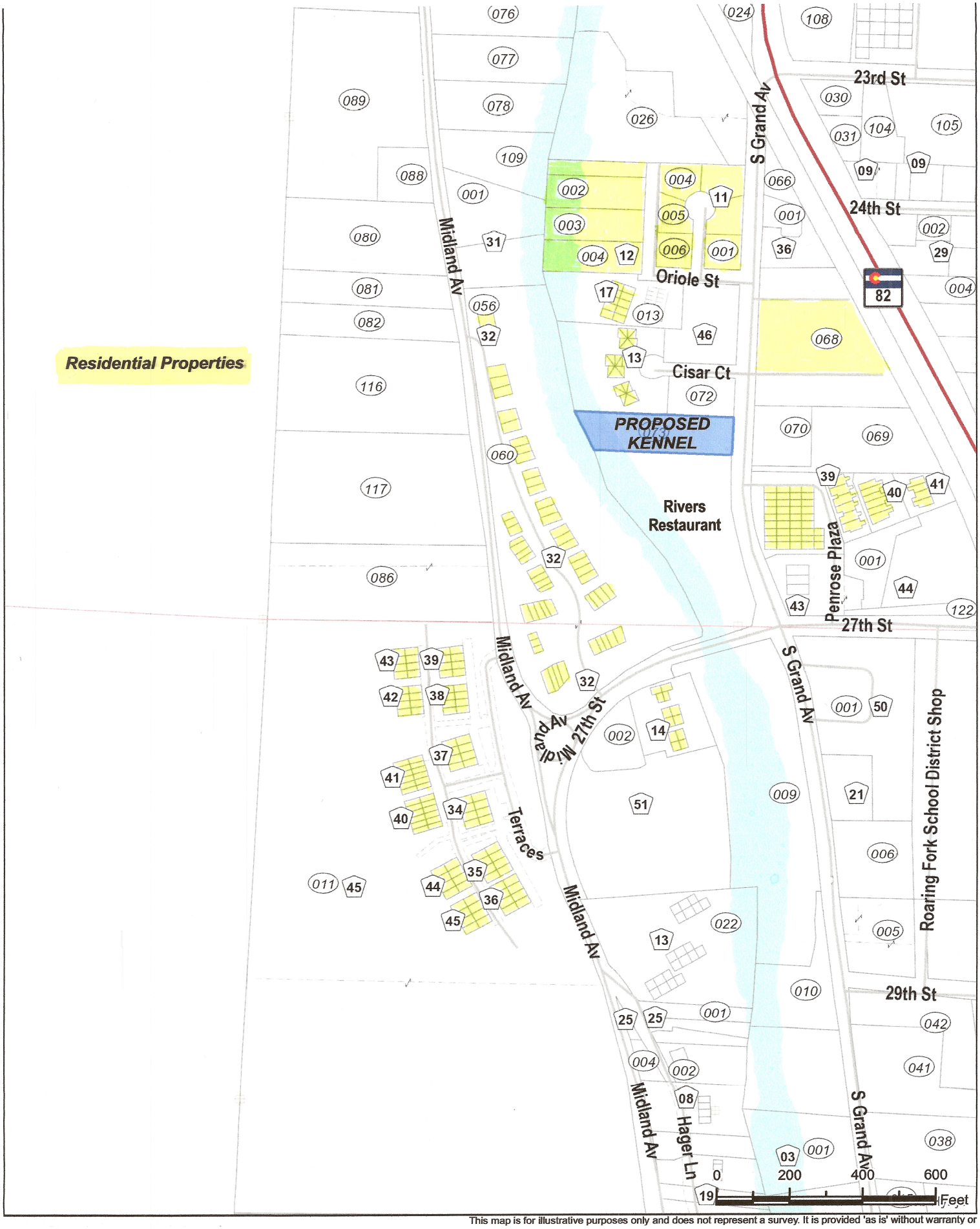
- 10 single-family homes located off Oriole street, 394 feet to the north;
- the Terrace Condominiums (104 condos located 615 feet to the southwest); and
- the Racquet Club Condominiums just south of 27th street (12 units located 636 feet southwest.)

There are also 17 professional offices in Penrose Plaza, located 186 feet to the southeast.

(Distances are approximate, based on the City of Glenwood Springs & Garfield County GIS maps, and are measured closest property line to closest property line.)

Since the construction of the Western Petroleum building as office space in the early 1960s, the area has evolved into a desirable residential area.

The kennel would be among 272 residences and 17 professional offices within a ¼ mile radius.



This map is for illustrative purposes only and does not represent a survey. It is provided 'as is' without warranty or

Our ***MAIN CONCERN IS NOISE*** from barking dogs.

- There will be a large play area for dogs on the riverfront (west) side of the property, as well as 18 kennels with outside access next to the fence that separates the kennel from Rivers restaurant. In spite of the owner's promise to control "excessive barking" through management policies, ***according to the project architect there is "no amount of landscaping that will block the noise"***.

- Dog barking ***violates the Colorado Noise Statute***. (See Attachment 1, Colorado Noise Statute.) Sound levels in excess of the following are considered noise and a public nuisance:

ZONE	7am - 7 pm	7 pm - 7 am
Residential	55 decibels	50 decibels
Commercial	60 decibels	55 decibels

  Although it will vary from one breed to another, as well as one animal to another, **noise level from a barking dog can reach 80-90 decibels** (Industrial Safety & Hygiene News, Feb. 2013). This can be compared to other common noises. (See Attachment 2, Decibel Chart.)

- Frequently there are cars parked in the Rivers Restaurant lot. (See attachment 3, Photo.) ***Car noise and people's conversation will stimulate dog barking***.

- Once a week, in the evening, Rivers Restaurant has a ***live music event*** during the summer months. This can also ***incite dog barking***.

- In the summer months, there is a bear that nightly tries to forage in area dumpsters. This will undoubtedly ***stir up the dogs and result in barking***.

- There is a basic principle of physics that ***sound is amplified over water***.* The project location is directly on the river and numerous residential properties are located there as well. There is no doubt that barking dogs will be heard.

- Dog barks are audible over ambient traffic noise.*

- Intermittent noises (like a dog barking) have more adverse effects on humans than continuous noises (aka white noise, like traffic.)*

- ***Noise causes stress***, which is well-known to have negative physical effects, not only on humans but on animals as well.*

** can be documented with scientific studies.*

At this point, we have no kenneled barking dogs around our homes and ask that this project be rejected so that we DON'T HAVE TO START DEALING WITH BARKING DOGS.

The proposed project is ***INCOMPATIBLE WITH THE CURRENT MUNICIPAL CODE***. The GWS Municipal Code, references the concept of ***compatibility.***

- *"Compatibility* means the characteristics of different uses, activities, or designs which allow them to be located near or adjacent to each other in harmony.

- Some elements affecting compatibility include the following: . . . ***noise, odor*** . . . Compatibility does not mean "the same as." Rather, compatibility refers to the ***sensitivity of development proposals in maintaining the character of existing development."***

- A dog kennel is ***not compatible*** with residential housing and the proposed project location is surrounded by residential properties.

The Code also addresses ***animal noise and odor as a nuisance:*** 100.020.120 – Animal-Related Nuisance

- "Circumstances in which animal ownership, custody, maintenance or control creates, contributes to, or permits any of the following undesirable animal conduct or conditions upon public or private property causing injury or substantial annoyance, or discomfort to the health and welfare of others shall be unlawful . . .

- (5) Making continuous ***noise*** in an excessive manner which is persistent and loud enough to be heard beyond the premises where the animal(s) is kept or harbored, and ***which substantially interferes with the reasonable use and enjoyment of other nearby properties in the community***.

- (6) The existence of substantial ***stench/offensive odor***, or general unsanitary conditions in which the animal(s) is kept, so as to ***interfere with the reasonable use and enjoyment of other nearby properties or otherwise make their physical occupation unreasonably uncomfortable***."

(Note: quoted from Glenwood Springs, Colorado - Municipal Code as found on GWS Municipal website)

The proposed project is I***NCOMPATIBLE WITH THE GLENWOOD SPRINGS 2011 COMPREHENSIVE PLAN*** which states that "the city's Comprehensive Plan is the community's guide for making land use decisions and is based on the **community's values and vision for the future**."

- Regarding Plan Update: "In order to keep the Plan current, it must be able to change as the community changes."

- **The current zoning of the project no longer matches the nature of the surrounding residential area. The character and condition of this location has changed substantially since the building on the project site was erected in the early 1960s and is now surrounded by desirable residential properties.**

- Riverside Protection: "Land and habitat along the Colorado and Roaring Fork rivers should be protected".

- **We are exceedingly lucky to be surrounded by deer, birds, ducks, geese, squirrels, chipmunks and bears who travel the Roaring Fork riparian area near the proposed project. The Roaring Fork River, in this location, is considered Gold Medal Water and supplies our drinking water. From an environmental standpoint, we must not allow ANY potential danger to this area.**

(Note: quoted from GWS 2011 Comprehensive Plan as found on GWS Municipal website).

The proposed project is ***INCOMPATIBLE WITH THE CONCEPTS IN THE DEVELOPMENT REGULATIONS ANALYSIS AND ASSESSMENT*** submitted to the city by Clarion Associates in November 2015.

- "The allowable uses within each district should be compatible with the intent of the district. There may be current land uses that are permitted in Glenwood Springs that are inconsistent with the intended character of their respective districts."
- ***Assuming a new Comprehensive Plan to be developed in the near future, it makes no sense to approve a project today that is contrary to the concepts forth in the Analysis and Assessment.***

*(*Note: quoted from Clarion Associates report as found on GWS Municipal website.)

A dog kennel in this location ***THREATENS PROPERTY VALUES*** and, consequently, ***GOVERNMENT TAX REVENUES.***

- This project is to be located on premium riverfront property, which is not the highest and best use of the land. There is no way to estimate the potential of decreased property values resulting from a noisy neighbor, but ***IT IS A RISK***.
- The former property tenant, Western Petroleum, was an office which generated no noise in our neighborhood and fit well in this residential environment. Any change in use will impact property values.

We appreciate your thoughtful consideration of these concerns and urge you to reject this project.

Sincerely,

George Fuller, President
Cottonwood Landing Homeowner's Association

Jeff Bryant, President
Roaring Fork Condominiums Homeowner's Association

Allan Storey, Owner
Storey Enterprises, Inc. (Valley Mobile Park)

Andy Hermes, President
Terrace Condominium Home Owners Association

Tom Rutledge, President
Penrose Townhomes

Colorado Noise Statute

25-12-103 - Maximum permissible noise levels.

(1) Every activity to which this article is applicable shall be conducted in a manner so that any **noise** produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of **noise** radiating from a property line at a distance of twenty-five feet or more therefrom in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such **noise** is a public nuisance:

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

(2) In the hours between 7:00 a.m. and the next 7:00 p.m., the **noise** levels permitted in subsection (1) of this section may be increased by ten db(A) for a period of not to exceed fifteen minutes in any one-hour period.

(3) Periodic, impulsive, or shrill **noises** shall be considered a public nuisance when such **noises** are at a sound level of five db(A) less than those listed in subsection (1) of this section.

(4) This article is not intended to apply to the operation of aircraft or to other activities which are subject to federal law with respect to **noise** control.

(5) Construction projects shall be subject to the maximum permissible **noise** levels specified for industrial zones for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of project.

(6) All railroad rights-of-way shall be considered as industrial zones for the purposes of this article, and the operation of trains shall be subject to the maximum permissible **noise** levels specified for such zone.

(7) This article is not applicable to the use of property for purposes of conducting speed or endurance events involving motor or other vehicles, but such exception is effective only during the specific period of time within which such use of the property is authorized by the political subdivision or governmental agency having lawful jurisdiction to authorize such use.

(8) For the purposes of this article, measurements with sound level meters shall be made when the wind velocity at the time and place of such measurement is not more than five miles per hour.

(9) In all sound level measurements, consideration shall be given to the effect of the ambient **noise** level created by the encompassing **noise** of the environment from all sources at the time and place of such sound level measurement.

(10) This article is not applicable to the use of property for the purpose of manufacturing, maintaining, or grooming machine-made snow. This subsection (10) shall not be construed to preempt or limit the authority of any political subdivision having jurisdiction to regulate **noise** abatement.

(11) This article is not applicable to the use of property by this state, any political subdivision of this state, or any other entity not organized for profit, including, but not limited to, nonprofit corporations, or any of their lessees, licensees, or permittees, for the purpose of promoting, producing, or holding cultural, entertainment, athletic, or patriotic events, including, but not limited to, concerts, music festivals, and fireworks displays. This subsection (11) shall not be construed to preempt or limit the authority of any political subdivision having jurisdiction to regulate **noise** abatement.

Source: L. 71: p. 648, § 1. **C.R.S. 1963:** § 66-35-3. **L. 82:** (10) added, p. 424, § 1, effective March 11. **L. 87:** (11) added, p. 1154, § 1, effective May 20.

Am. Jur.2d. See 61A Am. Jur.2d, Pollution Control, § 267.

Residential development of property is not precluded when **noise** emanating onto property exceeds limits set forth in this section. Einarsen v. City of Wheat Ridge, 43 Colo. App. 232, 604 P.2d 691 (1979).

Trier of fact to determine mode to use in measuring noise. Davis v. Izaak Walton League of America, 717 P.2d 984 (Colo. App. 1985).

Applied in City of Lakewood v. DeRoos, 631 P.2d 1140 (Colo. App. 1981).

DECIBEL CHART

Commercial	Industrial	Residential	dB Level
Threshold For Hearing			0
Good Recording Studio		Breathing	10
		Rustling Leaves	15
		Whisper, Mosquito	20
Library		Living / Dining Room	30
Refrigerator Hum		Kitchen / Bathroom	40
Quiet Office	Power Lawn Mower	Home Office	50
		Birds at 10'	55
Conversational Speech			60
Piano Practice		Electric Shaver	60
Business Office		Piano Practice	65
Noisy Restaurant	Inplant Office	Street Traffic	70
Chamber Music		Barking Dog	75
Classroom		Alarm Clock	75
		Television / Dishwasher	75
Airplane at 1 mile	Manual Machines	Vacuum Cleaner	80
Reception / Lobby Area	Handsaw	Garbage Disposal	85
Motor Bus		Telephone Dial Tone	85
Applause in Auditorium		Lawn Mower	85
OSHA Required Hearing Protection in Factory			85
Teleconference Room		Train at 100'	90
Subway	Farm Tractor	Teenage Stereo	90
Sustained Exposure May Cause Hearing Loss			90
Music Practice Room	Electric Drill	Walkman at 5/10	94
French Horn	Average Factory Noise	Blender	100
Orchestra	Diesel Truck	Motorcycle	105
Computer Room	Printing Press	Train	105
Bass Drum	Heavy Truck	Power Saw	110
Dog Kennel	Power Mower	Baby Crying	110
Symphony Orchestra	Punch Press	Squeeky Toy to Ear	110
Pain Begins			120
Disco	Sandblasting	Shot Gun	120
Cymbal Crash	Pneumatic Clipper	Air Raid Siren	130
Dragcar Racing	Military Jet	Shotgun	140
Rock Concert	Aircraft Carrier Deck	Jet Takeoff	140
Chest Wall Begins to Vibrate			150
Ear Drum Breaks Instantly			160
Death of Hearing Tissue			180
Loudest Possible Sound			194

from controlnoise.com, NetWell Noise Control



ATTACHMENT 3

Rivers Restaurant

2525 S. Grand Ave
Glenwood Springs, CO. 81601
970-928-8813
970-928-8814 Fax
rivers@rof.net

City of Glenwood Springs
Planning & Zoning
101 8th St.
Glenwood Springs, CO. 81601
970-384-6411 andrew.mcgregor@cogs.us

Dear Planning & Zoning,

My name is Michael Schlicher. I am the chef and a representative of Rivers Restaurant located at 2525 S. Grand Avenue in Glenwood Springs. We at Rivers are opposed to the proposed dog boarding kennel to be located next door at 2517 S. Grand Ave.

Our concerns are both of noise and summertime stench. As a child, my parents operated a pet boarding facility in West Windsor, New Jersey. There were rarely if never a quiet time. When on e dog starts barking, they all seemed to chime in. Then there was the stink, even with extensive cleaning three times a day, the summertime stench, I will never forget.

Kennel like this need to be built in a larger parcel and not in a mostly residential neighborhood. The noise will only be magnified by the river and canyon, where as it needs to be buffered. We believe a business as this next door would be a detriment to our revenue, especially in the summer months when we rely heavily on our outdoor dining. Constant barking over the sounds of smooth jazz and polite conversations isn't going to enhance anyone's dining experience.
I am a dog lover and owner and agree that there is a need for pet boarding kennels, but not on this property.

Thank you,

Michael Schlicher
Chef

Anita Wan
General Manager

The Barsness Law Firm, P.C.
Attorneys at Law
1607 Grand Avenue, Suite 24
Glenwood Springs, CO 81601
(970) 945-9345 Telephone
(970) 945-8366 Facsimile

Chad J. Barsness, J.D.
Jennifer J. Barsness, J.D., LL.M.

Colin J. Wilhelm, J.D.

April 20, 2016

To Whom it May Concern:

I have owned condominium property located at 1607 Grand Ave., Suite 24, Glenwood Springs, CO 81601 for approximately 9 years. I also operate my law firm out of this location. My space is located on the floor above the current location of All Dogs and Cats.

It is my understanding that All Dogs and Cats currently runs the Veterinary Clinic and Hospital on the ground floor and in the basement of the building. During this timeframe, noise and/or animal odors have never been a problem and/or interfered with my business operations of The Barsness Law Firm, P.C.

It is my belief that a dog boarding facility in the current location being proposed would be a benefit to the City of Glenwood Springs and I would encourage the City of Glenwood Springs to approve the facility as a benefit to the community as a whole.

If you have any additional questions or concerns regarding this matter, please do not hesitate to contact me.

Sincerely,

Chad J. Barsness

CJB/cgs

From:	Bruce Barth
To:	Trent Hyatt
Subject:	FW: All Dogs and Cats
Date:	Friday, April 22, 2016 2:28:36 PM

From: Lori Pohm <alldogsandcatsvet@gmail.com>
Date: Friday, April 22, 2016 2:27 PM
To: Bruce Barth <bruce@redhousearchitecture.com>
Subject: Fwd: All Dogs and Cats

---------- Forwarded message ----------
From: **Rick Hayes** <rick@excellps.com>
Date: Thu, Apr 21, 2016 at 11:00 AM
Subject: All Dogs and Cats
To: bruce@rehousearchitecture.com
Cc: Lori Pohm <alldogsandcatsvet@gmail.com>

April 21, 2016

Dear Glenwood Springs Planning and Zoning Commission,

I would like to take a moment to explain to you what great Owners/Stewards of the Van Rand Professional Center the vet clinic All Dogs and Cats has been. Our company, Excell Property Services has been the "Association Manager" of the building for many years and have always been impressed with the day to day conduct of their operation. With all of those pets coming and going they manage to keep not only their interior unit but also the exterior of the building looking great. We have never even once had a complaint about noise or messes from other owners in the building. Bob and Lori are true professionals to work with.

If you should have any future questions or concerns please feel free to contact this office and we will be available.

Rick

Rick Hayes

Excell Property Services, Inc.

P.O. Box 4738

Basalt, CO 81621

970-927-3734

Fax 970-927-0565

Cell 970-948-7161

rick@excellps.com

Dog Holliday's Pet Resort
Special Review Submittal



15 March 2016

Prepared By:
Red House Architecture P.C.
815 Blake Avenue
Glenwood Springs, CO 81601
970 945-8240

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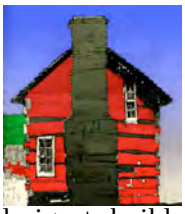
M. Exterior Light Fixtures

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A. PROJECT DESCRIPTION

March 15, 2016

RED HOUSE
architecture



design + build

Trent Hyatt - City of Glenwood Springs
101 West 8th Street
Glenwood Springs, CO 81601

Re: Dog Holliday's Kennel
2517 South Grand Avenue
Glenwood Springs, CO. 81601

Dear Trent:

Please accept this letter of description and the attached drawings for Special Review process of the Dog Holliday's Pet Resort located at 2517 South Grand Avenue (the former Western Petroleum building). Bob Thorsen and Lori Pohm would like to remodel the existing pre-fabricated steel building, that it has held the Western Petroleum business for many years, into a boarding kennel for dogs and cats as well as a grooming facility. The lower valley has a great need for this type of business and the industrial location and zoning seems best suited for the business type.

The existing property is zoned C-3 and the building most recently housed an industrial/office use – all of which would remain unchanged. The lot is 43,124 sf in size of which approximately two thirds is a relatively flat bench and the remainder slopes down to the Roaring Fork River. C-3 zoning surrounds the subject property on all sides and the proposed use is compatible with the surrounding uses given the mitigation to noise and refuse disposal. To the east of the subject property is South Grand Avenue and the Roaring Fork River runs along the west property line. Rivers Restaurant occupies the site directly south of the subject property while Aspen Insulation is housed in the pre-fabricated steel building to the north. There are residential townhomes abutting the west end of the north property boundary. The existing building is a pre-fabricated steel structure, approximately 3968 sf in size with an assortment of movable sheds on the northwest portion of the property.

The overall idea for the project is the containment of all kennel and "semi-permanent" animal spaces within the walls of the existing building, including an indoor play area. The area on the west side of the building would contain a covered and semi-enclosed play area as well as an open-air play area (which would be a proposed addition to the building) which is 960 sf or 24.2% of the existing building area. All play areas would be heavily landscaped and monitored with regards to specific animal combinations and noise output. Hours and number of animals at any one time in these areas will be limited. Individual, "private" kennels would occupy the side yard on the south side of the building. The kennels would be screened by the existing heavy foliage and fence, plus additional landscape as required.

The existing drop-off/drive-thru on the east side of the building will remain and parking on the north side of the building will also remain and be striped to include 12 regular sized spaces and one handicap space located near the entry. The main entrance to the kennel and grooming facilities will remain on the northeast corner of the existing structure, which is adjacent to the existing City sidewalk for pedestrian access. Pedestrian access through the site will be prohibited to create security for the employees and animals.

Dog Holliday's Pet Resort and grooming salon is going to be a comprehensive pet care business. It will not be your traditional concrete slab and chain link kennel business. It is designed for pet comfort, enjoyment, and strives to be a fear free environment. We will offer long term boarding and day boarding to start with but if we grow too big to handle all the number dogs then we will need to discontinue day boarding. Dogs that are boarding will spend a couple hour in the morning and afternoon in the exercise area. The owners will have a la carte items that they can add on such as training, swimming lessons, private walk or exercise, grooming and bakery treats. We have designed to large indoor exercise areas so we can divide the dogs by size and activity level. We will also have an outdoor pool and exercise area. The dogs will be supervised at all times when they are in the play areas. Along with boarding we will have a certified trainer on staff.



We will have a certified dog trainer that only uses positive reinforcement training techniques on staff and offer puppy and kitten, obedience, dog active sport classes and nose work classes. Behavior is the number one cause for pets to end up in a shelter. Our aim is to prevent behavior problems before they start. Educating pet owners about dog behavior and training is key to building the owner pet bond and making sure that pet does not end up in a shelter. Our pool will serve at as an exercise area, training for Dockdogs, and for physical therapy for pets.

We will have two to three groomers that will offer breed cuts, seasonal grooming, and bath and brushes. We will also have retail items that include training items, puzzles and toys for pets, and a line of bakery items for pets.

Pick up and drop off services for the pets will be offered. We will pick up pets from hotels or local tourist attractions, so the pets are in a safe environment while tourist enjoy local activities.

2) The anticipated average length of stay will be 4 days to 10 days.

3) Hours of operation for grooming and boarding will be 7:30 to 6:00 P.M., although evening indoor training classes will be offered until 9:00 p.m.

4) After dogs have been assessed for activity level, sociability, and aggressive tendencies they will be broken into play groups. We will operate under the conditions that for a large dog we will have 75 square feet of play area per a dog and small dogs 50 square feet per a dog. This will limit the play groups to 13 large dogs in the 1000 square foot play area and 10 small dogs in the 500 square foot play area. The dogs will be placed in the play area in compatible groups and watched by staff members and the number of dogs per staff member will be set according to USDA /APHIS guidelines. The dogs will play for 1.5 to 2 hours starting no earlier than 7:00 AM and no later than 8:00 PM. We will rotate them through the play areas throughout the day and they each will get to play twice a day. These times will apply for out door play and indoor play. The pool will operate seasonally as weather allows.



5) Loud dogs will not be exercised with the groups outside. They will be exercised alone outside for a shorter time or only exercised inside. The owners of such pets will be informed what our policy is and that we must be respectful of our neighbors. This policy will also apply to the patio suites. If a dog is barking incessantly outside in the patio it will be denied access to the outside. Aggressive dogs will be denied group play, and they will have private time alone in the play areas, with no dogs visible.

6) The maximum number of boarding dogs would be 46 and it is highly unlikely that that number would ever be attained. There are 23 suites and to reach the maximum number of dogs (46) there would be 2 dogs from the same family in every suite. A more realistic maximum number would be 30 dogs and even that would mean that every suite was full and there were multiple pets from several families in several of the suites.

The maximum number of cats would 6.
The maximum number of daycare dogs would be 10 when our suites are full.

7) Customers dropping off for Daycare or grooming will park their car and walk their pet into the Resort. If they have a punch card or are a regular, a staff member will escort their pet to its suite or play area. If it is a first time client or grooming client they will fill out paper work and then their pet will be escorted by a staff member to its specific area. The owner will then depart.

8) The outdoor play area will be heavily landscaped to add maximum noise mitigation, shade, and fun features for the pets. The perimeter will be enclosed with a minimum 6 ‘-0 tall, full privacy fence with an inwardly angled top to prevent escape. The fence will be solid to prevent the dogs from seeing people or activity that will induce barking. The ground covering will be K9 turf or a similar material that is designed for maximum drainage, sanitation, and odor resistance while maintaining aesthetically pleasing appearance. The swimming pool will be fenced for safety. Only pet safe plants will be used for landscaping. Play equipment and toys will be provided appropriate for the group of dogs exercising. Agility equipment will be set up for classes and drop in practice at designated times.



9) Since the dogs will be supervised at all times outside the waste will be immediately picked up and placed in a sealed animal proof trashcan. At the end of the day the trash cans will be emptied and the waste in a tied bag will be placed in the dumpster along with the indoor refuse. The dumpster will be emptied two to three times a week as needed to avoid noxious smell.

10) Dog food deliveries will be weekly on Wednesday or Thursday. The truck will park in the horseshoe driveway. The rest of the deliveries will be by U.P.S. and will be small delivery trucks and will not be more than weekly.

All Dogs & Cats Veterinary Clinic will operate the facility. They have been in the veterinary business since 1992, located in the Van Rand building south of Glenwood Springs High School. In the current condominium situation, All Dogs & Cats have not had any noise or odor complaints within the building and have also been Local's Choice Best veterinarian or runner up since 1998.

The project is being proposed contains 90% of the activity indoors to contain the maximum amount of noise trespass. It is highly energy efficient, exceeding minimums in insulation and air sealing for indoor environment comfort and sound mitigation and will use sustainable materials and methods of construction to the maximum extent possible.

Please feel free to contact me with any questions.

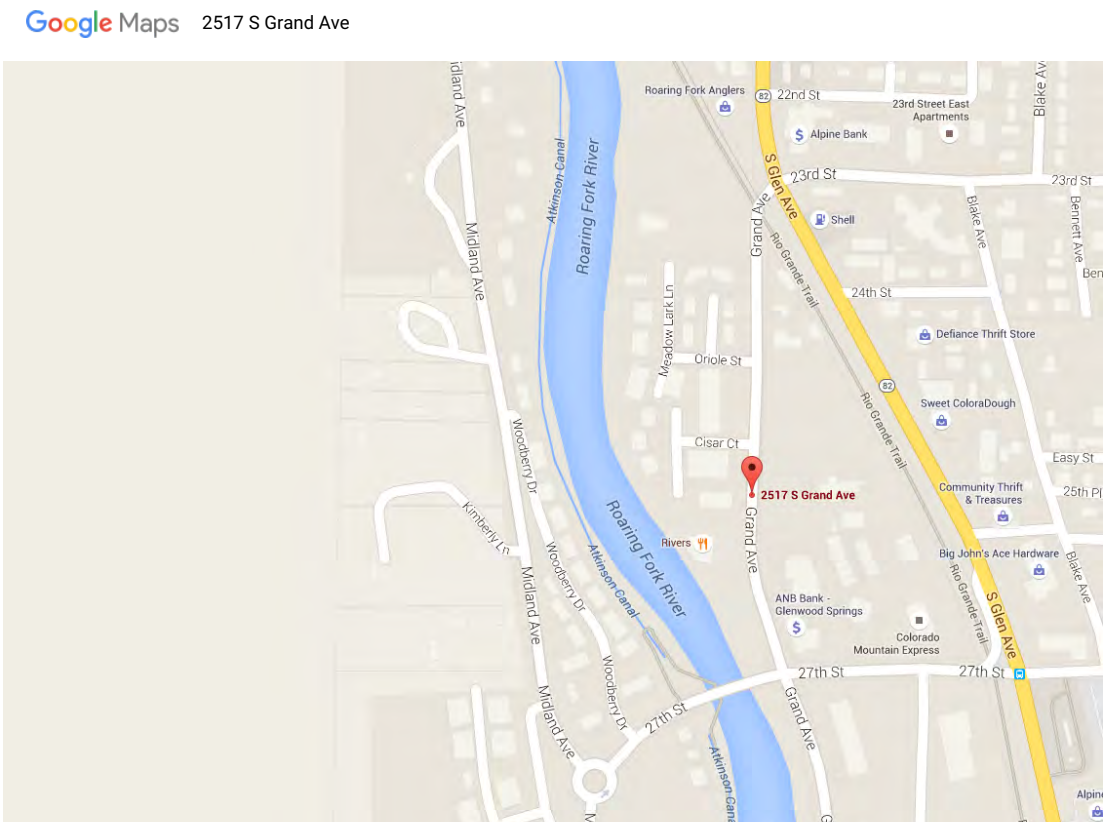
Best Regards,

Bruce Barth
Red House Architecture PC

B. LEGAL DESCRIPTION

Section: 16 Township: 6 Range: 89 TR IN SWSE

C. VICINITY MAP



D. PROOF OF OWNERSHIP

553912 10/20/1999 08:41A B1156 P87 M ALSDORF
1 of 2 R 10.00 D 0.00 GARFIELD COUNTY CO

SPECIAL WARRANTY DEED

N.S.K.F. CORPORATION, a Colorado corporation, Grantor, for good and valuable consideration, in hand paid, hereby sells and conveys to **GRAND GP LLC, a Colorado limited liability company**, Grantee, whose address is P. O. Box 848, Glenwood Springs, Colorado 81602, the following real property in the County of Garfield and State of Colorado, to wit:

See attached Exhibit A attached hereto and incorporated herein by this reference;

also known as: 2517 South Grand Avenue, Glenwood Springs, Colorado,

with all its appurtenances, and warrants the title to the same against all persons claiming under the Grantor.

NO DOCUMENTARY FEE REQUIRED: Consideration less than $500.00.

SIGNED this 1st day of October, 1999.

N.S.K.F. CORPORATION
A Colorado Corporation

By _____
Stephen M. Fattor, President

ATTEST:

_____
Carol A. Fattor, Secretary

STATE OF COLORADO)
) ss.
COUNTY OF GARFIELD)

The foregoing instrument was acknowledged before me this 1st day of October, 1999, by STEPHEN M. FATTOR, as President, and CAROL A. FATTOR, as Secretary, of N.S.K.F. CORPORATION, a Colorado corporation.

WITNESS my hand and official seal.
My commission expires: 7/7/2003

_____
Notary Public

After recording return to: Schenk, Kerst & deWinter
302 8th St., Ste. 310, Glenwood Springs, CO 81601

EXHIBIT A

ALL THAT PORTION OF THE SW1/4SE1/4 OF SECTION 16, TOWNSHIP 6 SOUTH, RANGE 89 WEST OF THE 6TH P.M., LYING EAST OF THE CENTER OF THE ROARING FORK RIVER AND WEST OF COLORADO STATE HIGHWAY NO. 82 (FORMERLY COUNTY ROAD) DESCRIBED AS FOLLOWS:

Beginning at a point on the Westerly line of Colorado State Highway No. 82 whence the Southeast corner of said Section 16 bears South 69 degrees 45' East 1420.04 feet;
thence North 88 degrees 32' West 373.07 feet to the approximate center line of the Roaring Fork River;
thence North 31 degrees 03' West 118.6 feet along the approximate center line of the Roaring Fork River;
thence South 88 degrees 32' East 437.33 feet to the Westerly line of Colorado State Highway 82;
thence South 1 degree 46' West 100.01 feet along the Westerly line of Colorado State Highway No. 82 to the POINT OF BEGINNING.

COUNTY OF GARFIELD
STATE OF COLORADO

553912 10/20/1999 08:41A B1156 P98 M ALSDORF
2 of 2 R 10.00 D 0.00 GARFIELD COUNTY CO

After recording return to: Schenk Kerst & deWinter
302 8th St., Ste. 310, Glenwood Springs, CO 81601

OFFICE OF THE SECRETARY OF STATE
OF THE STATE OF COLORADO

CERTIFICATE OF FACT OF GOOD STANDING

I, Wayne W. Williams, as the Secretary of State of the State of Colorado, hereby certify that, according to the records of this office,

GRAND GP LLC

is a

Limited Liability Company

formed or registered on 12/08/1998 under the law of Colorado, has complied with all applicable requirements of this office, and is in good standing with this office. This entity has been assigned entity identification number 19981217779 .

This certificate reflects facts established or disclosed by documents delivered to this office on paper through 03/10/2016 that have been posted, and by documents delivered to this office electronically through 03/14/2016 @ 08:59:53 .

I have affixed hereto the Great Seal of the State of Colorado and duly generated, executed, and issued this official certificate at Denver, Colorado on 03/14/2016 @ 08:59:53 in accordance with applicable law. This certificate is assigned Confirmation Number 9547372 .

Secretary of State of the State of Colorado

**********End of Certificate**********

Notice: A certificate issued electronically from the Colorado Secretary of State's Web site is fully and immediately valid and effective. However, as an option, the issuance and validity of a certificate obtained electronically may be established by visiting the Validate a Certificate page of the Secretary of State's Web site, http://www.sos.state.co.us/biz/CertificateSearchCriteria.do entering the certificate's confirmation number displayed on the certificate, and following the instructions displayed. Confirming the issuance of a certificate is merely optional and is not necessary to the valid and effective issuance of a certificate. For more information, visit our Web site, http://www.sos.state.co.us/ click "Businesses, trademarks, trade names" and select "Frequently Asked Questions."

OFFICE OF THE SECRETARY OF STATE
OF THE STATE OF COLORADO

CERTIFICATE OF DOCUMENT FILED

I, Wayne W. Williams, as the Secretary of State of the State of Colorado, hereby certify that, according to the records of this office, the attached document is a true and complete copy of the

Articles of Organization

with Document # 19981217779 of
GRAND GP LLC

Colorado Limited Liability Company

(Entity ID # 19981217779)

consisting of 1 pages.

This certificate reflects facts established or disclosed by documents delivered to this office on paper through 03/10/2016 that have been posted, and by documents delivered to this office electronically through 03/14/2016@ 09:00:32.

I have affixed hereto the Great Seal of the State of Colorado and duly generated, executed, and issued this official certificate at Denver, Colorado on 03/14/2016 @ 09:00:32 in accordance with applicable law. This certificate is assigned Confirmation Number 9547378 .



Wayne W. Williams

Secretary of State of the State of Colorado

**********End of Certificate**********

Notice: A certificate issued electronically from the Colorado Secretary of State's Web site is fully and immediately valid and effective. However, as an option, the issuance and validity of a certificate obtained electronically may be established by visiting the Validate a Certificate page of the Secretary of State's Web site, http://www.sos.state.co.us/biz/CertificateSearchCriteria.do entering the certificate's confirmation number displayed on the certificate, and following the instructions displayed. Confirming the issuance of a certificate is merely optional and is not necessary to the valid and effective issuance of a certificate. For more information, visit our Web site, http://www.sos.state.co.us/ click "Businesses, trademarks, trade names" and select "Frequently Asked Questions."

A COLORADO LIMITED LIABILITY COMPANY

SECRETARY OF STATE
12-08-1998 16:34:47

The undersigned natural person of the age of eighteen (18) years or more, acting as organizer of a limited liability company, under the Colorado Limited Liability Company Act, adopts the following Articles of Organization for such limited liability company:

FIRST: The name of the limited liability company is **GRAND GP LLC**.

SECOND: The principal place of business of the limited liability company is 2517 Grand Avenue, Glenwood Springs, Colorado 81601.

THIRD: The name and business address of the registered agent for service of process is:

Stephen M. Fattor
823 N. Traver Trail
P.O. Box 848
Glenwood Springs, CO 81601

FOURTH: Management of the limited liability company is vested in its managers rather than members. The name and business address of the initial manager is:

M&C FATTOR LLC
823 N. Traver Trail
P.O. Box 848
Glenwood Springs, CO 81601

FIFTH: The limited liability company shall be formed and legally organized and shall commence to exist on January 1, 1999, but in any event not later than ninety (90) days after the date of filing of these Articles of Organization with the Colorado Secretary of State.

SIXTH: The name and address of the organizer is:

Dan Kerst, Esq.
SCHENK, KERST & deWINTER LLP
302 Eighth Street, Suite 310
Glenwood Springs, CO 81601

SIGNED this 5th day of December, 1998.

Dan Kerst, Organizer

E. AUTHORIZATION LETTER

March 9, 2016

RED HOUSE
architecture



design + build

City of Glenwood Springs Community Development Department
101 West 8th Street
Glenwood Springs, CO 81601

Re: Dog Holidays
2517 South Grand Avenue
Glenwood Springs, CO

Subject: Authorization

To whom it may concern:

This letter serves as authorization for Bruce Barth of Red House Architecture to act a representative of the owner for the above mentioned project applications and all associated work. Please accept this as consent to process the application and feel free to contact me with any questions.

Best Regards,

Mike Fattor,
Grand GP, LLC

0806 L1

815 blake avenue glenwood springs colorado 816101 p 970 945 8240 f 970 947 9137 www.redhousearchitecture.com

F. C-3 DISTRICT REGULATIONS

District Regulations/Statistics (*C/3 General Commercial District*):

1. All service, fabrication and repair operations are conducted within a building
    a. See attached plans and text
2. All outdoor storage of materials is enclosed by a fence at least six (6) feet in height
    a. See attached plans and text
3. All loading and unloading of vehicles is conducted on private property
    a. See attached plans
4. All practical means are used to confine odor, noise, glare and vibration to the site
    a. See attached text

1. *Fencing, screening.* All outside areas used for operations and storage shall be enclosed by a site-obscuring fence at least six (6) feet in height. Fencing materials should be compatible with the building's architecture. To the extent possible, screening accomplished by landscaping or materials shall be integral with the theme of the building's architecture. Roof equipment, such as vents and ventilation equipment, shall be screened from public view at any street level and shall be constructed of materials that are harmonious with the building appearance.
    a. ***See drawings and text above for description fencing of exterior areas.***
2. *Emissions*. No unreasonable amount of odor, gases, radiation, liquid waste, solid waste, glare, noise or vibration shall leave the site. Techniques may include utilizing available best practices for mitigation, redesign of a site plan, or potentially the removal of the offending feature from the site.
    a. ***See text above for description of odor mitigation.***
3. *Loading and circulation*. Loading and unloading of materials shall not be conducted in travel lanes of streets. The use of alleys for loading and unloading is preferable to the use of streets. To the extent possible, loading areas shall be located on private property away from the front of the building. Where it is deemed necessary to locate a loading area at the front of a building, such loading area or areas shall be off-set from access ways. On-site circulation to loading areas shall not interfere with other site activities. If off-street parking is provided, it should be located away from the building frontage.
    a. ***See text above for description of loading/unloading of deliveries.***
4. *Exterior walls facing street*.
    a. Exterior walls facing a street shall be constructed of materials that are permanent in appearance, compatible within the neighborhood and appropriate to the building's design concept. Preferred materials include brick, cut stone and stucco. The applicant shall provide street-view building elevations of sufficient detail to allow Planning and Zoning Commission review of the building plans for compliance with the aforesaid performance standards. Mechanical projections from the exterior walls facing a street shall not be allowed.
        a. The existing surrounding street facades are an eclectic mix. The building directly north is a pre-fabricated steel warehouse and the building directly south is wood frame restaurant building (see attached photos). The proposed east facing wall (towards Grand Avenue) of the existing building will be enhanced with a full stone wainscot on the east elevation and a partial wainscot on the south and north elevations. Barnwood siding will be added over the existing metal siding above the wainscot on all sides and as trim around the existing windows at the Entry. The remainder of the existing metal siding will be painted a complimentary earth-tone color. The exterior individual enclosures on the south side of the building will be constructed of wood frame material with a rusted metal panels as the exterior finish. The proposed addition on the west end (rear) of the

building will also be a wood framed addition with a similar metal panel finish with openings per the attached drawings.

b. New development should be sensitive to the historic architectural context from which the City has evolved. Building walls, particularly at street level, shall provide horizontal and vertical undulation and/or relief to minimize the appearance of bulk and flatness. Large façades shall be broken up with store fronts, entrances, windows or similar design features. Awnings, canopies, cornices and other fascia treatments that provide relief on a building façade are encouraged. Such architectural details that project into the public right-of-way may need a license to encroach. No more than fifteen (15) horizontal feet of the building front may be blank wall, unless such façade is enhanced by artwork, landscaping or extensive architectural detailing, in which case wall areas may be extended to no more than thirty (30) horizontal feet.

a. The existing building form, scale and massing will remain in tact and the entry door and associated glazing will also remain as the main building entrance – see drawings and a. above for proposed materials

5. *Colors*. Exterior building colors shall be consistent with the predominant masonry colors of the neighborhood.

a. ***The existing building is a pre-fabricated steel building and currently has molded metal sheet metal panels as the exterior finish. The east elevation and portions of the north and south elevations are proposed with the addition of stone veneer and barnwood (see exterior elevations).***

6. *Lighting*.

a. Exterior on-site lighting shall be shielded to reflect light downward, so that the cone of light is contained within the boundaries of the property and the light source concealed from adjoining properties or the street. Every attempt shall be made to design a site and building so that light standards do not exceed building height. Use of minimum wattage metal halide or color-corrected sodium light sources is encouraged. Non-color-corrected low pressure sodium and mercury vapor light sources are prohibited.

a. See attached cut sheets and light locations on Site Plan.

b. Street lighting shall be consistent with the theme lighting fixtures in the neighborhood.

a. ***Existing street lighting to remain***

7. *Landscaping*.

a. Public amenities, including but not limited to benches, kiosks, phone booths, bus shelters, trash receptacles, restrooms, fountains, art, bike racks and pedestrian lighting shall be provided and incorporated within the landscape plan. Unimproved yards shall be landscaped with grass or suitable native vegetative cover.

a. See attached landscape Plan

b. Street trees shall be provided within the sidewalk. Street trees must be selected from an approved City tree list, maintain a maximum separation of thirty-five (35) feet and minimum height to fourteen (14) feet. A minimum trunk caliper of three (3) inches is recommended.

a. Existing vegetation to remain

8. *Signs*. Signs shall conform with Article 070.060 of this Code.

a. ***All signage shall conform to City codes.***

9. *Parking*. If provided, parking lots and structures, whether as the principal use of a lot or as an accessory use, shall conform with design requirements of Article 070.050 of this Code.

a. ***The existing parking area located north of the existing building will remain and be re-striped to accommodate 1 parking space per 250 sf of building area. The proposed project area (excluding the specific areas for animal kennels and activities) encompasses 2482 sf. This translates into 12 parking spaces, one of***

which is handicap accessible.

Minimum building lot area:

a. Lots devoted wholly or partially to residential use: six thousand (6,000) square feet.

a. ***Lot area is 43,124 sf***

(4) Maximum floor area ratio: 3.0:1

a. FAR as proposed is 4,928:43,124 or 0.12:1.0

(5) Minimum yards:

a. Front yard setback: Non-residential land uses shall be located between five (5) and sixty (60) feet from the front property line. All other land uses: twenty-five (25) feet from arterial and collector streets; or, twenty (20) feet from all other streets.

b. Side yard setback: five (5) feet.

a. Side yard setbacks are 5'-0" - see site plan

c. Rear yard setback:

1. Seven and one-half (7.5) feet if there is no alley at the rear of the property.
2. Ten (10) feet from an alley

a. Rear yard setback is 7'-6" with no development on the steep slopes leading to the Roaring Fork River - see site plan

d. No dwelling unit shall be located within fifty (50) feet of a railroad right-of-way.

a. There is no residential component of the development with the exception of the overnight staff person that will remain on site in the main building to monitor the animals.

(6) Maximum height of buildings: thirty-five (35) feet.

a. The existing building height of 15'6" will remain.

G. COMMERCIAL DESIGN STANDARDS

1. Building elevations

In order to promote buildings that are constructed to a human scale, to provide a visual connection to the street and neighboring properties, and to prevent long expanses of blank walls, no building elevation, regardless of exterior wall plane setback or the location of interior walls, shall exceed thirty (30) feet in length

a. To the greatest extent possible the existing steel building has been amended to comply with the design standards. The street facing (east) elevation and southeast and northeast corners will be re-sided to comply with the standards using masonry and wood siding and using the existing fenestration to create the required variation. The north wall that reaches to the back (west) of the site will remain in tact due to the fact that the drive aisle and parking to the north needs to maintain its existing width which extends right to the building existing face. The south wall that reaches to the back (west) of the site will also remain but is covered by heavy existing vegetation as well as the proposed individual kennels along the wall.

2. Windows, doors and customer entrances.

In order to create a sense of transparency and to visually connect the building's interior with the public exterior, primary and secondary customer entrances shall be clearly defined, highly visible.

a. The existing storefront fenestration and entry door on the northeast corner will remain and be enhanced by the addition of masonry veneer and barnwood siding.

3. Roofs.

To reduce the visual impact of roof mass, no roofline along any building elevation shall exceed thirty (30) feet in length without a visually balanced, physical variation.

a. The existing roof will remain and a trellis will be added to the east facing storefront fenestration to add depth to the public façade

4. Building materials and colors.

Intent. To utilize high quality, long-lasting building and roofing materials which have a proven ability to withstand Glenwood Springs' harsh environment, and to select a color palette that adds visual interest to the development parcel and that is compatible with the surrounding natural environment

a. ***All of the existing exterior materials will remain. The existing metal siding will be covered in key/specific, public locations to enhance the visual aspect of the building as much as possible. Earth tone colored stone veneer will be used along with barnwood and the existing blue metal siding will be painted an earth tone light beige color.***

H. SPECIAL REVIEW CRITERIA

Conditions. A special use permit may be granted for a special review use as provided in Subsections 070.040.030(a) through (j3), inclusive, or for an architectural feature exceeding building height limitations, as provided in Subsection 070.040.030(o), or for a building height over forty (40) feet in the C/2 Zone District, as provided in Subsection 070.040.030(h), provided that the Planning Commission finds that the proposal meets the following criteria:

1. All special use permits: The proposal is consistent with City goals and policies and plans and will be compatible with existing and allowed uses surrounding or affected by the proposed use. Analysis of compliance with this criterion may include, but is not limited to, the following factors:
    a. The applicant has demonstrated safe pedestrian access to and across the site.
        a. ***The existing sidewalk across the east end of the property will remain in tact as will the existing curb cuts for access.***
    b. The applicant has demonstrated safe and adequate vehicular circulation, parking and access for the proposed use.
        a. The existing drive aisle and parking will remain on the north side of the existing building. The parking will be striped and handicap accessible space added per code. The existing drop-off loop on the east side of the existing building will also remain for daycare and small deliveries.
    c. The proposed use is compatible with the character of the neighborhood.
        a. The neighborhood consists of an eclectic mix of industrial, mixed use and residential and restaurant uses. The building directly south is Rivers Restaurant and is set back +/-30'-0 from Grand Avenue and approximately 32'-0 from the south property line of the subject property (see Site Photos). The building directly north of the subject property is a pre-fabricated steel building that houses an insulation company (office and warehouse). Adjacent to the northwest corner and across the river to the west of the subject property are residential townhomes. Directly across Grand Avenue is a vacant, commercially zoned lot that is planed for an assisted living and rehabilitation facility with a veterinary clinic to its east. To the north of the vacant lot is a trailer park and to the south is a mixed-use building with commercial and residential uses. The existing building is a prefabricated metal building with metal siding and roof panels. The proposed design would add stone veneer and wood siding to the main street and parking lot facing elements of the building. The existing storefront glass on the east and north elevations, including the entry door would remain. The remainder of the existing metal siding will remain in place and receive a new painted finish. Additional elements added to the existing building include an enclosed outdoor play area, which is proposed to be skinned in rusted corrugated metal. It would match the fencing of the (uncovered) individual private enclosed outdoor areas (see landscape drawings).

d. The proposal mitigates any potential negative impacts to surrounding properties. Mitigation techniques will be specific to the proposed use and the character of the surrounding properties, but may include techniques such as restrictions on hours of operation; screening with walls, fencing and/or landscaping; sound reduction techniques; modifications to light levels and fixtures; and compatible architecture.

a. ***The key to mitigation is the structure set up to operate the facility. Dogs will be assessed for activity level, sociability, and aggressive tendencies and divided into play groups. watched by staff members and the number of dogs per staff member will be set according to USDA /APHIS guidelines. The dogs will play for 1.5 to 2 hours starting no earlier than 7:00 AM and no later than 8:00 PM. The dogs will be rotated through the play areas throughout the day and they each will get to play twice a day. These times will apply for out door play and indoor play. The pool will operate seasonally as weather allows. Loud dogs will not be exercised with the groups outside. They will be exercised alone outside for a shorter time or only exercised inside. The owners of such pets will be informed what our policy is and that we must be respectful of our neighbors. This policy will also apply to the patio suites. If a dog is barking incessantly outside in the patio it will be denied access to the outside. Aggressive dogs will be denied group play, and they will have private time alone in the play areas, with no dogs visible.***
With regards to physical mitigation techniques, the southwest corner of the lot has been given a much larger land and landscape buffer due to the adjacent residential units. Both the southwest and south boundaries of the outdoor area have been heavily landscaped to mitigate noise (see landscape drawings). The existing heavy vegetation and fencing along the south property line will remain with additional plantings and fencing at the private enclosed outdoor areas. In addition, all sides of the outdoor play areas are surrounded with a solid fence that aids in noise and sight mitigation (see landscape drawings). The dogs will be supervised at all times and outside the waste will be immediately picked up and placed in a sealed animal proof trashcan. At the end of the day the trash cans will be emptied and the waste in a tied bag will be placed in the dumpster along with the indoor refuse. The dumpster will be emptied two to three times a week as needed to avoid noxious smell. The ground covering in the outdoor play area will be K9 turf or a similar material that is designed for maximum drainage, sanitation, and odor resistance while maintaining aesthetically pleasing appearance.

2. Special use permit for nonresidential use excluding home occupations in any residential zone district (R/1 through R/4):
    a. The proposal is compatible with the residential character of the neighborhood and enhances or does not affect the historic quality of the neighborhood.
        a. There is no identifiable residential or "historical quality" in the existing neighborhood and while the building already exists, the applicant is proposing to add quality materials to enhance the exteriors.

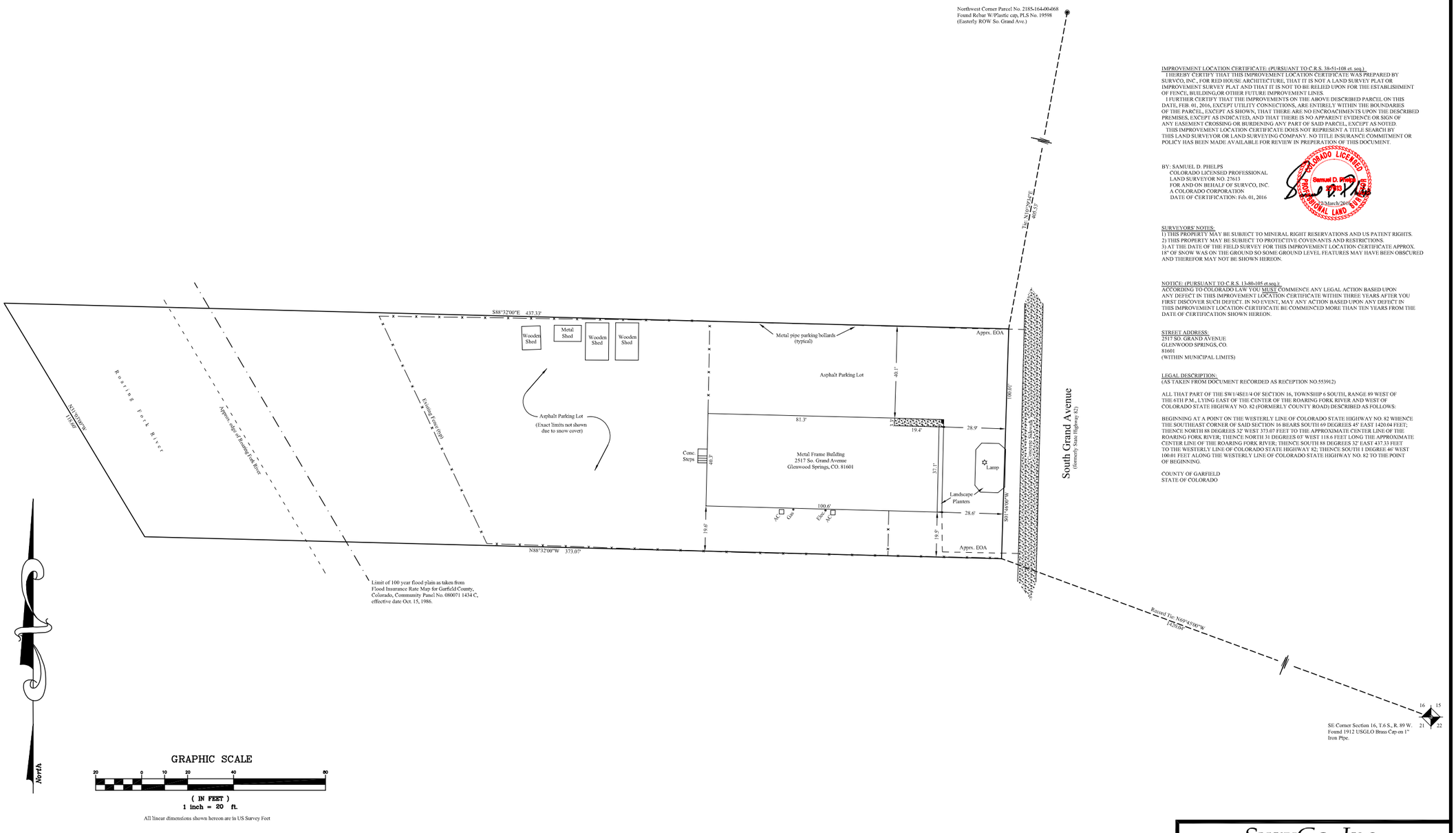
b. No existing building will be removed or the exterior modified extensively unless the new or modified building utilizes and enhances the aesthetic and historic qualities of the neighborhood more than would rehabilitation of the existing building.

a. The proposed alterations and additions to the building do not detract from the existing surrounding character of the area. Again, there is no identifiable residential or "historical quality" in the existing neighborhood.

I. PLAT/SURVEY DRAWING

Improvement Location Certificate

SITUATED IN THE SE1/4SE1/4 OF SECTION 16, TOWNSHIP 6 SOUTH, RANGE 89 WEST OF THE 6TH P.M.
CITY OF GLENWOOD SPRINGS, COUNTY OF GARFIELD, STATE OF COLORADO



IMPROVEMENT LOCATION CERTIFICATE: (PURSUANT TO C.R.S. 38-51-108 et. seq.):
I HEREBY CERTIFY THAT THIS IMPROVEMENT LOCATION CERTIFICATE WAS PREPARED BY SURVCO, INC., FOR RED HOUSE ARCHITECTURE, THAT IT IS NOT A LAND SURVEY PLAT OR IMPROVEMENT SURVEY PLAT AND THAT IT IS NOT TO BE RELIED UPON FOR THE ESTABLISHMENT OF FENCE, BUILDING,OR OTHER FUTURE IMPROVEMENT LINES.
I FURTHER CERTIFY THAT THE IMPROVEMENTS ON THE ABOVE DESCRIBED PARCEL ON THIS DATE, FEB. 01, 2016, EXCEPT UTILITY CONNECTIONS, ARE ENTIRELY WITHIN THE BOUNDARIES OF THE PARCEL, EXCEPT AS SHOWN, THAT THERE ARE NO ENCROACHMENTS UPON THE DESCRIBED PREMISES, EXCEPT AS INDICATED, AND THAT THERE IS NO APPARENT EVIDENCE OR SIGN OF ANY EASEMENT CROSSING OR BURDENING ANY PART OF SAID PARCEL, EXCEPT AS NOTED.
THIS IMPROVEMENT LOCATION CERTIFICATE DOES NOT REPRESENT A TITLE SEARCH BY THIS LAND SURVEYOR OR LAND SURVEYING COMPANY. NO TITLE INSURANCE COMMITMENT OR POLICY HAS BEEN MADE AVAILABLE FOR REVIEW IN PREPERATION OF THIS DOCUMENT.

BY: SAMUEL D. PHELPS
COLORADO LICENSED PROFESSIONAL
LAND SURVEYOR NO. 27613
FOR AND ON BEHALF OF SURVCO, INC.
A COLORADO CORPORATION
DATE OF CERTIFICATION: Feb. 01, 2016

COLORADO LICENSED Samuel D. Phelps 27613 PROFESSIONAL LAND SURVEYOR
23March2016

SURVEYORS' NOTES:
1) THIS PROPERTY MAY BE SUBJECT TO MINERAL RIGHT RESERVATIONS AND US PATENT RIGHTS.
2) THIS PROPERTY MAY BE SUBJECT TO PROTECTIVE COVENANTS AND RESTRICTIONS.
3) AT THE DATE OF THE FIELD SURVEY FOR THIS IMPROVEMENT LOCATION CERTIFICATE APPROX. 18" OF SNOW WAS ON THE GROUND SO SOME GROUND LEVEL FEATURES MAY HAVE BEEN OBSCURED AND THEREFOR MAY NOT BE SHOWN HEREON.

NOTICE: (PURSUANT TO C.R.S. 13-80-105 et seq.):
ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS IMPROVEMENT LOCATION CERTIFICATE WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS IMPROVEMENT LOCATION CERTIFICATE BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF CERTIFICATION SHOWN HEREON.

STREET ADDRESS:
2517 SO. GRAND AVENUE
GLENWOOD SPRINGS, CO.
81601
(WITHIN MUNICIPAL LIMITS)

LEGAL DESCRIPTION:
(AS TAKEN FROM DOCUMENT RECORDED AS RECEPTION NO.553912)

ALL THAT PART OF THE SW1/4SE1/4 OF SECTION 16, TOWNSHIP 6 SOUTH, RANGE 89 WEST OF THE 6TH P.M., LYING EAST OF THE CENTER OF THE ROARING FORK RIVER AND WEST OF COLORADO STATE HIGHWAY NO. 82 (FORMERLY COUNTY ROAD) DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE WESTERLY LINE OF COLORADO STATE HIGHWAY NO. 82 WHENCE THE SOUTHEAST CORNER OF SAID SECTION 16 BEARS SOUTH 69 DEGREES 45' EAST 1420.04 FEET; THENCE NORTH 88 DEGREES 32' WEST 373.07 FEET TO THE APPROXIMATE CENTER LINE OF THE ROARING FORK RIVER; THENCE NORTH 31 DEGREES 03' WEST 118.6 FEET LONG THE APPROXIMATE CENTER LINE OF THE ROARING FORK RIVER; THENCE SOUTH 88 DEGREES 32' EAST 437.33 FEET TO THE WESTERLY LINE OF COLORADO STATE HIGHWAY 82; THENCE SOUTH 1 DEGREE 46' WEST 100.01 FEET ALONG THE WESTERLY LINE OF COLORADO STATE HIGHWAY NO. 82 TO THE POINT OF BEGINNING.

COUNTY OF GARFIELD
STATE OF COLORADO

Sheet 1 of 1	Client: Red House Architecture	Date: 01/Feb./2016				
		.dwg file: 16.004.001				
	Drawn By: S. Phelps	Job No.: 16.004	NO.	BY	DATE	REVISION DESCRIPTION
			1	sdp	03/12/16	add 100 year flood plain limit

SurvCo, Inc.
RTK GPS and Conventional Land Surveying Services
826-1/2 Grand Avenue
Post Office Box 2782
Glenwood Springs, CO. 81602-2782
Phone: (970) 945-5945 Fax: (970) 945-5946
Email: survco@gmail.com

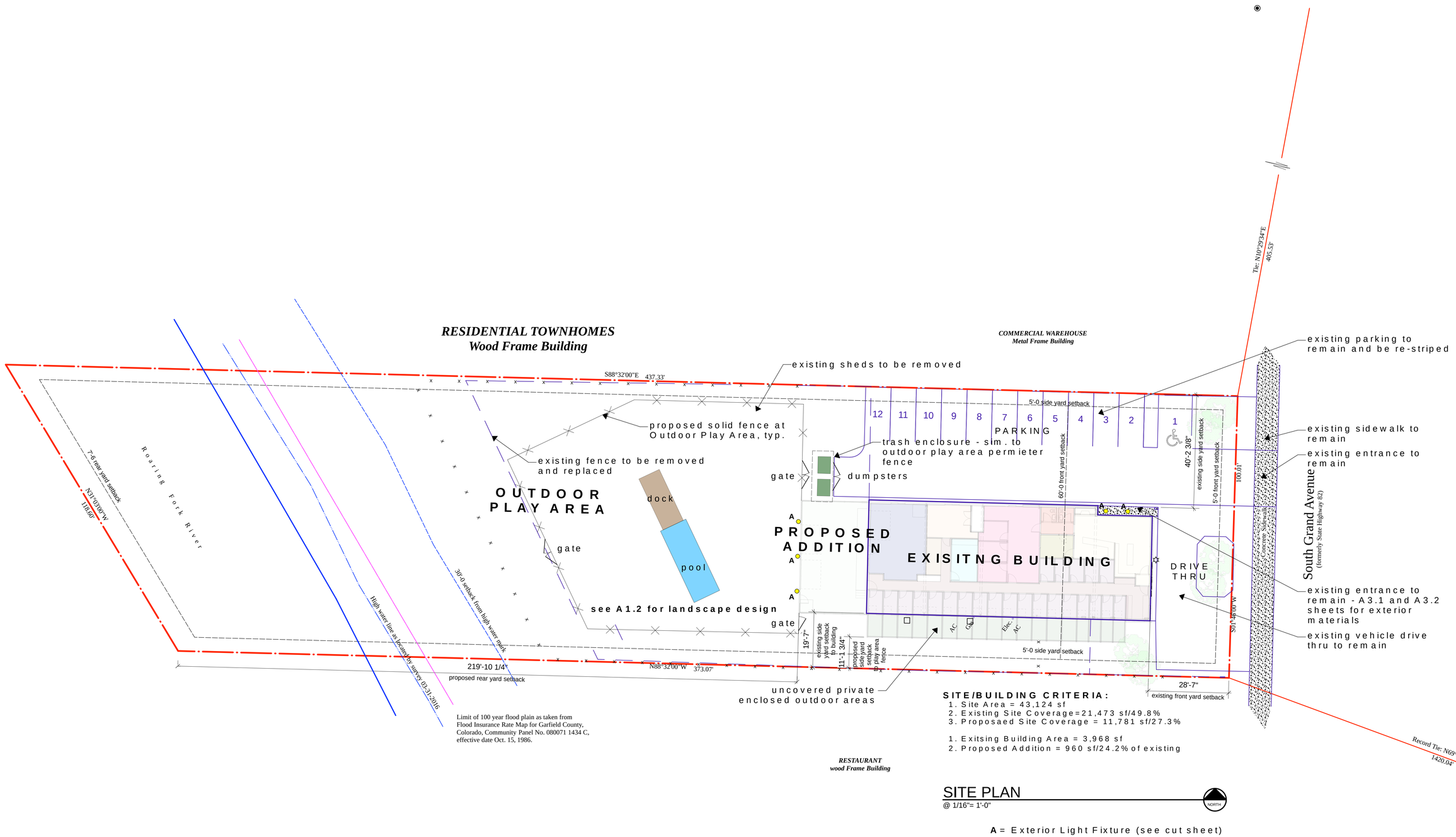
J. ARCHITECTURAL DRAWINGS

DOG Holliday's Pet Resort



DOG Holliday's Pet Resort





SITE/BUILDING CRITERIA:

1. Site Area = 43,124 sf
2. Existing Site Coverage=21,473 sf/49.8%
3. Proposaed Site Coverage = 11,781 sf/27.3%

1. Exitsing Building Area = 3,968 sf
2. Proposed Addition = 960 sf/24.2% of existing

SITE PLAN

@ 1/16"= 1'-0"

NORTH

A = Exterior Light Fixture (see cut sheet)

RED HOUSE
architecture
design + build

815 BLAKE AVE.
GLENWOOD SPRINGS,
CO. 81601

PHONE (970) 945-8240
FAX (866) 431-1950
brad@redhousearchitecture.com

GRAPHIC SCALE
10 20 40 80
(IN FEET)
1 inch = 20 ft.

Dog Holliday's Pet Resort

2517 South Grand Avenue
GLENWOOD SPRINGS, COLORADO

date: remarks:

COPYRIGHT RED HOUSE ARCHITECTURE

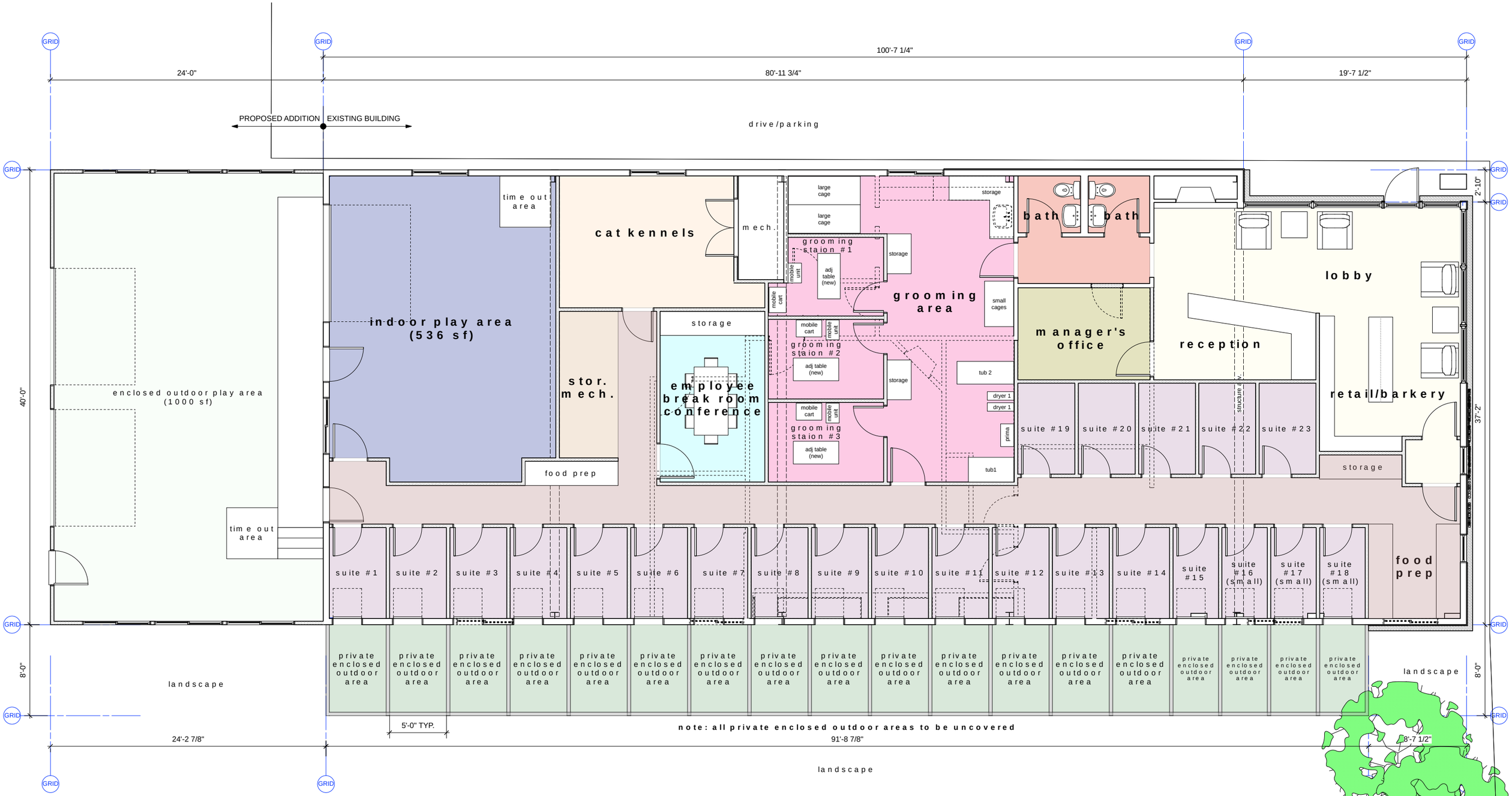
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SITE PLAN

A1.1

0806 A1.1

job no: 0806
drawn by: BB/ BR
checked by: BNB
date printed: 3/14/16



ENTRY LEVEL FLOOR PLAN

@ 1/4"= 1'-0"

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GLENWOOD SPRINGS, CO. 81601

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FAX (866) 431-1950
bruce@redhousearchitecture.com

Dog Holliday's Pet Resort

2517 South Grand Avenue
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date: remarks:

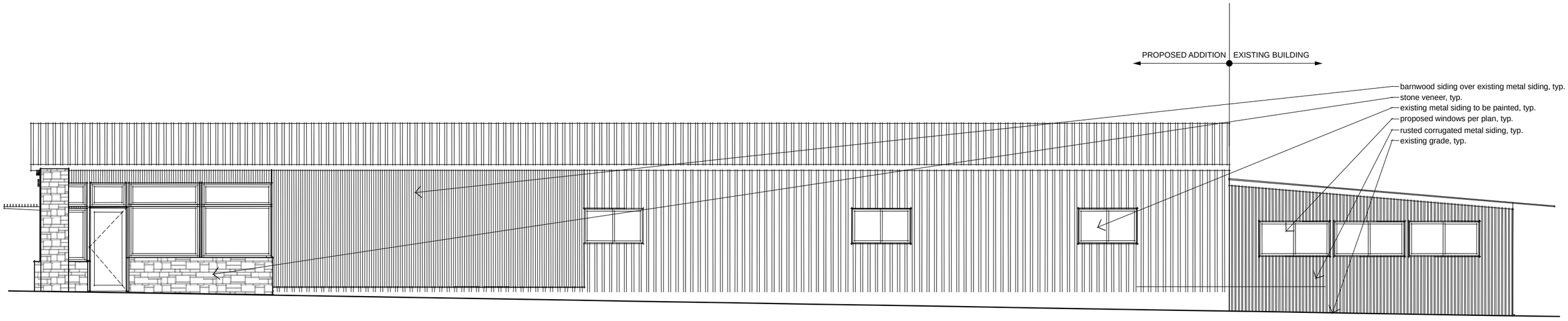
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ENTRY LEVEL FLOOR PLAN

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checked by:: BNB
date printed: 3/14/16

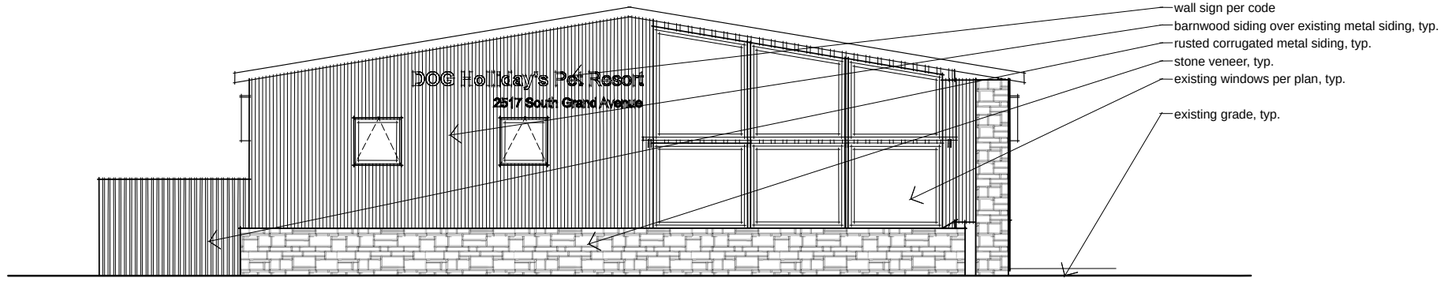
A2.1

0806 A2.1



North Elevation

1/4" = 1'-0



East Elevation

1/4" = 1'-0

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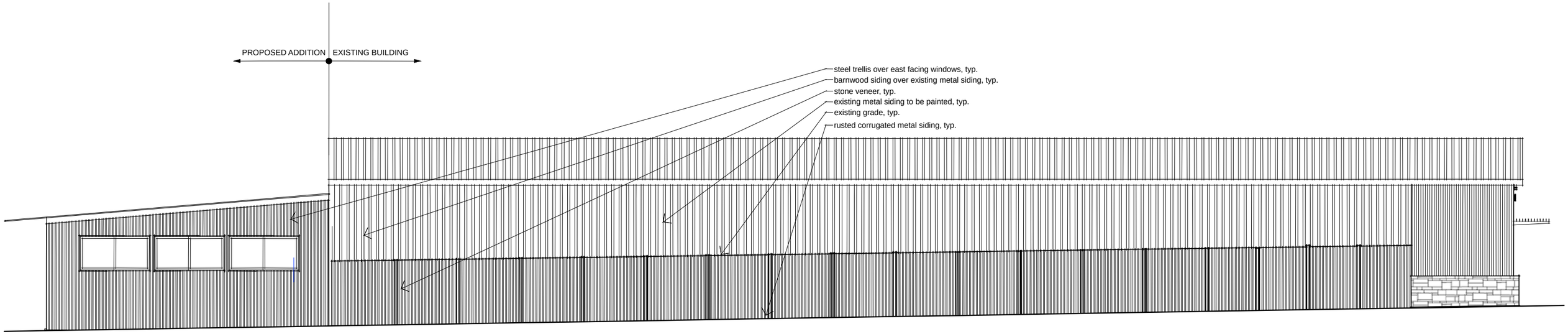
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EXTERIOR ELEVATIONS

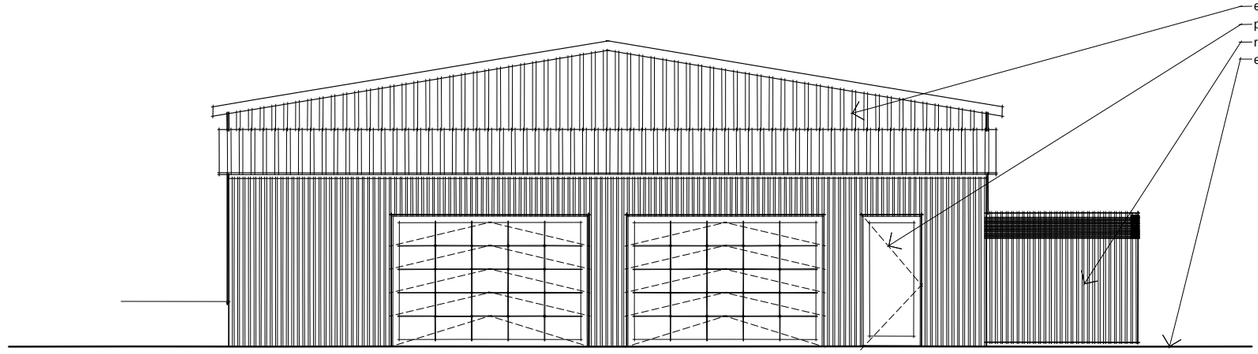
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checked by: BNB
date printed: 3/14/16

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0806 A2.1



S o u t h E l e v a t i o n
1/4" = 1'-0



W e s t E l e v a t i o n
1/4" = 1'-0

RED HOUSE
architecture
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815 BLAKE AVE.
GLENWOOD SPRINGS,
CO. 81601

PHONE (970) 945-8240
FAX (866) 431-1950
bruce@redhousearchitecture .com

D o g H o l l i d a y ' s P e t R e s o r t

2517 South Grand Avenue
GLENWOOD SPRINGS, COLORADO

date: remarks:

COPYRIGHT RED HOUSE ARCHITECTURE

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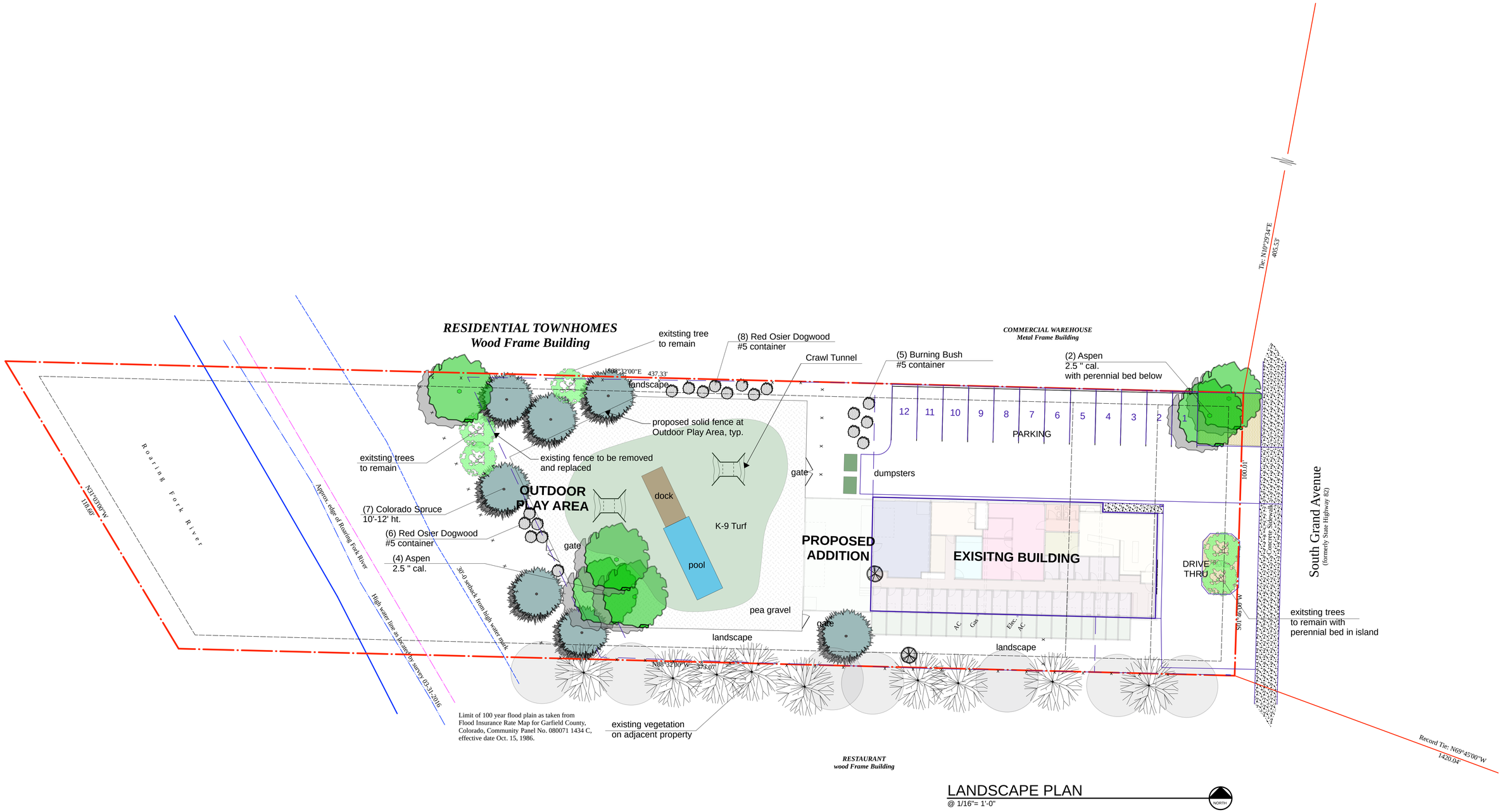
EXTERIOR ELEVATIONS

job no: 0806
drawn by: BB/ BR
checked by: BNB
date printed: 3/14/16

A3.2

0806 A2.1

K. LANDSCAPE DRAWINGS



LANDSCAPE PLAN
@ 1/16"= 1'-0"

RED HOUSE
architecture
design + build

815 BLAKE AVE.
GLENWOOD SPRINGS,
CO. 81601

PHONE (970) 945-8240
FAX (866) 431-1950
bruce@redhousearchitecture.com

Dog Holliday's Pet Resort

2517 South Grand Avenue
GLENWOOD SPRINGS, COLORADO

date: remarks:

COPYRIGHT RED HOUSE ARCHITECTURE

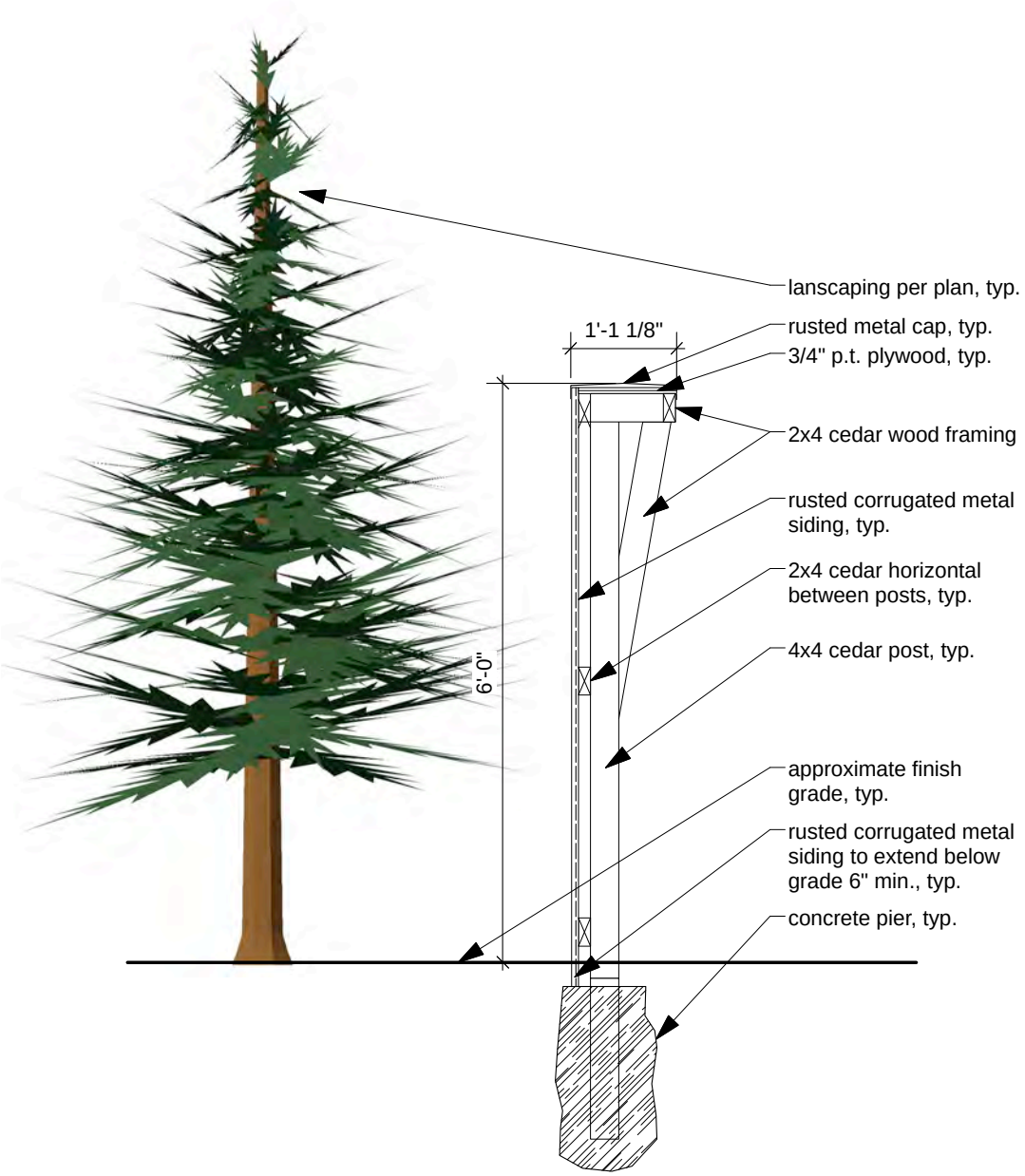
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LANDSCAPE PLAN

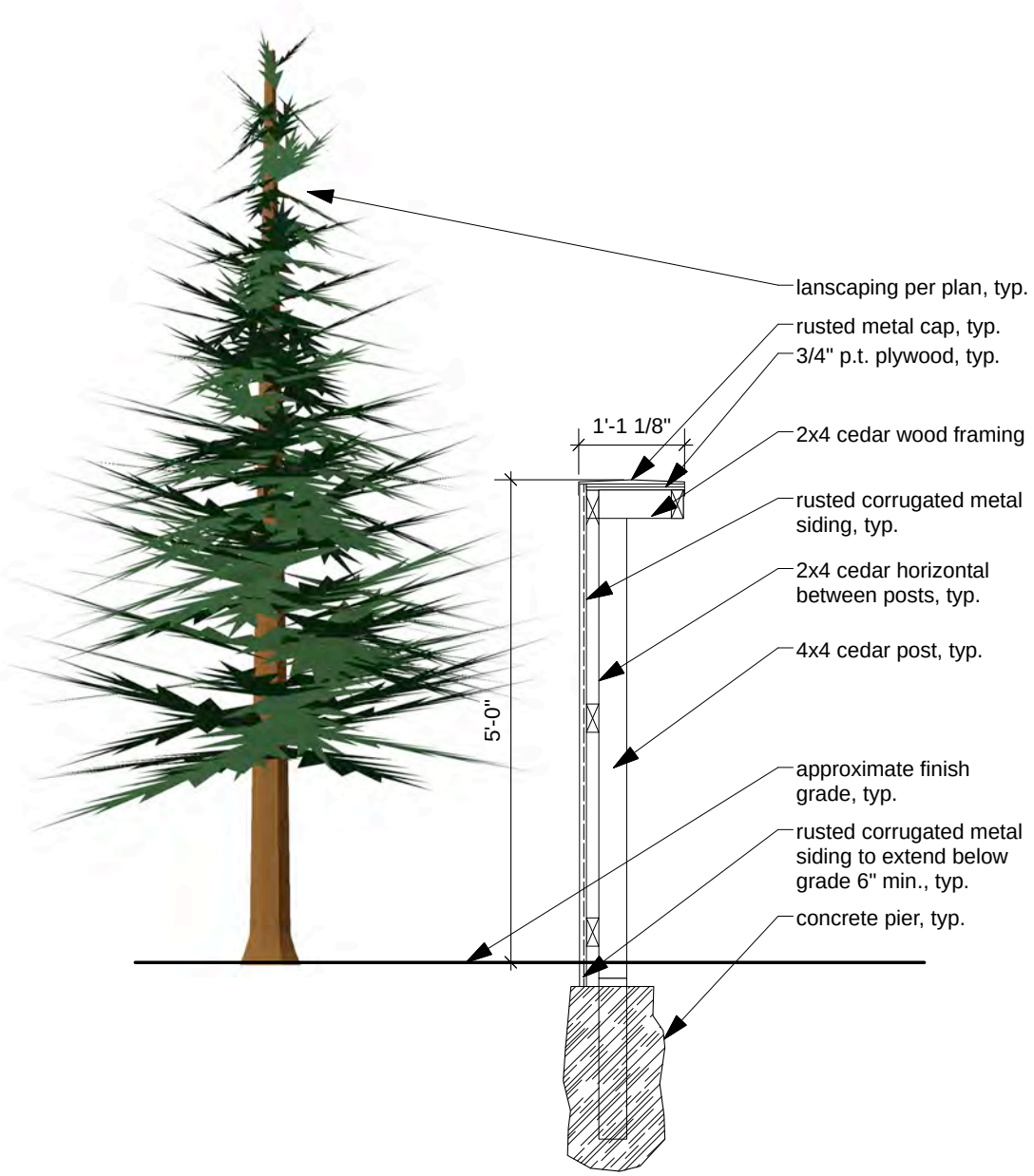
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job no: 0806
drawn by: JP
checked by: BNB
date printed: 3/14/16

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Outdoor Play Area Permieter Fence



Individual Outdoor Play Area Fence

L. ENGINEERING DOCUMENTS

MOUNTAIN CROSS ENGINEERING, INC.
Civil and Environmental Consulting and Design

March 15, 2016

Mr. Bruce Barth
Red House Architecture
815 Blake Avenue
Glenwood Springs, CO 81601

RE: Drainage for Dog Holiday's Pet Resort

Dear Bruce:

The purpose of this correspondence is to evaluate the Dog Holiday's Pet Resort from a storm water management perspective. The site plan has been reviewed by this office. It is understood that there is a proposed addition that will replace exiting paved parking. The remainder of the asphalt paving from the western parking lot will be removed and will be replaced with an outdoor play area for dogs. This area will contain landscaping, a dog pool, and will be partially covered with turf. The existing site drains to the west and ultimately to the Roaring Fork River. Site grading and drainage patterns are to remain essentially the same.

There are no downstream drainage appurtenances or properties that will be impacted by changes in storm water flowrates. The site drains directly to the river and site grading is proposed to remain the same. The site proposes to decrease impervious area and increase the potential for infiltration of precipitation. The existing improvements to landscaping will provide greater treatment of storm water from the asphalt hardscape that is proposed to remain.

The site changes will decrease runoff, improve treatment of storm water, and increase the potential of the site for infiltration of precipitation. All are improvements over the existing condition.

Thank you for the opportunity to provide this letter. Feel free to call if you have any questions, concerns, or comments.

Sincerely,
Mountain Cross Engineering, Inc.

Chris Hale, PE

826 ½ Grand Avenue, Glenwood Springs, CO 81601
P: 970.945.5544 F: 970.945.5658 www.mountaincross-eng.com

MOUNTAIN CROSS ENGINEERING, INC.
Civil and Environmental Consulting and Design

March 15, 2016

Mr. Bruce Barth
Red House Architecture
815 Blake Avenue
Glenwood Springs, CO 81601

RE: Utilities for Dog Holiday's Pet Resort

Dear Bruce:

The purpose of this correspondence is to evaluate the utilities of the proposed Dog Holiday's Pet Resort. The site plan has been reviewed by this office. The site has an existing building and the proposed plan proposes to remodel the existing building with a proposed addition. The plan is proposing to use all the existing utility connections.

The existing water service line size should be verified for adequacy. A new service tap may be necessary.

Thank you for the opportunity to provide this letter. Feel free to call if you have any questions, concerns, or comments.

Sincerely,
Mountain Cross Engineering, Inc.

Chris Hale, PE

826 ½ Grand Avenue, Glenwood Springs, CO 81601
P: 970.945.5544 F: 970.945.5558 www.mountaincross-eng.com

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Ripley Outdoor Wall Sconce

By **Kichler**

$80.30 - $144.10

IN STOCK Ships within 2 business days.

5 out of 5

1 of **1** (100%) people recommend this product

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Shown in Small size

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Details

The Kichler Wall Sconce offers refined Craftsman-style design combined with durable, outdoor-ready construction. Will fit wonderfully in many outdoor dining areas and on porches and patios. When used w this sconce is Dark Sky compliant.

Since 1938, Cleveland-based Kichler Lighting has created exceptional lighting in a variety of styles, finis a diverse collection of indoor and outdoor lighting in classic and contemporary styles, Kichler Lighting a home lighting that is both beautiful and functional.

The Ripley Outdoor Wall Sconce is available with the following:

Details:

- Aluminum construction
- Olde Bronze finish
- Round wall plate
- UL Listed Wet
- Dark Sky compliant when used with R14 40-W lamp (not included)

Options:

- **Size:** Small, Medium, Large

Lighting:

- One 40 Watt 120 Volt R14 E26 Medium Base Incandescent lamp (not included), or one 60 Watt 120 Volt G40 E26 Medium Base Incandescent lamp (not included).

Compare Brightness:

VIEW CHART

Dimensions:

- **Large Option Fixture Height 10", Width 12", Depth 13"**:

- **Medium Option Fixture Height 9.5", Width 10", Depth 11.5"**:
- **Medium Option Plate Diameter 5.87"**:
- **Small Option Fixture Height 7.5", Width 8", Depth 9.5"**:
- **Small Option Plate Diameter 5.12"**:

Ratings: Based on 1 reviews, this product is rated 5.0 out of 5.

Manufacturer IDs: view

Need help with some of our terminology? Check out **Lumens' Lighting & Design Glossary**.

YOU MAY ALSO LIKE



Cirrus Linear Suspension/Semi-Flushmount
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Lyndon Outdoor Wall Sconce
By Kichler

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N. SITE PHOTOS



Existing Building from the northeast



Southeast corner of the Property (adjacent to Rivers restaurant)



Rivers Restaurant parking at adjoining property line



North Elevation of Rivers Restaurant



Northwest Corner of Rover Restaurant parking/dumpster area



View looking northeast from northwest corner of Rivers Restaurant parking area



Existing Building from the southeast



Neighboring Building directly north of the subject property



Side of Neighboring Building directly on north property line



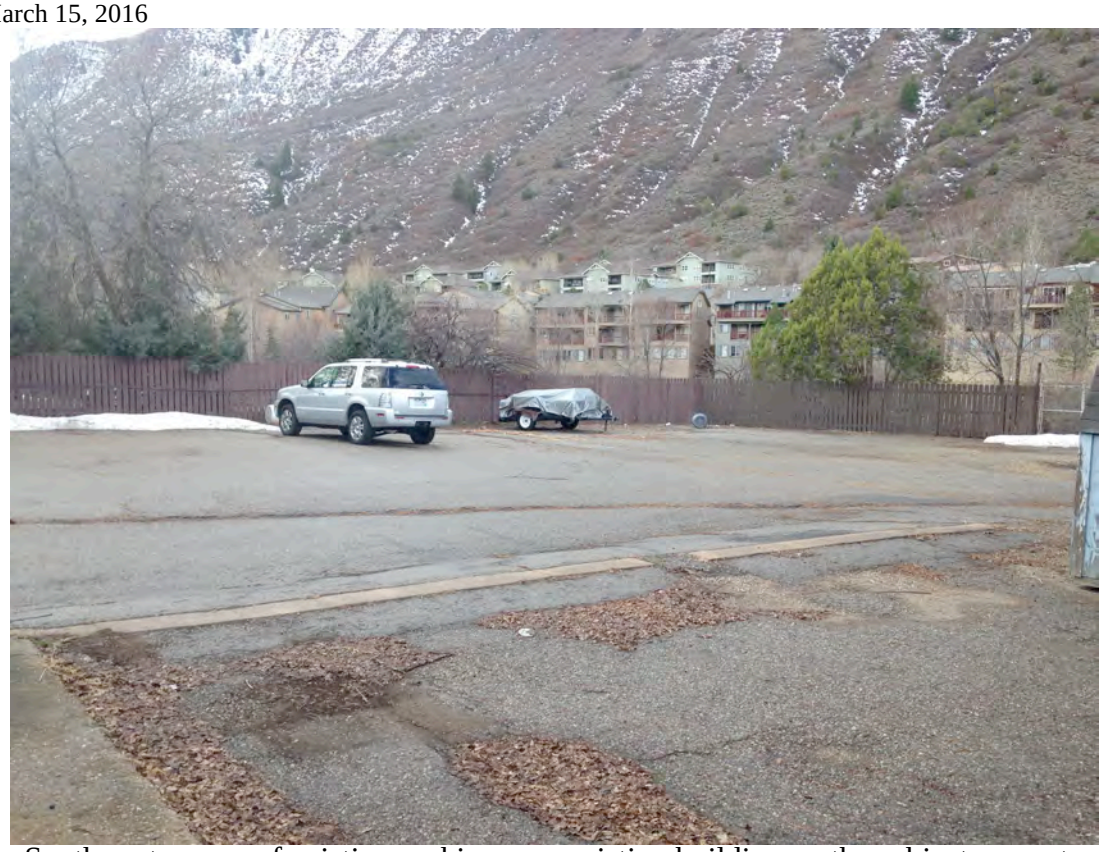
Existing sheds on north side of subject property with Cisar Court Townhomes in the background



West Elevation of the existing building on the subject property



West Elevation and south side yard of the existing building on the subject property



Southwest corner of existing parking area existing building on the subject property

Planning and Zoning Commission Report

Date: May 24, 2022
To: Planning and Zoning Commission
From: Trent L. Hyatt, Long Range Senior Planner
Subject: #76-21– Roaring Fork Transportation Authority Regional Transit Center

REQUEST	Consideration of a Location and Extent Review application for the construction of a 60,000 square foot bus storage/office building, 4,600 square fuel/wash bay addition to the existing 40,650 square foot maintenance/bus storage/fuel/wash facility, and other related site improvements.
APPLICANT	Bluegreen
OWNER	Roaring Fork Transportation Authority
LOCATION	2307 Wulfsohn Road (PINs: 2185-053-36-002, 003, and 004)
ZONE	Light Industrial (I1)/Mixed-Use Corridor (M1)
SURROUNDING LAND USES	North: Midland Avenue and Wulfsohn Road Rights-of-Way South: BLM West: Vacant/BLM East: RFTA West Glenwood Park and Ride
LOT SIZE	Approximately 19.90 acres

ACTION ITEM

Per Section 070.060.050(a)/Table 060.2 of the *Glenwood Springs Municipal Code* (Code), the Planning and Zoning Commission (Commission) is the reviewing body for Location and Extent Review (L&E) applications for public or quasi-public special districts (funded by taxpayers) for compliance with the *Glenwood Springs Comprehensive Plan* (Comp Plan) per Colorado Revised Statutes 30-28-110 and 22-32-101 et seq. Following any approval (with or without conditions) of an L&E, the applicant must still submit and receive approval of a grading and building applications from the City.

Action 1 - Location and Extent Review - allowing the construction of a 60,000 square foot bus storage/office building, 4,600 square fuel/wash bay addition to the existing 40,650 square foot maintenance/bus storage/fuel/wash facility, and other related site improvements.

Staff recommendation: *Staff recommends* ***approval (with conditions)*** *of the Location and Extent Review application with the findings and conditions on pages 8-9.*

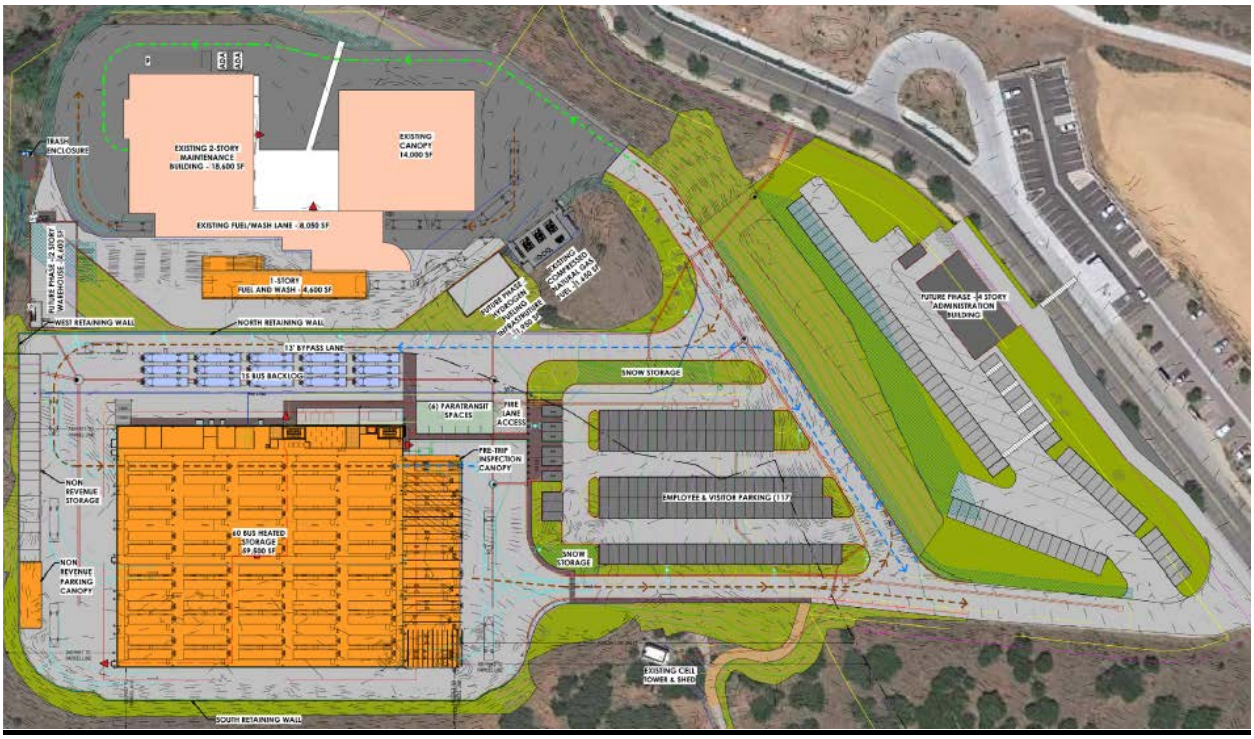
BACKGROUND/ANALYSIS

Proposal

The Roaring Fork Transportation Authority (RFTA) is in the process of implementing a 10 phase Regional Transit Center improvements plan for their facilities in Glenwood Springs. L&E applications for Phases 1 and 2 were approved by the Commission in 2017 and 2019 respectively. The current proposal includes aspects of phases 3-5 and 7 as depicted in green in the table below which also outlines past and future projects. RFTA expects to address additional phases (transit, administrative building, warehouse, and housing) via future applications as funding allows. Please note, future phases are not a part of the current proposal /review and are outlined herein for informational purposes only. RFTA is required to submit applications for future phases for which are subject to regulations applicable at that time.

Phase	Scope	Status
1	Lowering and grading of the existing grade Temporary bus parking lot (for maintaining operations during future phases)	Complete
2	Additional Grading and Excavation Fleet Maintenance Build Renovation and Expansion	Finishing May 2022
3	Grading, Excavation, Site Preparation Operations Center Bus Storage Building A: 30 indoor storage spaces Pre- Trip Inspection Zones Backlog Parking Maintenance Warehouse A	5339 Grant Proposal
4	GMF Administration Renovation Access road relocation	BUILD Grant Proposal
5	Includes Bus Building 30B and associated drives and Pre-Trip Inspection Zones	BUILD Grant Proposal
6	West Glenwood Transit Center and RFTA Administration Building with associated drives and parking	Future
7	Fueling Drive Lanes (Hydrogen, CNG and Diesel) Bus Wash Addition (Hydrogen, CNG, and Diesel)	5339 Grant Proposal
8	Includes Warehouse B, associated drives and parking	Future
9/10	Housing (Under consideration for last phases)	Future

Bluegreen, on behalf of RFTA, currently proposes the construction of a two story, 60,000 square foot heated storage area for 60 buses which includes offices for dispatch. Additionally, a 4,600 square fuel/wash bay addition is proposed for the existing 40,650 building which currently includes administration office, the Glenwood Maintenance Facility, and a bus storage canopy. Significant related site improvements include new parking, grading, retaining walls, etc. Attached documents includes the illustrative master plan (depicted below), floor plans, elevations, landscaping plan, grading, utilities plans, and related reports for your review.



Development Standards

Article 070.040 of the Glenwood Springs Municipal Code (Code) outlines the development standards applicable to developments within the City. A summary of applicable standards is provided in the table below. Specific areas of interest are addressed in further detail. The table outlines numerous areas where the application is not in compliance with generally applicable code requirements. However, as a reminder, the L&E process allows for this circumstance by a special district and variances are not required. That being said, the applicant has tried to adhere to design requirements were possible and revised the application to address staff's comments were feasible.

Code Standard		Proposal	Standard Met
Common Open Space	10% (35,844 square feet)	58.9 (450,098 square feet)	Yes
Landscaping	I1 - 10% (35,844 square feet) M1 - 15% (53,766 square feet)	8% (28,273 square feet approximately)	No
Parking Lot Landscaping			
Surface Area	20%	Additional information needed to determine %	No
Interior	10 square feet/space	Additional information needed to determine	No
Setbacks			
Front	I1 - 20 feet M1 - Minimum – 5 feet M1 - Maximum – 25 feet	124 feet approximately (existing CNG fueling)	Yes

Code Standard		Proposal	Standard Met
Rear	I1 - 10 feet M1 - 7.5 feet	116 feet approximately (existing maintenance building)	Yes
Side	I1 - 10 feet M1 - 5 feet	12 feet approximately (existing maintenance building canopy)	Yes
Height	40 feet maximum	38 feet	Yes
Parking	107 (one stall per 1,000 square feet)	-117 spaces -In front setback	Yes No
Bike Parking	9 spaces	9 spaces	Yes
Trash Enclosure	Enclosed, 6 foot	6 foot corrugated metal fence	Yes
Building Design			
Architectural Elements	3 required every 30 feet	-30% glazed windows/doors facing ROWs, parking, or adjacent residential uses -Change in color -Change in texture -Awnings	No Yes Yes Yes
Roof	Change in height every 50 feet		Yes
Materials	Shall not include more than 70% of one	Metal Concrete	Yes
Colors	Shall not include white, off-white, or fluorescent	Tan, dark gray, light gray (metal doors)	No
Retaining Walls	6-foot maximum height without plane change	35 feet	No

Sensitive Area Protection 070.040.020

As per the "Geologic Hazards of the Glenwood Springs Metropolitan Area" maps, the subject property is subject to severe rockfall and hydrocompaction as well as moderate ancient debris flow, mudflow, and land flow deposits. The combination of said hazards, most of which result from the Eagle Valley evaporite soils at the site, would generally limit development. While the maps provide a general understanding of hazards that may impact development, site-specific geotechnical evaluations were prepared by Ground Engineering and CTL Thompson. Some mitigation measures have already been constructed for the site, namely a debris basin located above it. Still numerous additional recommendations related to building foundation, retaining wall design, and site grading activities are outlined in the site-specific geotechnical study which the applicant should adhere to and has been included as a condition of approval below.

Landscaping 070.040.040

Expansion of parking/circulation areas at the site require landscaping improvements per the Code. However, the presence of the geologic hazards outlined above make irrigation and introducing water to site soils a very risky proposition. Therefore, the applicant is only proposing limited

landscaping improvements in areas that will not impact the built environment as depicted on the landscaping plan provided. Existing, undisturbed landscaping serves as a screen/buffer of the site from adjacent properties.

Nonresidential Design Standards

While fiscally constrained, the applicant attempted to comply with applicable design standards outlined in Section (070.040.090) as much as is feasible. The design includes the required minimum three elements every 30 feet, exclusive of 30 percent glazing. The roof lines of building improvements include pleasant changes in height (which are not necessarily depicted in the perspective drawing below but shown on attached detailed elevations).

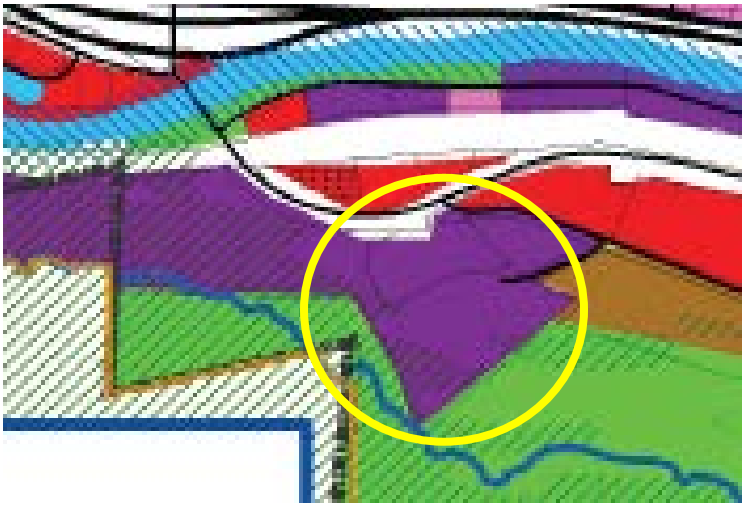


Location and Extent Review Criteria

The Location and Extent review criteria are outlined in Section 070.060.050(d)(3)e.3 of the Code and are outlined in bold italics below.

i. Is consistent with the Comprehensive Plan and other City plans and policies;

As shown at right, Map 2.1 (Future Land Use – North Portion of the City) of the Glenwood Springs Comprehensive Plan (Comp Plan) identifies the area as "Industrial" in purple. Chapter Two of the Comp Plan explains that the "Industrial" designation…accommodates heavy commercial, light industrial, and industrial uses such as manufacturing, warehousing and distributing, indoor and outdoor storage." Transit centers/bus maintenance facilities as proposed are in compliance with the designation.



Numerous community goals and related objectives and strategies outlined in the Executive Summary and subsequent chapters of the Comp Plan support this proposal. These goals are outlined in the following table.

Comprehensive Plan Goal Supported	Objective and Strategies
Promote long-term, sustainable, diverse, economic development	-Direct development into a compact form: infill and redevelopment (Chapter 3, Page 34) -Attract diverse businesses and industries (Chapter 4, Page 50) -Maintain the role as regional center (Chapter 4, Page 54) -Retain role as a regional center (Chapter 7, Page 83)
Staff Comment: While the specific proposal and/or use may not be diverse, transit plays an integral role in promoting a sustainable economy. The objectives/strategies outlined above are supported by the current application and aid in attracting diverse businesses and maintaining/retaining our regional center.	
Maintain Glenwood Springs as the regional tourism, retail, commercial, and governmental center of Garfield County	-Attract diverse businesses and industries (Chapter 4, Page 50) -Retain the long-standing tourist market (Chapter 4, Page 54) -Build on role as a regional medical and education center (Chapter 4, Page 54) -Maintain the role as regional center (Chapter 4, Page 54) -Retain role as a governmental center (Chapter 4, 56)
Staff Comment: Expanding RFTA's transit capabilities is necessary to maintain and enhance the City's status as the regional center of Garfield County. The objectives/strategies outlined above are supported by the current proposal as it aids in attracting diverse businesses, supporting tourism, and governmental services.	
Direct development to locations and building forms that are cost effective to serve	-Direct development into a compact form: infill and redevelopment (Chapter 3, Page 34) -Direct growth to areas where utilities and services can be provided efficiently (Chapter 7, Page 82) -Retain role as a regional center (Chapter 7, Page 83) -Direct growth inward (Chapter 9, Page 102)
Staff Comment: The improvements associated with these phases are a continuation of RFTA's plans to develop the site into a regional transit center. Improvements already exist at site which are served by City's utilities which makes future improvements more cost effective. The objectives/strategies support the Comp Plan goal.	
Address transportation and provide multiple convenient travel choices	-Direct development into a compact form: infill and redevelopment (Chapter 3, Page 34) -Enhance pedestrian–friendliness while facilitating traffic (Chapter 3, Page 36)

	-Encourage reduction of single-occupant vehicles and encourage alternate travel modes through land use planning and community design (Chapter 5, Page 66) -Strengthen transit and plan for transit hubs (Chapter 5, Page 66)
Staff Comment: RFTA's current proposal and future phases are a direct response to this Comp Plan goal and the objectives/strategies outlined to achieve it.	
Support social diversity	-Direct development into a compact form: infill and redevelopment (Chapter 3, Page 34) -Require good design for mixed-use and higher density projects (Chapter 6, Page 78) -Direct growth inward (Chapter 9, Page 102) -Retain role as a regional center (Chapter 7, Page 83) -Direct growth inward (Chapter 9, Page 102)
Staff Comment: Transportation improvements allow for greater social diversity by providing all citizens the ability to move freely throughout the regions benefiting all other Comp Plan goals outlined above. This proposal impact/strengthens all the objectives/strategies outlined above are supported by the current and aid in achieving this Comp Plan goal.	

ii. Is consistent with the general purpose and intent of this Code; and

As outlined above, the proposal is not in compliance with all aspects of the City's Development Code. However, it is consistent with the general intent and purpose as outlined in Section 070.010.030 to protect public health, safety, and welfare and to create the best built environment.

iii. Minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city.

While certain known geologic hazards exist at the site, compliance with the recommendations provided by the consulting engineer should limit the negative impacts associated therewith.

Reviewing Agency Comments
An overview of any comments received from referral agencies is provided below. Said comments are also attached.

Electric Department – Comments received outline general construction items related to ownership and layout of improvements, conduit sizes, construction responsibilities, the relocation of fiber optics, and potential impacts of site lighting.

Engineering Department – Received comments outline the need for additional information/revisions related to the future planning of public facilities and traffic, master drainage/stormwater, ADA parking, erosion control, site plan inconsistencies, drive aisle widths, water/sewer line separation, etc.

Public Works – Received comments outline concerns related to the debris flow pond access, the stability of the retaining wall design, and snow storage.

Water/Wastewater - Comments received address the ownership of improvements, clearance around fire hydrants and other specifications, need design revisions and details, water line encasements, and metering.

ACTION ALTERNATIVES AND STAFF RECOMMENDATION:

Section 070.060.030(g)(1)d outlines the review and decision procedures for applications being considered by the Commission and/or City Council stating, "[T]he applicable review body shall **approve, approve with conditions, or deny** the application **based on the applicable approval criteria** listed in the application-specific procedures. The body may also **continue** the hearing or **refer the application** to another authority as provided in 070.060.050(a)(2)c, Referral and Call-Up Procedures."

Action 1 - Location and Extent Review - allowing the construction of a 6,775 square foot addition to the existing 15,565 square foot maintenance facility, additional vehicle storage/circulation, retaining walls, and other site improvements.

Staff Recommendation/Suggested Motion
Staff recommends **approval (with conditions)** of the Site/Architectural Plan Review with the following **findings** and **conditions**:

Recommended Findings:
1. The proposal is consistent with the Comprehensive Plan and other City plans and policies;
2. The proposal is consistent with the general purpose and intent of this Code; and
3. The proposal minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city.

Recommended Conditions:
1. This approval is only related to Phases 3-5 and 7 as described in the staff report dated May 24, 2022. Future phases described therein, or other improvement proposed by RFTA, may be subject to Title 70.080 *Guidelines and Regulations for Matters of State Interest* of the *Glenwood Springs Municipal Code*, where applicable.
2. The applicant shall comply with/address all City referral comments prior to the issuance of a grading permit or building permit application.
3. The applicant shall work with the Community Development Department to address various zoning/design requirements that are not in full compliance with Title 70 of the *Glenwood Springs Municipal Code* to best of their ability.
4. The applicant shall adhere to recommendations outlined in the geotechnical evaluations prepared for the application.
5. Any future physical changes or improvements to the property or buildings on the parcel are subject to the review and approval of the Community Development Director for compliance with applicable requirements of the *Glenwood Springs Municipal Code*.

6. The applicant shall comply with all verbal representations made in the public hearings, as outlined in all application materials, and/or as revised per conditions herein and approved by the Community Development Director.
7. The applicant shall submit a building permit application as required. All contractors must receive a license to work in the City of Glenwood Springs.
8. Prior to submitting a building or grading permit application, the applicant shall schedule a pre-construction meeting with applicable City departments.

Alternate Motion for Denial

In most instances, staff has worked with the applicant to address requirements outlined in the Code. Therefore, we are generally in support of an application by the time it reaches the Commission for consideration. However, if Commission does not believe the application meets minimum approval criteria, your denial should be based on one or more of the same approval criteria applicable to the application. You should support your motion with findings outlining the shortcomings of the request as shown in the example below:

I move to **DENY** the Location and Extent Review application finding that [Insert one or more of the following findings here]:

1. The proposal is inconsistent with the Comprehensive Plan and other City plans and policies due to [insert reasoning here];
2. The proposal is inconsistent with the general purpose and intent of this Code because [insert reasoning here]; and/or
3. The proposal creates adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the city by [insert reasoning here].

Stantec

SAUNDERS

SGM

bluegreen
www.bluegreenaspen.com

RFTA
Roaring Fork Transportation Authority

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT RFTA GMF3457

NEW 2 STORY, HEATED VEHICLE STORAGE, OPERATIONS OFFICE BUILDING, AND FUEL AND WASH ADDITION

2307 WULFSOHN RD., GLENWOOD SPRINGS, CO 81601

LOCATION & EXTENT

DATE OF PREPARATION: 04/22/2022

Stantec Project Number: 2270417345

Client Project Number: 21-001

OWNER

ROARING FORK TRANSPORTATION AUTHORITY
2307 WULFSOHN RD.
GLENWOOD SPRINGS, CO 81601
CONTACT: NICK SENN, NSENN@RFTA.COM, 970-384-4862

OWNER'S CONSTRUCTION MANAGER/ CONSTRUCTOR

SAUNDERS
86 INVERNESS PLACE NORTH
ENGLEWOOD, CO 80112
CONTACT: MICHAEL HAGER, M.hager@saundersinc.com (303) 699-9000

ARCHITECT

STANTEC ARCHITECTURE
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DENVER, CO, 80202
CONTACT: MERLIN MALEY, merlin.maley@stantec.com

CIVIL ENGINEER

SGM
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GLENWOOD SPRINGS, CO 81601
CONTACT: RICK BARTH, rickb@sgm-inc.com, (970) 384-9088

LANDSCAPE ARCHITECT

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ASPEN, CO 81611
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ELECTRICAL ENGINEER

STANTEC
601 SW 2ND AVENUE, #1400
PORTLAND, OR 97204
CONTACT: KRISTIN SATTEM, Kristin.Sattem@stantec.com, (503) 273-0079

PLUMBING ENGINEER

STANTEC
4100 194th STREET SW, Ste 400
LYNNWOOD, WA, 98036
CONTACT: SEAN DAMON, sean.damon@stantec.com, (206) 225-8271

MECHANICAL ENGINEER

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STRUCTURAL ENGINEER

SGM
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CONTACT: JOHN PARTCH, johnp@sgm-inc.com, (970) 384-9035

LIGHTING DESIGN

STANTEC ARCHITECTURE INC.
999 18th STREET, SUITE 202
DENVER, CO, 80202
CONTACT: RACHEL FITZGERALD, rachel.fitzgerald@stantec.com, (303) 601-6249

VEHICLE MAINTENANCE & EQUIPMENT CONSULTANT

STANTEC
733 MARQUETTE AVE, Ste 100
MINNEAPOLIS, MN, 55402-2309
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GEOTECHNICAL ENGINEER

JOHN MECHLING, P.E. (CO, MT, TX, UT, ID)
234 CENTER DRIVE
GLENWOOD SPRINGS, CO, 81601
jmechling@ctlthompson.com, Office (970) 945-9809, Cell (970) 379-2690

RETAINING WALL DESIGNER

GSI - JUSTIN PETERSON, P.E. (WY, CO)
MOUNTAIN PDE
GEOSTABILIZATION INTERNATIONAL
justin@gsi.us, Office (855) 579-0536, Cell (970) 773-6790

PROJECT SUMMARY TABLE:

	Acres	Square Feet
Lot Size Information	19.90	866,830

	Existing	Existing to Remain	Proposed	TOTAL
Limits of Disturbance	N/A	N/A	358,442 sf (41.4% of Lot)	358,442 (41.4% of Lot)
Off-Street Parking Spaces	117	0	117	117
Required Parking **	43	43	65	107
Non-Residential Uses	42,300 sq.ft.	42,300 sq.ft	64,100 sq.ft.	106,400 sq.ft.
Residential Units	0	0	0	0
Open Space	526,070 sf (61.0% of Lot)	356,136 sf (41.1% of Lot)	81,700 sf (7.6% of Lot)	437,836 sf (50.5% of Lot)
Building Height: Bus Storage	N/A	N/A	38'-0"	38'-0"
Building Height: GMF	38'-0"	38'-0"	0	0
Building Height: CNG	20'-6"	20'-6"	0	0
Building Height: Fuel & Wash	N/A	N/A	20'-0"	20'-0"
Building Height: GMF Canopy	17'-0"	17'-0"	0	0
Snow Storage	no minimum req'd	N/A	36,805 sf *	36,805 sf *
Lot Coverage	338,390 sf (39.0% of Lot)	152,252 sf (17.6% of Lot)	264,480 sf (30.5% of Lot)	416,732 sf (48.1% of Lot)
Average Slope within Limits of Disturbance	8.9%	8.9%	8.3%	8.3%
Bicycle Parking	0	0	9	9
Landscape Area	2,370 sf (0.02% of Lot)	0 sf (0% of Lot)	12,262 sf (1.4% of Lot)	12,262 sf (1.4% of Lot)
Total Impervious Area	338,390 sf (39.0% of Lot)	152,252 sf (17.6% of Lot)	264,480 sf (30.5% of Lot)	416,732 sf (48.1% of Lot)
Other	N/A	N/A	N/A	N/A

*The proposed snow storage area is 13% of the total plowable area which includes 115,842 sf of existing hardscape and 162,056 sf of proposed hardscape
** Required Parking is based on CoGS Code, Table 030.1, "Commercial Use-Maintenance & Repair-Major Repair Facility (1 stall per 1000 sq.ft)





VICINITY MAP: N

PUBLIC FACILITIES NOTES: NOT APPLICABLE

BASIS OF BEARING AND BENCHMARK:

BASIS OF BEARINGS: BEARINGS BASED ON SOUTH LINE OF LOT D, AS PER THE FIRST AMENDED PLAT, RECEPTION NO. 937346, GARFIELD COUNTY, N90°00'00"W, BETWEEN TWO 18" LONG, 5/8" DIAMETER REBARS & 1 ¼" GREEN PLASTIC CAPS MARKED LS 38417.

DATUM AND BENCHMARK: ELEVATION INFORMATION SHOWN HEREON IS BASED UPON GPS OBSERVATIONS UTILIZING OPUS, GEOID 12B TO DERIVE THE NGVD29 ELEVATION OF 5824.7' AT THE TOP OF A 18" LONG, 5/8" DIAMETER REBAR & 2 ½" GREEN PLASTIC CAP MARKED LS 38417, AT THE EAST END OF THE SOUTH LINE OF LOT D, AS PER THE FIRST AMENDED PLAT, RECEPTION NO. 937346, GARFIELD COUNTY.

FEMA FLOOD PLAIN STATEMENT:

ACCORDING TO FEMA PANEL 0802051431B EFFECTIVE 01/03/1986, THE SITE IS NOT WITHIN THE DESIGNATED FLOODPLAIN.

GEOLOGICAL HAZARD DISCLOSURE

THIS PROPERTY IS SUBJECT TO GEOLOGIC HAZARDS PER THE ADOPTED MAPPING BY THE CITY OF GLENWOOD SPRINGS. HAZARDS TO NOTE ARE MAJOR SLOPE HAZARD, MODERATE SLOPE HAZARD, MAJOR SOIL HAZARD AND MODERATE SOIL HAZARD. A FINAL GEOLOGIC HAZARD REPORT WILL BE SUBMITTED UPON APPLICATION OF A BUILDING PERMIT.

PARCEL DESCRIPTION:

Account	R084509
Parcel	218505336004
Property Address	GLENWOOD SPRINGS, CO 81601
Legal Description	Section: 6 Township: 6 Range: 89 Subdivision: GLENWOOD SPRINGS MUNICIPAL Lot: A, Subdivision: GLENWOOD MEADOWS #1 MINOR SUB Lot: MOC DRIVEWAY AS PER FIRST AMENDED PLAT RECEPTION NO. 937346 AS PER PLAT RECEPTION NO. 657438 11.618 ACRES
Acres	12.232
Land SqFt	0
Tax Area	54
Mill Levy	78.4360
Subdivision	GLENWOOD SPRINGS MUNICIPAL

Account	R009167
Parcel	218505336002
Property Address	2307 WULFSOHN RD, GLENWOOD SPRINGS, CO 81601
Legal Description	Section: 5 Township: 6 Range: 89 Subdivision: GLENWOOD SPRINGS MUNICIPAL Lot: B OPERATIONS MINOR
Acres	5.138
Land SqFt	0
Tax Area	54
Mill Levy	78.4360
Subdivision	GLENWOOD SPRINGS MUNICIPAL

Account	R041405
Parcel	218505337003
Property Address	, GLENWOOD SPRINGS, CO 81601
Legal Description	Section: 5 Township: 6 Range: 89 Subdivision: GLENWOOD MEADOWS #1 MINOR SUB MUNICIPAL OPERATION CENTER ENTRANCE
Acres	2.48
Land SqFt	0
Tax Area	64
Mill Levy	83.4360
Subdivision	GLENWOOD MEADOWS #1 MINOR SUB

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C-003 - LE.R2 - CDOT M-STANDARDS INDEX SHEET
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DISCLAIMER PAGE

MASTER PLAN
ASP-MP - LE.R2 - ARCHITECTURAL MASTER PLAN LE.R2

SITE LEGEND:

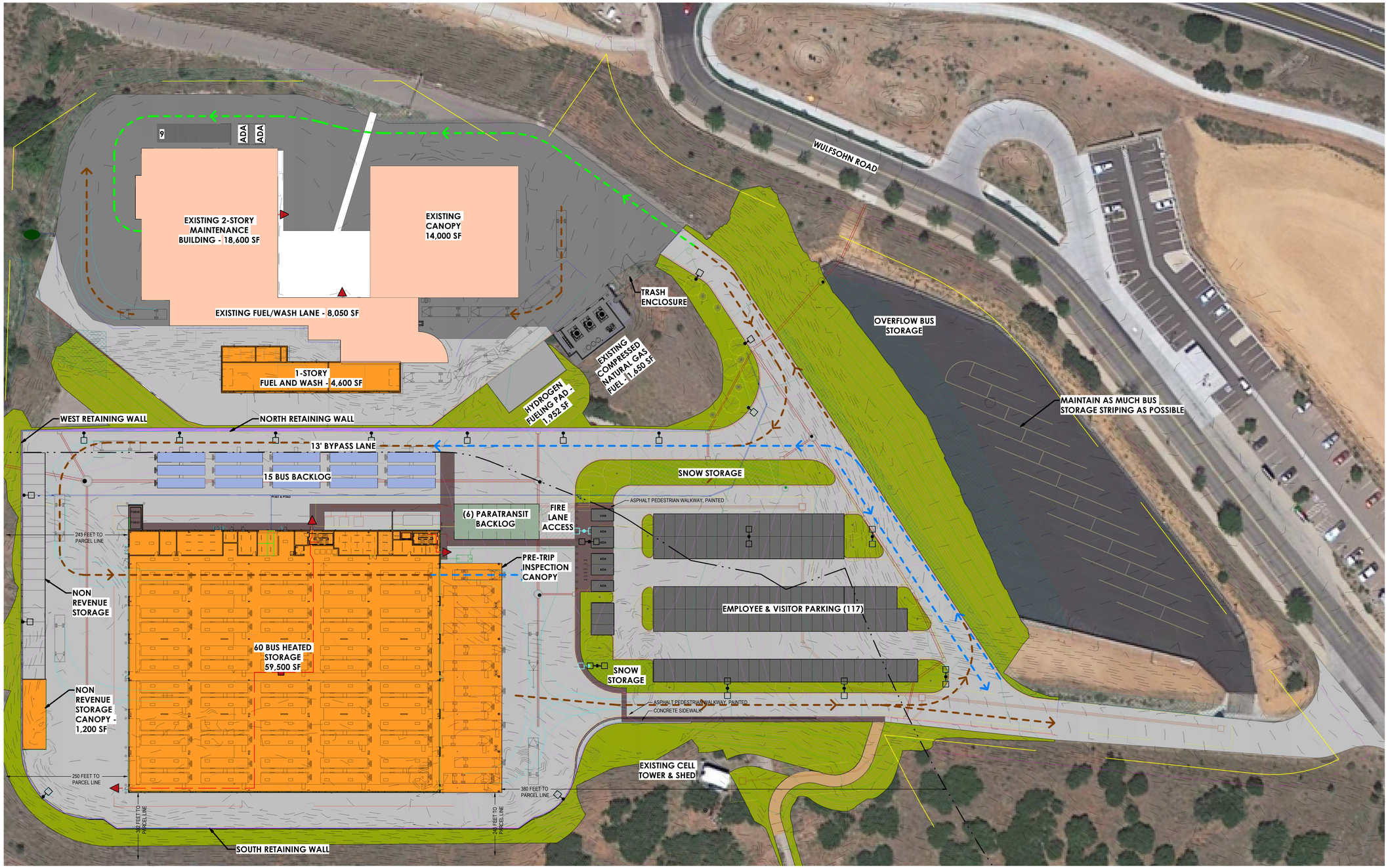
- NEW PAVEMENT
- EXISTING PAVEMENT
- PEDESTRIAN WALKWAY PAVEMENT
- EXISTING CONCRETE
- LANDSCAPE AREA
- TRASH AND RECYCLING ENCLOSURE
- NEW BUILDING
- EXISTING BUILDING
- MASTER PLAN (FUTURE) BUILDINGS

PARKING/STAGING LEGEND:

- EMPLOYEE PARKING
- PARATRANSIT
- BUS BACKLOG PARKING

LEGEND:

- CIRCULATION PATH OF OPERATORS
- CIRCULATION PATH OF SERVICE HOSTLERS
- CIRCULATION PATH OF MAINTENANCE
- PARCEL BOUNDARY LINE



1 **ARCHITECTURAL SITE PLAN LE.R2**
ASP-101-LE.R2 1" = 40'-0"

Stantec

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999 18th Street, Suite 202
Denver, 80202-2424
Tel: (303) 295-1717 • www.stantec.com

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Legend

COLORADO LICENSED
MORGEN MERLIN HALLER
402104
ARCHITECT
22 APRIL 22

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

ARCHITECTURAL SITE PLAN

40' 20' 0' 40' 80'
SCALE: 1" = 40'

ASP-101-LE.R2

04/07/22
STANTEC #2270417345

Linetypes

EXISTING	PROPOSED	DESCRIPTION
	T — OH	OVERHEAD TELEPHONE LINE
T T T	T T T	UNDERGROUND TELEPHONE LINE
	G	LOW PRESSURE GAS LINE
HPG	G — HP	HIGH PRESSURE GAS LINE
	C	UNDERGROUND CABLE TELEVISION LINE
	C — OH	OVERHEAD CABLE TELEVISION LINE
	E	UNDERGROUND ELECTRICAL LINE
	E — OH	OVERHEAD ELECTRICAL LINE
D D	D	STORM DRAIN LINE & DIRECTION
W W	W	WATER LINE
WS WS	WS WS	WATER SERVICE LINE
S S	S	SANITARY SEWER LINE
S S		SANITARY SEWER LINE WITH DIRECTION
SS SS	SS SS	SANTIARY SEWER SERVICE LINE
	FO	FIBER OPTIC LINE
IRR IRR	IRR IRR	IRRIGATION LINE
		DRAINAGE SWALE FLOWLINE
X X X X	X X X X	BARBED-WIRE FENCE LINE
O O O O	O O O O	CHAIN LINK FENCE
	SF SF SF	SILT FENCE
18" CMP	24" CMP	CULVERT, SIZE & FES
		EDGE OF ASPHALT
		EDGE OF CONCRETE
		EDGE OF WATER
		CENTERLINE
		ROCK WALL
		CONTOURS
		RIGHT-OF-WAY
		VEGETATION
LDA LDA	LDA LDA	LIMITS OF DISTURBED AREA
		RAILROAD TRACKS
		TOP OF CUT
		TOP OF FILL
		EASEMENT
AE	AE	ACTIVITY ENVELOPE

Hatching

EXISTING	PROPOSED	DESCRIPTION
		ASPHALT MILLING
		ASPHALT
Conc.		CONCRETE SURFACING (PLAN VIEW)
Grav.		GRAVEL SURFACING
		RIPRAP/RIVER ROCK
		RE-ESTABLISH NATIVE VEGETATION
		WOOD DECK
		FLAGSTONE
		UNDISTURBED SOIL
		RECOMPACTED SOIL

Symbols

EXISTING	PROPOSED	DESCRIPTION
		DECIDUOUS TREE
		CONIFEROUS TREE
		MONUMENT MARKER
		CONTROL POINT
T	T	TELEPHONE PEDESTAL
C	C	CABLE PEDESTAL
ET	ET	ELECTRIC TRANSFORMER
EP	EP	ELECTRIC PEDESTAL
EV	EV	ELECTRIC VAULT
		ELECTRIC SERVICE T-POST
EM	EM	ELECTRIC METER
HV AC		HEATING/AIR CONDITIONING UNIT
G	G	GAS MARKER
GM	GM	GAS METER
GV	GV	GAS VALVE
G	G	GAS WELL
TDSWE		MANHOLES-TELE/DRAINAGE/SEWER/ WATER/ELEC PER PLAN REFERENCE
		CURB INLET
		STORM DRAIN INLET
CO	CO	CLEAN-OUT
		WATER VALVE
		FIRE HYDRANT
		WATER SHUT-OFF VALVE
WM	WM	WATER METER
		WATER SPIGOT
W	W	WELL
IRR	IRR	IRRIGATION VALVE
icv	icv	IRRIGATION CONTROL VALVE
icb	icb	IRRIGATION CONTROL BOX
		IRRIGATION HEADGATE
IR	IR	IRRIGATION MANHOLE
SH	SH	IRRIGATION SPRINKLER HEAD
		PVC PIPE
		UTILITY POLE
		GUY WIRE
		STREET LIGHT POLE
		FLOOD LIGHT
		SIGN
m	m	MAILBOX
		BOLLARD
		FIBER OPTIC LINE MARKER
42.77FL		FINISHED SPOT ELEV. W/ DESCRIPTION
		NEW FLARED END SECTION (HDPE)
		NEW FLARED END SECTION (CMP)
		SOIL BORING LOCATION
		TEST PIT LOCATION
		EROSION CONTROL LOG
R	R	LARGE ROCK/BOULDER
		"T" POST
		SATELLITE DISH
T		TRANSITION FROM SPILL TO CATCH GUTTER
		MINIMUM 4" TOP SOIL OR SPECIFIED ALTERNATIVE
		DRAINAGE FLOW ARROW

Abbreviations

@	AT
°	DEGREE
ø	DIAMETER
#	NUMBER
AAC	ALUMINUM ARCH CULVERT
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ABC	AGGREGATE BASE COURSE
ABUT	ABUTMENT
ACM	ASBESTOS CONTAINING MATERIAL
ACP	ASBESTOS CEMENT PIPE
ADA	AMERICANS W/ DISABILITIES ACT
ADT	AVERAGE DAILY TRIPS
ALT	ALTERNATE
AP	ANGLE POINT
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
AS	ASPHALT
ASD	ALLOWABLE STRESS DESIGN
ASPH	ASPHALT
ATB	ASPHALT TREATED BASE
BBL	BARRELS
BCKF	BACK FACING
BLKF	BLOCK FACING
BLM	BUREAU OF LAND MANAGEMENT
BM	BENCHMARK
BMP	BEST MANAGEMENT PRACTICES
BOW	BACK OF SIDEWALK
BP	BEGIN PROJECT, BEGINNING POINT
BT	BEGIN TRANSITION
BVCE	BEGINNING VERTICAL CURVE ELEVATION
BVCS	BEGINNING VERTICAL CURVE STATION
BW	BOTTOM OF WALL
C	CURB
CBC	CONCRETE BOX CULVERT
CC	CURB CUT
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CDPHE	COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
CF	CUBIC FEET
CFS	CUBIC FEET PER SECOND
CG	CURB AND GUTTER
CIP	CAST IN PLACE
CL	CENTERLINE
CLOMR	CONDITIONAL LETTER OF MAP REVISION
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CONCRETE
COM	COMMUNICATIONS
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
COR	CORNER
CPE	CORRUGATED POLYETHYLENE PIPE
CSP	CORRUGATED STEEL PIPE
CTB	CEMENT TREATED BASE
CU	CUBIC
CY	CUBIC YARD
D	DEEP
DB	DECIBELS
DEG	DEGREES
DHV	DESIGN HOUR VOLUME
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DOW	DIVISION OF WILDLIFE
DR	DRAIN
DTM	DIGITAL TERRAIN MODEL
DW	DRIVEWAY
DWG	DRAWING
E	EASTING
EA	EACH
EB	EAST BOUND
EG	EXISTING GRADE
EL	ELEVATION
ELEV	ELEVATION
EOA	EDGE OF ASPHALT
EOD	EDGE OF DRIVEWAY
EOC	EDGE OF CONCRETE
EOG	EDGE OF GRAVEL
EOM	EDGE OF MILLNGS
EOP	EDGE OF PAVEMENT
EP	END PROJECT, END POINT
EPA	ENVIRONMENTAL PROTECTION AGENCY
ES	ELECTRIC SERVICE
ESMT	EASEMENT
EST	ESTIMATE
EVCE	END VERTICAL CURVE ELEVATION
EVCS	END VERTICAL CURVE STATION
EX	EXISTING
EXIST	EXISTING
EXT	EXTERIOR
FAA	FEDERAL AVIATION ADMINISTRATION
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FES	FLARED END SECTION
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FL	FLOWLINE
FOW	FACE OF WALL
FPS	FEET PER SECOND
FRTF	FRONT FACE
FT	FEET
G	GAS
GAL	GALLONS
GALV	GALVANIZED
GB	GRADE BREAK
GIS	GEOGRAPHICAL INFORMATION SYSTEM
GPM	GALLONS PER MINUTE
GPS	GLOBAL POSITIONING SYSTEM
GR	GRAVEL
GRAV	GRAVEL
GS	GAS SERVICE
GSP	GALVANIZED STEEL PIPE
GV	GATE VALVE
HAZMAT	HAZARDOUS MATERIALS
HC	HANDICAP RAMP
HCL	HORIZONTAL CONTROL LINE
HDPE	HIGH DENSITY POLYETHYLENE
HMA	HOT MIXED ASPHALT
HORIZ	HORIZONTAL
HOV	HIGH OCCUPANCY VEHICLE
HP	HIGH POINT
HPG	HIGH PRESSURE GAS
HWY	HIGHWAY
HYD	HYDRANT
ID	INSIDE DIAMETER
INT	INTERSECTION
INV	INVERT
IP	INLET PROTECTION
JB	JUNCTION BOX
KIP	THOUSAND POUNDS
KW	KILOWATT
L	LEFT
LGTH	LENGTH
LB	POUNDS
LB/FT	POUNDS PER FOOT
LEED	LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
LF	LINEAR FOOT
LOMR	LETTER OF MAP REVISION
LPFM	LOW PRESSURE FORCE MAIN
LP	LOW POINT
LS	LUMP SUM
LSA	LANDSCAPED AREA
LT	LIGHT POLE
LTB	LIME TREATED BASE
LUM	LUMINARY
M	METERS
MAT'L	MATERIAL
MAX	MAXIMUM
MH	MANHOLE
MHT	METHOD OF HANDLING TRAFFIC
MIN	MINIMUM
MISC	MISCELLANEOUS
ML	MEGALUG
MLW	MASONRY LANDSCAPE WALL
MP	MILE POST
MPH	MILES PER HOUR
MSE	MECHANICALLY STABILIZE EARTH
MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
MW	MONITORING WELL
N	NORTHING
N/A	NOT APPLICABLE
NAT	NATIVE GRASS AREA
NAVD	NORTH AMERICAN VERTICAL DATUM
NB	NORTH BOUND
NE	NORTHEAST
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NGVD	NATIONAL GEODETIC VERTICAL DATUM 1929
NHS	NATIONAL HIGHWAY SYSTEM
NIP	NAIL IN PLACE
NO	NUMBER
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NTP	NOTICE TO PROCEED
NTS	NOT TO SCALE
NW	NORTHWEST
O/S	OFFSET
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OP	OUTLET PROTECTION
OT	OVERHEAD TELEPHONE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PED	PEDESTRIAN
PERM	PERMANENT
PG	PAGE
PGL	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
PM	PROJECT MANAGER
PNT	POINT
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVE
PROP	PROPOSED
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FEET
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PUD	PLANNED UNIT DEVELOPMENT
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
Q	PEAK DISCHARGE
QA/QC	QUALITY ASSURANCE/QUALITY CONTROL
QTY	QUANTITY
R	RIGHT
R-R	REMOVE AND REPLACE
RAD	RADIUS
RCP	REINFORCED CONCRETE PIPE
REF	REFERENCE
REQ	REQUIRED
REVEG	REVEGETATE
RFTA	ROARING FORK TRANSIT AUTHORITY
ROW	RIGHT OF WAY
RP	RADIUS POINT
RSS	REINFORCED SOIL SLOPE
RW	RETAINING WALL
SAC	STEEL ARCH CULVERT
SAN	SANITARY
SB	SOUTH BOUND
SCF	SEDIMENT CONTROL FENCE
SD	STORM DRAIN
SDR	STANDARD DIMENSION RATIO
SE	SOUTHEAST
SECT	SECTION
SF	SQUARE FEET
SHLDR	SHOULDER
SL	SANITARY SEWER LINE
SMH	SANITARY SEWER MANHOLE
SOD	GRASS AREA
SS	SANITARY SEWER SERVICE
SSD	STOPPING SIGHT DISTANCE
STA	STATION
STBK	SETBACK
SW	SIDEWALK
SY	SQUARE YARDS
SYM	SYMMETRICAL
T	TREAD STAIRS
TAN	TANGENT
TBC	TOP BACK OF CURB
TBLK	THRUST BLOCK
TC	TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TCP	TRAFFIC CONTROL PLAN
TELE	TELEPHONE
TEMP	TEMPORARY
TP	TOP OF PIPE
TRANS	TRANSITION
TRFLG	TRAFFIC FLANGE OF FIRE HYDRANT
TW	TOP OF WALL
TYP	TYPICAL
UCTV	UNDERGROUND CABLE TELEVISION LINE
UE	UNDERGROUND ELECTRIC LINE
UG	UNDERGROUND GAS LINE
USACE	US ARMY CORPS OF ENGINEERS
USGS	US GEOLOGICAL SURVEY
UT	UNDERGROUND TELEPHONE LINE
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VP	VALLEY PAN
VTC	VEHICLE TRACKING CONTROL
W	WIDE
W/	WITH
WB	WEST BOUND
WL	WATER LINE
WS	WATER SERVICE
WQCD	WATER QUALITY CONTROL DIVISION
WS	WATER SERVICE
WWM	WELDED WIRE MESH
X-S	CROSS SLOPE
YD	YARD

Civil Sheet List Table

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C-164	Electric & Misc Utility Details
C-171	General Erosion Control Plan
C-172	Erosion Control Details

Stantec

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www.bluegreenaspen.com

COLORADO LICENSED PROFESSIONAL ENGINEER 36152 11/17/21

Legend

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

LEGEND AND ABBREVIATIONS

04/22/22

C-001 LE.R2 STANTEC PROJECT #2270417345

GENERAL PROVISIONS (NOTE: "CONTRACTOR" SHALL REFER TO THE GC OR ASSIGNED SUB CONTRACTOR)

1. CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO THE AREAS OF DISTURBANCE, PLUS AN ALLOWANCE OF FIVE FEET (5'-0). ANY DISTURBANCE BEYOND THESE LIMITS SHALL BE RESTORED TO ORIGINAL CONDITION. CONSTRUCTION ACTIVITIES INCLUDE PARKING OF VEHICLES OR EQUIPMENT, DISPOSAL OF LITTER, AND ANY OTHER ACTION WHICH WOULD ALTER EXISTING CONDITIONS. PARKING SHALL NOT BE IN UNAPPROVED AREAS.
2. THE CONTRACTOR SHALL PROTECT ALL WORK AREAS AND FACILITIES FROM WATER AT ALL TIMES. AREAS AND FACILITIES SUBJECTED TO FLOODING SHALL BE PROMPTLY DEWATERED AND RESTORED AT NO ADDITIONAL COST TO THE PROJECT.
3. CONTROL OF SURFACE RUNOFF AND THE REPAIR OF DAMAGES RESULTING FROM RUNOFF IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. THE COST TO CONTROL SURFACE RUNOFF OR REPAIR DAMAGES WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK.
4. THE CONTRACTOR SHALL KEEP EXISTING DRAINAGE STRUCTURES FUNCTIONAL AND MAINTAIN DRAINAGE TO THOSE STRUCTURES. MAINTAINING DRAINAGE WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK.
5. THE CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTS DESIGNATED TO REMAIN FROM DAMAGE DURING CONSTRUCTION OPERATIONS. ANY MONUMENTS DISTURBED BY THE CONTRACTOR THAT ARE NOT DESIGNATED FOR RELOCATION SHALL BE RESET AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL NOTE THOSE MONUMENTS IN THE FIELD PRIOR TO CONSTRUCTION.
6. THE CONTRACTOR SHALL HAVE: ONE COPY OF THE GEOTECHNICAL INVESTIGATION, ONE COPY OF THE SIGNED PLANS AND REVIEWED SHOP DRAWINGS AND ONE COPY OF THE CONSTRUCTION SPECIFICATIONS FOR THE PROJECT AT THE JOB SITE AT ALL TIMES.
7. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE ENGINEERING PROJECT REPRESENTATIVE. REQUIRED QUALITY CERTIFICATIONS AND DOCUMENTATION SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PLACEMENT OR USE OF THE MATERIAL.
8. PROJECT INSPECTION AND TESTING WILL BE COORDINATED BY THE CONTRACTOR AND OVERSEEN BY THE ENGINEER OR REPRESENTATIVE. CONTRACTOR TO PROVIDE 48 HOUR NOTICE FOR ALL REQUIRED TESTS.
9. CONTROL STAKING PROVIDED BY SGM. CONTRACTOR TO COORDINATE WITH SGM SURVEY MANAGER: BOB BRANDEBERRY @ 970-384-9077. NOTIFY SGM FOR ADDITIONAL SURVEYING NEEDS.
10. REFER TO LANDSCAPE DRAWINGS FOR ADDITIONAL INFORMATION ON RESTORATION OR VEGETATION NOT SHOWN ON THE CIVIL DRAWINGS.
11. FOLLOW CITY PUBLIC WORKS MANUAL FOR ALL WATER, SEWER, ELECTRIC AND ASSOCIATED COMMUNICATIONS DETAILS. UNLESS OTHERWISE SUPERSEDED, IN GENERAL, STORMWATER AND PAVING ELEMENTS FOLLOW CDOT STANDARDS FOR MATERIALS AND INSTALLATION PRACTICES, LATEST EDITION. WATER AND SEWER FOLLOWS CITY STANDARDS (SEE UTILITY NOTES). CONTRACTOR SHOULD HAVE AVAILABLE APPROPRIATE MANUALS, SPECIFICATIONS AND DETAIL REFERENCES ON SITE AT ALL TIMES.
12. THIS PROPERTY IS SUBJECT TO GEOLOGIC HAZARDS PER THE ADOPTED MAPPING BY THE CITY OF GLENWOOD SPRINGS. HAZARDS TO NOTE ARE MODERATE HYDRO-COMPACTIVE SOILS. A SUB-SURFACE SOIL STUDY HAS BEEN PREPARED FOR FOUNDATION DESIGN AND GENERAL SITE GEOLOGICAL RECOMMENDATIONS AND SHALL BE FOLLOWED AS REQUIRED FOR THE SUBMISSION OF A BUILDING PERMIT.
13. AS A PUBLIC FACILITY ALL STANDARDS FOR PUBLIC ACCESS ARE TO BE ACHIEVED.
14. FOR PAVING, EARTHWORK, AND STORM SEWER, FOLLOW CDOT STANDARDS AND DETAILS, LATEST EDITIONS, UNLESS OTHERWISE SUPERCEDED HEREIN. REFER TO GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.

UTILITIES

1. EXISTING UTILITY LOCATIONS SHOWN ON THE PLAN SHEETS ARE PLOTTED FROM THE BEST AVAILABLE INFORMATION.
2. WHILE THE WATER AND SEWER ARE CONNECTED TO CITY FACILITIES TO THE NORTH OF THE SITE (SEE SITE PLAN), THE WATER AND SEWER MAINS AND SERVICES ARE OWNED BY RFTA. REGARDLESS, FOLLOW TYPICAL CITY STANDARDS FOR INSTALLATION AND CARE OF UTILITY ELEMENTS.
3. FOLLOW STANDARD TESTING PROCEDURES FOR PUBLIC UTILITIES FOR ALL WATER, SEWER, ELEC AND COMM ELEMENTS.
4. LOCATION AND NOTIFICATION OF BOTH UNCC MEMBER AND NON-MEMBER UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES AS NECESSARY TO INSURE THE UTILITIES WILL NOT BE IMPACTED BY CONSTRUCTION ACTIVITIES. IT IS ESTIMATED THAT 8 HOURS OF POTHOLING WILL BE REQUIRED ON THIS PROJECT AS DIRECTED BY THE ENGINEER. ANTICIPATED AREAS TARGETING SUCH LOCATIONS ARE SHOWN ON THE PLAN.
6. IF FIELD CONDITIONS ARE FOUND TO BE DIFFERENT THAN SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY SO THAT APPROPRIATE ACTION CAN BE TAKEN BY THE OWNER.
7. ALL UNDERGROUND UTILITY CONSTRUCTION SHALL BE COMPLETED AND ACCEPTED PRIOR TO PLACING PAVEMENT.
8. CITY FIBER OPTIC AND PRIVATE COMMUNICATIONS ARE PRESENT IN THE AREA, SOME OF WHICH ARE CONNECTED TO THE CELL TOWER LOCATION. SPECIAL CARE AND LOGISTICS ARE WARRANTED AS PORTIONS OF THOSE COMMUNICATIONS MUST REMAIN ACTIVE AS LONG AS POSSIBLE. THEREFORE NEW OR TEMPORARY INSTALLATIONS MAY BE REQUIRED TO MAKE THE TRANSFER OF COMMUNICATIONS PLAUSIBLE. CONTACT THE CITY ELECTRIC DEPARTMENT FOR ADDITIONAL COORDINATION.

PERMITS & GENERAL HYDROLOGY NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED DEWATERING PERMITS AND DEVELOPING THE METHODS OF COMPLIANCE WITH THOSE PERMITS FOR ALL CONSTRUCTION ACTIVITIES ON THE PROJECT.
2. ANY PUMPING OF WATER WILL REQUIRE A DISCHARGE PERMIT FROM CDPHE WATER QUALITY CONTROL DIVISION, AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ONLY CLEAN WATER THAT HAS NOT PICKED UP SEDIMENT FROM THE WORK AREA SHALL BE DISCHARGED FROM THE SITE WITHOUT PRIOR TREATMENT. WATER CONTAINING ELEVATED LEVELS OF SEDIMENT SHALL BE TREATED PRIOR TO DISCHARGE USING BEST MANAGEMENT PRACTICES AS APPROVED BY THE ENGINEER. CONDITIONS OF THE PERMIT INCLUDING MONITORING AND REPORTING WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK.
3. CDPS PERMIT - THIS PROJECT RESULTS IN ONE ACRE OR MORE OF EARTH DISTURBANCE, THEREFORE A COLORADO DISCHARGE PERMIT SYSTEM - STORMWATER CONSTRUCTION PERMIT WILL BE REQUIRED. THE CONTRACTOR SHALL NOT COMMENCE PERMIT-RELATED WORK UNTIL THE PERMIT IS RECEIVED. WORK PERFORMED MUST BE CONSISTENT WITH THAT DETAILED IN THE STORM WATER MANAGEMENT PLAN OR SUBSEQUENT, APPROVED AMENDMENTS.
4. A BASE STORMWATER MANAGEMENT PLAN AND EROSION CONTROL PLAN ARE PROVIDED FOR CONTRACTOR USE AND AMENDMENT.

NOTES & PHASING:

1. CONTRACTOR TO PROVIDE TRAFFIC CONTROL PLAN(S) WITH ANTICIPATED SCHEDULES. AVOID DAMAGING NON-CONSTRUCTION AREAS OR PROVIDE REPAIRS AT CONTRACTOR COST FOR CONTINUED USE OF PROJECT FACILITIES.
2. PENDING CONTRACTOR'S PLAN, TRAFFIC CONTROL MAY REQUIRE SIGNAGE OR NOTIFICATIONS AT MIDLAND AVENUE.
3. CONTRACTOR MUST KEEP ACCESS TO THE EXISTING GMF AND CITY WWTP ROAD AT ALL TIMES, 24/7.

GENERAL DEMOLITION NOTES:

1. HARD SURFACE DEMOLITION INCLUDES ANY CONCRETE OR ASPHALT BREAK UP, SAWCUTTING, OR OTHER DEMOLITION, REMOVAL, AND DISPOSAL. WHERE AVAILABLE, CONCRETE SHALL BE CUT AT NEXT AVAILABLE JOINT.
2. SOFT SURFACE DEMOLITION INCLUDES TOPSOIL REMOVAL (WHERE APPLICABLE) AND SET ASIDE FOR PLACING BACK IN DISTURBED AREAS, GENERAL EXCAVATION TO SUBGRADE IN THOSE AREAS AND ALL HAUL OFF OF STANDARD MATERIAL.

GENERAL SITE AND PAVING NOTES:

1. TRAFFIC CONTROL REQUIREMENTS:
   - MAINTAIN ACCESS TO OTHER STRUCTURES AT ALL TIMES. TEMPORARY CLOSURE ALLOWED FOR UTILITY WORK
   - PROVIDE FOR EMERGENCY ACCESS CONTINUOUSLY.
   - PROVIDE SAFETY CONES, FLAG PERSONS, VERTICAL PANELS WITH BEACONS, SIGNAGE AND BARRICADES AS NECESSARY TO PROTECT PUBLIC AND WORK SITE.
   - PROVIDE SIGNAGE AS REQUIRED BY OWNER AND LOCAL GOVERNMENT WITH JURISDICTION OVER ADJACENT ROADS.
   - MAINTAIN ACCESS TO LOWER RFTA GMF AND CITY WWTF AT ALL TIMES.
2. THE CONTRACTOR SHALL CERTIFY THAT ALL AGGREGATES USED ON THIS PROJECT ARE FREE FROM HAZARDOUS COMPONENTS IN EXCESS OF THE THRESHOLD CONCENTRATIONS ESTABLISHED BY THE E.P.A.
3. PRIME COAT NOT REQUIRED UNLESS INDICATED ON DRAWINGS. PREPARED BASE COURSES SHALL BE PRIMED AT CONTRACTOR'S EXPENSE IF THE SURFACE HAS DETERIORATED DUE TO TRAFFIC, WEATHER OR TIME LAPSE BETWEEN SURFACE PREPARATION AND PLACEMENT OF BITUMINOUS MATERIALS, SUCH THAT, IN THE OPINION OF THE ENGINEER, USE OF PRIME COAT IS REQUIRED. APPLICATION RATE SHALL BE 0.3 GALS/SQ.YD.
4. DILUTED EMULSIFIED ASPHALT OR TACK COAT SHALL CONSIST OF 1 PART EMULSIFIED AND 1 PART WATER. RATES OF APPLICATION SHALL BE DETERMINED BY THE ENGINEER AT THE TIME OF APPLICATION. APPROXIMATE RATE SHALL BE 0.1 GALS./SQ.YD.
5. THE FOLLOWING SHALL BE USED WITH EACH BITUMINOUS PAVER:
   A) A SKI-TYPE DEVICE AT LEAST 30 FEET IN LENGTH.
   B) SHORT SKI OR SHOE.
6. PAVEMENT MARKING TO INCLUDE THE FOLLOWING:
   A) PARKING STALLS, SINGLE WHITE LINE. PAINT.
   B) HANDICAP SYMBOLS. THERMOPLASTIC.
   C) CENTERLINE OF ACCESS ROAD - DOUBLE YELLOW LINES. PAINT.
   D) NOTED LETTERING OR DIRECTIONAL ARROWS. THERMOPLASTIC.
   E) CROSSWALKS AND STOP BARS. THERMOPLASTIC.
   F) MISCELLANEOUS CROSS HATCH STRIPING. PAINT.
8. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH APPLICABLE SECTIONS OF THE SITE SUBSOIL STUDY. CONTRACTOR TO NOTE REQUIREMENTS FOR EXCAVATION, BACKFILL AND SUPPORT MATERIALS.
9. SLOPE SOILS AWAY FROM BUILDING AS PER SITE SUBSOIL STUDY. SLOPE ASPHALT/CONCRETE AWAY FROM BUILDING AS SHOWN ON GRADING PLAN.
10. SPOT ELEVATIONS ALONG CURB/GUTTER ARE TO TOP BACK OF CURB UNLESS OTHERWISE NOTED.
11. SOURCE OF MAPPING: EXISTING FIELD CONDITIONS WERE GENERATED BY A SURVEY PERFORMED BY SGM INC. UTILITIES WERE GENERATED FROM A COMPOSITE OF FIELD SURVEY, MAPS PROVIDED BY OWNER AND MAPS FROM RESPECTIVE UTILITY COMPANIES.
12. THROUGHOUT ALL PHASES OF CONSTRUCTION, UNTIL THE FINAL ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL KEEP THE WORK SITE CLEAN AND FREE FROM RUBBISH AND DEBRIS. THE CONTRACTOR SHALL ALSO ABATE DUST NUISANCE AS NECESSARY BY CLEANING, SWEEPING AND SPRINKLING WITH WATER OR OTHER MEANS AS NECESSARY. IT IS ANTICIPATED DUST CONTROL WILL BE REQUIRED ON THIS PROJECT.

EXISTING UTILITY S.U.E. NOTES

1. UTILITIES ARE DEPICTED ON THESE PLANS IN ACCORDANCE WITH THEIR ACHIEVED "QUALITY LEVELS" AS DEFINED IN THE AMERICAN SOCIETY OF CIVIL ENGINEER'S DOCUMENT ASCE 38, "STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA." RELIANCE UPON THESE DATA FOR RISK MANAGEMENT PURPOSES DURING BIDDING DOES NOT RELIEVE THE CONTRACTOR OR UTILITY OWNER FROM FOLLOWING ALL APPLICABLE UTILITY DAMAGE PREVENTION STATUTES, POLICIES, AND/OR PROCEDURES DURING EXCAVATION. IT IS IMPORTANT THAT THE CONTRACTOR INVESTIGATES AND UNDERSTANDS THE SCOPE OF WORK BETWEEN THE PROJECT OWNER AND THEIR ENGINEER REGARDING THE SCOPE AND LIMITS OF THE UTILITY INVESTIGATIONS LEADING TO THESE UTILITY DEPICTIONS.
2. UTILITY QUALITY LEVELS ARE GENERALLY DEFINED AS FOLLOWS. REFER TO ASCE 38 FOR FURTHER DEFINITION:
   2.A. QUALITY LEVEL D (QLD) – INDICATES INFORMATION DERIVED FROM EXISTING RECORDS, UTILITY RECORD DRAWINGS, ONE-CALL MARKOUTS, AND ORAL RECOLLECTIONS.
   2.B. QUALITY LEVEL C (QLC) – INDICATES INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING SUCH INFORMATION TO QL D INFORMATION.
   2.C. QUALITY LEVEL B (QLB) – INDICATES INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES.
   2.D. QUALITY LEVEL A (QLA) – INDICATES THE PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. (EG. A TEST HOLE OR TEST PIT.)
3. QUALITY LEVEL B IN COMPLIANCE WITH SB18-167 (TITLE 9) AND ASCE 38 WAS NOT ACHIEVED ON ALL UTILITIES
4. ALL WATER UTILITIES DEPICTED ON THE PLANS ARE SHOWN AT QUALITY LEVEL D (QLD)
5. ALL SEWER UTILITIES DEPICTED ON THE PLANS ARE SHOWN AT QUALITY LEVEL D (QLD)
6. PROPOSED (FUTURE IMPROVEMENTS) WATER LINE LOCATIONS ARE DEPICTED FROM THE CONSTRUCTION DRAWINGS. LOCATIONS ARE APPROXIMATE. PROPOSED WATER LINE IS SHOWN AT QUALITY LEVEL D (QLD)
7. ELECTRIC LINE DEPICTED ON THE PLANS ARE CITY TRUNK MAIN(S).
8. GAS DEPICTED ON THE PLANS IS SHOWN AT QUALITY LEVEL D. (QLD)
9. TELECOMMUNICATIONS (CABLE/FIBER, PHONE) LINES DEPICTED ON THE PLANS ARE SHOWN AT QUALITY LEVEL D (QLD)
10. OTHER UTILITIES MAY BE PRESENT WHICH WERE NOT IDENTIFIED THROUGH THE SUBSURFACE UTILITY INVESTIGATION PROCESS AND ARE NOT IDENTIFIED ON THE PLAN SET. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION AND FOR FULFILLING 811 REQUIREMENTS.
11. FOR FUTURE LOCATION EASE, ALL INSTALLED UTILITIES SHALL BE ELECTRONICALLY TRACEABLE. IF THE UTILITY IS NOT ALREADY TRACEABLE, THEN 10 GA TRACER WIRE SHALL BE INCLUDING IN THE INSTALLATION OF THE UTILITY, INCLUDING SERVICES TO THE POINT OF ENTRY TO THE BUILDING.

GENERAL WATER NOTES:

1. IN GENERAL, FOLLOW CITY UTILITY DESIGN AND INSTALLATION STANDARDS, KEY ELEMENTS SUMMARIZED HERE. OTHER THAN THE WATER MAIN EXTENSION IS 6", AND TRACER WIRE CONNECTIONS ARE DIFFERENT FROM THE PWM, FOLLOW SECTION 3 OF CITY PWM, 2018 MANUAL.
2. ALL WATER MAINS SHALL BE INSTALLED WITH A 5.5' MINIMUM AND 10' MAXIMUM DEPTH OF COVER. IF GRADE CONFLICTS OCCUR WITH EXISTING UTILITIES OR OTHER OBSTRUCTIONS, THE PROPOSED WATER MAIN GRADE CAN BE VARIED PROVIDED THE MINIMUM AND MAXIMUM DEPTH OF COVER IS MAINTAINED.
3. ALL FITTINGS (BENDS, CROSSES, PLUGS, VALVES AND TEES) TO HAVE A CONCRETE THRUST BLOCK INSTALLED IN ACCORDANCE WITH THE THRUST BLOCK TABLE SHOWN IN GWS PWM W-01 WITH A STATIC PRESSURE OF 150 PSI. MEGALUGS ARE REQ'D IN ADDITION TO THE CONC. THRUST BLOCK. ALL CONCRETE THRUST BLOCK SHALL BE FORMED AND POURED IN PLACE AGAINST NATIVE SOIL OR SOIL WITH PROPER COMPACTION ON ALL FITTINGS INCLUDING TAPS 4" OR LARGER TO RESIST HYDRAULIC THRUST. POLY WRAP BOND BREAKER SHALL BE INSTALLED BETWEEN CONCRETE AND ALL PIPES AND ASSOCIATED APPURTENANCES.
4. CONTRACTOR TO CONTACT GLENWOOD SPRINGS WATER DEPARTMENT WITH INVENTORY OF WATER LINE APPURTENANCES REMOVED FROM EXISTING UTILITIES FOR EVALUATION IF APPURTENANCES SHOULD BE DISPOSED OF BY CONTRACTOR OR SUPPLIED TO GLENWOOD SPRINGS WATER DEPARTMENT.
5. THE WATER LINE LOCATION SHOWN MAY UTILIZE DEFLECTION. CONTRACTOR MUST USE PIPE PROVIDER THAT ALLOWS 1 DEGREE OF DEFLECTION PER STICK OF PIPE. IN NO CASE SHALL FIELD DEFLECTIONS EXCEED MANUFACTURERS RECOMMENDATIONS.
6. ALL KNOWN SERVICES WHICH TIE INTO THE EXISTING MAIN ARE SHOWN.
7. ALL WATER DISTRIBUTION AND TRANSMISSION PIPING SHALL BE C900 PVC.
8. ALL FITTINGS SHALL BE CLASS 150 DIP, MECHANICAL JOINT OR PRE-APPROVED FLANGED FITTING AS DICTATED BY THE APPURTENANCES TO BE INSTALLED.
9. ALL PIPE AND FITTINGS SHALL HAVE 10 GAGE TRACER WIRE AND TERMINATE AT SEPARATE CONNECTION POINTS, NOT INSIDE VALVE BOXES OR LOOSE ON HYDRANTS. LOOPS OF LOOSE WIRE ARE NOT ALLOWED AS A CONNECTION LOCATION FOR TRACER WIRE. CONNECTORS SHALL BE COPPERHEAD BRAND OR EQUAL. SEE SUE NOTES FOR ADDITIONAL TRACER WIRE COMMENTARY.
10. GATE VALVES SHALL BE INSTALLED FOR ALL VALVES 12" AND SMALLER. GATE VALVES SHALL BE CLASS 250 MUELLER OR PRE-APPROVED EQUIVALENT, RESILIENT SEAT, EPOXY COATED, MECHANICAL JOINT OR FLANGED, AS REQUIRED, NON-RISING VALVE STEM, AND SHALL OPEN BY TURNING TO THE LEFT, COUNTER-CLOCKWISE. GATE VALVES SHALL CONFORM TO AWWA SPECIFICATIONS C-509. SERVICE FITTINGS, SADDLES, CORP AND CURB STOPS SHALL BE MUELLER.
11. FIRE HYDRANTS SHALL BE "KENNEDY K81D GUARDIAN OR MUELLER SUPER CENTURION 250" WITH A 6" MECHANICAL JOINT END CONNECTION MODEL A-423.
12. THE CONTRACTOR SHALL ENSURE PIPES ARE FREE OF GRAVEL AND DEBRIS PRIOR TO BEING INSTALLED IN THE TRENCH. IF THE PIPE IS DIRTY, HAS GRAVEL OR DEBRIS INSIDE, OR HAS SAT UNUSED FOR A LONG PERIOD OF TIME, THE PIPE WILL REQUIRE CLEANING PRIOR TO INSTALLATION.
13. THE PIPE SHALL BE BEDDED FOR THE FULL LENGTH OF THE PIPELINE. THE BEDDING MATERIAL SHALL BE CLASS 6 AGGREGATE AND NOT NATIVE EXCAVATED MATERIAL. THE BEDDING SHALL EXTEND FROM 6 INCHES BELOW THE PIPE AND BELLS TO 12 INCHES OVER THE TOP OF THE PIPE AND BELLS. BEDDING WILL EXTEND THE FULL WIDTH OF THE EXCAVATION. 12" ABOVE THE TOP OF PIPE CAN BE NATIVE, 6" MINUS MATERIAL.
14. BACKFILL MATERIAL FROM 12 INCHES ABOVE THE TOP OF THE PIPE TO THE BOTTOM OF THE ROAD BASE ELEVATION SHALL BE NO LARGER THAN 6" MATERIAL IN ALL STREET RIGHT-OF-WAYS.
15. THE CONTRACTOR SHALL NOTIFY THE CITY OF GLENWOOD SPRINGS WATER DEPARTMENT AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
16. A CHLORINATION/BACTERIOLOGICAL, HYDROSTATIC/LEAKAGE AND CONDUCTIVITY TEST WILL BE REQUIRED ON ALL NEW LINES AND SYSTEMS BEFORE ACCEPTANCE BY THE WATER DEPARTMENT AND THE EOR. THESE TESTS SHALL BE PERFORMED AS PER APPLICABLE ANSI/AWWA STANDARD C651.
17. WATER SERVICES: 3" IN SIZE AND LARGER SHALL BE INSTALLED WITH A TEE ON MAIN, GATE VALVE OF SIMILAR SIZE, LENGTH OF PIPE (DIP) AS REQUIRED TO TIE INTO EXISTING WATER SERVICE AND A MECHANICAL COUPLING: 2" AND SMALLER IN SIZE SHALL BE INSTALLED WITH A CORP STOP ON MAIN WATER LINE, TYPE K COPPER OR HDPE (PURE CORE W/ COMPRESSION FITTINGS) OF SIMILAR SIZE TO A NEW CURB STOP. IN ALL CASES, FIELD VERIFY LINE SIZE AND TYPE. NEW WATER SERVICE INSTALLATIONS ARE TO AVOID ADDITIONAL FITTINGS WHEN CONNECTING TO EXISTING WATER SERVICE AS BEST AS POSSIBLE.

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Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

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GENERAL NOTES

04/22/22

C-002 LE.R2 STANTEC PROJECT #2270417345

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COLORADO
DEPARTMENT OF TRANSPORTATION

M&S STANDARDS PLANS LIST

July 31, 2019

Revised on December 27, 2019

ALL OF THE M&S STANDARD PLANS, AS SUPPLEMENTED AND REVISED, APPLY TO THIS PROJECT WHEN USED BY DESIGNATED PAY ITEM OR SUBSIDIARY ITEM.

THE M&S STANDARD PLANS USED TO DESIGN THIS PROJECT ARE INDICATED BY A MARKED BOX ■. ALL THE OTHER M&S STANDARD PLANS ARE STILL ELIGIBLE FOR CONSTRUCTION IF APPROVED THE ENGINEER.

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CONTRACTOR SHALL KEEP A FULL SET OF THE M/S STANDARDS ON SITE FOR REFERENCE. -- RFTA GMF 3,4,5 AND 7.

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 12/27/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Project Development Branch JBK

STANDARDS PLANS LIST

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
STANDARDS PLANS LIST
Standard Sheet No. 1 of 1
Project Sheet Number:

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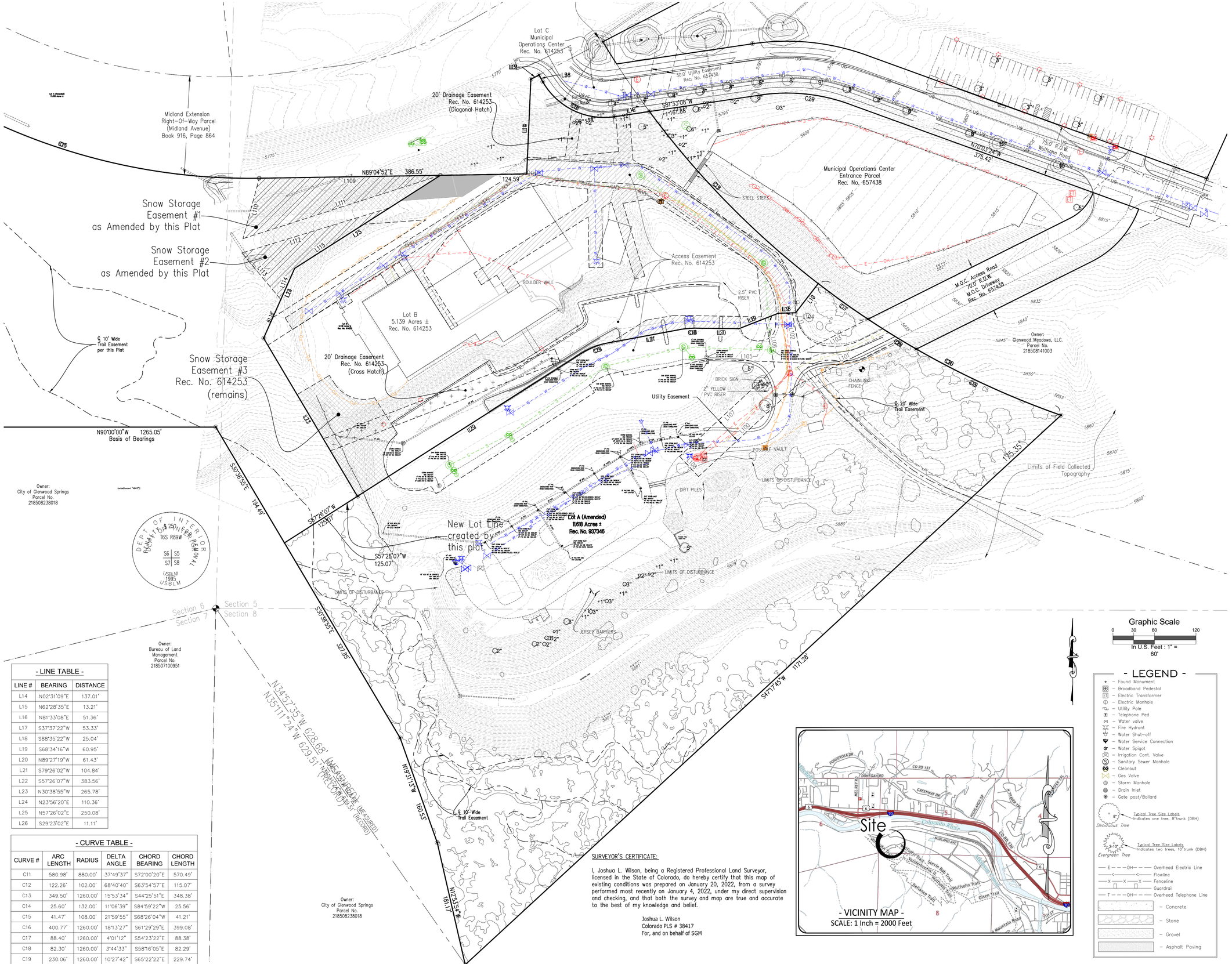
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Roaring Fork Transportation Authority

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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

CDOT M-STANDARDS INDEX SHEET

04/22/22
C-003 LE.R2 STANTEC PROJECT #2270417345



- LINE TABLE -

LINE #	BEARING	DISTANCE
L14	N02°31'09"E	137.01'
L15	N62°28'35"E	13.21'
L16	N81°33'08"E	51.36'
L17	S37°37'22"W	53.33'
L18	S88°35'22"W	25.04'
L19	S68°34'16"W	60.95'
L20	N89°27'19"W	61.43'
L21	S79°26'02"W	104.84'
L22	S57°26'07"W	383.56'
L23	N30°38'55"W	265.78'
L24	N23°56'20"E	110.36'
L25	N57°26'02"E	250.08'
L26	S29°23'02"E	11.11'

- CURVE TABLE -

CURVE #	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C11	580.98'	880.00'	37°49'37"	S72°00'20"E	570.49'
C12	122.26'	102.00'	68°40'40"	S63°54'57"E	115.07'
C13	349.50'	1260.00'	15°53'34"	S44°25'51"E	348.38'
C14	25.60'	132.00'	11°06'39"	S84°59'22"W	25.56'
C15	41.47'	108.00'	21°59'55"	S68°26'04"W	41.21'
C16	400.77'	1260.00'	18°13'27"	S61°29'29"E	399.08'
C17	88.40'	1260.00'	4°01'12"	S54°23'22"E	88.38'
C18	82.30'	1260.00'	3°44'33"	S58°16'05"E	82.29'
C19	230.06'	1260.00'	10°27'42"	S65°22'22"E	229.74'
C20	130.08'	262.50'	28°23'30"	N84°15'09"W	128.75'

SURVEYOR'S CERTIFICATE:

I, Joshua L. Wilson, being a Registered Professional Land Surveyor, licensed in the State of Colorado, do hereby certify that this map of existing conditions was prepared on January 20, 2022, from a survey performed most recently on January 4, 2022, under my direct supervision and checking, and that both the survey and map are true and accurate to the best of my knowledge and belief.

Joshua L. Wilson
Colorado PLS # 38417
For, and on behalf of SGM

Graphic Scale
0 30 60 120
In U.S. Feet : 1" = 60'

- LEGEND -

- Found Monument
- Broadband Pedestal
- Electric Transformer
- Electric Manhole
- Utility Pole
- Telephone Ped
- Water valve
- Fire Hydrant
- Water Shut-off
- Water Service Connection
- Water Spigot
- Irrigation Cont. Valve
- Sanitary Sewer Manhole
- Cleanout
- Gas Valve
- Storm Manhole
- Drain Inlet
- Gate post/Bollard

8" Typical Tree Size Labels
Deciduous Tree — Indicates one tree, 8"trunk (DBH)

2-10" Typical Tree Size Labels
Evergreen Tree — Indicates two trees, 10"trunk (DBH)

- Overhead Electric Line
- Flowline
- Fenceline
- Guardrail
- Overhead Telephone Line
- Concrete
- Stone
- Gravel
- Asphalt Paving

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PROPERTY DESCRIPTION:

LOT A (AMENDED), GLENWOOD SPRINGS MUNICIPAL OPERATION CENTER, PER FIRST AMENDED PLAT RECEPTION NO. 937346 & MOC DRIVEWAY, GLENWOOD MEADOWS #1 MINOR SUB PER PLAT RECEPTION NO. 657438.

NOTES:

1. Basis of Bearings: Bearings based on South line of Lot D, as per the First Amended Plat, Reception No. 937346, Garfield County, N90°00'00"W, between two 18" Long, 5/8" Diameter Rebars & 1 ¼"Green Plastic Caps Marked LS 38417.
2. This map has been prepared pursuant to client request for an Existing Conditions Map.
3. Date of field survey : Includes data from survey initiated in 2019, with latest field survey date of January 4, 2022. This Existing Conditions Map contains topography and existing conditions taken from an UAV Drone Flight performed by SGM. Information within the RED limits line shown hereon has be field surveyed. Areas outside of said RED line are shown using the UAV Drone information and will need to be verified and updated once snow and ice has melted.
4. Units of linear measurements are displayed in US Survey Feet.
5. Vertical Information:

   Datum and Benchmark: Elevation information shown hereon is based upon GPS observations utilizing OPUS, Geoid 12B to derive the NGVD29 elevation of 5824.7' at the top of a 18"Long, 5/8" Diameter Rebar & 2 ¼"Green Plastic Cap Marked LS 38417, at the east end of the South line of Lot D, as per the First Amended Plat, Reception No. 937346, Garfield County.

   Contour Interval: 1 Foot Minor, 5 Foot Major.
6. Any subsurface utilities not shown, were not marked by appropriate utility companies at the time of this survey and therefore may not be shown hereon. Underground utilities locates have not been marked recently for the purpose of this work. Only paint marks and utility pin flags on the ground surface were surveyed by SGM as part of this survey. Client/contractor must contact specific utility companies to verify both the location and depth of respective utilities. Additional surveying work would be required to show any such subsurface utility locations on this drawing. SGM will not be responsible for protection of subsurface utilities.

Client/Project Logo

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Client/Project

GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

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EXISTING CONDITIONS MAP

N
60' 30' 0' 60' 120'
SCALE: 1" = 60'

04/22/22

C-020 LE.R2 STANTEC PROJECT #2270417345

REMOVE CONC BASES & STEEL STAIRS

REMOVE ~380 LF GUARDRAIL & 64 POSTS GUARDRAIL MAY BE REUSED IF NOT DAMAGED NEW POSTS, REGARDLESS

APPROX LIMIT OF PAVING REMOVAL – RELOCATE FENCE FOR BUS SECURITY ALONG THIS LINE AFTER CONSTRUCTION OF EMBANKMENT

APPROX. END OF PLANNED ROAD RECONST

EXISTING EDGE OF ASPHALT ROADWAY

REMOVE EX FENCE & REUSE FOR REVISED BUS PARKING AREA

REMOVE OH POWER & POLES, PROVIDE TEMP SVC AS NEEDED

REMOVE EX. TRASH ENCLOSURE

PROTECT EX UTIL GEAR

ROTHOLE AND VERIFY WL PIPE LOCATION, DEPTH AND CONDITION – PROPOSED TIE IN LOCATION

REMOVE AND SALVAGE BOULDERS FOR FUTURE USE

POTHOLE AND VERIFY SS PIPE LOCATION, DEPTH AND CONDITION – PROPOSED TIE IN LOCATION

BOULDER WALL

2.5" PVC RISER

REMOVE EX PED BRIDGE APPROX LOCATION SHOWN

REMOVE EX SIGN / BRICKWORK

TRENCH RESTORE/REPAVE FOR ELEC/FO REINSTALL

REMOVE ASPHALT, C/G AND SIDEWALK FOR MASS EXCAVATION AND LOWER PLATFORM WORK

REMOVE EX SANITARY SEWER ~5 MH ~600 LF PIPE

REMOVE EX CONC VAL PAN–PROTECT EX STRUCTURE

REMOVE EX ROCK & MSE WALL

APPROX. END OF PLANNED ROAD RECONST

BRICK SIGN

6' CHAINLINK FENCE

2" YELLOW PVC RISER

GATE

REMOVE EX ELEC VAULT

REMOVE ALL PAVING & HARDSCAPE

SEE GENERAL NOTES SHEET C–002, UTILITIES NOTE 8 FOR COMMS ASSOCIATED WITH CELL TOWER AND CITY FIBER OPTIC COORDINATION

REMOVE EX VALVE CLUSTER & FH

REMOVE EX FENCE

APPROX LOC. OF LIMIT OF TRAIL RE–GRADING

POSSIBLE VAULT

REMOVE EX STORMSEWER ~2 INLETS 1 STM MH ~370 LF PIPE

REMOVE EX COMMS

REMOVE EX UTIL YARD ELEC TF VAULT FH COMM PEDESTALS

DIRT PILES

REMOVE EX STORMSEWER ~11 INLETS ~700 LF PIPE

REMOVE EX ROCK / SOIL PILES w/ EXCAVATION ACTIVITY

RAISED FUEL TANK PAD

REMOVE JERSEY BARRIERS & FUEL PAD (FUEL TANK ALREADY GONE)

REMOVE WL VALVES & APPURTENANCES

PREVIOUS STRUCTURE ALREADY REMOVED IN TOTAL

JERSEY BARRIERS

CLEAN OUT AND INSPECT SMALL ADS DISCHARGE PIPE – PIPE AND OUTLET REMAIN UNLESS SHOWING DAMAGE UPON INSPECTION (APPROX LOC SHOWN)

REMOVE EX TREES ON SLOPE–CONFIRM w/ WALL AND LNDSCP

CLEAN OUT AND INSPECT SMALL ADS DISCHARGE PIPE – PIPE AND OUTLET REMAIN UNLESS SHOWING DAMAGE UPON INSPECTION

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Civil Legend - See Sheet C-001

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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

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DEMOLITION PLAN

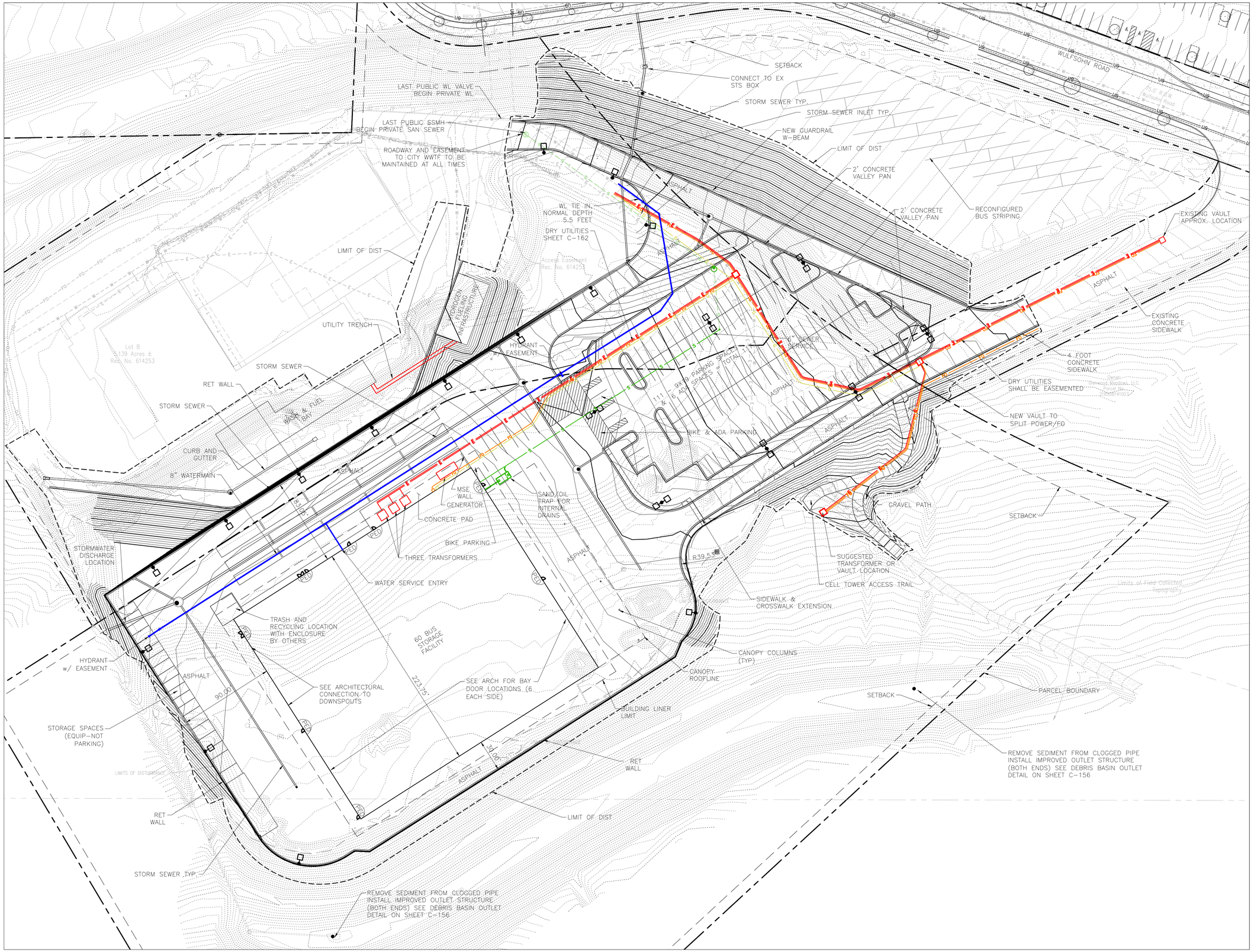
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40' 20' 0' 40' 80'

SCALE: 1" = 40'

04/22/22

C-021 LE.R2 STANTEC PROJECT #2270417345



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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

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GENERAL SITE AND UTILITY PLAN

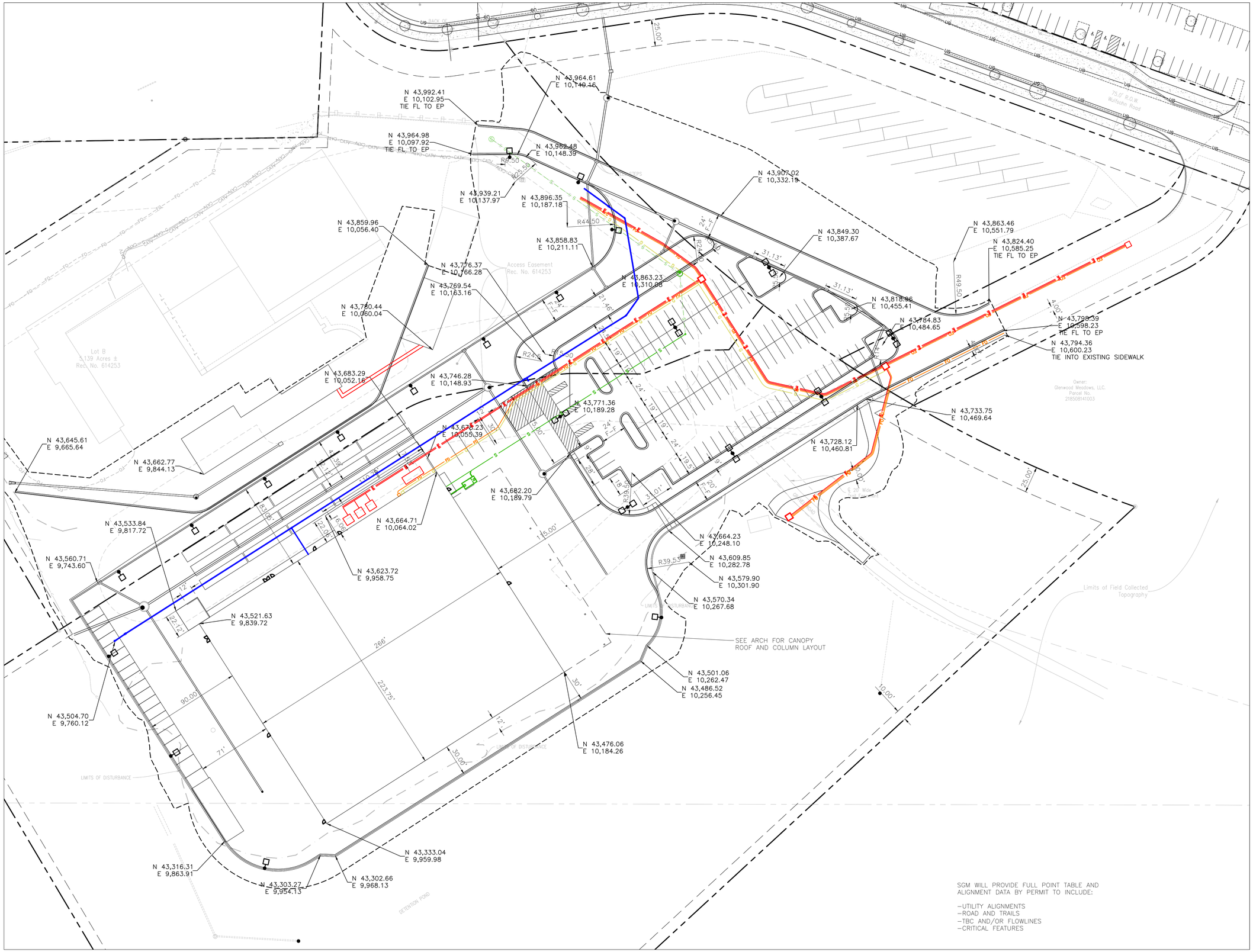
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40' 20' 0' 40' 80'

SCALE: 1" = 40'

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C-101 LE.R2 STANTEC PROJECT #2270417345



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Civil Legend - See sheet C-001

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GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

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GEOMETRY SHEET

N

40' 20' 0' 40' 80'
SCALE: 1" = 40'

04/22/22

C-102 LE.R2 STANTEC PROJECT #2270417345



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4/22/22

Civil Legend - See Sheet C-001

Client/Project Logo

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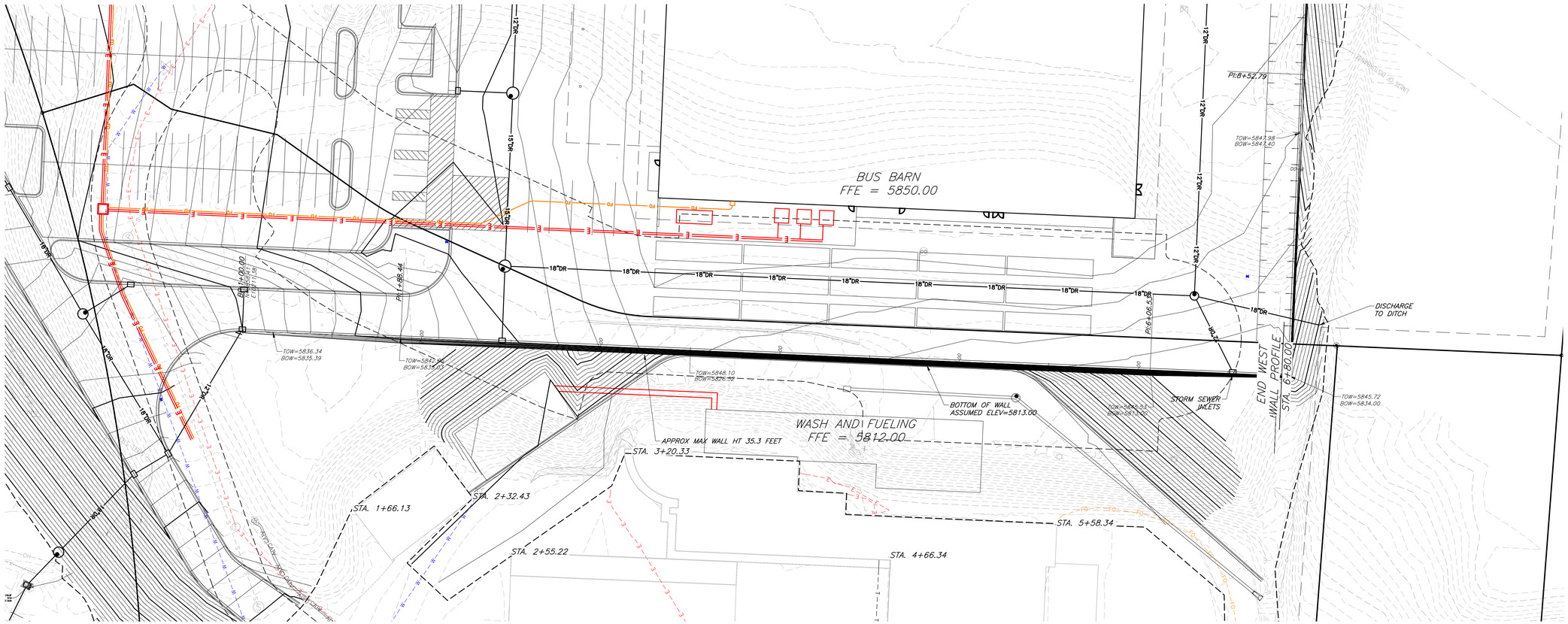
GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

2307 WULFSOHN RD.,
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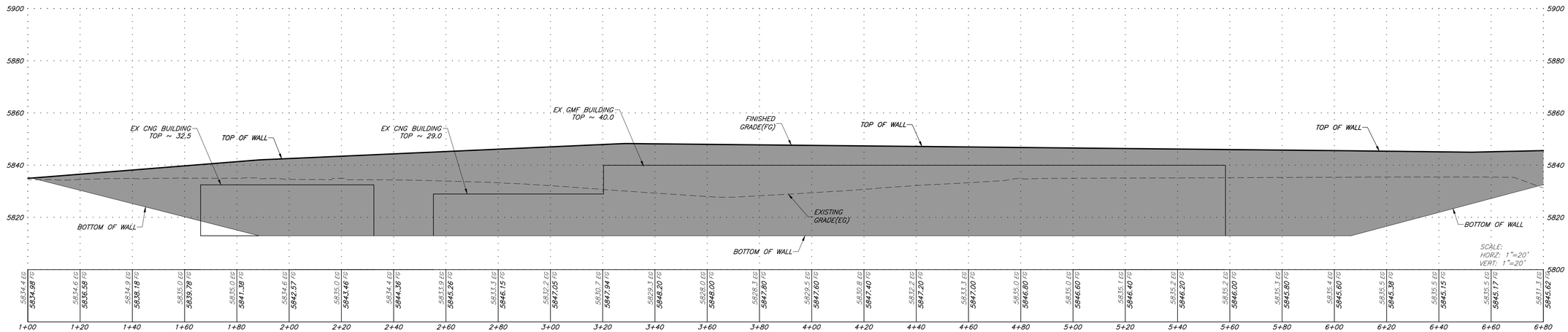
GRADING & DRAINAGE PLAN

04/22/22

C-111 LE.R2 STANTEC PROJECT #2270417345







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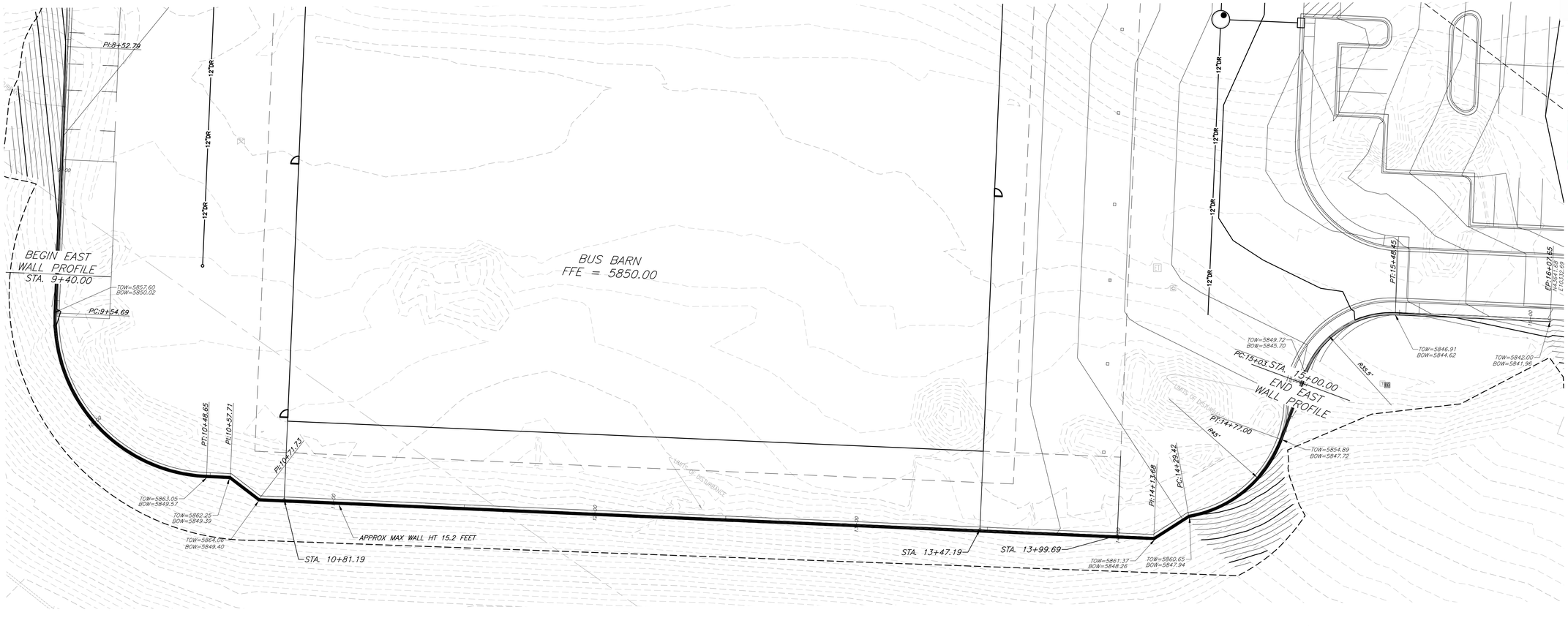
GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

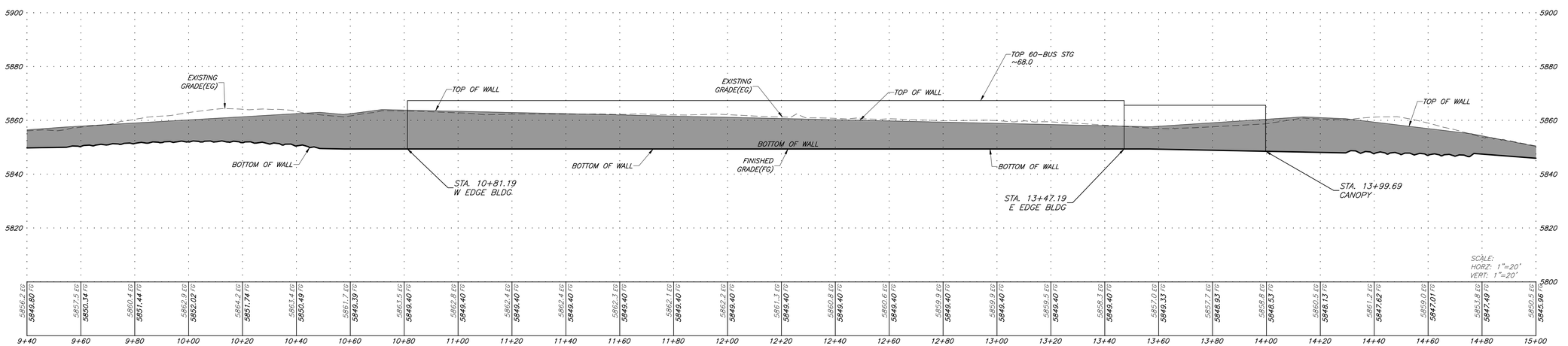
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WALL GRADING PLAN & PROFILE

04/22/22

C-112 LE.R2 STANTEC PROJECT #2270417345





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Civil Legend - See Sheet C-001

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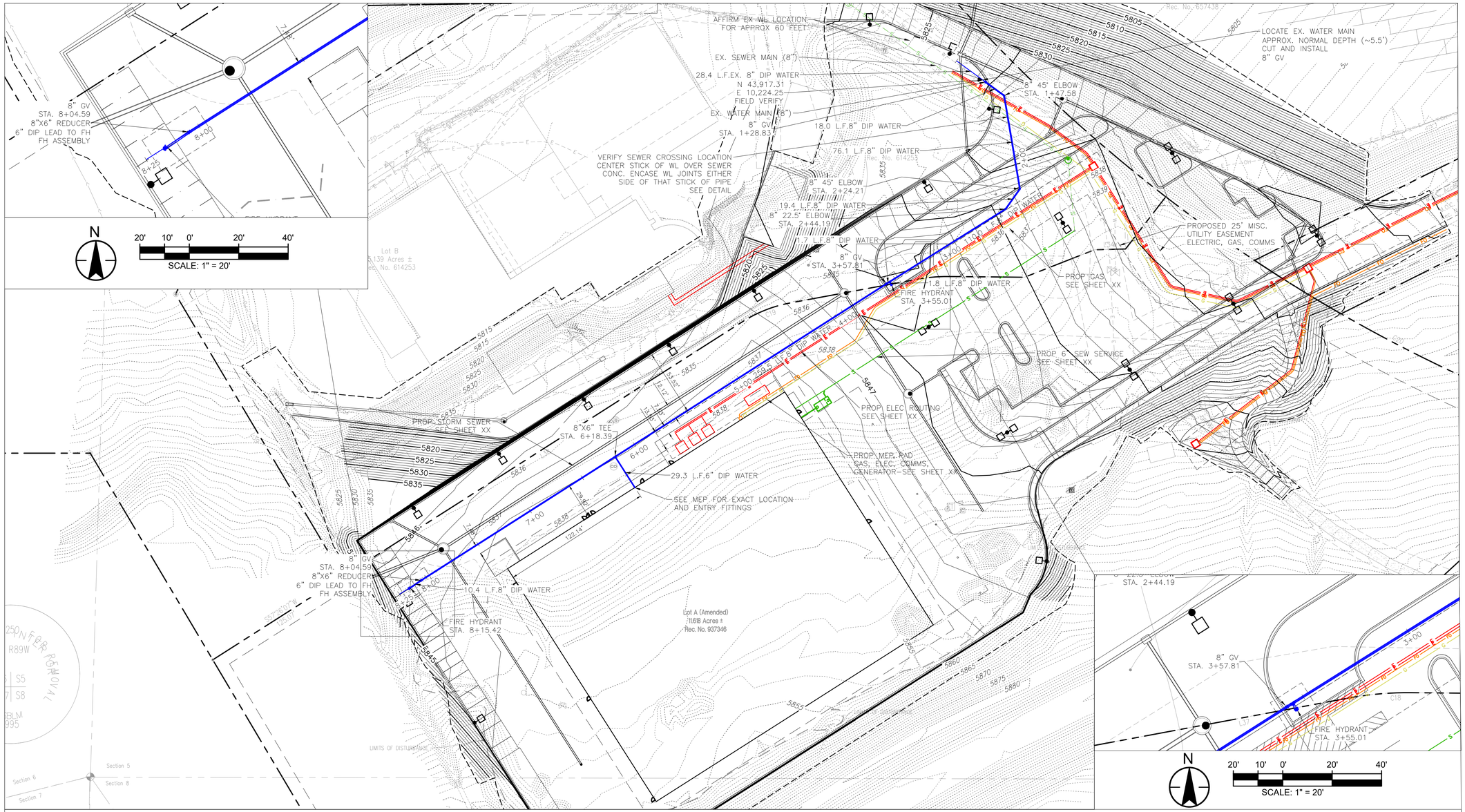
GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

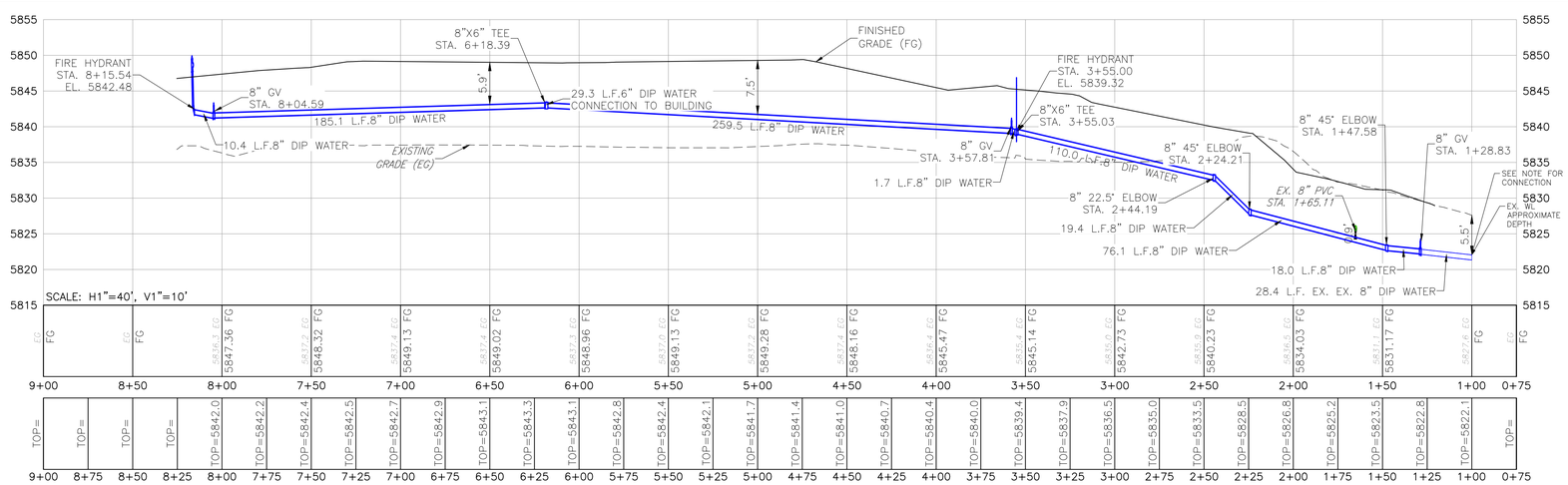
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WALL GRADING PLAN & PROFILE

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C-113 LE.R2 STANTEC PROJECT #2270417345





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GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS -

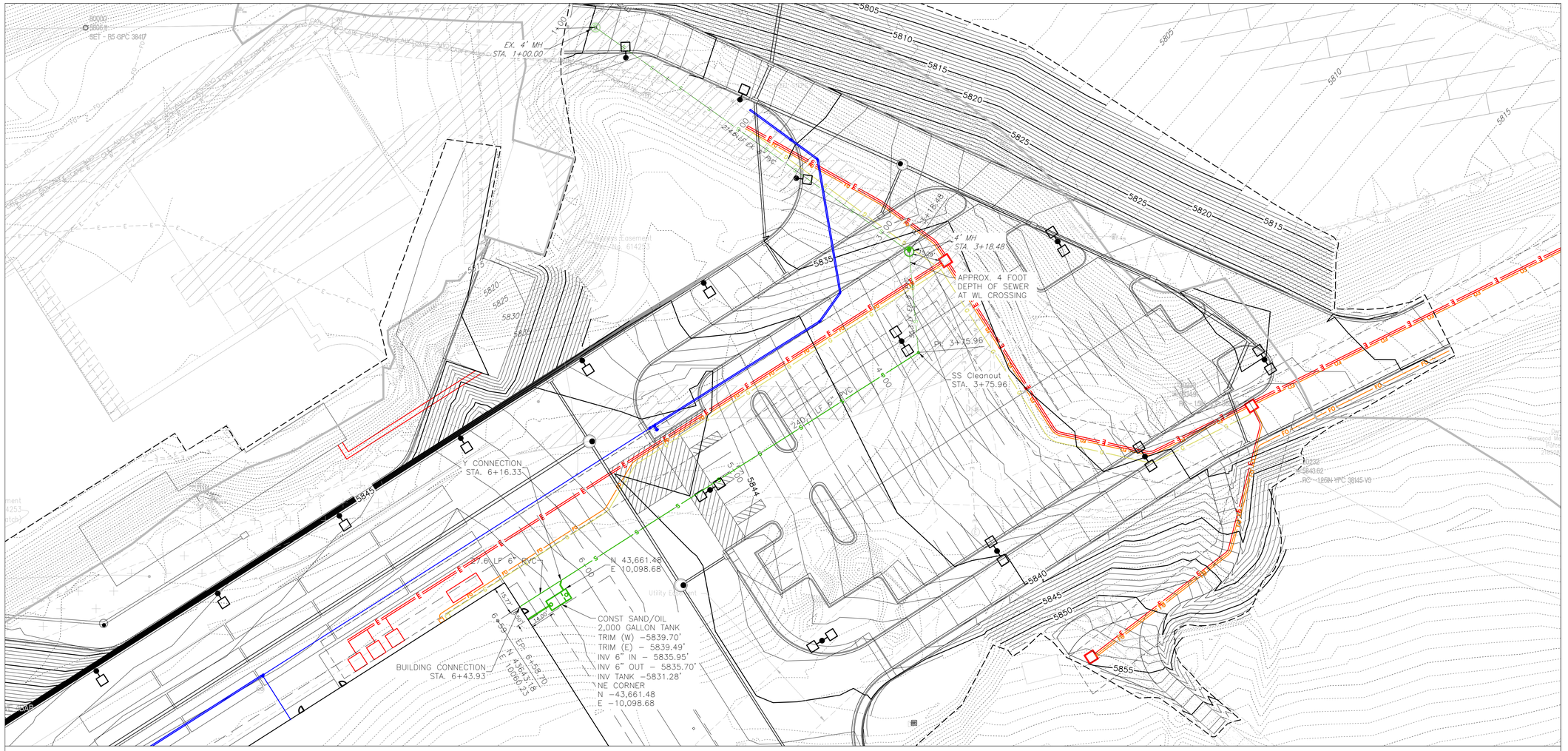
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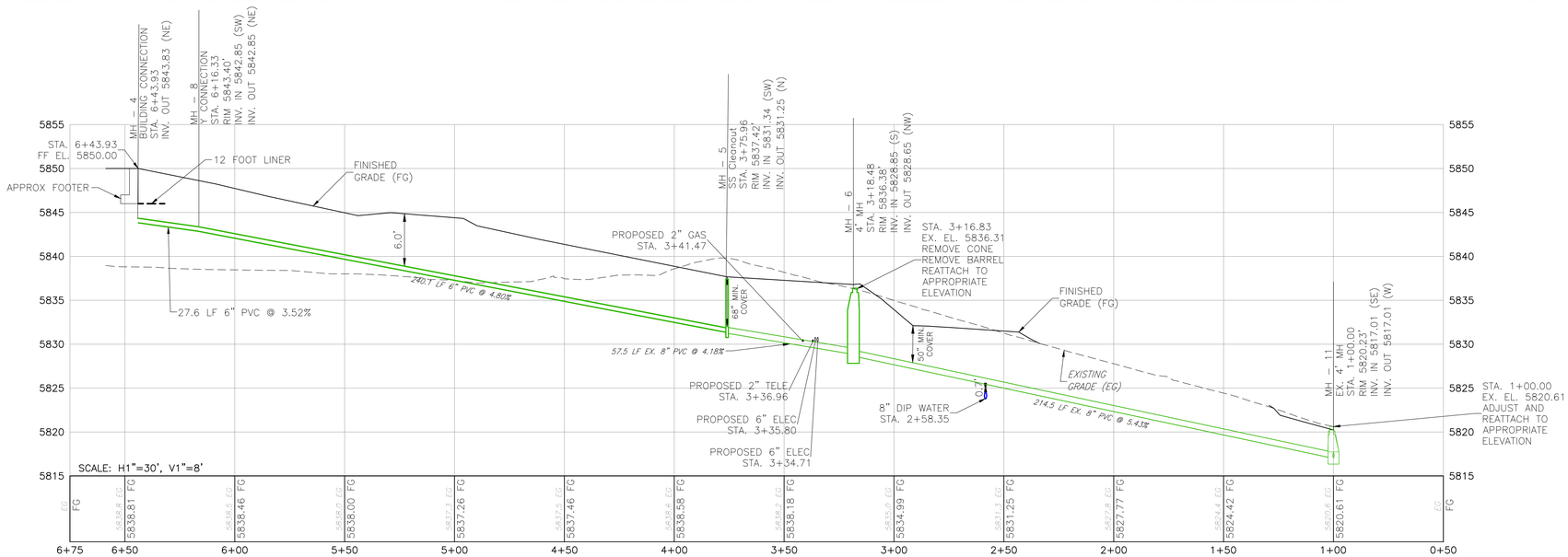
WATERLINE
PLAN & PROFILE

N
40' 20' 0' 40' 80'
SCALE: 1" =20'

04/22/22

C-151 LE.R2 STANTEC PROJECT #2270417345





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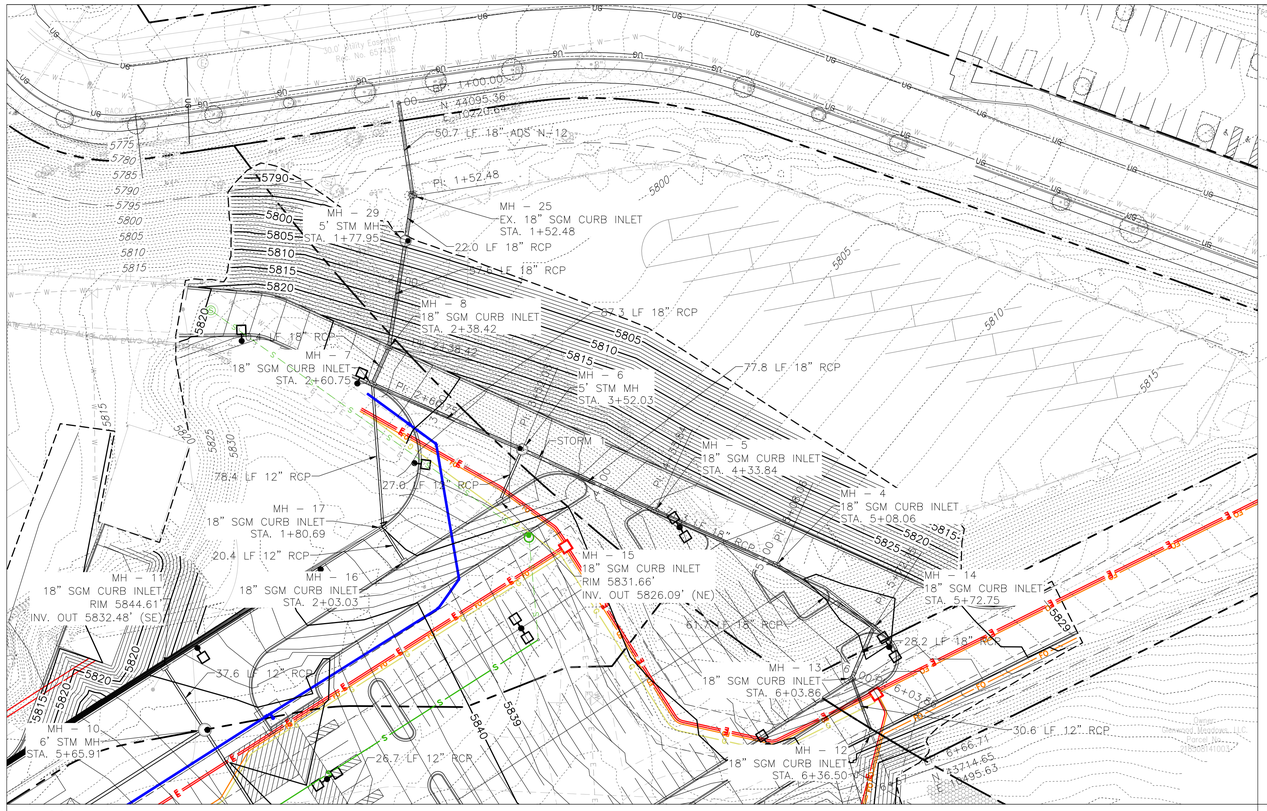
SEWER SERVICE PLAN & PROFILE

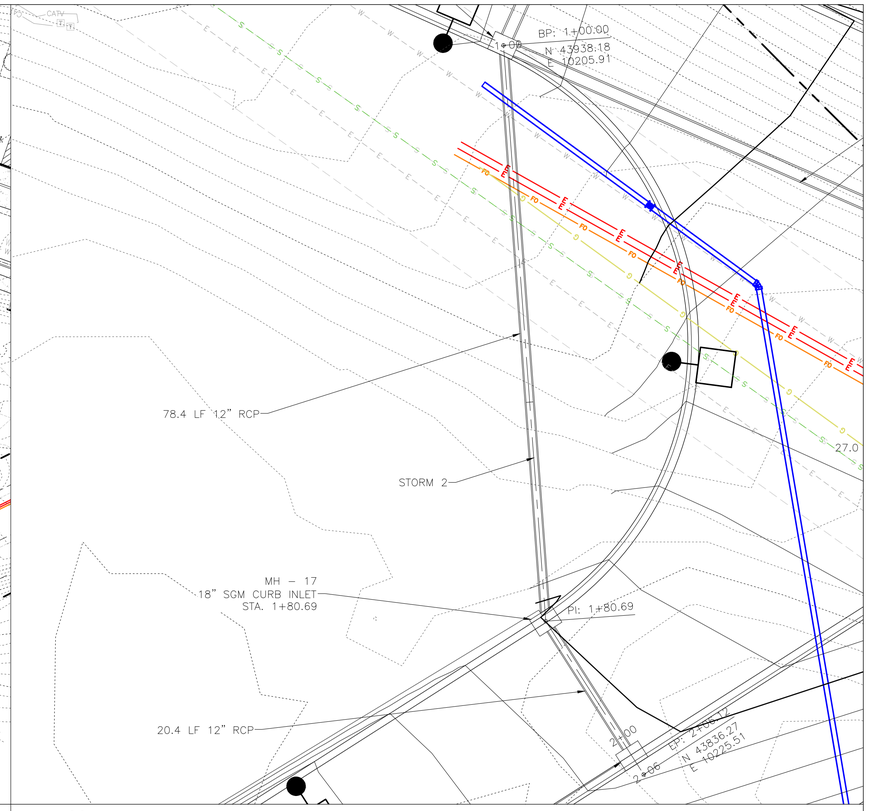
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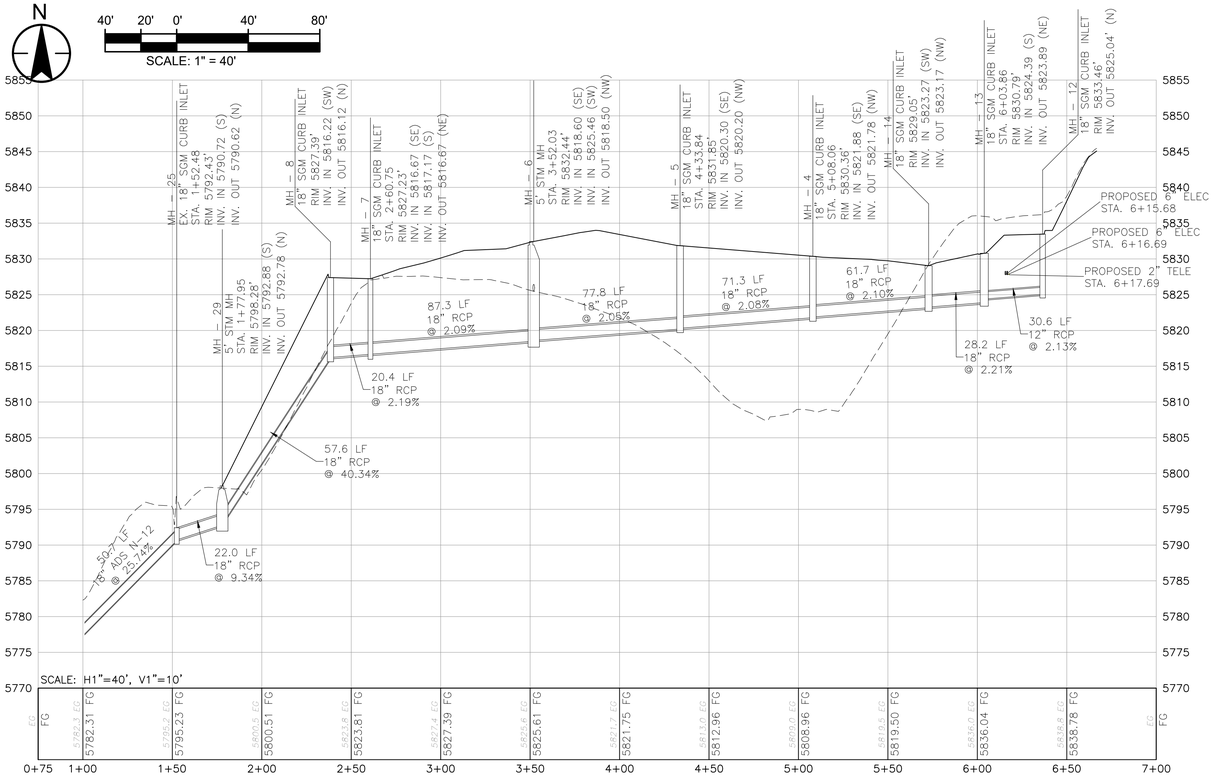
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SCALE: 1" = 30'

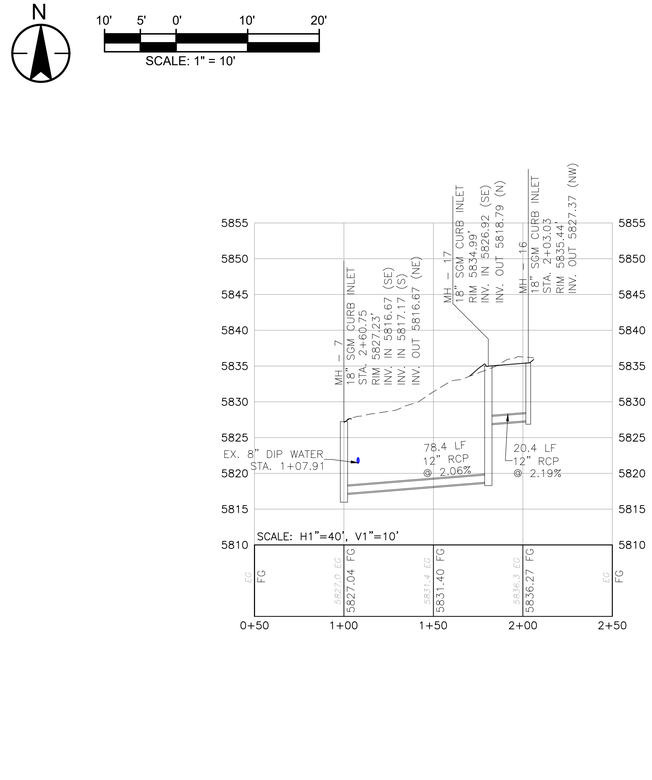
04/22/22

C-152 LE.R2 STANTEC PROJECT #2270417345









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Civil Legend - See sheet C-001

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

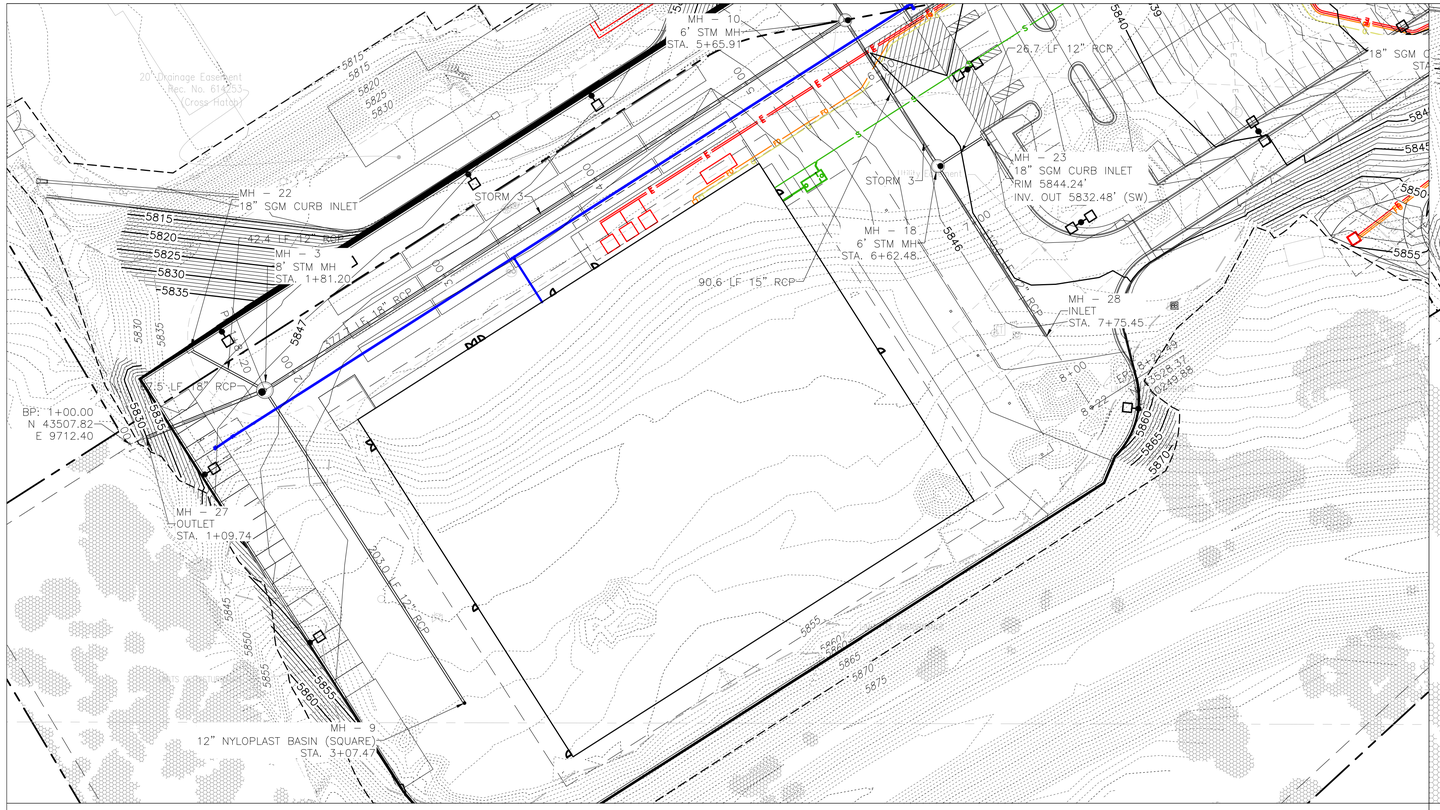
GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

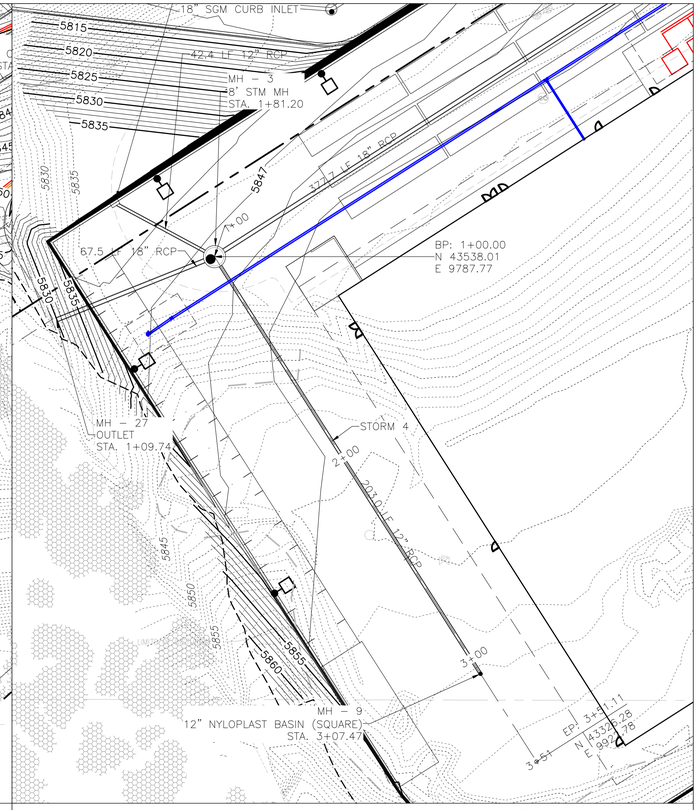
2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

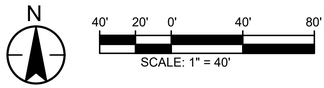
STORM SEWER PLAN & PROFILE 1&2

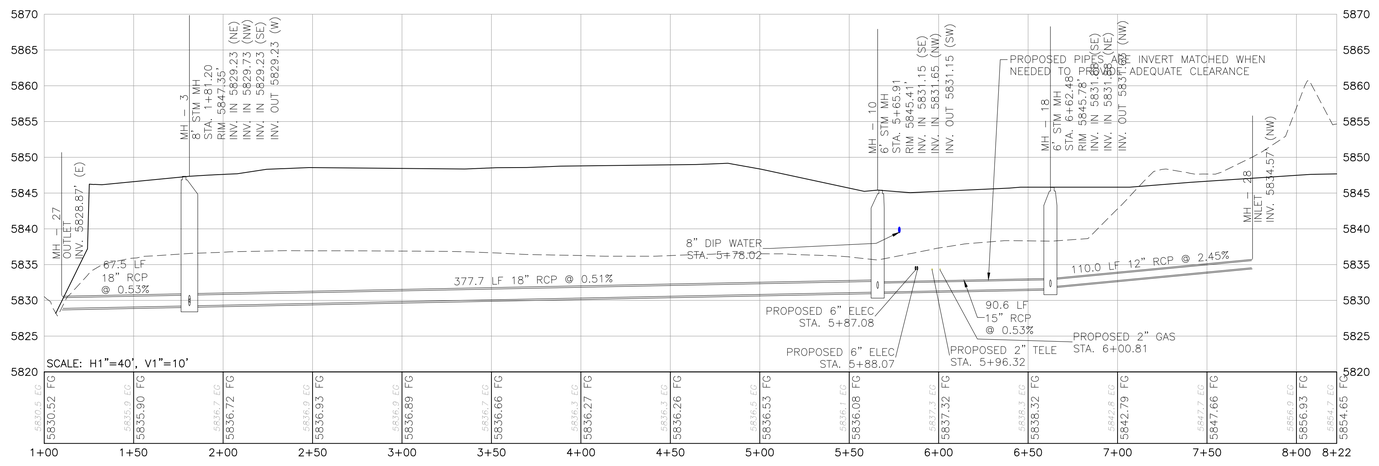
04/22/22

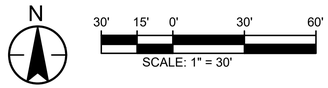
C-153 LE.R2 STANTEC PROJECT #2270417345

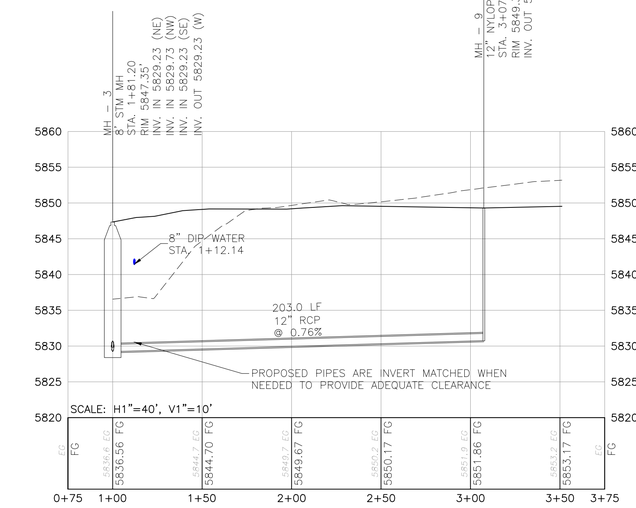












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Client/Project Logo

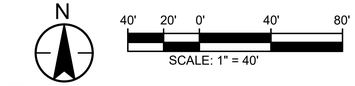
RFTA
Roaring Fork Transportation Authority

Client/Project

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MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

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STORM SEWER
PLAN & PROFILE 3&4



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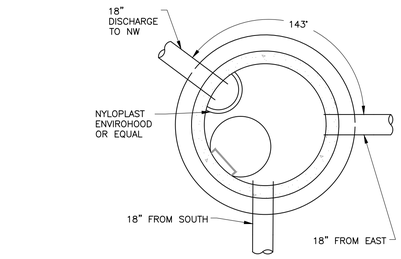
PAVING & SIGNAGE PLAN

N

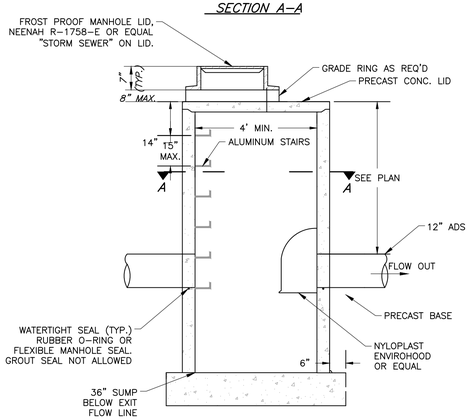
40' 20' 0' 40' 80'
SCALE: 1" = 40'

04/22/22

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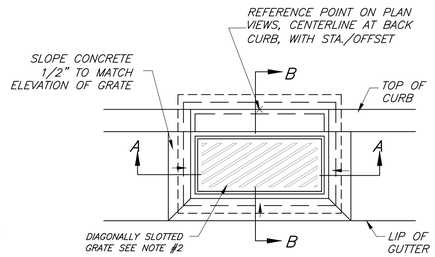


SECTION A–A



STORM SEWER MANHOLE

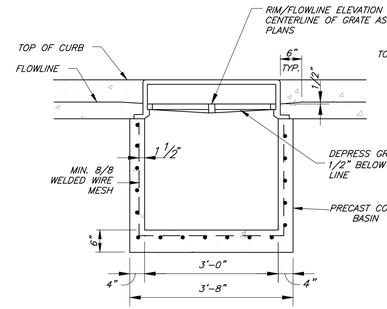
NOT TO SCALE



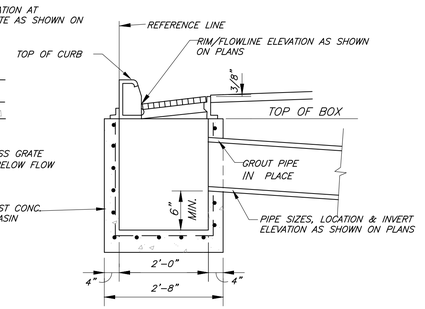
PLAN

NOTES:

1) FRAME, GRATE & CURB INLET TO BE DEETER FOUNDRY, INC. #2046 OR APPROVED EQUAL. "DRAINS TO RIVER" ON GRATE.
2) DOUBLE INLET FRAME, GRATE & CURB INLET TO BE DEETER FOUNDRY, INC. #2046 OR APPROVED EQUAL. (ABUTTING SIDE FLANGES TO BE OMITTED TO FORM DOUBLE). THE CONCRETE BASIN FOR THE DOUBLE INLET SHALL BE THE SAME AS SHOWN, EXCEPT THAT THE OVERALL WIDTH OF SECTION A–A SHALL BE 6'–10" RATHER THAN 3'–8".
3) FRAME & GRATE SHALL BE ASPHALT PAINT–DIPPED BY MANUFACTURER.
4) PRECAST CONCRETE ADJUSTMENT RINGS (IF REQUIRED) SHALL BE GROUTED IN PLACE.
5) PIPE ENDS ARE TO BE TRIMMED FLUSH WITH THE INTERIOR WALLS.
6) SET GRATE W/ CONC. LEVELING COURSE TO MATCH LONGITUDINAL SLOPE OF THE ROAD. IF GREATER THAN 2% SLOPE. OTHERWISE SET AT LOW END GRADE OF PAVING.



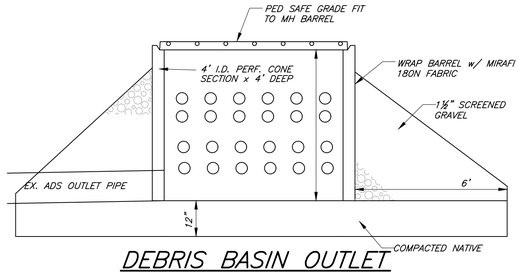
SECTION A–A



SECTION B–B

CURB DRAIN INLET

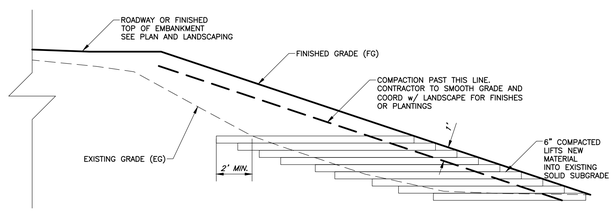
NTS



DEBRIS BASIN OUTLET

N.T.S.

2 LOCATIONS



TYPICAL EMBANKMENT KEYING DETAIL

EARTHWORK PROCEDURES AND DETAILS MAY NEED ADJUSTMENT PENDING EXPOSED FIELD CONDITIONS. CONFIRM WITH GEOTECHNICAL REPORT.

NOTES:

1) M–604, TYPE 13 (VALLEY PAN) INLET DETAILS

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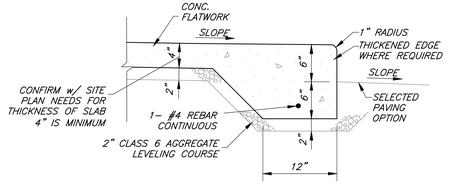
GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

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GLENWOOD SPRINGS, CO 81601

GRADING & DRAINAGE DETAILS

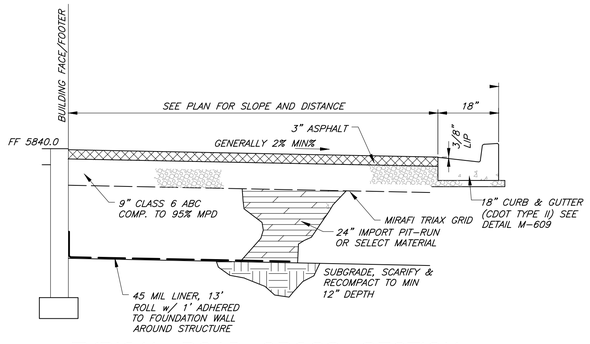
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C-156 LE.R2 STANTEC PROJECT #2270417345



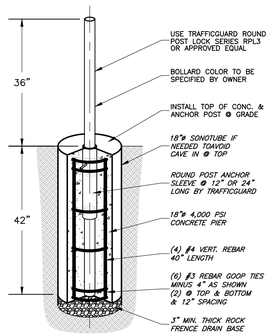
CONCRETE FLATWORK THICKENED EDGE

NTS



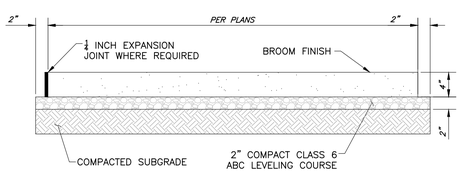
TYPICAL ROAD CROSS-SECTION

NTS



REMOVABLE BOLLARD SECTION

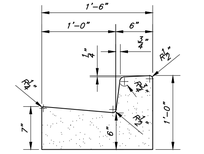
NTS



CONCRETE SIDEWALK

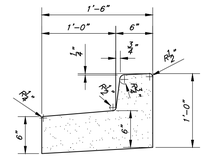
NOTES:

1) EXPANSION JOINTS: 100' ON CENTER AND AT DRIVEWAYS.
2) DUMMY JOINTS: 1" DEEP BY 1/8" – 1/4" WIDTH AT INTERVALS EQUAL TO SIDEWALK WIDTH.
3) USE 1/4" RADIUS ON ALL EDGES.
4) USE 6" DEPTH OF CONCRETE ON ALL DRIVEWAYS.
5) CURE FOR 72 HOURS USING CURING COMPOUND, PLASTIC COVERING OR MOISTURE.
6) USE 3750 PSI CONCRETE WITH FIBERMESH ADDITIVE AT 1-1/2 LBS./C.Y. MAXIMUM SLUMP 4".



18" CATCH CURB & GUTTER

NTS - SEE CDOT TYPE II



18" INVERTED CURB & GUTTER

NTS - SEE CDOT TYPE II



CUSTOM-1



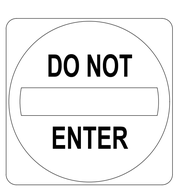
R1-6



R1-1



R2-1



R5-1



R4-7bR



R6-1L

NOTES:

1) SEE PAVING PLAN FOR SIGNAGE PLACEMENT.
2) ALL SIGNS TO BE ON CDOT CLASS 1 SIGN POSTS UNLESS OTHERWISE NOTED.

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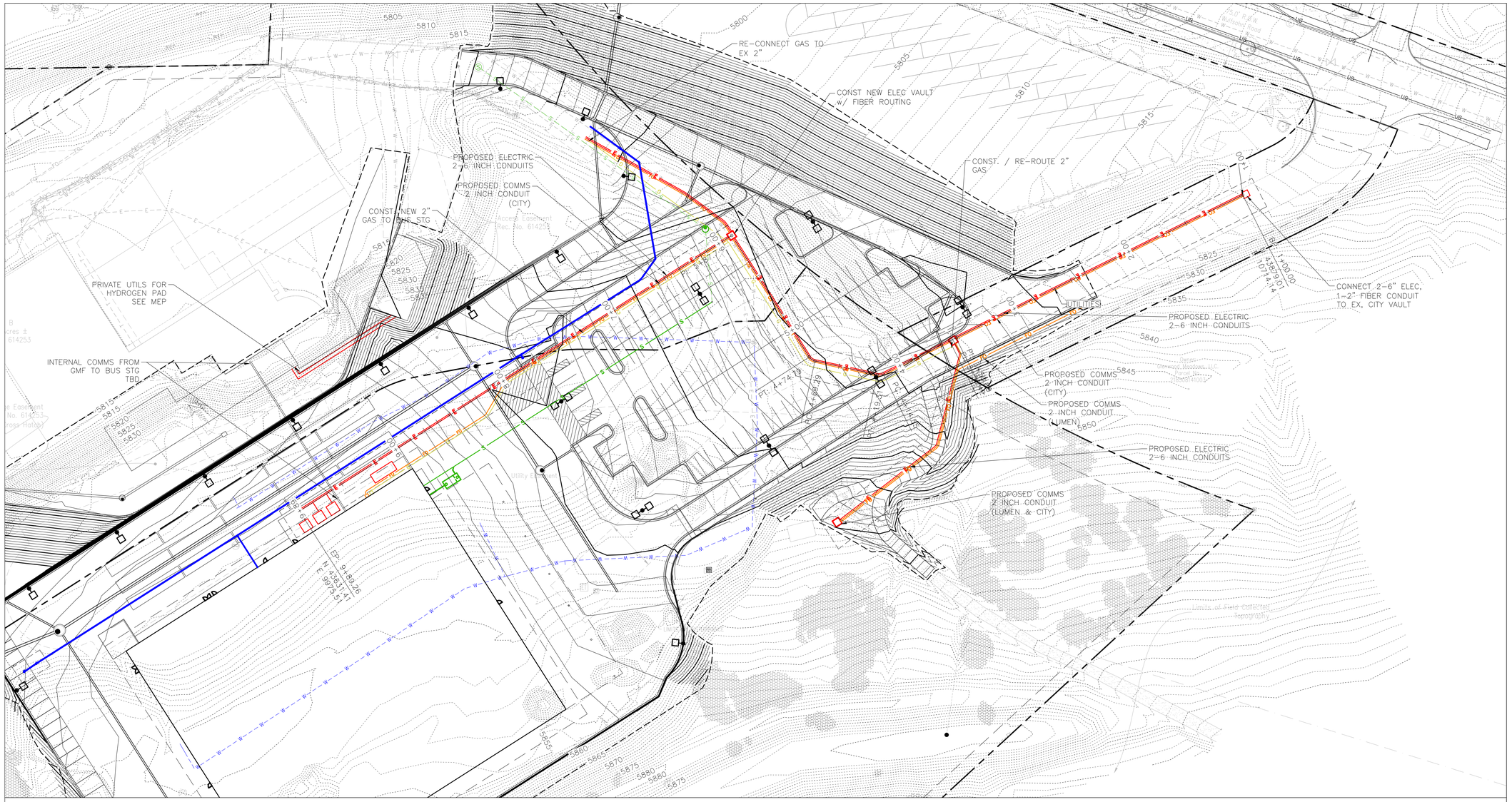
GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

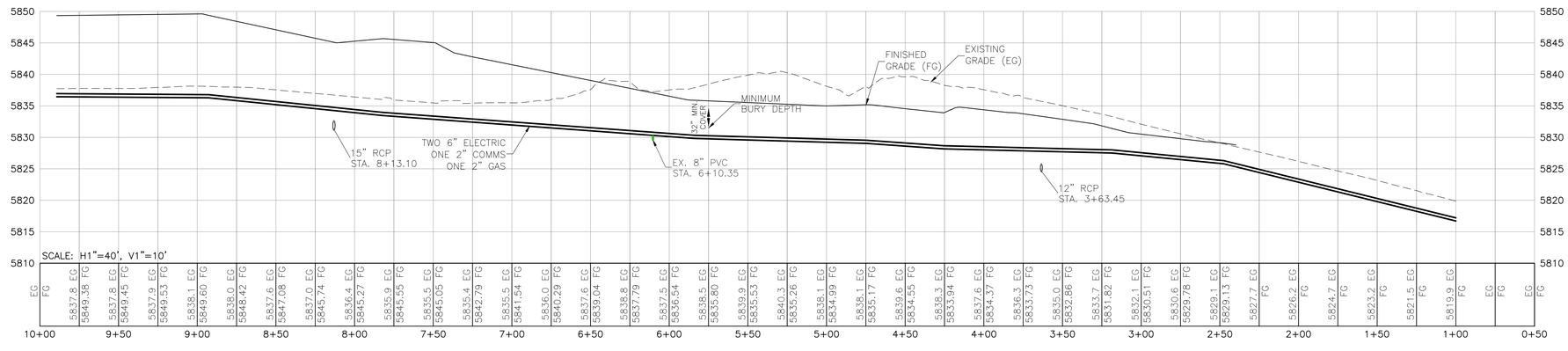
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PAVING & SIGNAGE DETAILS

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GLENWOOD SPRINGS
MAINTENANCE FACILITY - BUS
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ELECTRIC, COMS, GAS PLAN & PROFILE

N

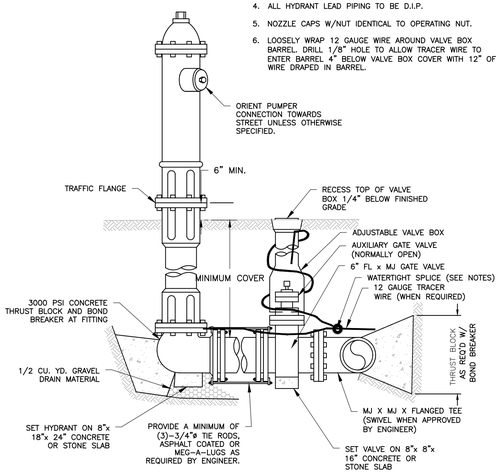
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SCALE: 1" = 40'

04/22/22

C-162 LE.R2 STANTEC PROJECT #2270417345

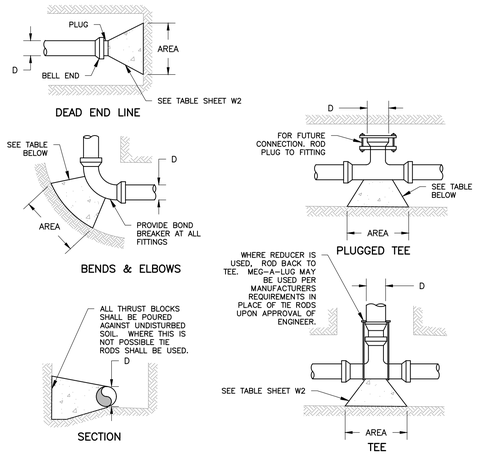
NOTES:

1. ALL JOINTS FROM MAIN TO HYDRANT SHALL BE HARNESSED MECHANICAL JOINTS OR FLANGED JOINTS.
2. HYDRANT, VALVE & FITTINGS TO BE 250 PSI RATED.
3. POLYETHYLENE WRAP (WHEN REQUIRED) SHALL COVER ASSEMBLY FROM HYDRANT BASE TO WATER MAIN.
4. ALL HYDRANT LEAD PIPING TO BE D.I.P.
5. NOZZLE CAPS W/NUT IDENTICAL TO OPERATING NUT.
6. LOOSELY WRAP 12 GAUGE WIRE AROUND VALVE BOX BARREL. DRILL 1/8" HOLE TO ALLOW TRACER WIRE TO ENTER BARREL 4" BELOW VALVE BOX COVER WITH 12" OF WIRE DRAPED IN BARREL.



FIRE HYDRANT ASSEMBLY DETAIL

N.T.S.



CONCRETE THRUST BLOCK DETAILS

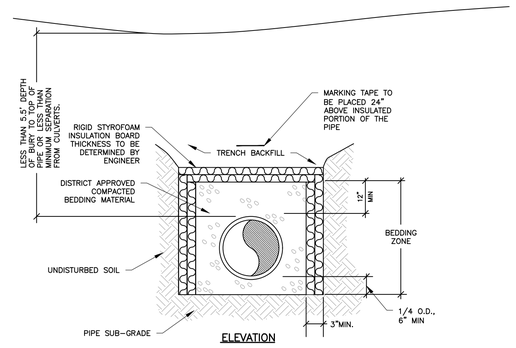
N.T.S.

SIZE	BEARING AREAS (IN SQ. FT.)				
	BENDS				TEES, DEAD ENDS, AND CROSS w DEAD END BRANCHES
	90°	45°	22 1/2°	11 1/2°	
4	2.2	1.2	0.6	0	1.5
6	4.8	2.6	1.3	0	3.3
8	8.4	4.5	2.4	1.2	5.9

NOTE: TEE SIZE IS BRANCH SIZE.

CONCRETE THRUST BLOCK SIZING TABLE

N.T.S.



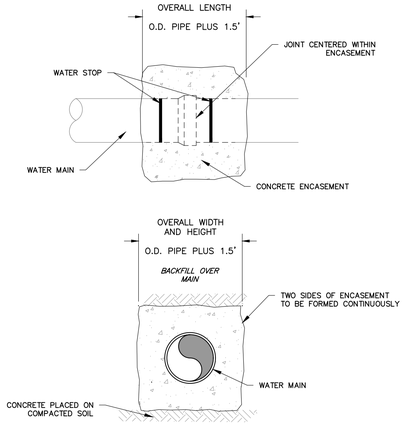
ELEVATION

GENERAL NOTES

1. CONDITION OF LESS THAN MINIMUM BURY DEPTH ALLOWED ONLY WITH WRITTEN APPROVAL FROM THE DISTRICT PRIOR TO CONSTRUCTION. INSULATION SHALL BE INSTALLED ON ALL PIPE THAT DOES NOT MEET MINIMUM BURY REQUIREMENTS. 1" INSULATION ~ 12" SOIL EQUIVALENCY.
2. SEE SEWER AND WATER PIPE BEDDING DETAIL FOR BACKFILL MATERIAL AND COMPACTION SPECS.
3. INSULATION SHALL BE INSTALLED ON ALL PIPE THAT IS WITHIN TWO FEET OF ANY DRAINAGE CULVERT. THIS APPLIES TO THE BOTTOM OF THE PIPE IF IT CROSSES OVER TOP OF THE CULVERT.
4. ALTERNATE COVER, INSULATE THE TOP BUT DO NOT EXPOSE THE TRENCH SIDES. GENERAL FORMULA FOR WIDTH OF INSULATION:
   4.1. PIPE DIAMETER X 3 + 2 (5.5 FEET FROST – (REAL DEPTH OF COVER + PIPE DIA + 0.5 FT). OUR CALCULATED MINIMUM DEPTH OF COVER WITH CURRENT INFORMATION = 3.4 FEET. THEREFORE:
   4.1.1. (0.67 X 3) + 2 (5.5 – (3.4 + 0.67 + 0.5)) = 3.68 ~ USE 4' BOARD.

WATER PIPE INSULATION DETAIL

N.T.S.



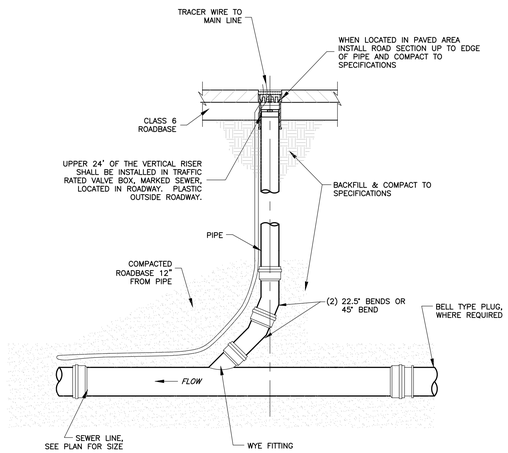
NOTE: IF WATERLINE HAS 18" OR LESS VERTICAL SEPARATION FROM SEWER, ALL JOINTS WITHIN 10' OF CROSSING OR MANHOLE MUST BE ENCASED IN CONCRETE.

WATER MAIN JOINT CONCRETE ENCASEMENT DETAIL

N.T.S.

SEPARATION OF WATER AND SEWER MAINS

1. PARALLEL INSTALLATION:
   A. NORMAL CONDITIONS—WHENEVER POSSIBLE, MAINS SHOULD BE LAID AT LEAST TEN FEET HORIZONTALLY FROM ANY SANITARY SEWER, STORM SEWER OR SEWER MANHOLE. THE DISTANCE SHOULD BE MEASURED EDGE-TO-EDGE.
   B. UNUSUAL CONDITIONS—WHEN LOCAL CONDITIONS PREVENT A HORIZONTAL SEPARATION OF TEN FEET, A WATER MAIN MAY BE LAID CLOSER TO STORM OR SANITARY SEWER PROVIDED THAT:
      1) IT IS LAID IN A SEPARATE TRENCH.
      2) THE ELEVATION OF THE CROWN OF THE SEWER IS AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN. SUCH SEPARATION SHOULD BE OF UNDISTURBED OR COMPACTED EARTH.
      3) WHERE THIS VERTICAL SEPARATION CANNOT BE OBTAINED, THE SEWER SHOULD BE CONSTRUCTED OF MATERIALS AND WITH JOINTS THAT ARE EQUIVALENT TO WATER MAIN STANDARDS OF CONSTRUCTION.
2. CROSSINGS:
   A. NORMAL CONDITIONS—WHENEVER POSSIBLE, WATER MAINS CROSSING OVER HOUSE SEWERS, STORM SEWERS, OR SANITARY SEWERS SHOULD BE LAID TO PROVIDE A SEPARATION OF AT LEAST 18 INCHES BETWEEN THE INVERT OF THE PRESSURE WATER MAIN AND THE CROWN OF THE SEWER.
   B. UNUSUAL CONDITIONS—WHEN LOCAL CONDITIONS PREVENT A VERTICAL SEPARATION AS DESCRIBED ABOVE, THE FOLLOWING CONSTRUCTION SHOULD BE USED:
      1) SEWER PASSING OVER OR LESS THAN 18 INCHES UNDER WATER MAINS SHOULD BE CONSTRUCTED OR MODIFIED USING ONE OF THE FOLLOWING METHODS:
         a) ONE LENGTH OF PIPE AT LEAST 18 FEET LONG CENTERED OVER OR UNDER THE WATER MAIN. JOINTS BETWEEN THE SEWER PIPE AND THE SPECIAL PIPE SHOULD BE ENCASED IN A CONCRETE COLLAR AT LEAST 6 INCHES THICK AND EXTENDING AT LEAST 6 INCHES EITHER SIDE OF THE JOINT.
         b) CONCRETE OR VITRIFIED CLAY SEWER PIPE WITH REINFORCED CONCRETE ENCASEMENT. ENCASEMENT SHOULD BE AT LEAST 6 INCHES THICK AND EXTEND A DISTANCE OF 10 FEET ON BOTH SIDES OF THE WATER MAIN.
      2) WATER MAINS PASSING UNDER SEWERS SHOULD, IN ADDITION, BE PROTECTED BY PROVIDING:
         a) A VERTICAL SEPARATION OF AT LEAST 18 INCHES BETWEEN THE INVERT OF THE SEWER AND THE CROWN OF THE WATER MAIN.
         b) ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING ON AND BREAKING THE WATER MAINS.

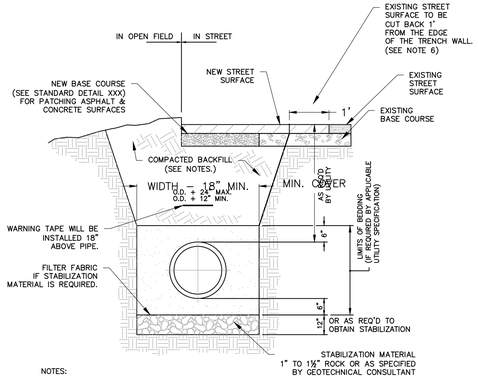


NOTES:

1. MUST BE TRAFFIC RATED IF INSTALLED IN TRAFFIC AREAS.

SEWER OR SMALL DRAIN PIPE CLEAN-OUT

N.T.S.



NOTES:

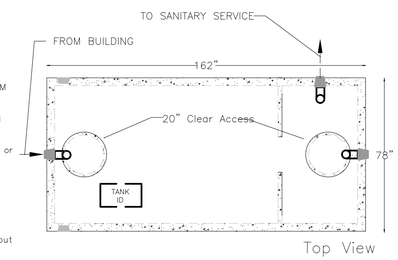
1. RIGHT OF WAY & EASEMENT AREAS SHALL BE GRADED (CUT & FILL) TO SUBGRADE (+/–0.5) AT UTILITY LOCATIONS INCLUDING SERVICES, PRIOR TO UTILITY INSTALLATION.
2. BACKFILL TO BE COMPACTED TO 95% AND WITHIN TWO (2)% OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY A.S.T.M. D-698 DENSITY IN ALL AREAS UNLESS OTHERWISE NOTED.
3. TRENCH EXCAVATION SHALL COMPLY WITH ALL OSHA STANDARDS.
4. FILTER FABRIC IS REQUIRED IF STABILIZATION MATERIAL IS USED. THE FABRIC SHALL BE INSTALLED AS SHOWN IN THE DETAIL.
5. IF NOT SPECIFIED BY APPLICABLE UTILITY, AN APPROVED GRADE OF SAND BEDDING SHALL BE INSTALLED TO SPRINGLINE.
6. A ONE FOOT CUT BACK IS NOT REQUIRED IF FLOW FILL IS USED FOR BACKFILL.

TRENCH EXCAVATION & BACKFILL DETAIL

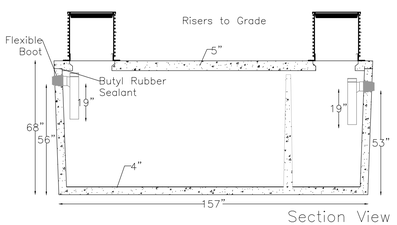
N.T.S.

DESIGN NOTES
- Design per performance test per ASTM C1227
- Top surface area 87.75 ft²
- f'c @ 28 days; concrete = 6,000 PSI Min.

Installation:
- Tank to be set on 5" min. sand bed or pea gravel
- Tank to be backfilled uniformly on all sides in lifts less than 24" and mechanically compacted
- Excavated material may be used for backfill, provided large stones are removed
- Excavation should be dewatered and tank filled with water prior to being put in service for installation with water table less than 2' below grade
- Meets C1644-06 for resilient connectors
- Inlet and Outlet identified above pipe
- Delivered complete with internal piping
- 4' Maximum bury depth



ALLOWABLE BURY (Based on Water Table)	
WATER TABLE	ALLOWABLE EARTH FILL
0' – 0"	3' – 0"
1' – 0"	3' – 0"
2' – 0"	4' – 0"
3' – 0"	4' – 0"
DRY	4' – 0"



Digging Specs	Invert		Dimensions			Net Capacity	Net Weight		
							Lid	Tank	Total
15' Long x 8' Wide 56" below inlet invert	Inlet 56"	Outlet 53"	Length 162"	Width 78"	Height 68"	2,142 gallons	5,420 lbs	15,140 lbs	20,560 lbs

PRECAST SAND/OIL SEPARATOR

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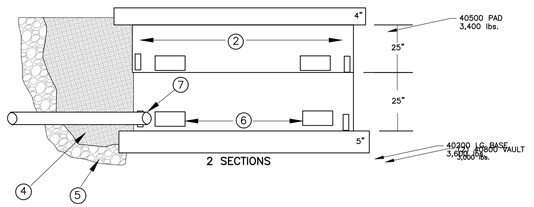
GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

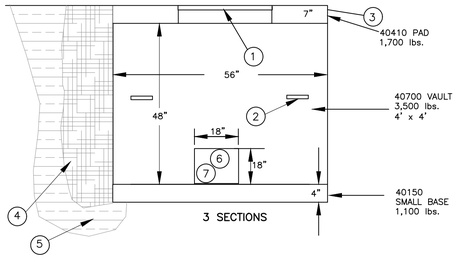
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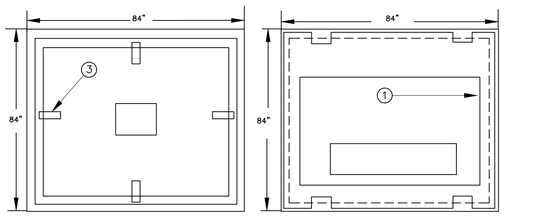
WATER & SEWER DETAILS

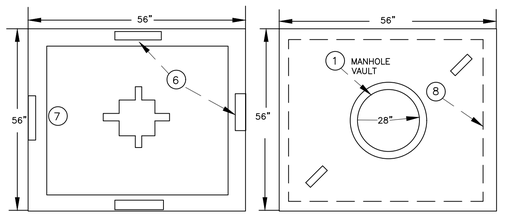
04/22/22

C-163 LE.R2 STANTEC PROJECT #2270417345









NOTES:

1. TYPICAL TRANSFORMER OUTLINE
2. LIFTING HANDLES (2) PER VAULT SECTION
3. LIFTING HOLES
4. BACKFILL TO BE WELL COMPACTED
5. SOIL UNDER BASE TO BE UNDISTURBED OR WELL COMPACTED
6. (8) KNOCKOUTS 8" X 12" PER VAULT SECTION
7. CONDUIT(S) INSTALLED THROUGH KNOCKOUTS SHALL BE GROUTED

3 PHASE (500 KVA or LARGER) TRANS. VAULT SPEC.

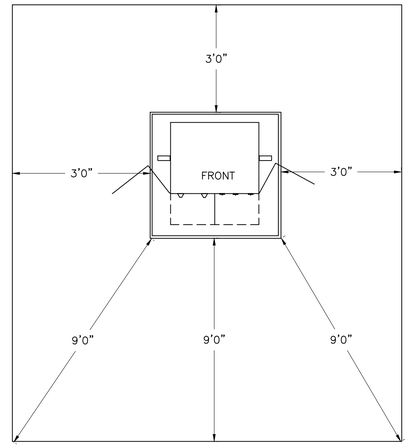
N.T.S.

NOTES:

1. 28" MANHOLE
2. 3/4" HOLE (TOTAL OF FOUR)
3. GROUND LEVEL
4. BACKFILL TO BE WELL COMPACTED
5. SOIL UNDER BASE TO BE UNDISTURBED OR WELL COMPACTED
6. (4) KNOCKOUTS 18" X 18" PER VAULT SECTION
7. CONDUIT(S) INSTALLED THROUGH KNOCKOUTS SHALL BE GROUTED
8. SECONDARY CABLE TAILS SHALL BE 60" LONG TO TOP OF PAD

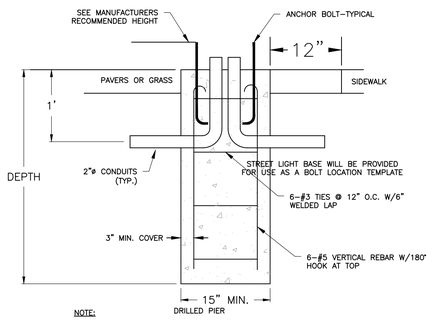
4' SQUARE MANHOLE VAULT SPECIFICATION

N.T.S.



TRANSFORMER AND EQUIPMENT CLEARANCES

N.T.S.



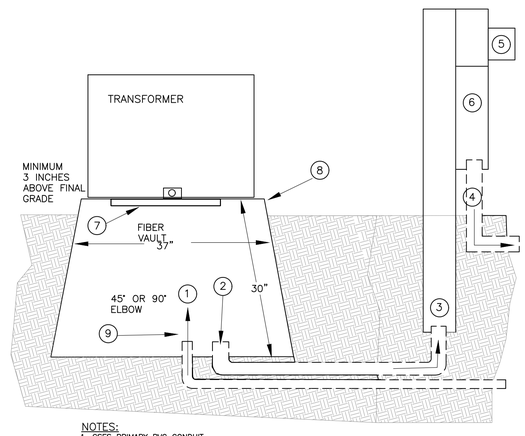
NOTE:

CONTRACTOR TO CUT EXISTING CONDUIT, INSTALL NEW CONDUIT TO AND THROUGH BASE OF LIGHT AT EACH FIXTURE USING LONG RADIUS SWEEPS AS NECESSARY, EXCAVATE FOR AND POUR FOUNDATION WITH REINFORCING AS SHOWN, AND REQUIRED ANCHOR BOLTS.

LIGHT FOUNDATION SCHEDULE		
POLE HEIGHT	10'	30'
DEPTH	3'	5'
DIAMETER	15"	24"
# OF ANCHOR BOLTS	3	4

STANDARD STREET LIGHT FOUNDATION

N.T.S.



NOTES:

1. GSES PRIMARY PVC CONDUIT
2. SECONDARY CONDUIT TO PEDESTAL
3. 3" PVC CONDUIT LINE SIDE
4. SECONDARY CONDUIT LOAD SIDE
5. GSES SUPPLIED WATT HOUR METER
6. MAIN DISCONNECT
7. OPENING MUST FACE DIRECTION OF FRONT OF TRANSFORMER DOOR
8. FIBER VAULT MUST BE PLACED LEVEL
9. CONDUIT ENTERING VAULT MUST EXTEND ABOVE GROUND LEVEL A MIN. OF 6" AND A MAX. OF 12"
10. A SEPERATE CONDUIT FOR EACH ELECTRIC SERVICE

TYPICAL FIBER TRANS. VAULT & METER PED SPECS.

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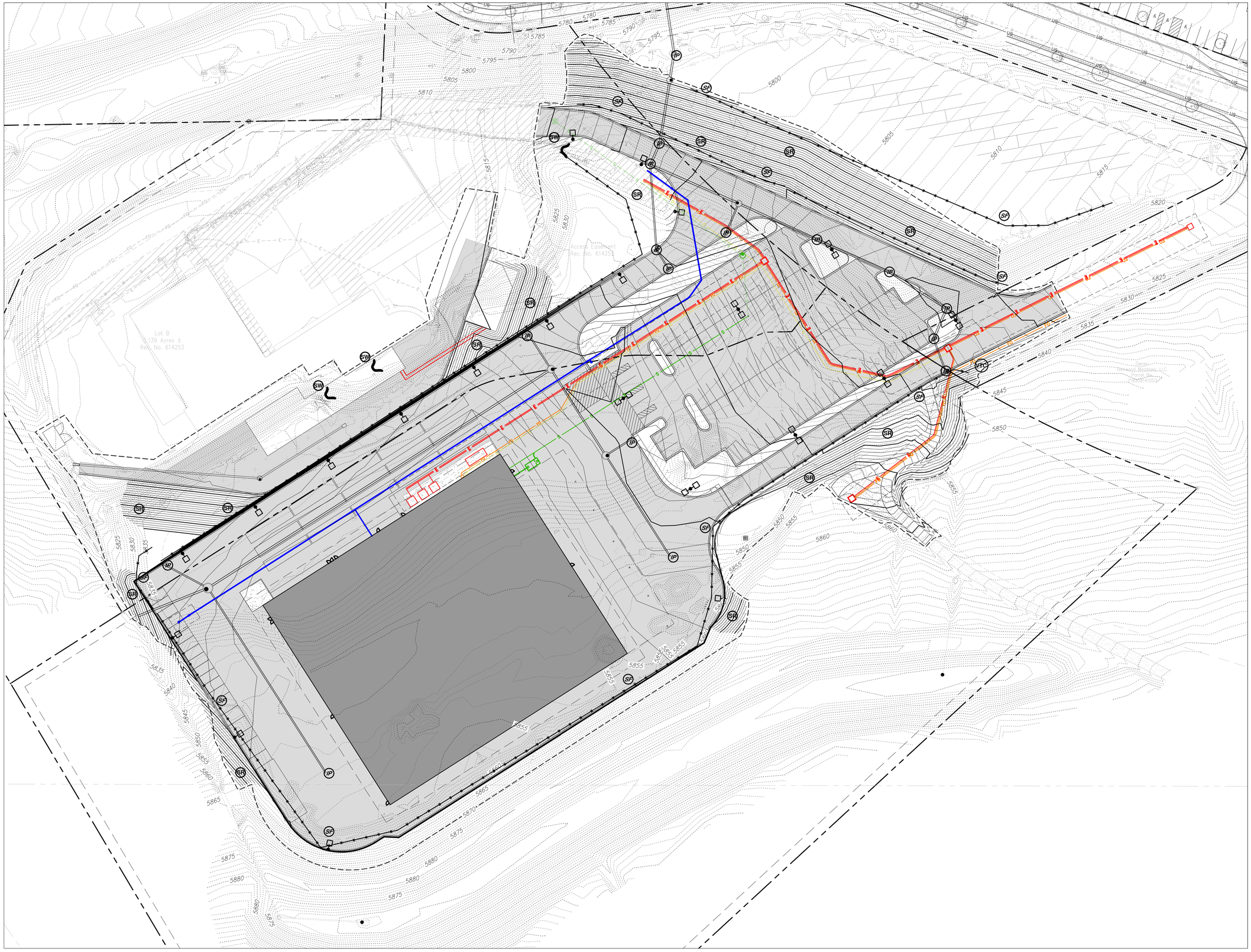
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ELECTRIC & MISC UTILITY DETAILS

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Civil Legend - See Sheet C-001

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MAINTENANCE FACILITY - BUS
STORAGE & OPERATIONS

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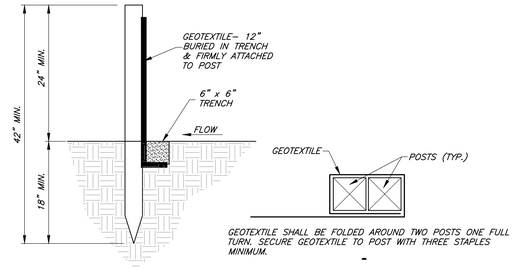
GENERAL EROSION CONTROL PLAN

N

40' 20' 0' 40' 80'
SCALE: 1" = 40'

04/22/22

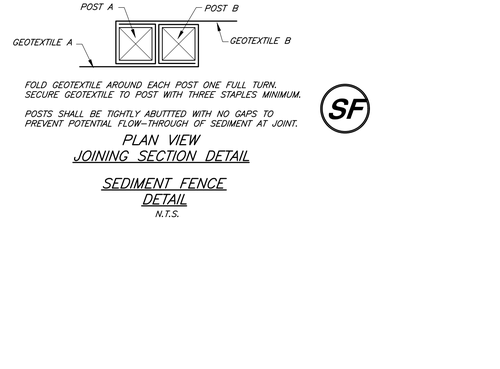
C-171 LE.R2 STANTEC PROJECT #2270417345



GEOTEXTILE SHALL BE FOLDED AROUND TWO POSTS ONE FULL TURN. SECURE GEOTEXTILE TO POST WITH THREE STAPLES MINIMUM.

EROSION CONTROL NOTES:

1. GEOTEXTILE SHALL BE ATTACHED TO WOOD POSTS WITH THREE OR MORE STAPLES PER POST.
2. STAPLES SHALL BE ½"
3. WOOD POST SHALL BE 1 ½" X 1 ½" NOMINAL.
4. REFER TO CDOT M-208-1

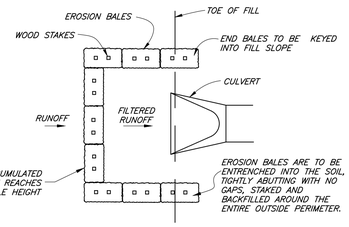


FOLD GEOTEXTILE AROUND EACH POST ONE FULL TURN. SECURE GEOTEXTILE TO POST WITH THREE STAPLES MINIMUM.

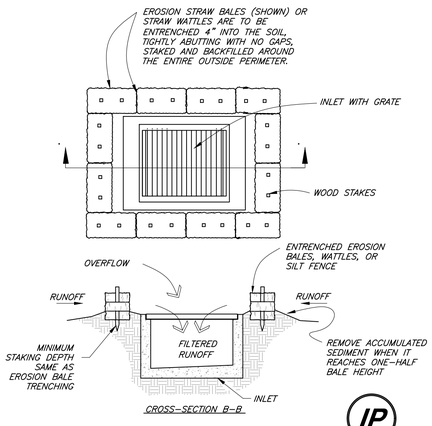
POSTS SHALL BE TIGHTLY ABUTTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.

PLAN VIEW
JOIINING SECTION DETAIL

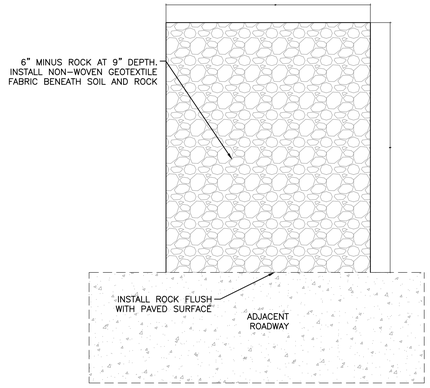
SEDIMENT FENCE DETAIL
N.T.S.



CULVERT EROSION BALE INLET PROTECTION
N.T.S.



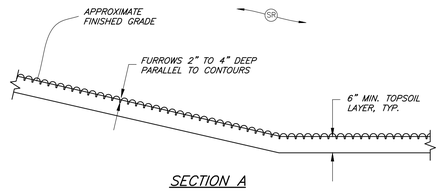
EROSION CONTROL INLET PROTECTION



VTC INSTALLATION NOTES:

1. INSTALL SEE PLAN VIE FOR GENERAL LOCATION. CONTRACTOR TO DETERMINE FINAL LOCATION OF CONSTRUCTION SITE ENTRANCE. VTC SHALL BE LOCATED AT ALL ACCESS POINTS TO PUBLIC OR PRIVATE ROADWAY CORRIDORS.
2. VTC SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
3. INSPECT VTC DAILY AND MAINTAIN IN EFFECTIVE OPERATING CONDITION. INSPECT ALL BMPS AFTER ANY PRECIPITATION EVENT, AND PERFORM NECESSARY MAINTENANCE.
4. ROCK SHALL BE REPLACED OR REGRADED TO MAINTAIN CONSISTENT DEPTH.
5. SEDIMENT TRACKED ONTO PAVED ROADS SHALL BE REMOVED THROUGHOUT THE DAY AND AT THE END OF EACH WORK DAY BY SHOVELING AND SWEEPING. SEDIMENT SHALL NOT BE DISPOSED OF INTO STORM DRAIN SYSTEM.
6. PORTABLE SYNTHETIC TRACKING PADS ARE ALLOWED.

VEHICLE TRACKING CONTROL DETAIL VTC
N.T.S.



SECTION A

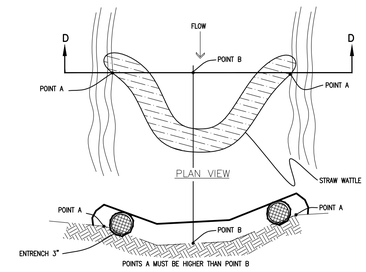
SURFACE ROUGHENING INSTALLATION NOTES

1. SURFACE ROUGHENING SHALL BE PROVIDED ON ALL FINISHED GRADES (SLOPES AND "FLAT" AREAS) WITHIN 2 DAYS OF COMPLETION OF FINISHED GRADE (FOR AREAS NOT RECEIVING TOPSOIL) OR WITHIN 2 DAYS OF TOPSOIL PLACEMENT.
2. AREAS WHERE BUILDING FOUNDATIONS, PAVEMENT, OR SOD IS TO BE PLACED WITHIN 7-DAYS OF FINISHED GRADING DO NOT NEED TO BE SURFACE ROUGHENED.
3. DISTURBED SURFACES SHALL BE ROUGHENED USING RIPPING OR TILLING EQUIPMENT ON THE CONTOUR OR TRACKING UP AND DOWN A SLOPE USING EQUIPMENT TREADS.
4. CONTRACTOR SHALL REVIEW LANDSCAPING PLANS TO COORDINATE SPECIFIC SURFACE TREATMENTS, PERMANENT AND TEMPORARY MEASURES.

SURFACE ROUGHENING MAINTENANCE NOTES

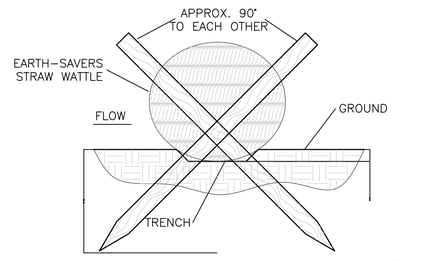
1. THE SWMP MANAGER SHALL INSPECT THE SURFACE ROUGHENING WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
2. VEHICLES AND EQUIPMENT SHALL GENERALLY BE CONFINED TO ACCESS DRIVES AND SHALL NOT BE DRIVEN OVER AREAS THAT HAVE BEEN SURFACE ROUGHENED.
3. IN NON-TURF GRASS FINISHED AREAS, SEEDING AND MULCHING SHALL TAKE PLACE DIRECTLY OVER SURFACE ROUGHENED AREAS WITHOUT FIRST SMOOTHING OUT THE SURFACE.
4. IN AREAS NOT SEEDED AND MULCHED AFTER SURFACE ROUGHENING, SURFACES SHALL BE RE-ROUGHENED AS NECESSARY TO MAINTAIN GROOVE DEPTH AND SMOOTH OVER ANY RILL EROSION.

SURFACE ROUGHENING SR
NOT TO SCALE



SECTION D-D

STRAW WATTLE CHECK DAM DETAIL
N.T.S.



STRAW WATTLE INSTALLATION DETAIL SW
N.T.S.

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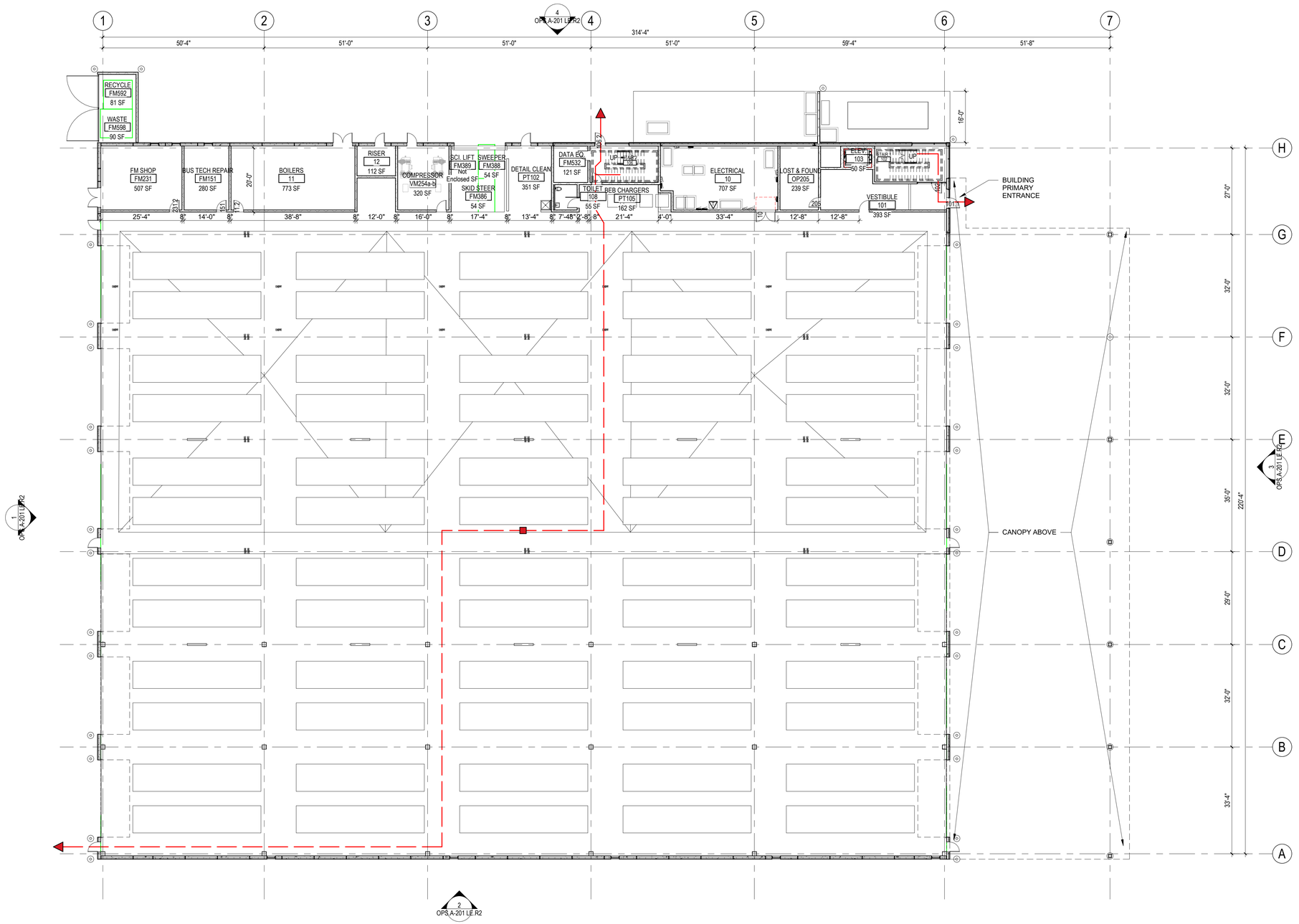
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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

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EROSION CONTROL DETAILS

04/22/22
C-172 LE.R2 STANTEC PROJECT #2270417345



1 LEVEL 1 - OVERALL FLOOR PLAN LE.R2

OPS.A-101 LE.R2 1/16" = 1'-0"

FINISH FLOOR ELEVATION = 100'-0" = 5,850

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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

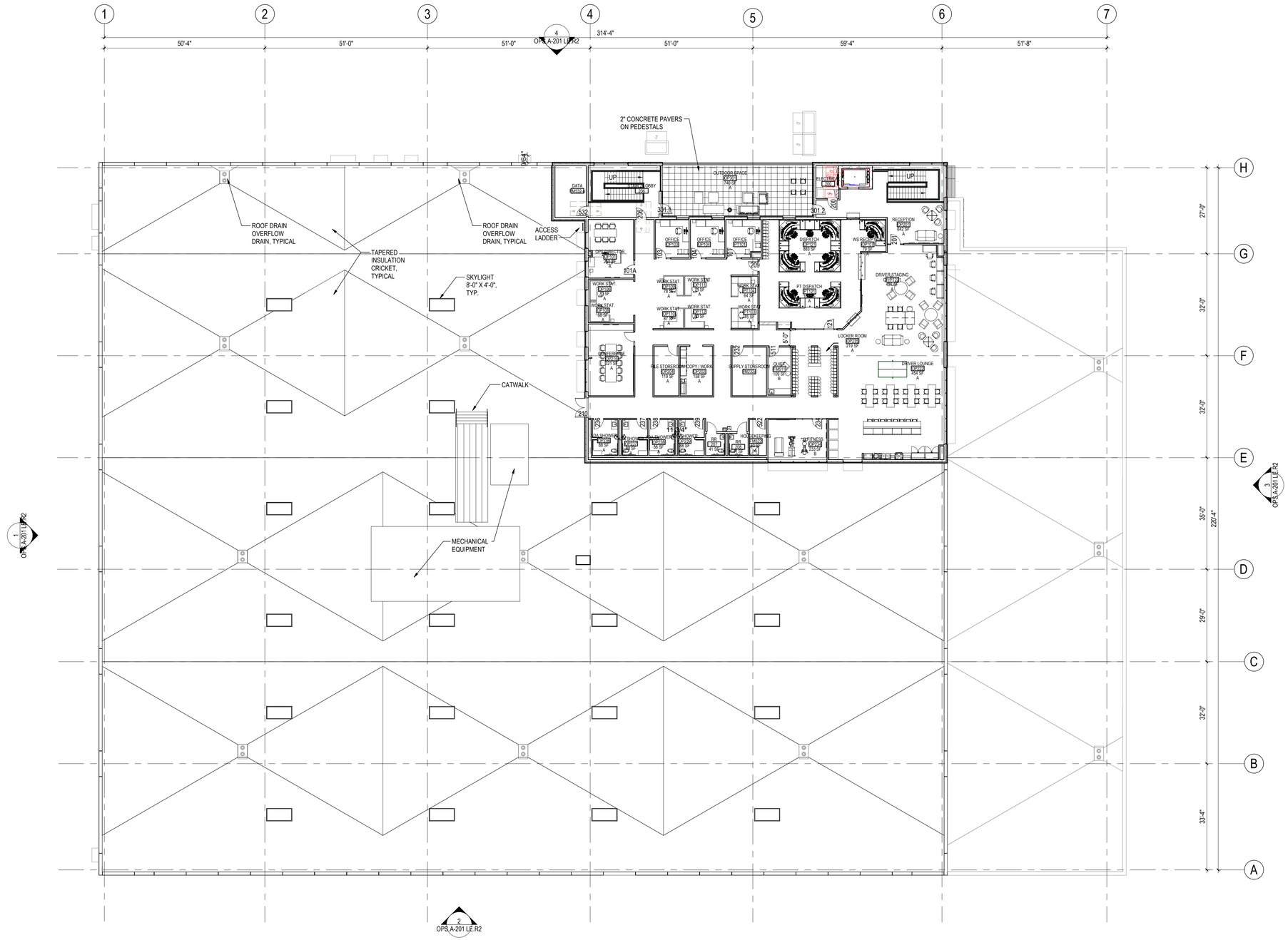
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LEVEL 01 - OVERALL FLOOR PLAN LE.R2

16' 8' 0' 16' 32'
SCALE: 1/16" = 1'-0"

OPS.A-101 LE.R2

04/22/22
STANTEC #2270417345



1 LEVEL 2 - OVERALL FLOOR PLAN LE.R2

OPS.A-102 LE:R2 1/16" = 1'-0"

FINISH FLOOR ELEVATION = 124'-0" = 5,974

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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

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LEVEL 02 - OVERALL FLOOR PLAN

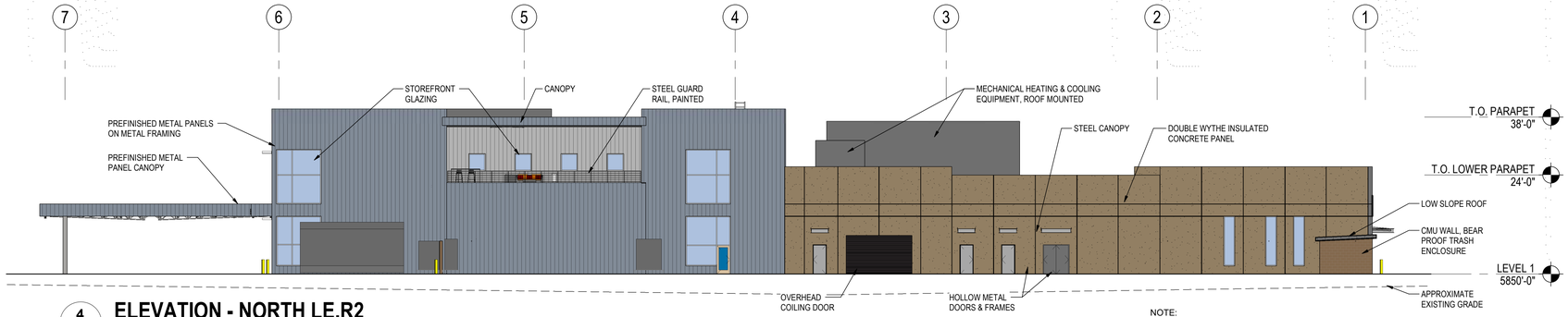
16' 8' 0' 16' 32'
SCALE: 1/16" = 1'-0"

04/22/22

OPS.A-102 LE.R2 STANTEC #2270417345

NORTH ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	3,175	38%
GLAZING	704.31	8%
PREFINISHED METAL PANEL	4,264	51%
METAL DOORS	267	3%
GROSS WALL AREA	8,442	100%

B OCCUPANCY NORTH ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
GLAZING	598.46	12%
PREFINISHED METAL PANEL	4,264	88%
METAL DOORS	0	0%
GROSS WALL AREA	4,863	100%



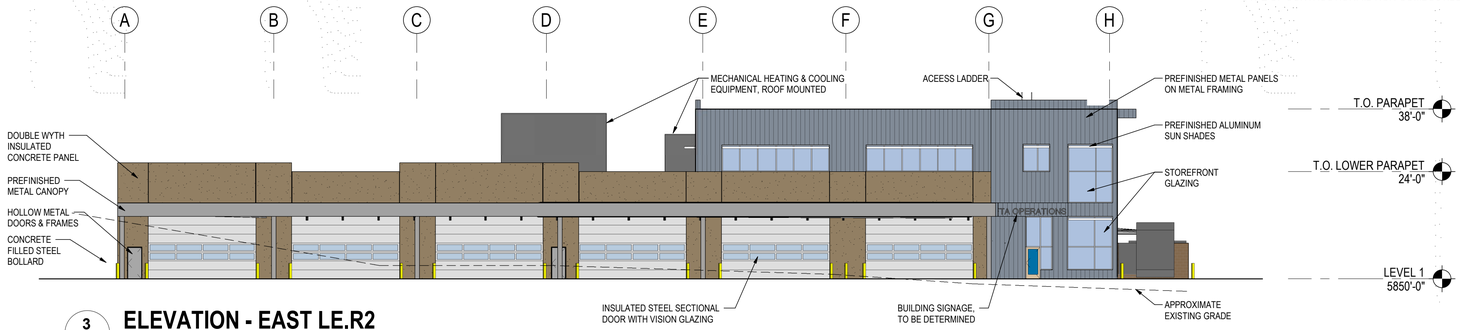
4 OPS.A-201 LE:R2 **ELEVATION - NORTH LE.R2** 1/16" = 1'-0"

NOTE:
THESE ELEVATIONS ARE CONCEPTUAL. INDIVIDUAL BULIDING ELEVATIONS MAY VARY BUT WILL BE EVALUATED FOR COMPLIANCE WITH DEISNG STANDARDS CONTAINED WITHING TITLE 070 OF THE GLENWOOD SPRINGS MUNICIPAL CODE THE THE TIME OF SUBMITTING A BUILDING PERMIT APPLICATION

TYPE OF CONTRUCTION: IIB NON-COMBUSTIBLE MATERIAL WHERE PREMITTED.

EAST ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	2,275	33%
GLAZING	1132	17%
PREFINISHED METAL PANEL	1,991	29%
METAL DOORS	1434.78	21%
GROSS WALL AREA	6,858	100%

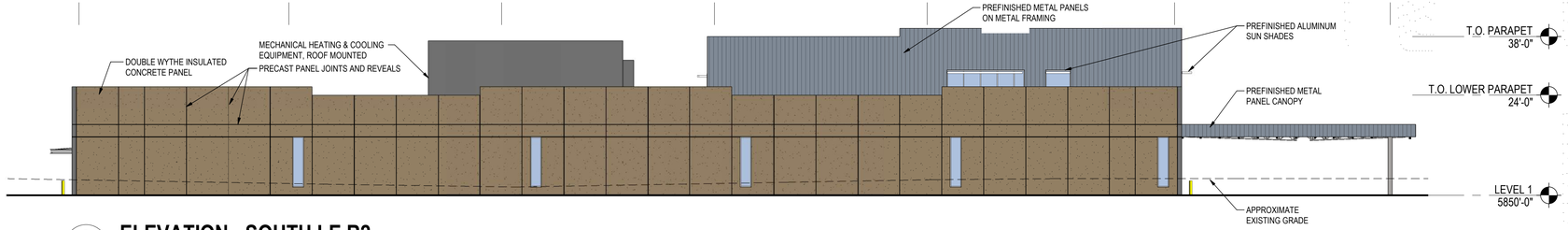
B OCCUPANCY EAST ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
GLAZING	645	31%
PREFINISHED METAL PANEL	1,405	69%
METAL DOORS	0	0%
GROSS WALL AREA	2,050	100%



3 OPS.A-201 LE:R2 **ELEVATION - EAST LE.R2** 1/16" = 1'-0"

SOUTH ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	6,575	79%
GLAZING	237.79	3%
PREFINISHED METAL PANEL	1,490	18%
METAL DOORS	0	0%
GROSS WALL AREA	8,323	100%

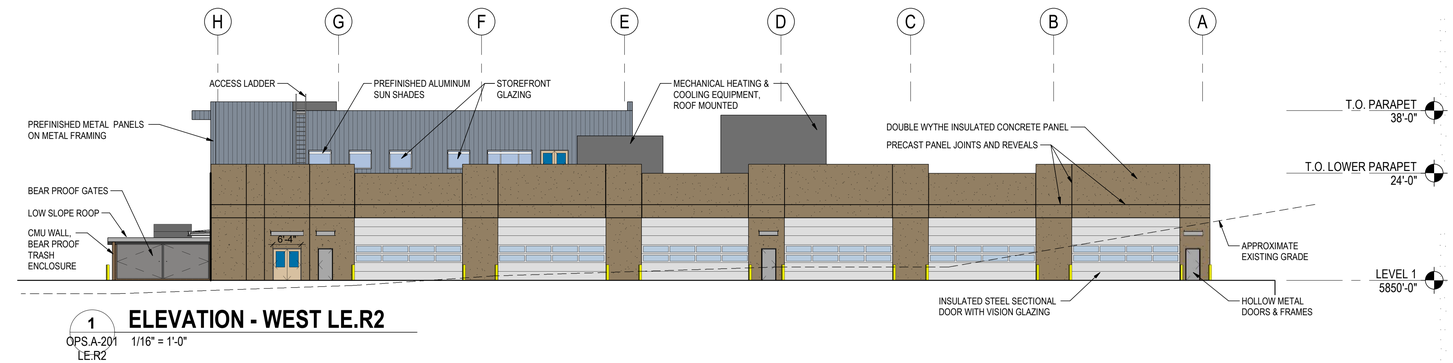
B OCCUPANCY SOUTH ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
GLAZING	96.64	6%
PREFINISHED METAL PANEL	1,490	94%
METAL DOORS	0	0%
GROSS WALL AREA	1,586	100%



2 OPS.A-201 LE:R2 **ELEVATION - SOUTH LE.R2** 1/16" = 1'-0"

WEST ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	3,532	53%
GLAZING	661.41	10%
PREFINISHED METAL PANEL	1,010	15%
METAL DOORS	1,511	23%
GROSS WALL AREA	6,700	100%

B OCCUPANCY WEST ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
GLAZING	126.53	11%
PREFINISHED METAL PANEL	1,010	89%
METAL DOORS	0	0%
GROSS WALL AREA	1,136	100%



1 OPS.A-201 LE:R2 **ELEVATION - WEST LE.R2** 1/16" = 1'-0"

FINISH FLOOR ELEVATION = 100'-0" = 5,850

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NOTE:
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TYPE OF CONSTRUCTION: IIB NON-COMBUSTIBLE MATERIAL EXCEPT WHERE PERMITTED.

East Elevation

Material	Surface Area	Percentage of Net
Painted Tilt Up Concrete	1400.00 SF	32%
Glazing	935.00 SF	21%
Prefinished Metal Panel	1369.00 SF	31%
Prefinished Sectional Doors (minus glazing)	721.00 SF	16%
Gross Wall Area	4425.00 SF	

COLORADO LICENSED ARCHITECT 402104 22 APRIL 22

Client/Project Logo

RFTA Roaring Fork Transportation Authority

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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

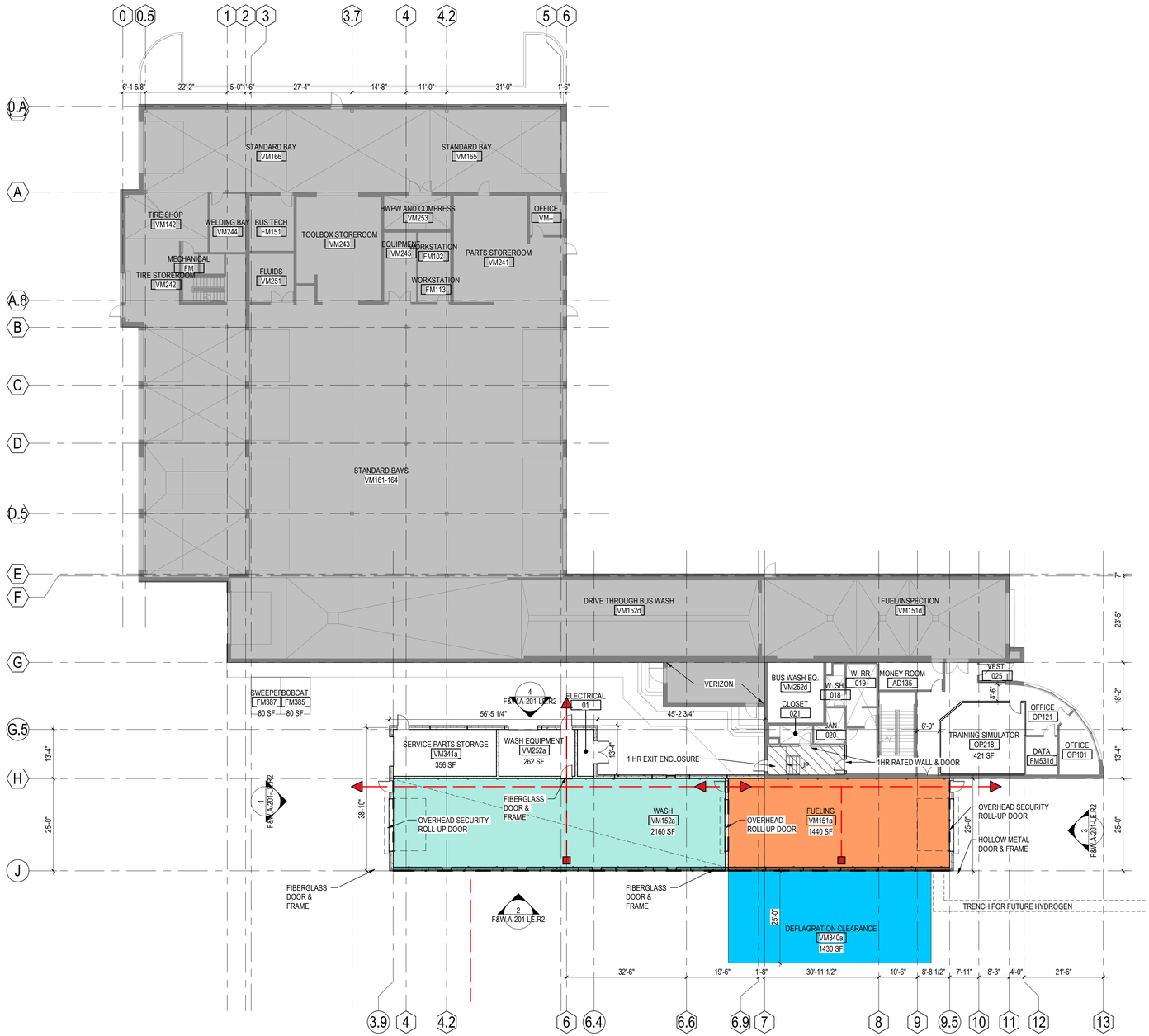
BUILDING ELEVATIONS

16' 8' 0' 16' 32'
SCALE: 1/16" = 1'-0"

04/22/22

OPS.A-201 LE:R2

STANTEC #2270417345



1 **LEVEL 1 - FLOOR PLAN LE.R2**
F&W.A-101-LE.R2 1/16" = 1'-0"

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AUSTIN MERLAK VALLE
402104
ARCHITECT
22 APRIL 22

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GLENWOOD SPRINGS
MAINTENANCE FACILITY

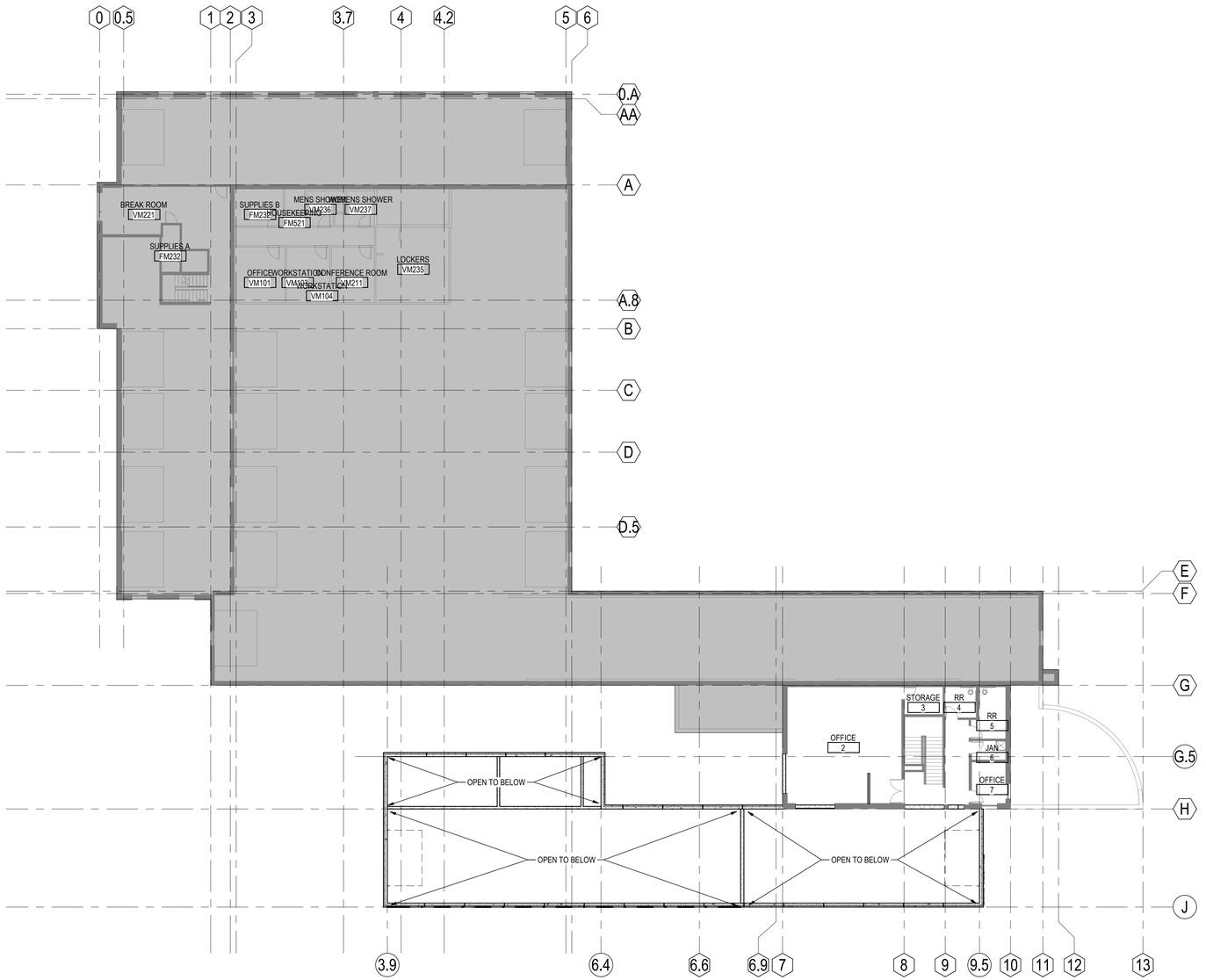
PROJECT ADDRESS

LEVEL 01 - OVERALL FLOOR PLAN

16' 8' 0' 16' 32'
SCALE: 1/16" = 1'-0"

04/22/22

F&W.A-101-LE.R2 STANTEC #2270417345



1 LEVEL 2 - OVERALL FLOOR PLAN LE.R2

F&W.A-102-LE.R2 1/16" = 1'-0"

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PROGRAM - LEVEL 2				
PROGRAM #	PRIORITY	Name	ACTUAL AREA	PROGRAM AREA
2	--	OFFICE	874 SF	0 SF
3	--	STORAGE	71 SF	0 SF
4	--	RR	65 SF	0 SF
5	--	RR	102 SF	0 SF
6	--	JAN	44 SF	0 SF
7	--	OFFICE	96 SF	0 SF
FM232	D	SUPPLIES B	117 SF	174 SF
FM232	D	SUPPLIES A	56 SF	174 SF
FM521	D	HOUSEKEEPING	47 SF	80 SF
VM101	D	OFFICE	183 SF	180 SF
VM103	D	WORKSTATION	81 SF	60 SF
VM104	D	WORKSTATION	75 SF	60 SF
VM211	D	CONFERENCE ROOM	155 SF	120 SF
VM221	D	BREAK ROOM	762 SF	400 SF
VM235	D	LOCKERS	354 SF	200 SF
VM236	D	MENS SHOWER	68 SF	55 SF
VM237	D	WOMENS SHOWER	71 SF	55 SF

COLORADO LICENSED ARCHITECT ANDREW MERLIN WALKER 402104 22 APRIL 22

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GLENWOOD SPRINGS MAINTENANCE FACILITY

PROJECT ADDRESS

LEVEL 02 - OVERALL FLOOR PLAN

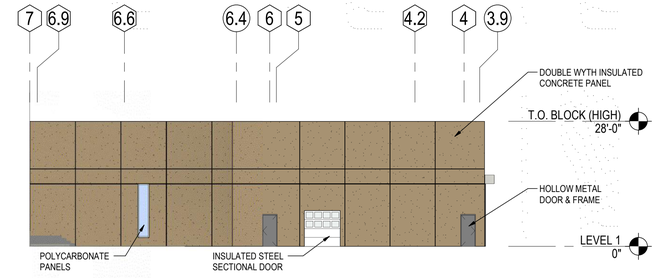
16' 8' 0' 16' 32'

SCALE: 1/16" = 1'-0"

04/22/22

F&W.A-102-LE.R2 STANTEC #2270417345

NORTH ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	2,700	95%
GLAZING	27.02	1%
PREFINISHED METAL PANEL	0	0%
METAL DOORS	109.92	4%
GROSS WALL AREA	2,845	100%



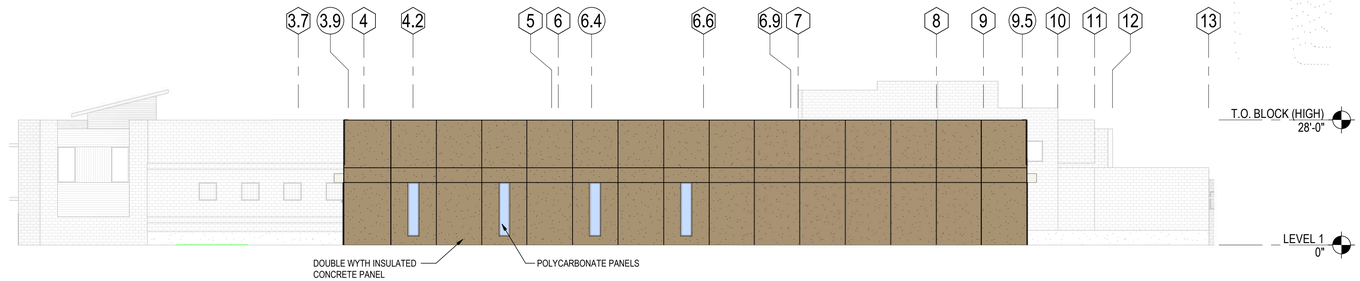
4 **ELEVATION NORTH LE.R2**
F&W.A-201-LE.R2 3/16" = 1'-0"

EAST ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	464	64%
GLAZING	0	0%
PREFINISHED METAL PANEL	0	0%
METAL DOORS	264.25	36%
GROSS WALL AREA	728	100%



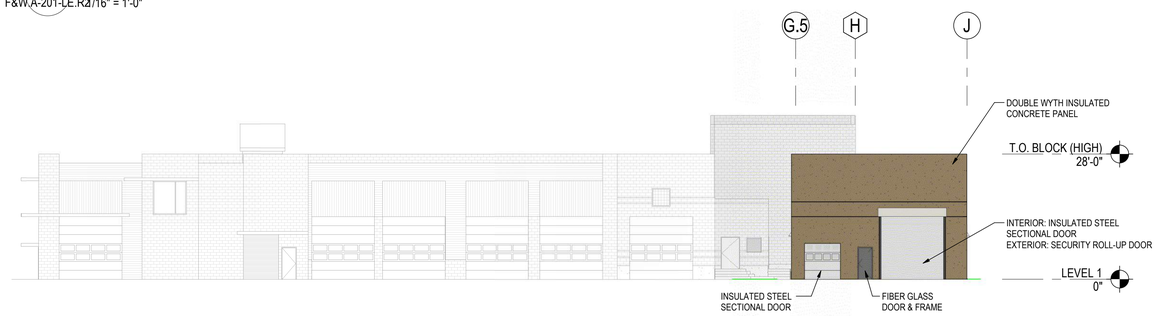
3 **ELEVATION EAST LE.R2**
F&W.A-201-LE.R2 3/16" = 1'-0"

SOUTH ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	4,164	97%
GLAZING	115.55	3%
PREFINISHED METAL PANEL	0	0%
METAL DOORS	0	0%
GROSS WALL AREA	4,280	100%



2 **ELEVATION SOUTH LE.R2**
F&W.A-201-LE.R2 3/16" = 1'-0"

WEST ELEVATION		
MATERIAL	SURFACE AREA	PERCENTAGE OF NET
PAINTED PRECAST CONCRETE	824	73%
GLAZING	0	0%
PREFINISHED METAL PANEL	0	0%
METAL DOORS	305.33	27%
GROSS WALL AREA	1,129	100%



1 **ELEVATION WEST LE.R2**
F&W.A-201-LE.R2 3/16" = 1'-0"

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COLORADO LICENSED ARCHITECT 402104 AARON MERLIN HALL 22 APRIL 22

Client/Project Logo

RFTA Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY

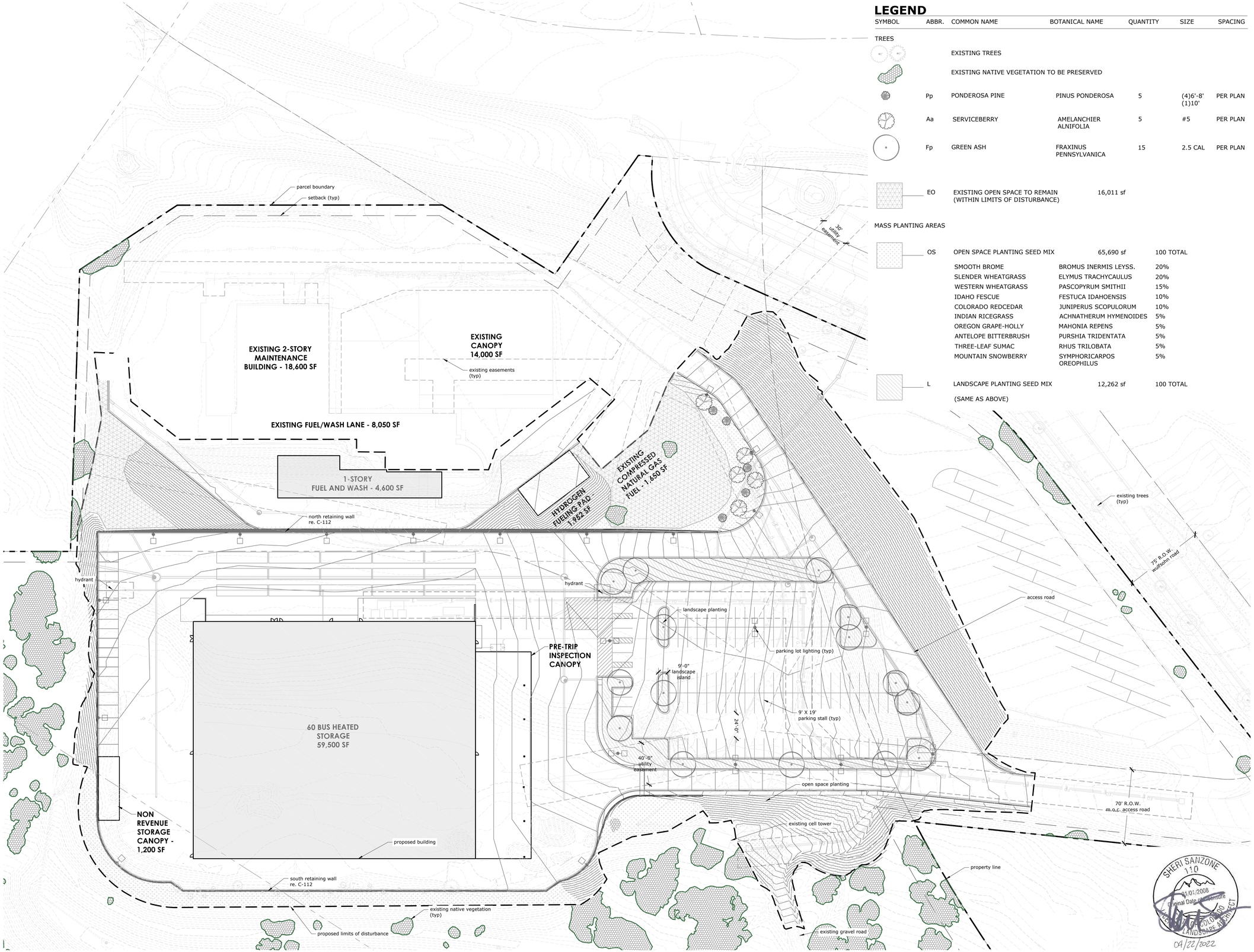
PROJECT ADDRESS

BUILDING ELEVATIONS

16' 8' 0' 16' 32'
SCALE: 1/16" = 1'-0"

LE.RE2 04/22/22

F&W.A-201-LE.R2 STANTEC #2270417345



LEGEND

SYMBOL	ABBR.	COMMON NAME	BOTANICAL NAME	QUANTITY	SIZE	SPACING
TREES						
		EXISTING TREES				
		EXISTING NATIVE VEGETATION TO BE PRESERVED				
	Pp	PONDEROSA PINE	PINUS PONDEROSA	5	(4)6'-8' (1)10'	PER PLAN
	Aa	SERVICEBERRY	AMELANCHIER ALNIFOLIA	5	#5	PER PLAN
	Fp	GREEN ASH	FRAXINUS PENNSYLVANICA	15	2.5 CAL	PER PLAN
	EO	EXISTING OPEN SPACE TO REMAIN (WITHIN LIMITS OF DISTURBANCE)		16,011 sf		
MASS PLANTING AREAS						
	OS	OPEN SPACE PLANTING SEED MIX		65,690 sf	100 TOTAL	
		SMOOTH BROME	BROMUS INERMIS LEYSS.		20%	
		SLENDER WHEATGRASS	ELYMUS TRACHYCAULUS		20%	
		WESTERN WHEATGRASS	PASCOPYRUM SMITHII		15%	
		IDAHO FESCUE	FESTUCA IDAHOENSIS		10%	
		COLORADO REDCEDAR	JUNIPERUS SCOPULORUM		10%	
		INDIAN RICEGRASS	ACHNATHERUM HYMENOIDES		5%	
		OREGON GRAPE-HOLLY	MAHONIA REPENS		5%	
		ANTELOPE BITTERBRUSH	PURSHIA TRIDENTATA		5%	
		THREE-LEAF SUMAC	RHUS TRILOBATA		5%	
		MOUNTAIN SNOWBERRY	SYMPHORICARPOS OREOPHILUS		5%	
	L	LANDSCAPE PLANTING SEED MIX		12,262 sf	100 TOTAL	
		(SAME AS ABOVE)				

PRELIMINARY
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SUMMARY CHART

COMBINED PARCEL AREA	866,824 SQ. FT.		
TOTAL LIMITS OF DISTURBANCE (L.O.D.)	358,442 SQ. FT.		
TOTAL LANDSCAPE AREA (WITHIN L.O.D)	12,262 SQ. FT.	3.4% OF L.O.D.	
TOTAL OPEN SPACE AREA (WITHIN L.O.D)	81,700 SQ. FT.	22.8% OF L.O.D.	
TOTAL HARDSCAPE AREA (WITHIN L.O.D.)	264,480 SQ. FT.	73.8% OF L.O.D.	
TOTAL PARKING LOT AREA (WITHIN L.O.D.)	39,825 SQ. FT.		
TOTAL PARKING LOT PLANTING AREA	12,262 SQ. FT.	31% (OF PARKING LOT PAVEMENT AREA)	
	REQUIRED	PROVIDED	DEFICIENT
TREES (<50% EVERGREEN)	134	25*	109*
SHRUBS (20% EVERGREEN)	538	538	0
PERENNIALS	1075	1075	0

* TREE COUNT REDUCTION IS PROPOSED TO ACCOUNT FOR THE FOLLOWING:

1. ANTICIPATED 1:1 TREE PRESERVATION CREDITS FOR ELIGIBLE UNDISTURBED NATIVE GAMBLE OAK GREATER THAN 4" DBH. SEE TREE PRESERVATION PLAN, L-101.
2. PRESENCE OF HYDROCOMPACTIVE SOILS, WHICH DISALLOW USE OF PERMANENT IRRIGATION AND JUSTIFY ALTERNATIVE COMPLIANCE LENIENCY BY DEVELOPMENT DIRECTOR. (PER 2021 GLENWOOD SPRINGS, CO MUNICIPAL CODE SECTION 070.040.050(g)(2)a.)
3. ALL REVEGETATED AREAS WILL BE SEEDED WITH AN APPROVED GARFIELD COUNTY DRYLAND SEED MIX.

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Roaring Fork Transportation Authority

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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

SHERI SANZONE
11/0
11/01/2008
Original Date of Licensure
COLORADO
LANDSCAPE ARCHITECT
04/22/2022

LANDSCAPE PLAN

N

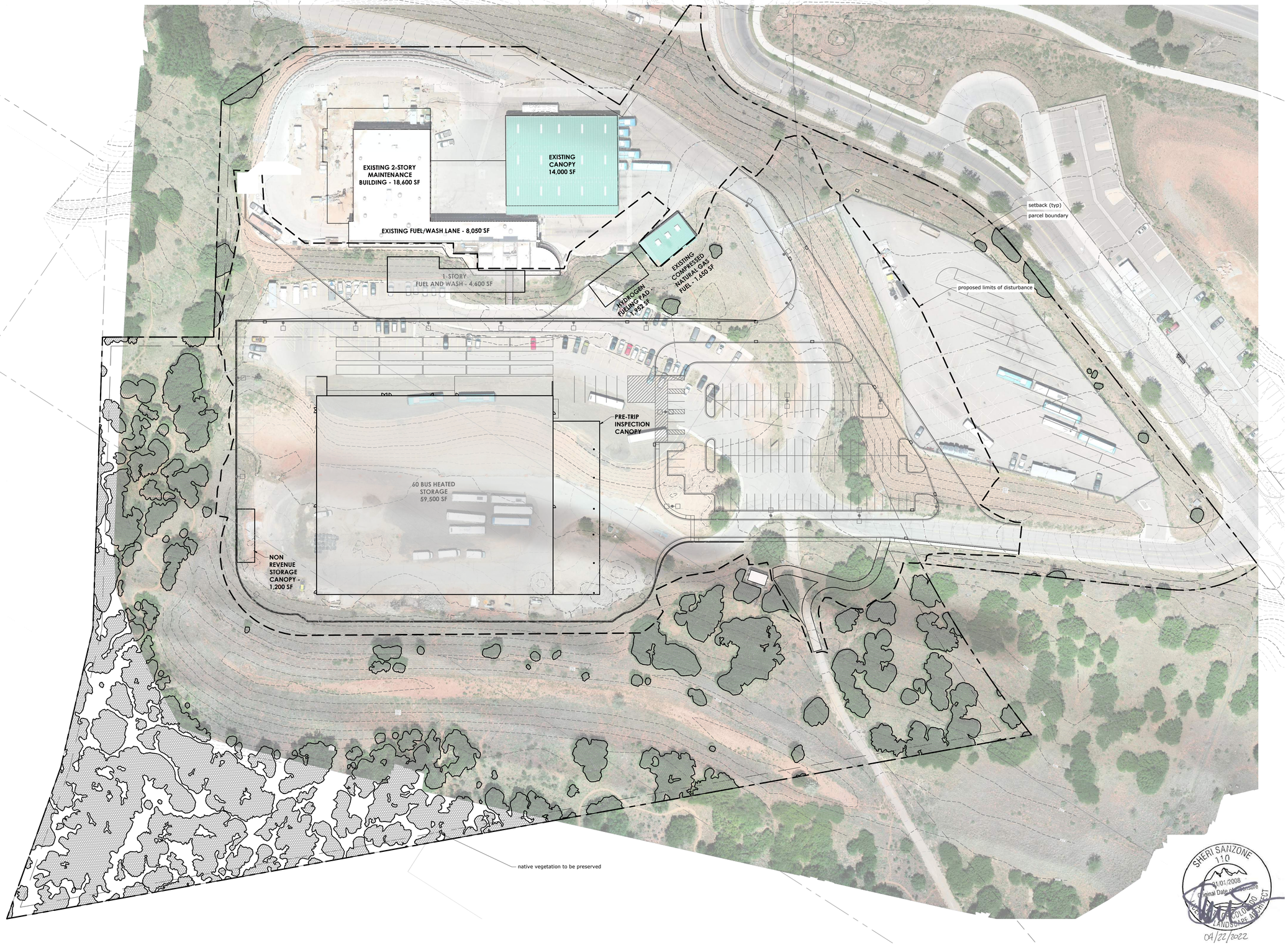
40' 20' 0' 40' 80'

SCALE: 1" = 40'

L-100 LE.R2

LE.R2 SUBMITTAL 04/22/22

STANTEC PROJECT #2270417345



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LEGEND

SYMBOL	DESCRIPTION
TREES	
	EXISTING NATIVE GAMBEL OAK VEGETATION TO BE PRESERVED
	112,513 SQ.FT.

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

TREE PRESERVATION PLAN

SHERI SANZONE
110
01/01/2008
Original Date of Licensure
REGISTERED COLORADO
LANDSCAPE ARCHITECT
04/22/2022

N

50' 25' 0' 50' 100'

SCALE: 1" = 50'

L-101 LE.R2

LE.R2 SUBMITTAL 04/22/22
STANTEC PROJECT #2270417345

LUMINAIRE SCHEDULE - EXTERIOR

TYPE	IMAGE	DESCRIPTION	MANUFACTURER	CATALOGUE SERIES	LAMP				CONTROLS	INPUT		FORM		
					TYPE	LUMENS	CCT	CRI	TYPE	WATTAGE	VOLTAGE	FINISH	LENS / DISTRIBUTION	MOUNTING
XP04		SINGLE HEAD POLE MOUNTED, TYPE IV DISTRIBUTION	ILP	SKYLINE SAM SINGLE	LED	24,000 LUMENS	3000K	70 CRI	0-10V	167 VA	UNIV	TBD	TYPE IV	SURFACE
XP04A		DUAL HEAD POLE MOUNTED AT 180 DEGREES, TYPE IV DISTRIBUTION	ILP	SKYLINE SAM D180	LED	48,000 LUMENS	3000K	70 CRI	0-10V	334 VA	UNIV	TBD	TYPE IV	SURFACE
XS01		SURFACE MOUNTED ROUND PARKING GARAGE STYLE AREA LIGHT	SIGNIFY	SVPG	LED	10,000 LUMENS	3000K	70 CRI	0-10V	132 VA	UNIV	TBD	TYPE V	SURFACE
XS02		TYPE "XS01" EXCEPT LOWER LUMEN OUTPUT	--	--	--	4,100 LUMENS	--	--	0-10V	36 VA	UNIV	--	--	--
XW01		WALL MOUNTED, TYPE IV DISTRIBUTION	ILP	SKYLINE SAS SINGLE	LED	6,000 LUMENS	3000K	70 CRI	0-10V	47 VA	UNIV	TBD	TYPE IV	SURFACE WALL @ 16'-0" AFG

ABBREVIATIONS

(D)	DEMOLISH
(E)	EXISTING TO REMAIN
(ERL)	EXISTING TO BE RELOCATED
(R)	RELOCATE
A	AMPS
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BOH	BACK OF HOUSE
EM	EMERGENCY
ETD	EMERGENCY TRANSFER DEVICE
G, GND	GROUND
LTG	LIGHTING
MAX	MAXIMUM
MIN	MINIMUM
MISC	MISCELLANEOUS
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OCC	OCCUPANCY
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
STD	STANDARD
TYP	TYPICAL
UNIV	UNIVERSAL VOLTAGE
UON	UNLESS OTHERWISE NOTED
V	VOLTS
XFMR	TRANSFORMER

LIGHTING AND DEVICE LEGEND

LUMINAIRES

CIRCUITS: EMERGENCY | NORMAL

- $\square$ $\$\#\#$ — LUMINAIRE IDENTIFICATION, SEE LUMINAIRES SCHEDULE
- $\square_{a}$ — LOWER-CASE LETTER(S) NEAR LUMINAIRE DENOTE ZONE
- LINEAR PENDANT MOUNTED LINEAR, LENGTH TO SCALE
- WALL MOUNTED RECESSED LINEAR LUMINAIRE, LENGTH TO SCALE
- RECESSED LINEAR WALL WASH LUMINAIRE, LENGTH TO SCALE
- RECESSED DOWNLIGHT LUMINAIRE
- SURFACE MOUNTED LUMINAIRE
- RECESSED ADJUSTABLE ACCENT OR WALLWASH LUMINAIRE
- N/A — CONTINUOUS SOURCE LUMINAIRE, PATH AS INDICATED
- PENDANT MOUNTED LUMINAIRE
- RECESSED RECTANGULAR LUMINAIRE, LENGTH TO SCALE
- RECESSED BASKET LUMINAIRE, DRAWN TO SCALE
- STRIP LUMINAIRE, LENGTH TO SCALE
- MONOPOINT AND FLOOD LUMINAIRE
- N/A — TRACK MOUNTED LUMINAIRE ASSEMBLY
- MULTI-LAMP ACCENT LUMINAIRE, NUMBER OF LAMPS NOT INDICATED
- UNDERCOUNTER TASK LUMINAIRE
- WALL MOUNTED LUMINAIRE
- WALL MOUNTED RECTANGULAR LUMINAIRE, LENGTH TO SCALE
- N/A — TASK/TABLE LUMINAIRE
- STEP LUMINAIRE
- POLE MOUNTED LUMINAIRE WITH BASE
- POST TOP LUMINAIRE
- ILLUMINATED BOLLARD
- IN-GROUND LUMINAIRE
- AIMED IN-GROUND LUMINAIRE
- SURFACE MOUNTED GARAGE LUMINAIRE
- SURFACE MOUNTED SHIELDED GARAGE LUMINAIRE, LINES INDICATE NUMBER AND POSITION OF SHIELD(S)

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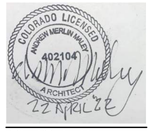
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GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

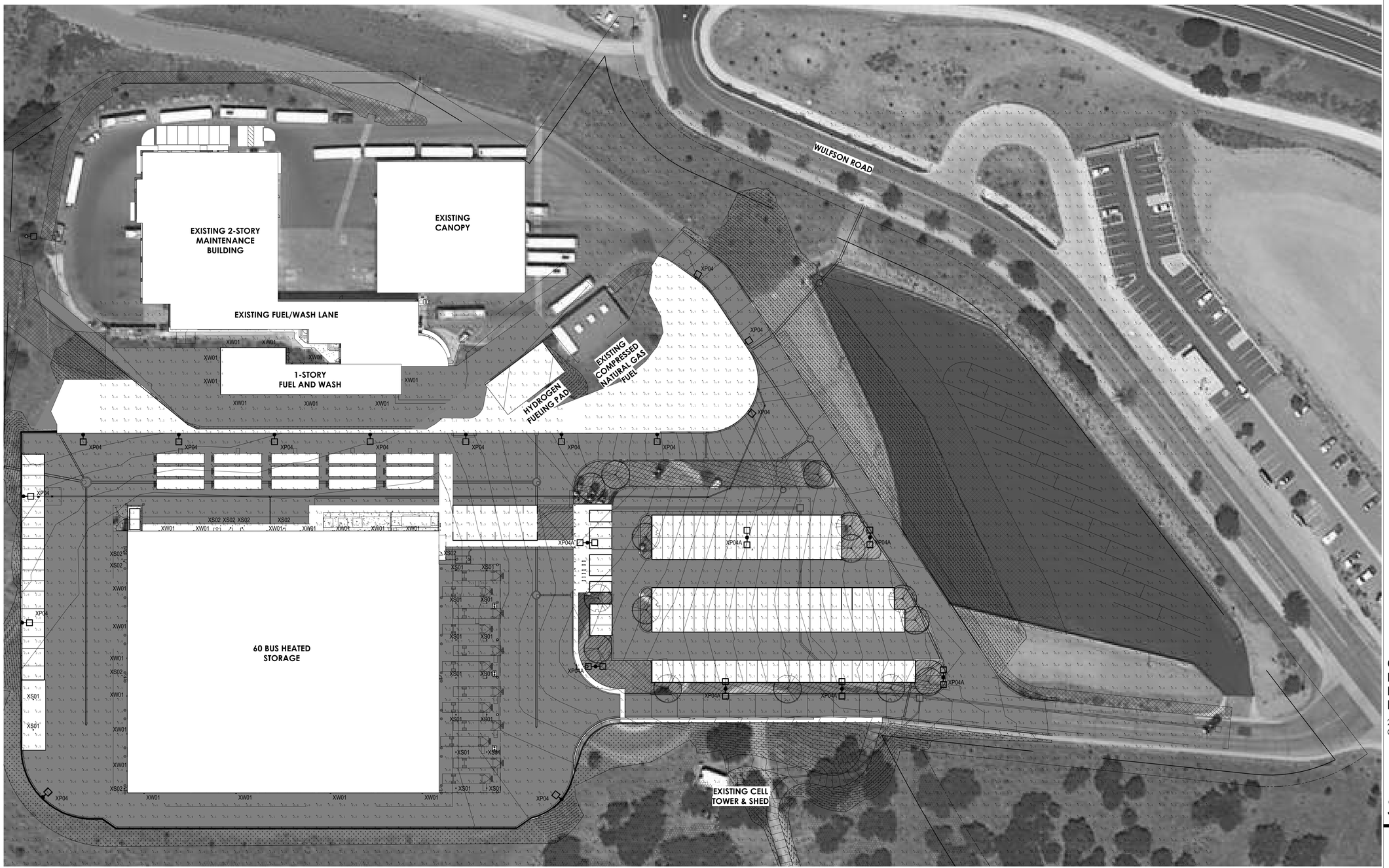
2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

LIGHTING LEGEND & LUMINAIRE SCHEDULE

EA-001 LE.R2

04/21/2022

STANTEC #2270417345



1 **LIGHTING SITE PLAN LE.R2**
EA-100-LE.R2 1" = 40'-0"

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Legend

COLORADO LICENSED
AARON MERLIN WILLIAMS
402104
ARCHITECT
22 APRIL 22

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

SITE LIGHTING PLAN

EA-100-LE.R2

04/21/2022
STANTEC #2270417345

SOIL STABILIZATION PLANS

RFTA MAINTANANCE FACILITY

GLENWOOD SPRINGS, CO



VICINITY MAP

(NOT TO SCALE)

SHEET INDEX

NO.	DESCRIPTION
C-01	COVER SHEET
C-02	SITE PLAN - MICROPILES
C-03	NORTH SNW PROFILE VIEWS
C-04	SOUTH SNW PROFILE VIEWS
C-05	NORTH WALL SECTION VIEWS
C-06	SOUTH WALL SECTION VIEWS
C-07	STANDARD DETAILS
C-08	EXAMPLE GRS WALL PHOTOGRAPH

SHEET REVISIONS

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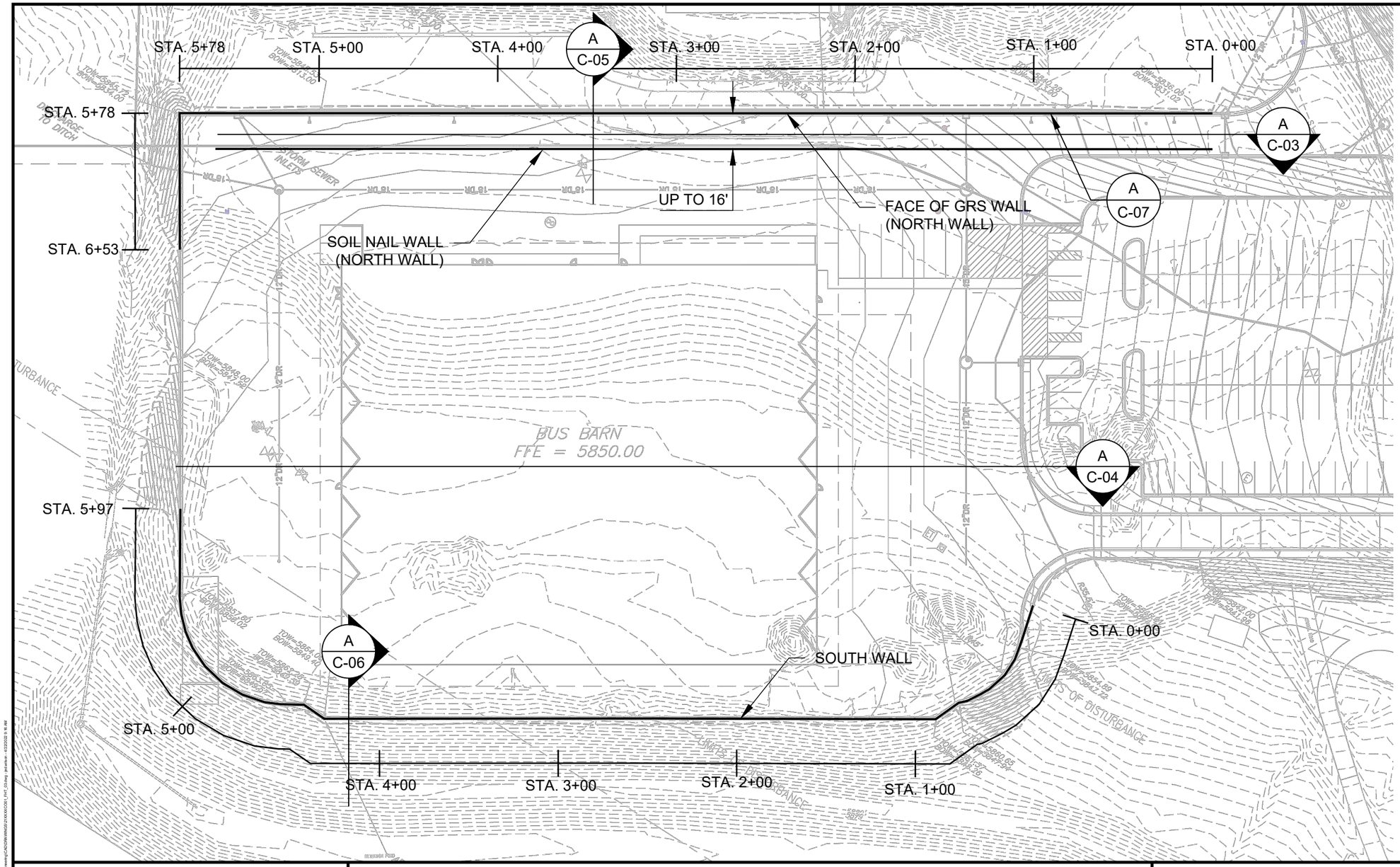
COVER SHEET

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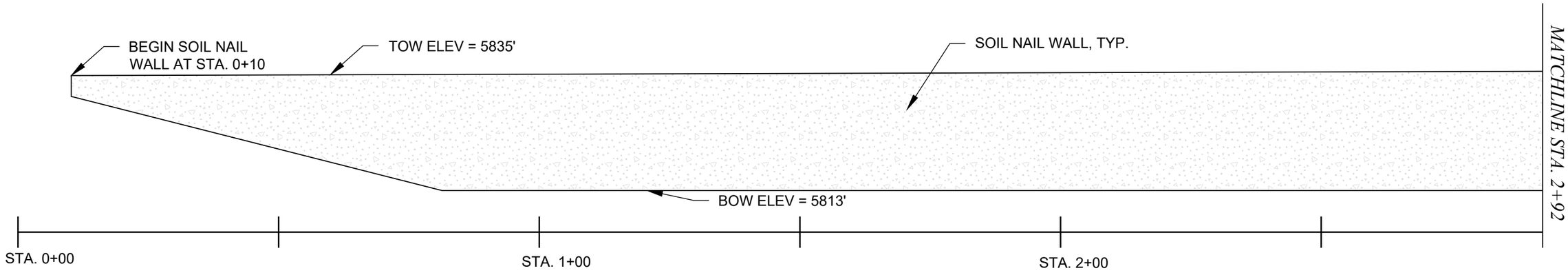
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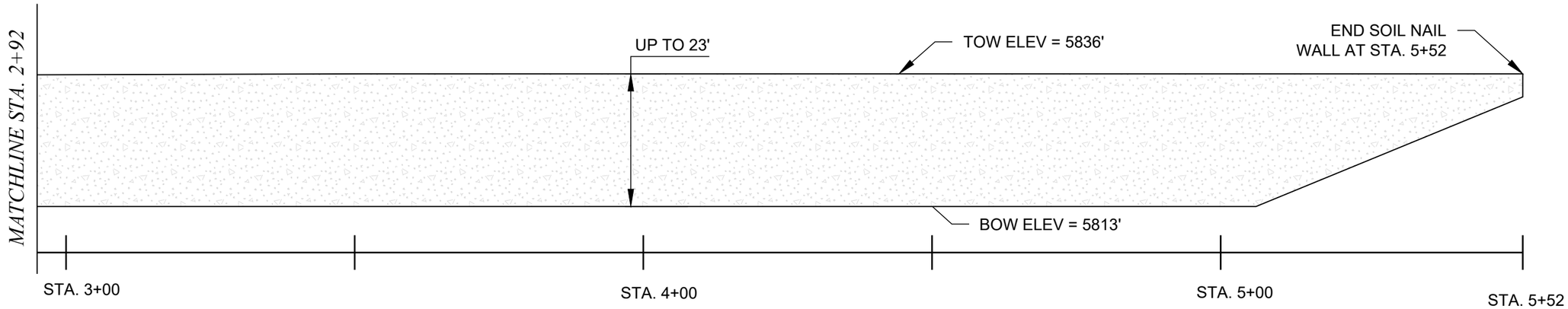
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A TYPICAL PROFILE
SCALE: 1" = 20'

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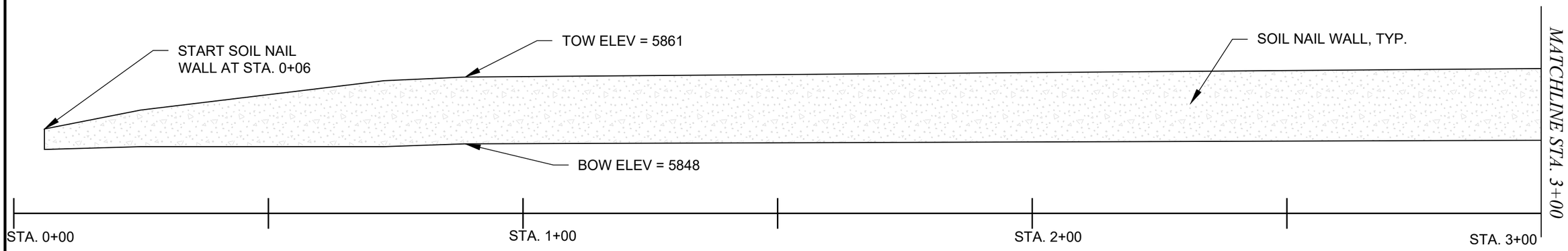
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NORTH SNW PROFILE VIEWS

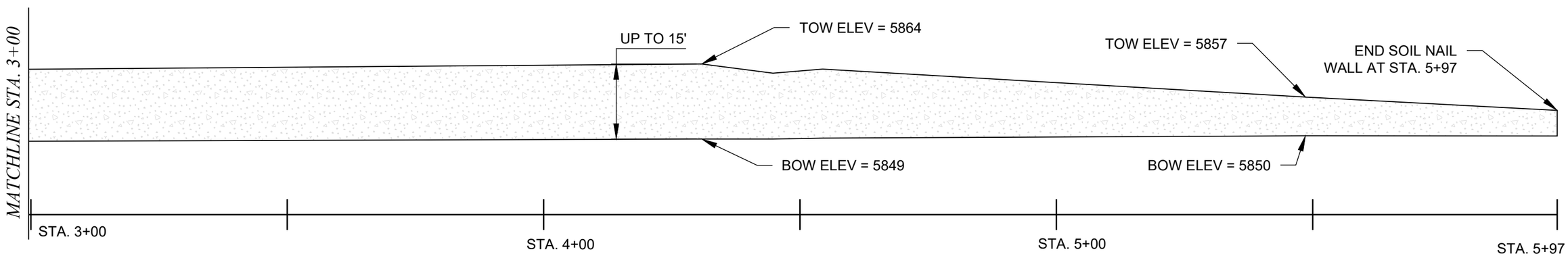
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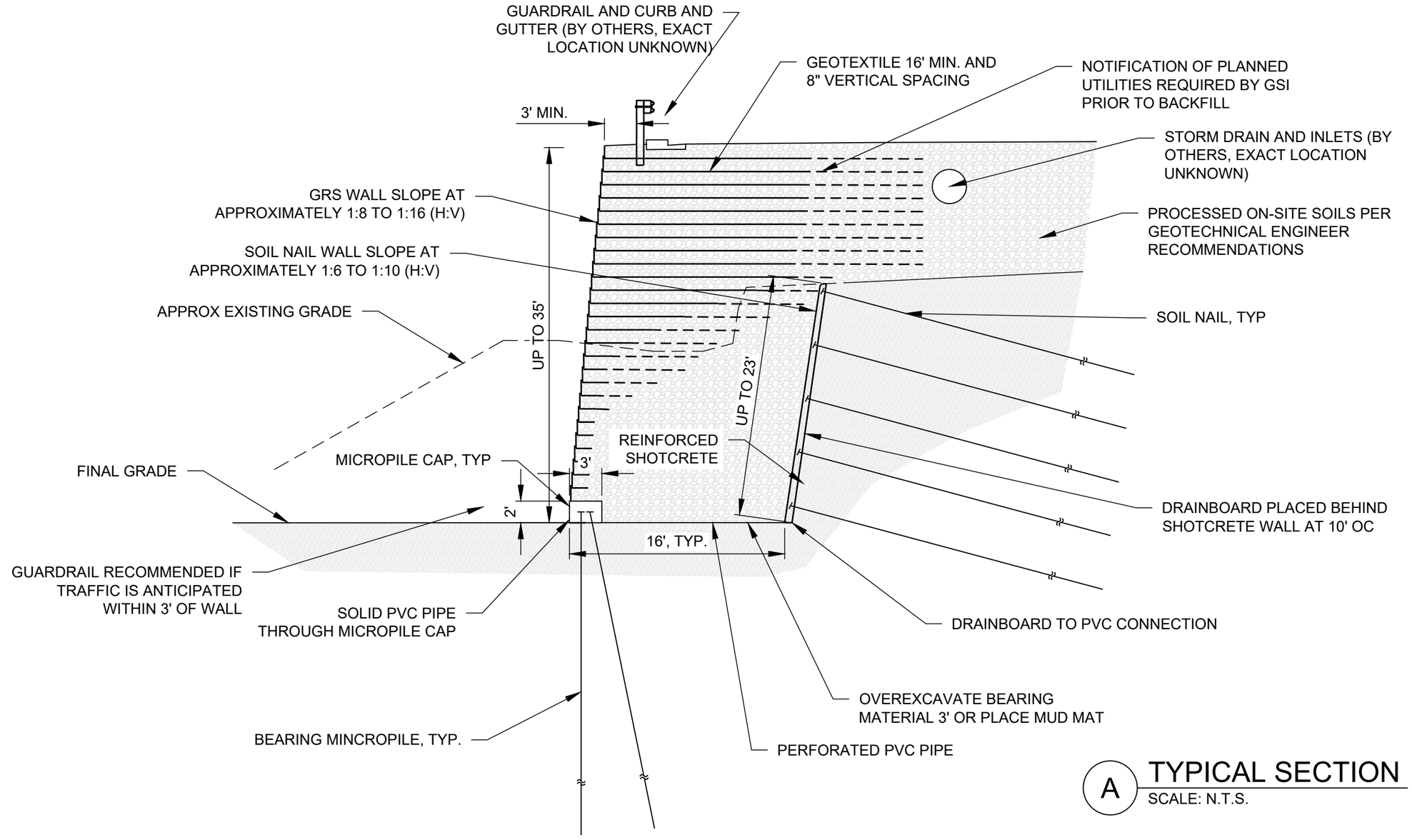
SOUTH SNW PROFILE VIEWS

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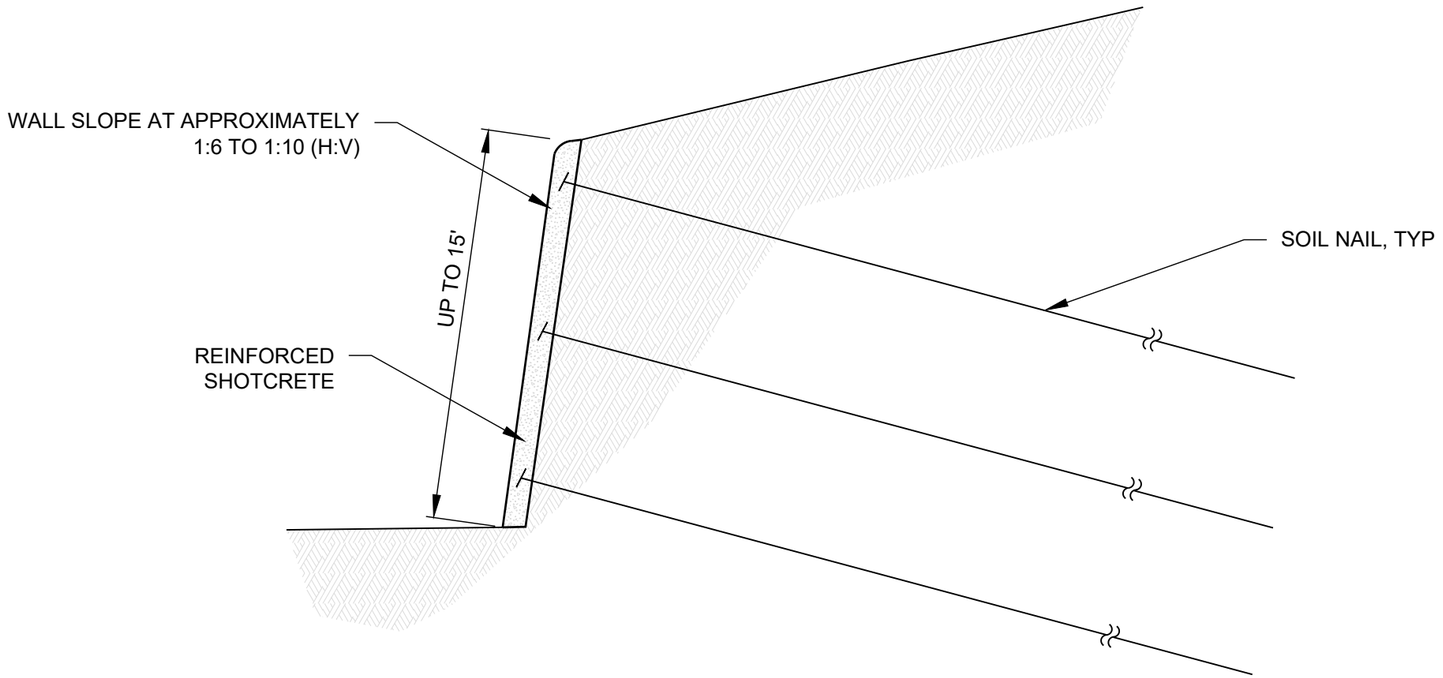
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NORTH WALL SECTION VIEW

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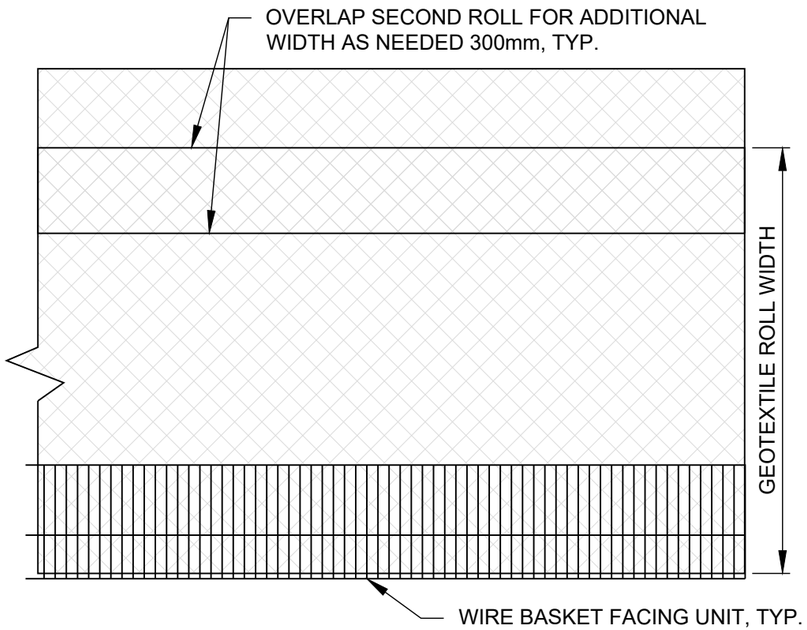
SHEET TITLE:
SOUTH WALL SECTION VIEW

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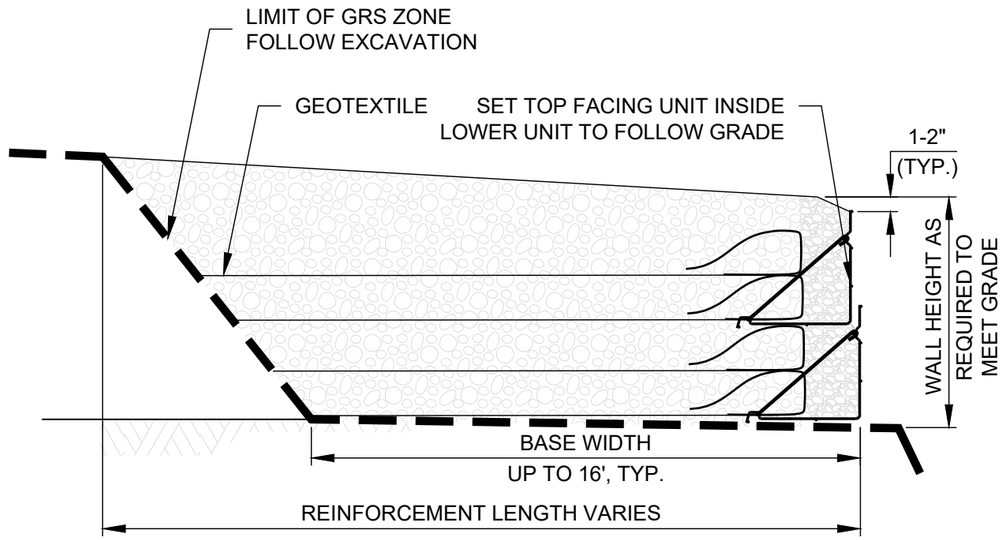
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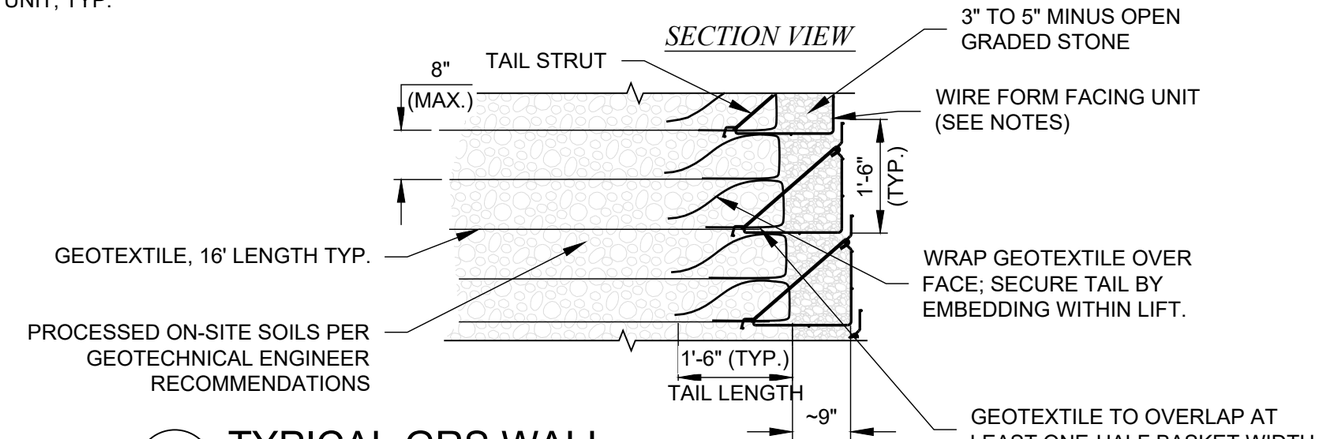
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PLAN VIEW



SECTION VIEW



A TYPICAL GRS WALL
SCALE: N.T.S.

NOTES:
1. FACING BASKETS ARE COMPOSED OF SIERRASCAPE SYSTEM, STONE FACE BASKETS AND TAIL STRUTS. GEOTEXTILE COMPOSED OF GEOTEX 4X4HF OR EQUIVALENT.
2. ALL FACING UNITS SHALL BE GALVANIZED PER ASTM A123 AFTER FABRICATION.
3. OPTIONAL - A THIN LAYER (2" MIN.) OF FINER STONE (1/4"-1") MAY BE PLACED AT THE TOP OF EACH UNIT TO PROVIDE A LEVEL SURFACE FOR THE UNIT ABOVE.

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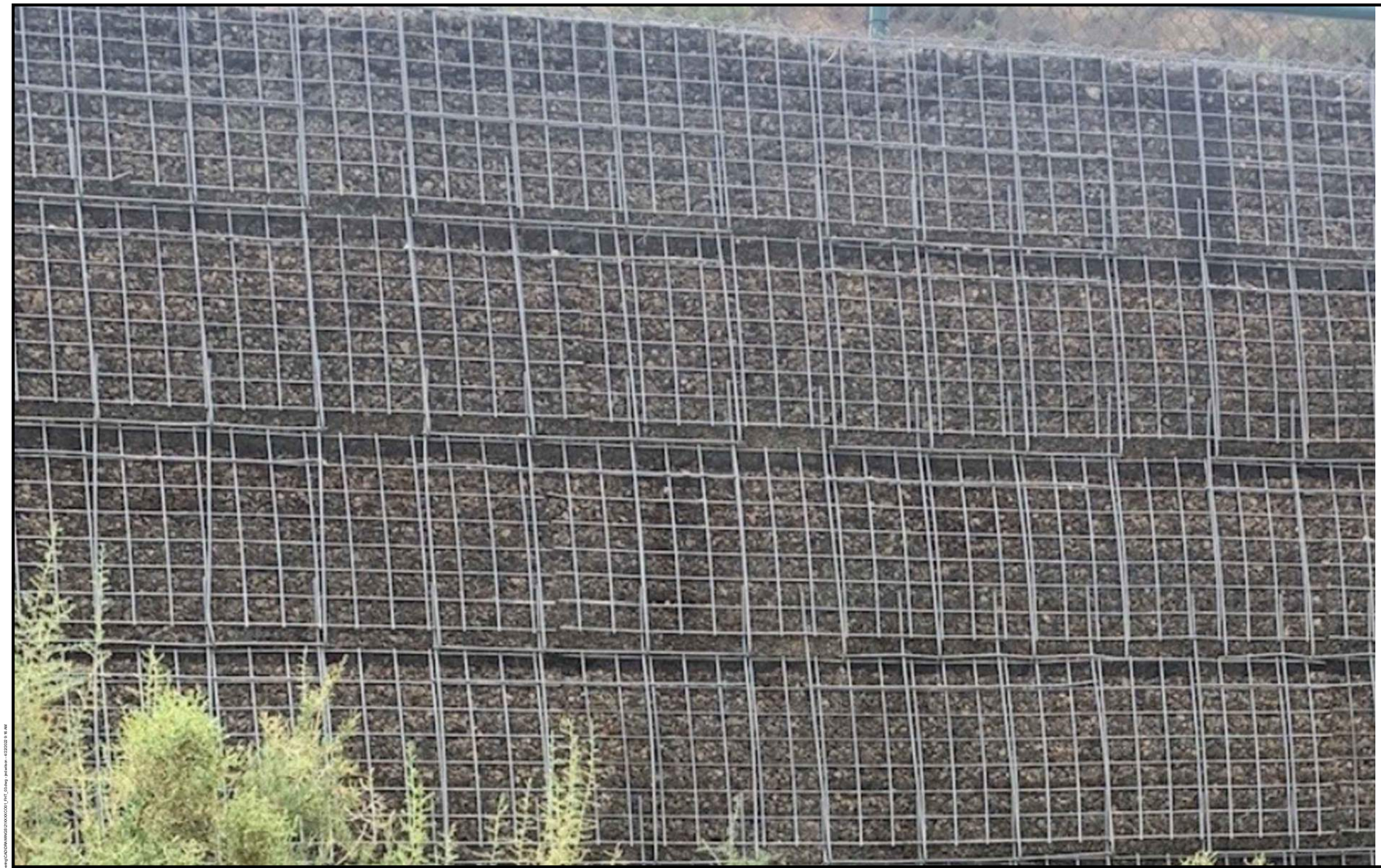
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STANDARD DETAILS

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NOTES:

1. 3" TO 5" MINUS OPEN GRADED STONE NOT SHOWN BEHIND FACING IN THIS EXAMPLE

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RFTA MAINTANANCE FACILITY

SHEET TITLE:

EXAMPLE GRS WALL PHOTOGRAPH

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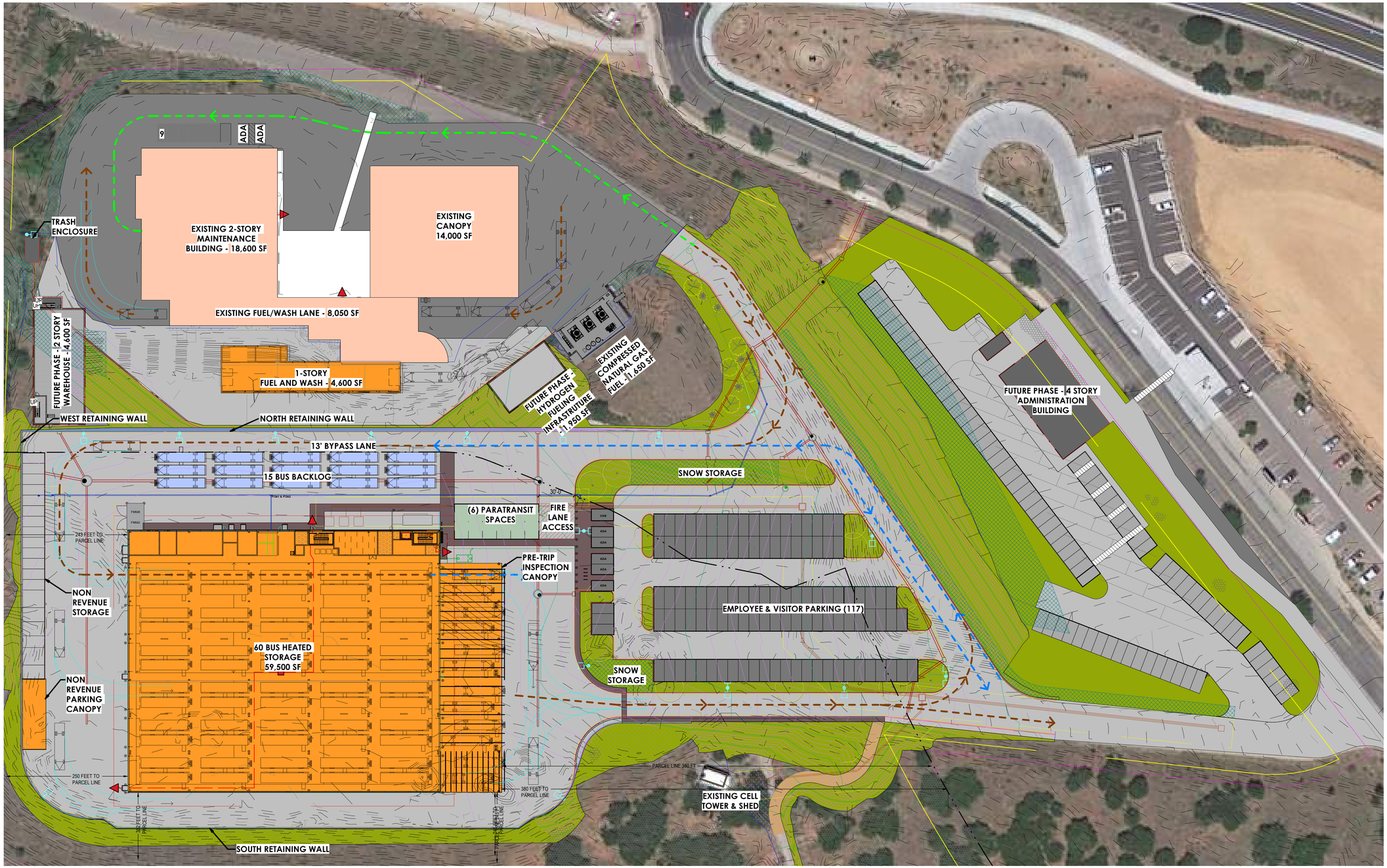
- NEW PAVEMENT
- EXISTING PAVEMENT
- PEDESTRIAN WALKWAY PAVEMENT
- EXISTING CONCRETE
- LANDSCAPE AREA
- TRASH AND RECYCLING ENCLOSURE
- NEW BUILDING
- EXISTING BUILDING
- MASTER PLAN (FUTURE) BUILDINGS

PARKING/STAGING LEGEND:

- EMPLOYEE PARKING
- PARATRANSIT
- BUS BACKLOG PARKING

LEGEND:

- CIRCULATION PATH OF OPERATORS
- CIRCULATION PATH OF SERVICE HOSTLERS
- CIRCULATION PATH OF MAINTENANCE
- PARCEL BOUNDARY LINE



1 MASTER PLAN LE.R2

ASP-MP-LE.R2 1" = 40'-0"

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RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

ARCHITECTURAL MASTER PLAN LE.R2

40' 20' 0' 40' 80'

SCALE: 1" = 40'

ASP-MP-LE.R2

LE.R2 SUBMITTAL 04/22/22

STANTEC #2270417345

Matthew Langhorst DPW
(970) 384-6438 (o)

CITY OF GLENWOOD SPRINGS PUBLIC WORKS

101 West 8th Street
Glenwood Springs, CO 81601

Planning Item: **70-26 RFTA Bus Barn Expansion**
Applicant: **RFTA**
Owner: **RFTA**
Location: **2301 Wulfsohn Road**
Parcel:
Date of Comments: **5-11-2022, Original Comments on 2-28-2022**

The following are W/WW, Electric and Public Works Department comments based on the application package dated 4-22-2022.

W/WW Department Comments

- All water and wastewater utilities proposed for this project outside of the ROW will be considered private and not maintained by the city. Please see attached markup for valve and manhole delimitation point for public private. Please label these locations as the delineation point on the plans.
- The fire hydrant at the west end of the property is in an equipment storage area, this hydrant needs to be kept clear at all times. Potentially add a water sampling station here due to the long dead-end line. The 8" hydrant valve can be a 6" on the hydrant lead line.
- The water, sewer and electric details need to follow city standards details at the City of Glenwood Springs Engineering Department website, Engineering Standards.
- Water Noe #1 calls out a 6" water main extension, plans show an 8".
- We recommend you change water note #15, the language of "in all street ROWs". No material larger than 6" should be used to backfill any utility trench in any location for ease of repair and maintenance later.
- The storm sewer crosses the waterline twice but is not shown in the profile. Please Add.
- A note should be added for the encasement of the waterline at the sewer crossing.
- All Fire hydrants must have a 15' easement centered on the hydrant if they are outside of the ROW. Access to the hydrant will also need to have an easement for maintenance. The City will own and maintain all fire hydrants, leads and valves.
- All services that are to be used for Fire sprinkler water must be designed and constructed to NFPA24 requirements and will be considered private. Items needing to be shown in detail…thrust block calculations, restraints, etc.
    - A plan and profile view of the piping alignments extending from the tap location to the building interior penetration.
    - Materials for construction.
    - Thrust restraint locations and specifications.

    - A comment indicating that the design conforms to all NFPA 24 requirements.
    - A note indicating that the service line must be pressure- and flow-tested in accordance with NFPA 24.
    - The stamp and signature of the Professional Engineer (PE) certifying the design.
- Will need to see a detail for the fire riser room that shows fire/domestic services, meter and backflow installation.
- How will this unit be metered?
- A utility report that shows water and wastewater system demands based on EQRs for the property should be included in the Engineering Report.
- A MEP plan is called out but not provided.

W/WW Department Contact Information:

- Mike Hoffman – 384-6343 (W/WW Field Superintendent)
- Utility Billing – 384-6400 (Account setup; Water Meter Purchase)
- Community Development Department – 384-6411 (Improvements Fees)

The following are Electric Department comments:

Electric Department Comments

- Owner will be responsible for cost associated with line extensions and or relocation through the ROW/property and all infrastructure for the new development.
- Final service layout, transformer locations and site planning will need to be coordinated with the City of Glenwood Springs Electric Department and final layout shown on final plans. The proposed electric relocation plans have been reviewed and approved. Those plans are considered preliminary at this time.
- To Note: From the cell tower transformer to the electric vault, that should be two 3" conduits.
- To Note: from the pull vault t the transformer locations should be two 6" conduits.
- To Note: All other sections where we tie into existing electric should be one 6" conduit and one 2" conduit.
- Owners GC/excavation company will be responsible for all trenching, including the line extension trenches to new transformer locations, electric primary and secondary conduit installation, electric pull vaults and transformer vaults.
- The City of Glenwood Springs Electric Department Costing Proposal will be paid in full prior to any work commencing. Any additions to the proposal will be due at time of completion of work or any saving will be refunded at time of completion of work.
- Developer needs to be aware of long lead times on material. Long lead times could be between 6 months to a year depending on material.
- The new development will require the main line serving the existing RFTA facilities to be relocated.

- The CBN fiber will also need to be relocated with the electric. The relocation of fiber will follow the proposed electric but will be a separate cost estimate.
- How is the lighting of this parcel going to affect the homes across the river? We have had lighting discussions with the railroad, I image this will be the same discussion.

Electric Department Contact Information:

- Doug Hazzard – 384-6353 (Electric Superintendent)
- Mark Smith – 970-930-7071, mark.smith@cogs.us (CBN)
- Utility Billing – 384-6400 (Account setup)

The following are Public Works Department comments:

PW Department Comments

- The proposed debris pond access road relocation could cause access issues for large trucks entering and cleaning the ponds above. Will RFTA allow excavators to be unloaded on their roadway to be able to drive them up to the pond location due to the access being steep and having minimal horizontal curves? No profile or geometry sheet was included for this access that I saw.
- Will the south wall design hold up to saturated soils? The debris pond just uphill does see a lot of spring and fall time water, if the outlet is not maintained it will saturate the soil downslope from it.
- The Master Plan sheet LE.R2 show snow storage only up front at the employee parking area. Does RFTA really intend to push snow from the southwest all the way to the northeast on this lot?

Public Works Contact Information:

- Matthew Langhorst – 384-6438 (PW Director)

CITY OF GLENWOOD SPRINGS

Engineering Department

Engineering Department
Jessica Bowser, Asst. City Engineer

Date: May 19, 2022

To: Community Development

Re: RFTA Location and Extent Review

Please see the following engineering comments for the RFTA Phase 3/4/5/7 Location and Extent Review. These comments are not inclusive of comments from other departments, including Public Works, Building, etc. It is up to the applicant to verify that the appropriate reviews have been completed by these departments. City of Glenwood Springs Engineering reserves the right to make additional comments throughout the application process, especially if significant modifications are made. *It is in the applicant's best interested to address all comments completely and provide a description of how and where these comments have been addressed to reduce the number of reviews necessary for approvals.*

Engineering will not review a revised submittal until the applicant provides a written response to these comments.

Comments to be addressed prior to the issuance of a Grading or Building Permit:

General Comments:

1. Over the last few years, these properties have been piecemealed together, leading to inconsistent approvals and improvements. Since this is a common development, with associated phasing, please submit master plans for the following elements:

    a. A site plan indicating the most intense use/s RFTA might want. Please include planned phasing and time frames for the development.

    Response from the applicant: *An updated Master Plan for the three subject parcels is included in the revised Plan Set.*

    Further City Commentary: **This comment has not been fully addressed.** The submitted document is not inclusive of the entire RFTA Phasing for previous and proposed developments outlined in various reports. This plan should include the entirety the proposed RFTA development in the West Glenwood RFTA Facility for present and future phasing and uses. Not having the wholistic view of future phasing will lead to issues in future phasing such as removal and replacement of potential public facilities that could have been sized or designed appropriately from the initial phasing to accommodate the proposed development. This entire facility should be treated much like a PUD where each phase can be "billed" against the master design. If conservative uses and densities are considered, the future analysis, review, and construction of these phases of development will be expedited.

b. A **Master Drainage Study**. This should evaluate the maximum lot coverage thar RFTA might consider with the most intense land uses above.

Response from the applicant: *A Master Drainage Report is included in this response submittal.*

Further City Commentary: **This comment has not been fully addressed.**

i. This report should consider the existing conditions and drainage with the current development. The current report that we have was not evaluated completely and the requested information from those improvements was never provided, nor was a stamped report completed.

ii. This baseline could then be evaluated against at the time of future phase developments.

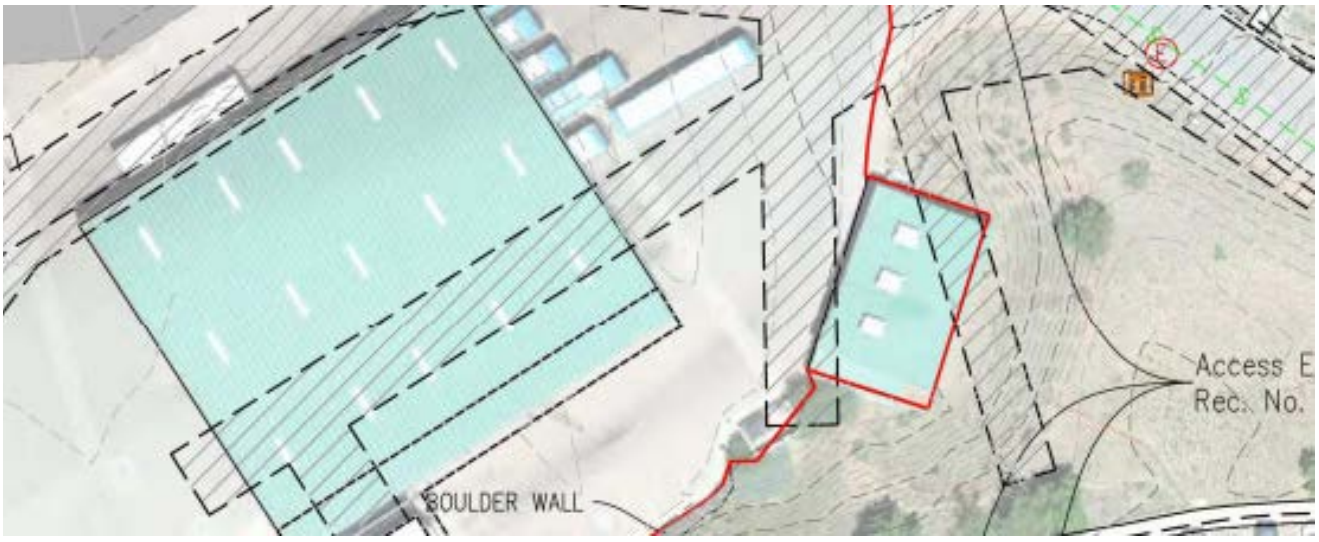
c. As each phase is developed, a drainage letter would need to still be completed to indicate compliance with this report or provide any amendments or improvements recommendations as necessary to maintain compliance with this report.

Response from the applicant: It is understood, and an updated letter will be provided as each phase is developed.

Further City Commentary: **This comment has not been fully addressed.** Additional Phasing at the Park and Ride facility is not analyzed.

Survey Comments:

2. What is this hatch for? It is not in the legend and does not appear to be for access since other access easements appear to not be hatched.



Response from the applicant: The hatch pattern helps to recognize the easements. The pattern has been improved, and easements called out in the updated Survey.

Further City Commentary: **This comment has not been addressed.** Sheet C020 still indicates hatching and easement labels that are unclear and not identified in the legend. This plan is not a stamped yet identifies the Surveyors Certification. An updated or separate survey plan was not provided.

3. It appears that many easements overlap and hatching is inconsistent and not provided in a legend. Could each easement be hatched with different semi-transparent colors and a bold colored dashed line for clarity? This should be included in a legend also.

   Response from the applicant: Many easements have been vacated over time and will need to be re-recorded. It is proposed to include these as part of the plat submitted as a part of Building Permit application and/or at the conclusion of the project.

   Further City Commentary: **This comment has not been addressed.** Sheet C020 still indicates hatching and easement labels that are unclear and not identified in the legend. This plan is not a stamped but identifies the Surveyors Certification. An updated or separate survey plan was also not provided.

Plan Comments:

General Comments:

~~4. Please include the replacement of the street trees that have died since the original development.~~

   ~~*Response from the applicant: The Applicant confirmed that trees planted as a part of the original development are still in place or have been previously replaced.*~~

   Further City Commentary: Noted. The condition of trees in the ROW associated with this development will be reviewed prior to Certificate of Occupancy.

~~5. A separate demolition plan should be provided for clarity. Items removed from the site should not be shown in the proposed plans.~~

   ~~*Response from the applicant: A Demolition Plan is included as a part of the updated Plan Set.*~~

6. An erosion control plan should be provided.

   Response from the applicant: An Erosion Control Plan is included as a part of the updated Plan Set.

   Further City Commentary: **Partially addressed.**

   - The erosion control plan has sub-standard erosion control.
   - The VTC is identified on the slope and not in the roadway and is placed inside the work area, not at the end of the work area/roadway replacement where vehicle tracking will occur.
   - A concrete washout is not provided.
   - Proper installation of silt fencing is parallel to contours, not perpendicular to the contour.
     - Silt fencing should be installed outside of the proposed grading and/or proposed work.
   - Check dams or other sedimentation protection should be installed to protect the drainage to the west of the site.

~~7. There appears to be a proposed relocation and re-grading of the Access Road for the Glenwood Meadows Storm/Debris Facilities. The district should review and approve the design and an easement for this relocation will be required.~~

   ~~*Response from the applicant: Understood.*~~

Further City Commentary: Noted. Engineering will not sign off on a grading or building permit until easements and approvals are provided to the city.

Cover Sheet:

8. The Summary Table seems inaccurate:

   Response from the applicant: The Summary Table is revised in the updated Plan Set.

   a. The total lot is 866,949 SF

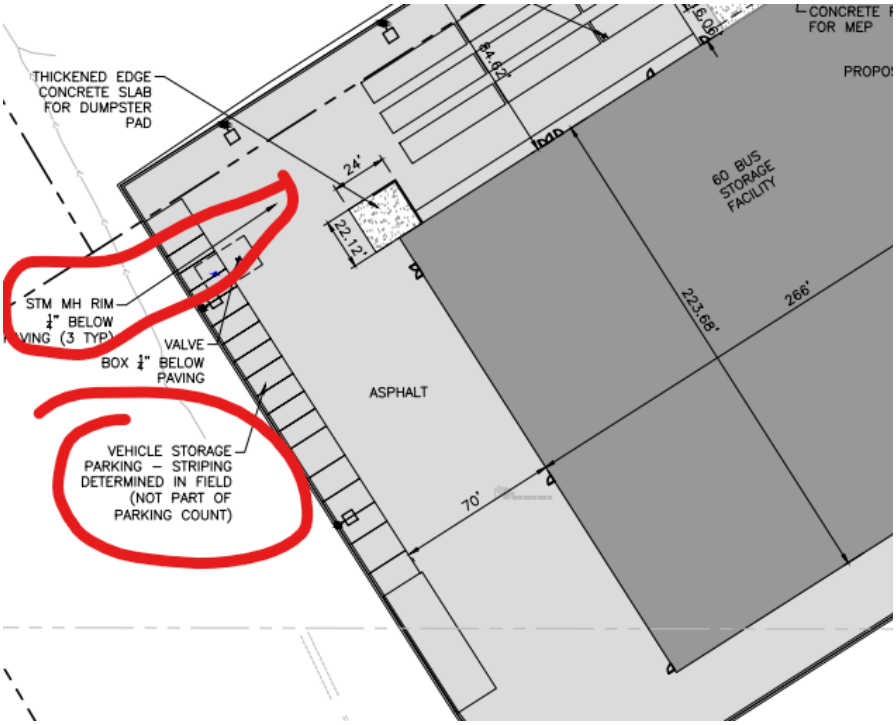
      Further City Commentary: Why did the lot size change between submittals? It was 866,949SF and is now shown as 866,830 SF

Site Plan:

9. There appear to be 134 Parking Spaces on site. 8 spaces are Accessible (2 existing). There should be at least 2 Van Accessible indicated spaces, only 1 is indicated. The Project Description states that there are 117 parking spaces, which do not include the Paratransit staging spaces. Inclusion does not change the number of accessible spaces on site; however, they should be accounted for in the planning.

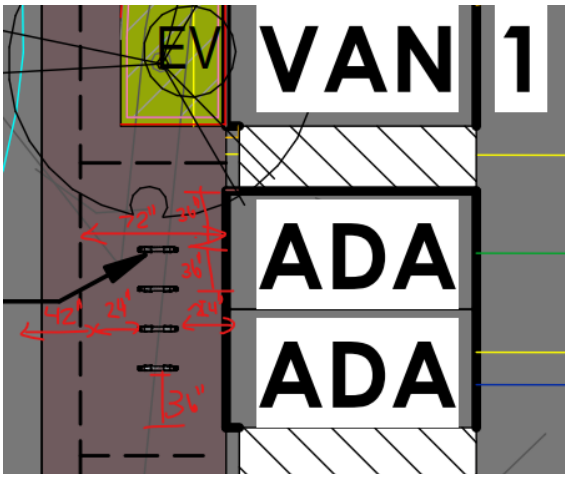
   Response from the applicant: The depiction of the proposed parking has been clarified. The Paratransit spaces are actually backlog bus spaces, not ADA spaces. An additional ADA van parking space has been added to the design.

   Further City Commentary: **This comment has not been fully addressed.** The plan still indicates 117 spaces to the east of the proposed buildings, along with "non-revenue storage" to the rear of the building. This storage is outlined in a way that makes it appear to be for more parking that may not be accounted for. It is identified in the signage and striping plan as parking, it should be included in the parking count:



10. Dimensioning is insufficient. Pedestrian walkways, clear areas around bicycle parking, and drive aisles should be appropriately dimensioned.

    a. Is there adequate pedestrian (42" to meet ADA) clearance around the bicycle parking if a bicycle is parked there. i.e. the racks should be spaced at a minimum of 36" and have 72" for accommodating a bike. This means that there should be at least 24" from the rack to the pedestrian area:



    Response from the applicant: Additional dimensions have been added to the Plan Set. Adequate clearances for ADA paths around bicycle parking have been confirmed. Bollards, wheel stops, and planting buffers are included to protect pedestrian paths and other site features.

    Further City Commentary: **This comment has not been addressed.** This dimensioning is not provided, nor were wheel stops in the plan. The bollards are removable – why do they need to be removable?

11. It appears that this walkway is at grade with the drive aisles and parking. How will the pedestrian area be protected from parking encroachment? Will there be wheel stops?

    Response from the applicant: The updated Plan Set includes appropriate drive aisles for the proposed project. Adequate dimensions for emergency response vehicles are included. A Pavement and Signage Plan is included in the Plan Set, illustrating the preliminary signage intent.

    Further City Commentary: **This comment has not been addressed.** Wheel stops are not indicated on the plan as the response states. Drive aisle dimensions are not provided for all drive aisles.

    a. What is this dimension?

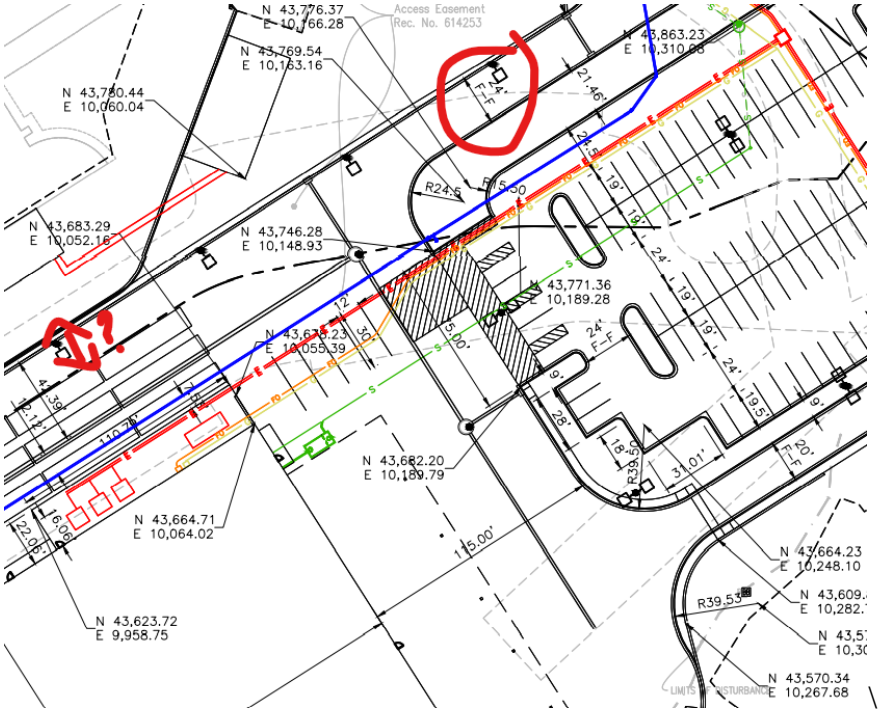


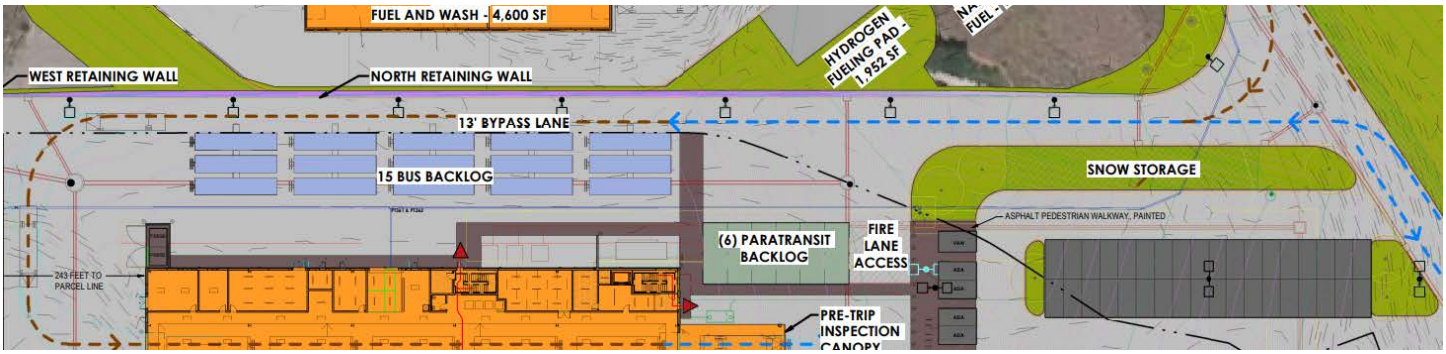
Further City Commentary: **This comment has not been addressed.** A dimension was not provided. See Sheet C-102 from this submittal:



b. Adequate drive aisles are not provided on the site plan.

Further City Commentary: **This comment has not been addressed.** The dimension adjacent to proposed bus storage/parking was not provided (See clip from Sheet C-102 below). This appears narrower than the 24' dimension on the driveway to the east. The overall plan indicates that this "bypass lane" is only 13' wide. ***20' should be maintained for all drive lanes at all times***.





c. They do not appear to be installed on the existing site. Two-way traffic should have a 24' drive aisle (20' at a very minimum with City Engineer variance approval). This was shown in the building expansion plans submitted in 2019 and should be constructed per these plans. The proposed/under construction expansion should be represented accurately on this proposed plan. Additionally, buses should not be staging in this space, as 20' drive aisles should be accommodated for EMS response to the site <u>at all times</u>.

Further City Commentary: **This comment has not been addressed.** The dimension adjacent to proposed bus storage/parking was not provided (See clip from Sheet C-102 below). This appears narrower than the 24' dimension on the driveway to the east. The overall plan indicates that this "bypass lane" is only 13' wide. ***20' should be maintained for all drive lanes at all times***.

i. No Parking Signs should be installed in locations where the drive aisles are a minimum and no parking lanes are facilitated.

Further City Commentary: **This comment has not been addressed**. No parking signs are not indicated.

ii. Even if the site circulation is proposed as one way, drive aisles should be a minimum of 20'.

Further City Commentary: **This comment has not been addressed.** The dimension adjacent to proposed bus storage/parking was not provided (See clip from Sheet C-102 below). This appears narrower than the 24' dimension on the driveway to the east. The overall plan indicates that this "bypass lane" is only 13' wide. ***20' should be maintained for all drive lanes at all times***.

Overall Civil Site and Utility Plan (See Public Works comments, utility comments made by public works supersede any engineering comments made below):

12. Proposed utilities end without any connections to existing.

    Response from the applicant: This is corrected in the updated Plan Set.

    Further City Commentary: **This comment has not been addressed.**

13. A hydrant is proposed at the west end of the improvements with snow storage directly in front of it. Hydrants must be kept clear at all times; snow storage is not allowed in front of fire hydrants.

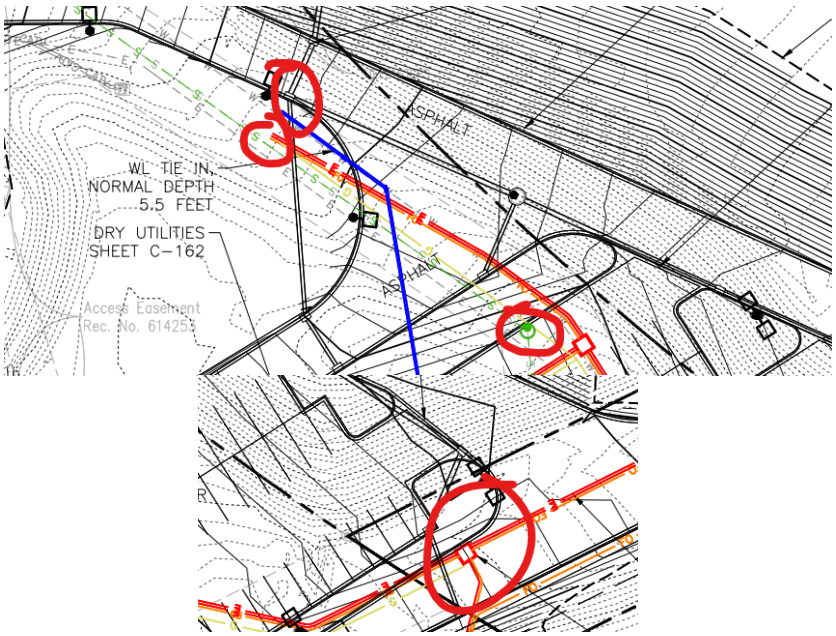
    Response from the applicant: The proposed design is revised to remove proposed snow storage from fire hydrant locations.

    Further City Commentary: Non-revenue storage is proposed where this hydrant is located. How will this hydrant be protected from vehicles and keep clear?

14. Water should be protected from sewer lines (storm and sanitary) per CDPHE regulations. Crossings should be minimized and clearance from the proposed sanitary manhole should be accommodated.

    Response from the applicant: Understood.

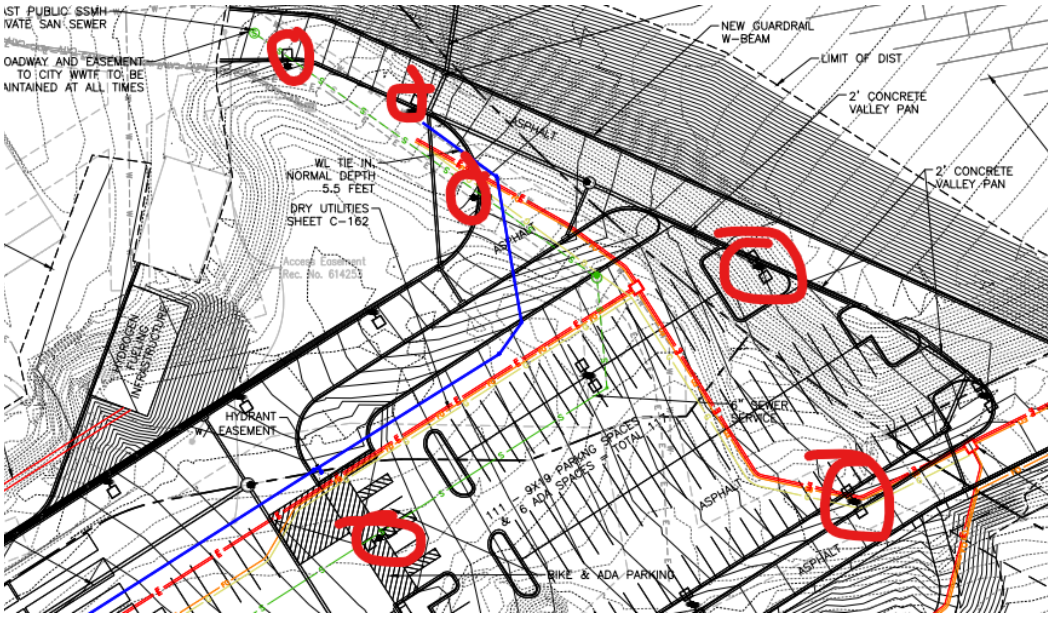
    Further City Commentary: **This comment has not been addressed.** Minimum clearances are required between gas and electric also. From the General site Utility sheet:



15. There appears to be a number of potential conflicts between light foundations and proposed utilities.

Response from the applicant: These conflicts are removed in the updated Plan Set.

Further City Commentary: **This comment has not been addressed.** From the General site Utility sheet:



16. Setbacks should have a different line type than the limits of disturbance or easements and should be identified in a legend.

Response from the applicant: Line types are revised in the updated Plan Set to improve legibility.

Further City Commentary: **This comment has not been addressed.** Setbacks are not identified in the legend.

17. Sight distances should be verified against the proposed landscaping and grading alterations for all intersections and potential conflicts.

Response from the applicant: Potential conflicts are eliminated in the updated Plan Set.

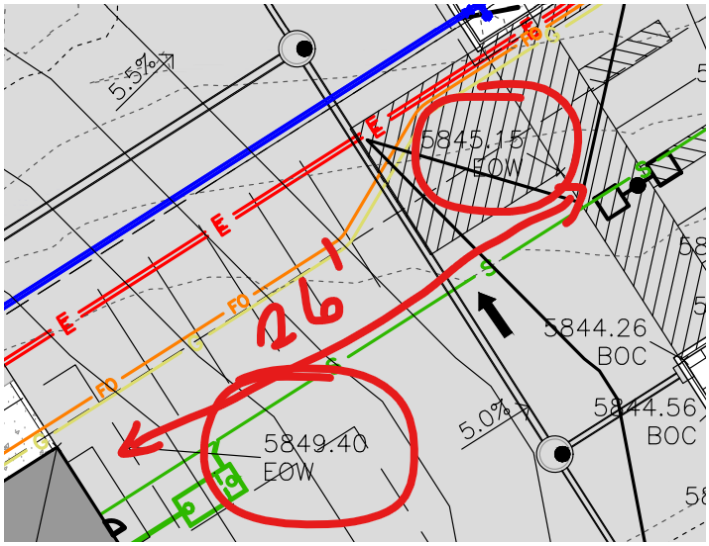
Further City Commentary: **This comment has not been addressed.** Sight triangles are not provided in the updated plan set

Grading Plan:

18. The proposed pedestrian walkway area designated as the accessible route does not appear to meet accessibility requirements.

Response from the applicant: The accessible route design is revised in the updated Plan Set.

Further City Commentary: **This comment has not been addressed.** If the Scale on the updated grading plan is accurate, there is 25-26 LF between these two points. The change in elevation is 4.25 feet as the plan indicates. This is a grade of approximately 16.3%, which is nowhere close to meeting accessible standards.



19. Is there curb and gutter on site? Linework makes it appear that there is, but the contours appear to not to indicate the curb.

    Response from the applicant: Yes, curb and gutter is included in the design and documented on the appropriate sheets. In particular, curb and gutter detail can be seen on sheet C-157 LE.R2 Paving and Signage Details.

    Further City Commentary: **This comment has not been addressed.** It is understood that there will be curb and gutter, however, the curb and gutter is not reflected in the grading plan contours. This is of concern because it could lead to inaccurate elevation points as indicated on the plan. See below from the Grading and Drainage Plan:



20. Inlets are proposed in the center of the bus staging. Is the design to have an inverted crown to catch drainage? These should have water quality to catch any oils or other contaminates that these vehicles are prone to leaking *before* they leave the site.

    Response from the applicant: Understood, the grading, and drainage design is revised in the updated Plan Set.

    Further City Commentary: **This comment has not been addressed.** The Drainage Report discusses ways to manage water quality but does not identify where this is actually taking place. The Storm Details identify the sumps in the manholes and inlets, but the water quality volumes have not been

shown to be met by any calculations of these items. The plan and profiles for the storm do not clarify this either.

> **4.4 Water Quality**
>
> Water quality will be provided onsite as part of the proposed improvements. Proposed methods for water quality will include sumps at inlets, snouts as discharge locations of inlets and baffled manholes at the last manhole before final discharge out of the site. Drainage from the interior of the bus storage facility will have a large sand/oil interceptor and will discharge to the sanitary sewer.

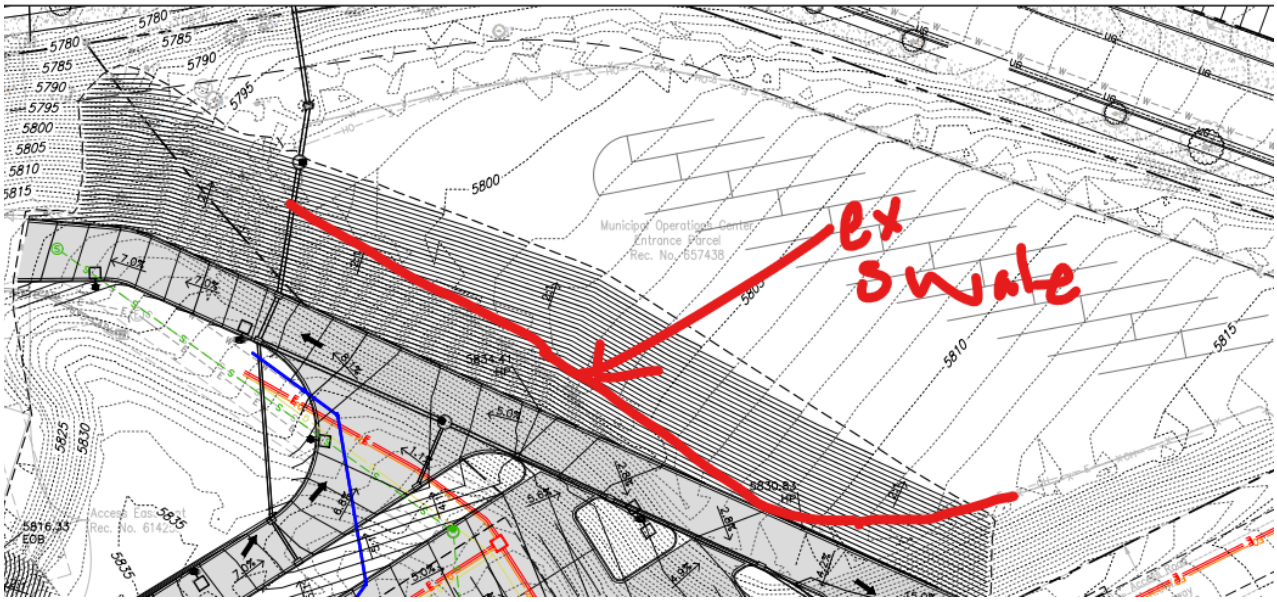
21. This project proposes substantial grading and snow storage on the adjacent site developed in 2017. It is still indicated to be used as a bus overflow facility. A new parking layout should be provided that indicated adequate space for drive aisles and bus turn around when also being used for snow storage.

    Response from the applicant: The existing intent for overflow bus storage circulation and parking is appropriate. Drainage design is revised in the updated Plan Set. The existing stairs are removed, and the bus hostelers will use the existing/proposed sidewalk to return to the 60-bus storage building.

    Further City Commentary: **This comment has not been addressed.** Dimensioning of the proposed layout is not provided in the plans.

    a. There is a ditch that drains to the inlet being replaced at the NW end of the site. Is this being reestablished?

       Further City Commentary: **This comment has not been addressed.** Swale is not shown to be re-established, where will runoff be conveyed? See clip from the Grading and Drainage Plan:



    b. The existing stairs to this lot are not addressed. Are these being removed? Will sidewalk be installed to facilitate safe pedestrian movement from this lot to the buildings?

       Further City Commentary: **This comment has not been addressed.** There is no existing or proposed sidewalk proposed on that side of the site. Pedestrian circulation should be facilitated.

Floor Plans:

22. Where do the roof drains discharge?

Response from the applicant: The roof drains internally discharge to the stormwater management system. Overflow water discharges to daylight. All stormwater is collected and treated for water quality before leaving the site.

Further City Commentary: **This comment has not been addressed.** Connections are not indicated in the plans.

If the roof drains are connecting with the floor drain system internally, this would not be allowed to enter the sanitary system after the sand oil system. Additionally, an overflow would not be allowed as the sand oil separator is required to treat for any spills in the storage area.

Comments not addressed on Previous Developments:

Glenwood Park n' Ride:

In 2016, RFTA submitted a building permit for the Park n' Ride. At that time comments issued by the engineering department were never addressed and since a grading permit was not a requirement, we were not able to resolve these comments.

23. The storm system should be accurately surveyed (including the verification of detention and water quality locations and sizing) and a maintenance plan and agreement provided to the city for these facilities.

    a. The report mentions an outlet structure on page 6 with a Wier. The ditch along Midland needs to be sized to verify capacity.

    Response from the applicant: The revised Drainage Report addresses these comments.

    Further City Commentary: **This comment has not been addressed.** While it may be understood that some of these deficiencies exist today, we cannot allow them to be made worse by RFTA's proposal. Detention should be accommodated or improvements to the public system made.

    b. Provide the HGL for the drainage system. These ponds and pipes are sized for the 25-year storm. There is concern over water velocity and the change in direction within the pond. If velocity is too high, especially in a less frequent event, this could cause undercutting of the bank.

    Response from the applicant: The revised Drainage Report addresses these comments.

    Further City Commentary: **This comment has not been addressed.** The report describes multiple deficiencies in the existing system, some of which RFTA installed. While it may be understood that some of these deficiencies exist today, we cannot allow them to be made worse by RFTA's proposal. Detention should be accommodated or improvements to the public system made. Additionally, RFTA should remedy their deficient system on site as the drainage report was never revised or approved for the previous phases.

24. A Final, Stamped, Drainage report was never provided to the City.

Response from the applicant: This request is being separately addressed by the Applicant.

Further City Commentary: **This comment has not been addressed. A separate item from the applicant was not received.**

a. Water quality should be included in these ponds since they serve a roadway/parking area. Section G mentions this briefly but how is the initial water entering the pond being prevented from passing through the pond?

   Further City Commentary: **This comment has not been addressed.** Water Quality calculations and capacity are not indicated. In fact, there is an assumed bypass that occurs because a pipe was installed with a backpitch with the Park and Ride Development.

b. Pre and Post Drainage mapping was never completed or provided. It is unclear why the lower basin initial phase and build out phase would have a different allowable runoff. These should be the same as they were previously undeveloped. The volume of storage required seems inconsistent with the pre/post drainage volumes.

   Response from the applicant: This request is being separately addressed by the Applicant.

   Further City Commentary: **This comment has not been addressed. A separate item from the applicant was not received.**

RFTA Regional Transportation Phase 1:

Another plan was submitted in 2016 for the Phase 1 site improvements to the RFTA RTC site.

25. There is a ditch mentioned in the plan comments that was installed on this site. It is no

a. Only a portion of the same drainage report from the Park and Ride was submitted with this application. It was not stamped and the previous questions were not answered. See above comments. This was the response provided by Shrewsberry when comments were issued:

10	What is this for? Any additional/relocated gravel area needs to be included in the impervious calculations for the stormwater facilities. Are the facilities at the park and ride adequate for the increased impervious area? Drainage maps were not included with the Park and Ride submittal and it is unclear what the proposed system will accommodate.	The existing gravel driveway is being removed and will not be relocated. The sand storage note is to relocate RFTA's sand storage facility and it is not a new impervious area. All drainage has already been accommodated. See attached excerpts from West Glenwood Park and Ride Lot and Trail Improvements Drainage Report prepared by SGM dated March 2015.

Response from the applicant: The revised Drainage Report addresses these comments.

Further City Commentary: **This comment has not been addressed.** Water Quality calculations and capacity are not indicated. In fact, there is an assumed bypass that occurs because a pipe was installed with a backpitch with the Park and Ride Development. This condition should be remedied.

RFTA Facility Expansion:

This expansion was reviewed in 2019.

26. The drainage narrative provided for this project did not contain a stamped disclaimer as required by the engineering standards.

Response from the applicant: This request is being separately addressed by the Applicant.

Further City Commentary: **This comment has not been addressed. A separate item from the applicant was not received.**

27. This project site has been identified in a geologic hazards area per the City of Glenwood Springs Geologic Hazards Mapping Completed by Lincoln Devore in 1978. Mapping is available on the City Website at the following link for your review: Geologic Hazards Mapping

    a. A **Geologic Hazards Report** should be completed by a qualified State of Colorado licensed Professional Engineer for this site. Mitigation should be completed per the City of Glenwood Springs Municipal Code Section 070.040.020 – Sensitive Area Protection Subsection (C).

    Response from the applicant: The updated Geotechnical Report is revised to address this comment.

    Further City Commentary: **This comment has not been addressed.** A geohazard report was not submitted and the submitted geotechnical report does not address the geohazards.

Drainage Report Comments:

28. A **Master Drainage Report** should be completed by qualified State of Colorado licensed Professional Engineer. Requirements for drainage are outlined within Chapter 4 of the City of Glenwood Springs Engineering Standards available here: Chapter 4 - Engineering Standards.

    Response from the applicant: The updated Master Drainage Report is revised to address this comment.

    Further City Commentary: **This comment has not been addressed.** A master plan should be completed that encompasses all of the RFTA Campus Phasing.

29. **Phase 3/4/5/7 Drainage Report Comments:**

    Response from the applicant: The updated Master Drainage Report is revised to address this comment.

    a. The report identifies maintenance needs of the debris basin on site. These facilities should be maintained prior to construction. A maintenance plan and agreement should be documented for these facilities with the city.

    Further City Commentary: **This comment has not been addressed.** A maintenance plan and agreement is still required.

    b. It is not intuitive from the proposed plan that there is a decrease in flows from the site given the large-scale improvements. A summary table comparing basins area, imperviousness, and downstream discharge point (design points) from existing to proposed (where there is a change) would be helpful to better understand the reduced flow conclusion.

    Further City Commentary: **This comment has not been addressed.** There is an increase in flows and there are capacity issues in the pre-development condition. It also appears that the previous development of the Park and Ride may have also contributed to this condition and was never addressed with the unstamped Drainage Report submitted at that time. Just because issues exist in the current condition, does not mean that it is acceptable to worsen this condition.

Detention should be provided on site or the public facilities upsized to allow the conveyance of flows in this system without overtopping.

c. The report states that there are three existing sedimentation ponds. The sizing and outfall structures information was not provided in a stamped report or verified at completion of the Park and Ride. This information should be provided, as these detention ponds were not described as sedimentation ponds in the previous, unstamped, report.

   Further City Commentary: **This comment has not been addressed.** Water Quality calculations and capacity are not indicated. In fact, there is an assumed bypass that occurs because a pipe was installed with a backpitch with the Park and Ride Development.

d. Water Quality recommendations should address contaminants generated from the proposed bus/vehicle circulation areas. Catching oils and floatable chemicals nearest the sources would be the primary watery quality concern for the proposed facilities. A sand oil separator may be an option for intercepting contaminates before they leave the site.

   Further City Commentary: **This comment has not been addressed.** Water Quality is mentioned in the report and that facilities would be included to facilitate water quality, none of these facilities are described or sized appropriately in the plans or report.

e. Final Drainage Report should address the proposed improvements and master plan any areas that are anticipated to be expanded into in the future. This will allow for RFTA to install facilities at an appropriate sizing, rather than potentially having to replace them in the future with other Phase developments.

   Further City Commentary: **This comment has not been addressed.** Additional Phases at the Park and Ride lot are not included. This facility has no detention or water quality designed for this or future phasing.

f. The Drainage Plans should identify design points and appropriate sizing calculations or evaluation of structures/facilities/water quality.

   Further City Commentary: **This comment has not been addressed.** Water Quality siding is not addressed, and detention is not accounted for.

30. Any retaining walls over four feet (4') in height from *bottom of footer to top of wall* or adjacent to any area subject to additional loading (tiered walls, traffic, parking, etc) shall be designed by a qualified State of Colorado licensed Professional Engineer.

    a. There was discussion during the meeting on March 1st about the construction of a 38' tall retaining wall on site. This was not shown in the plans submitted, but it was described being directly below the existing debris catch basin for this property. This catch basin is prone to holding water year-round and special consideration should be made for the maintenance and location of this facitlity. The geohazard/geotechnical report should address this directly along with any potential load impacts during an event that may cause debris and this considered in the design.

Response from the applicant: Understood. The revised retaining wall design is included in the updated Plan Set. Also included in this response are detailed design sheets from GSI, the wall design-build contractor.

Further City Commentary: **This comment has not been addressed.** Plans from GSI were provided, but none of them are stamped. The storm is called out in the plans behind soil nail walls but is it in an unknown location that could be hit by these nails.

A Geohazard report was not submitted and the instability of the slope above this proposed wall is called out in the Supplemental Geotechnical Engineering Investigation from CTL dated April 6, 2022, but is not specifically evaluated for stability at the height proposed, especially given the additional loading this wall is likely to see with water being retained in this facility. Impacts and/or additional loading for this wall that could occur in the event of a debris flow is not evaluated.

Furthermore, the Supplemental document from CTL described encountering groundwater seepage at 7-9 feet at the time of drilling that will supply additional loading on this proposed wall, even if there is not storage in the debris pond occurring. The excavations described in the uphill excavation area only callout 10-15 feet, not the 35 feet shown in the plans. There was an analysis of the existing slope and with the excavation of up to 15 feet, which does not match the plans. There was no discussion on the stability if a debris event were to occur or for a 35-foot excavation.

31. Review the requirements for ADA accessibility adjacent to or within the proposed development.

    Response from the applicant: Understood.

    a. Rocky Mountain ADA has been very helpful in providing guidance and review of local project and defining the applicability of the Accessible Design Standards as well as the guidance provided in the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-or-Way (PROWAG).

32. The proposed site plan, grading and drainage should be supported by the findings in the Geotechnical Report. If they conflict with the provided report, the geotechnical engineer should provide documentation that they have reviewed the proposal and show that it is supported by any additional investigation and/or recommendations made by the geotechnical engineer.

    Response from the applicant: Understood.

    Further City Commentary: **This comment has not been addressed.**

33. A **Grading Permit** shall be submitted along with the following documentation:

    Response from the applicant: Understood.

    a. No work for this project will be allowed to commence until **all** work easements (temporary or permanent), on or off site, are in place for the development of property.

    b. Final Stamped Reports (Geotechnical, Drainage, Traffic Geologic Hazards, etc).

    c. Final Stamped Construction Documents.

    d. If the project has a proposed On Site Wastewater Treatment System (OWTS), said system design shall be submitted to the City along with any and all approved permitting for this system.

    e. If the project has an existing On Site Wastewater Treatment System (OWTS), verification of said system capacity, maintenance records, and applicable permitting should be submitted to the City.

f. The Stormwater Management Plan, along with any applicable approved state permits, including a **Construction Stormwater Discharges Permit** or **Dewatering Permit.**

g. Approved Letter of Map Revision or No-Rise Certification shall be completed by a qualified State of Colorado licensed Professional Engineer.

34. Any additional permitting necessary for the project should be submitted, including Building and/or Right of Way Permits.

Response from the applicant: Understood.

a. Any work taking place within an adjacent property required an easement (temporary or permanent).

Response from the applicant: Understood.

b. Any work taking place within the City of Glenwood Springs Right of Way requires a **Right of Way Permit.**

Response from the applicant: Understood.

i. Provide S.U.E. plan per Colorado Law CRS 9-1.5-102 requirements or provide a stamped letter determining why this is not a Subsurface Utility Engineering-Required Project.

c. Any work taking place within the CDOT Right of Way will require a **Special Use Permit (SUP).**

Response from the applicant: Understood.

d. Any permanent facilities within the City of Glenwood Springs Right of Way requires a **License to Encroach**. See Community Development for further information.

Response from the applicant: Understood.

e. If the disturbance of this project is greater than one (1) acre, a Colorado Department of Health and Environment (CDPHE) **Construction Stormwater Discharges Permit**. This includes phased projects or comon developments, regardless of timeline. CDPHE defines a common development as a development that is contiguous in nature or related developments. This could be a development a part of a PUD or other subdivision and/or a development within a ¼ mile distance with the same owner/developer.

Response from the applicant: Understood.

Further City Commentary: **This comment has not been addressed.** Current work taking place on the RFTA site requires a CDPHE permit and RFTA has been noticed about this requirement already. No additional permits will be issued until a CDPHE permit is obtained.

Comments to be addressed prior to Certificate of Occupancy:

35. The city will require a **maintenance plan and agreement** with the development for the detention and debris system/s. If the system/s are not being maintained property and having a negative effect on downstream facilities, the City will need access to perform the maintenance and back charge the facility owner. See Community Development for further information.

Response from the applicant: Understood for those elements included as a part of this application.

36. All drainage, retaining walls, and/or other site improvements require a **stamped/signed certification letter** from the engineer of record that verifies that all improvements were constructed per plan.

    Response from the applicant: Understood for those elements included as a part of this application.

    a. If not constructed per plan, an explanation for the changes and any calculations/certifications should be submitted to verify that it meets the plan requirements.

37. **Record drawings (As-Builts)/Improvement Survey Plat (ISP)** will be required to be submitted to the city along with electronic drawings (CAD) as described in the Engineering Standards.

    Response from the applicant: Understood for those elements included as a part of this application.

    a. Critical improvements should be identified including, but not limited to:

        i. Utility improvements, identify:

            1. Structures
            2. Pipes
            3. Inverts
            4. Service locations
            5. Ownership demarcation points
            6. As-built plan and profile for any utility mains (private or public)

        ii. Stormwater improvements, include

            1. Verified detention capacity and/or verified infiltration rates

        iii. Retaining walls, identify:

            1. Locations
            2. Height, i.e. top of wall (TOW) and bottom of wall (BOW)

    b. Any approved **Licenses to Encroach** may require amending if the as-built conditions vary from the approved licensing locations.

    c. **Utility Easements** shall be recorded for any City of Glenwood Springs main lines, hydrants, or transformers not in the City right of way.

Comments to be addressed with any future phase:

The City does not believe that the current Traffic Impact Analysis adequately addresses the requirements in the City's Engineering Standards. At the time RFTA submits for any future phase of this project, all current

development and future development will need to be analyzed in accordance with the Standards. Existing condition traffic counts and queue and turning movement counts will need to be redone. RFTA current and future operations and maintenance will need to be included in each intersection analysis, along with a 20 year growth analysis of the exisitng condition. All aspects of the study will need to be coordinated with the City Engineer prior to the study start.

DRAINAGE REPORT

RFTA BUS OPERATIONS FACILITY IMPROVEMENTS
GLENWOOD SPRINGS, CO



April 2022

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DRAINAGE REPORT

RFTA BUS OPERATIONS FACILITY IMPROVEMENTS
GLENWOOD SPRINGS, CO



PREPARED BY

4/14/2022

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SGM Project # 2021-445.001

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LIST OF ACRONYMS

CDOT	Colorado Department of Transportation
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
USDA	United States Department of Agriculture

1.0 Introduction

This project consists of site grading, utility placement, roadway construction and drainage improvements all designed to serve the expansion of the RFTA bus operations facility. The extent of the project site is shown in the attached Figure 1 Vicinity Map in Appendix A. The improvements include the expansion of the bus storage facility, a revised parking layout and a revised driveway to accommodate the new parking layout. The layout of the proposed improvements is shown in the attached Figure 2 Conceptual Plan Exhibit in Appendix A.

The scope of work on this project includes the following:

- Site Grading
- Utility Installation
- Roadway Construction and Traffic Control
- Site Drainage Improvements

This report has been prepared to provide analysis and documentation of drainage improvements. This report includes hydrologic analysis to determine flow rates generated by contributing watersheds and hydraulic analysis to determine design capacity of the proposed storm sewer system. Design criteria for this analysis has generally been prepared in accordance with the City of Glenwood Springs Engineering Design Standards.

1.1 Existing Conditions

The project site where construction is to occur is on parcels 218505336004, 218505336002 and 218505337003 in Glenwood Springs, Colorado. Current development on the parcels includes existing parking, buildings and driveways that serve the RFTA Bus Operations.

The total basin area included in this study was 231.06 acres, which included 21.00 acres of impervious. Of the total area, 168.82 acres of runoff discharges to the west and 62.24 acres of runoff discharges to the north.

Per City request, we are also analyzing additional basins adjacent to our site that we are not impacting directly, but have potentially associated drainage elements to, at a minimum, assess and calibrate so there is a more “overall” understanding of the various systems in this region of West Glenwood. The attached Figure 3 Existing Drainage Exhibit Part One, located in Appendix A, shows the extents of the existing watersheds, the two discharge locations and watersheds that are considered onsite versus offsite. Looking at the attached Figure 4 Existing Drainage Exhibit Part Two, located in Appendix A, shows the existing drainage patterns through the project site. Both Figures 3 and 4 show the extents of digitized impervious as well.

Shown in Figures 3 and 4, the purple watersheds are considered offsite because the purple watersheds will not be impacted by the RFTA Operations Facility improvements in the proposed condition. Meanwhile, the green watersheds are considered onsite and will be impacted by the RFTA Operations Facility improvements in the proposed condition.

It should be noted that development concepts have already been approved within basins 810 and 820 as a part of the Meadows development. In addition, basin 710 is owned by

RFTA and could be developed. For the existing conditions analysis, only currently built imperviousness and site surfaces was evaluated.

1.1.1 Existing Conditions – Discharge to the West

Runoff discharging to the west from onsite watersheds, shown on the attached Figure 4 Existing Drainage Exhibit Part Two, located in Appendix A, drains to an existing 24-inch pipe located beneath the Midland Avenue multi-use path. The discharge from the 24-inch pipe is conveyed through a series of other pipes and ditches before entering an existing 48-inch pipe, located beneath the Midland Avenue and railroad tracks intersection, to ultimately discharge to the Colorado River.

1.1.2 Existing Conditions – Discharge to the North

Runoff discharging from the north from onsite watersheds, shown on the attached Figure 4 Existing Drainage Exhibit Part Two, drains to an existing 18-inch pipe located beneath Midland Avenue. The discharge from the 18-inch pipe is conveyed to a ditch south of the railroad tracks before entering an existing 48-inch pipe, located beneath the railroad tracks, to enter another ditch, then another 48-inch pipe beneath Devereux Road to ultimately discharge to the Colorado River. The size of all three of these pipes were verified in 2022.

Upstream of the existing 18-inch pipe, the existing RFTA operations site includes several stormwater management features. These include a debris catch basin uphill (south) of the site, water quality ponds that serve the West Glenwood Park and Ride and culverts that convey stormwater beneath trails and roads as needed.

It should be noted that the location where watersheds 810 and 820 discharge, shown in Figure 4, differs from what is planned in the 2004 Glenwood Meadows Master Drainage Plan. Currently, watersheds 810 and 820 discharge to the north, but the 2004 Glenwood Meadows Master Drainage Plan shows that this area should discharge to a proposed pond to the east. In the Glenwood Meadows Master Drainage Plan, watershed PR-B is equivalent to watershed 820 in this study. Similarly, watershed PR-A in the master plan is equivalent to watershed 810.

1.1.3 Existing Conditions – Soils

According to the NRCS Websoil Survey, hydrologic soil groups in the drainage area include A, B and D soils. Attached, in Appendix A, is the NRCS soil report. The site is a known area of poor and varying soil conditions. Eagle Valley Evaporite, expansive or collapsive soils, generally due to hydro-consolidation have a history of revealing themselves in the entire Meadows area to the river, even as recent as a notable sink hole in 2003 along Midland Avenue. Such conditions encourage, as infrastructure allows, consideration of evacuating water off site as quickly as possible and not storing water on site except as absolutely necessary.

1.1.4 Existing Conditions – Floodplain

No portion of the project site is within the 100-year floodplain as defined by the FEMA map panel #0802051431B dated January 03, 1986 for Garfield County Colorado. A FEMA FIRMette is also provided for reference in Appendix A of this report.

1.2 Proposed Conditions

By request of the city, two proposed conditions were considered in this analysis. The first proposed condition only includes development for the improvements of the RFTA bus facility south west of Wulfson Road, as shown in the RFTA Master Plan Layout, attached in Appendix A. The second proposed condition includes improvements to the RFTA bus facility south west of Wulfson Road and potential future development in watershed 710, 810 and 820.

For a visual comparison of the existing conditions versus proposed conditions, Figure 5 Proposed Drainage Part One, located in Appendix A, shows the extents of the proposed watersheds, the two discharge locations and watersheds that are considered onsite versus offsite. Looking at the attached Figure 6 Proposed Drainage Exhibit Part Two, located in Appendix A, shows the proposed drainage patterns through the project site. Both Figures 5 and 6 show the extents of digitized impervious as well.

A comparison of the total modeled area, total impervious area, total net new impervious area for existing conditions and proposed conditions is shown below in Table 1. Table 1 shows that both proposed conditions evaluated will increase the amount of proposed impervious in the study area.

Table 1: Comparison of Total Modeled, Total Impervious and Total Net New Impervious

	Existing	Proposed 1*	Proposed 2**
Total Modeled Area	231.06 acres	231.06 acres	231.06 acres
Total Impervious Area	21.00 acres	23.55 acres	50.46 acres
Total Net New Impervious Area	NA	+2.55 acres	+29.46 acres

**Proposed 1 refers to the proposed condition which excludes future development in watersheds 710, 810 and 820.*
***Proposed 2 refers to the proposed condition which includes future development in watersheds 710, 810 and 820. A generous 80% impervious cover is assumed for watershed 710, 810 and 820.*

The general drainage patterns of the site remain mostly unchanged from the existing to the proposed conditions. Table 2, on the next page, shows a comparison of the areas tributary to the west and north discharge locations. Comparing the different development conditions of Table 2, the overall watershed areas discharging to each each major concentration point are nearly the same.

Table 2: Comparison of Tributary Areas to Discharge Locations for Existing and Proposed Conditions

	Existing	Proposed 1*	Proposed 2**
Total Tributary Area	231.06 acres	231.06 acres	231.06 acres
Total Tributary Area Discharging to the West	168.82 acres	168.85 acres	168.85 acres
Total Tributary Area Discharging to the North	62.24 acres	62.21 acres	62.21 acres

Upstream of the discharge locations, new drainage infrastructure will be designed to convey stormwater runoff per the Glenwood Engineering Standards within watersheds 350 and 680 shown in Figures 5 and 6. As this is a preliminary drainage analysis, detailed sizing of proposed pipes has not been completed. However, some preliminary pipe sizing calculations are included in this report.

1.3 Design Criteria

This drainage analysis will use the 25-year and 100-year design storms to meet the City of Glenwood Springs design criteria. The results of the proposed improvements will be shown to have no adverse impacts to downstream properties outside of the right of way. The proposed improvements will also demonstrate that water quality will be provided.

2.0 Hydrology

2.1 Method of Analysis

The existing and proposed conditions were analyzed using the SCS (Soil Conservation Service TR-20) method used by the Natural Resources Conservation Service (NRCS). The SCS method for hydrological modeling requires the selection of rainfall depths for regional precipitation events, curve numbers and calculating a time of concentration. Hydrograph generation and routing was performed using a hydrological modeling software called HydroCAD version 10.10-6a. Detailed hydrological input data are included in the Appendices B, C and D.

2.2 Watershed Delineation

Watersheds were delineated using survey data where possible. Where survey data was unavailable, watersheds were delineated using light detection and ranging (LiDAR). Accuracy of the LIDAR data meets American Society for Photogrammetry & Remote Sensing (ASPRS) Class 1 standards for large scale maps which includes a 2' contour interval. Watersheds were divided into sub-areas as defined by critical points of entry in and out of the drainage system. A graphical representation of the existing watersheds can be found in Figures 3 and 4 in Appendix A. A graphical representation of the proposed watersheds can be found in Figures 5 and 6 in Appendix A.

2.3 Rainfall Depths

The rainfall depth is the depth of rainfall in inches for a specific rainfall duration and a selected frequency. The rainfall depths for this site have been obtained from NOAA Hydrometeorological Design Studies Center Precipitation Frequency Data Server Atlas 14 Point Precipitation Frequency Estimates. Atlas 14 is an ongoing study used to analyze historical rainfall data in order to update statistical hypothetical rainfall events throughout the United States. The following rainfall depths with corresponding rainfall recurrence intervals were obtained from NOAA-Atlas 14 for the 24-hour rainfall event. See Appendix A for rainfall data from NOAA-Atlas 14.

Table 3: Rainfall Storm Depths

Recurrence Interval Rainfall Event	Duration (hours)	Rainfall Depth (inches)
25-year	24	2.16
100-year	24	2.73

2.4 Curve Numbers

In the SCS method, the curve number ranges from 0 to 98 where a higher curve number indicates more impervious area and, subsequently, resulting in a higher peak flow rate. The SCS recommends different curve numbers as a function of land use type. Below are the curve numbers used for this hydrological analysis. Impervious area was digitized using survey data and recent aerial imagery.

Table 4: Curve Number Descriptions

Description	SCS Description	Hydrologic Soil Group (HSG)	Curve Number (CN)
Pervious	Arid, SemiArid Rangeland, Pinyon/Juniper Fair Condition	A	58
Pervious	Arid, SemiArid Rangeland, Pinyon/Juniper Fair Condition	B	58
Pervious	Arid, SemiArid Rangeland, Pinyon/Juniper Fair Condition	C	73
Pervious	Arid, SemiArid Rangeland, Pinyon/Juniper Fair Condition	D	80
Impervious	Impervious	NA	98

2.4 Rainfall Distribution

The rainfall distribution, the accumulated rainfall depth over a period time at a certain interval, is used to generate the inflow hydrograph. For this analysis, a Type-II Distribution was used.

2.5 Time of Concentration

The time of concentration is the summation of all travel times for consecutive components of the drainage conveyance system from the hydrologically most distant point in the basin. There are three components used in determining the time of concentration, sheet flow, shallow concentrated flow and channelized flow. Of the three, sheet flow and shallow concentrated flow were used in the analysis. NRCS recommends the maximum length for sheet flow should be no greater than 100 feet. The travel time for sheet flow is a function of Manning's roughness coefficient, the hydraulic length, the rainfall depth for the 2 year-24 hour rainfall in inches and the longitudinal slope. Travel time for shallow concentrated flow is a function of watercourse slope and velocity factor. The velocity factor is a function of the surface description (paved, grass, woodland, ect.) If the time of concentration was calculated as a less than five minutes, a time of concentration of five minutes was directly entered into the model.

3.0 Hydraulics

3.1 Pond and Catch Basin Hydraulics

HydroCAD generates inflow hydrographs created from the hydrology calculations and routes them through ponds and catch basins, where ponds have a storage volume and catch basins have a negligible storage volume. HydroCAD routes the hydrograph of a watershed through the storage volume and outlet structure(s) of a pond to create an outflow hydrograph. Similarly, HydroCAD routes the hydrograph of a watershed through the outlet structure(s) of a catch basin to create an outflow hydrograph. Options for outlet structures in HydroCAD commonly included, culverts, broad-crested weirs, asymmetrical weirs, horizontal orifices, vertical orifices and many more. HydroCAD allows for the modeling of multiple outlets of a pond in series or in parallel as well. For details about how the capacity of a given outlet structure is calculated, HydroCAD offers an extensive manual detailing the variables and equations used for routing hydrographs through an outlet structure. This manual is not included in this report. The resulting output is a hydrograph that can be passed onto to another reach or pond.

3.2 Reach Hydraulics

Similar to the previous discussion about pond outlet hydraulics, reaches in HydroCAD were used to calculate the capacity of conveyance structures, such as ditches. HydroCAD routes the inflow hydrograph from upstream through an area and geometry of a given cross-section and longitudinal slope of the conveyance structure to calculate the conveyance capacity, the peak water surface depth in the cross-section and an outflow hydrograph. The hydraulic capacity equation used is manning's equation and assumes a normal depth of flow. More details can be found in the HydroCAD manual.

3.3 Routing Hydraulics

The routing method in HydroCAD makes assumptions about how pond, catch basins and reaches interact with each other. In this application, because multiple ponds, catch basins and reaches are closely connected, the Dynamic Storage-Indication Method was used for the routing. By using this method, according to HydroCAD, "the stage-discharge and storage-indication curves are re-evaluated at each time step, based on the current elevation of any downstream nodes. This allows the routing to respond to ongoing tailwater changes."

3.4 Hydraulic Gradeline

Since HydroCAD is a hydrograph routing model, the flows are constantly changing for each time step, so there is no single hydraulic grade line. A traditional hydraulic gradeline only applies to a static analysis. Instead, HydroCAD provides the peak water surface elevation as reported at each node.

3.5 Onsite Pipe Capacity Calculations

The onsite pipe layout has not been finalized yet, but calculations have been done to determine what size pipe should provide sufficient capacity given an assumption of slope. This calculation was done using manning's equation with the assumption that the hydraulic gradeline is at the top of the pipe.

4.0 Results

4.1 Summary

Table 3 below, provides a summary of the peak discharges for the three conditions previously described.

Table 5: Discharge Peak Runoff Summary

		25-Year Rainfall Event Peak Flow Rate (cfs)		100-Year Rainfall Event Peak Flow Rate (cfs)	
		West Peak Runoff	**North Peak Runoff**	**West Peak Runoff**	**North Peak Runoff**
Development Condition	Existing	39.0 cfs	10.2 cfs	86.0 cfs	27.3 cfs
	Proposed 1*	41.4 cfs	14.9 cfs	88.0 cfs	31.6 cfs
	Proposed 2**	41.4 cfs	64.2 cfs	88.0 cfs	95.5 cfs

**Proposed 1 refers to the proposed condition which excludes future development in watersheds 710, 810 and 820.*
***Proposed 2 refers to the proposed condition which includes future development in watersheds 710, 810 and 820. A generous 80% impervious cover is assumed for watersheds 710, 810 and 820.*

It was expected that the peak runoff would increase from the existing to the proposed conditions because the amount of proposed impervious will increase in the proposed conditions. Detailed HydroCAD modeling input and output data can be found in the appendices B, C and D.

4.2 Key Drainage and Conveyance Capacity Issues

This drainage study found drainage and conveyance capacity issues in the existing and proposed conditions. The following sections describe and quantify them.

4.2.1 Existing Drainage Issues Identified during the 25-Year Event

Please reference the # in the report to the # found on the Map Key for Existing Drainage Issues for the 25-Year Event Exhibit, located in the Appendix E. Detailed HydroCAD modeling input and output data for existing conditions that support these findings can be found in Appendix B.

1. The inlet, Node P300, has no outlet pipe. This has been verified from 2022 site investigation and survey data. In addition, the next upstream inlet, P400, has a rim elevation that is two feet lower than the downstream inlet, P300. Since this pipe system has no clearly defined outlet, it was assumed that structures P300 and P400 do not meaningfully contribute to conveyance. Therefore, all runoff generated upstream was assumed to bypass inlets P400 and P300.

2. At node P110, an inlet, survey data shows contours such that bypass from inlet P110, goes across Midland Avenue to another inlet, node P200. Bypass occurs from inlet P110 to P200 during the 25-Year Event.

3. At node P200, an inlet, the maximum water surface elevation exceeds the rim elevation by 0.6 feet. Based on this information, it is likely that a portion of this intersection is flooded.

4. At node P330, a culvert with upstream storage, the capacity of the culvert and storage volume was exceeded, and bypass occurs from P330 to ditch S300 around the P320 culvert. P330 culvert is undersized as a 24-inch pipe while the two adjacent upstream and downstream pipes are 36 inches in diameter.

5. At node P360, a debris catch basin, two issues were identified. First, the outlet structure is partially buried according to field observations and needs maintenance. In the modeling of this outlet, it was assumed that this outlet is properly maintained and is not clogged. Second, the “designated spillway” on the west side is at a higher elevation than the “actual spillway” on the east side by one to two feet, according to survey data. In the unlikely event the debris catch basin fills up, it will spill to watershed 600, not watershed 340.

6. At node P900, a debris catch basin, there is pipe that is likely buried and not identified by survey. According to the JR Harris & Company construction plans from 2014, they show a pipe on the east side of the debris catch basin. However, when the plans were overlaid with aerial imagery, what was built does not match the plans. Nonetheless, based on the pond grading with a high point ridgeline going across watershed 360 and 900, a low spot on the east half of the basin and the JR Harris & Company construction plans from 2014, it was assumed that there is a pipe on the east half of the debris catch basin. For modeling of existing conditions, it was assumed that this pipe was not clogged.

7. At node P640, a water quality pond, the outlet pipe is back pitched with flow going from pond node P620 to pond node P640. The back pitched pipe was found based on 2022 survey data. The proposed plans indicate the pipe should flow from P640 to P620. Due to the back pitched pipe, the water spills from P640 to P620 during the 25-Year Event.

4.2.2 Existing Drainage Issues Identified during the 100-Year Event

All of the existing drainage issues described in section 4.2.1 do not improve during the existing conditions 100-Year Event. Detailed modeling output for the 100-Year Event are included in the HydroCAD output data in Appendix B.

In addition to those drainage issues found in the 25-Year Event, the following additional drainage issues were identified during the 100-Year Event that did not present themselves during the 25-Year Event.

Please reference the # in the report to the # found on the Map Key for Existing Drainage Issues for the 100-Year Event Exhibit, in Appendix E. Detailed HydroCAD modeling input and output data for existing conditions that support these findings can be found in Appendix B.

8. At reach node S300, a ditch, the conveyance capacity of the ditch is exceeded. Excess flow that the ditch cannot convey spills across Midland Avenue to watershed 400, bypasses inlet P400, and drains to inlet P200.

9. At node P200, an inlet, the entire intersection is flooded indicated by spill occurring across Midland Avenue to the Colorado River.

10. At reach node S600, a ditch, the conveyance capacity of the ditch is exceeded. Excess flow spills onto Midland Avenue for additional conveyance capacity. It was calculated that about 6 feet of the roadway would be flooded under existing conditions for the 100-Year Event.

4.2.3 Proposed Drainage Issues for the 25-Year Event

Drainage issues identified for the 25-Year Event under existing conditions remain in the proposed conditions. The increased impervious area does not improve the existing drainage issues, but the proposed develop does not create any new drainage issues. To quantify the impact of proposed impervious on the existing drainage issues, Table 6, on the next page, compares the impact on drainage issues from the existing conditions to the proposed conditions for the 25-Year Event. Detailed HydroCAD modeling input and output data for proposed conditions that support these findings can be found in Appendices C and D.

Table 6: Comparison of Drainage Issues from Existing to Proposed for the 25-Year Event

Numbered Drainage Issue Within Report*	Node Location Issue	Nature of Issue	Quantified Issue for Existing Conditions	Quantified Issue for Proposed Conditions 1**	Quantified Issue for Proposed Conditions 2***
1	P300 and P400	No outlet pipe	All flow bypasses	All flow bypasses	All flow bypasses
2	P110	Bypass across Midland Avenue	6.1 cfs	6.6 cfs	6.6 cfs
3	P200	Depth of Flooding at Intersection	0.61 feet	0.63 feet	0.63 feet
4	P330	Bypass to ditch along south side of bike path	6.3 cfs	7.9 cfs	7.9 cfs
5 and 6	P360 and P900	Clogged Pipe	Assumed unclogged	Assumed unclogged	Assumed unclogged
7	P640	Bypass due to backpitched pipe	5.8 cfs	9.9 cfs	9.9 cfs

**Please reference the # in the report to the # found on the Map Key for Existing Drainage Issues for the 25-Year Event Exhibit, included in the Appendix E.*
***Proposed 1 refers to the proposed condition which excludes future development in watersheds 710, 810 and 820.*
****Proposed 2 refers to the proposed condition which includes future development in watersheds 710, 810 and 820. A generous 80% impervious cover is assumed for watersheds 710, 810 and 820.*

From Table 6, above, during the 25-Year Event, existing drainage issues do not improve in the proposed condition. However, modeling shows that no damage to property would occur during the 25-Year Event because all flows remain in the right of way.

4.2.4 Proposed Drainage Issues for the 100-Year Event – RFTA Development

The following section only discusses drainage issues in the proposed condition that includes development of the RFTA operations facility. Drainage issues with regards to development in watershed 710, 810 and 820 is discussed in section 4.2.5.

Drainage issues identified for the 100-Year Event under existing conditions remain in the proposed condition, where the proposed condition ONLY includes improvements to the RFTA operations facility. The increased impervious area does not improve the existing drainage issues, but the proposed develop does not create any new drainage issues.

Table 7, on the next page, compares the impact on drainage issues from the existing conditions to the proposed conditions for the 100-Year Event. Detailed HydroCAD modeling input and output data that support these findings can be found in Appendices B, C and D.

Table 7: Comparison of Drainage Issues from Existing to Proposed for the 100-Year Event

Numbered Drainage Issue Within Report*	Node Location Issue	Nature of Issue	Quantified Issue for Existing Conditions	Quantified Issue for Proposed Conditions 1**	Quantified Issue for Proposed Conditions 2***
1	P300 and P400	No outlet pipe	All flow bypasses	All flow bypasses	All flow bypasses
2	P110	Bypass across Midland Avenue	15.3 cfs	15.3 cfs	15.3 cfs
3	P200	Depth of Flooding at Intersection	3.0 feet	3.1 feet	3.1 feet
4	P330	Bypass to ditch along south side of bike path	29.5 cfs	31.3 cfs	31.3 cfs
5 and 6	P360 and P900	Clogged Pipe	Assumed unclogged	Assumed unclogged	Assumed unclogged
7	P640	Bypass due to backpitched pipe	11.1 cfs	15.2 cfs	15.2 cfs
8	S300	Ditch capacity exceeded and spills across Midland Ave	7.9 cfs	10.2 cfs	10.2 cfs
9	P200	Spill across Midland Ave to Colorado River	7.3 cfs	9.1 cfs	9.1 cfs
10	S600	Ditch capacity exceeded resulting in width of roadway flooded	5.9 feet	7.4 feet	7.4 feet

**Please reference the # in the report to the # found on the Map Key for Existing Drainage Issues for the 100-Year Event Exhibit, included in the Appendix E.*
***Proposed 1 refers to the proposed condition which excludes future development in watersheds 710, 810 and 820.*
****Proposed 2 refers to the proposed condition which includes future development in watersheds 710, 810 and 820. A generous 80% impervious cover is assumed for watersheds 710, 810 and 820.*

From the table on the previous page, during the 100-Year event, existing drainage issues do not improve in the proposed condition. However, modeling shows that no damage to property would occur during the 100-year event because all flows remain in the right of way.

4.2.5 Proposed Drainage Issues Identified for the 25, 100-Year Event – Full Dev.

The following section describes the resulting drainage issues that would occur with the existing drainage infrastructure if watersheds 710, 810 and 820 were developed to have 80% impervious area. To be clear, this proposed condition that includes 80% impervious for watersheds 710, 810 and 820 also includes the planned improvements to the RFTA Operations Facility south west of Wulfson Road.

In addition to the drainage issues previously discussed, three new drainage issues were identified resulting from development in watersheds 710, 810 and 820. Detailed HydroCAD modeling input and output data that support these findings can be found in Appendix D.

1. For the 25-Year Event
    a. For node P510, a culvert beneath the railroad tracks north of Midland Avenue, 0.56 cfs spills to another culvert beneath the railroad tracks to the west.

2. For the 100-Year event
    a. For node P710, a culvert beneath the Midland Avenue bike path, 1.2 cfs spills over the bike path.
    b. For node P510, a culvert beneath the railroad tracks north of Midland Avenue, 12.8 cfs spills to another culvert beneath the rail tracks to the west.

The drainage analysis for the developed condition of watersheds 710, and 810 and 820 should be re-evaluated when this land is developed. This is especially important for watersheds 810 and 820 because the 2004 Glenwood Meadows Drainage Master Plan shows watersheds 810 and 820 discharge to a pond to the east and not to the north. Currently as the land exists now, watersheds 810 and 820 discharge to the north.

4.3 Onsite Pipe Capacity to Determine Pipe Sizing

The onsite pipe layout has not been finalized yet, but the outlet pipes leaving directly from the area of improvements were sized assuming a given slope. The table below shows the results of pipe capacity calculations for the peak flow rate from watersheds 350, 680 and debris catch basin 900. The pipe slopes are assumed given the proposed grading completed thus far. The pipes were sized to convey the 25-Year Event. Pipe capacity will be verified in the final design.

Table 8: Onsite Preliminary Pipe Sizing Summary for the 25-Year Event

Pipe Label	**PIPE FLOW** SUM (cfs)	Slope (ft/ft)	Dia. (in.)	n	Qfull (cfs)	Vfull (ft/sec)	Excess Capacity (cfs)
Pipe from Watershed 380	**9.85**	0.0050	24	0.013	16.00	5.1	6.1
Pipe from Watershed 680 and 900	**3.41**	0.0200	18	0.013	14.86	8.4	11.4

4.4 Water Quality

Water quality will be provided onsite as part of the proposed improvements. Proposed methods for water quality will include sumps at inlets, snouts as discharge locations of inlets and baffled manholes at the last manhole before final discharge out of the site. Drainage from the interior of the bus storage facility will have a large sand/oil interceptor and will discharge to the sanitary sewer.

5.0 Conclusion

This drainage study analyzed three conditions – existing conditions, a proposed condition for only RFTA Operations Facility Improvements, and a proposed condition for conceptual future development in watersheds 710, 810 and 820. The study found that there are existing drainage issues within the area studied for both the 25-Year and 100-Year Events. However, no damage to property was found in the results and all flows should remain in the right of way.

The two proposed conditions analyzed increased the amount of impervious within the study area. Subsequently, peak flow rates increased. However, tables 6 and 7 within the report show that existing drainage issues do not significantly change in the proposed conditions. In addition, all three conditions analyzed found there would be no damage to property as all flows remain in the right of way for both the 25-Year and 100-Year Events.

In addition, the analysis of the proposed condition that only included the RFTA Operations Facility improvements found that no new drainage issues were created. However, the analysis of the proposed condition that included development of watersheds 710, 810 and 820 to include 80% cover found two new drainage issues that did not exist prior. Nonetheless, 80% impervious cover is a conservative estimate for development and the drainage issues identified are relatively minor because all flows remain in the right of way.

Based on the information presented above, this drainage study has shown that the proposed RFTA Operations Facility improvements should not have adverse impacts to downstream properties for the 25-Year and 100-Year events.

The proposed RFTA Operations Facility drainage improvements will also include water quality elements to provide water quality treatment as required by the city.

Appendix A

Introductory Figures and Exhibits

Figure 1 - Vicinity Map

Figure 2 - RFTA Master Plan Layout

Figure 3 - Existing Drainage Exhibit Part 1

Figure 4 - Existing Drainage Exhibit Part 2

NRCS Web Soil Survey Hydrologic Soil Group Report

FEMA Floodplain FIRMette

Figure 5 - Proposed Drainage Exhibit Part 1

Figure 6 - Proposed Drainage Exhibit Part 2

NOAA Atlas 14 Precipitation Data

Figure 1

Project: Glenwood Springs Maintenance Facility – Heated Vehicle Storage

Vicinity Map



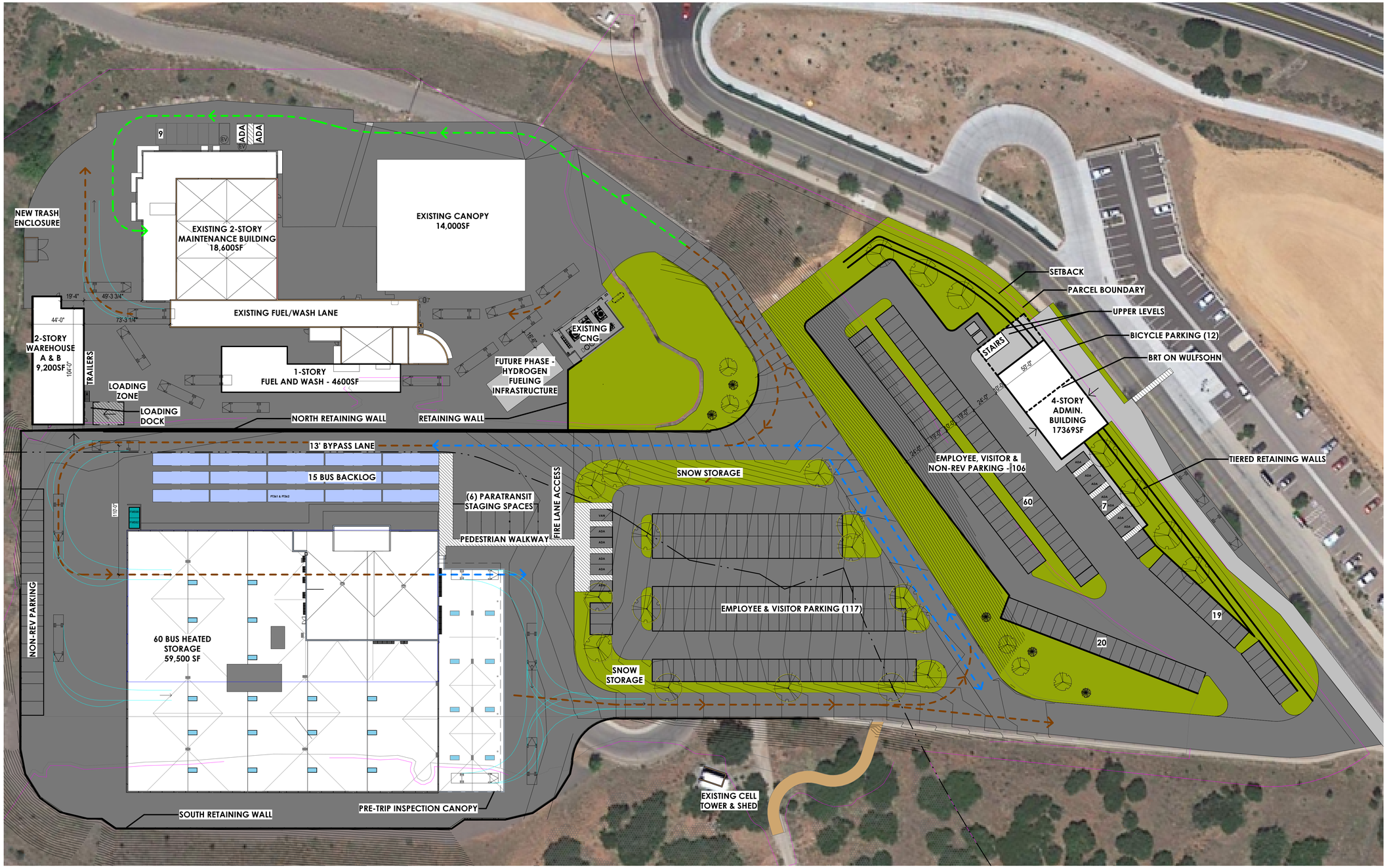
Source: Garfield County qPublic.net GIS Data Viewer

Figure 2 - RFTA Master Layout Exhibit

BUILDINGS	POR	PROVIDED
WAREHOUSE A	4,933 GSF	5,000 GSF
WAREHOUSE B	6,200 GSF	6,200 GSF
ADMIN BUILDING	17,369 GSG	17,369 GSF

PARKING	POR	PROVIDED
EMPLOYEE	63 (75% = 47)	47
VISITOR & PARTON	43	43
DISABILITY	7	7
NON-REV	9	9
TOTAL	125	106

TRAILER PARKING AT WAREHOUSES



1 A-100b **NEXT STEPS CONCEPTUAL PLAN**
1" = 40'-0"

Stantec

Stantec Architecture Inc.
999 18th Street, Suite 202
Denver, 80202-2424
Tel: (303) 295-1717 • www.stantec.com

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SAUNDERS

Consultants

SGM

bluegreen
www.bluegreenaspen.com

Legend

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

NEXT STEPS CONCEPTUAL PLAN

A-100b

03/16/2022

STANTEC PROJECT #2270417345

West Discharge Location

North Discharge Location

210
100
110
120
200
410
430
420
400
300
320
330
630
500
510
700
800
610
620
640
650
660
710
670
810
350
600
680
310
820
900
340
360

Legend

- Existing Pipe
- Existing Stage Storage
- Existing Impervious

Existing Basins

Basin Type

- Onsite
- Offsite

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Figure 3
Existing Drainage Exhibit Part 1
RFTA, Glenwood Springs, CO

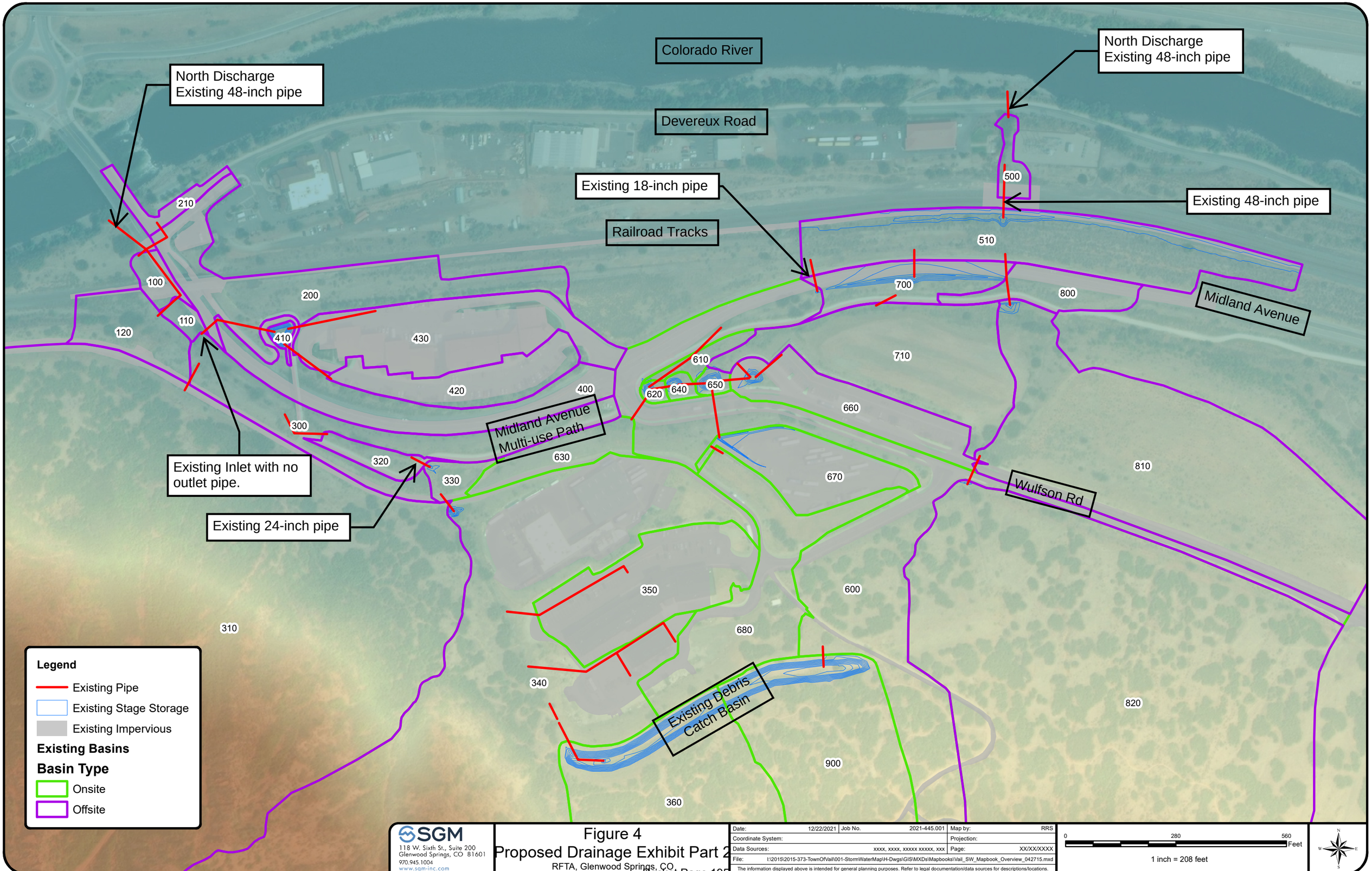
Date:	4/7/2022	Job No.	2021-445.001
Map by:	RRS		
Coordinate System:		Projection:	
Data Sources:	xxxx, xxxx, xxxxx xxxxx, xxx	Page:	xxxx
File:	I:\2021\2021-445-RftaBusBarn\001-CivilEng\H-Dwgs\GIS\MXDs\Existing_Drainage_Narrative_Exhibit_Part1.mxd		

The information displayed above is intended for general planning purposes. Refer to legal documentation/data sources for descriptions/locations.

0 360 720 Feet

1 inch = 375 feet

N W E S



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Figure 4
Proposed Drainage Exhibit Part 2
RFTA, Glenwood Springs, CO

Date:	12/22/2021	Job No.	2021-445.001	Map by:	RRS
Coordinate System:				Projection:	
Data Sources:	xxxx, xxxx, xxxxx xxxxx, xxx			Page:	XX/XX/XXXX
File:	I:\2015\2015-373-TownOfVail\001-StormWaterMap\H-Dwgs\GIS\MXDs\Mapbooks\Vail_SW_Mapbook_Overview_042715.mxd				

The information displayed above is intended for general planning purposes. Refer to legal documentation/data sources for descriptions/locations.

0 280 560 Feet

1 inch = 208 feet

N W E S

Hydrologic Soil Group—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Watershed_Shapefile_Jan23)



Map Scale: 1:8,980 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1600 2400

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil 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: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 14, Sep 2, 2021

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

Date(s) aerial images were photographed: Sep 24, 2015—Nov 2, 2015

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
2	Arle-Ansari-Rock outcrop complex, 12 to 65 percent slopes	B	80.2	34.7%
9	Badland	D	26.5	11.5%
11	Begay sandy loam, 6 to 12 percent slopes	A	15.3	6.6%
15	Chilton channery loam, 12 to 25 percent slopes	A	73.9	32.0%
67	Torriorthents-Rock outcrop complex, steep	D	35.0	15.2%
73	Water		0.1	0.1%
Totals for Area of Interest			**231.1**	**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.

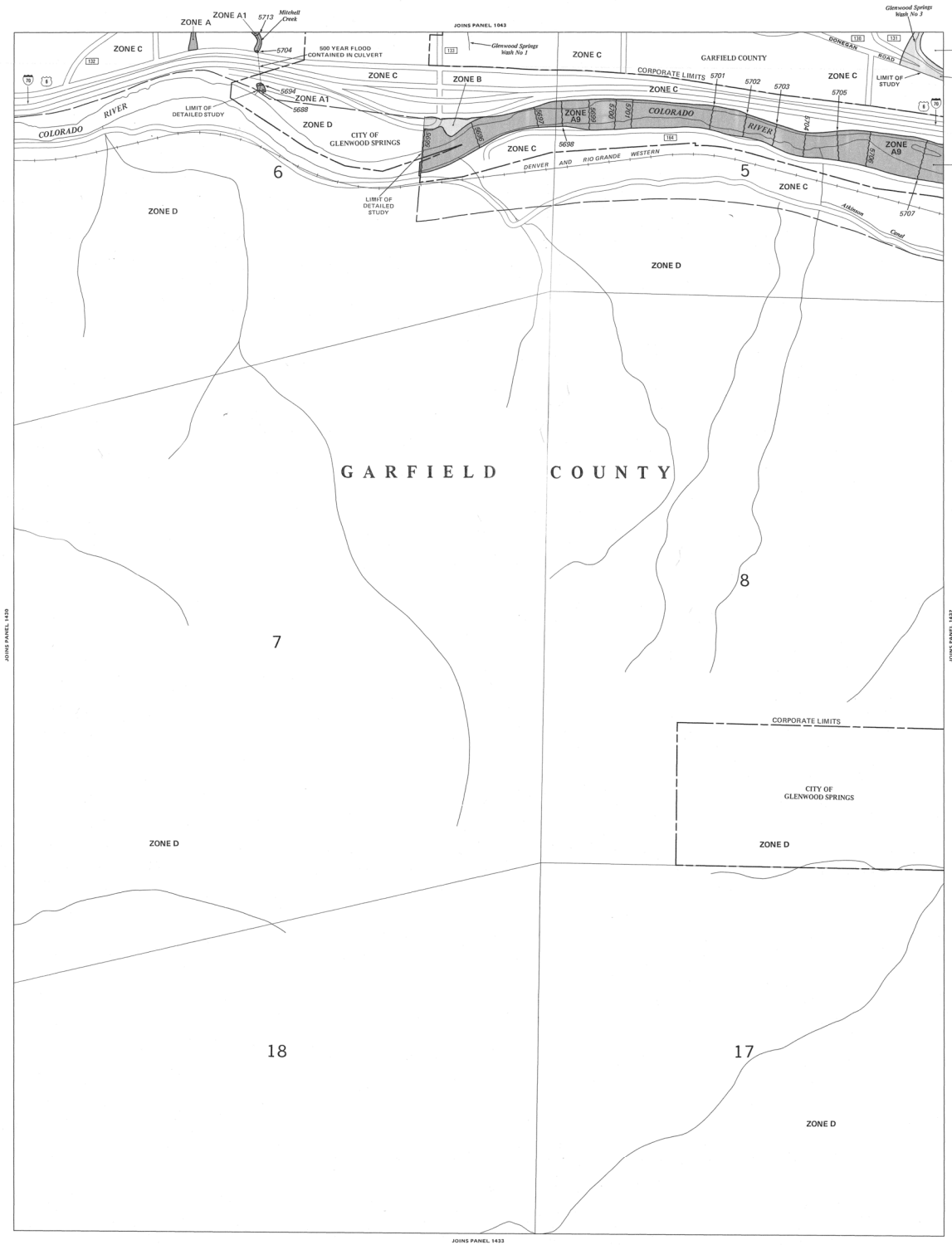
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 6 SOUTH, RANGE 89 WEST

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations — ZONE B / ZONE A1 / ZONE A5
100-Year Flood Boundary
500-Year Flood Boundary — ZONE B
Base Flood Elevation Line With Elevation In Feet** — 513
Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)
Elevation Reference Mark — RM7×
Zone D Boundary
River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown, or areas of 100-year alluvial fan flooding, depths and velocities shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
DECEMBER 15, 1977

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
DECEMBER 15, 1977

FLOOD INSURANCE RATE MAP REVISIONS:
Map revised January 3, 1986 to change flood plain boundaries, zone designations, base flood elevations, corporate limits, scale, cultural features, or map format.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

GARFIELD COUNTY, COLORADO
(UNINCORPORATED AREAS)

PANEL 1431 OF 1900
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
080205 1431 B

MAP REVISED:
JANUARY 3, 1986

Federal Emergency Management Agency

West Discharge Location

North Discharge Location

210
100
110
120
200
410
430
420
400
300
320
330
630
610
620
640
650
660
670
500
510
700
800
710
810
600
680
350
310
340
360
900
820

Legend

- Proposed Pipes
- Existing Stage Storage
- Proposed Impervious

Proposed Basins

Basin Type

- Onsite
- Offsite

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Figure 5
Proposed Drainage Exhibit Part 1
RFTA, Glenwood Springs, CO

Date:	4/7/2022	Job No.	2021-445.001
Map by:	RRS		
Coordinate System:		Projection:	
Data Sources:	xxxx, xxxx, xxxxx xxxxx, xxx	Page:	xxxx
File:	I:\2021\2021-445-RftaBusBarn\001-CivilEng\H-Dwgs\GIS\MXDs\Proposed_Drainage_Narrative_Exhibit_Part1.mxd		

The information displayed above is intended for general planning purposes. Refer to legal documentation/data sources for descriptions/locations.

0 360 720 Feet

1 inch = 375 feet

N W E S

Colorado River

North Discharge
Existing 48-inch pipe

North Discharge
Existing 48-inch pipe

Devereux Road

Existing 18-inch pipe

Existing 48-inch pipe

Railroad Tracks

Midland Avenue

Midland Avenue
Multi-use Path

Existing Inlet with no
outlet pipe.

Existing 24-inch pipe

Wulfson Rd

Existing Debris
Catch Basin

100
110
120
200
210
300
310
320
330
340
350
360
400
410
420
430
500
510
600
610
620
630
640
650
660
670
680
700
710
800
810
820
900

Legend

- Proposed Pipes
- Existing Stage Storage
- Proposed Impervious

Proposed Basins

Basin Type

- Onsite
- Offsite

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Figure 6
Proposed Drainage Exhibit Part 2

RFTA, Glenwood Springs, CO

Date:	12/22/2021	Job No.	2021-445.001
Map by:	RRS		
Coordinate System:		Projection:	
Data Sources:	xxxx, xxxx, xxxxx xxxxx, xxx	Page:	XX/XX/XXXX
File:	I:\2015\2015-373-TownOfVail\001-StormWaterMap\H-Dwgs\GIS\MXDs\Mapbooks\Vail_SW_Mapbook_Overview_042715.mxd		

The information displayed above is intended for general planning purposes. Refer to legal documentation/data sources for descriptions/locations.

0 280 560 Feet

1 inch = 208 feet

NOAA Atlas 14, Volume 8, Version 2
Location name: Glenwood Springs, Colorado, USA*
Latitude: 39.5574°, Longitude: -107.3563°
Elevation: 5796.18 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.125** (0.098-0.161)	**0.178** (0.140-0.230)	**0.261** (0.205-0.339)	**0.328** (0.256-0.428)	**0.417** (0.311-0.560)	**0.483** (0.352-0.660)	**0.546** (0.384-0.768)	**0.608** (0.409-0.882)	**0.685** (0.443-1.03)	**0.741** (0.469-1.14)
10-min	**0.183** (0.144-0.236)	**0.260** (0.205-0.336)	**0.383** (0.300-0.496)	**0.481** (0.375-0.627)	**0.611** (0.455-0.821)	**0.707** (0.515-0.967)	**0.799** (0.562-1.13)	**0.890** (0.599-1.29)	**1.00** (0.649-1.51)	**1.09** (0.686-1.67)
15-min	**0.223** (0.176-0.288)	**0.317** (0.250-0.410)	**0.467** (0.366-0.605)	**0.586** (0.457-0.765)	**0.745** (0.554-1.00)	**0.862** (0.628-1.18)	**0.975** (0.686-1.37)	**1.09** (0.731-1.58)	**1.22** (0.791-1.84)	**1.32** (0.837-2.03)
30-min	**0.295** (0.233-0.382)	**0.414** (0.326-0.535)	**0.599** (0.470-0.777)	**0.746** (0.581-0.973)	**0.937** (0.696-1.25)	**1.08** (0.782-1.47)	**1.21** (0.848-1.69)	**1.33** (0.896-1.93)	**1.49** (0.960-2.23)	**1.59** (1.01-2.45)
60-min	**0.391** (0.308-0.505)	**0.513** (0.404-0.664)	**0.707** (0.554-0.917)	**0.860** (0.670-1.12)	**1.06** (0.789-1.42)	**1.21** (0.879-1.65)	**1.35** (0.946-1.89)	**1.48** (0.995-2.14)	**1.64** (1.06-2.46)	**1.76** (1.11-2.70)
2-hr	**0.486** (0.387-0.620)	**0.613** (0.488-0.783)	**0.814** (0.646-1.04)	**0.974** (0.768-1.25)	**1.18** (0.892-1.56)	**1.34** (0.986-1.80)	**1.48** (1.06-2.05)	**1.62** (1.11-2.32)	**1.80** (1.18-2.66)	**1.92** (1.23-2.91)
3-hr	**0.569** (0.457-0.720)	**0.686** (0.550-0.869)	**0.872** (0.697-1.11)	**1.02** (0.811-1.30)	**1.22** (0.930-1.61)	**1.37** (1.02-1.83)	**1.51** (1.09-2.08)	**1.65** (1.14-2.35)	**1.83** (1.21-2.69)	**1.96** (1.26-2.95)
6-hr	**0.741** (0.602-0.925)	**0.844** (0.684-1.05)	**1.01** (0.820-1.27)	**1.16** (0.930-1.46)	**1.36** (1.06-1.78)	**1.52** (1.15-2.02)	**1.68** (1.23-2.30)	**1.85** (1.29-2.60)	**2.07** (1.39-3.02)	**2.25** (1.46-3.33)
12-hr	**0.922** (0.758-1.13)	**1.05** (0.863-1.30)	**1.27** (1.04-1.57)	**1.46** (1.18-1.81)	**1.72** (1.35-2.22)	**1.93** (1.48-2.53)	**2.15** (1.59-2.90)	**2.38** (1.68-3.30)	**2.69** (1.82-3.85)	**2.93** (1.92-4.27)
24-hr	**1.12** (0.933-1.36)	**1.29** (1.07-1.56)	**1.57** (1.30-1.91)	**1.81** (1.49-2.22)	**2.16** (1.72-2.75)	**2.44** (1.89-3.15)	**2.73** (2.04-3.63)	**3.03** (2.16-4.15)	**3.45** (2.36-4.87)	**3.77** (2.51-5.42)
2-day	**1.36** (1.14-1.62)	**1.55** (1.30-1.85)	**1.87** (1.57-2.25)	**2.16** (1.80-2.60)	**2.57** (2.07-3.24)	**2.91** (2.28-3.71)	**3.26** (2.47-4.28)	**3.64** (2.63-4.92)	**4.15** (2.87-5.79)	**4.56** (3.06-6.45)
3-day	**1.52** (1.29-1.80)	**1.74** (1.47-2.06)	**2.11** (1.78-2.51)	**2.43** (2.04-2.91)	**2.89** (2.35-3.60)	**3.26** (2.58-4.12)	**3.65** (2.77-4.74)	**4.05** (2.94-5.42)	**4.60** (3.20-6.35)	**5.04** (3.40-7.06)
4-day	**1.66** (1.41-1.95)	**1.90** (1.61-2.24)	**2.30** (1.95-2.72)	**2.64** (2.23-3.14)	**3.13** (2.55-3.86)	**3.52** (2.79-4.41)	**3.92** (2.99-5.05)	**4.34** (3.16-5.76)	**4.91** (3.43-6.72)	**5.35** (3.63-7.45)
7-day	**2.01** (1.73-2.34)	**2.26** (1.95-2.64)	**2.69** (2.31-3.15)	**3.06** (2.61-3.59)	**3.58** (2.94-4.36)	**3.99** (3.19-4.93)	**4.41** (3.40-5.60)	**4.84** (3.56-6.34)	**5.43** (3.83-7.33)	**5.89** (4.03-8.09)
10-day	**2.31** (2.00-2.67)	**2.58** (2.23-2.98)	**3.03** (2.61-3.51)	**3.41** (2.92-3.98)	**3.95** (3.27-4.76)	**4.37** (3.53-5.36)	**4.81** (3.73-6.06)	**5.26** (3.89-6.83)	**5.87** (4.16-7.86)	**6.34** (4.37-8.64)
20-day	**3.16** (2.78-3.60)	**3.50** (3.07-3.98)	**4.05** (3.54-4.63)	**4.52** (3.92-5.18)	**5.16** (4.32-6.12)	**5.67** (4.62-6.83)	**6.18** (4.85-7.65)	**6.70** (5.01-8.55)	**7.40** (5.30-9.73)	**7.93** (5.52-10.6)
30-day	**3.87** (3.43-4.37)	**4.29** (3.79-4.85)	**4.97** (4.37-5.63)	**5.53** (4.84-6.29)	**6.29** (5.29-7.37)	**6.88** (5.64-8.19)	**7.45** (5.88-9.13)	**8.04** (6.05-10.1)	**8.80** (6.35-11.5)	**9.37** (6.57-12.4)
45-day	**4.79** (4.27-5.35)	**5.33** (4.75-5.96)	**6.19** (5.49-6.95)	**6.89** (6.07-7.77)	**7.81** (6.61-9.05)	**8.50** (7.02-10.0)	**9.17** (7.28-11.1)	**9.82** (7.43-12.2)	**10.6** (7.72-13.7)	**11.2** (7.93-14.8)
60-day	**5.58** (5.00-6.20)	**6.24** (5.59-6.94)	**7.28** (6.49-8.12)	**8.10** (7.18-9.07)	**9.17** (7.78-10.5)	**9.95** (8.24-11.6)	**10.7** (8.51-12.8)	**11.4** (8.65-14.1)	**12.3** (8.91-15.6)	**12.9** (9.11-16.8)

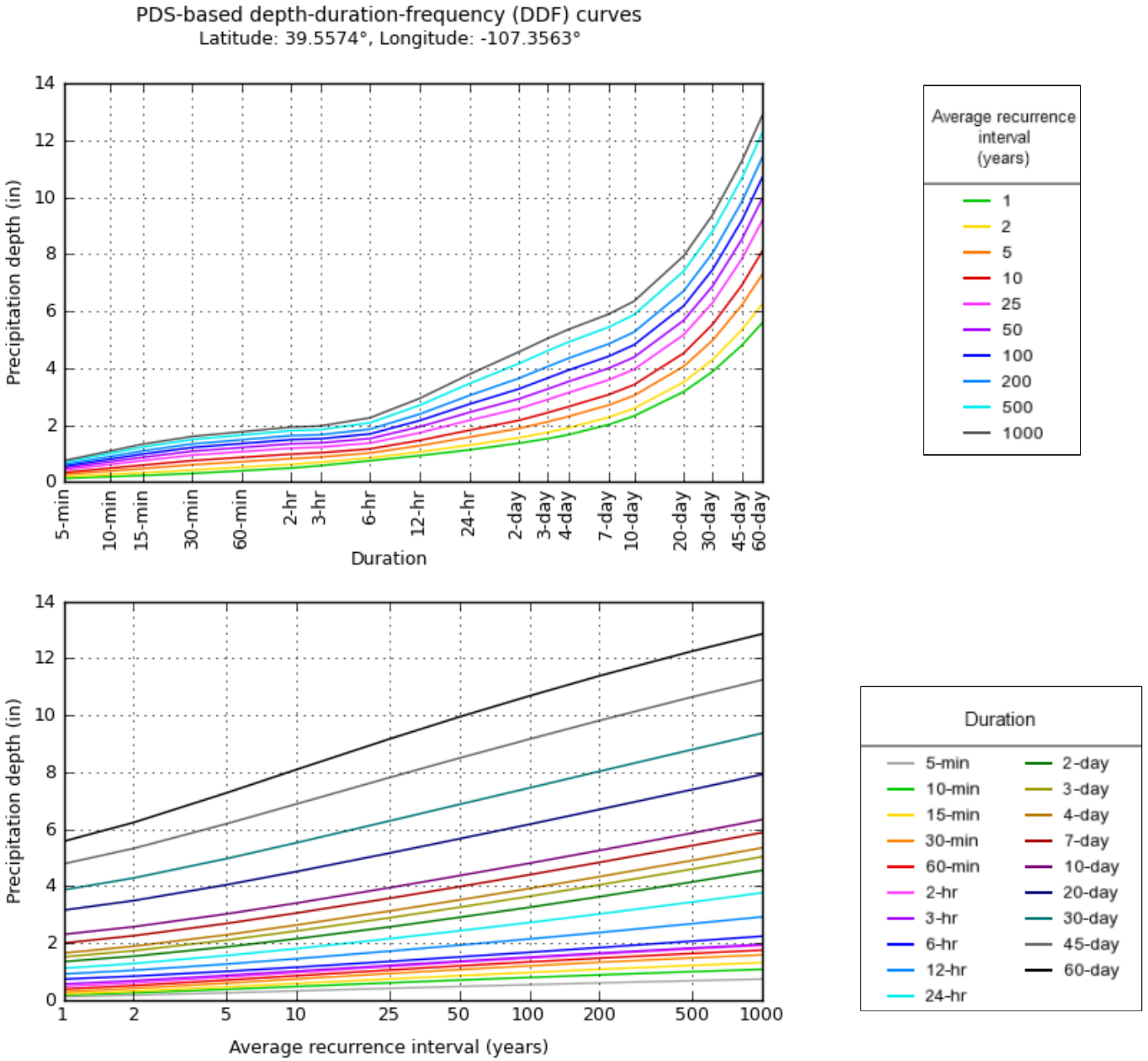
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



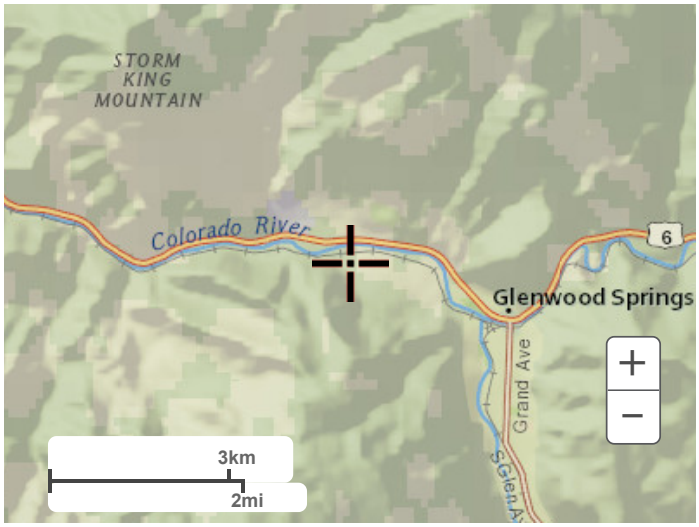
NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Wed Oct 20 14:37:24 2021

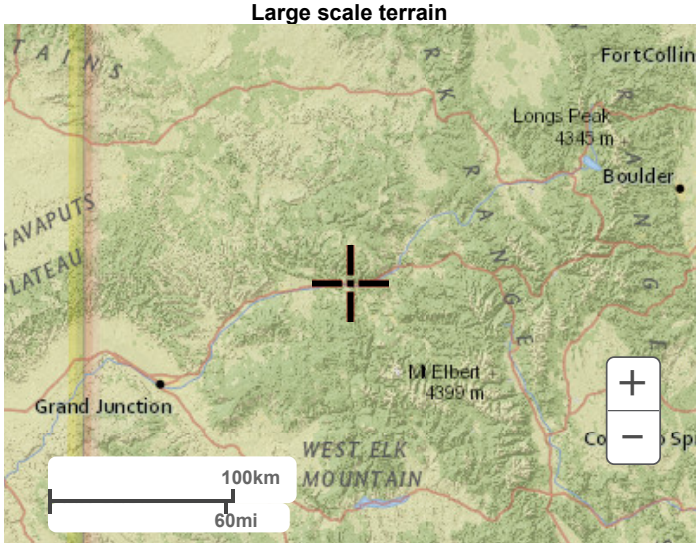
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Maps & aerials

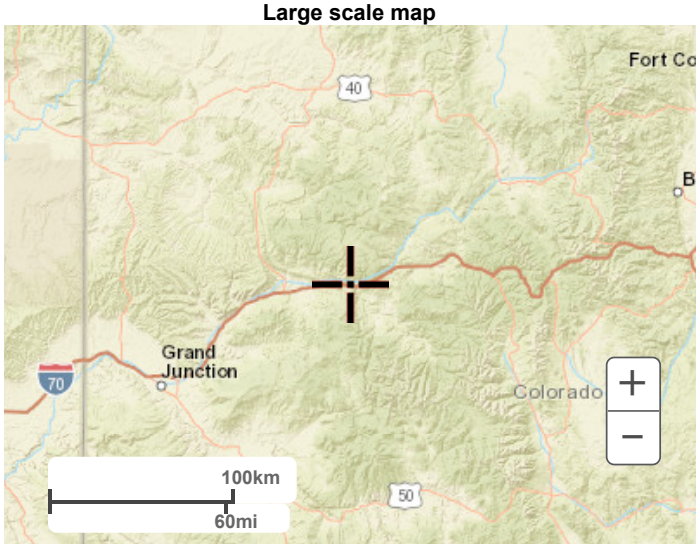
Small scale terrain



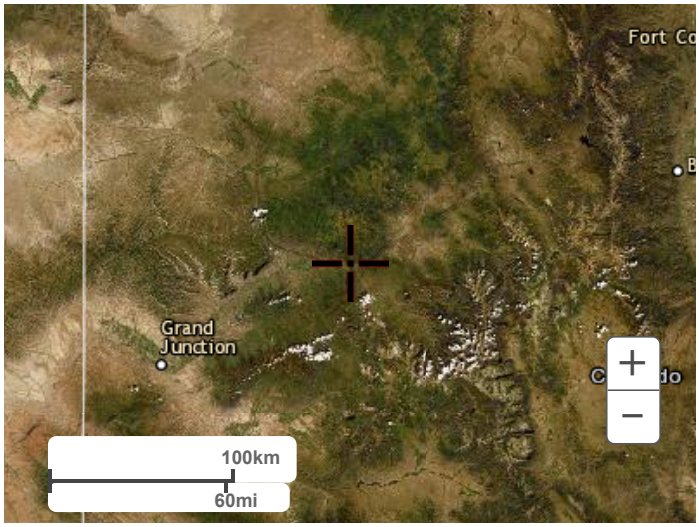
Large scale terrain



Large scale map



Large scale aerial



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National Water Center
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Appendix B

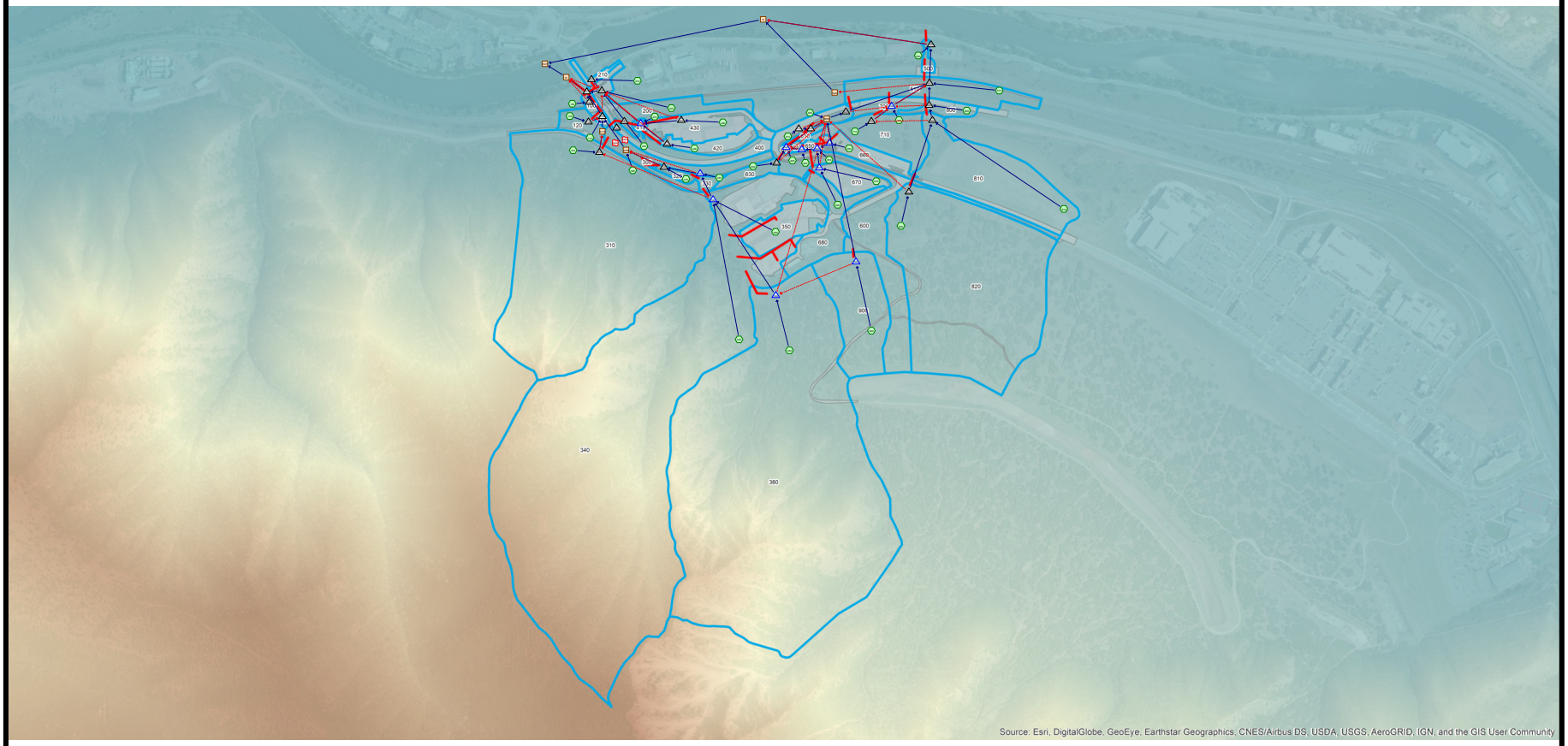
Existing Condition HydroCAD Data

Existing HydroCAD Routing Diagram 25-Year Event

Existing HydroCAD Data 25-Year Event

Existing HydroCAD Routing Diagram 100-Year Event

Existing HydroCAD Data 100-Year Event



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Existing
Prepared by SGM, Printed 4/6/2022 **25 Year**
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth>0.62"
Tc=5.0 min CN=79 Runoff=0.31 cfs 0.014 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth>0.14"
Tc=5.0 min CN=63 Runoff=0.02 cfs 0.002 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.13 cfs 0.013 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=1.12 cfs 0.065 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth>1.93"
Tc=5.0 min CN=98 Runoff=0.94 cfs 0.048 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth>0.18"
Tc=5.0 min CN=65 Runoff=0.42 cfs 0.034 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth>0.16"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=3.76 cfs 0.443 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=0.14 cfs 0.008 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth>0.14"
Tc=5.0 min CN=63 Runoff=0.03 cfs 0.003 af

Subcatchment340: Runoff Area=62.550 ac 5.12% Impervious Runoff Depth>0.23"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=13.38 cfs 1.173 af

Subcatchment350: Runoff Area=2.533 ac 89.62% Impervious Runoff Depth>1.54"
Tc=5.0 min CN=94 Runoff=6.90 cfs 0.326 af

Subcatchment360: Runoff Area=57.137 ac 0.38% Impervious Runoff Depth>0.33"
Flow Length=3,685' Tc=12.3 min CN=71 Runoff=20.54 cfs 1.573 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth>0.71"
Tc=5.0 min CN=81 Runoff=2.54 cfs 0.114 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth>1.23"
Tc=5.0 min CN=90 Runoff=2.82 cfs 0.128 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth>1.54"
Tc=5.0 min CN=94 Runoff=7.31 cfs 0.345 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth>0.25"
Tc=5.0 min CN=68 Runoff=0.09 cfs 0.005 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.52 cfs 0.050 af

Subcatchment600: Runoff Area=8.420 ac 28.66% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=3.34 cfs 0.194 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.001 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.757 ac 16.25% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.11 cfs 0.010 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.001 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.001 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth>1.63"
Tc=5.0 min CN=95 Runoff=4.35 cfs 0.209 af

Subcatchment670: Runoff Area=1.437 ac 88.66% Impervious Runoff Depth>1.46"
Tc=5.0 min CN=93 Runoff=3.75 cfs 0.175 af

Subcatchment680: Runoff Area=2.882 ac 17.70% Impervious Runoff Depth>0.18"
Tc=5.0 min CN=65 Runoff=0.53 cfs 0.043 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth>0.54"
Tc=5.0 min CN=77 Runoff=1.02 cfs 0.047 af

Subcatchment710: Runoff Area=3.271 ac 1.41% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=59 Runoff=0.04 cfs 0.021 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth>0.50"
Tc=5.0 min CN=76 Runoff=0.71 cfs 0.034 af

Subcatchment810: Runoff Area=8.130 ac 8.15% Impervious Runoff Depth>0.11"
Tc=5.0 min CN=61 Runoff=0.32 cfs 0.072 af

Subcatchment820: Runoff Area=23.436 ac 1.05% Impervious Runoff Depth>0.06"
Flow Length=1,968' Tc=16.1 min CN=58 Runoff=0.18 cfs 0.122 af

Subcatchment900: Runoff Area=6.007 ac 2.43% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=59 Runoff=0.07 cfs 0.038 af

Reach N: Inflow=10.17 cfs 1.018 af
Outflow=10.17 cfs 1.018 af

Reach OUT: Inflow=48.11 cfs 5.228 af
Outflow=48.11 cfs 5.228 af

Reach S110: Avg. Flow Depth=0.22' Max Vel=3.68 fps Inflow=3.76 cfs 0.443 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=3.74 cfs 0.443 af

Reach S300: Avg. Flow Depth=0.96' Max Vel=7.44 fps Inflow=24.11 cfs 3.118 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=43.43 cfs Outflow=24.10 cfs 3.117 af

Reach S600: Avg. Flow Depth=0.60' Max Vel=3.58 fps Inflow=9.42 cfs 0.667 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=301.54 cfs Outflow=8.38 cfs 0.667 af

Reach Spill: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach W: Inflow=38.99 cfs 4.210 af
Outflow=38.99 cfs 4.210 af

Pond P-OUT: Peak Elev=5,697.92' Inflow=38.94 cfs 4.207 af
Primary=38.94 cfs 4.207 af Secondary=0.00 cfs 0.000 af Outflow=38.94 cfs 4.207 af

Pond P100: Peak Elev=5,702.77' Inflow=0.31 cfs 0.014 af
Primary=0.25 cfs 0.011 af Secondary=0.06 cfs 0.003 af Outflow=0.31 cfs 0.014 af

Pond P110: Peak Elev=5,708.24' Inflow=27.92 cfs 3.575 af
Primary=21.79 cfs 2.936 af Secondary=6.13 cfs 0.638 af Outflow=27.92 cfs 3.575 af

Pond P120: Peak Elev=5,724.76' Inflow=0.13 cfs 0.013 af
Primary=0.13 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.013 af

Pond P200: Peak Elev=5,703.26' Inflow=18.91 cfs 1.260 af
Primary=18.91 cfs 1.260 af Secondary=0.00 cfs 0.000 af Outflow=18.91 cfs 1.260 af

Pond P210: Peak Elev=5,704.13' Inflow=0.94 cfs 0.048 af
Primary=0.94 cfs 0.048 af Secondary=0.00 cfs 0.000 af Outflow=0.94 cfs 0.048 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.16' Inflow=3.76 cfs 0.443 af
Primary=3.76 cfs 0.443 af Secondary=0.00 cfs 0.000 af Outflow=3.76 cfs 0.443 af

Pond P320: Peak Elev=5,749.65' Inflow=17.45 cfs 3.017 af
Primary=17.45 cfs 3.017 af Secondary=0.00 cfs 0.000 af Outflow=17.45 cfs 3.017 af

Pond P330: Peak Elev=5,774.89' Storage=164 cf Inflow=23.68 cfs 3.076 af
Primary=17.35 cfs 3.009 af Secondary=6.33 cfs 0.067 af Outflow=23.68 cfs 3.076 af

Pond P340: Peak Elev=5,784.08' Storage=192 cf Inflow=23.66 cfs 3.073 af
Primary=23.66 cfs 3.073 af Secondary=0.00 cfs 0.000 af Outflow=23.66 cfs 3.073 af

Pond P360: Peak Elev=5,870.65' Storage=8,538 cf Inflow=20.54 cfs 1.573 af
Primary=7.71 cfs 1.573 af Secondary=0.00 cfs 0.000 af Outflow=7.71 cfs 1.573 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.53' Storage=4,337 cf Inflow=10.13 cfs 0.474 af
Primary=9.87 cfs 0.394 af Secondary=0.00 cfs 0.000 af Outflow=9.87 cfs 0.394 af

Pond P420: Peak Elev=5,750.70' Inflow=2.82 cfs 0.128 af
Primary=2.82 cfs 0.128 af Secondary=0.00 cfs 0.000 af Outflow=2.82 cfs 0.128 af

Pond P430: Peak Elev=5,740.67' Inflow=7.31 cfs 0.345 af
Primary=7.31 cfs 0.345 af Secondary=0.00 cfs 0.000 af Outflow=7.31 cfs 0.345 af

Pond P500: Peak Elev=5,707.11' Inflow=10.17 cfs 1.018 af
Primary=10.17 cfs 1.018 af Secondary=0.00 cfs 0.000 af Outflow=10.17 cfs 1.018 af

Pond P510: Peak Elev=5,735.10' Inflow=10.11 cfs 1.012 af
Primary=10.11 cfs 1.012 af Secondary=0.00 cfs 0.000 af Outflow=10.11 cfs 1.012 af

Pond P600: Peak Elev=5,754.40' Inflow=8.38 cfs 0.667 af
Primary=8.38 cfs 0.667 af Secondary=0.00 cfs 0.000 af Outflow=8.38 cfs 0.667 af

Pond P610-inlet: Peak Elev=5,765.54' Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P610-pipe: Peak Elev=5,762.53' Inflow=6.82 cfs 0.434 af
Primary=6.82 cfs 0.434 af Secondary=0.00 cfs 0.000 af Outflow=6.82 cfs 0.434 af

Pond P620: Peak Elev=5,765.41' Storage=42 cf Inflow=6.73 cfs 0.432 af
Primary=6.82 cfs 0.432 af Secondary=0.00 cfs 0.000 af Outflow=6.82 cfs 0.432 af

Pond P630: Peak Elev=5,771.35' Inflow=0.11 cfs 0.010 af
Primary=0.04 cfs 0.003 af Secondary=0.07 cfs 0.007 af Outflow=0.11 cfs 0.010 af

Pond P640: Peak Elev=5,773.73' Storage=2,545 cf Inflow=8.15 cfs 0.428 af
Primary=0.92 cfs 0.382 af Secondary=5.78 cfs 0.047 af Outflow=6.70 cfs 0.428 af

Pond P650: Peak Elev=5,777.46' Storage=3,157 cf Inflow=8.47 cfs 0.428 af
Primary=8.15 cfs 0.428 af Secondary=0.00 cfs 0.000 af Outflow=8.15 cfs 0.428 af

Pond P660: Peak Elev=5,779.00' Storage=0 cf Inflow=4.35 cfs 0.209 af
Primary=4.35 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=4.35 cfs 0.209 af

Pond P670: Peak Elev=5,797.00' Storage=0.000 af Inflow=4.14 cfs 0.218 af
Primary=4.14 cfs 0.218 af Secondary=0.00 cfs 0.000 af Outflow=4.14 cfs 0.218 af

Pond P700: Peak Elev=5,752.00' Storage=0 cf Inflow=1.02 cfs 0.068 af
Primary=1.02 cfs 0.068 af Secondary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.068 af

Pond P710: Peak Elev=5,758.19' Inflow=0.04 cfs 0.021 af
Primary=0.04 cfs 0.021 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.021 af

Pond P800: Peak Elev=5,747.68' Inflow=0.90 cfs 0.228 af
Primary=0.90 cfs 0.228 af Secondary=0.00 cfs 0.000 af Outflow=0.90 cfs 0.228 af

Pond P810: Peak Elev=5,761.12' Inflow=0.32 cfs 0.195 af
Primary=0.32 cfs 0.195 af Secondary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.195 af

Pond P820: Peak Elev=5,812.03' Inflow=0.18 cfs 0.122 af
Primary=0.18 cfs 0.122 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.122 af

Pond P900: Peak Elev=5,870.10' Storage=269 cf Inflow=0.07 cfs 0.038 af
Primary=0.05 cfs 0.034 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.034 af

Link S300D: Manual Hydrograph Inflow=43.43 cfs 86.178 af
Primary=43.43 cfs 86.178 af

Link S300S: Manual Hydrograph Inflow=7.87 cfs 15.616 af
Primary=7.87 cfs 15.616 af

Total Runoff Area = 231.059 ac Runoff Volume = 5.315 af Average Runoff Depth = 0.28"
90.91% Pervious = 210.059 ac 9.09% Impervious = 21.000 ac

Summary for Subcatchment 100:

Runoff = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af, Depth> 0.62"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.14"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af, Depth> 0.16"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 1.12 cfs @ 11.99 hrs, Volume= 0.065 af, Depth> 0.28"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af, Depth> 1.93"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.42 cfs @ 12.00 hrs, Volume= 0.034 af, Depth> 0.18"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af, Depth> 0.16"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.14 cfs @ 11.99 hrs, Volume= 0.008 af, Depth> 0.28"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.03 cfs @ 12.01 hrs, Volume= 0.003 af, Depth> 0.14"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 13.38 cfs @ 12.05 hrs, Volume= 1.173 af, Depth> 0.23"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	3.200	98	Impervious
*	1.238	58	A soils
*	38.326	58	B Soils
*	19.786	80	D soils
	62.550	67	Weighted Average
	59.350		94.88% Pervious Area
	3.200		5.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 6.90 cfs @ 11.96 hrs, Volume= 0.326 af, Depth> 1.54"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.270	98	Impervious
*	0.263	58	A soils
	2.533	94	Weighted Average
	0.263		10.38% Pervious Area
	2.270		89.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 20.54 cfs @ 12.07 hrs, Volume= 1.573 af, Depth> 0.33"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.216	98	Impervious
*	7.090	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	57.137	71	Weighted Average
	56.921		99.62% Pervious Area
	0.216		0.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 2.54 cfs @ 11.97 hrs, Volume= 0.114 af, Depth> 0.71"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af, Depth> 1.23"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af, Depth> 1.54"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.09 cfs @ 11.99 hrs, Volume= 0.005 af, Depth> 0.25"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.52 cfs @ 12.01 hrs, Volume= 0.050 af, Depth> 0.16"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 3.34 cfs @ 11.99 hrs, Volume= 0.194 af, Depth> 0.28"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.413	98	Impervious
*	6.007	58	A soils
	8.420	69	Weighted Average
	6.007		71.34% Pervious Area
	2.413		28.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af, Depth> 0.08"
Routed to Pond P610-inlet :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.11 cfs @ 12.01 hrs, Volume= 0.010 af, Depth> 0.16"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.123	98	Impervious
*	0.634	58	A soils
	0.757	64	Weighted Average
	0.634		83.75% Pervious Area
	0.123		16.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.001 af, Depth> 0.06"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.001 af, Depth> 0.06"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af, Depth> 1.63"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 3.75 cfs @ 11.96 hrs, Volume= 0.175 af, Depth> 1.46"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.274	98	Impervious
*	0.163	58	A soils
	1.437	93	Weighted Average
	0.163		11.34% Pervious Area
	1.274		88.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 0.53 cfs @ 12.00 hrs, Volume= 0.043 af, Depth> 0.18"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.510	98	Impervious
*	2.372	58	A soils
	2.882	65	Weighted Average
	2.372		82.30% Pervious Area
	0.510		17.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 1.02 cfs @ 11.97 hrs, Volume= 0.047 af, Depth> 0.54"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed area is undevleoped.

Runoff = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af, Depth> 0.08"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.046	98	Impervious
*	3.225	58	A Soils
	3.271	59	Weighted Average
	3.225		98.59% Pervious Area
	0.046		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.71 cfs @ 11.97 hrs, Volume= 0.034 af, Depth> 0.50"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed area is undevleoped.

Runoff = 0.32 cfs @ 12.03 hrs, Volume= 0.072 af, Depth> 0.11"
Routed to Pond P810 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.663	98	Impervious
*	7.467	58	A Soils
	8.130	61	Weighted Average
	7.467		91.85% Pervious Area
	0.663		8.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed area is undevleoped.

Runoff = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af, Depth> 0.06"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.245	98	Impervious
*	23.191	58	A soils
	23.436	58	Weighted Average
	23.191		98.95% Pervious Area
	0.245		1.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Subcatchment 900:

Runoff = 0.07 cfs @ 12.39 hrs, Volume= 0.038 af, Depth> 0.08"
Routed to Pond P900 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.146	98	Impervious
*	5.861	58	A soils
*	0.000	58	B soils
*	0.000	80	D Soils
	6.007	59	Weighted Average
	5.861		97.57% Pervious Area
	0.146		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Reach N:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 62.238 ac, 13.43% Impervious, Inflow Depth > 0.20" for 25yr-24hr event
Inflow = 10.17 cfs @ 12.04 hrs, Volume= 1.018 af
Outflow = 10.17 cfs @ 12.04 hrs, Volume= 1.018 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 231.059 ac, 9.09% Impervious, Inflow Depth > 0.27" for 25yr-24hr event
Inflow = 48.11 cfs @ 12.03 hrs, Volume= 5.228 af
Outflow = 48.11 cfs @ 12.03 hrs, Volume= 5.228 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S110:

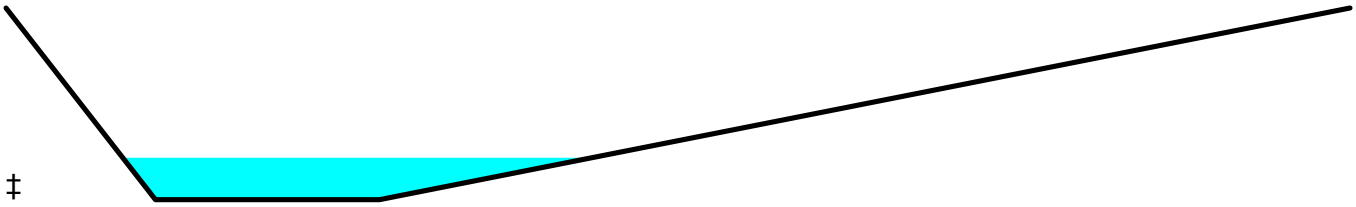
Ditch Parameters from SGM 2015 Survey

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Outflow = 3.74 cfs @ 12.05 hrs, Volume= 0.443 af, Atten= 1%, Lag= 0.4 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.68 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 1.0 min

Peak Storage= 112 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 6.28'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

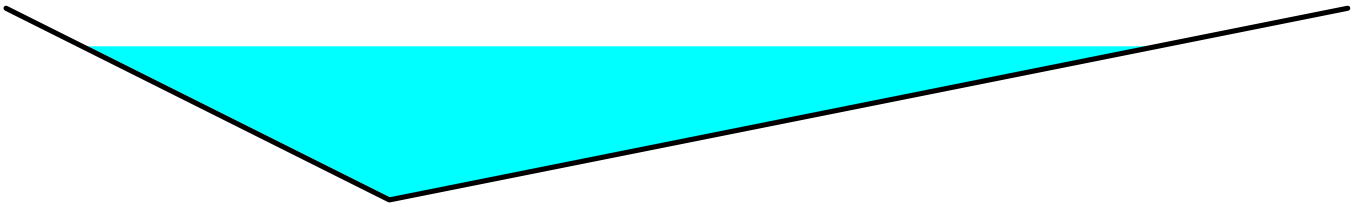
Ditch Parameters from SGM 2015 Survey

Inflow Area = 125.132 ac, 4.97% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 24.11 cfs @ 12.04 hrs, Volume= 3.118 af
Outflow = 24.10 cfs @ 12.04 hrs, Volume= 3.117 af, Atten= 0%, Lag= 0.2 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.44 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.32 fps, Avg. Travel Time= 0.6 min

Peak Storage= 357 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.96' , Surface Width= 6.74'
Bank-Full Depth= 1.20' Flow Area= 5.0 sf, Capacity= 43.43 cfs

0.00' x 1.20' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 5.0 '/' Top Width= 8.40'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



Summary for Reach S600:

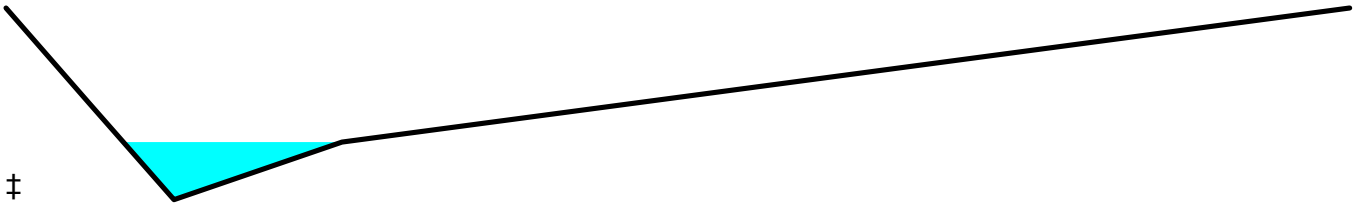
Parameters from 2015 SGM survey

Inflow Area = 21.566 ac, 27.24% Impervious, Inflow Depth > 0.37" for 25yr-24hr event
Inflow = 9.42 cfs @ 12.03 hrs, Volume= 0.667 af
Outflow = 8.38 cfs @ 12.05 hrs, Volume= 0.667 af, Atten= 11%, Lag= 0.9 min
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.58 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.45 fps, Avg. Travel Time= 3.0 min

Peak Storage= 615 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.60' , Surface Width= 7.80'
Bank-Full Depth= 2.00' Flow Area= 41.4 sf, Capacity= 301.54 cfs

Custom cross-section, Length= 263.0' Slope= 0.0266 '/'
Constant n= 0.030 Short grass
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-6.00	5,761.00	0.00
-3.00	5,760.00	1.00
0.00	5,759.00	2.00
6.00	5,759.60	1.40
42.00	5,761.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Width (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0.0	0	0.00
0.60	2.3	7.9	7.8	615	8.38
1.00	7.8	19.5	19.3	2,040	33.92
2.00	41.4	48.4	48.0	10,888	301.54

Summary for Reach Spill:

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 168.821 ac, 7.49% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 38.99 cfs @ 12.02 hrs, Volume= 4.210 af
Outflow = 38.99 cfs @ 12.02 hrs, Volume= 4.210 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

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[57] Hint: Peaked at 5,697.92' (Flood elevation advised)

Inflow Area = 168.821 ac, 7.49% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 38.94 cfs @ 12.02 hrs, Volume= 4.207 af
Outflow = 38.94 cfs @ 12.02 hrs, Volume= 4.207 af, Atten= 0%, Lag= 0.0 min
Primary = 38.94 cfs @ 12.02 hrs, Volume= 4.207 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,697.92' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,705.05'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=38.88 cfs @ 12.02 hrs HW=5,697.92' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 38.88 cfs @ 7.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

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[57] Hint: Peaked at 5,702.77' (Flood elevation advised)

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth > 0.62" for 25yr-24hr event
Inflow = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af
Outflow = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 11.97 hrs, Volume= 0.011 af
Routed to Pond P-OUT :
Secondary = 0.06 cfs @ 11.97 hrs, Volume= 0.003 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,702.77' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.25 cfs @ 11.97 hrs HW=5,702.77' TW=5,697.73' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.25 cfs of 27.02 cfs potential flow)
└─**1=Orifice/Grate** (Weir Controls 0.25 cfs @ 0.57 fps)

Secondary OutFlow Max=0.06 cfs @ 11.97 hrs HW=5,702.77' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.41 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert
Spill direction based on 2015 SGM survey contour data

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[57] Hint: Peaked at 5,708.24' (Flood elevation advised)
[62] Hint: Exceeded Reach S110 OUTLET depth by 0.07' @ 11.93 hrs
[61] Hint: Exceeded Reach S300 outlet invert by 0.24' @ 12.04 hrs

Inflow Area = 159.468 ac, 4.31% Impervious, Inflow Depth > 0.27" for 25yr-24hr event
Inflow = 27.92 cfs @ 12.04 hrs, Volume= 3.575 af
Outflow = 27.92 cfs @ 12.04 hrs, Volume= 3.575 af, Atten= 0%, Lag= 0.0 min
Primary = 21.79 cfs @ 12.04 hrs, Volume= 2.936 af
Routed to Pond P-OUT :
Secondary = 6.13 cfs @ 12.04 hrs, Volume= 0.638 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.24' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#4	Secondary	5,707.90'	**8.0' long + 16.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=21.78 cfs @ 12.04 hrs HW=5,708.24' TW=5,697.86' (Dynamic Tailwater)
└**3=Culvert** (Passes 21.78 cfs of 135.80 cfs potential flow)
└**2=Culvert** (Passes 21.78 cfs of 80.09 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 21.78 cfs @ 1.90 fps)

Secondary OutFlow Max=6.12 cfs @ 12.04 hrs HW=5,708.24' TW=5,703.19' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 6.12 cfs @ 1.36 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

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[57] Hint: Peaked at 5,724.76' (Flood elevation advised)

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af
Outflow = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.76' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.13 cfs @ 12.01 hrs HW=5,724.76' TW=5,708.22' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.13 cfs of 132.94 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.13 cfs @ 0.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' TW=5,701.20' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

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[58] Hint: Peaked 0.61' above defined flood level

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth > 1.67" for 25yr-24hr event
Inflow = 18.91 cfs @ 11.99 hrs, Volume= 1.260 af
Outflow = 18.91 cfs @ 11.99 hrs, Volume= 1.260 af, Atten= 0%, Lag= 0.0 min
Primary = 18.91 cfs @ 11.99 hrs, Volume= 1.260 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.26' @ 11.99 hrs
Flood Elev= 5,702.65'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=18.90 cfs @ 11.99 hrs HW=5,703.26' TW=5,697.86' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 18.90 cfs of 27.58 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 18.90 cfs @ 2.56 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

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[57] Hint: Peaked at 5,704.13' (Flood elevation advised)

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth > 1.93" for 25yr-24hr event
Inflow = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af
Outflow = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,704.13' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.93 cfs @ 11.96 hrs HW=5,704.13' TW=5,703.23' (Dynamic Tailwater)
2=Culvert (Passes 0.93 cfs of 14.39 cfs potential flow)
1=Orifice/Grate (Orifice Controls 0.93 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' TW=5,698.94' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P310:

[57] Hint: Peaked at 5,746.16' (Flood elevation advised)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Outflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af, Atten= 0%, Lag= 0.0 min
Primary = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Routed to Reach S110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.16' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.75 cfs @ 12.04 hrs HW=5,746.16' TW=5,715.22' (Dynamic Tailwater)
└**2=Culvert** (Passes 3.75 cfs of 96.86 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 3.75 cfs @ 1.31 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' TW=5,715.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,749.65' (Flood elevation advised)

Inflow Area = 122.857 ac, 4.74% Impervious, Inflow Depth > 0.29" for 25yr-24hr event
Inflow = 17.45 cfs @ 12.03 hrs, Volume= 3.017 af
Outflow = 17.45 cfs @ 12.03 hrs, Volume= 3.017 af, Atten= 0%, Lag= 0.0 min
Primary = 17.45 cfs @ 12.03 hrs, Volume= 3.017 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.65' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.44 cfs @ 12.03 hrs HW=5,749.65' TW=5,715.96' (Dynamic Tailwater)
└**2=Culvert** (Passes 17.44 cfs of 77.25 cfs potential flow)
└**1=Culvert** (Inlet Controls 17.44 cfs @ 4.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' TW=5,715.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 122.505 ac, 4.67% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 23.68 cfs @ 12.04 hrs, Volume= 3.076 af
Outflow = 23.68 cfs @ 12.04 hrs, Volume= 3.076 af, Atten= 0%, Lag= 0.1 min
Primary = 17.35 cfs @ 12.04 hrs, Volume= 3.009 af
Routed to Pond P320 :
Secondary = 6.33 cfs @ 12.04 hrs, Volume= 0.067 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,774.89' @ 12.04 hrs Surf.Area= 256 sf Storage= 164 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (909.3 - 909.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	195 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	6	0	0
5,774.00	50	28	28
5,775.00	283	167	195

Device	Routing	Invert	Outlet Devices
#1	Primary	5,772.57'	**24.0" Round Culvert** L= 43.6' Ke= 0.500 Inlet / Outlet Invert= 5,772.57' / 5,767.34' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.35 cfs @ 12.04 hrs HW=5,774.88' TW=5,749.65' (Dynamic Tailwater)
1=Culvert (Inlet Controls 17.35 cfs @ 5.52 fps)

Secondary OutFlow Max=6.31 cfs @ 12.04 hrs HW=5,774.88' TW=5,715.96' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 6.31 cfs @ 1.52 fps)

Summary for Pond P340:

Information from SGM 2022 Survey

Inflow Area = 122.220 ac, 4.65% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 23.66 cfs @ 12.03 hrs, Volume= 3.073 af
Outflow = 23.66 cfs @ 12.04 hrs, Volume= 3.073 af, Atten= 0%, Lag= 0.2 min
Primary = 23.66 cfs @ 12.04 hrs, Volume= 3.073 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P310 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,784.08' @ 12.04 hrs Surf.Area= 184 sf Storage= 192 cf

Plug-Flow detention time= 0.2 min calculated for 3.073 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (909.2 - 909.0)

Volume	Invert	Avail.Storage	Storage Description
#1	5,781.00'	1,480 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,781.00	0	0	0
5,782.00	17	9	9
5,783.00	74	46	54
5,784.00	175	125	179
5,785.00	299	237	416
5,786.00	499	399	815
5,787.00	832	666	1,480

Device	Routing	Invert	Outlet Devices
#1	Primary	5,781.92'	**36.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,781.92' / 5,781.38' S= 0.0098 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Secondary	5,786.00'	**25.0' long + 7.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=23.63 cfs @ 12.04 hrs HW=5,784.07' TW=5,774.88' (Dynamic Tailwater)
1=Culvert (Barrel Controls 23.63 cfs @ 6.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,781.00' TW=5,736.56' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
NOTE: the spill location goes to basin 600. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side. Pipe is currently filled with sediment, but is modeled assuming the pipe is not clogged.

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=545)

Inflow Area = 57.137 ac, 0.38% Impervious, Inflow Depth > 0.33" for 25yr-24hr event
Inflow = 20.54 cfs @ 12.07 hrs, Volume= 1.573 af
Outflow = 7.71 cfs @ 12.28 hrs, Volume= 1.573 af, Atten= 62%, Lag= 12.5 min
Primary = 7.71 cfs @ 12.28 hrs, Volume= 1.573 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.65' @ 12.28 hrs Surf.Area= 10,538 sf Storage= 8,538 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.7 min (913.6 - 908.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	122,672 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,868.00	36	0	0
5,869.00	188	112	112
5,870.00	5,913	3,051	3,163
5,871.00	12,990	9,452	12,614
5,872.00	10,652	11,821	24,435
5,873.00	12,551	11,602	36,037
5,874.00	14,430	13,491	49,527
5,875.00	16,332	15,381	64,908
5,876.00	18,262	17,297	82,205
5,877.00	20,237	19,250	101,455
5,878.00	22,198	21,218	122,672

Device	Routing	Invert	Outlet Devices
#1	Primary	5,866.85'	**15.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900

n= 0.013, Flow Area= 1.23 sf

#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.71 cfs @ 12.28 hrs HW=5,870.65' TW=5,783.42' (Dynamic Tailwater)
1=Culvert (Barrel Controls 7.71 cfs @ 6.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' TW=5,761.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth > 1.42" for 25yr-24hr event
Inflow = 10.13 cfs @ 11.96 hrs, Volume= 0.474 af
Outflow = 9.87 cfs @ 11.97 hrs, Volume= 0.394 af, Atten= 3%, Lag= 0.9 min
Primary = 9.87 cfs @ 11.97 hrs, Volume= 0.394 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.53' @ 11.97 hrs Surf.Area= 1,764 sf Storage= 4,337 cf

Plug-Flow detention time= 108.7 min calculated for 0.394 af (83% of inflow)
Center-of-Mass det. time= 35.3 min (837.6 - 802.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=9.85 cfs @ 11.97 hrs HW=5,736.53' TW=5,703.26' (Dynamic Tailwater)
└**2=Culvert** (Passes 9.85 cfs of 19.44 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.85 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

[57] Hint: Peaked at 5,750.70' (Flood elevation advised)

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth > 1.23" for 25yr-24hr event
Inflow = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af
Outflow = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.70' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500

			Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900
			n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
			2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.82 cfs @ 11.96 hrs HW=5,750.70' TW=5,736.52' (Dynamic Tailwater)
└**2=Culvert** (Passes 2.82 cfs of 15.09 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.82 cfs @ 1.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

[57] Hint: Peaked at 5,740.67' (Flood elevation advised)

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth > 1.54" for 25yr-24hr event
Inflow = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af
Outflow = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af, Atten= 0%, Lag= 0.0 min
Primary = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.67' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500
			Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900
			n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.30 cfs @ 11.96 hrs HW=5,740.67' TW=5,736.52' (Dynamic Tailwater)
└**2=Culvert** (Passes 7.30 cfs of 12.20 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 7.30 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

[57] Hint: Peaked at 5,707.11' (Flood elevation advised)

Inflow Area = 62.238 ac, 13.43% Impervious, Inflow Depth > 0.20" for 25yr-24hr event
Inflow = 10.17 cfs @ 12.04 hrs, Volume= 1.018 af
Outflow = 10.17 cfs @ 12.04 hrs, Volume= 1.018 af, Atten= 0%, Lag= 0.0 min
Primary = 10.17 cfs @ 12.04 hrs, Volume= 1.018 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,707.11' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.11 cfs @ 12.04 hrs HW=5,707.10' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 10.11 cfs @ 3.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

[57] Hint: Peaked at 5,735.10' (Flood elevation advised)

Inflow Area = 61.979 ac, 13.38% Impervious, Inflow Depth > 0.20" for 25yr-24hr event
Inflow = 10.11 cfs @ 12.04 hrs, Volume= 1.012 af
Outflow = 10.11 cfs @ 12.04 hrs, Volume= 1.012 af, Atten= 0%, Lag= 0.0 min
Primary = 10.11 cfs @ 12.04 hrs, Volume= 1.012 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,735.10' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.05 cfs @ 12.04 hrs HW=5,735.10' TW=5,707.10' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 10.05 cfs @ 3.57 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

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[61] Hint: Exceeded Reach S600 outlet invert by 0.40' @ 12.05 hrs

Inflow Area = 21.566 ac, 27.24% Impervious, Inflow Depth > 0.37" for 25yr-24hr event
Inflow = 8.38 cfs @ 12.05 hrs, Volume= 0.667 af
Outflow = 8.38 cfs @ 12.05 hrs, Volume= 0.667 af, Atten= 0%, Lag= 0.0 min
Primary = 8.38 cfs @ 12.05 hrs, Volume= 0.667 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,754.40' @ 12.05 hrs
Flood Elev= 5,756.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	5,755.50'	**Asymmetrical Weir, C= 2.70** Offset (feet) -6.00 -3.50 0.00 6.00 26.00 Elev. (feet) 5,757.00 5,756.00 5,755.50 5,756.20 5,757.00

Primary OutFlow Max=8.33 cfs @ 12.05 hrs HW=5,754.40' TW=5,735.10' (Dynamic Tailwater)
└**1=Culvert** (Passes 8.33 cfs of 9.97 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 8.33 cfs @ 2.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.28' TW=5,752.00' (Dynamic Tailwater)
└**3=Asymmetrical Weir** (Controls 0.00 cfs)

Summary for Pond P610-inlet:

Information from SGM 2022 Survey

Inflow Area = 0.231 ac, 3.03% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.54' @ 12.39 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Secondary	5,766.80'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 12.39 hrs HW=5,765.54' TW=5,761.78' (Dynamic Tailwater)
└**2=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.54' TW=5,761.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610-pipe:

Information from SGM 2022 Survey

Inflow Area = 7.139 ac, 46.44% Impervious, Inflow Depth > 0.73" for 25yr-24hr event
Inflow = 6.82 cfs @ 12.03 hrs, Volume= 0.434 af
Outflow = 6.82 cfs @ 12.03 hrs, Volume= 0.434 af, Atten= 0%, Lag= 0.0 min
Primary = 6.82 cfs @ 12.03 hrs, Volume= 0.434 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,762.53' @ 12.03 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.27'	**24.0" Round Culvert** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 5,761.27' / 5,759.70' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

#2 Secondary 5,765.54' **18.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=6.58 cfs @ 12.03 hrs HW=5,762.52' TW=5,761.58' (Dynamic Tailwater)
1=Culvert (Outlet Controls 6.58 cfs @ 4.56 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.27' TW=5,761.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=544)

Inflow Area = 6.908 ac, 47.89% Impervious, Inflow Depth > 0.75" for 25yr-24hr event
Inflow = 6.73 cfs @ 12.03 hrs, Volume= 0.432 af
Outflow = 6.82 cfs @ 12.03 hrs, Volume= 0.432 af, Atten= 0%, Lag= 0.3 min
Primary = 6.82 cfs @ 12.03 hrs, Volume= 0.432 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610-pipe :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.41' @ 12.03 hrs Surf.Area= 130 sf Storage= 42 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (847.0 - 846.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	1,713 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,765.00	76	0	0
5,766.00	207	142	142
5,767.00	343	275	417
5,768.00	609	476	893
5,769.00	1,031	820	1,713

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.26'	**24.0" Round Culvert** L= 126.3' Ke= 0.500 Inlet / Outlet Invert= 5,764.26' / 5,761.27' S= 0.0237 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.70 cfs @ 12.03 hrs HW=5,765.40' TW=5,762.52' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 6.70 cfs @ 3.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' TW=5,761.27' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM 2022 Survey

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[57] Hint: Peaked at 5,771.35' (Flood elevation advised)

Inflow Area = 0.757 ac, 16.25% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 0.11 cfs @ 12.01 hrs, Volume= 0.010 af
Outflow = 0.11 cfs @ 12.01 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 12.01 hrs, Volume= 0.003 af
Routed to Pond P620 :
Secondary = 0.07 cfs @ 12.01 hrs, Volume= 0.007 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.35' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,767.94'	**12.0" Round Culvert** L= 71.5' Ke= 0.500 Inlet / Outlet Invert= 5,767.94' / 5,767.20' S= 0.0103 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,771.33'	**10.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,771.33'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 12.01 hrs HW=5,771.35' TW=5,765.07' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.04 cfs of 5.78 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.04 cfs @ 0.28 fps)

Secondary OutFlow Max=0.07 cfs @ 12.01 hrs HW=5,771.35' TW=5,761.48' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir**(Weir Controls 0.07 cfs @ 0.33 fps)

Summary for Pond P640:

Information from SGM 2022 Survey
Yes, survey data confirmed that the pipe is back pitched.

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[44] Hint: Outlet device #4 is below defined storage
[92] Warning: Device #3 is above defined storage

Inflow Area = 6.073 ac, 52.45% Impervious, Inflow Depth > 0.85" for 25yr-24hr event
Inflow = 8.15 cfs @ 11.98 hrs, Volume= 0.428 af
Outflow = 6.70 cfs @ 12.03 hrs, Volume= 0.428 af, Atten= 18%, Lag= 2.7 min
Primary = 0.92 cfs @ 12.03 hrs, Volume= 0.382 af
Routed to Pond P620 :
Secondary = 5.78 cfs @ 12.03 hrs, Volume= 0.047 af
Routed to Pond P620 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,773.73' @ 12.03 hrs Surf.Area= 1,107 sf Storage= 2,545 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 18.3 min (845.8 - 827.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	2,853 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,769.00	41	0	0
5,770.00	248	145	145
5,771.00	459	354	498
5,772.00	656	558	1,056
5,773.00	873	765	1,820
5,774.00	1,192	1,033	2,853

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.50'	**24.0" Round Culvert** L= 59.7' Ke= 0.500 Inlet / Outlet Invert= 5,763.42' / 5,764.50' S= -0.0181 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,773.50'	**20.0' long + 10.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,774.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.78'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.92 cfs @ 12.03 hrs HW=5,773.73' TW=5,765.38' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.92 cfs of 43.40 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.92 cfs @ 10.53 fps)

Secondary OutFlow Max=5.72 cfs @ 12.03 hrs HW=5,773.73' TW=5,765.38' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 5.72 cfs @ 1.11 fps)

Summary for Pond P650:

Information from SGM 2022 Survey

[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 5.967 ac, 53.38% Impervious, Inflow Depth > 0.86" for 25yr-24hr event
Inflow = 8.47 cfs @ 11.96 hrs, Volume= 0.428 af
Outflow = 8.15 cfs @ 11.98 hrs, Volume= 0.428 af, Atten= 4%, Lag= 1.2 min
Primary = 8.15 cfs @ 11.98 hrs, Volume= 0.428 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.46' @ 11.98 hrs Surf.Area= 1,420 sf Storage= 3,157 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.1 min (827.2 - 811.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	6,281 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	79	0	0
5,774.00	334	207	207
5,775.00	638	486	693
5,776.00	916	777	1,470
5,777.00	1,238	1,077	2,547
5,778.00	1,634	1,436	3,983
5,779.00	2,962	2,298	6,281

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.52'	**24.0" Round Culvert** L= 70.6' Ke= 0.500 Inlet / Outlet Invert= 5,769.52' / 5,768.38' S= 0.0161 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,776.96'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,772.75'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.13 cfs @ 11.98 hrs HW=5,777.46' TW=5,773.01' (Dynamic Tailwater)
└**1=Culvert** (Passes 8.13 cfs of 31.91 cfs potential flow)
  └**3=Orifice/Grate** (Weir Controls 7.24 cfs @ 2.31 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.89 cfs @ 10.16 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,773.00' TW=5,761.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM 2022 Survey

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth > 1.63" for 25yr-24hr event
Inflow = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af
Outflow = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min
Primary = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af
  Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.00' @ 11.96 hrs Surf.Area= 234 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (789.1 - 789.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	2,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,779.00	234	0	0
5,780.00	414	324	324
5,781.00	633	524	848
5,782.00	968	801	1,648
5,783.00	1,540	1,254	2,902

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.87'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.87' / 5,773.00' S= 0.0628 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.17 cfs @ 11.96 hrs HW=5,779.00' TW=5,777.43' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 5.17 cfs @ 3.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' TW=5,761.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

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[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 4.319 ac, 41.31% Impervious, Inflow Depth > 0.61" for 25yr-24hr event
Inflow = 4.14 cfs @ 11.97 hrs, Volume= 0.218 af
Outflow = 4.14 cfs @ 11.97 hrs, Volume= 0.218 af, Atten= 0%, Lag= 0.0 min
Primary = 4.14 cfs @ 11.97 hrs, Volume= 0.218 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,797.00' @ 0.00 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (831.4 - 831.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,797.00'	0.061 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,797.00	0.005	0.000	0.000
5,798.00	0.024	0.014	0.014
5,799.00	0.068	0.046	0.061

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,790.62'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,790.62' / 5,777.57' S= 0.2534 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 11.97 hrs HW=5,797.00' TW=5,777.45' (Dynamic Tailwater)
↑└**1=Culvert** (Passes 0.00 cfs of 36.71 cfs potential flow)
↑└**3=Culvert** (Passes 0.00 cfs of 20.19 cfs potential flow)
↑└**4=Orifice/Grate** (Passes 0.00 cfs of 37.19 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,797.00' TW=5,761.00' (Dynamic Tailwater)
↑└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.330 ac, 12.66% Impervious, Inflow Depth > 0.19" for 25yr-24hr event
Inflow = 1.02 cfs @ 11.97 hrs, Volume= 0.068 af
Outflow = 1.02 cfs @ 11.97 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 11.97 hrs, Volume= 0.068 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.00' @ 0.00 hrs Surf.Area= 587 sf Storage= 0 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (919.5 - 919.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 11.97 hrs HW=5,752.00' TW=5,734.82' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.00 cfs of 13.32 cfs potential flow)
└**1=Orifice/Grate** (Passes 0.00 cfs of 36.54 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' TW=5,734.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

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[57] Hint: Peaked at 5,758.19' (Flood elevation advised)

Inflow Area = 3.271 ac, 1.41% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af
Outflow = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,758.19' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.04 cfs @ 12.39 hrs HW=5,758.19' TW=5,752.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.04 cfs @ 1.35 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' TW=5,752.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 3.94% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.90 cfs @ 12.00 hrs, Volume= 0.228 af
Outflow = 0.90 cfs @ 12.00 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min
Primary = 0.90 cfs @ 12.00 hrs, Volume= 0.228 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,747.68' @ 12.00 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.89 cfs @ 12.00 hrs HW=5,747.68' TW=5,734.89' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.89 cfs @ 1.92 fps)
↑—**1=Orifice/Grate** (Passes 0.89 cfs of 48.84 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P810:

[57] Hint: Peaked at 5,761.12' (Flood elevation advised)

Inflow Area = 31.566 ac, 2.88% Impervious, Inflow Depth > 0.07" for 25yr-24hr event
Inflow = 0.32 cfs @ 12.03 hrs, Volume= 0.195 af
Outflow = 0.32 cfs @ 12.03 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.03 hrs, Volume= 0.195 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,761.12' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.32 cfs @ 12.03 hrs HW=5,761.12' TW=5,747.66' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.32 cfs @ 1.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' TW=5,758.10' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P820:

[57] Hint: Peaked at 5,812.03' (Flood elevation advised)

Inflow Area = 23.436 ac, 1.05% Impervious, Inflow Depth > 0.06" for 25yr-24hr event
Inflow = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af
Outflow = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af
Routed to Pond P810 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.03' @ 13.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.18 cfs @ 13.08 hrs HW=5,812.03' TW=5,761.11' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.18 cfs of 105.27 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' TW=5,761.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P900:

JR Harris & Company Plans 2014 show a pipe on the east side of debris catch basin, but what was built compared to the plans differs from aerial imagery. Based on the pond grading with a low area to the east, it was assumed that there is an existing 12 inch pipe here. The pipe is likely buried which is why it was not picked up by survey. All pipe parameters are assumed. Pipe is assumed to not be clogged even if it likely is clogged.

Inflow Area = 6.007 ac, 2.43% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.07 cfs @ 12.39 hrs, Volume= 0.038 af
Outflow = 0.05 cfs @ 15.03 hrs, Volume= 0.034 af, Atten= 35%, Lag= 158.1 min
Primary = 0.05 cfs @ 15.03 hrs, Volume= 0.034 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P360 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.10' @ 15.03 hrs Surf.Area= 2,768 sf Storage= 269 cf

Plug-Flow detention time= 100.5 min calculated for 0.034 af (88% of inflow)
Center-of-Mass det. time= 51.2 min (1,075.6 - 1,024.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,870.00'	98,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,870.00	2,448	0	0
5,871.00	5,544	3,996	3,996
5,872.00	9,422	7,483	11,479
5,873.00	11,136	10,279	21,758
5,874.00	12,759	11,948	33,706
5,875.00	14,397	13,578	47,284
5,876.00	16,056	15,227	62,510
5,877.00	17,865	16,961	79,471
5,878.00	19,943	18,904	98,375

Device	Routing	Invert	Outlet Devices
#1	Primary	5,870.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 5,870.00' / 5,869.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,871.50'	**12.0' long + 8.0 '/' SideZ x 100.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.05 cfs @ 15.03 hrs HW=5,870.10' TW=5,761.26' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.05 cfs @ 1.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,870.00' TW=5,868.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link S300D:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 51.30 cfs.

43.43 cfs remains in ditch
7.87 cfs spills to watershed 400

Inflow = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af
Primary = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
43.43 43.43

Summary for Link S300S:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

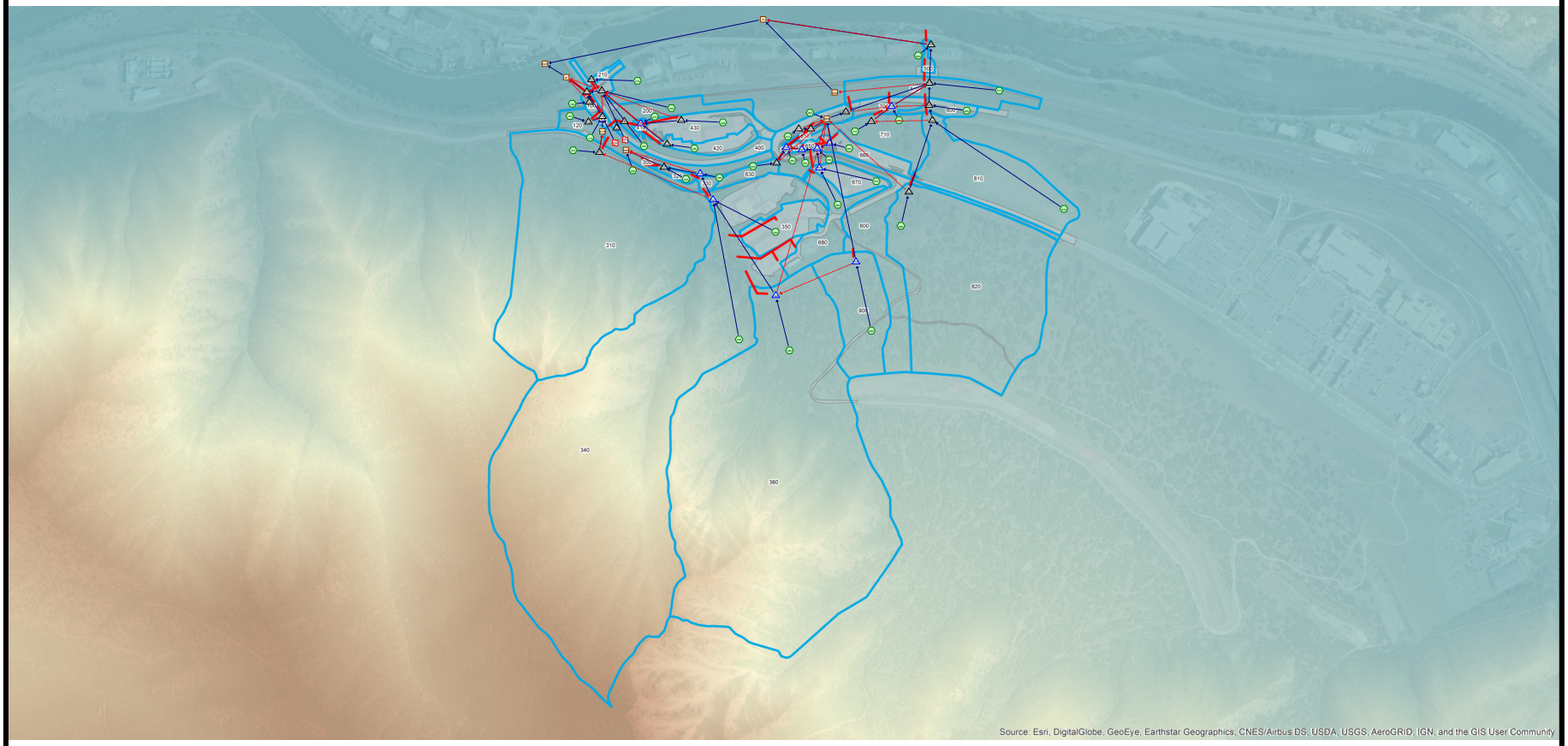
From S300, ditch capacity is 43.43 cfs. Ditch receives 51.30 cfs.

43.43 cfs remains in ditch
7.87 cfs spills to watershed 400

Inflow = 7.87 cfs @ 0.00 hrs, Volume= 15.616 af
Primary = 7.87 cfs @ 0.00 hrs, Volume= 15.616 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
7.87 7.87



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Existing 100 Year
Prepared by SGM, Printed 4/6/2022
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 100:

Runoff = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af, Depth> 0.99"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.07 cfs @ 11.99 hrs, Volume= 0.004 af, Depth> 0.32"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af, Depth> 0.36"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 2.55 cfs @ 11.98 hrs, Volume= 0.125 af, Depth> 0.53"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 1.19 cfs @ 11.96 hrs, Volume= 0.063 af, Depth> 2.50"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 1.34 cfs @ 11.98 hrs, Volume= 0.073 af, Depth> 0.39"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af, Depth> 0.35"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.32 cfs @ 11.98 hrs, Volume= 0.016 af, Depth> 0.53"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.13 cfs @ 11.99 hrs, Volume= 0.008 af, Depth> 0.32"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 36.93 cfs @ 12.03 hrs, Volume= 2.369 af, Depth> 0.45"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	3.200	98	Impervious
*	1.238	58	A soils
*	38.326	58	B Soils
*	19.786	80	D soils
	62.550	67	Weighted Average
	59.350		94.88% Pervious Area
	3.200		5.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 9.15 cfs @ 11.96 hrs, Volume= 0.441 af, Depth> 2.09"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.270	98	Impervious
*	0.263	58	A soils
	2.533	94	Weighted Average
	0.263		10.38% Pervious Area
	2.270		89.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 44.23 cfs @ 12.06 hrs, Volume= 2.891 af, Depth> 0.61"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.216	98	Impervious
*	7.090	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	57.137	71	Weighted Average
	56.921		99.62% Pervious Area
	0.216		0.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 4.01 cfs @ 11.96 hrs, Volume= 0.179 af, Depth> 1.11"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.19"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af, Depth> 1.74"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af, Depth> 2.09"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.21 cfs @ 11.98 hrs, Volume= 0.011 af, Depth> 0.49"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 1.92 cfs @ 11.99 hrs, Volume= 0.110 af, Depth> 0.36"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 7.60 cfs @ 11.98 hrs, Volume= 0.371 af, Depth> 0.53"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.413	98	Impervious
*	6.007	58	A soils
	8.420	69	Weighted Average
	6.007		71.34% Pervious Area
	2.413		28.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af, Depth> 0.22"
Routed to Pond P610-inlet :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.19"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af, Depth> 0.36"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.123	98	Impervious
*	0.634	58	A soils
	0.757	64	Weighted Average
	0.634		83.75% Pervious Area
	0.123		16.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.19"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.19"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 5.70 cfs @ 11.96 hrs, Volume= 0.279 af, Depth> 2.18"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 5.03 cfs @ 11.96 hrs, Volume= 0.239 af, Depth> 1.99"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.274	98	Impervious
*	0.163	58	A soils
	1.437	93	Weighted Average
	0.163		11.34% Pervious Area
	1.274		88.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 1.70 cfs @ 11.98 hrs, Volume= 0.093 af, Depth> 0.39"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.510	98	Impervious
*	2.372	58	A soils
	2.882	65	Weighted Average
	2.372		82.30% Pervious Area
	0.510		17.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 1.74 cfs @ 11.97 hrs, Volume= 0.078 af, Depth> 0.89"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed area is undevleoped.

Runoff = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af, Depth> 0.22"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.046	98	Impervious
*	3.225	58	A Soils
	3.271	59	Weighted Average
	3.225		98.59% Pervious Area
	0.046		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 1.25 cfs @ 11.97 hrs, Volume= 0.056 af, Depth> 0.84"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed area is undevleoped.

Runoff = 2.59 cfs @ 11.99 hrs, Volume= 0.181 af, Depth> 0.27"
Routed to Pond P810 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.663	98	Impervious
*	7.467	58	A Soils
	8.130	61	Weighted Average
	7.467		91.85% Pervious Area
	0.663		8.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed area is undevleoped.

Runoff = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af, Depth> 0.19"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.245	98	Impervious
*	23.191	58	A soils
	23.436	58	Weighted Average
	23.191		98.95% Pervious Area
	0.245		1.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Subcatchment 900:

Runoff = 1.23 cfs @ 12.00 hrs, Volume= 0.108 af, Depth> 0.22"
Routed to Pond P900 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.146	98	Impervious
*	5.861	58	A soils
*	0.000	58	B soils
*	0.000	80	D Soils
	6.007	59	Weighted Average
	5.861		97.57% Pervious Area
	0.146		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Reach N:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 62.238 ac, 13.43% Impervious, Inflow Depth > 0.38" for 100yr-24hr event
Inflow = 27.25 cfs @ 12.00 hrs, Volume= 1.982 af
Outflow = 27.25 cfs @ 12.00 hrs, Volume= 1.982 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 105.927 ac, 13.95% Impervious, Inflow Depth > 11.98" for 100yr-24hr event
Inflow = 112.88 cfs @ 11.99 hrs, Volume= 105.748 af
Outflow = 112.88 cfs @ 11.99 hrs, Volume= 105.748 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S110:

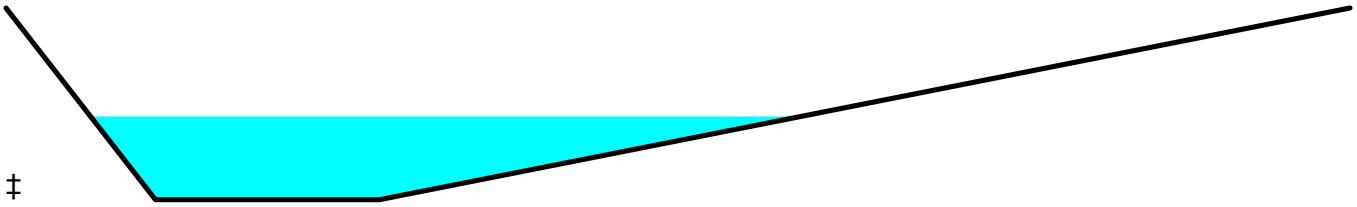
Ditch Parameters from SGM 2015 Survey

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.35" for 100yr-24hr event
Inflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Outflow = 14.64 cfs @ 12.02 hrs, Volume= 0.982 af, Atten= 0%, Lag= 0.3 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.37 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.23 fps, Avg. Travel Time= 0.8 min

Peak Storage= 299 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 9.52'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

Ditch Parameters from SGM 2015 Survey

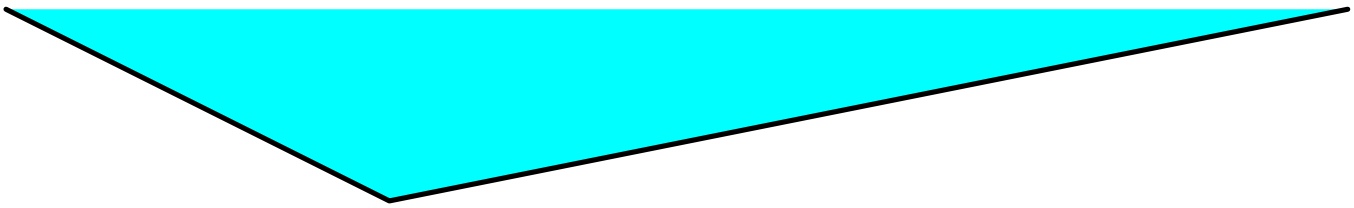
[91] Warning: Storage range exceeded by 0.08'
[55] Hint: Peak inflow is 118% of Manning's capacity

Inflow Area = 125.132 ac, 4.97% Impervious, Inflow Depth > 0.56" for 100yr-24hr event
Inflow = 51.39 cfs @ 12.02 hrs, Volume= 5.797 af
Outflow = 51.30 cfs @ 12.03 hrs, Volume= 5.796 af, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.96 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.70 fps, Avg. Travel Time= 0.5 min

Peak Storage= 630 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.28' , Surface Width= 8.98'
Bank-Full Depth= 1.20' Flow Area= 5.0 sf, Capacity= 43.43 cfs

0.00' x 1.20' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 5.0 '/' Top Width= 8.40'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



Summary for Reach S600:

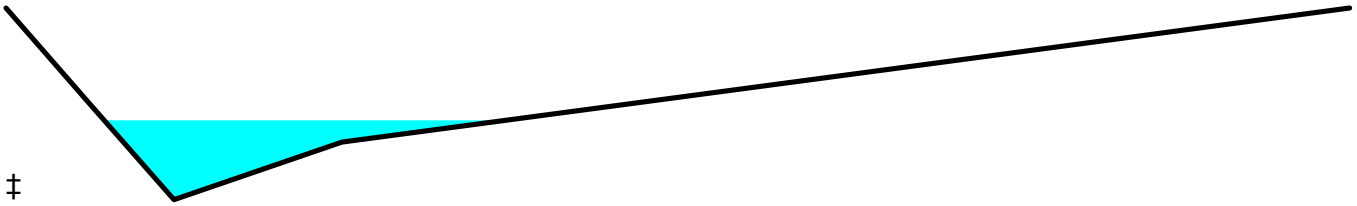
Parameters from 2015 SGM survey

Inflow Area = 21.566 ac, 27.24% Impervious, Inflow Depth > 0.62" for 100yr-24hr event
Inflow = 19.89 cfs @ 11.99 hrs, Volume= 1.115 af
Outflow = 19.05 cfs @ 12.01 hrs, Volume= 1.114 af, Atten= 4%, Lag= 1.2 min
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.90 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.59 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,284 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.83' , Surface Width= 14.38'
Bank-Full Depth= 2.00' Flow Area= 41.4 sf, Capacity= 301.54 cfs

Custom cross-section, Length= 263.0' Slope= 0.0266 '/'
Constant n= 0.030 Short grass
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-6.00	5,761.00	0.00
-3.00	5,760.00	1.00
0.00	5,759.00	2.00
6.00	5,759.60	1.40
42.00	5,761.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Width (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0.0	0	0.00
0.60	2.3	7.9	7.8	615	8.38
1.00	7.8	19.5	19.3	2,040	33.92
2.00	41.4	48.4	48.0	10,888	301.54

Summary for Reach Spill:

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 43.689 ac, 14.69% Impervious, Inflow Depth > 28.50" for 100yr-24hr event
Inflow = 85.97 cfs @ 11.99 hrs, Volume= 103.766 af
Outflow = 85.97 cfs @ 11.99 hrs, Volume= 103.766 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

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[57] Hint: Peaked at 5,698.52' (Flood elevation advised)

Inflow Area = 43.689 ac, 14.69% Impervious, Inflow Depth > 23.55" for 100yr-24hr event
Inflow = 55.58 cfs @ 12.02 hrs, Volume= 85.725 af
Outflow = 55.58 cfs @ 12.02 hrs, Volume= 85.725 af, Atten= 0%, Lag= 0.0 min
Primary = 55.58 cfs @ 12.02 hrs, Volume= 85.725 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,698.52' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,705.05'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=55.58 cfs @ 12.02 hrs HW=5,698.52' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 55.58 cfs @ 7.80 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.06' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

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[57] Hint: Peaked at 5,702.78' (Flood elevation advised)

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth > 0.99" for 100yr-24hr event
Inflow = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af
Outflow = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 11.97 hrs, Volume= 0.018 af
Routed to Pond P-OUT :
Secondary = 0.10 cfs @ 11.97 hrs, Volume= 0.005 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,702.78' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.40 cfs @ 11.97 hrs HW=5,702.78' TW=5,698.40' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 0.40 cfs of 27.07 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.40 cfs @ 0.67 fps)

Secondary OutFlow Max=0.10 cfs @ 11.97 hrs HW=5,702.78' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.48 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert
Spill direction based on 2015 SGM survey contour data

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[57] Hint: Peaked at 5,708.20' (Flood elevation advised)
[62] Hint: Exceeded Reach S110 OUTLET depth by 0.05' @ 0.00 hrs

Inflow Area = 34.336 ac, 1.89% Impervious, Inflow Depth > 5.81" for 100yr-24hr event
Inflow = 22.98 cfs @ 12.02 hrs, Volume= 16.631 af
Outflow = 22.98 cfs @ 12.02 hrs, Volume= 16.631 af, Atten= 0%, Lag= 0.0 min
Primary = 18.12 cfs @ 12.02 hrs, Volume= 13.584 af
Routed to Pond P-OUT :
Secondary = 4.86 cfs @ 12.02 hrs, Volume= 3.048 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.20' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 16.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=18.09 cfs @ 12.02 hrs HW=5,708.20' TW=5,698.52' (Dynamic Tailwater)
3=Culvert (Passes 18.09 cfs of 135.27 cfs potential flow)
2=Culvert (Passes 18.09 cfs of 79.80 cfs potential flow)
1=Orifice/Grate (Weir Controls 18.09 cfs @ 1.79 fps)

Secondary OutFlow Max=4.85 cfs @ 12.02 hrs HW=5,708.20' TW=5,705.98' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Weir Controls 4.85 cfs @ 1.28 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

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[57] Hint: Peaked at 5,724.78' (Flood elevation advised)

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth > 0.36" for 100yr-24hr event
Inflow = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af
Outflow = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.78' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.50 cfs @ 11.99 hrs HW=5,724.78' TW=5,708.18' (Dynamic Tailwater)
2=Culvert (Passes 0.50 cfs of 133.05 cfs potential flow)
1=Orifice/Grate (Weir Controls 0.50 cfs @ 0.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' TW=5,708.05' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

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[58] Hint: Peaked 3.38' above defined flood level
[80] Warning: Exceeded Pond P210 by 5.87' @ 12.04 hrs (18.77 cfs 12.397 af)
[80] Warning: Exceeded Pond P210 by 5.87' @ 12.04 hrs (191.84 cfs 125.381 af)

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth > 119.17" for 100yr-24hr event
Inflow = 68.77 cfs @ 11.99 hrs, Volume= 90.160 af
Outflow = 68.77 cfs @ 11.99 hrs, Volume= 90.160 af, Atten= 0%, Lag= 0.0 min
Primary = 37.34 cfs @ 11.99 hrs, Volume= 72.123 af
Routed to Pond P-OUT :
Secondary = 31.43 cfs @ 11.99 hrs, Volume= 18.037 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,706.03' @ 11.99 hrs
Flood Elev= 5,702.65'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=37.33 cfs @ 11.99 hrs HW=5,706.03' TW=5,698.47' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 37.33 cfs @ 11.88 fps)
└**1=Orifice/Grate** (Passes 37.33 cfs of 79.69 cfs potential flow)

Secondary OutFlow Max=31.23 cfs @ 11.99 hrs HW=5,706.03' TW=0.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 31.23 cfs @ 2.00 fps)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

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[57] Hint: Peaked at 5,706.03' (Flood elevation advised)
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=614)

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth > 2.50" for 100yr-24hr event
Inflow = 1.19 cfs @ 11.96 hrs, Volume= 0.063 af
Outflow = 1.68 cfs @ 11.99 hrs, Volume= 0.062 af, Atten= 0%, Lag= 2.0 min
Primary = 0.05 cfs @ 11.92 hrs, Volume= 0.003 af
Routed to Pond P200 :
Secondary = 1.66 cfs @ 11.99 hrs, Volume= 0.060 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,706.03' @ 11.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 11.92 hrs HW=5,705.94' TW=5,705.97' (Dynamic Tailwater)
2=Culvert (Controls 0.00 cfs)
1=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.99 hrs HW=5,706.02' TW=5,706.03' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P310:

[57] Hint: Peaked at 5,746.40' (Flood elevation advised)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.35" for 100yr-24hr event
Inflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Outflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af, Atten= 0%, Lag= 0.0 min
Primary = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Routed to Reach S110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.40' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.66 cfs @ 12.02 hrs HW=5,746.40' TW=5,715.43' (Dynamic Tailwater)
└**2=Culvert** (Passes 14.66 cfs of 98.27 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 14.66 cfs @ 2.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' TW=5,715.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,749.84' (Flood elevation advised)

Inflow Area = 122.857 ac, 4.74% Impervious, Inflow Depth > 0.51" for 100yr-24hr event
Inflow = 21.07 cfs @ 12.02 hrs, Volume= 5.198 af
Outflow = 21.07 cfs @ 12.02 hrs, Volume= 5.198 af, Atten= 0%, Lag= 0.0 min
Primary = 21.07 cfs @ 12.02 hrs, Volume= 5.198 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.84' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=21.05 cfs @ 12.02 hrs HW=5,749.84' TW=5,716.28' (Dynamic Tailwater)
└**2=Culvert** (Passes 21.05 cfs of 78.67 cfs potential flow)
└**1=Culvert** (Inlet Controls 21.05 cfs @ 4.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' TW=5,715.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage
[93] Warning: Storage range exceeded by 0.47'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 122.505 ac, 4.67% Impervious, Inflow Depth > 0.56" for 100yr-24hr event
Inflow = 50.11 cfs @ 12.03 hrs, Volume= 5.708 af
Outflow = 50.34 cfs @ 12.04 hrs, Volume= 5.708 af, Atten= 0%, Lag= 0.3 min
Primary = 20.84 cfs @ 12.04 hrs, Volume= 5.182 af
Routed to Pond P320 :
Secondary = 29.50 cfs @ 12.04 hrs, Volume= 0.526 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,775.47' @ 12.04 hrs Surf.Area= 283 sf Storage= 195 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (894.7 - 894.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	195 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	6	0	0
5,774.00	50	28	28
5,775.00	283	167	195

Device	Routing	Invert	Outlet Devices
#1	Primary	5,772.57'	**24.0" Round Culvert** L= 43.6' Ke= 0.500 Inlet / Outlet Invert= 5,772.57' / 5,767.34' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=20.83 cfs @ 12.04 hrs HW=5,775.47' TW=5,749.84' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 20.83 cfs @ 6.63 fps)

Secondary OutFlow Max=29.36 cfs @ 12.04 hrs HW=5,775.47' TW=5,716.28' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 29.36 cfs @ 2.55 fps)

Summary for Pond P340:

Information from SGM 2022 Survey

Inflow Area = 122.220 ac, 4.65% Impervious, Inflow Depth > 0.56" for 100yr-24hr event
Inflow = 50.35 cfs @ 12.02 hrs, Volume= 5.702 af
Outflow = 50.01 cfs @ 12.03 hrs, Volume= 5.701 af, Atten= 1%, Lag= 0.6 min
Primary = 50.01 cfs @ 12.03 hrs, Volume= 5.701 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P310 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,785.70' @ 12.03 hrs Surf.Area= 439 sf Storage= 675 cf

Plug-Flow detention time= 0.2 min calculated for 5.701 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (894.7 - 894.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,781.00'	1,480 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,781.00	0	0	0
5,782.00	17	9	9
5,783.00	74	46	54
5,784.00	175	125	179
5,785.00	299	237	416
5,786.00	499	399	815
5,787.00	832	666	1,480

Device	Routing	Invert	Outlet Devices
#1	Primary	5,781.92'	**36.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,781.92' / 5,781.38' S= 0.0098 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

#2	Secondary	5,786.00'	**25.0' long + 7.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=49.96 cfs @ 12.03 hrs HW=5,785.70' TW=5,775.46' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 49.96 cfs @ 7.23 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,781.00' TW=5,736.56' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
NOTE: the spill location goes to basin 600. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side. Pipe is currently filled with sediment, but is modeled assuming the pipe is not clogged.

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=475)
[80] Warning: Exceeded Pond P900 by 2.26' @ 12.41 hrs (48.40 cfs 2.469 af)

Inflow Area = 57.137 ac, 0.38% Impervious, Inflow Depth > 0.61" for 100yr-24hr event
Inflow = 44.23 cfs @ 12.06 hrs, Volume= 2.891 af
Outflow = 9.57 cfs @ 12.42 hrs, Volume= 2.892 af, Atten= 78%, Lag= 21.8 min
Primary = 9.57 cfs @ 12.42 hrs, Volume= 2.892 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,872.50' @ 12.42 hrs Surf.Area= 11,603 sf Storage= 30,005 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 20.4 min (905.2 - 884.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	122,672 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,868.00	36	0	0
5,869.00	188	112	112
5,870.00	5,913	3,051	3,163
5,871.00	12,990	9,452	12,614
5,872.00	10,652	11,821	24,435
5,873.00	12,551	11,602	36,037
5,874.00	14,430	13,491	49,527
5,875.00	16,332	15,381	64,908
5,876.00	18,262	17,297	82,205
5,877.00	20,237	19,250	101,455
5,878.00	22,198	21,218	122,672

Device	Routing	Invert	Outlet Devices
#1	Primary	5,866.85'	**15.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.57 cfs @ 12.42 hrs HW=5,872.50' TW=5,783.71' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 9.57 cfs @ 7.80 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth > 1.94" for 100yr-24hr event
Inflow = 13.61 cfs @ 11.96 hrs, Volume= 0.649 af
Outflow = 13.32 cfs @ 11.97 hrs, Volume= 0.568 af, Atten= 2%, Lag= 0.9 min
Primary = 13.32 cfs @ 11.97 hrs, Volume= 0.568 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.65' @ 11.97 hrs Surf.Area= 1,803 sf Storage= 4,545 cf

Plug-Flow detention time= 90.0 min calculated for 0.568 af (88% of inflow)
Center-of-Mass det. time= 30.7 min (824.6 - 793.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=13.29 cfs @ 11.97 hrs HW=5,736.64' TW=5,706.03' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 13.29 cfs of 19.65 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 13.29 cfs @ 2.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' TW=5,705.70' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

[57] Hint: Peaked at 5,750.74' (Flood elevation advised)

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth > 1.74" for 100yr-24hr event
Inflow = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af
Outflow = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min
Primary = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.92 cfs @ 11.96 hrs HW=5,750.74' TW=5,736.64' (Dynamic Tailwater)
└**2=Culvert** (Passes 3.92 cfs of 15.20 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 3.92 cfs @ 1.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' TW=5,705.70' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

[57] Hint: Peaked at 5,740.74' (Flood elevation advised)

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth > 2.09" for 100yr-24hr event
Inflow = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af
Outflow = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.0 min
Primary = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=9.67 cfs @ 11.96 hrs HW=5,740.74' TW=5,736.64' (Dynamic Tailwater)
└**2=Culvert** (Passes 9.67 cfs of 12.14 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.67 cfs @ 2.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' TW=5,705.70' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

[57] Hint: Peaked at 5,707.89' (Flood elevation advised)

Inflow Area = 62.238 ac, 13.43% Impervious, Inflow Depth > 0.38" for 100yr-24hr event
Inflow = 27.25 cfs @ 12.00 hrs, Volume= 1.982 af
Outflow = 27.25 cfs @ 12.00 hrs, Volume= 1.982 af, Atten= 0%, Lag= 0.0 min
Primary = 27.25 cfs @ 12.00 hrs, Volume= 1.982 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,707.89' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=27.20 cfs @ 12.00 hrs HW=5,707.88' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 27.20 cfs @ 4.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P510:

[57] Hint: Peaked at 5,735.88' (Flood elevation advised)

Inflow Area = 61.979 ac, 13.38% Impervious, Inflow Depth > 0.38" for 100yr-24hr event
Inflow = 27.05 cfs @ 12.00 hrs, Volume= 1.971 af
Outflow = 27.05 cfs @ 12.00 hrs, Volume= 1.971 af, Atten= 0%, Lag= 0.0 min
Primary = 27.05 cfs @ 12.00 hrs, Volume= 1.971 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,735.88' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=27.00 cfs @ 12.00 hrs HW=5,735.88' TW=5,707.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 27.00 cfs @ 4.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

[62] Hint: Exceeded Reach S600 OUTLET depth by 1.24' @ 12.01 hrs

Inflow Area = 21.566 ac, 27.24% Impervious, Inflow Depth > 0.62" for 100yr-24hr event
Inflow = 19.05 cfs @ 12.01 hrs, Volume= 1.114 af
Outflow = 19.05 cfs @ 12.01 hrs, Volume= 1.114 af, Atten= 0%, Lag= 0.0 min
Primary = 14.85 cfs @ 12.01 hrs, Volume= 1.094 af
Routed to Pond P510 :
Secondary = 4.21 cfs @ 12.01 hrs, Volume= 0.020 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,756.07' @ 12.01 hrs
Flood Elev= 5,756.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	5,755.50'	**Asymmetrical Weir, C= 2.70** Offset (feet) -6.00 -3.50 0.00 6.00 26.00 Elev. (feet) 5,757.00 5,756.00 5,755.50 5,756.20 5,757.00

Primary OutFlow Max=14.84 cfs @ 12.01 hrs HW=5,756.07' TW=5,735.87' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 14.84 cfs @ 8.40 fps)
↑—**2=Orifice/Grate** (Passes 14.84 cfs of 41.58 cfs potential flow)

Secondary OutFlow Max=4.15 cfs @ 12.01 hrs HW=5,756.07' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Asymmetrical Weir** (Weir Controls 4.15 cfs @ 0.86 fps)

Summary for Pond P610-inlet:

Information from SGM 2022 Survey

Inflow Area = 0.231 ac, 3.03% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af
Outflow = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.56' @ 12.00 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Secondary	5,766.80'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 12.00 hrs HW=5,765.56' TW=5,763.02' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.54' TW=5,761.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610-pipe:

Information from SGM 2022 Survey

Inflow Area = 7.139 ac, 46.44% Impervious, Inflow Depth > 1.05" for 100yr-24hr event
Inflow = 12.14 cfs @ 11.99 hrs, Volume= 0.627 af
Outflow = 12.14 cfs @ 11.99 hrs, Volume= 0.627 af, Atten= 0%, Lag= 0.0 min
Primary = 12.14 cfs @ 11.99 hrs, Volume= 0.627 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,763.03' @ 12.00 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.27'	**24.0" Round Culvert** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 5,761.27' / 5,759.70' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.03 cfs @ 11.99 hrs HW=5,763.02' TW=5,761.82' (Dynamic Tailwater)
1=Culvert (Outlet Controls 12.03 cfs @ 5.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.27' TW=5,761.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 6.908 ac, 47.89% Impervious, Inflow Depth > 1.08" for 100yr-24hr event
Inflow = 12.13 cfs @ 11.99 hrs, Volume= 0.623 af
Outflow = 12.10 cfs @ 11.99 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.3 min
Primary = 12.10 cfs @ 11.99 hrs, Volume= 0.623 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610-pipe :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.91' @ 11.99 hrs Surf.Area= 195 sf Storage= 123 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (839.2 - 839.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	1,713 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,765.00	76	0	0
5,766.00	207	142	142
5,767.00	343	275	417
5,768.00	609	476	893
5,769.00	1,031	820	1,713

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.26'	**24.0" Round Culvert** L= 126.3' Ke= 0.500 Inlet / Outlet Invert= 5,764.26' / 5,761.27' S= 0.0237 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=12.08 cfs @ 11.99 hrs HW=5,765.91' TW=5,763.02' (Dynamic Tailwater)
1=Culvert (Inlet Controls 12.08 cfs @ 4.37 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' TW=5,761.27' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM 2022 Survey

[57] Hint: Peaked at 5,771.38' (Flood elevation advised)

Inflow Area = 0.757 ac, 16.25% Impervious, Inflow Depth > 0.36" for 100yr-24hr event
Inflow = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af
Outflow = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 11.99 hrs, Volume= 0.008 af
Routed to Pond P620 :
Secondary = 0.27 cfs @ 11.99 hrs, Volume= 0.015 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.38' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,767.94'	**12.0" Round Culvert** L= 71.5' Ke= 0.500 Inlet / Outlet Invert= 5,767.94' / 5,767.20' S= 0.0103 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,771.33'	**10.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#3	Device 1	5,771.33'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=0.13 cfs @ 11.99 hrs HW=5,771.38' TW=5,765.90' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.13 cfs of 5.81 cfs potential flow)
↑—**3=Orifice/Grate** (Weir Controls 0.13 cfs @ 0.43 fps)

Secondary OutFlow Max=0.26 cfs @ 11.99 hrs HW=5,771.38' TW=5,761.81' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.26 cfs @ 0.49 fps)

Summary for Pond P640:

Information from SGM 2022 Survey
Yes, survey data confirmed that the pipe is back pitched.

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[44] Hint: Outlet device #4 is below defined storage
[92] Warning: Device #3 is above defined storage

Inflow Area = 6.073 ac, 52.45% Impervious, Inflow Depth > 1.21" for 100yr-24hr event
Inflow = 12.03 cfs @ 11.98 hrs, Volume= 0.614 af
Outflow = 11.99 cfs @ 11.99 hrs, Volume= 0.614 af, Atten= 0%, Lag= 0.3 min
Primary = 0.93 cfs @ 11.99 hrs, Volume= 0.478 af
Routed to Pond P620 :
Secondary = 11.06 cfs @ 11.99 hrs, Volume= 0.137 af
Routed to Pond P620 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,773.84' @ 11.99 hrs Surf.Area= 1,141 sf Storage= 2,666 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.2 min (837.9 - 821.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	2,853 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,769.00	41	0	0
5,770.00	248	145	145
5,771.00	459	354	498
5,772.00	656	558	1,056
5,773.00	873	765	1,820
5,774.00	1,192	1,033	2,853

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.50'	**24.0" Round Culvert** L= 59.7' Ke= 0.500
			Inlet / Outlet Invert= 5,763.42' / 5,764.50' S= -0.0181 '/' Cc= 0.900
			n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,773.50'	**20.0' long + 10.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**

			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,774.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.78'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.93 cfs @ 11.99 hrs HW=5,773.84' TW=5,765.90' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.93 cfs of 42.62 cfs potential flow)
↑**3=Orifice/Grate** (Controls 0.00 cfs)
4=Orifice/Grate (Orifice Controls 0.93 cfs @ 10.65 fps)

Secondary OutFlow Max=11.04 cfs @ 11.99 hrs HW=5,773.84' TW=5,765.90' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 11.04 cfs @ 1.39 fps)

Summary for Pond P650:

Information from SGM 2022 Survey

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[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 5.967 ac, 53.38% Impervious, Inflow Depth > 1.23" for 100yr-24hr event
Inflow = 12.29 cfs @ 11.97 hrs, Volume= 0.613 af
Outflow = 12.01 cfs @ 11.98 hrs, Volume= 0.613 af, Atten= 2%, Lag= 0.9 min
Primary = 12.01 cfs @ 11.98 hrs, Volume= 0.613 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.63' @ 11.98 hrs Surf.Area= 1,486 sf Storage= 3,401 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 15.3 min (821.3 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	6,281 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	79	0	0
5,774.00	334	207	207
5,775.00	638	486	693
5,776.00	916	777	1,470
5,777.00	1,238	1,077	2,547
5,778.00	1,634	1,436	3,983
5,779.00	2,962	2,298	6,281

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.52'	**24.0" Round Culvert** L= 70.6' Ke= 0.500 Inlet / Outlet Invert= 5,769.52' / 5,768.38' S= 0.0161 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,776.96'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,772.75'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.00 cfs @ 11.98 hrs HW=5,777.63' TW=5,773.84' (Dynamic Tailwater)
└─**1=Culvert** (Passes 12.00 cfs of 29.44 cfs potential flow)
  ├─**3=Orifice/Grate** (Weir Controls 11.18 cfs @ 2.67 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.82 cfs @ 9.37 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,773.00' TW=5,761.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=592)

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth > 2.18" for 100yr-24hr event
Inflow = 5.70 cfs @ 11.96 hrs, Volume= 0.279 af
Outflow = 5.65 cfs @ 11.97 hrs, Volume= 0.279 af, Atten= 1%, Lag= 0.5 min
Primary = 5.65 cfs @ 11.97 hrs, Volume= 0.279 af
  Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.07' @ 11.97 hrs Surf.Area= 247 sf Storage= 17 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (781.2 - 781.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	2,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,779.00	234	0	0
5,780.00	414	324	324
5,781.00	633	524	848
5,782.00	968	801	1,648
5,783.00	1,540	1,254	2,902

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.87'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.87' / 5,773.00' S= 0.0628 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.64 cfs @ 11.97 hrs HW=5,779.07' TW=5,777.62' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.64 cfs @ 3.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 4.319 ac, 41.31% Impervious, Inflow Depth > 0.92" for 100yr-24hr event
Inflow = 6.63 cfs @ 11.97 hrs, Volume= 0.332 af
Outflow = 6.63 cfs @ 11.97 hrs, Volume= 0.332 af, Atten= 0%, Lag= 0.0 min
Primary = 6.63 cfs @ 11.97 hrs, Volume= 0.332 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,797.00' @ 0.00 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	5,797.00'	0.061 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,797.00	0.005	0.000	0.000
5,798.00	0.024	0.014	0.014
5,799.00	0.068	0.046	0.061

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,790.62'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,790.62' / 5,777.57' S= 0.2534 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 11.97 hrs HW=5,797.00' TW=5,777.62' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.00 cfs of 36.55 cfs potential flow)
↑—**3=Culvert** (Passes 0.00 cfs of 20.19 cfs potential flow)
↑—**4=Orifice/Grate** (Passes 0.00 cfs of 37.19 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,797.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.330 ac, 12.66% Impervious, Inflow Depth > 0.44" for 100yr-24hr event
Inflow = 6.39 cfs @ 12.00 hrs, Volume= 0.157 af
Outflow = 6.39 cfs @ 12.00 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 6.39 cfs @ 12.00 hrs, Volume= 0.157 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.00' @ 12.01 hrs Surf.Area= 587 sf Storage= 0 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (875.2 - 875.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.32 cfs @ 12.00 hrs HW=5,752.00' TW=5,735.87' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 13.32 cfs @ 7.54 fps)
↑—**1=Orifice/Grate** (Passes 13.32 cfs of 36.54 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' TW=5,734.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

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[57] Hint: Peaked at 5,758.47' (Flood elevation advised)

Inflow Area = 3.271 ac, 1.41% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af
Outflow = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,758.47' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.67 cfs @ 12.00 hrs HW=5,758.47' TW=5,752.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.67 cfs @ 2.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' TW=5,752.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 3.94% Impervious, Inflow Depth > 0.23" for 100yr-24hr event
Inflow = 3.99 cfs @ 12.00 hrs, Volume= 0.610 af
Outflow = 3.99 cfs @ 12.00 hrs, Volume= 0.610 af, Atten= 0%, Lag= 0.0 min
Primary = 3.99 cfs @ 12.00 hrs, Volume= 0.610 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,748.04' @ 12.00 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.98 cfs @ 12.00 hrs HW=5,748.04' TW=5,735.87' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 3.98 cfs @ 2.81 fps)
└**1=Orifice/Grate** (Passes 3.98 cfs of 71.49 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' TW=5,752.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P810:

[57] Hint: Peaked at 5,761.51' (Flood elevation advised)

Inflow Area = 31.566 ac, 2.88% Impervious, Inflow Depth > 0.21" for 100yr-24hr event
Inflow = 2.88 cfs @ 12.01 hrs, Volume= 0.554 af
Outflow = 2.88 cfs @ 12.01 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min
Primary = 2.88 cfs @ 12.01 hrs, Volume= 0.554 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,761.51' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.88 cfs @ 12.01 hrs HW=5,761.51' TW=5,748.04' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 2.88 cfs @ 2.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' TW=5,758.10' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P820:

[57] Hint: Peaked at 5,812.13' (Flood elevation advised)

Inflow Area = 23.436 ac, 1.05% Impervious, Inflow Depth > 0.19" for 100yr-24hr event
Inflow = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af
Outflow = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af, Atten= 0%, Lag= 0.0 min
Primary = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af
Routed to Pond P810 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.13' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.86 cfs @ 12.18 hrs HW=5,812.13' TW=5,761.47' (Dynamic Tailwater)
↑└**2=Culvert** (Passes 1.86 cfs of 107.00 cfs potential flow)
↑└**1=Orifice/Grate** (Weir Controls 1.86 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' TW=5,761.00' (Dynamic Tailwater)
↑└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P900:

JR Harris & Company Plans 2014 show a pipe on the east side of debris catch basin, but what was built compared to the plans differs from aerial imagery. Based on the pond grading with a low area to the east, it was assumed that there is an existing 12 inch pipe here. The pipe is likely buried which is why it was not picked up by survey. All pipe parameters are assumed. Pipe is assumed to not be clogged even if it likely is clogged.

Inflow Area = 6.007 ac, 2.43% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 1.23 cfs @ 12.00 hrs, Volume= 0.108 af
Outflow = 0.25 cfs @ 12.53 hrs, Volume= 0.101 af, Atten= 80%, Lag= 31.6 min
Primary = 0.25 cfs @ 12.53 hrs, Volume= 0.101 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P360 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.24' @ 12.53 hrs Surf.Area= 3,201 sf Storage= 687 cf

Plug-Flow detention time= 62.8 min calculated for 0.101 af (94% of inflow)
Center-of-Mass det. time= 33.3 min (986.4 - 953.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,870.00'	98,375 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,870.00	2,448	0	0
5,871.00	5,544	3,996	3,996
5,872.00	9,422	7,483	11,479
5,873.00	11,136	10,279	21,758
5,874.00	12,759	11,948	33,706
5,875.00	14,397	13,578	47,284
5,876.00	16,056	15,227	62,510
5,877.00	17,865	16,961	79,471
5,878.00	19,943	18,904	98,375

Device	Routing	Invert	Outlet Devices
#1	Primary	5,870.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 5,870.00' / 5,869.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,871.50'	**12.0' long + 8.0 '/' SideZ x 100.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.25 cfs @ 12.53 hrs HW=5,870.24' TW=5,761.37' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.25 cfs @ 1.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,870.00' TW=5,868.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link S300D:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 51.30 cfs.

43.43 cfs remains in ditch
7.87 cfs spills to watershed 400

Inflow = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af
Primary = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af, Atten= 0%, Lag= 0.0 min
Routed to Pond P200 :

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
43.43 43.43

Summary for Link S300S:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 51.30 cfs.

43.43 cfs remains in ditch
7.87 cfs spills to watershed 400

Inflow = 7.87 cfs @ 0.00 hrs, Volume= 15.616 af
Primary = 7.87 cfs @ 0.00 hrs, Volume= 15.616 af, Atten= 0%, Lag= 0.0 min
Routed to Pond P110 :

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
7.87 7.87

Appendix C

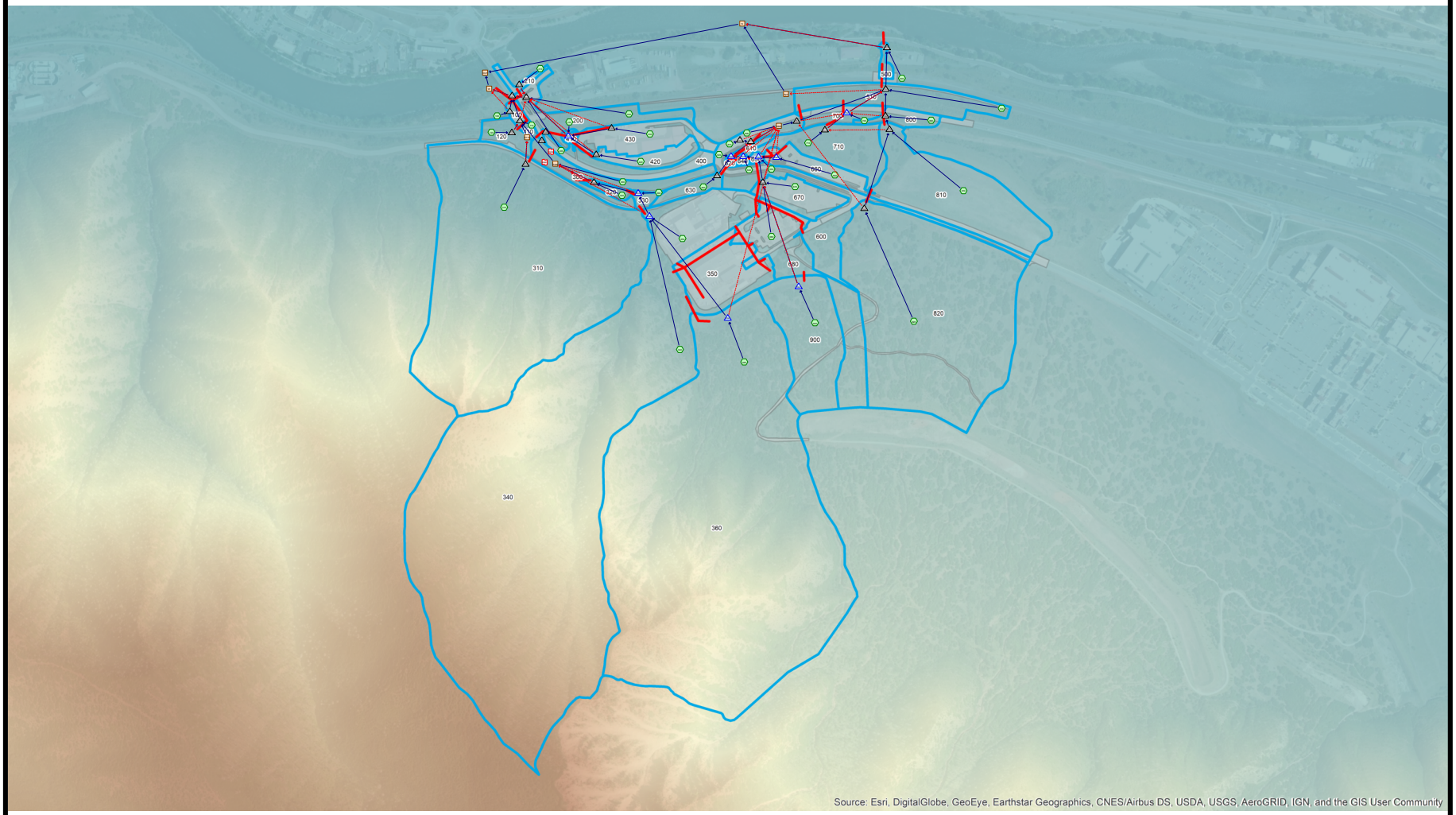
Proposed Conditions HydroCAD Data – RFTA Development Only

Proposed – RFTA Development Only - HydroCAD Routing Diagram 25-Year Event

Proposed – RFTA Development Only - HydroCAD Data 25-Year Event

Proposed – RFTA Development Only - HydroCAD Routing Diagram 100-Year Event

Proposed – RFTA Development Only - HydroCAD Data 100-Year Event



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Proposed1-RFTA-Dev
Prepared by SGM, Printed 4/6/2022 **25 Year**
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth>0.62"
Tc=5.0 min CN=79 Runoff=0.31 cfs 0.014 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth>0.14"
Tc=5.0 min CN=63 Runoff=0.02 cfs 0.002 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.13 cfs 0.013 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=1.12 cfs 0.065 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth>1.93"
Tc=5.0 min CN=98 Runoff=0.94 cfs 0.048 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth>0.18"
Tc=5.0 min CN=65 Runoff=0.42 cfs 0.034 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth>0.16"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=3.76 cfs 0.443 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=0.14 cfs 0.008 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth>0.14"
Tc=5.0 min CN=63 Runoff=0.03 cfs 0.003 af

Subcatchment340: Runoff Area=61.159 ac 5.21% Impervious Runoff Depth>0.23"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=13.08 cfs 1.147 af

Subcatchment350: Runoff Area=3.950 ac 83.77% Impervious Runoff Depth>1.38"
Tc=5.0 min CN=92 Runoff=9.85 cfs 0.454 af

Subcatchment360: Runoff Area=57.137 ac 0.38% Impervious Runoff Depth>0.33"
Flow Length=3,685' Tc=12.3 min CN=71 Runoff=20.54 cfs 1.573 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth>0.71"
Tc=5.0 min CN=81 Runoff=2.54 cfs 0.114 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth>1.23"
Tc=5.0 min CN=90 Runoff=2.82 cfs 0.128 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth>1.54"
Tc=5.0 min CN=94 Runoff=7.31 cfs 0.345 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth>0.25"
Tc=5.0 min CN=68 Runoff=0.09 cfs 0.005 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.52 cfs 0.050 af

Subcatchment600: Runoff Area=5.143 ac 45.52% Impervious Runoff Depth>0.50"
Tc=5.0 min CN=76 Runoff=4.54 cfs 0.213 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.001 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.745 ac 15.03% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.10 cfs 0.010 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.001 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.001 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth>1.63"
Tc=5.0 min CN=95 Runoff=4.35 cfs 0.209 af

Subcatchment670: Runoff Area=1.879 ac 75.57% Impervious Runoff Depth>1.09"
Tc=5.0 min CN=88 Runoff=3.81 cfs 0.171 af

Subcatchment680: Runoff Area=5.705 ac 34.51% Impervious Runoff Depth>0.36"
Tc=5.0 min CN=72 Runoff=3.36 cfs 0.172 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth>0.54"
Tc=5.0 min CN=77 Runoff=1.02 cfs 0.047 af

Subcatchment710: Runoff Area=3.271 ac 1.41% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=59 Runoff=0.04 cfs 0.021 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth>0.50"
Tc=5.0 min CN=76 Runoff=0.71 cfs 0.034 af

Subcatchment810: Runoff Area=8.130 ac 8.15% Impervious Runoff Depth>0.11"
Tc=5.0 min CN=61 Runoff=0.32 cfs 0.072 af

Subcatchment820: Runoff Area=23.436 ac 1.05% Impervious Runoff Depth>0.06"
Flow Length=1,968' Tc=16.1 min CN=58 Runoff=0.18 cfs 0.122 af

Subcatchment900: Runoff Area=6.007 ac 2.43% Impervious Runoff Depth>0.08"
Flow Length=3,685' Tc=12.3 min CN=59 Runoff=0.07 cfs 0.038 af

Reach N: Inflow=14.94 cfs 1.162 af
Outflow=14.94 cfs 1.162 af

Reach OUT: Inflow=55.98 cfs 5.473 af
Outflow=55.98 cfs 5.473 af

Reach S110: Avg. Flow Depth=0.61' Max Vel=6.48 fps Inflow=29.74 cfs 3.662 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=29.71 cfs 3.661 af

Reach S300: Avg. Flow Depth=0.99' Max Vel=7.58 fps Inflow=26.07 cfs 3.220 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=43.43 cfs Outflow=26.06 cfs 3.219 af

Reach S600: Avg. Flow Depth=0.72' Max Vel=3.67 fps Inflow=14.50 cfs 0.811 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=301.54 cfs Outflow=12.88 cfs 0.810 af

Reach Spill: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach W: Inflow=41.36 cfs 4.311 af
Outflow=41.36 cfs 4.311 af

Pond P-OUT: Peak Elev=5,698.01' Inflow=41.31 cfs 4.308 af
Primary=41.31 cfs 4.308 af Secondary=0.00 cfs 0.000 af Outflow=41.31 cfs 4.308 af

Pond P100: Peak Elev=5,702.77' Inflow=0.31 cfs 0.014 af
Primary=0.25 cfs 0.011 af Secondary=0.06 cfs 0.003 af Outflow=0.31 cfs 0.014 af

Pond P110: Peak Elev=5,708.25' Inflow=29.84 cfs 3.676 af
Primary=23.21 cfs 3.016 af Secondary=6.64 cfs 0.660 af Outflow=29.84 cfs 3.676 af

Pond P120: Peak Elev=5,724.76' Inflow=0.13 cfs 0.013 af
Primary=0.13 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.013 af

Pond P200: Peak Elev=5,703.28' Inflow=19.59 cfs 1.281 af
Primary=19.59 cfs 1.281 af Secondary=0.00 cfs 0.000 af Outflow=19.59 cfs 1.281 af

Pond P210: Peak Elev=5,704.13' Inflow=0.94 cfs 0.048 af
Primary=0.94 cfs 0.048 af Secondary=0.00 cfs 0.000 af Outflow=0.94 cfs 0.048 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.16' Inflow=3.76 cfs 0.443 af
Primary=3.76 cfs 0.443 af Secondary=0.00 cfs 0.000 af Outflow=3.76 cfs 0.443 af

Pond P320: Peak Elev=5,749.67' Inflow=17.81 cfs 3.094 af
Primary=17.81 cfs 3.094 af Secondary=0.00 cfs 0.000 af Outflow=17.81 cfs 3.094 af

Pond P330: Peak Elev=5,774.94' Storage=126 cf Inflow=25.59 cfs 3.178 af
Primary=17.70 cfs 3.086 af Secondary=7.89 cfs 0.092 af Outflow=25.59 cfs 3.178 af

Pond P340: Peak Elev=5,784.16' Storage=208 cf Inflow=25.58 cfs 3.175 af
Primary=25.56 cfs 3.175 af Secondary=0.00 cfs 0.000 af Outflow=25.56 cfs 3.175 af

Pond P360: Peak Elev=5,871.11' Storage=8,096 cf Inflow=20.54 cfs 1.573 af
Primary=8.21 cfs 1.573 af Secondary=0.00 cfs 0.000 af Outflow=8.21 cfs 1.573 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.53' Storage=4,337 cf Inflow=10.13 cfs 0.474 af
Primary=9.87 cfs 0.394 af Secondary=0.00 cfs 0.000 af Outflow=9.87 cfs 0.394 af

Pond P420: Peak Elev=5,750.70' Inflow=2.82 cfs 0.128 af
Primary=2.82 cfs 0.128 af Secondary=0.00 cfs 0.000 af Outflow=2.82 cfs 0.128 af

Pond P430: Peak Elev=5,740.67' Inflow=7.31 cfs 0.345 af
Primary=7.31 cfs 0.345 af Secondary=0.00 cfs 0.000 af Outflow=7.31 cfs 0.345 af

Pond P500: Peak Elev=5,707.36' Inflow=14.94 cfs 1.162 af
Primary=14.94 cfs 1.162 af Secondary=0.00 cfs 0.000 af Outflow=14.94 cfs 1.162 af

Pond P510: Peak Elev=5,735.36' Inflow=14.87 cfs 1.156 af
Primary=14.87 cfs 1.156 af Secondary=0.00 cfs 0.000 af Outflow=14.87 cfs 1.156 af

Pond P600: Peak Elev=5,755.23' Inflow=12.88 cfs 0.810 af
Primary=12.63 cfs 0.810 af Secondary=0.25 cfs 0.000 af Outflow=12.88 cfs 0.810 af

Pond P610-inlet: Peak Elev=5,765.54' Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P610-pipe: Peak Elev=5,762.86' Inflow=10.67 cfs 0.598 af
Primary=10.67 cfs 0.598 af Secondary=0.00 cfs 0.000 af Outflow=10.67 cfs 0.598 af

Pond P620: Peak Elev=5,765.77' Storage=98 cf Inflow=10.90 cfs 0.597 af
Primary=10.67 cfs 0.597 af Secondary=0.00 cfs 0.000 af Outflow=10.67 cfs 0.597 af

Pond P630: Peak Elev=5,771.37' Inflow=0.10 cfs 0.010 af
Primary=0.10 cfs 0.010 af Secondary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.010 af

Pond P640: Peak Elev=5,773.81' Storage=2,635 cf Inflow=11.03 cfs 0.586 af
Primary=0.93 cfs 0.489 af Secondary=9.87 cfs 0.097 af Outflow=10.80 cfs 0.586 af

Pond P650: Peak Elev=5,777.59' Storage=3,339 cf Inflow=11.42 cfs 0.586 af
Primary=11.03 cfs 0.586 af Secondary=0.00 cfs 0.000 af Outflow=11.03 cfs 0.586 af

Pond P660: Peak Elev=5,779.00' Storage=0 cf Inflow=4.35 cfs 0.209 af
Primary=4.35 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=4.35 cfs 0.209 af

Pond P670: Peak Elev=5,796.49' Inflow=7.12 cfs 0.377 af
Primary=7.12 cfs 0.377 af Secondary=0.00 cfs 0.000 af Outflow=7.12 cfs 0.377 af

Pond P700: Peak Elev=5,752.00' Storage=0 cf Inflow=1.02 cfs 0.069 af
Primary=1.02 cfs 0.069 af Secondary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.069 af

Pond P710: Peak Elev=5,758.19' Inflow=0.04 cfs 0.021 af
Primary=0.04 cfs 0.021 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.021 af

Pond P800: Peak Elev=5,747.68' Inflow=0.90 cfs 0.228 af
Primary=0.90 cfs 0.228 af Secondary=0.00 cfs 0.000 af Outflow=0.90 cfs 0.228 af

Pond P810: Peak Elev=5,761.12' Inflow=0.32 cfs 0.195 af
Primary=0.32 cfs 0.195 af Secondary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.195 af

Pond P820: Peak Elev=5,812.03' Inflow=0.18 cfs 0.122 af
Primary=0.18 cfs 0.122 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.122 af

Pond P900: Peak Elev=5,870.10' Storage=269 cf Inflow=0.07 cfs 0.038 af
Primary=0.05 cfs 0.033 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.033 af

Link S300D: Manual Hydrograph Inflow=43.43 cfs 86.178 af
Primary=43.43 cfs 86.178 af

Link S300S: Manual Hydrograph Inflow=10.19 cfs 20.220 af
Primary=10.19 cfs 20.220 af

Total Runoff Area = 231.061 ac Runoff Volume = 5.561 af Average Runoff Depth = 0.29"
89.81% Pervious = 207.515 ac 10.19% Impervious = 23.546 ac

Summary for Subcatchment 100:

Runoff = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af, Depth> 0.62"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.14"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af, Depth> 0.16"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 1.12 cfs @ 11.99 hrs, Volume= 0.065 af, Depth> 0.28"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af, Depth> 1.93"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.42 cfs @ 12.00 hrs, Volume= 0.034 af, Depth> 0.18"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af, Depth> 0.16"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.14 cfs @ 11.99 hrs, Volume= 0.008 af, Depth> 0.28"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.03 cfs @ 12.01 hrs, Volume= 0.003 af, Depth> 0.14"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 13.08 cfs @ 12.05 hrs, Volume= 1.147 af, Depth> 0.23"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	3.185	98	Impervious
*	0.735	58	A soils
*	37.804	58	B Soils
*	19.435	80	D soils
	61.159	67	Weighted Average
	57.974		94.79% Pervious Area
	3.185		5.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 9.85 cfs @ 11.96 hrs, Volume= 0.454 af, Depth> 1.38"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	3.309	98	Impervious
*	0.462	58	A soils
*	0.008	58	B soils
*	0.171	80	D soils
	3.950	92	Weighted Average
	0.641		16.23% Pervious Area
	3.309		83.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 20.54 cfs @ 12.07 hrs, Volume= 1.573 af, Depth> 0.33"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.216	98	Impervious
*	7.090	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	57.137	71	Weighted Average
	56.921		99.62% Pervious Area
	0.216		0.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 2.54 cfs @ 11.97 hrs, Volume= 0.114 af, Depth> 0.71"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af, Depth> 1.23"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af, Depth> 1.54"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.09 cfs @ 11.99 hrs, Volume= 0.005 af, Depth> 0.25"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.52 cfs @ 12.01 hrs, Volume= 0.050 af, Depth> 0.16"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 4.54 cfs @ 11.97 hrs, Volume= 0.213 af, Depth> 0.50"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.341	98	Impervious
*	2.802	58	A soils
	5.143	76	Weighted Average
	2.802		54.48% Pervious Area
	2.341		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af, Depth> 0.08"
Routed to Pond P610-inlet :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af, Depth> 0.16"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.112	98	Impervious
*	0.633	58	A soils
	0.745	64	Weighted Average
	0.633		84.97% Pervious Area
	0.112		15.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.001 af, Depth> 0.06"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.001 af, Depth> 0.06"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af, Depth> 1.63"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 3.81 cfs @ 11.96 hrs, Volume= 0.171 af, Depth> 1.09"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.420	98	Impervious
*	0.459	58	A soils
	1.879	88	Weighted Average
	0.459		24.43% Pervious Area
	1.420		75.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 3.36 cfs @ 11.98 hrs, Volume= 0.172 af, Depth> 0.36"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.969	98	Impervious
*	3.736	58	A soils
	5.705	72	Weighted Average
	3.736		65.49% Pervious Area
	1.969		34.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 1.02 cfs @ 11.97 hrs, Volume= 0.047 af, Depth> 0.54"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af, Depth> 0.08"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.046	98	Impervious
*	3.225	58	A Soils
	3.271	59	Weighted Average
	3.225		98.59% Pervious Area
	0.046		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.71 cfs @ 11.97 hrs, Volume= 0.034 af, Depth> 0.50"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed area is undevleoped.

Runoff = 0.32 cfs @ 12.03 hrs, Volume= 0.072 af, Depth> 0.11"
Routed to Pond P810 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.663	98	Impervious
*	7.467	58	A Soils
	8.130	61	Weighted Average
	7.467		91.85% Pervious Area
	0.663		8.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed area is undevleoped.

Runoff = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af, Depth> 0.06"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.245	98	Impervious
*	23.191	58	A soils
	23.436	58	Weighted Average
	23.191		98.95% Pervious Area
	0.245		1.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Subcatchment 900:

Runoff = 0.07 cfs @ 12.51 hrs, Volume= 0.038 af, Depth> 0.08"
Routed to Pond P900 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.146	98	Impervious
*	5.861	58	A soils
*	0.000	58	B soils
*	0.000	80	D Soils
	6.007	59	Weighted Average
	5.861		97.57% Pervious Area
	0.146		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Reach N:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 62.214 ac, 15.88% Impervious, Inflow Depth > 0.22" for 25yr-24hr event
Inflow = 14.94 cfs @ 12.03 hrs, Volume= 1.162 af
Outflow = 14.94 cfs @ 12.03 hrs, Volume= 1.162 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 231.061 ac, 10.19% Impervious, Inflow Depth > 0.28" for 25yr-24hr event
Inflow = 55.98 cfs @ 12.02 hrs, Volume= 5.473 af
Outflow = 55.98 cfs @ 12.02 hrs, Volume= 5.473 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S110:

Ditch Parameters from SGM 2015 Survey

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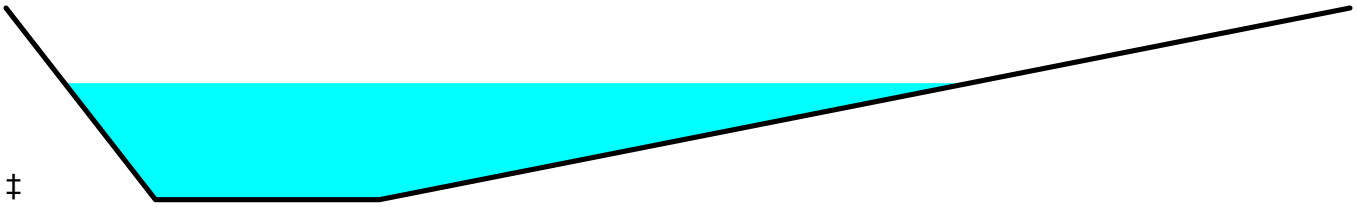
[62] Hint: Exceeded Reach S300 OUTLET depth by 7.00' @ 0.00 hrs

Inflow Area = 158.376 ac, 4.88% Impervious, Inflow Depth > 0.28" for 25yr-24hr event
Inflow = 29.74 cfs @ 12.03 hrs, Volume= 3.662 af
Outflow = 29.71 cfs @ 12.04 hrs, Volume= 3.661 af, Atten= 0%, Lag= 0.2 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.48 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.70 fps, Avg. Travel Time= 0.7 min

Peak Storage= 504 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 12.10'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

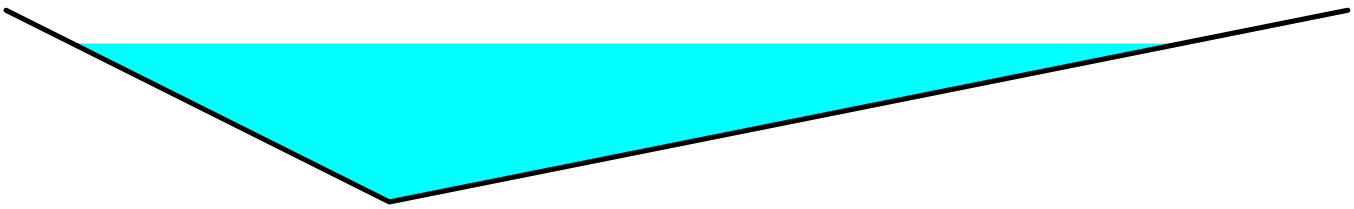
Ditch Parameters from SGM 2015 Survey

Inflow Area = 125.158 ac, 5.79% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 26.07 cfs @ 12.03 hrs, Volume= 3.220 af
Outflow = 26.06 cfs @ 12.03 hrs, Volume= 3.219 af, Atten= 0%, Lag= 0.2 min
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.58 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.49 fps, Avg. Travel Time= 0.5 min

Peak Storage= 378 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.99' , Surface Width= 6.94'
Bank-Full Depth= 1.20' Flow Area= 5.0 sf, Capacity= 43.43 cfs

0.00' x 1.20' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 5.0 '/' Top Width= 8.40'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



Summary for Reach S600:

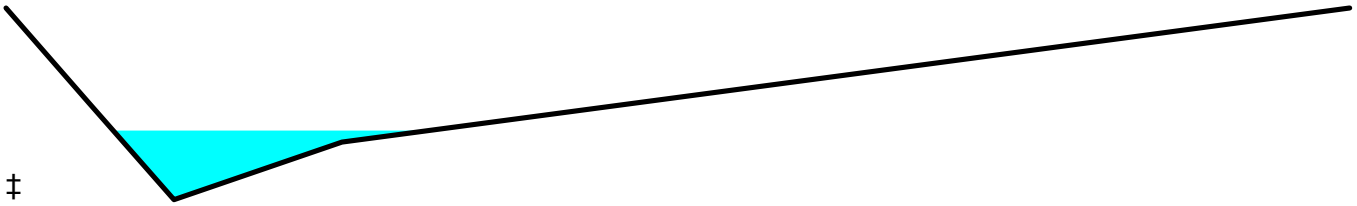
Parameters from 2015 SGM survey

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.45" for 25yr-24hr event
Inflow = 14.50 cfs @ 12.01 hrs, Volume= 0.811 af
Outflow = 12.88 cfs @ 12.03 hrs, Volume= 0.810 af, Atten= 11%, Lag= 1.3 min
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.67 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 3.0 min

Peak Storage= 923 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.72' , Surface Width= 11.31'
Bank-Full Depth= 2.00' Flow Area= 41.4 sf, Capacity= 301.54 cfs

Custom cross-section, Length= 263.0' Slope= 0.0266 '/'
Constant n= 0.030 Short grass
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-6.00	5,761.00	0.00
-3.00	5,760.00	1.00
0.00	5,759.00	2.00
6.00	5,759.60	1.40
42.00	5,761.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Width (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0.0	0	0.00
0.60	2.3	7.9	7.8	615	8.38
1.00	7.8	19.5	19.3	2,040	33.92
2.00	41.4	48.4	48.0	10,888	301.54

Summary for Reach Spill:

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 168.847 ac, 8.09% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 41.36 cfs @ 12.01 hrs, Volume= 4.311 af
Outflow = 41.36 cfs @ 12.01 hrs, Volume= 4.311 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

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[57] Hint: Peaked at 5,698.01' (Flood elevation advised)

Inflow Area = 168.847 ac, 8.09% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 41.31 cfs @ 12.01 hrs, Volume= 4.308 af
Outflow = 41.31 cfs @ 12.01 hrs, Volume= 4.308 af, Atten= 0%, Lag= 0.0 min
Primary = 41.31 cfs @ 12.01 hrs, Volume= 4.308 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,698.01' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,705.05'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=41.26 cfs @ 12.01 hrs HW=5,698.01' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 41.26 cfs @ 7.37 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

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[57] Hint: Peaked at 5,702.77' (Flood elevation advised)

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth > 0.62" for 25yr-24hr event
Inflow = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af
Outflow = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 11.97 hrs, Volume= 0.011 af
Routed to Pond P-OUT :
Secondary = 0.06 cfs @ 11.97 hrs, Volume= 0.003 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.77' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.25 cfs @ 11.97 hrs HW=5,702.77' TW=5,697.83' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 0.25 cfs of 27.02 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.25 cfs @ 0.57 fps)

Secondary OutFlow Max=0.06 cfs @ 11.97 hrs HW=5,702.77' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.41 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

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[57] Hint: Peaked at 5,708.25' (Flood elevation advised)
[61] Hint: Exceeded Reach S110 outlet invert by 0.25' @ 12.04 hrs

Inflow Area = 159.494 ac, 4.95% Impervious, Inflow Depth > 0.28" for 25yr-24hr event
Inflow = 29.84 cfs @ 12.04 hrs, Volume= 3.676 af
Outflow = 29.84 cfs @ 12.04 hrs, Volume= 3.676 af, Atten= 0%, Lag= 0.0 min
Primary = 23.21 cfs @ 12.04 hrs, Volume= 3.016 af
Routed to Pond P-OUT :
Secondary = 6.64 cfs @ 12.04 hrs, Volume= 0.660 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.25' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 16.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=23.17 cfs @ 12.04 hrs HW=5,708.25' TW=5,697.95' (Dynamic Tailwater)
└─**3=Culvert** (Passes 23.17 cfs of 135.99 cfs potential flow)
└─**2=Culvert** (Passes 23.17 cfs of 80.19 cfs potential flow)
└─**1=Orifice/Grate** (Weir Controls 23.17 cfs @ 1.94 fps)

Secondary OutFlow Max=6.63 cfs @ 12.04 hrs HW=5,708.25' TW=5,703.21' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 6.63 cfs @ 1.38 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

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[57] Hint: Peaked at 5,724.76' (Flood elevation advised)

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af
Outflow = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.76' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.13 cfs @ 12.01 hrs HW=5,724.76' TW=5,708.24' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.13 cfs of 132.94 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.13 cfs @ 0.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' TW=5,701.20' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

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[57] Hint: Peaked at 5,703.28' (Flood elevation advised)

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth > 1.69" for 25yr-24hr event
Inflow = 19.59 cfs @ 11.99 hrs, Volume= 1.281 af
Outflow = 19.59 cfs @ 11.99 hrs, Volume= 1.281 af, Atten= 0%, Lag= 0.0 min
Primary = 19.59 cfs @ 11.99 hrs, Volume= 1.281 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.28' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=19.57 cfs @ 11.99 hrs HW=5,703.28' TW=5,697.95' (Dynamic Tailwater)
└**2=Culvert** (Passes 19.57 cfs of 27.64 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 19.57 cfs @ 2.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' TW=5,695.57' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

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[57] Hint: Peaked at 5,704.13' (Flood elevation advised)

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth > 1.93" for 25yr-24hr event
Inflow = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af
Outflow = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,704.13' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.93 cfs @ 11.96 hrs HW=5,704.13' TW=5,703.24' (Dynamic Tailwater)
2=Culvert (Passes 0.93 cfs of 14.28 cfs potential flow)
1=Orifice/Grate (Orifice Controls 0.93 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' TW=5,698.94' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P310:

[57] Hint: Peaked at 5,746.16' (Flood elevation advised)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Outflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af, Atten= 0%, Lag= 0.0 min
Primary = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Routed to Reach S110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.16' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.75 cfs @ 12.04 hrs HW=5,746.16' TW=5,715.61' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 3.75 cfs of 96.86 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 3.75 cfs @ 1.31 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' TW=5,715.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,749.67' (Flood elevation advised)

Inflow Area = 122.883 ac, 5.57% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 17.81 cfs @ 12.03 hrs, Volume= 3.094 af
Outflow = 17.81 cfs @ 12.03 hrs, Volume= 3.094 af, Atten= 0%, Lag= 0.0 min
Primary = 17.81 cfs @ 12.03 hrs, Volume= 3.094 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.67' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.80 cfs @ 12.03 hrs HW=5,749.67' TW=5,715.99' (Dynamic Tailwater)
↑└**2=Culvert** (Passes 17.80 cfs of 77.39 cfs potential flow)
↑└**1=Culvert** (Inlet Controls 17.80 cfs @ 4.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' TW=5,715.00' (Dynamic Tailwater)
↑└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 122.531 ac, 5.51% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 25.59 cfs @ 12.03 hrs, Volume= 3.178 af
Outflow = 25.59 cfs @ 12.03 hrs, Volume= 3.178 af, Atten= 0%, Lag= 0.1 min
Primary = 17.70 cfs @ 12.03 hrs, Volume= 3.086 af
Routed to Pond P320 :
Secondary = 7.89 cfs @ 12.03 hrs, Volume= 0.092 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,774.94' @ 12.03 hrs Surf.Area= 160 sf Storage= 126 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (905.9 - 905.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	137 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	6	0	0
5,774.00	50	28	28
5,775.00	167	109	137

Device	Routing	Invert	Outlet Devices
#1	Primary	5,772.57'	**24.0" Round Culvert** L= 43.6' Ke= 0.500 Inlet / Outlet Invert= 5,772.57' / 5,767.34' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.69 cfs @ 12.03 hrs HW=5,774.94' TW=5,749.67' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 17.69 cfs @ 5.63 fps)

Secondary OutFlow Max=7.87 cfs @ 12.03 hrs HW=5,774.94' TW=5,715.99' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.87 cfs @ 1.65 fps)

Summary for Pond P340:

Information from SGM 2022 Survey

Inflow Area = 122.246 ac, 5.49% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 25.58 cfs @ 12.02 hrs, Volume= 3.175 af
Outflow = 25.56 cfs @ 12.03 hrs, Volume= 3.175 af, Atten= 0%, Lag= 0.2 min
Primary = 25.56 cfs @ 12.03 hrs, Volume= 3.175 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,784.16' @ 12.03 hrs Surf.Area= 195 sf Storage= 208 cf

Plug-Flow detention time= 0.2 min calculated for 3.173 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (905.8 - 905.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,781.00'	1,480 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,781.00	0	0	0
5,782.00	17	9	9
5,783.00	74	46	54
5,784.00	175	125	179
5,785.00	299	237	416
5,786.00	499	399	815
5,787.00	832	666	1,480

Device	Routing	Invert	Outlet Devices
#1	Primary	5,781.92'	**36.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 5,781.92' / 5,781.38' S= 0.0120 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

#2 Secondary 5,786.00' **25.0' long + 7.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=25.53 cfs @ 12.03 hrs HW=5,784.16' TW=5,774.94' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 25.53 cfs @ 6.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,781.00' TW=5,715.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side. Pipe is currently filled with sediment, but is modeled assuming the pipe is not clogged.

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=549)

Inflow Area = 57.137 ac, 0.38% Impervious, Inflow Depth > 0.33" for 25yr-24hr event
Inflow = 20.54 cfs @ 12.07 hrs, Volume= 1.573 af
Outflow = 8.21 cfs @ 12.26 hrs, Volume= 1.573 af, Atten= 60%, Lag= 11.5 min
Primary = 8.21 cfs @ 12.26 hrs, Volume= 1.573 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,871.11' @ 12.26 hrs Surf.Area= 7,706 sf Storage= 8,096 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (913.0 - 908.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	114,520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,868.00	35	0	0
5,869.00	188	112	112
5,870.00	3,402	1,795	1,907
5,871.00	7,349	5,376	7,282
5,872.00	10,652	9,001	16,283
5,873.00	12,551	11,602	27,884
5,874.00	14,430	13,491	41,375
5,875.00	16,332	15,381	56,756
5,876.00	18,262	17,297	74,053
5,877.00	20,237	19,250	93,302
5,878.00	22,198	21,218	114,520

Device	Routing	Invert	Outlet Devices
#1	Primary	5,866.85'	**15.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.21 cfs @ 12.26 hrs HW=5,871.11' TW=5,783.46' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 8.21 cfs @ 6.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth > 1.42" for 25yr-24hr event
Inflow = 10.13 cfs @ 11.96 hrs, Volume= 0.474 af
Outflow = 9.87 cfs @ 11.97 hrs, Volume= 0.394 af, Atten= 3%, Lag= 0.9 min
Primary = 9.87 cfs @ 11.97 hrs, Volume= 0.394 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.53' @ 11.97 hrs Surf.Area= 1,764 sf Storage= 4,337 cf

Plug-Flow detention time= 108.7 min calculated for 0.394 af (83% of inflow)
Center-of-Mass det. time= 35.3 min (837.6 - 802.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=9.85 cfs @ 11.97 hrs HW=5,736.53' TW=5,703.27' (Dynamic Tailwater)
└**2=Culvert** (Passes 9.85 cfs of 19.44 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.85 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

[57] Hint: Peaked at 5,750.70' (Flood elevation advised)

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth > 1.23" for 25yr-24hr event
Inflow = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af
Outflow = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.70' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.82 cfs @ 11.96 hrs HW=5,750.70' TW=5,736.52' (Dynamic Tailwater)
└**2=Culvert** (Passes 2.82 cfs of 15.09 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.82 cfs @ 1.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

[57] Hint: Peaked at 5,740.67' (Flood elevation advised)

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth > 1.54" for 25yr-24hr event
Inflow = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af
Outflow = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af, Atten= 0%, Lag= 0.0 min
Primary = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.67' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.30 cfs @ 11.96 hrs HW=5,740.67' TW=5,736.52' (Dynamic Tailwater)
2=Culvert (Passes 7.30 cfs of 12.20 cfs potential flow)
1=Orifice/Grate (Weir Controls 7.30 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' TW=5,698.94' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P500:

[57] Hint: Peaked at 5,707.36' (Flood elevation advised)

Inflow Area = 62.214 ac, 15.88% Impervious, Inflow Depth > 0.22" for 25yr-24hr event
Inflow = 14.94 cfs @ 12.03 hrs, Volume= 1.162 af
Outflow = 14.94 cfs @ 12.03 hrs, Volume= 1.162 af, Atten= 0%, Lag= 0.0 min
Primary = 14.94 cfs @ 12.03 hrs, Volume= 1.162 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,707.36' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=14.88 cfs @ 12.03 hrs HW=5,707.36' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 14.88 cfs @ 3.97 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

[57] Hint: Peaked at 5,735.36' (Flood elevation advised)

Inflow Area = 61.955 ac, 15.84% Impervious, Inflow Depth > 0.22" for 25yr-24hr event
Inflow = 14.87 cfs @ 12.03 hrs, Volume= 1.156 af
Outflow = 14.87 cfs @ 12.03 hrs, Volume= 1.156 af, Atten= 0%, Lag= 0.0 min
Primary = 14.87 cfs @ 12.03 hrs, Volume= 1.156 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,735.36' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=14.81 cfs @ 12.03 hrs HW=5,735.35' TW=5,707.36' (Dynamic Tailwater)
1=Culvert (Inlet Controls 14.81 cfs @ 3.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

[62] Hint: Exceeded Reach S600 OUTLET depth by 0.51' @ 12.03 hrs

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.45" for 25yr-24hr event
Inflow = 12.88 cfs @ 12.03 hrs, Volume= 0.810 af
Outflow = 12.88 cfs @ 12.03 hrs, Volume= 0.810 af, Atten= 0%, Lag= 0.0 min
Primary = 12.63 cfs @ 12.03 hrs, Volume= 0.810 af
Routed to Pond P510 :
Secondary = 0.25 cfs @ 12.03 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,755.23' @ 12.03 hrs
Flood Elev= 5,756.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	5,755.00'	**Asymmetrical Weir, C= 2.70** Offset (feet) -6.00 -3.50 0.00 6.00 26.00 Elev. (feet) 5,757.00 5,756.00 5,755.00 5,756.20 5,757.00

Primary OutFlow Max=12.62 cfs @ 12.03 hrs HW=5,755.23' TW=5,735.35' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 12.62 cfs @ 7.14 fps)
↑—**2=Orifice/Grate** (Passes 12.62 cfs of 32.06 cfs potential flow)

Secondary OutFlow Max=0.24 cfs @ 12.03 hrs HW=5,755.23' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Asymmetrical Weir** (Weir Controls 0.24 cfs @ 0.52 fps)

Summary for Pond P610-inlet:

Information from SGM 2022 Survey

Inflow Area = 0.231 ac, 3.03% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.54' @ 12.39 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Secondary	5,766.89'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 12.39 hrs HW=5,765.54' TW=5,761.87' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.54' TW=5,761.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610-pipe:

Information from SGM 2022 Survey

Inflow Area = 16.399 ac, 30.83% Impervious, Inflow Depth > 0.44" for 25yr-24hr event
Inflow = 10.67 cfs @ 12.01 hrs, Volume= 0.598 af
Outflow = 10.67 cfs @ 12.01 hrs, Volume= 0.598 af, Atten= 0%, Lag= 0.0 min
Primary = 10.67 cfs @ 12.01 hrs, Volume= 0.598 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,762.86' @ 12.01 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.27'	**24.0" Round Culvert** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 5,761.27' / 5,759.70' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.33 cfs @ 12.01 hrs HW=5,762.85' TW=5,761.69' (Dynamic Tailwater)
1=Culvert (Outlet Controls 10.33 cfs @ 5.32 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.27' TW=5,761.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 16.168 ac, 31.22% Impervious, Inflow Depth > 0.44" for 25yr-24hr event
Inflow = 10.90 cfs @ 12.00 hrs, Volume= 0.597 af
Outflow = 10.67 cfs @ 12.01 hrs, Volume= 0.597 af, Atten= 2%, Lag= 0.4 min
Primary = 10.67 cfs @ 12.01 hrs, Volume= 0.597 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610-pipe :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.77' @ 12.01 hrs Surf.Area= 177 sf Storage= 98 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (885.3 - 885.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	1,713 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,765.00	76	0	0
5,766.00	207	142	142
5,767.00	343	275	417
5,768.00	609	476	893
5,769.00	1,031	820	1,713

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.26'	**24.0" Round Culvert** L= 126.3' Ke= 0.500 Inlet / Outlet Invert= 5,764.26' / 5,761.27' S= 0.0237 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.56 cfs @ 12.01 hrs HW=5,765.76' TW=5,762.85' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 10.56 cfs @ 4.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' TW=5,761.27' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

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[57] Hint: Peaked at 5,771.37' (Flood elevation advised)

Inflow Area = 0.745 ac, 15.03% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af
Outflow = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.37' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,767.94'	**12.0" Round Culvert** L= 71.5' Ke= 0.500 Inlet / Outlet Invert= 5,767.94' / 5,767.20' S= 0.0103 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,771.40'	**10.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3 Device 1 5,771.33' **24.0" Horiz. Orifice/Grate X 0.60** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=0.10 cfs @ 12.01 hrs HW=5,771.37' TW=5,765.74' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.10 cfs of 5.80 cfs potential flow)
↑—**3=Orifice/Grate** (Weir Controls 0.10 cfs @ 0.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,767.94' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P640:

Information from SGM 2022 Survey
Yes, the existing outlet pipe is back pitched.

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[44] Hint: Outlet device #4 is below defined storage
[92] Warning: Device #3 is above defined storage

Inflow Area = 15.345 ac, 32.17% Impervious, Inflow Depth > 0.46" for 25yr-24hr event
Inflow = 11.03 cfs @ 11.98 hrs, Volume= 0.586 af
Outflow = 10.80 cfs @ 12.00 hrs, Volume= 0.586 af, Atten= 2%, Lag= 1.3 min
Primary = 0.93 cfs @ 12.00 hrs, Volume= 0.489 af
Routed to Pond P620 :
Secondary = 9.87 cfs @ 12.00 hrs, Volume= 0.097 af
Routed to Pond P620 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,773.81' @ 12.00 hrs Surf.Area= 1,132 sf Storage= 2,635 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.9 min (883.9 - 866.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	2,853 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,769.00	41	0	0
5,770.00	248	145	145
5,771.00	459	354	498
5,772.00	656	558	1,056
5,773.00	873	765	1,820
5,774.00	1,192	1,033	2,853

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.50'	**24.0" Round Culvert** L= 59.7' Ke= 0.500 Inlet / Outlet Invert= 5,763.42' / 5,764.50' S= -0.0181 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,773.50'	**20.0' long + 10.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,774.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.78'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.93 cfs @ 12.00 hrs HW=5,773.81' TW=5,765.69' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.93 cfs of 43.12 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.93 cfs @ 10.62 fps)

Secondary OutFlow Max=9.55 cfs @ 12.00 hrs HW=5,773.81' TW=5,765.73' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 9.55 cfs @ 1.32 fps)

Summary for Pond P650:

Information from SGM 2022 Survey

[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 15.239 ac, 32.39% Impervious, Inflow Depth > 0.46" for 25yr-24hr event
Inflow = 11.42 cfs @ 11.97 hrs, Volume= 0.586 af
Outflow = 11.03 cfs @ 11.98 hrs, Volume= 0.586 af, Atten= 3%, Lag= 1.0 min
Primary = 11.03 cfs @ 11.98 hrs, Volume= 0.586 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.59' @ 11.98 hrs Surf.Area= 1,470 sf Storage= 3,339 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.8 min (865.9 - 849.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	6,281 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	79	0	0
5,774.00	334	207	207
5,775.00	638	486	693
5,776.00	916	777	1,470
5,777.00	1,238	1,077	2,547
5,778.00	1,634	1,436	3,983
5,779.00	2,962	2,298	6,281

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.52'	**24.0" Round Culvert** L= 70.6' Ke= 0.500 Inlet / Outlet Invert= 5,769.52' / 5,768.38' S= 0.0161 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,776.96'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,772.75'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.97 cfs @ 11.98 hrs HW=5,777.58' TW=5,773.61' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 10.97 cfs of 30.15 cfs potential flow)
↑—**3=Orifice/Grate** (Weir Controls 10.14 cfs @ 2.58 fps)
—**4=Orifice/Grate** (Orifice Controls 0.84 cfs @ 9.60 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,773.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM 2022 Survey

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth > 1.63" for 25yr-24hr event
Inflow = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af
Outflow = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min
Primary = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.00' @ 11.96 hrs Surf.Area= 234 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (789.1 - 789.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	2,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,779.00	234	0	0
5,780.00	414	324	324
5,781.00	633	524	848
5,782.00	968	801	1,648
5,783.00	1,540	1,254	2,902

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.87'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.87' / 5,773.00' S= 0.0628 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.17 cfs @ 11.96 hrs HW=5,779.00' TW=5,777.55' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.17 cfs @ 3.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

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[57] Hint: Peaked at 5,796.49' (Flood elevation advised)

Inflow Area = 13.591 ac, 26.01% Impervious, Inflow Depth > 0.33" for 25yr-24hr event
Inflow = 7.12 cfs @ 11.97 hrs, Volume= 0.377 af
Outflow = 7.12 cfs @ 11.97 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min
Primary = 7.12 cfs @ 11.97 hrs, Volume= 0.377 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,796.49' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,790.62'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,790.62' / 5,777.57' S= 0.2534 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.11 cfs @ 11.97 hrs HW=5,796.49' TW=5,777.58' (Dynamic Tailwater)
↑**1=Culvert** (Passes 7.11 cfs of 36.11 cfs potential flow)
↑**3=Culvert** (Passes 7.11 cfs of 19.26 cfs potential flow)
↑**4=Orifice/Grate** (Weir Controls 7.11 cfs @ 1.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,777.47' TW=5,761.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.330 ac, 12.66% Impervious, Inflow Depth > 0.19" for 25yr-24hr event
Inflow = 1.02 cfs @ 11.97 hrs, Volume= 0.069 af
Outflow = 1.02 cfs @ 11.97 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 11.97 hrs, Volume= 0.069 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.00' @ 0.00 hrs Surf.Area= 587 sf Storage= 0 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (918.3 - 918.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500

			Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900
			n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 11.97 hrs HW=5,752.00' TW=5,734.93' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.00 cfs of 13.32 cfs potential flow)
└**1=Orifice/Grate** (Passes 0.00 cfs of 36.54 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' TW=5,734.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

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[57] Hint: Peaked at 5,758.19' (Flood elevation advised)

Inflow Area = 3.271 ac, 1.41% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af
Outflow = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 12.39 hrs, Volume= 0.021 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,758.19' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500
			Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900
			n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.04 cfs @ 12.39 hrs HW=5,758.19' TW=5,752.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.04 cfs @ 1.35 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' TW=5,752.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 3.94% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.90 cfs @ 12.00 hrs, Volume= 0.228 af
Outflow = 0.90 cfs @ 12.00 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min
Primary = 0.90 cfs @ 12.00 hrs, Volume= 0.228 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,747.68' @ 12.00 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.89 cfs @ 12.00 hrs HW=5,747.68' TW=5,735.23' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.89 cfs @ 1.92 fps)
└**1=Orifice/Grate** (Passes 0.89 cfs of 48.84 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' TW=5,752.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P810:

[57] Hint: Peaked at 5,761.12' (Flood elevation advised)

Inflow Area = 31.566 ac, 2.88% Impervious, Inflow Depth > 0.07" for 25yr-24hr event
Inflow = 0.32 cfs @ 12.03 hrs, Volume= 0.195 af
Outflow = 0.32 cfs @ 12.03 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.03 hrs, Volume= 0.195 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,761.12' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.32 cfs @ 12.03 hrs HW=5,761.12' TW=5,747.66' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.32 cfs @ 1.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' TW=5,758.10' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P820:

[57] Hint: Peaked at 5,812.03' (Flood elevation advised)

Inflow Area = 23.436 ac, 1.05% Impervious, Inflow Depth > 0.06" for 25yr-24hr event
Inflow = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af
Outflow = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 13.08 hrs, Volume= 0.122 af
Routed to Pond P810 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.03' @ 13.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.18 cfs @ 13.08 hrs HW=5,812.03' TW=5,761.11' (Dynamic Tailwater)
2=Culvert (Passes 0.18 cfs of 105.27 cfs potential flow)
1=Orifice/Grate (Weir Controls 0.18 cfs @ 0.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' TW=5,752.28' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P900:

JR Harris & Company Plans 2014 show a pipe on the east side of debris catch basin, but what was built compared to the plans differs from aerial imagery. Based on the pond grading with a low area to the east, it was assumed that there is an existing 12 inch pipe here. The pipe is likely buried which is why it was not picked up by survey. All pipe parameters are assumed. Pipe is assumed to not be clogged even if it likely is clogged.

Inflow Area = 6.007 ac, 2.43% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.07 cfs @ 12.51 hrs, Volume= 0.038 af
Outflow = 0.05 cfs @ 15.14 hrs, Volume= 0.033 af, Atten= 33%, Lag= 157.7 min
Primary = 0.05 cfs @ 15.14 hrs, Volume= 0.033 af
Routed to Pond P670 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P670 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.10' @ 15.14 hrs Surf.Area= 2,768 sf Storage= 269 cf

Plug-Flow detention time= 100.4 min calculated for 0.033 af (88% of inflow)
Center-of-Mass det. time= 51.2 min (1,079.6 - 1,028.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,870.00'	98,374 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,870.00	2,448	0	0
5,871.00	5,544	3,996	3,996
5,872.00	9,422	7,483	11,479
5,873.00	11,136	10,279	21,758
5,874.00	12,759	11,948	33,706
5,875.00	14,397	13,578	47,284
5,876.00	16,055	15,226	62,510
5,877.00	17,865	16,960	79,470
5,878.00	19,943	18,904	98,374

Device	Routing	Invert	Outlet Devices
#1	Primary	5,870.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 5,870.00' / 5,869.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,871.50'	**12.0' long + 8.0 '/' SideZ x 100.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.05 cfs @ 15.14 hrs HW=5,870.10' TW=5,796.27' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.05 cfs @ 1.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,870.00' TW=5,777.47' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link S300D:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af
Primary = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
43.43 43.43

Summary for Link S300S:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

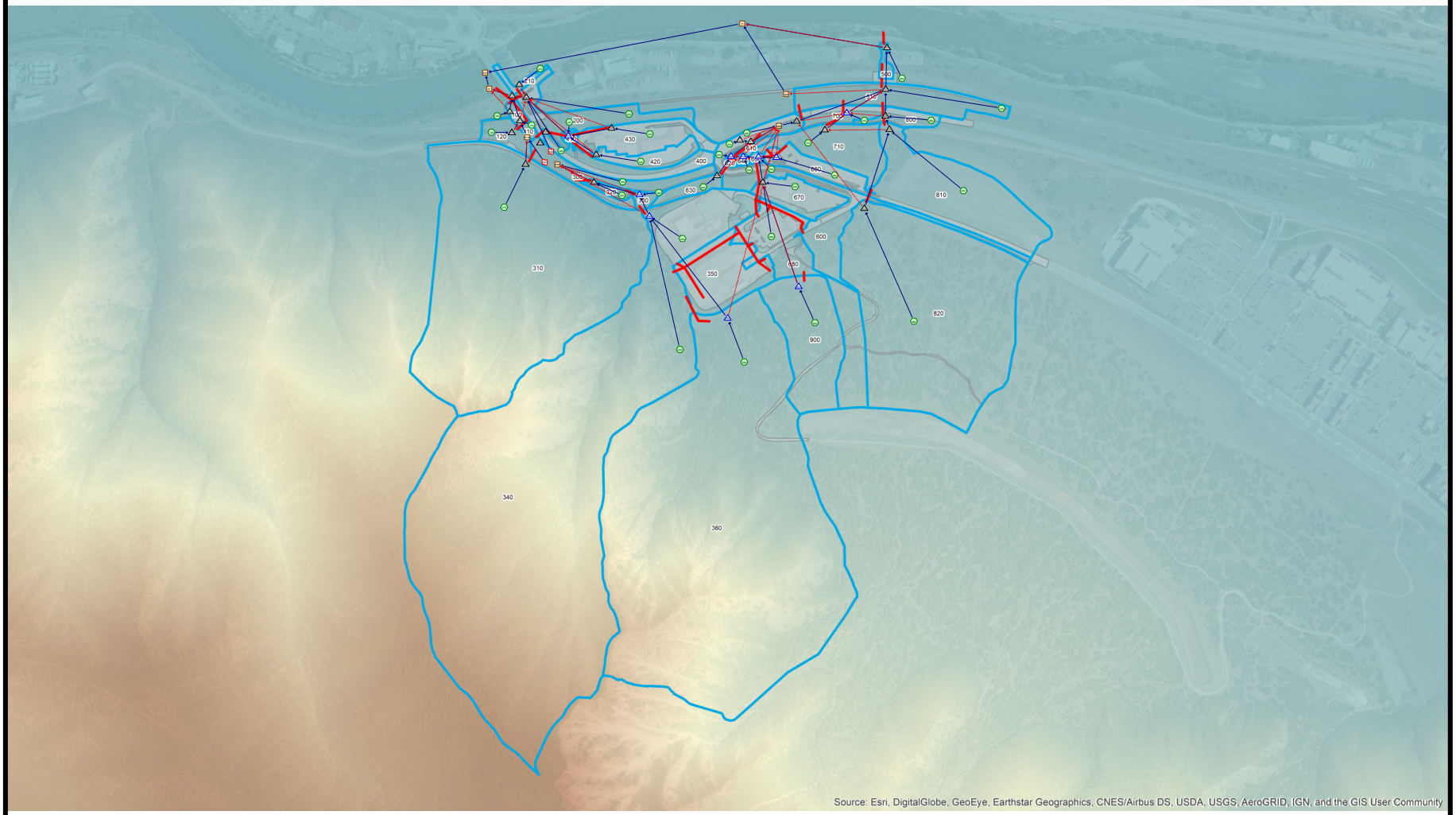
From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af
Primary = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
10.19 10.19



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Proposed1-RFTA-Dev
Prepared by SGM, Printed 4/6/2022 **100 Year**
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 100:

Runoff = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af, Depth> 0.99"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.07 cfs @ 11.99 hrs, Volume= 0.004 af, Depth> 0.32"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af, Depth> 0.36"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 2.55 cfs @ 11.98 hrs, Volume= 0.125 af, Depth> 0.53"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 1.19 cfs @ 11.96 hrs, Volume= 0.063 af, Depth> 2.50"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 1.34 cfs @ 11.98 hrs, Volume= 0.073 af, Depth> 0.39"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af, Depth> 0.35"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.32 cfs @ 11.98 hrs, Volume= 0.016 af, Depth> 0.53"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.13 cfs @ 11.99 hrs, Volume= 0.008 af, Depth> 0.32"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 36.11 cfs @ 12.03 hrs, Volume= 2.317 af, Depth> 0.45"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	3.185	98	Impervious
*	0.735	58	A soils
*	37.804	58	B Soils
*	19.435	80	D soils
	61.159	67	Weighted Average
	57.974		94.79% Pervious Area
	3.185		5.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 13.35 cfs @ 11.96 hrs, Volume= 0.627 af, Depth> 1.91"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	3.309	98	Impervious
*	0.462	58	A soils
*	0.008	58	B soils
*	0.171	80	D soils
	3.950	92	Weighted Average
	0.641		16.23% Pervious Area
	3.309		83.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 44.23 cfs @ 12.06 hrs, Volume= 2.891 af, Depth> 0.61"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.216	98	Impervious
*	7.090	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	57.137	71	Weighted Average
	56.921		99.62% Pervious Area
	0.216		0.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 4.01 cfs @ 11.96 hrs, Volume= 0.179 af, Depth> 1.11"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.19"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af, Depth> 1.74"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af, Depth> 2.09"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.21 cfs @ 11.98 hrs, Volume= 0.011 af, Depth> 0.49"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 1.92 cfs @ 11.99 hrs, Volume= 0.110 af, Depth> 0.36"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 7.92 cfs @ 11.97 hrs, Volume= 0.358 af, Depth> 0.84"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.341	98	Impervious
*	2.802	58	A soils
	5.143	76	Weighted Average
	2.802		54.48% Pervious Area
	2.341		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af, Depth> 0.22"
Routed to Pond P610-inlet :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.19"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af, Depth> 0.36"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.112	98	Impervious
*	0.633	58	A soils
	0.745	64	Weighted Average
	0.633		84.97% Pervious Area
	0.112		15.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.19"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.19"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 5.70 cfs @ 11.96 hrs, Volume= 0.279 af, Depth> 2.18"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 5.43 cfs @ 11.96 hrs, Volume= 0.247 af, Depth> 1.58"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.420	98	Impervious
*	0.459	58	A soils
	1.879	88	Weighted Average
	0.459		24.43% Pervious Area
	1.420		75.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 6.63 cfs @ 11.97 hrs, Volume= 0.310 af, Depth> 0.65"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.969	98	Impervious
*	3.736	58	A soils
	5.705	72	Weighted Average
	3.736		65.49% Pervious Area
	1.969		34.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 1.74 cfs @ 11.97 hrs, Volume= 0.078 af, Depth> 0.89"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af, Depth> 0.22"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.046	98	Impervious
*	3.225	58	A Soils
	3.271	59	Weighted Average
	3.225		98.59% Pervious Area
	0.046		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 1.25 cfs @ 11.97 hrs, Volume= 0.056 af, Depth> 0.84"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed area is undevleoped.

Runoff = 2.59 cfs @ 11.99 hrs, Volume= 0.181 af, Depth> 0.27"
Routed to Pond P810 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.663	98	Impervious
*	7.467	58	A Soils
	8.130	61	Weighted Average
	7.467		91.85% Pervious Area
	0.663		8.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed area is undevleoped.

Runoff = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af, Depth> 0.19"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.245	98	Impervious
*	23.191	58	A soils
	23.436	58	Weighted Average
	23.191		98.95% Pervious Area
	0.245		1.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Subcatchment 900:

Runoff = 0.76 cfs @ 12.10 hrs, Volume= 0.108 af, Depth> 0.22"
Routed to Pond P900 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.146	98	Impervious
*	5.861	58	A soils
*	0.000	58	B soils
*	0.000	80	D Soils
	6.007	59	Weighted Average
	5.861		97.57% Pervious Area
	0.146		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Reach N:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 62.214 ac, 15.88% Impervious, Inflow Depth > 0.42" for 100yr-24hr event
Inflow = 31.62 cfs @ 12.00 hrs, Volume= 2.192 af
Outflow = 31.62 cfs @ 12.00 hrs, Volume= 2.192 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 105.903 ac, 15.39% Impervious, Inflow Depth > 12.53" for 100yr-24hr event
Inflow = 119.48 cfs @ 11.99 hrs, Volume= 110.547 af
Outflow = 119.48 cfs @ 11.99 hrs, Volume= 110.547 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S110:

Ditch Parameters from SGM 2015 Survey

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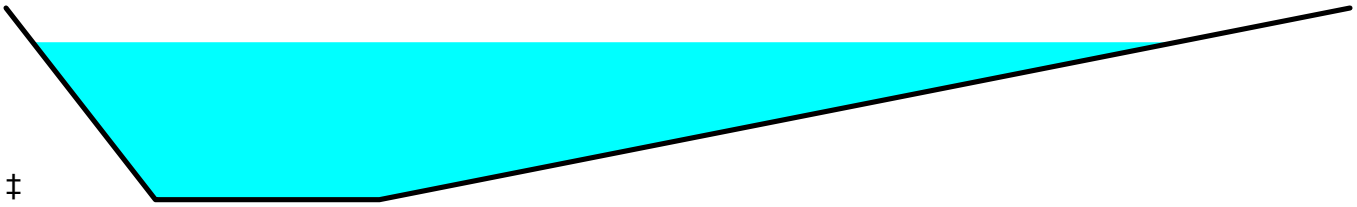
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 31.49" for 100yr-24hr event
Inflow = 58.11 cfs @ 12.02 hrs, Volume= 87.161 af
Outflow = 58.09 cfs @ 12.02 hrs, Volume= 87.145 af, Atten= 0%, Lag= 0.2 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.71 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 7.17 fps, Avg. Travel Time= 0.3 min

Peak Storage= 829 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.82' , Surface Width= 15.33'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

Ditch Parameters from SGM 2015 Survey

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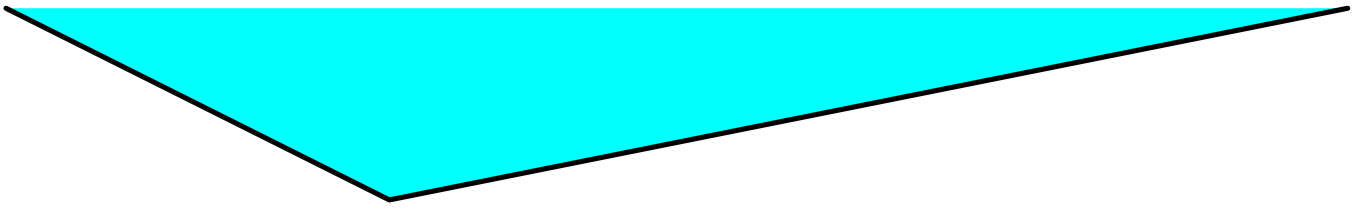
[91] Warning: Storage range exceeded by 0.11'
[55] Hint: Peak inflow is 124% of Manning's capacity

Inflow Area = 125.158 ac, 5.79% Impervious, Inflow Depth > 0.57" for 100yr-24hr event
Inflow = 53.66 cfs @ 12.02 hrs, Volume= 5.931 af
Outflow = 53.62 cfs @ 12.03 hrs, Volume= 5.930 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.04 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.86 fps, Avg. Travel Time= 0.5 min

Peak Storage= 652 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.31' , Surface Width= 9.15'
Bank-Full Depth= 1.20' Flow Area= 5.0 sf, Capacity= 43.43 cfs

0.00' x 1.20' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 5.0 '/' Top Width= 8.40'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



Summary for Reach S600:

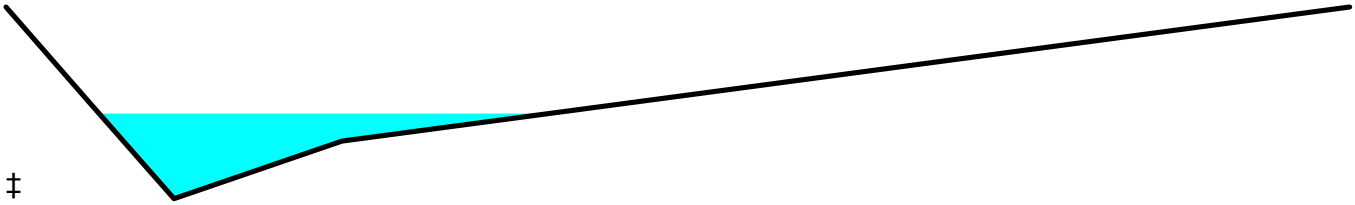
Parameters from 2015 SGM survey

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.74" for 100yr-24hr event
Inflow = 23.70 cfs @ 11.99 hrs, Volume= 1.325 af
Outflow = 23.36 cfs @ 12.00 hrs, Volume= 1.324 af, Atten= 1%, Lag= 1.0 min
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.05 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 2.7 min

Peak Storage= 1,516 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.89' , Surface Width= 16.04'
Bank-Full Depth= 2.00' Flow Area= 41.4 sf, Capacity= 301.54 cfs

Custom cross-section, Length= 263.0' Slope= 0.0266 '/'
Constant n= 0.030 Short grass
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-6.00	5,761.00	0.00
-3.00	5,760.00	1.00
0.00	5,759.00	2.00
6.00	5,759.60	1.40
42.00	5,761.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Width (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0.0	0	0.00
0.60	2.3	7.9	7.8	615	8.38
1.00	7.8	19.5	19.3	2,040	33.92
2.00	41.4	48.4	48.0	10,888	301.54

Summary for Reach Spill:

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 43.689 ac, 14.69% Impervious, Inflow Depth > 29.76" for 100yr-24hr event
Inflow = 87.95 cfs @ 11.99 hrs, Volume= 108.355 af
Outflow = 87.95 cfs @ 11.99 hrs, Volume= 108.355 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

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[57] Hint: Peaked at 5,699.68' (Flood elevation advised)

Inflow Area = 43.689 ac, 14.69% Impervious, Inflow Depth > 29.76" for 100yr-24hr event
Inflow = 87.85 cfs @ 11.99 hrs, Volume= 108.351 af
Outflow = 87.85 cfs @ 11.99 hrs, Volume= 108.351 af, Atten= 0%, Lag= 0.0 min
Primary = 87.85 cfs @ 11.99 hrs, Volume= 108.351 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,699.68' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,705.05'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=87.82 cfs @ 11.99 hrs HW=5,699.68' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 87.82 cfs @ 6.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,697.64' TW=0.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

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[57] Hint: Peaked at 5,702.78' (Flood elevation advised)

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth > 0.99" for 100yr-24hr event
Inflow = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af
Outflow = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 11.97 hrs, Volume= 0.018 af
Routed to Pond P-OUT :
Secondary = 0.10 cfs @ 11.97 hrs, Volume= 0.005 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.78' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.40 cfs @ 11.97 hrs HW=5,702.78' TW=5,699.57' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.40 cfs of 27.07 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.40 cfs @ 0.67 fps)

Secondary OutFlow Max=0.10 cfs @ 11.97 hrs HW=5,702.78' TW=0.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.48 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

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[57] Hint: Peaked at 5,708.43' (Flood elevation advised)
[61] Hint: Exceeded Reach S110 outlet invert by 0.43' @ 12.02 hrs

Inflow Area = 34.336 ac, 1.89% Impervious, Inflow Depth > 30.47" for 100yr-24hr event
Inflow = 58.56 cfs @ 12.02 hrs, Volume= 87.178 af
Outflow = 58.56 cfs @ 12.02 hrs, Volume= 87.178 af, Atten= 0%, Lag= 0.0 min
Primary = 43.26 cfs @ 12.02 hrs, Volume= 66.031 af
Routed to Pond P-OUT :
Secondary = 15.30 cfs @ 12.02 hrs, Volume= 21.147 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.43' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 16.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=43.24 cfs @ 12.02 hrs HW=5,708.43' TW=5,699.54' (Dynamic Tailwater)
└─**3=Culvert** (Passes 43.24 cfs of 138.41 cfs potential flow)
└─**2=Culvert** (Passes 43.24 cfs of 81.49 cfs potential flow)
└─**1=Orifice/Grate** (Weir Controls 43.24 cfs @ 2.39 fps)

Secondary OutFlow Max=15.29 cfs @ 12.02 hrs HW=5,708.43' TW=5,705.64' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 15.29 cfs @ 1.74 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

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[57] Hint: Peaked at 5,724.78' (Flood elevation advised)

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth > 0.36" for 100yr-24hr event
Inflow = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af
Outflow = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.78' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.50 cfs @ 11.99 hrs HW=5,724.78' TW=5,708.42' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.50 cfs of 133.05 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.50 cfs @ 0.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' TW=5,708.19' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

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[57] Hint: Peaked at 5,705.72' (Flood elevation advised)
[80] Warning: Exceeded Pond P210 by 4.17' @ 12.08 hrs (2.29 cfs 0.045 af)
[80] Warning: Exceeded Pond P210 by 0.36' @ 11.89 hrs (59.63 cfs 0.378 af)

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth > 55.91" for 100yr-24hr event
Inflow = 45.47 cfs @ 11.99 hrs, Volume= 42.302 af
Outflow = 45.47 cfs @ 11.99 hrs, Volume= 42.302 af, Atten= 0%, Lag= 0.0 min
Primary = 36.35 cfs @ 11.99 hrs, Volume= 42.229 af
Routed to Pond P-OUT :
Secondary = 9.12 cfs @ 11.99 hrs, Volume= 0.073 af
Routed to Pond P-OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,705.72' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.34 cfs @ 11.99 hrs HW=5,705.71' TW=5,699.66' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 36.34 cfs @ 11.57 fps)
└**1=Orifice/Grate** (Passes 36.34 cfs of 75.83 cfs potential flow)

Secondary OutFlow Max=8.97 cfs @ 11.99 hrs HW=5,705.71' TW=5,699.66' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir**(Weir Controls 8.97 cfs @ 1.39 fps)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

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[57] Hint: Peaked at 5,705.71' (Flood elevation advised)
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=600)

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth > 2.50" for 100yr-24hr event
Inflow = 1.19 cfs @ 11.96 hrs, Volume= 0.063 af
Outflow = 1.32 cfs @ 12.01 hrs, Volume= 0.063 af, Atten= 0%, Lag= 3.2 min
Primary = 0.79 cfs @ 11.86 hrs, Volume= 0.048 af
Routed to Pond P200 :
Secondary = 1.25 cfs @ 12.01 hrs, Volume= 0.015 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,705.71' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 11.86 hrs HW=5,704.13' TW=5,704.24' (Dynamic Tailwater)
2=Culvert (Controls 0.00 cfs)
1=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=19.93 cfs @ 12.01 hrs HW=5,705.69' TW=5,705.69' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir(Weir Controls 19.93 cfs @ 0.41 fps)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P310:

[57] Hint: Peaked at 5,746.40' (Flood elevation advised)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.35" for 100yr-24hr event
Inflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Outflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af, Atten= 0%, Lag= 0.0 min
Primary = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Routed to Reach S110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.40' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.66 cfs @ 12.02 hrs HW=5,746.40' TW=5,715.82' (Dynamic Tailwater)
└**2=Culvert** (Passes 14.66 cfs of 98.27 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 14.66 cfs @ 2.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' TW=5,715.52' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,749.85' (Flood elevation advised)

Inflow Area = 122.883 ac, 5.57% Impervious, Inflow Depth > 0.51" for 100yr-24hr event
Inflow = 21.28 cfs @ 12.02 hrs, Volume= 5.255 af
Outflow = 21.28 cfs @ 12.02 hrs, Volume= 5.255 af, Atten= 0%, Lag= 0.0 min
Primary = 21.28 cfs @ 12.02 hrs, Volume= 5.255 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.85' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=21.28 cfs @ 12.02 hrs HW=5,749.85' TW=5,716.31' (Dynamic Tailwater)
└─**2=Culvert** (Passes 21.28 cfs of 78.76 cfs potential flow)
└─**1=Culvert** (Inlet Controls 21.28 cfs @ 4.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' TW=5,715.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage
[93] Warning: Storage range exceeded by 0.50'

Inflow Area = 122.531 ac, 5.51% Impervious, Inflow Depth > 0.57" for 100yr-24hr event
Inflow = 52.35 cfs @ 12.03 hrs, Volume= 5.842 af
Outflow = 52.34 cfs @ 12.03 hrs, Volume= 5.842 af, Atten= 0%, Lag= 0.0 min
Primary = 21.04 cfs @ 12.03 hrs, Volume= 5.240 af
Routed to Pond P320 :
Secondary = 31.30 cfs @ 12.03 hrs, Volume= 0.602 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,775.50' @ 12.03 hrs Surf.Area= 167 sf Storage= 137 cf

Plug-Flow detention time= 0.0 min calculated for 5.840 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (891.3 - 891.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	137 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	6	0	0
5,774.00	50	28	28
5,775.00	167	109	137

Device	Routing	Invert	Outlet Devices
#1	Primary	5,772.57'	**24.0" Round Culvert** L= 43.6' Ke= 0.500 Inlet / Outlet Invert= 5,772.57' / 5,767.34' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=21.04 cfs @ 12.03 hrs HW=5,775.50' TW=5,749.85' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 21.04 cfs @ 6.70 fps)

Secondary OutFlow Max=31.29 cfs @ 12.03 hrs HW=5,775.50' TW=5,716.31' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 31.29 cfs @ 2.60 fps)

Summary for Pond P340:

Information from SGM 2022 Survey

Inflow Area = 122.246 ac, 5.49% Impervious, Inflow Depth > 0.57" for 100yr-24hr event
Inflow = 53.01 cfs @ 12.02 hrs, Volume= 5.835 af
Outflow = 52.25 cfs @ 12.03 hrs, Volume= 5.834 af, Atten= 1%, Lag= 0.9 min
Primary = 52.25 cfs @ 12.03 hrs, Volume= 5.834 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,785.90' @ 12.03 hrs Surf.Area= 480 sf Storage= 767 cf

Plug-Flow detention time= 0.2 min calculated for 5.834 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (891.2 - 891.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,781.00'	1,480 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,781.00	0	0	0
5,782.00	17	9	9
5,783.00	74	46	54
5,784.00	175	125	179
5,785.00	299	237	416
5,786.00	499	399	815
5,787.00	832	666	1,480

Device	Routing	Invert	Outlet Devices
#1	Primary	5,781.92'	**36.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 5,781.92' / 5,781.38' S= 0.0120 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

#2 Secondary 5,786.00' **25.0' long + 7.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=52.24 cfs @ 12.03 hrs HW=5,785.90' TW=5,775.50' (Dynamic Tailwater)
1=Culvert (Barrel Controls 52.24 cfs @ 7.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,781.00' TW=5,715.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side. Pipe is currently filled with sediment, but is modeled assuming the pipe is not clogged.

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=485)

Inflow Area = 57.137 ac, 0.38% Impervious, Inflow Depth > 0.61" for 100yr-24hr event
Inflow = 44.23 cfs @ 12.06 hrs, Volume= 2.891 af
Outflow = 10.09 cfs @ 12.40 hrs, Volume= 2.891 af, Atten= 77%, Lag= 20.3 min
Primary = 10.09 cfs @ 12.40 hrs, Volume= 2.891 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,873.09' @ 12.40 hrs Surf.Area= 12,719 sf Storage= 29,015 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 18.0 min (902.8 - 884.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	114,520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,868.00	35	0	0
5,869.00	188	112	112
5,870.00	3,402	1,795	1,907
5,871.00	7,349	5,376	7,282
5,872.00	10,652	9,001	16,283
5,873.00	12,551	11,602	27,884
5,874.00	14,430	13,491	41,375
5,875.00	16,332	15,381	56,756
5,876.00	18,262	17,297	74,053
5,877.00	20,237	19,250	93,302
5,878.00	22,198	21,218	114,520

Device	Routing	Invert	Outlet Devices
#1	Primary	5,866.85'	**15.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.09 cfs @ 12.40 hrs HW=5,873.09' TW=5,783.76' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 10.09 cfs @ 8.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth > 1.94" for 100yr-24hr event
Inflow = 13.61 cfs @ 11.96 hrs, Volume= 0.649 af
Outflow = 13.32 cfs @ 11.97 hrs, Volume= 0.568 af, Atten= 2%, Lag= 0.9 min
Primary = 13.32 cfs @ 11.97 hrs, Volume= 0.568 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.65' @ 11.97 hrs Surf.Area= 1,803 sf Storage= 4,545 cf

Plug-Flow detention time= 90.0 min calculated for 0.568 af (88% of inflow)
Center-of-Mass det. time= 30.7 min (824.6 - 793.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=13.29 cfs @ 11.97 hrs HW=5,736.64' TW=5,705.71' (Dynamic Tailwater)
└**2=Culvert** (Passes 13.29 cfs of 19.65 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 13.29 cfs @ 2.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' TW=5,703.17' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

[57] Hint: Peaked at 5,750.74' (Flood elevation advised)

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth > 1.74" for 100yr-24hr event
Inflow = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af
Outflow = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min
Primary = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.92 cfs @ 11.96 hrs HW=5,750.74' TW=5,736.64' (Dynamic Tailwater)
└**2=Culvert** (Passes 3.92 cfs of 15.20 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 3.92 cfs @ 1.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' TW=5,703.17' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

[57] Hint: Peaked at 5,740.74' (Flood elevation advised)

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth > 2.09" for 100yr-24hr event
Inflow = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af
Outflow = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.0 min
Primary = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=9.67 cfs @ 11.96 hrs HW=5,740.74' TW=5,736.64' (Dynamic Tailwater)
└**2=Culvert** (Passes 9.67 cfs of 12.14 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.67 cfs @ 2.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' TW=5,703.17' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

[57] Hint: Peaked at 5,708.05' (Flood elevation advised)

Inflow Area = 62.214 ac, 15.88% Impervious, Inflow Depth > 0.42" for 100yr-24hr event
Inflow = 31.62 cfs @ 12.00 hrs, Volume= 2.191 af
Outflow = 31.62 cfs @ 12.00 hrs, Volume= 2.192 af, Atten= 0%, Lag= 0.0 min
Primary = 31.62 cfs @ 12.00 hrs, Volume= 2.192 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.05' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=31.58 cfs @ 12.00 hrs HW=5,708.05' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 31.58 cfs @ 4.87 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P510:

[57] Hint: Peaked at 5,736.04' (Flood elevation advised)

Inflow Area = 61.955 ac, 15.84% Impervious, Inflow Depth > 0.42" for 100yr-24hr event
Inflow = 31.42 cfs @ 12.00 hrs, Volume= 2.181 af
Outflow = 31.42 cfs @ 12.00 hrs, Volume= 2.181 af, Atten= 0%, Lag= 0.0 min
Primary = 31.42 cfs @ 12.00 hrs, Volume= 2.181 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.04' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=31.38 cfs @ 12.00 hrs HW=5,736.04' TW=5,708.05' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 31.38 cfs @ 4.86 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

[62] Hint: Exceeded Reach S600 OUTLET depth by 1.09' @ 12.00 hrs

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.74" for 100yr-24hr event
Inflow = 23.36 cfs @ 12.00 hrs, Volume= 1.324 af
Outflow = 23.36 cfs @ 12.00 hrs, Volume= 1.324 af, Atten= 0%, Lag= 0.0 min
Primary = 14.62 cfs @ 12.00 hrs, Volume= 1.249 af
Routed to Pond P510 :
Secondary = 8.75 cfs @ 12.00 hrs, Volume= 0.075 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,755.98' @ 12.00 hrs
Flood Elev= 5,756.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	5,755.00'	**Asymmetrical Weir, C= 2.70** Offset (feet) -6.00 -3.50 0.00 6.00 26.00 Elev. (feet) 5,757.00 5,756.00 5,755.00 5,756.20 5,757.00

Primary OutFlow Max=14.61 cfs @ 12.00 hrs HW=5,755.98' TW=5,736.04' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 14.61 cfs @ 8.27 fps)
↑—**2=Orifice/Grate** (Passes 14.61 cfs of 40.65 cfs potential flow)

Secondary OutFlow Max=8.72 cfs @ 12.00 hrs HW=5,755.98' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Asymmetrical Weir** (Weir Controls 8.72 cfs @ 1.07 fps)

Summary for Pond P610-inlet:

Information from SGM 2022 Survey

Inflow Area = 0.231 ac, 3.03% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af
Outflow = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.56' @ 12.00 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Secondary	5,766.89'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 12.00 hrs HW=5,765.56' TW=5,763.44' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.54' TW=5,761.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610-pipe:

Information from SGM 2022 Survey

Inflow Area = 16.399 ac, 30.83% Impervious, Inflow Depth > 0.71" for 100yr-24hr event
Inflow = 16.40 cfs @ 12.01 hrs, Volume= 0.966 af
Outflow = 16.40 cfs @ 12.01 hrs, Volume= 0.966 af, Atten= 0%, Lag= 0.0 min
Primary = 16.40 cfs @ 12.01 hrs, Volume= 0.966 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,763.44' @ 12.01 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.27'	**24.0" Round Culvert** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 5,761.27' / 5,759.70' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.39 cfs @ 12.01 hrs HW=5,763.44' TW=5,761.89' (Dynamic Tailwater)
1=Culvert (Inlet Controls 16.39 cfs @ 5.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.27' TW=5,761.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 16.168 ac, 31.22% Impervious, Inflow Depth > 0.71" for 100yr-24hr event
Inflow = 16.44 cfs @ 12.00 hrs, Volume= 0.962 af
Outflow = 16.35 cfs @ 12.01 hrs, Volume= 0.962 af, Atten= 1%, Lag= 0.6 min
Primary = 16.35 cfs @ 12.01 hrs, Volume= 0.962 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610-pipe :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,766.43' @ 12.01 hrs Surf.Area= 265 sf Storage= 243 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (880.6 - 880.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	1,713 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,765.00	76	0	0
5,766.00	207	142	142
5,767.00	343	275	417
5,768.00	609	476	893
5,769.00	1,031	820	1,713

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.26'	**24.0" Round Culvert** L= 126.3' Ke= 0.500 Inlet / Outlet Invert= 5,764.26' / 5,761.27' S= 0.0237 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=16.34 cfs @ 12.01 hrs HW=5,766.43' TW=5,763.44' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 16.34 cfs @ 5.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' TW=5,761.27' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

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[57] Hint: Peaked at 5,771.42' (Flood elevation advised)

Inflow Area = 0.745 ac, 15.03% Impervious, Inflow Depth > 0.36" for 100yr-24hr event
Inflow = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af
Outflow = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 11.99 hrs, Volume= 0.022 af
Routed to Pond P620 :
Secondary = 0.06 cfs @ 11.99 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.42' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,767.94'	**12.0" Round Culvert** L= 71.5' Ke= 0.500 Inlet / Outlet Invert= 5,767.94' / 5,767.20' S= 0.0103 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,771.40'	**10.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3 Device 1 5,771.33' **24.0" Horiz. Orifice/Grate X 0.60** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=0.32 cfs @ 11.99 hrs HW=5,771.42' TW=5,766.36' (Dynamic Tailwater)
1=Culvert (Passes 0.32 cfs of 5.84 cfs potential flow)
3=Orifice/Grate (Weir Controls 0.32 cfs @ 0.58 fps)

Secondary OutFlow Max=0.06 cfs @ 11.99 hrs HW=5,771.42' TW=5,761.88' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.31 fps)

Summary for Pond P640:

Information from SGM 2022 Survey
Yes, the existing outlet pipe is back pitched.

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[44] Hint: Outlet device #4 is below defined storage
[92] Warning: Device #3 is above defined storage

Inflow Area = 15.345 ac, 32.17% Impervious, Inflow Depth > 0.73" for 100yr-24hr event
Inflow = 16.13 cfs @ 12.00 hrs, Volume= 0.940 af
Outflow = 16.11 cfs @ 12.00 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.3 min
Primary = 0.94 cfs @ 12.00 hrs, Volume= 0.658 af
Routed to Pond P620 :
Secondary = 15.17 cfs @ 12.00 hrs, Volume= 0.281 af
Routed to Pond P620 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,773.91' @ 12.00 hrs Surf.Area= 1,162 sf Storage= 2,744 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.2 min (879.5 - 862.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	2,853 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,769.00	41	0	0
5,770.00	248	145	145
5,771.00	459	354	498
5,772.00	656	558	1,056
5,773.00	873	765	1,820
5,774.00	1,192	1,033	2,853

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.50'	**24.0" Round Culvert** L= 59.7' Ke= 0.500 Inlet / Outlet Invert= 5,763.42' / 5,764.50' S= -0.0181 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,773.50'	**20.0' long + 10.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,774.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.78'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.94 cfs @ 12.00 hrs HW=5,773.91' TW=5,766.42' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.94 cfs of 41.40 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.94 cfs @ 10.72 fps)

Secondary OutFlow Max=15.17 cfs @ 12.00 hrs HW=5,773.91' TW=5,766.42' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 15.17 cfs @ 1.55 fps)

Summary for Pond P650:

Information from SGM 2022 Survey

[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 15.239 ac, 32.39% Impervious, Inflow Depth > 0.74" for 100yr-24hr event
Inflow = 17.69 cfs @ 11.97 hrs, Volume= 0.939 af
Outflow = 16.12 cfs @ 12.00 hrs, Volume= 0.938 af, Atten= 9%, Lag= 1.7 min
Primary = 16.12 cfs @ 12.00 hrs, Volume= 0.938 af
  Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.98' @ 12.00 hrs Surf.Area= 1,626 sf Storage= 3,948 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.5 min (862.2 - 844.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	6,281 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	79	0	0
5,774.00	334	207	207
5,775.00	638	486	693
5,776.00	916	777	1,470
5,777.00	1,238	1,077	2,547
5,778.00	1,634	1,436	3,983
5,779.00	2,962	2,298	6,281

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.52'	**24.0" Round Culvert** L= 70.6' Ke= 0.500 Inlet / Outlet Invert= 5,769.52' / 5,768.38' S= 0.0161 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,776.96'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,772.75'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.09 cfs @ 12.00 hrs HW=5,777.98' TW=5,773.91' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 16.09 cfs of 30.51 cfs potential flow)
↑—**3=Orifice/Grate** (Orifice Controls 15.24 cfs @ 4.85 fps)
—**4=Orifice/Grate** (Orifice Controls 0.85 cfs @ 9.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,773.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM 2022 Survey

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=592)

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth > 2.18" for 100yr-24hr event
Inflow = 5.70 cfs @ 11.96 hrs, Volume= 0.279 af
Outflow = 5.65 cfs @ 11.97 hrs, Volume= 0.279 af, Atten= 1%, Lag= 0.5 min
Primary = 5.65 cfs @ 11.97 hrs, Volume= 0.279 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.07' @ 11.97 hrs Surf.Area= 247 sf Storage= 17 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (781.2 - 781.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	2,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,779.00	234	0	0
5,780.00	414	324	324
5,781.00	633	524	848
5,782.00	968	801	1,648
5,783.00	1,540	1,254	2,902

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.87'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.87' / 5,773.00' S= 0.0628 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.64 cfs @ 11.97 hrs HW=5,779.07' TW=5,777.89' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.64 cfs @ 3.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

[57] Hint: Peaked at 5,796.60' (Flood elevation advised)

Inflow Area = 13.591 ac, 26.01% Impervious, Inflow Depth > 0.58" for 100yr-24hr event
Inflow = 12.02 cfs @ 11.97 hrs, Volume= 0.658 af
Outflow = 12.02 cfs @ 11.97 hrs, Volume= 0.658 af, Atten= 0%, Lag= 0.0 min
Primary = 12.02 cfs @ 11.97 hrs, Volume= 0.658 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,796.60' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#3	Device 1	5,790.62'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,790.62' / 5,777.57' S= 0.2534 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.00 cfs @ 11.97 hrs HW=5,796.60' TW=5,777.90' (Dynamic Tailwater)
↑**1=Culvert** (Passes 12.00 cfs of 35.90 cfs potential flow)
↑**3=Culvert** (Passes 12.00 cfs of 19.45 cfs potential flow)
↑**4=Orifice/Grate** (Weir Controls 12.00 cfs @ 1.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,777.47' TW=5,761.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.330 ac, 12.66% Impervious, Inflow Depth > 0.59" for 100yr-24hr event
Inflow = 10.95 cfs @ 12.00 hrs, Volume= 0.212 af
Outflow = 10.95 cfs @ 12.00 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min
Primary = 10.95 cfs @ 12.00 hrs, Volume= 0.212 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.00' @ 12.00 hrs Surf.Area= 587 sf Storage= 0 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (835.3 - 835.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.32 cfs @ 12.00 hrs HW=5,752.00' TW=5,736.04' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 13.32 cfs @ 7.54 fps)
└**1=Orifice/Grate** (Passes 13.32 cfs of 36.54 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' TW=5,734.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,758.47' (Flood elevation advised)

Inflow Area = 3.271 ac, 1.41% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af
Outflow = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.00 hrs, Volume= 0.059 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,758.47' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.67 cfs @ 12.00 hrs HW=5,758.47' TW=5,752.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.67 cfs @ 2.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' TW=5,752.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 3.94% Impervious, Inflow Depth > 0.23" for 100yr-24hr event
Inflow = 3.99 cfs @ 12.00 hrs, Volume= 0.610 af
Outflow = 3.99 cfs @ 12.00 hrs, Volume= 0.610 af, Atten= 0%, Lag= 0.0 min
Primary = 3.99 cfs @ 12.00 hrs, Volume= 0.610 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,748.04' @ 12.00 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.98 cfs @ 12.00 hrs HW=5,748.04' TW=5,736.04' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 3.98 cfs @ 2.81 fps)
↑—**1=Orifice/Grate** (Passes 3.98 cfs of 71.49 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P810:

[57] Hint: Peaked at 5,761.51' (Flood elevation advised)

Inflow Area = 31.566 ac, 2.88% Impervious, Inflow Depth > 0.21" for 100yr-24hr event
Inflow = 2.88 cfs @ 12.01 hrs, Volume= 0.554 af
Outflow = 2.88 cfs @ 12.01 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min
Primary = 2.88 cfs @ 12.01 hrs, Volume= 0.554 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,761.51' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.88 cfs @ 12.01 hrs HW=5,761.51' TW=5,748.04' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.88 cfs @ 2.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' TW=5,758.10' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P820:

[57] Hint: Peaked at 5,812.13' (Flood elevation advised)

Inflow Area = 23.436 ac, 1.05% Impervious, Inflow Depth > 0.19" for 100yr-24hr event
Inflow = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af
Outflow = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af, Atten= 0%, Lag= 0.0 min
Primary = 1.87 cfs @ 12.18 hrs, Volume= 0.372 af
Routed to Pond P810 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.13' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.86 cfs @ 12.18 hrs HW=5,812.13' TW=5,761.47' (Dynamic Tailwater)
2=Culvert (Passes 1.86 cfs of 107.00 cfs potential flow)
1=Orifice/Grate (Weir Controls 1.86 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' TW=5,752.28' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P900:

JR Harris & Company Plans 2014 show a pipe on the east side of debris catch basin, but what was built compared to the plans differs from aerial imagery. Based on the pond grading with a low area to the east, it was assumed that there is an existing 12 inch pipe here. The pipe is likely buried which is why it was not picked up by survey. All pipe parameters are assumed. Pipe is assumed to not be clogged even if it likely is clogged.

Inflow Area = 6.007 ac, 2.43% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.76 cfs @ 12.10 hrs, Volume= 0.108 af
Outflow = 0.25 cfs @ 12.66 hrs, Volume= 0.101 af, Atten= 67%, Lag= 33.2 min
Primary = 0.25 cfs @ 12.66 hrs, Volume= 0.101 af
Routed to Pond P670 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P670 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.24' @ 12.66 hrs Surf.Area= 3,200 sf Storage= 686 cf

Plug-Flow detention time= 62.8 min calculated for 0.101 af (94% of inflow)
Center-of-Mass det. time= 33.4 min (991.0 - 957.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,870.00'	98,374 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,870.00	2,448	0	0
5,871.00	5,544	3,996	3,996
5,872.00	9,422	7,483	11,479
5,873.00	11,136	10,279	21,758
5,874.00	12,759	11,948	33,706
5,875.00	14,397	13,578	47,284
5,876.00	16,055	15,226	62,510
5,877.00	17,865	16,960	79,470
5,878.00	19,943	18,904	98,374

Device	Routing	Invert	Outlet Devices
#1	Primary	5,870.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 5,870.00' / 5,869.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,871.50'	**12.0' long + 8.0 '/' SideZ x 100.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.25 cfs @ 12.66 hrs HW=5,870.24' TW=5,796.31' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.25 cfs @ 1.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,870.00' TW=5,777.47' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link S300D:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af
Primary = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af, Atten= 0%, Lag= 0.0 min
Routed to Reach S110 :

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
43.43 43.43

Summary for Link S300S:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af
Primary = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af, Atten= 0%, Lag= 0.0 min
Routed to Pond P200 :

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
10.19 10.19

Appendix D

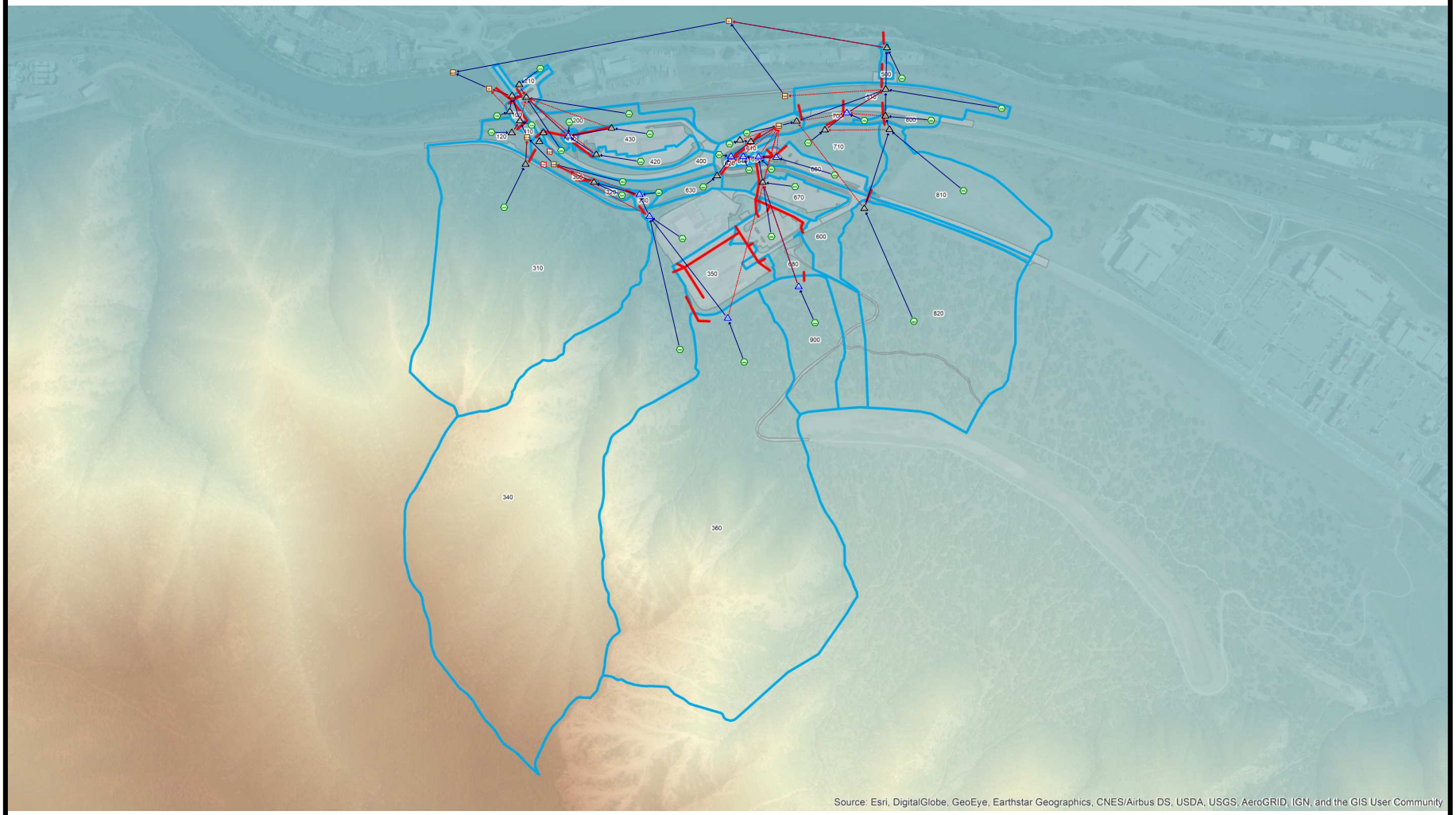
Proposed Conditions HydroCAD Data – Full Development

Proposed – Full Development - HydroCAD Routing Diagram 25-Year Event

Proposed – Full Development - HydroCAD Data 25-Year Event

Proposed – Full Development - HydroCAD Routing Diagram 100-Year Event

Proposed – Full Development - HydroCAD Data 100-Year Event



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Proposed-Full-Dev
Prepared by SGM, Printed 4/6/2022 **25 Year**
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth>0.62"
Tc=5.0 min CN=79 Runoff=0.31 cfs 0.014 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth>0.14"
Tc=5.0 min CN=63 Runoff=0.02 cfs 0.002 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.13 cfs 0.013 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=1.12 cfs 0.065 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth>1.93"
Tc=5.0 min CN=98 Runoff=0.94 cfs 0.048 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth>0.18"
Tc=5.0 min CN=65 Runoff=0.42 cfs 0.034 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth>0.16"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=3.76 cfs 0.443 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth>0.28"
Tc=5.0 min CN=69 Runoff=0.14 cfs 0.008 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth>0.14"
Tc=5.0 min CN=63 Runoff=0.03 cfs 0.003 af

Subcatchment340: Runoff Area=61.159 ac 5.21% Impervious Runoff Depth>0.23"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=13.08 cfs 1.147 af

Subcatchment350: Runoff Area=3.950 ac 83.77% Impervious Runoff Depth>1.38"
Tc=5.0 min CN=92 Runoff=9.85 cfs 0.454 af

Subcatchment360: Runoff Area=57.137 ac 0.38% Impervious Runoff Depth>0.33"
Flow Length=3,685' Tc=12.3 min CN=71 Runoff=20.54 cfs 1.573 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth>0.71"
Tc=5.0 min CN=81 Runoff=2.54 cfs 0.114 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth>1.23"
Tc=5.0 min CN=90 Runoff=2.82 cfs 0.128 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth>1.54"
Tc=5.0 min CN=94 Runoff=7.31 cfs 0.345 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth>0.25"
Tc=5.0 min CN=68 Runoff=0.09 cfs 0.005 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.52 cfs 0.050 af

Subcatchment600: Runoff Area=5.143 ac 45.52% Impervious Runoff Depth>0.50"
Tc=5.0 min CN=76 Runoff=4.54 cfs 0.213 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.001 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.745 ac 15.03% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=64 Runoff=0.10 cfs 0.010 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.001 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.001 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth>1.63"
Tc=5.0 min CN=95 Runoff=4.35 cfs 0.209 af

Subcatchment670: Runoff Area=1.879 ac 75.57% Impervious Runoff Depth>1.09"
Tc=5.0 min CN=88 Runoff=3.81 cfs 0.171 af

Subcatchment680: Runoff Area=5.705 ac 34.51% Impervious Runoff Depth>0.36"
Tc=5.0 min CN=72 Runoff=3.36 cfs 0.172 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth>0.54"
Tc=5.0 min CN=77 Runoff=1.02 cfs 0.047 af

Subcatchment710: Runoff Area=3.270 ac 80.00% Impervious Runoff Depth>1.23"
Tc=5.0 min CN=90 Runoff=7.38 cfs 0.335 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth>0.50"
Tc=5.0 min CN=76 Runoff=0.71 cfs 0.034 af

Subcatchment810: Runoff Area=8.130 ac 80.00% Impervious Runoff Depth>1.23"
Tc=5.0 min CN=90 Runoff=18.36 cfs 0.833 af

Subcatchment820: Runoff Area=23.436 ac 80.00% Impervious Runoff Depth>1.23"
Flow Length=1,968' Tc=16.1 min CN=90 Runoff=36.11 cfs 2.395 af

Subcatchment900: Runoff Area=6.007 ac 2.43% Impervious Runoff Depth>0.08"
Flow Length=3,685' Tc=12.3 min CN=59 Runoff=0.07 cfs 0.038 af

Reach N: Inflow=64.16 cfs 4.510 af
Outflow=64.16 cfs 4.510 af

Reach OUT: Inflow=105.45 cfs 8.822 af
Outflow=105.45 cfs 8.822 af

Reach S110: Avg. Flow Depth=0.61' Max Vel=6.48 fps Inflow=29.74 cfs 3.662 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=29.71 cfs 3.661 af

Reach S300: Avg. Flow Depth=0.99' Max Vel=7.58 fps Inflow=26.07 cfs 3.220 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=43.43 cfs Outflow=26.06 cfs 3.219 af

Reach S600: Avg. Flow Depth=0.72' Max Vel=3.67 fps Inflow=14.50 cfs 0.811 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=301.54 cfs Outflow=12.88 cfs 0.810 af

Reach Spill: Inflow=0.56 cfs 0.002 af
Outflow=0.56 cfs 0.002 af

Reach W: Inflow=41.36 cfs 4.311 af
Outflow=41.36 cfs 4.311 af

Pond P-OUT: Peak Elev=5,698.01' Inflow=41.31 cfs 4.308 af
Primary=41.31 cfs 4.308 af Secondary=0.00 cfs 0.000 af Outflow=41.31 cfs 4.308 af

Pond P100: Peak Elev=5,702.77' Inflow=0.31 cfs 0.014 af
Primary=0.25 cfs 0.011 af Secondary=0.06 cfs 0.003 af Outflow=0.31 cfs 0.014 af

Pond P110: Peak Elev=5,708.25' Inflow=29.84 cfs 3.676 af
Primary=23.21 cfs 3.016 af Secondary=6.64 cfs 0.660 af Outflow=29.84 cfs 3.676 af

Pond P120: Peak Elev=5,724.76' Inflow=0.13 cfs 0.013 af
Primary=0.13 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.013 af

Pond P200: Peak Elev=5,703.28' Inflow=19.59 cfs 1.281 af
Primary=19.59 cfs 1.281 af Secondary=0.00 cfs 0.000 af Outflow=19.59 cfs 1.281 af

Pond P210: Peak Elev=5,704.13' Inflow=0.94 cfs 0.048 af
Primary=0.94 cfs 0.048 af Secondary=0.00 cfs 0.000 af Outflow=0.94 cfs 0.048 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.16' Inflow=3.76 cfs 0.443 af
Primary=3.76 cfs 0.443 af Secondary=0.00 cfs 0.000 af Outflow=3.76 cfs 0.443 af

Pond P320: Peak Elev=5,749.67' Inflow=17.81 cfs 3.094 af
Primary=17.81 cfs 3.094 af Secondary=0.00 cfs 0.000 af Outflow=17.81 cfs 3.094 af

Pond P330: Peak Elev=5,774.94' Storage=126 cf Inflow=25.59 cfs 3.178 af
Primary=17.70 cfs 3.086 af Secondary=7.89 cfs 0.092 af Outflow=25.59 cfs 3.178 af

Pond P340: Peak Elev=5,784.16' Storage=208 cf Inflow=25.58 cfs 3.175 af
Primary=25.56 cfs 3.175 af Secondary=0.00 cfs 0.000 af Outflow=25.56 cfs 3.175 af

Pond P360: Peak Elev=5,871.11' Storage=8,096 cf Inflow=20.54 cfs 1.573 af
Primary=8.21 cfs 1.573 af Secondary=0.00 cfs 0.000 af Outflow=8.21 cfs 1.573 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.53' Storage=4,337 cf Inflow=10.13 cfs 0.474 af
Primary=9.87 cfs 0.394 af Secondary=0.00 cfs 0.000 af Outflow=9.87 cfs 0.394 af

Pond P420: Peak Elev=5,750.70' Inflow=2.82 cfs 0.128 af
Primary=2.82 cfs 0.128 af Secondary=0.00 cfs 0.000 af Outflow=2.82 cfs 0.128 af

Pond P430: Peak Elev=5,740.67' Inflow=7.31 cfs 0.345 af
Primary=7.31 cfs 0.345 af Secondary=0.00 cfs 0.000 af Outflow=7.31 cfs 0.345 af

Pond P500: Peak Elev=5,709.13' Inflow=63.59 cfs 4.509 af
Primary=63.59 cfs 4.509 af Secondary=0.00 cfs 0.000 af Outflow=63.59 cfs 4.509 af

Pond P510: Peak Elev=5,737.13' Inflow=64.08 cfs 4.505 af
Primary=63.51 cfs 4.503 af Secondary=0.56 cfs 0.002 af Outflow=64.08 cfs 4.505 af

Pond P600: Peak Elev=5,755.23' Inflow=12.88 cfs 0.810 af
Primary=12.63 cfs 0.810 af Secondary=0.25 cfs 0.000 af Outflow=12.88 cfs 0.810 af

Pond P610-inlet: Peak Elev=5,765.54' Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P610-pipe: Peak Elev=5,762.86' Inflow=10.67 cfs 0.598 af
Primary=10.67 cfs 0.598 af Secondary=0.00 cfs 0.000 af Outflow=10.67 cfs 0.598 af

Pond P620: Peak Elev=5,765.77' Storage=98 cf Inflow=10.90 cfs 0.597 af
Primary=10.67 cfs 0.597 af Secondary=0.00 cfs 0.000 af Outflow=10.67 cfs 0.597 af

Pond P630: Peak Elev=5,771.37' Inflow=0.10 cfs 0.010 af
Primary=0.10 cfs 0.010 af Secondary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.010 af

Pond P640: Peak Elev=5,773.81' Storage=2,635 cf Inflow=11.03 cfs 0.586 af
Primary=0.93 cfs 0.489 af Secondary=9.87 cfs 0.097 af Outflow=10.80 cfs 0.586 af

Pond P650: Peak Elev=5,777.59' Storage=3,339 cf Inflow=11.42 cfs 0.586 af
Primary=11.03 cfs 0.586 af Secondary=0.00 cfs 0.000 af Outflow=11.03 cfs 0.586 af

Pond P660: Peak Elev=5,779.00' Storage=0 cf Inflow=4.35 cfs 0.209 af
Primary=4.35 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=4.35 cfs 0.209 af

Pond P670: Peak Elev=5,796.49' Inflow=7.12 cfs 0.377 af
Primary=7.12 cfs 0.377 af Secondary=0.00 cfs 0.000 af Outflow=7.12 cfs 0.377 af

Pond P700: Peak Elev=5,752.00' Storage=0 cf Inflow=8.39 cfs 0.383 af
Primary=8.39 cfs 0.383 af Secondary=0.00 cfs 0.000 af Outflow=8.39 cfs 0.383 af

Pond P710: Peak Elev=5,759.65' Inflow=7.38 cfs 0.335 af
Primary=7.38 cfs 0.335 af Secondary=0.00 cfs 0.000 af Outflow=7.38 cfs 0.335 af

Pond P800: Peak Elev=5,749.89' Inflow=45.27 cfs 3.262 af
Primary=45.27 cfs 3.262 af Secondary=0.00 cfs 0.000 af Outflow=45.27 cfs 3.262 af

Pond P810: Peak Elev=5,763.44' Inflow=44.65 cfs 3.229 af
Primary=44.65 cfs 3.229 af Secondary=0.00 cfs 0.000 af Outflow=44.65 cfs 3.229 af

Pond P820: Peak Elev=5,812.92' Inflow=36.11 cfs 2.395 af
Primary=36.11 cfs 2.395 af Secondary=0.00 cfs 0.000 af Outflow=36.11 cfs 2.395 af

Pond P900: Peak Elev=5,870.10' Storage=269 cf Inflow=0.07 cfs 0.038 af
Primary=0.05 cfs 0.033 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.033 af

Link S300D: Manual Hydrograph Inflow=43.43 cfs 86.178 af
Primary=43.43 cfs 86.178 af

Link S300S: Manual Hydrograph Inflow=10.19 cfs 20.220 af
Primary=10.19 cfs 20.220 af

Total Runoff Area = 231.060 ac Runoff Volume = 8.910 af Average Runoff Depth = 0.46"
78.16% Pervious = 180.599 ac 21.84% Impervious = 50.461 ac

Summary for Subcatchment 100:

Runoff = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af, Depth> 0.62"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.14"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af, Depth> 0.16"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 1.12 cfs @ 11.99 hrs, Volume= 0.065 af, Depth> 0.28"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af, Depth> 1.93"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.42 cfs @ 12.00 hrs, Volume= 0.034 af, Depth> 0.18"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af, Depth> 0.16"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.14 cfs @ 11.99 hrs, Volume= 0.008 af, Depth> 0.28"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.03 cfs @ 12.01 hrs, Volume= 0.003 af, Depth> 0.14"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 13.08 cfs @ 12.05 hrs, Volume= 1.147 af, Depth> 0.23"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	3.185	98	Impervious
*	0.735	58	A soils
*	37.804	58	B Soils
*	19.435	80	D soils
	61.159	67	Weighted Average
	57.974		94.79% Pervious Area
	3.185		5.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 9.85 cfs @ 11.96 hrs, Volume= 0.454 af, Depth> 1.38"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	3.309	98	Impervious
*	0.462	58	A soils
*	0.008	58	B soils
*	0.171	80	D soils
	3.950	92	Weighted Average
	0.641		16.23% Pervious Area
	3.309		83.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 20.54 cfs @ 12.07 hrs, Volume= 1.573 af, Depth> 0.33"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.216	98	Impervious
*	7.090	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	57.137	71	Weighted Average
	56.921		99.62% Pervious Area
	0.216		0.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 2.54 cfs @ 11.97 hrs, Volume= 0.114 af, Depth> 0.71"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af, Depth> 1.23"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af, Depth> 1.54"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.09 cfs @ 11.99 hrs, Volume= 0.005 af, Depth> 0.25"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.52 cfs @ 12.01 hrs, Volume= 0.050 af, Depth> 0.16"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 4.54 cfs @ 11.97 hrs, Volume= 0.213 af, Depth> 0.50"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.341	98	Impervious
*	2.802	58	A soils
	5.143	76	Weighted Average
	2.802		54.48% Pervious Area
	2.341		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af, Depth> 0.08"
Routed to Pond P610-inlet :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af, Depth> 0.16"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.112	98	Impervious
*	0.633	58	A soils
	0.745	64	Weighted Average
	0.633		84.97% Pervious Area
	0.112		15.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.001 af, Depth> 0.06"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 12.91 hrs, Volume= 0.001 af, Depth> 0.06"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af, Depth> 1.63"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 3.81 cfs @ 11.96 hrs, Volume= 0.171 af, Depth> 1.09"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.420	98	Impervious
*	0.459	58	A soils
	1.879	88	Weighted Average
	0.459		24.43% Pervious Area
	1.420		75.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 3.36 cfs @ 11.98 hrs, Volume= 0.172 af, Depth> 0.36"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	1.969	98	Impervious
*	3.736	58	A soils
	5.705	72	Weighted Average
	3.736		65.49% Pervious Area
	1.969		34.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 1.02 cfs @ 11.97 hrs, Volume= 0.047 af, Depth> 0.54"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 7.38 cfs @ 11.96 hrs, Volume= 0.335 af, Depth> 1.23"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	2.616	98	Impervious
*	0.654	58	A Soils
	3.270	90	Weighted Average
	0.654		20.00% Pervious Area
	2.616		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.71 cfs @ 11.97 hrs, Volume= 0.034 af, Depth> 0.50"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 18.36 cfs @ 11.96 hrs, Volume= 0.833 af, Depth> 1.23"
Routed to Pond P810 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	6.504	98	Impervious
*	1.626	58	A Soils
	8.130	90	Weighted Average
	1.626		20.00% Pervious Area
	6.504		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

[47] Hint: Peak is 114% of capacity of segment #3

Runoff = 36.11 cfs @ 12.08 hrs, Volume= 2.395 af, Depth> 1.23"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	18.749	98	Impervious
*	4.687	58	A soils
	23.436	90	Weighted Average
	4.687		20.00% Pervious Area
	18.749		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Subcatchment 900:

Runoff = 0.07 cfs @ 12.51 hrs, Volume= 0.038 af, Depth> 0.08"
Routed to Pond P900 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 25yr-24hr Rainfall=2.16"

	Area (ac)	CN	Description
*	0.146	98	Impervious
*	5.861	58	A soils
*	0.000	58	B soils
*	0.000	80	D Soils
	6.007	59	Weighted Average
	5.861		97.57% Pervious Area
	0.146		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Reach N:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 62.213 ac, 59.14% Impervious, Inflow Depth > 0.87" for 25yr-24hr event
Inflow = 64.16 cfs @ 12.02 hrs, Volume= 4.510 af
Outflow = 64.16 cfs @ 12.02 hrs, Volume= 4.510 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 231.060 ac, 21.84% Impervious, Inflow Depth > 0.46" for 25yr-24hr event
Inflow = 105.45 cfs @ 12.02 hrs, Volume= 8.822 af
Outflow = 105.45 cfs @ 12.02 hrs, Volume= 8.822 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S110:

Ditch Parameters from SGM 2015 Survey

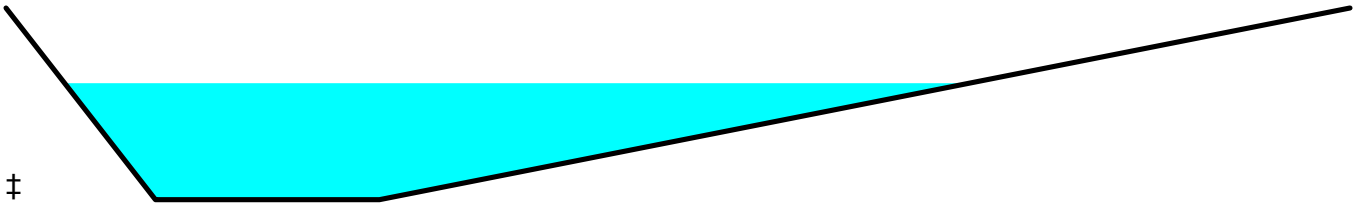
[62] Hint: Exceeded Reach S300 OUTLET depth by 7.00' @ 0.00 hrs

Inflow Area = 158.376 ac, 4.88% Impervious, Inflow Depth > 0.28" for 25yr-24hr event
Inflow = 29.74 cfs @ 12.03 hrs, Volume= 3.662 af
Outflow = 29.71 cfs @ 12.04 hrs, Volume= 3.661 af, Atten= 0%, Lag= 0.2 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.48 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.70 fps, Avg. Travel Time= 0.7 min

Peak Storage= 504 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 12.10'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

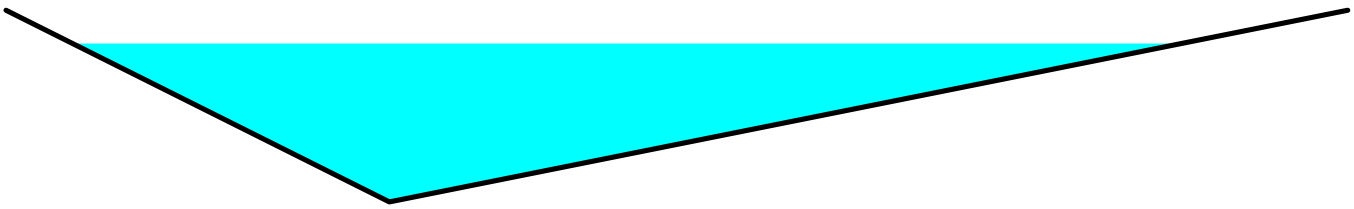
Ditch Parameters from SGM 2015 Survey

Inflow Area = 125.158 ac, 5.79% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 26.07 cfs @ 12.03 hrs, Volume= 3.220 af
Outflow = 26.06 cfs @ 12.03 hrs, Volume= 3.219 af, Atten= 0%, Lag= 0.2 min
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.58 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.49 fps, Avg. Travel Time= 0.5 min

Peak Storage= 378 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.99' , Surface Width= 6.94'
Bank-Full Depth= 1.20' Flow Area= 5.0 sf, Capacity= 43.43 cfs

0.00' x 1.20' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 5.0 '/' Top Width= 8.40'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



Summary for Reach S600:

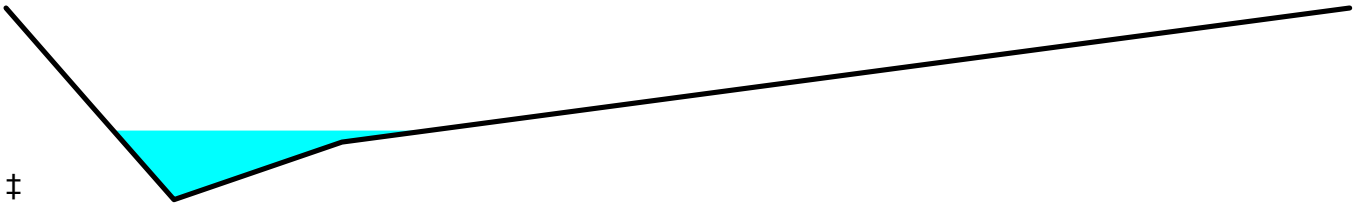
Parameters from 2015 SGM survey

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.45" for 25yr-24hr event
Inflow = 14.50 cfs @ 12.01 hrs, Volume= 0.811 af
Outflow = 12.88 cfs @ 12.03 hrs, Volume= 0.810 af, Atten= 11%, Lag= 1.3 min
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.67 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 3.0 min

Peak Storage= 923 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.72' , Surface Width= 11.31'
Bank-Full Depth= 2.00' Flow Area= 41.4 sf, Capacity= 301.54 cfs

Custom cross-section, Length= 263.0' Slope= 0.0266 '/'
Constant n= 0.030 Short grass
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-6.00	5,761.00	0.00
-3.00	5,760.00	1.00
0.00	5,759.00	2.00
6.00	5,759.60	1.40
42.00	5,761.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Width (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0.0	0	0.00
0.60	2.3	7.9	7.8	615	8.38
1.00	7.8	19.5	19.3	2,040	33.92
2.00	41.4	48.4	48.0	10,888	301.54

Summary for Reach Spill:

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 0.56 cfs @ 12.02 hrs, Volume= 0.002 af
Outflow = 0.56 cfs @ 12.02 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 168.847 ac, 8.09% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 41.36 cfs @ 12.01 hrs, Volume= 4.311 af
Outflow = 41.36 cfs @ 12.01 hrs, Volume= 4.311 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

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[57] Hint: Peaked at 5,698.01' (Flood elevation advised)

Inflow Area = 168.847 ac, 8.09% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 41.31 cfs @ 12.01 hrs, Volume= 4.308 af
Outflow = 41.31 cfs @ 12.01 hrs, Volume= 4.308 af, Atten= 0%, Lag= 0.0 min
Primary = 41.31 cfs @ 12.01 hrs, Volume= 4.308 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,698.01' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,705.05'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=41.26 cfs @ 12.01 hrs HW=5,698.01' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 41.26 cfs @ 7.37 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

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[57] Hint: Peaked at 5,702.77' (Flood elevation advised)

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth > 0.62" for 25yr-24hr event
Inflow = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af
Outflow = 0.31 cfs @ 11.97 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 11.97 hrs, Volume= 0.011 af
Routed to Pond P-OUT :
Secondary = 0.06 cfs @ 11.97 hrs, Volume= 0.003 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.77' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.25 cfs @ 11.97 hrs HW=5,702.77' TW=5,697.83' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 0.25 cfs of 27.02 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.25 cfs @ 0.57 fps)

Secondary OutFlow Max=0.06 cfs @ 11.97 hrs HW=5,702.77' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.41 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

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[57] Hint: Peaked at 5,708.25' (Flood elevation advised)
[61] Hint: Exceeded Reach S110 outlet invert by 0.25' @ 12.04 hrs

Inflow Area = 159.494 ac, 4.95% Impervious, Inflow Depth > 0.28" for 25yr-24hr event
Inflow = 29.84 cfs @ 12.04 hrs, Volume= 3.676 af
Outflow = 29.84 cfs @ 12.04 hrs, Volume= 3.676 af, Atten= 0%, Lag= 0.0 min
Primary = 23.21 cfs @ 12.04 hrs, Volume= 3.016 af
Routed to Pond P-OUT :
Secondary = 6.64 cfs @ 12.04 hrs, Volume= 0.660 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.25' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 16.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=23.17 cfs @ 12.04 hrs HW=5,708.25' TW=5,697.95' (Dynamic Tailwater)
└─**3=Culvert** (Passes 23.17 cfs of 135.99 cfs potential flow)
└─**2=Culvert** (Passes 23.17 cfs of 80.19 cfs potential flow)
└─**1=Orifice/Grate** (Weir Controls 23.17 cfs @ 1.94 fps)

Secondary OutFlow Max=6.63 cfs @ 12.04 hrs HW=5,708.25' TW=5,703.21' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 6.63 cfs @ 1.38 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

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[57] Hint: Peaked at 5,724.76' (Flood elevation advised)

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af
Outflow = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.01 hrs, Volume= 0.013 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.76' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.13 cfs @ 12.01 hrs HW=5,724.76' TW=5,708.24' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.13 cfs of 132.94 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.13 cfs @ 0.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' TW=5,701.20' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

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[57] Hint: Peaked at 5,703.28' (Flood elevation advised)

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth > 1.69" for 25yr-24hr event
Inflow = 19.59 cfs @ 11.99 hrs, Volume= 1.281 af
Outflow = 19.59 cfs @ 11.99 hrs, Volume= 1.281 af, Atten= 0%, Lag= 0.0 min
Primary = 19.59 cfs @ 11.99 hrs, Volume= 1.281 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.28' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=19.57 cfs @ 11.99 hrs HW=5,703.28' TW=5,697.95' (Dynamic Tailwater)
└**2=Culvert** (Passes 19.57 cfs of 27.64 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 19.57 cfs @ 2.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' TW=5,695.57' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

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[57] Hint: Peaked at 5,704.13' (Flood elevation advised)

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth > 1.93" for 25yr-24hr event
Inflow = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af
Outflow = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 11.96 hrs, Volume= 0.048 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,704.13' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.93 cfs @ 11.96 hrs HW=5,704.13' TW=5,703.24' (Dynamic Tailwater)
2=Culvert (Passes 0.93 cfs of 14.28 cfs potential flow)
1=Orifice/Grate (Orifice Controls 0.93 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' TW=5,698.94' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P310:

[57] Hint: Peaked at 5,746.16' (Flood elevation advised)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Outflow = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af, Atten= 0%, Lag= 0.0 min
Primary = 3.76 cfs @ 12.04 hrs, Volume= 0.443 af
Routed to Reach S110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.16' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.75 cfs @ 12.04 hrs HW=5,746.16' TW=5,715.61' (Dynamic Tailwater)
└**2=Culvert** (Passes 3.75 cfs of 96.86 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 3.75 cfs @ 1.31 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' TW=5,715.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,749.67' (Flood elevation advised)

Inflow Area = 122.883 ac, 5.57% Impervious, Inflow Depth > 0.30" for 25yr-24hr event
Inflow = 17.81 cfs @ 12.03 hrs, Volume= 3.094 af
Outflow = 17.81 cfs @ 12.03 hrs, Volume= 3.094 af, Atten= 0%, Lag= 0.0 min
Primary = 17.81 cfs @ 12.03 hrs, Volume= 3.094 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.67' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.80 cfs @ 12.03 hrs HW=5,749.67' TW=5,715.99' (Dynamic Tailwater)
└**2=Culvert** (Passes 17.80 cfs of 77.39 cfs potential flow)
└**1=Culvert** (Inlet Controls 17.80 cfs @ 4.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' TW=5,715.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 122.531 ac, 5.51% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 25.59 cfs @ 12.03 hrs, Volume= 3.178 af
Outflow = 25.59 cfs @ 12.03 hrs, Volume= 3.178 af, Atten= 0%, Lag= 0.1 min
Primary = 17.70 cfs @ 12.03 hrs, Volume= 3.086 af
Routed to Pond P320 :
Secondary = 7.89 cfs @ 12.03 hrs, Volume= 0.092 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,774.94' @ 12.03 hrs Surf.Area= 160 sf Storage= 126 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (905.9 - 905.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	137 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	6	0	0
5,774.00	50	28	28
5,775.00	167	109	137

Device	Routing	Invert	Outlet Devices
#1	Primary	5,772.57'	**24.0" Round Culvert** L= 43.6' Ke= 0.500 Inlet / Outlet Invert= 5,772.57' / 5,767.34' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.69 cfs @ 12.03 hrs HW=5,774.94' TW=5,749.67' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 17.69 cfs @ 5.63 fps)

Secondary OutFlow Max=7.87 cfs @ 12.03 hrs HW=5,774.94' TW=5,715.99' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.87 cfs @ 1.65 fps)

Summary for Pond P340:

Information from SGM 2022 Survey

Inflow Area = 122.246 ac, 5.49% Impervious, Inflow Depth > 0.31" for 25yr-24hr event
Inflow = 25.58 cfs @ 12.02 hrs, Volume= 3.175 af
Outflow = 25.56 cfs @ 12.03 hrs, Volume= 3.175 af, Atten= 0%, Lag= 0.2 min
Primary = 25.56 cfs @ 12.03 hrs, Volume= 3.175 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,784.16' @ 12.03 hrs Surf.Area= 195 sf Storage= 208 cf

Plug-Flow detention time= 0.2 min calculated for 3.173 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (905.8 - 905.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,781.00'	1,480 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,781.00	0	0	0
5,782.00	17	9	9
5,783.00	74	46	54
5,784.00	175	125	179
5,785.00	299	237	416
5,786.00	499	399	815
5,787.00	832	666	1,480

Device	Routing	Invert	Outlet Devices
#1	Primary	5,781.92'	**36.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 5,781.92' / 5,781.38' S= 0.0120 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

#2 Secondary 5,786.00' **25.0' long + 7.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=25.53 cfs @ 12.03 hrs HW=5,784.16' TW=5,774.94' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 25.53 cfs @ 6.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,781.00' TW=5,715.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side. Pipe is currently filled with sediment, but is modeled assuming the pipe is not clogged.

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=549)

Inflow Area = 57.137 ac, 0.38% Impervious, Inflow Depth > 0.33" for 25yr-24hr event
Inflow = 20.54 cfs @ 12.07 hrs, Volume= 1.573 af
Outflow = 8.21 cfs @ 12.26 hrs, Volume= 1.573 af, Atten= 60%, Lag= 11.5 min
Primary = 8.21 cfs @ 12.26 hrs, Volume= 1.573 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,871.11' @ 12.26 hrs Surf.Area= 7,706 sf Storage= 8,096 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (913.0 - 908.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	114,520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,868.00	35	0	0
5,869.00	188	112	112
5,870.00	3,402	1,795	1,907
5,871.00	7,349	5,376	7,282
5,872.00	10,652	9,001	16,283
5,873.00	12,551	11,602	27,884
5,874.00	14,430	13,491	41,375
5,875.00	16,332	15,381	56,756
5,876.00	18,262	17,297	74,053
5,877.00	20,237	19,250	93,302
5,878.00	22,198	21,218	114,520

Device	Routing	Invert	Outlet Devices
#1	Primary	5,866.85'	**15.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.21 cfs @ 12.26 hrs HW=5,871.11' TW=5,783.46' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 8.21 cfs @ 6.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth > 1.42" for 25yr-24hr event
Inflow = 10.13 cfs @ 11.96 hrs, Volume= 0.474 af
Outflow = 9.87 cfs @ 11.97 hrs, Volume= 0.394 af, Atten= 3%, Lag= 0.9 min
Primary = 9.87 cfs @ 11.97 hrs, Volume= 0.394 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.53' @ 11.97 hrs Surf.Area= 1,764 sf Storage= 4,337 cf

Plug-Flow detention time= 108.7 min calculated for 0.394 af (83% of inflow)
Center-of-Mass det. time= 35.3 min (837.6 - 802.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=9.85 cfs @ 11.97 hrs HW=5,736.53' TW=5,703.27' (Dynamic Tailwater)
└**2=Culvert** (Passes 9.85 cfs of 19.44 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.85 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

[57] Hint: Peaked at 5,750.70' (Flood elevation advised)

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth > 1.23" for 25yr-24hr event
Inflow = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af
Outflow = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 2.82 cfs @ 11.96 hrs, Volume= 0.128 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.70' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.82 cfs @ 11.96 hrs HW=5,750.70' TW=5,736.52' (Dynamic Tailwater)
└**2=Culvert** (Passes 2.82 cfs of 15.09 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.82 cfs @ 1.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' TW=5,698.94' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

[57] Hint: Peaked at 5,740.67' (Flood elevation advised)

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth > 1.54" for 25yr-24hr event
Inflow = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af
Outflow = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af, Atten= 0%, Lag= 0.0 min
Primary = 7.31 cfs @ 11.96 hrs, Volume= 0.345 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.67' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.30 cfs @ 11.96 hrs HW=5,740.67' TW=5,736.52' (Dynamic Tailwater)
2=Culvert (Passes 7.30 cfs of 12.20 cfs potential flow)
1=Orifice/Grate (Weir Controls 7.30 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' TW=5,698.94' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P500:

[57] Hint: Peaked at 5,709.13' (Flood elevation advised)

Inflow Area = 62.213 ac, 59.14% Impervious, Inflow Depth > 0.87" for 25yr-24hr event
Inflow = 63.59 cfs @ 12.02 hrs, Volume= 4.509 af
Outflow = 63.59 cfs @ 12.02 hrs, Volume= 4.509 af, Atten= 0%, Lag= 0.0 min
Primary = 63.59 cfs @ 12.02 hrs, Volume= 4.509 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,709.13' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=63.52 cfs @ 12.02 hrs HW=5,709.13' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 63.52 cfs @ 6.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

[57] Hint: Peaked at 5,737.13' (Flood elevation advised)

Inflow Area = 61.954 ac, 59.28% Impervious, Inflow Depth > 0.87" for 25yr-24hr event
Inflow = 64.08 cfs @ 12.02 hrs, Volume= 4.505 af
Outflow = 64.08 cfs @ 12.02 hrs, Volume= 4.505 af, Atten= 0%, Lag= 0.0 min
Primary = 63.51 cfs @ 12.02 hrs, Volume= 4.503 af
Routed to Pond P500 :
Secondary = 0.56 cfs @ 12.02 hrs, Volume= 0.002 af
Routed to Reach Spill :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,737.13' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=63.44 cfs @ 12.02 hrs HW=5,737.13' TW=5,709.13' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 63.44 cfs @ 6.02 fps)

Secondary OutFlow Max=0.55 cfs @ 12.02 hrs HW=5,737.13' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.82 fps)

Summary for Pond P600:

Information from SGM survey 2014

[62] Hint: Exceeded Reach S600 OUTLET depth by 0.51' @ 12.03 hrs

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.45" for 25yr-24hr event
Inflow = 12.88 cfs @ 12.03 hrs, Volume= 0.810 af
Outflow = 12.88 cfs @ 12.03 hrs, Volume= 0.810 af, Atten= 0%, Lag= 0.0 min
Primary = 12.63 cfs @ 12.03 hrs, Volume= 0.810 af
Routed to Pond P510 :
Secondary = 0.25 cfs @ 12.03 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,755.23' @ 12.03 hrs
Flood Elev= 5,756.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	5,755.00'	**Asymmetrical Weir, C= 2.70** Offset (feet) -6.00 -3.50 0.00 6.00 26.00 Elev. (feet) 5,757.00 5,756.00 5,755.00 5,756.20 5,757.00

Primary OutFlow Max=12.62 cfs @ 12.03 hrs HW=5,755.23' TW=5,737.10' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 12.62 cfs @ 7.14 fps)
↑—**2=Orifice/Grate** (Passes 12.62 cfs of 32.06 cfs potential flow)

Secondary OutFlow Max=0.24 cfs @ 12.03 hrs HW=5,755.23' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Asymmetrical Weir** (Weir Controls 0.24 cfs @ 0.52 fps)

Summary for Pond P610-inlet:

Information from SGM 2022 Survey

Inflow Area = 0.231 ac, 3.03% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 12.39 hrs, Volume= 0.001 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.54' @ 12.39 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Secondary	5,766.89'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 12.39 hrs HW=5,765.54' TW=5,761.87' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.54' TW=5,761.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610-pipe:

Information from SGM 2022 Survey

Inflow Area = 16.399 ac, 30.83% Impervious, Inflow Depth > 0.44" for 25yr-24hr event
Inflow = 10.67 cfs @ 12.01 hrs, Volume= 0.598 af
Outflow = 10.67 cfs @ 12.01 hrs, Volume= 0.598 af, Atten= 0%, Lag= 0.0 min
Primary = 10.67 cfs @ 12.01 hrs, Volume= 0.598 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,762.86' @ 12.01 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.27'	**24.0" Round Culvert** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 5,761.27' / 5,759.70' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.33 cfs @ 12.01 hrs HW=5,762.85' TW=5,761.69' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 10.33 cfs @ 5.32 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.27' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 16.168 ac, 31.22% Impervious, Inflow Depth > 0.44" for 25yr-24hr event
Inflow = 10.90 cfs @ 12.00 hrs, Volume= 0.597 af
Outflow = 10.67 cfs @ 12.01 hrs, Volume= 0.597 af, Atten= 2%, Lag= 0.4 min
Primary = 10.67 cfs @ 12.01 hrs, Volume= 0.597 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610-pipe :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.77' @ 12.01 hrs Surf.Area= 177 sf Storage= 98 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (885.3 - 885.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	1,713 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,765.00	76	0	0
5,766.00	207	142	142
5,767.00	343	275	417
5,768.00	609	476	893
5,769.00	1,031	820	1,713

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.26'	**24.0" Round Culvert** L= 126.3' Ke= 0.500 Inlet / Outlet Invert= 5,764.26' / 5,761.27' S= 0.0237 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.56 cfs @ 12.01 hrs HW=5,765.76' TW=5,762.85' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 10.56 cfs @ 4.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' TW=5,761.27' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

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[57] Hint: Peaked at 5,771.37' (Flood elevation advised)

Inflow Area = 0.745 ac, 15.03% Impervious, Inflow Depth > 0.16" for 25yr-24hr event
Inflow = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af
Outflow = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 12.01 hrs, Volume= 0.010 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.37' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,767.94'	**12.0" Round Culvert** L= 71.5' Ke= 0.500 Inlet / Outlet Invert= 5,767.94' / 5,767.20' S= 0.0103 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,771.40'	**10.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#3	Device 1	5,771.33'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=0.10 cfs @ 12.01 hrs HW=5,771.37' TW=5,765.74' (Dynamic Tailwater)
1=Culvert (Passes 0.10 cfs of 5.80 cfs potential flow)
3=Orifice/Grate (Weir Controls 0.10 cfs @ 0.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,767.94' TW=5,761.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P640:

Information from SGM 2022 Survey
Yes, the existing outlet pipe is back pitched.

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[44] Hint: Outlet device #4 is below defined storage
[92] Warning: Device #3 is above defined storage

Inflow Area = 15.345 ac, 32.17% Impervious, Inflow Depth > 0.46" for 25yr-24hr event
Inflow = 11.03 cfs @ 11.98 hrs, Volume= 0.586 af
Outflow = 10.80 cfs @ 12.00 hrs, Volume= 0.586 af, Atten= 2%, Lag= 1.3 min
Primary = 0.93 cfs @ 12.00 hrs, Volume= 0.489 af
Routed to Pond P620 :
Secondary = 9.87 cfs @ 12.00 hrs, Volume= 0.097 af
Routed to Pond P620 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,773.81' @ 12.00 hrs Surf.Area= 1,132 sf Storage= 2,635 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.9 min (883.9 - 866.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	2,853 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,769.00	41	0	0
5,770.00	248	145	145
5,771.00	459	354	498
5,772.00	656	558	1,056
5,773.00	873	765	1,820
5,774.00	1,192	1,033	2,853

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.50'	**24.0" Round Culvert** L= 59.7' Ke= 0.500 Inlet / Outlet Invert= 5,763.42' / 5,764.50' S= -0.0181 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,773.50'	**20.0' long + 10.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,774.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.78'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.93 cfs @ 12.00 hrs HW=5,773.81' TW=5,765.69' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.93 cfs of 43.12 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.93 cfs @ 10.62 fps)

Secondary OutFlow Max=9.55 cfs @ 12.00 hrs HW=5,773.81' TW=5,765.73' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 9.55 cfs @ 1.32 fps)

Summary for Pond P650:

Information from SGM 2022 Survey

[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 15.239 ac, 32.39% Impervious, Inflow Depth > 0.46" for 25yr-24hr event
Inflow = 11.42 cfs @ 11.97 hrs, Volume= 0.586 af
Outflow = 11.03 cfs @ 11.98 hrs, Volume= 0.586 af, Atten= 3%, Lag= 1.0 min
Primary = 11.03 cfs @ 11.98 hrs, Volume= 0.586 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.59' @ 11.98 hrs Surf.Area= 1,470 sf Storage= 3,339 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.8 min (865.9 - 849.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	6,281 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	79	0	0
5,774.00	334	207	207
5,775.00	638	486	693
5,776.00	916	777	1,470
5,777.00	1,238	1,077	2,547
5,778.00	1,634	1,436	3,983
5,779.00	2,962	2,298	6,281

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.52'	**24.0" Round Culvert** L= 70.6' Ke= 0.500 Inlet / Outlet Invert= 5,769.52' / 5,768.38' S= 0.0161 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,776.96'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,772.75'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.97 cfs @ 11.98 hrs HW=5,777.58' TW=5,773.61' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 10.97 cfs of 30.15 cfs potential flow)
↑—**3=Orifice/Grate** (Weir Controls 10.14 cfs @ 2.58 fps)
—**4=Orifice/Grate** (Orifice Controls 0.84 cfs @ 9.60 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,773.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth > 1.63" for 25yr-24hr event
Inflow = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af
Outflow = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min
Primary = 4.35 cfs @ 11.96 hrs, Volume= 0.209 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.00' @ 11.96 hrs Surf.Area= 234 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (789.1 - 789.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	2,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,779.00	234	0	0
5,780.00	414	324	324
5,781.00	633	524	848
5,782.00	968	801	1,648
5,783.00	1,540	1,254	2,902

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.87'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.87' / 5,773.00' S= 0.0628 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.17 cfs @ 11.96 hrs HW=5,779.00' TW=5,777.55' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.17 cfs @ 3.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

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[57] Hint: Peaked at 5,796.49' (Flood elevation advised)

Inflow Area = 13.591 ac, 26.01% Impervious, Inflow Depth > 0.33" for 25yr-24hr event
Inflow = 7.12 cfs @ 11.97 hrs, Volume= 0.377 af
Outflow = 7.12 cfs @ 11.97 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min
Primary = 7.12 cfs @ 11.97 hrs, Volume= 0.377 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,796.49' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,790.62'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,790.62' / 5,777.57' S= 0.2534 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.11 cfs @ 11.97 hrs HW=5,796.49' TW=5,777.58' (Dynamic Tailwater)
↑**1=Culvert** (Passes 7.11 cfs of 36.11 cfs potential flow)
↑**3=Culvert** (Passes 7.11 cfs of 19.26 cfs potential flow)
↑**4=Orifice/Grate** (Weir Controls 7.11 cfs @ 1.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,777.47' TW=5,761.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

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[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 4.329 ac, 72.03% Impervious, Inflow Depth > 1.06" for 25yr-24hr event
Inflow = 8.39 cfs @ 11.96 hrs, Volume= 0.383 af
Outflow = 8.39 cfs @ 11.96 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min
Primary = 8.39 cfs @ 11.96 hrs, Volume= 0.383 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.00' @ 11.96 hrs Surf.Area= 587 sf Storage= 0 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (824.9 - 824.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500

Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900
n= 0.013, Flow Area= 1.77 sf

#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.32 cfs @ 11.96 hrs HW=5,752.00' TW=5,736.87' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 13.32 cfs @ 7.54 fps)
└**1=Orifice/Grate** (Passes 13.32 cfs of 36.54 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' TW=5,734.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

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[57] Hint: Peaked at 5,759.65' (Flood elevation advised)

Inflow Area = 3.270 ac, 80.00% Impervious, Inflow Depth > 1.23" for 25yr-24hr event
Inflow = 7.38 cfs @ 11.96 hrs, Volume= 0.335 af
Outflow = 7.38 cfs @ 11.96 hrs, Volume= 0.335 af, Atten= 0%, Lag= 0.0 min
Primary = 7.38 cfs @ 11.96 hrs, Volume= 0.335 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,759.65' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.38 cfs @ 11.96 hrs HW=5,759.65' TW=5,752.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 7.38 cfs @ 5.01 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' TW=5,752.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 79.14% Impervious, Inflow Depth > 1.21" for 25yr-24hr event
Inflow = 45.27 cfs @ 12.01 hrs, Volume= 3.262 af
Outflow = 45.27 cfs @ 12.01 hrs, Volume= 3.262 af, Atten= 0%, Lag= 0.0 min
Primary = 45.27 cfs @ 12.01 hrs, Volume= 3.262 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.89' @ 12.01 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=45.25 cfs @ 12.01 hrs HW=5,749.89' TW=5,737.10' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 45.25 cfs @ 5.41 fps)
└**1=Orifice/Grate** (Passes 45.25 cfs of 137.74 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' TW=5,752.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P810:

[57] Hint: Peaked at 5,763.44' (Flood elevation advised)

Inflow Area = 31.566 ac, 80.00% Impervious, Inflow Depth > 1.23" for 25yr-24hr event
Inflow = 44.65 cfs @ 12.01 hrs, Volume= 3.229 af
Outflow = 44.65 cfs @ 12.01 hrs, Volume= 3.229 af, Atten= 0%, Lag= 0.0 min
Primary = 44.65 cfs @ 12.01 hrs, Volume= 3.229 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,763.44' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=44.64 cfs @ 12.01 hrs HW=5,763.44' TW=5,749.89' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 44.64 cfs @ 5.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' TW=5,758.10' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P820:

[57] Hint: Peaked at 5,812.92' (Flood elevation advised)

Inflow Area = 23.436 ac, 80.00% Impervious, Inflow Depth > 1.23" for 25yr-24hr event
Inflow = 36.11 cfs @ 12.08 hrs, Volume= 2.395 af
Outflow = 36.11 cfs @ 12.08 hrs, Volume= 2.395 af, Atten= 0%, Lag= 0.0 min
Primary = 36.11 cfs @ 12.08 hrs, Volume= 2.395 af
Routed to Pond P810 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.92' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=36.09 cfs @ 12.08 hrs HW=5,812.92' TW=5,763.32' (Dynamic Tailwater)
└**2=Culvert** (Passes 36.09 cfs of 119.75 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 36.09 cfs @ 3.13 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' TW=5,752.28' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P900:

JR Harris & Company Plans 2014 show a pipe on the east side of debris catch basin, but what was built compared to the plans differs from aerial imagery. Based on the pond grading with a low area to the east, it was assumed that there is an existing 12 inch pipe here. The pipe is likely buried which is why it was not picked up by survey. All pipe parameters are assumed. Pipe is assumed to not be clogged even if it likely is clogged.

Inflow Area = 6.007 ac, 2.43% Impervious, Inflow Depth > 0.08" for 25yr-24hr event
Inflow = 0.07 cfs @ 12.51 hrs, Volume= 0.038 af
Outflow = 0.05 cfs @ 15.14 hrs, Volume= 0.033 af, Atten= 33%, Lag= 157.7 min
Primary = 0.05 cfs @ 15.14 hrs, Volume= 0.033 af
Routed to Pond P670 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P670 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.10' @ 15.14 hrs Surf.Area= 2,768 sf Storage= 269 cf

Plug-Flow detention time= 100.4 min calculated for 0.033 af (88% of inflow)
Center-of-Mass det. time= 51.2 min (1,079.6 - 1,028.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,870.00'	98,374 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,870.00	2,448	0	0
5,871.00	5,544	3,996	3,996
5,872.00	9,422	7,483	11,479
5,873.00	11,136	10,279	21,758
5,874.00	12,759	11,948	33,706
5,875.00	14,397	13,578	47,284
5,876.00	16,055	15,226	62,510
5,877.00	17,865	16,960	79,470
5,878.00	19,943	18,904	98,374

Device	Routing	Invert	Outlet Devices
#1	Primary	5,870.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 5,870.00' / 5,869.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,871.50'	**12.0' long + 8.0 '/' SideZ x 100.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.05 cfs @ 15.14 hrs HW=5,870.10' TW=5,796.27' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.05 cfs @ 1.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,870.00' TW=5,777.47' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link S300D:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af
Primary = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
43.43 43.43

Summary for Link S300S:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

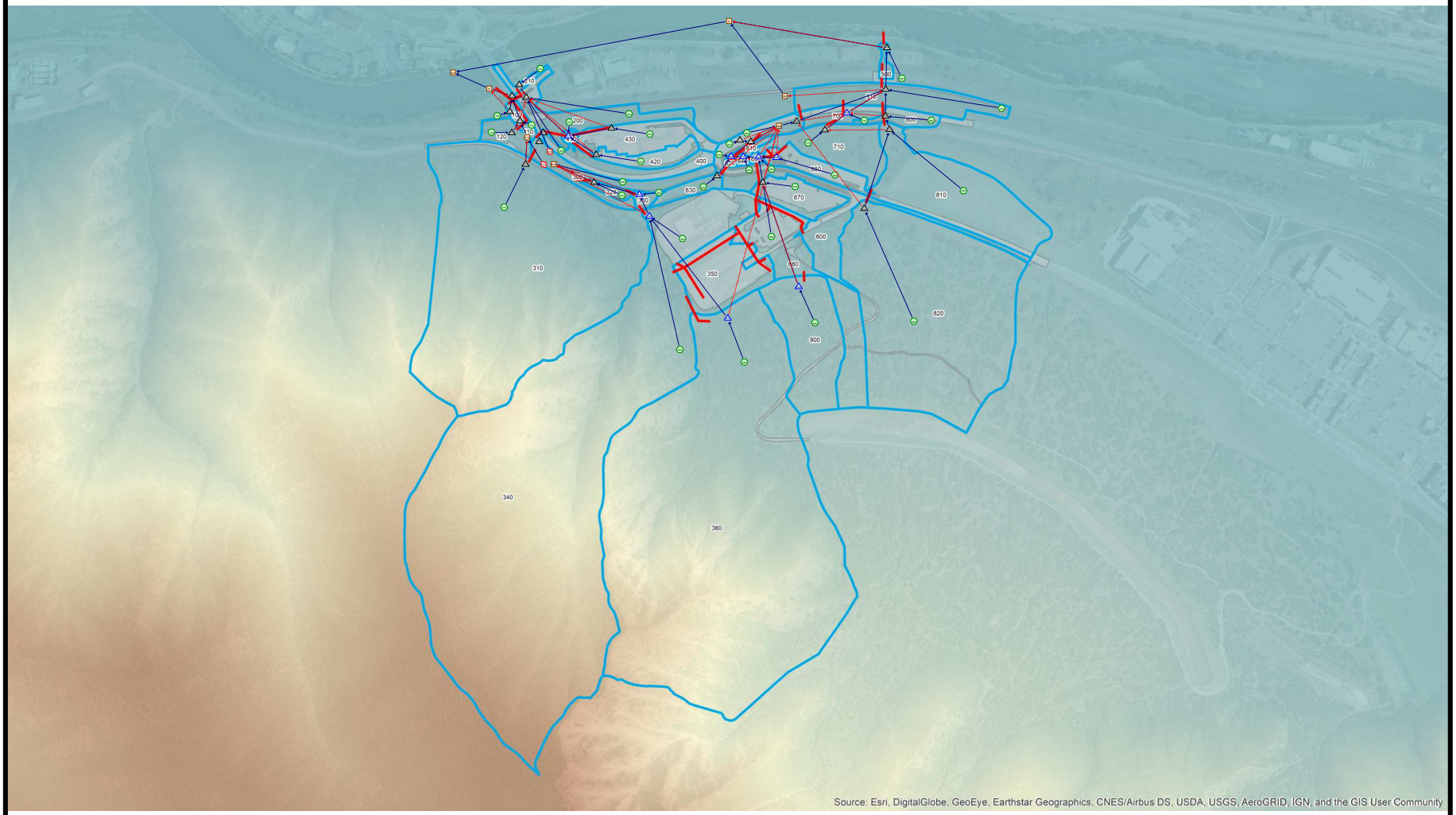
From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af
Primary = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
10.19 10.19



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Proposed-Full-Dev
Prepared by SGM, Printed 4/6/2022 **100 Year**
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 100:

Runoff = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af, Depth> 0.99"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.07 cfs @ 11.99 hrs, Volume= 0.004 af, Depth> 0.32"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af, Depth> 0.36"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 2.55 cfs @ 11.98 hrs, Volume= 0.125 af, Depth> 0.53"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 1.19 cfs @ 11.96 hrs, Volume= 0.063 af, Depth> 2.50"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 1.34 cfs @ 11.98 hrs, Volume= 0.073 af, Depth> 0.39"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af, Depth> 0.35"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.32 cfs @ 11.98 hrs, Volume= 0.016 af, Depth> 0.53"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.13 cfs @ 11.99 hrs, Volume= 0.008 af, Depth> 0.32"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 36.11 cfs @ 12.03 hrs, Volume= 2.317 af, Depth> 0.45"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	3.185	98	Impervious
*	0.735	58	A soils
*	37.804	58	B Soils
*	19.435	80	D soils
	61.159	67	Weighted Average
	57.974		94.79% Pervious Area
	3.185		5.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 13.35 cfs @ 11.96 hrs, Volume= 0.627 af, Depth> 1.91"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	3.309	98	Impervious
*	0.462	58	A soils
*	0.008	58	B soils
*	0.171	80	D soils
	3.950	92	Weighted Average
	0.641		16.23% Pervious Area
	3.309		83.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 44.23 cfs @ 12.06 hrs, Volume= 2.891 af, Depth> 0.61"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.216	98	Impervious
*	7.090	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	57.137	71	Weighted Average
	56.921		99.62% Pervious Area
	0.216		0.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 4.01 cfs @ 11.96 hrs, Volume= 0.179 af, Depth> 1.11"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.19"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af, Depth> 1.74"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af, Depth> 2.09"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.21 cfs @ 11.98 hrs, Volume= 0.011 af, Depth> 0.49"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 1.92 cfs @ 11.99 hrs, Volume= 0.110 af, Depth> 0.36"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 7.92 cfs @ 11.97 hrs, Volume= 0.358 af, Depth> 0.84"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.341	98	Impervious
*	2.802	58	A soils
	5.143	76	Weighted Average
	2.802		54.48% Pervious Area
	2.341		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af, Depth> 0.22"
Routed to Pond P610-inlet :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.19"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af, Depth> 0.36"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.112	98	Impervious
*	0.633	58	A soils
	0.745	64	Weighted Average
	0.633		84.97% Pervious Area
	0.112		15.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.19"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.02 cfs @ 12.01 hrs, Volume= 0.002 af, Depth> 0.19"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 5.70 cfs @ 11.96 hrs, Volume= 0.279 af, Depth> 2.18"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 5.43 cfs @ 11.96 hrs, Volume= 0.247 af, Depth> 1.58"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.420	98	Impervious
*	0.459	58	A soils
	1.879	88	Weighted Average
	0.459		24.43% Pervious Area
	1.420		75.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 6.63 cfs @ 11.97 hrs, Volume= 0.310 af, Depth> 0.65"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	1.969	98	Impervious
*	3.736	58	A soils
	5.705	72	Weighted Average
	3.736		65.49% Pervious Area
	1.969		34.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 1.74 cfs @ 11.97 hrs, Volume= 0.078 af, Depth> 0.89"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 10.26 cfs @ 11.96 hrs, Volume= 0.473 af, Depth> 1.74"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	2.616	98	Impervious
*	0.654	58	A Soils
	3.270	90	Weighted Average
	0.654		20.00% Pervious Area
	2.616		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 1.25 cfs @ 11.97 hrs, Volume= 0.056 af, Depth> 0.84"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 25.52 cfs @ 11.96 hrs, Volume= 1.176 af, Depth> 1.74"
Routed to Pond P810 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	6.504	98	Impervious
*	1.626	58	A Soils
	8.130	90	Weighted Average
	1.626		20.00% Pervious Area
	6.504		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

[47] Hint: Peak is 160% of capacity of segment #3

Runoff = 50.65 cfs @ 12.08 hrs, Volume= 3.381 af, Depth> 1.73"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	18.749	98	Impervious
*	4.687	58	A soils
	23.436	90	Weighted Average
	4.687		20.00% Pervious Area
	18.749		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Subcatchment 900:

Runoff = 0.76 cfs @ 12.10 hrs, Volume= 0.108 af, Depth> 0.22"
Routed to Pond P900 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr-24hr Rainfall=2.73"

	Area (ac)	CN	Description
*	0.146	98	Impervious
*	5.861	58	A soils
*	0.000	58	B soils
*	0.000	80	D Soils
	6.007	59	Weighted Average
	5.861		97.57% Pervious Area
	0.146		2.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Reach N:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 62.213 ac, 59.14% Impervious, Inflow Depth > 1.27" for 100yr-24hr event
Inflow = 95.46 cfs @ 12.01 hrs, Volume= 6.610 af
Outflow = 95.46 cfs @ 12.01 hrs, Volume= 6.610 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 105.902 ac, 40.80% Impervious, Inflow Depth > 13.03" for 100yr-24hr event
Inflow = 182.89 cfs @ 11.99 hrs, Volume= 114.965 af
Outflow = 182.89 cfs @ 11.99 hrs, Volume= 114.965 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S110:

Ditch Parameters from SGM 2015 Survey

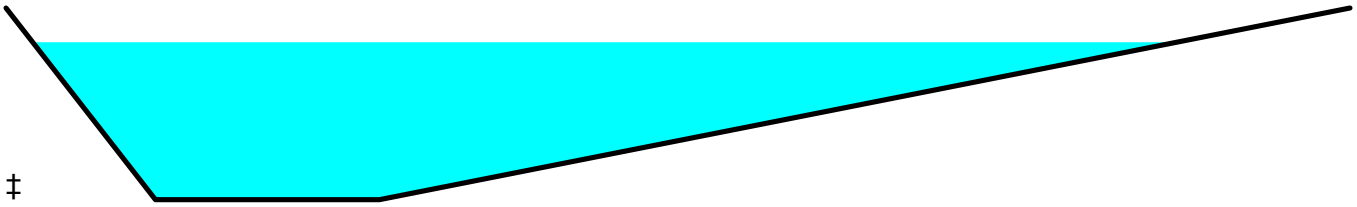
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 31.49" for 100yr-24hr event
Inflow = 58.11 cfs @ 12.02 hrs, Volume= 87.161 af
Outflow = 58.09 cfs @ 12.02 hrs, Volume= 87.145 af, Atten= 0%, Lag= 0.2 min
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.71 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 7.17 fps, Avg. Travel Time= 0.3 min

Peak Storage= 829 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.82' , Surface Width= 15.33'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

Ditch Parameters from SGM 2015 Survey

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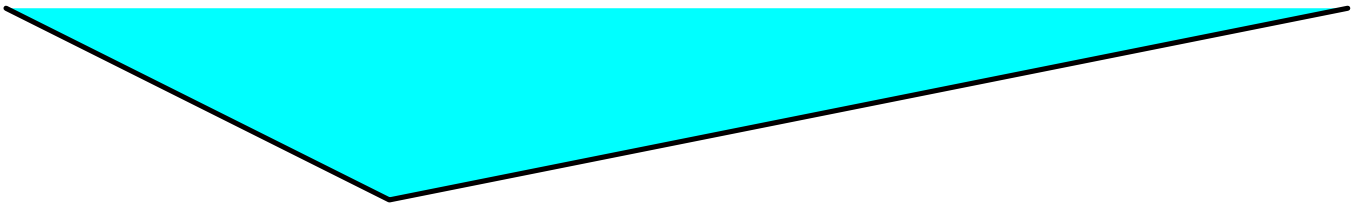
[91] Warning: Storage range exceeded by 0.11'
[55] Hint: Peak inflow is 124% of Manning's capacity

Inflow Area = 125.158 ac, 5.79% Impervious, Inflow Depth > 0.57" for 100yr-24hr event
Inflow = 53.66 cfs @ 12.02 hrs, Volume= 5.931 af
Outflow = 53.62 cfs @ 12.03 hrs, Volume= 5.930 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.04 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.86 fps, Avg. Travel Time= 0.5 min

Peak Storage= 652 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.31' , Surface Width= 9.15'
Bank-Full Depth= 1.20' Flow Area= 5.0 sf, Capacity= 43.43 cfs

0.00' x 1.20' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 5.0 '/' Top Width= 8.40'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



Summary for Reach S600:

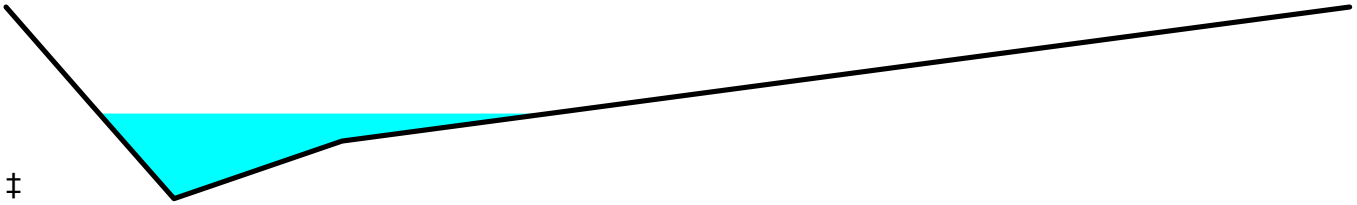
Parameters from 2015 SGM survey

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.74" for 100yr-24hr event
Inflow = 23.70 cfs @ 11.99 hrs, Volume= 1.325 af
Outflow = 23.36 cfs @ 12.00 hrs, Volume= 1.324 af, Atten= 1%, Lag= 1.0 min
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.05 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 2.7 min

Peak Storage= 1,516 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.89' , Surface Width= 16.04'
Bank-Full Depth= 2.00' Flow Area= 41.4 sf, Capacity= 301.54 cfs

Custom cross-section, Length= 263.0' Slope= 0.0266 '/'
Constant n= 0.030 Short grass
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-6.00	5,761.00	0.00
-3.00	5,760.00	1.00
0.00	5,759.00	2.00
6.00	5,759.60	1.40
42.00	5,761.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Width (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0.0	0	0.00
0.60	2.3	7.9	7.8	615	8.38
1.00	7.8	19.5	19.3	2,040	33.92
2.00	41.4	48.4	48.0	10,888	301.54

Summary for Reach Spill:

[40] Hint: Not Described (Outflow=Inflow)

Inflow = 12.79 cfs @ 12.01 hrs, Volume= 0.143 af
Outflow = 12.79 cfs @ 12.01 hrs, Volume= 0.143 af, Atten= 0%, Lag= 0.0 min
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 43.689 ac, 14.69% Impervious, Inflow Depth > 29.76" for 100yr-24hr event
Inflow = 87.95 cfs @ 11.99 hrs, Volume= 108.355 af
Outflow = 87.95 cfs @ 11.99 hrs, Volume= 108.355 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

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[57] Hint: Peaked at 5,699.68' (Flood elevation advised)

Inflow Area = 43.689 ac, 14.69% Impervious, Inflow Depth > 29.76" for 100yr-24hr event
Inflow = 87.85 cfs @ 11.99 hrs, Volume= 108.351 af
Outflow = 87.85 cfs @ 11.99 hrs, Volume= 108.351 af, Atten= 0%, Lag= 0.0 min
Primary = 87.85 cfs @ 11.99 hrs, Volume= 108.351 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,699.68' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,705.05'	**60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=87.82 cfs @ 11.99 hrs HW=5,699.68' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 87.82 cfs @ 6.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,697.64' TW=0.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

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[57] Hint: Peaked at 5,702.78' (Flood elevation advised)

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth > 0.99" for 100yr-24hr event
Inflow = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af
Outflow = 0.51 cfs @ 11.97 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 11.97 hrs, Volume= 0.018 af
Routed to Pond P-OUT :
Secondary = 0.10 cfs @ 11.97 hrs, Volume= 0.005 af
Routed to Reach W :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.78' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.40 cfs @ 11.97 hrs HW=5,702.78' TW=5,699.57' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 0.40 cfs of 27.07 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.40 cfs @ 0.67 fps)

Secondary OutFlow Max=0.10 cfs @ 11.97 hrs HW=5,702.78' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.48 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

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[57] Hint: Peaked at 5,708.43' (Flood elevation advised)
[61] Hint: Exceeded Reach S110 outlet invert by 0.43' @ 12.02 hrs

Inflow Area = 34.336 ac, 1.89% Impervious, Inflow Depth > 30.47" for 100yr-24hr event
Inflow = 58.56 cfs @ 12.02 hrs, Volume= 87.178 af
Outflow = 58.56 cfs @ 12.02 hrs, Volume= 87.178 af, Atten= 0%, Lag= 0.0 min
Primary = 43.26 cfs @ 12.02 hrs, Volume= 66.031 af
Routed to Pond P-OUT :
Secondary = 15.30 cfs @ 12.02 hrs, Volume= 21.147 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.43' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 16.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=43.24 cfs @ 12.02 hrs HW=5,708.43' TW=5,699.54' (Dynamic Tailwater)
└─**3=Culvert** (Passes 43.24 cfs of 138.41 cfs potential flow)
└─**2=Culvert** (Passes 43.24 cfs of 81.49 cfs potential flow)
└─**1=Orifice/Grate** (Weir Controls 43.24 cfs @ 2.39 fps)

Secondary OutFlow Max=15.29 cfs @ 12.02 hrs HW=5,708.43' TW=5,705.64' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 15.29 cfs @ 1.74 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

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[57] Hint: Peaked at 5,724.78' (Flood elevation advised)

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth > 0.36" for 100yr-24hr event
Inflow = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af
Outflow = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 11.99 hrs, Volume= 0.029 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.78' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.50 cfs @ 11.99 hrs HW=5,724.78' TW=5,708.42' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.50 cfs of 133.05 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.50 cfs @ 0.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' TW=5,708.19' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

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[57] Hint: Peaked at 5,705.72' (Flood elevation advised)
[80] Warning: Exceeded Pond P210 by 4.17' @ 12.08 hrs (2.29 cfs 0.045 af)
[80] Warning: Exceeded Pond P210 by 0.36' @ 11.89 hrs (59.63 cfs 0.378 af)

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth > 55.91" for 100yr-24hr event
Inflow = 45.47 cfs @ 11.99 hrs, Volume= 42.302 af
Outflow = 45.47 cfs @ 11.99 hrs, Volume= 42.302 af, Atten= 0%, Lag= 0.0 min
Primary = 36.35 cfs @ 11.99 hrs, Volume= 42.229 af
Routed to Pond P-OUT :
Secondary = 9.12 cfs @ 11.99 hrs, Volume= 0.073 af
Routed to Pond P-OUT :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,705.72' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.34 cfs @ 11.99 hrs HW=5,705.71' TW=5,699.66' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 36.34 cfs @ 11.57 fps)
└**1=Orifice/Grate** (Passes 36.34 cfs of 75.83 cfs potential flow)

Secondary OutFlow Max=8.97 cfs @ 11.99 hrs HW=5,705.71' TW=5,699.66' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir**(Weir Controls 8.97 cfs @ 1.39 fps)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

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[57] Hint: Peaked at 5,705.71' (Flood elevation advised)
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=600)

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth > 2.50" for 100yr-24hr event
Inflow = 1.19 cfs @ 11.96 hrs, Volume= 0.063 af
Outflow = 1.32 cfs @ 12.01 hrs, Volume= 0.063 af, Atten= 0%, Lag= 3.2 min
Primary = 0.79 cfs @ 11.86 hrs, Volume= 0.048 af
Routed to Pond P200 :
Secondary = 1.25 cfs @ 12.01 hrs, Volume= 0.015 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,705.71' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 11.86 hrs HW=5,704.13' TW=5,704.24' (Dynamic Tailwater)
2=Culvert (Controls 0.00 cfs)
1=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=19.93 cfs @ 12.01 hrs HW=5,705.69' TW=5,705.69' (Dynamic Tailwater)
3=Broad-Crested Rectangular Weir(Weir Controls 19.93 cfs @ 0.41 fps)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P310:

[57] Hint: Peaked at 5,746.40' (Flood elevation advised)

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth > 0.35" for 100yr-24hr event
Inflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Outflow = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af, Atten= 0%, Lag= 0.0 min
Primary = 14.68 cfs @ 12.02 hrs, Volume= 0.982 af
Routed to Reach S110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S110 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.40' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.66 cfs @ 12.02 hrs HW=5,746.40' TW=5,715.82' (Dynamic Tailwater)
└**2=Culvert** (Passes 14.66 cfs of 98.27 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 14.66 cfs @ 2.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' TW=5,715.52' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,749.85' (Flood elevation advised)

Inflow Area = 122.883 ac, 5.57% Impervious, Inflow Depth > 0.51" for 100yr-24hr event
Inflow = 21.28 cfs @ 12.02 hrs, Volume= 5.255 af
Outflow = 21.28 cfs @ 12.02 hrs, Volume= 5.255 af, Atten= 0%, Lag= 0.0 min
Primary = 21.28 cfs @ 12.02 hrs, Volume= 5.255 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.85' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=21.28 cfs @ 12.02 hrs HW=5,749.85' TW=5,716.31' (Dynamic Tailwater)
└─**2=Culvert** (Passes 21.28 cfs of 78.76 cfs potential flow)
└─**1=Culvert** (Inlet Controls 21.28 cfs @ 4.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' TW=5,715.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage
[93] Warning: Storage range exceeded by 0.50'

Inflow Area = 122.531 ac, 5.51% Impervious, Inflow Depth > 0.57" for 100yr-24hr event
Inflow = 52.35 cfs @ 12.03 hrs, Volume= 5.842 af
Outflow = 52.34 cfs @ 12.03 hrs, Volume= 5.842 af, Atten= 0%, Lag= 0.0 min
Primary = 21.04 cfs @ 12.03 hrs, Volume= 5.240 af
Routed to Pond P320 :
Secondary = 31.30 cfs @ 12.03 hrs, Volume= 0.602 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,775.50' @ 12.03 hrs Surf.Area= 167 sf Storage= 137 cf

Plug-Flow detention time= 0.0 min calculated for 5.840 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (891.3 - 891.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	137 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	6	0	0
5,774.00	50	28	28
5,775.00	167	109	137

Device	Routing	Invert	Outlet Devices
#1	Primary	5,772.57'	**24.0" Round Culvert** L= 43.6' Ke= 0.500 Inlet / Outlet Invert= 5,772.57' / 5,767.34' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=21.04 cfs @ 12.03 hrs HW=5,775.50' TW=5,749.85' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 21.04 cfs @ 6.70 fps)

Secondary OutFlow Max=31.29 cfs @ 12.03 hrs HW=5,775.50' TW=5,716.31' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 31.29 cfs @ 2.60 fps)

Summary for Pond P340:

Information from SGM 2022 Survey

Inflow Area = 122.246 ac, 5.49% Impervious, Inflow Depth > 0.57" for 100yr-24hr event
Inflow = 53.01 cfs @ 12.02 hrs, Volume= 5.835 af
Outflow = 52.25 cfs @ 12.03 hrs, Volume= 5.834 af, Atten= 1%, Lag= 0.9 min
Primary = 52.25 cfs @ 12.03 hrs, Volume= 5.834 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,785.90' @ 12.03 hrs Surf.Area= 480 sf Storage= 767 cf

Plug-Flow detention time= 0.2 min calculated for 5.834 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (891.2 - 891.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,781.00'	1,480 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,781.00	0	0	0
5,782.00	17	9	9
5,783.00	74	46	54
5,784.00	175	125	179
5,785.00	299	237	416
5,786.00	499	399	815
5,787.00	832	666	1,480

Device	Routing	Invert	Outlet Devices
#1	Primary	5,781.92'	**36.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 5,781.92' / 5,781.38' S= 0.0120 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

#2 Secondary 5,786.00' **25.0' long + 7.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=52.24 cfs @ 12.03 hrs HW=5,785.90' TW=5,775.50' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 52.24 cfs @ 7.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,781.00' TW=5,715.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side. Pipe is currently filled with sediment, but is modeled assuming the pipe is not clogged.

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=485)

Inflow Area = 57.137 ac, 0.38% Impervious, Inflow Depth > 0.61" for 100yr-24hr event
Inflow = 44.23 cfs @ 12.06 hrs, Volume= 2.891 af
Outflow = 10.09 cfs @ 12.40 hrs, Volume= 2.891 af, Atten= 77%, Lag= 20.3 min
Primary = 10.09 cfs @ 12.40 hrs, Volume= 2.891 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,873.09' @ 12.40 hrs Surf.Area= 12,719 sf Storage= 29,015 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 18.0 min (902.8 - 884.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	114,520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,868.00	35	0	0
5,869.00	188	112	112
5,870.00	3,402	1,795	1,907
5,871.00	7,349	5,376	7,282
5,872.00	10,652	9,001	16,283
5,873.00	12,551	11,602	27,884
5,874.00	14,430	13,491	41,375
5,875.00	16,332	15,381	56,756
5,876.00	18,262	17,297	74,053
5,877.00	20,237	19,250	93,302
5,878.00	22,198	21,218	114,520

Device	Routing	Invert	Outlet Devices
#1	Primary	5,866.85'	**15.0" Round Culvert** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.09 cfs @ 12.40 hrs HW=5,873.09' TW=5,783.76' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 10.09 cfs @ 8.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

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[43] Hint: Has no inflow (Outflow=Zero)

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth > 1.94" for 100yr-24hr event
Inflow = 13.61 cfs @ 11.96 hrs, Volume= 0.649 af
Outflow = 13.32 cfs @ 11.97 hrs, Volume= 0.568 af, Atten= 2%, Lag= 0.9 min
Primary = 13.32 cfs @ 11.97 hrs, Volume= 0.568 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.65' @ 11.97 hrs Surf.Area= 1,803 sf Storage= 4,545 cf

Plug-Flow detention time= 90.0 min calculated for 0.568 af (88% of inflow)
Center-of-Mass det. time= 30.7 min (824.6 - 793.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=13.29 cfs @ 11.97 hrs HW=5,736.64' TW=5,705.71' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 13.29 cfs of 19.65 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 13.29 cfs @ 2.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' TW=5,703.17' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

[57] Hint: Peaked at 5,750.74' (Flood elevation advised)

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth > 1.74" for 100yr-24hr event
Inflow = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af
Outflow = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min
Primary = 3.92 cfs @ 11.96 hrs, Volume= 0.181 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.92 cfs @ 11.96 hrs HW=5,750.74' TW=5,736.64' (Dynamic Tailwater)
↑—**2=Culvert** (Passes 3.92 cfs of 15.20 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 3.92 cfs @ 1.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' TW=5,703.17' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

[57] Hint: Peaked at 5,740.74' (Flood elevation advised)

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth > 2.09" for 100yr-24hr event
Inflow = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af
Outflow = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.0 min
Primary = 9.69 cfs @ 11.96 hrs, Volume= 0.467 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.74' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=9.67 cfs @ 11.96 hrs HW=5,740.74' TW=5,736.64' (Dynamic Tailwater)
└**2=Culvert** (Passes 9.67 cfs of 12.14 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.67 cfs @ 2.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' TW=5,703.17' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

[57] Hint: Peaked at 5,709.84' (Flood elevation advised)

Inflow Area = 62.213 ac, 59.14% Impervious, Inflow Depth > 1.25" for 100yr-24hr event
Inflow = 82.67 cfs @ 12.00 hrs, Volume= 6.467 af
Outflow = 82.67 cfs @ 12.00 hrs, Volume= 6.467 af, Atten= 0%, Lag= 0.0 min
Primary = 82.67 cfs @ 12.00 hrs, Volume= 6.467 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,709.84' @ 12.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=82.65 cfs @ 12.00 hrs HW=5,709.84' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 82.65 cfs @ 6.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P510:

[57] Hint: Peaked at 5,737.83' (Flood elevation advised)

Inflow Area = 61.954 ac, 59.28% Impervious, Inflow Depth > 1.28" for 100yr-24hr event
Inflow = 95.26 cfs @ 12.01 hrs, Volume= 6.599 af
Outflow = 95.26 cfs @ 12.01 hrs, Volume= 6.599 af, Atten= 0%, Lag= 0.0 min
Primary = 82.47 cfs @ 12.01 hrs, Volume= 6.456 af
Routed to Pond P500 :
Secondary = 12.79 cfs @ 12.01 hrs, Volume= 0.143 af
Routed to Reach Spill :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,737.83' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=82.45 cfs @ 12.01 hrs HW=5,737.83' TW=5,709.84' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 82.45 cfs @ 6.66 fps)

Secondary OutFlow Max=12.76 cfs @ 12.01 hrs HW=5,737.83' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 12.76 cfs @ 2.32 fps)

Summary for Pond P600:

Information from SGM survey 2014

[62] Hint: Exceeded Reach S600 OUTLET depth by 1.09' @ 12.00 hrs

Inflow Area = 21.542 ac, 34.33% Impervious, Inflow Depth > 0.74" for 100yr-24hr event
Inflow = 23.36 cfs @ 12.00 hrs, Volume= 1.324 af
Outflow = 23.36 cfs @ 12.00 hrs, Volume= 1.324 af, Atten= 0%, Lag= 0.0 min
Primary = 14.62 cfs @ 12.00 hrs, Volume= 1.249 af
Routed to Pond P510 :
Secondary = 8.75 cfs @ 12.00 hrs, Volume= 0.075 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,755.98' @ 12.00 hrs
Flood Elev= 5,756.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	5,755.00'	**Asymmetrical Weir, C= 2.70** Offset (feet) -6.00 -3.50 0.00 6.00 26.00 Elev. (feet) 5,757.00 5,756.00 5,755.00 5,756.20 5,757.00

Primary OutFlow Max=14.61 cfs @ 12.00 hrs HW=5,755.98' TW=5,737.83' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 14.61 cfs @ 8.27 fps)
└**2=Orifice/Grate** (Passes 14.61 cfs of 40.65 cfs potential flow)

Secondary OutFlow Max=8.72 cfs @ 12.00 hrs HW=5,755.98' TW=5,752.70' (Dynamic Tailwater)
└**3=Asymmetrical Weir** (Weir Controls 8.72 cfs @ 1.07 fps)

Summary for Pond P610-inlet:

Information from SGM 2022 Survey

Inflow Area = 0.231 ac, 3.03% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af
Outflow = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.56' @ 12.00 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Secondary	5,766.89'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.05 cfs @ 12.00 hrs HW=5,765.56' TW=5,763.44' (Dynamic Tailwater)
└**2=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.54' TW=5,761.00' (Dynamic Tailwater)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610-pipe:

Information from SGM 2022 Survey

Inflow Area = 16.399 ac, 30.83% Impervious, Inflow Depth > 0.71" for 100yr-24hr event
Inflow = 16.40 cfs @ 12.01 hrs, Volume= 0.966 af
Outflow = 16.40 cfs @ 12.01 hrs, Volume= 0.966 af, Atten= 0%, Lag= 0.0 min
Primary = 16.40 cfs @ 12.01 hrs, Volume= 0.966 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,763.44' @ 12.01 hrs
Flood Elev= 5,767.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.27'	**24.0" Round Culvert** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 5,761.27' / 5,759.70' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,765.54'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.39 cfs @ 12.01 hrs HW=5,763.44' TW=5,761.89' (Dynamic Tailwater)
1=Culvert (Inlet Controls 16.39 cfs @ 5.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.27' TW=5,761.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 16.168 ac, 31.22% Impervious, Inflow Depth > 0.71" for 100yr-24hr event
Inflow = 16.44 cfs @ 12.00 hrs, Volume= 0.962 af
Outflow = 16.35 cfs @ 12.01 hrs, Volume= 0.962 af, Atten= 1%, Lag= 0.6 min
Primary = 16.35 cfs @ 12.01 hrs, Volume= 0.962 af
Routed to Pond P610-pipe :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610-pipe :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,766.43' @ 12.01 hrs Surf.Area= 265 sf Storage= 243 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (880.6 - 880.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	1,713 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,765.00	76	0	0
5,766.00	207	142	142
5,767.00	343	275	417
5,768.00	609	476	893
5,769.00	1,031	820	1,713

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.26'	**24.0" Round Culvert** L= 126.3' Ke= 0.500 Inlet / Outlet Invert= 5,764.26' / 5,761.27' S= 0.0237 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=16.34 cfs @ 12.01 hrs HW=5,766.43' TW=5,763.44' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 16.34 cfs @ 5.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' TW=5,761.27' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

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[57] Hint: Peaked at 5,771.42' (Flood elevation advised)

Inflow Area = 0.745 ac, 15.03% Impervious, Inflow Depth > 0.36" for 100yr-24hr event
Inflow = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af
Outflow = 0.39 cfs @ 11.99 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 11.99 hrs, Volume= 0.022 af
Routed to Pond P620 :
Secondary = 0.06 cfs @ 11.99 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.42' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,767.94'	**12.0" Round Culvert** L= 71.5' Ke= 0.500 Inlet / Outlet Invert= 5,767.94' / 5,767.20' S= 0.0103 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,771.40'	**10.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#3 Device 1 5,771.33' **24.0" Horiz. Orifice/Grate X 0.60** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=0.32 cfs @ 11.99 hrs HW=5,771.42' TW=5,766.36' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.32 cfs of 5.84 cfs potential flow)
↑**3=Orifice/Grate** (Weir Controls 0.32 cfs @ 0.58 fps)

Secondary OutFlow Max=0.06 cfs @ 11.99 hrs HW=5,771.42' TW=5,761.88' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.31 fps)

Summary for Pond P640:

Information from SGM 2022 Survey
Yes, the existing outlet pipe is back pitched.

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[44] Hint: Outlet device #4 is below defined storage
[92] Warning: Device #3 is above defined storage

Inflow Area = 15.345 ac, 32.17% Impervious, Inflow Depth > 0.73" for 100yr-24hr event
Inflow = 16.13 cfs @ 12.00 hrs, Volume= 0.940 af
Outflow = 16.11 cfs @ 12.00 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.3 min
Primary = 0.94 cfs @ 12.00 hrs, Volume= 0.658 af
Routed to Pond P620 :
Secondary = 15.17 cfs @ 12.00 hrs, Volume= 0.281 af
Routed to Pond P620 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,773.91' @ 12.00 hrs Surf.Area= 1,162 sf Storage= 2,744 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.2 min (879.5 - 862.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	2,853 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,769.00	41	0	0
5,770.00	248	145	145
5,771.00	459	354	498
5,772.00	656	558	1,056
5,773.00	873	765	1,820
5,774.00	1,192	1,033	2,853

Device	Routing	Invert	Outlet Devices
#1	Primary	5,764.50'	**24.0" Round Culvert** L= 59.7' Ke= 0.500 Inlet / Outlet Invert= 5,763.42' / 5,764.50' S= -0.0181 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,773.50'	**20.0' long + 10.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,774.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.78'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.94 cfs @ 12.00 hrs HW=5,773.91' TW=5,766.42' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.94 cfs of 41.40 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.94 cfs @ 10.72 fps)

Secondary OutFlow Max=15.17 cfs @ 12.00 hrs HW=5,773.91' TW=5,766.42' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 15.17 cfs @ 1.55 fps)

Summary for Pond P650:

Information from SGM 2022 Survey

[44] Hint: Outlet device #4 is below defined storage

Inflow Area = 15.239 ac, 32.39% Impervious, Inflow Depth > 0.74" for 100yr-24hr event
Inflow = 17.69 cfs @ 11.97 hrs, Volume= 0.939 af
Outflow = 16.12 cfs @ 12.00 hrs, Volume= 0.938 af, Atten= 9%, Lag= 1.7 min
Primary = 16.12 cfs @ 12.00 hrs, Volume= 0.938 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.98' @ 12.00 hrs Surf.Area= 1,626 sf Storage= 3,948 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.5 min (862.2 - 844.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,773.00'	6,281 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,773.00	79	0	0
5,774.00	334	207	207
5,775.00	638	486	693
5,776.00	916	777	1,470
5,777.00	1,238	1,077	2,547
5,778.00	1,634	1,436	3,983
5,779.00	2,962	2,298	6,281

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.52'	**24.0" Round Culvert** L= 70.6' Ke= 0.500 Inlet / Outlet Invert= 5,769.52' / 5,768.38' S= 0.0161 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,776.96'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,772.75'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.09 cfs @ 12.00 hrs HW=5,777.98' TW=5,773.91' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 16.09 cfs of 30.51 cfs potential flow)
↑—**3=Orifice/Grate** (Orifice Controls 15.24 cfs @ 4.85 fps)
—**4=Orifice/Grate** (Orifice Controls 0.85 cfs @ 9.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,773.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM 2022 Survey

[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=592)

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth > 2.18" for 100yr-24hr event
Inflow = 5.70 cfs @ 11.96 hrs, Volume= 0.279 af
Outflow = 5.65 cfs @ 11.97 hrs, Volume= 0.279 af, Atten= 1%, Lag= 0.5 min
Primary = 5.65 cfs @ 11.97 hrs, Volume= 0.279 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.07' @ 11.97 hrs Surf.Area= 247 sf Storage= 17 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (781.2 - 781.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	2,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,779.00	234	0	0
5,780.00	414	324	324
5,781.00	633	524	848
5,782.00	968	801	1,648
5,783.00	1,540	1,254	2,902

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.87'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.87' / 5,773.00' S= 0.0628 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.64 cfs @ 11.97 hrs HW=5,779.07' TW=5,777.89' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.64 cfs @ 3.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' TW=5,761.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

[57] Hint: Peaked at 5,796.60' (Flood elevation advised)

Inflow Area = 13.591 ac, 26.01% Impervious, Inflow Depth > 0.58" for 100yr-24hr event
Inflow = 12.02 cfs @ 11.97 hrs, Volume= 0.658 af
Outflow = 12.02 cfs @ 11.97 hrs, Volume= 0.658 af, Atten= 0%, Lag= 0.0 min
Primary = 12.02 cfs @ 11.97 hrs, Volume= 0.658 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,796.60' @ 11.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#3	Device 1	5,790.62'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,790.62' / 5,777.57' S= 0.2534 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.00 cfs @ 11.97 hrs HW=5,796.60' TW=5,777.90' (Dynamic Tailwater)
└─**1=Culvert** (Passes 12.00 cfs of 35.90 cfs potential flow)
└─**3=Culvert** (Passes 12.00 cfs of 19.45 cfs potential flow)
└─**4=Orifice/Grate** (Weir Controls 12.00 cfs @ 1.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,777.47' TW=5,761.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

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[44] Hint: Outlet device #1 is below defined storage
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=593)

Inflow Area = 4.329 ac, 72.03% Impervious, Inflow Depth > 1.74" for 100yr-24hr event
Inflow = 19.63 cfs @ 11.99 hrs, Volume= 0.627 af
Outflow = 15.34 cfs @ 12.03 hrs, Volume= 0.628 af, Atten= 22%, Lag= 2.6 min
Primary = 15.34 cfs @ 12.03 hrs, Volume= 0.628 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.80' @ 12.03 hrs Surf.Area= 2,073 sf Storage= 1,065 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (804.0 - 803.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=15.34 cfs @ 12.03 hrs HW=5,752.80' TW=5,737.81' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 15.34 cfs @ 8.68 fps)
└**1=Orifice/Grate** (Passes 15.34 cfs of 44.75 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' TW=5,734.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

[57] Hint: Peaked at 5,760.06' (Flood elevation advised)

Inflow Area = 3.270 ac, 80.00% Impervious, Inflow Depth > 1.74" for 100yr-24hr event
Inflow = 10.26 cfs @ 11.96 hrs, Volume= 0.474 af
Outflow = 10.26 cfs @ 11.96 hrs, Volume= 0.474 af, Atten= 0%, Lag= 0.0 min
Primary = 9.08 cfs @ 11.96 hrs, Volume= 0.469 af
Routed to Pond P700 :
Secondary = 1.18 cfs @ 11.96 hrs, Volume= 0.005 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,760.06' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=9.08 cfs @ 11.96 hrs HW=5,760.06' TW=5,752.19' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 9.08 cfs @ 5.16 fps)

Secondary OutFlow Max=1.18 cfs @ 11.96 hrs HW=5,760.06' TW=5,752.20' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.18 cfs @ 0.62 fps)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 79.14% Impervious, Inflow Depth > 1.71" for 100yr-24hr event
Inflow = 63.71 cfs @ 12.00 hrs, Volume= 4.613 af
Outflow = 63.71 cfs @ 12.00 hrs, Volume= 4.613 af, Atten= 0%, Lag= 0.0 min
Primary = 63.71 cfs @ 12.00 hrs, Volume= 4.613 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.50' @ 12.00 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=63.67 cfs @ 12.00 hrs HW=5,750.49' TW=5,737.83' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 63.67 cfs @ 6.03 fps)
↑—**1=Orifice/Grate** (Passes 63.67 cfs of 153.44 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' TW=5,752.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P810:

[57] Hint: Peaked at 5,764.03' (Flood elevation advised)

Inflow Area = 31.566 ac, 80.00% Impervious, Inflow Depth > 1.73" for 100yr-24hr event
Inflow = 62.85 cfs @ 12.01 hrs, Volume= 4.557 af
Outflow = 62.85 cfs @ 12.01 hrs, Volume= 4.557 af, Atten= 0%, Lag= 0.0 min
Primary = 62.62 cfs @ 12.01 hrs, Volume= 4.556 af
Routed to Pond P800 :
Secondary = 0.23 cfs @ 12.01 hrs, Volume= 0.001 af
Routed to Pond P710 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,764.03' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=62.60 cfs @ 12.01 hrs HW=5,764.03' TW=5,750.49' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 62.60 cfs @ 5.99 fps)

Secondary OutFlow Max=0.23 cfs @ 12.01 hrs HW=5,764.03' TW=5,759.85' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir**(Weir Controls 0.23 cfs @ 0.39 fps)

Summary for Pond P820:

[57] Hint: Peaked at 5,813.15' (Flood elevation advised)

Inflow Area = 23.436 ac, 80.00% Impervious, Inflow Depth > 1.73" for 100yr-24hr event
Inflow = 50.65 cfs @ 12.08 hrs, Volume= 3.381 af
Outflow = 50.65 cfs @ 12.08 hrs, Volume= 3.381 af, Atten= 0%, Lag= 0.0 min
Primary = 50.65 cfs @ 12.08 hrs, Volume= 3.381 af
Routed to Pond P810 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,813.15' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=50.64 cfs @ 12.08 hrs HW=5,813.15' TW=5,763.87' (Dynamic Tailwater)
└**2=Culvert** (Passes 50.64 cfs of 123.25 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 50.64 cfs @ 3.51 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' TW=5,752.28' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P900:

JR Harris & Company Plans 2014 show a pipe on the east side of debris catch basin, but what was built compared to the plans differs from aerial imagery. Based on the pond grading with a low area to the east, it was assumed that there is an existing 12 inch pipe here. The pipe is likely buried which is why it was not picked up by survey. All pipe parameters are assumed. Pipe is assumed to not be clogged even if it likely is clogged.

Inflow Area = 6.007 ac, 2.43% Impervious, Inflow Depth > 0.22" for 100yr-24hr event
Inflow = 0.76 cfs @ 12.10 hrs, Volume= 0.108 af
Outflow = 0.25 cfs @ 12.66 hrs, Volume= 0.101 af, Atten= 67%, Lag= 33.2 min
Primary = 0.25 cfs @ 12.66 hrs, Volume= 0.101 af
Routed to Pond P670 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P670 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.24' @ 12.66 hrs Surf.Area= 3,200 sf Storage= 686 cf

Plug-Flow detention time= 62.8 min calculated for 0.101 af (94% of inflow)
Center-of-Mass det. time= 33.4 min (991.0 - 957.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,870.00'	98,374 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,870.00	2,448	0	0
5,871.00	5,544	3,996	3,996
5,872.00	9,422	7,483	11,479
5,873.00	11,136	10,279	21,758
5,874.00	12,759	11,948	33,706
5,875.00	14,397	13,578	47,284
5,876.00	16,055	15,226	62,510
5,877.00	17,865	16,960	79,470
5,878.00	19,943	18,904	98,374

Device	Routing	Invert	Outlet Devices
#1	Primary	5,870.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 5,870.00' / 5,869.00' S= 0.0167 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	5,871.50'	**12.0' long + 8.0 '/' SideZ x 100.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.25 cfs @ 12.66 hrs HW=5,870.24' TW=5,796.31' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.25 cfs @ 1.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,870.00' TW=5,777.47' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link S300D:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af
Primary = 43.43 cfs @ 0.00 hrs, Volume= 86.178 af, Atten= 0%, Lag= 0.0 min
Routed to Reach S110 :

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
43.43 43.43

Summary for Link S300S:

THIS NOTE IS ONLY APPLICABLE FOR THE 100 YEAR STORM EVENT

From S300, ditch capacity is 43.43 cfs. Ditch receives 53.62 cfs.

43.43 cfs remains in ditch
10.19 cfs spills to watershed 400

Inflow = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af
Primary = 10.19 cfs @ 0.00 hrs, Volume= 20.220 af, Atten= 0%, Lag= 0.0 min
Routed to Pond P200 :

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

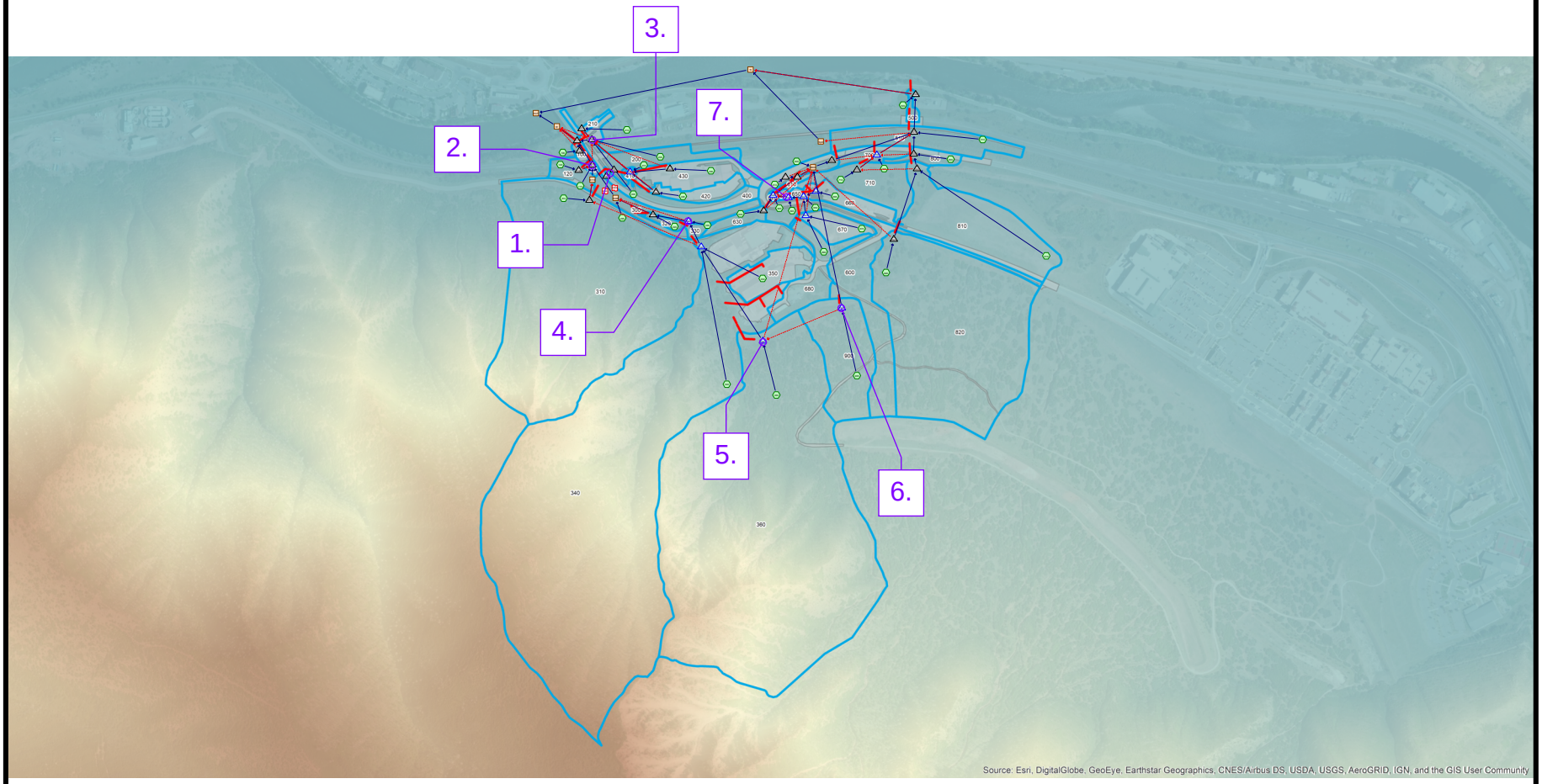
2 Point manual hydrograph, To= 0.00 hrs, dt= 24.00 hrs, cfs =
10.19 10.19

Appendix E

Drainage Issues Map Key

Existing Conditions HydroCAD Diagram – Drainage Issues Map Key – 25 -Year Event

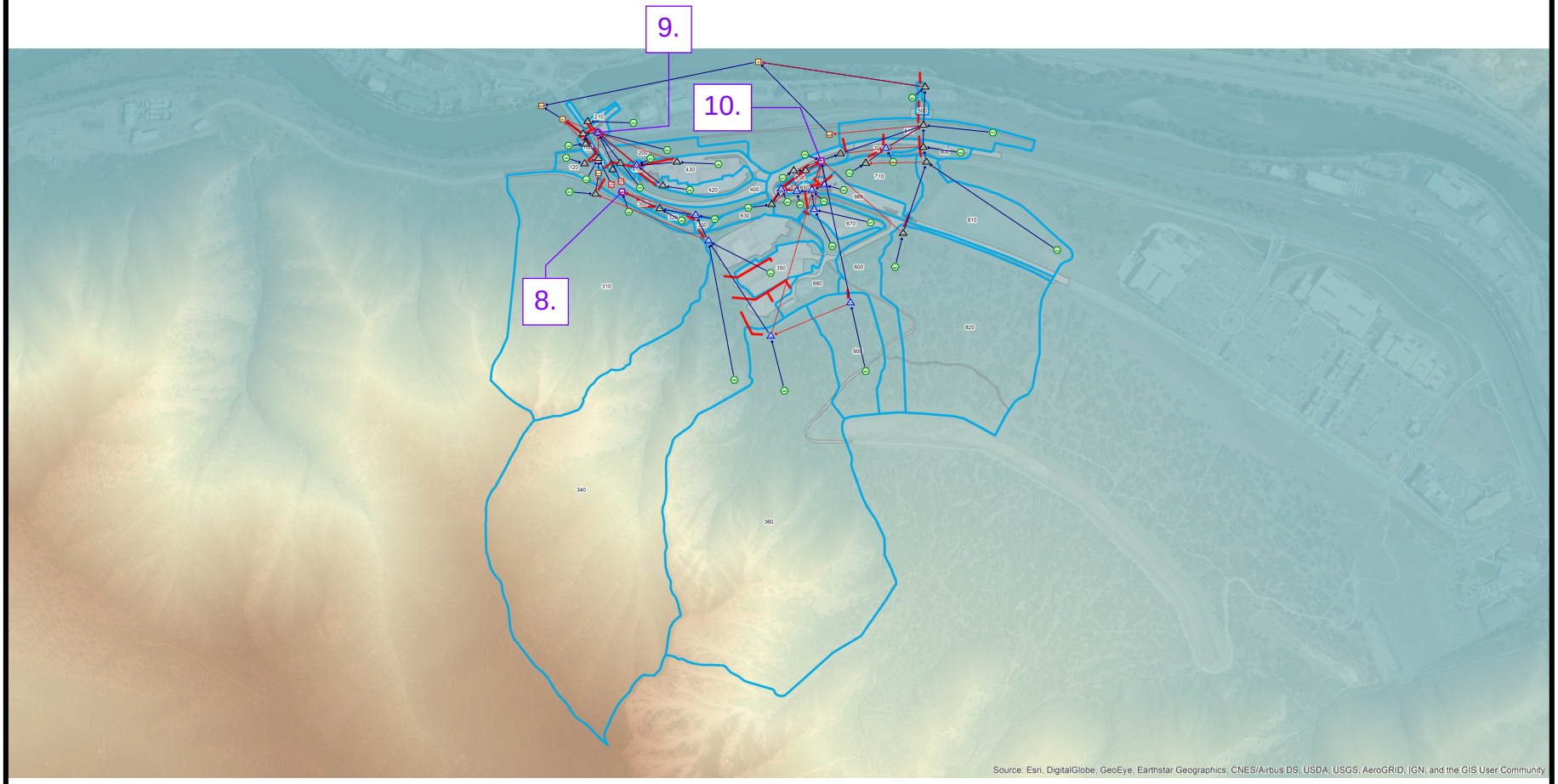
Existing Conditions HydroCAD Diagram – Drainage Issues Map Key – 100 -Year Event



Map Key For Existing Drainage Issues for the 25-Year Event Exhibit

Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Existing
Prepared by SGM, Printed 4/6/2022 **25 Year**
HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC



Map Key For Existing Drainage Issues for the 100-Year Event Exhibit

Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Existing 100 Year
Prepared by SGM, Printed 4/6/2022
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CTL|THOMPSON INCORPORATED

CTL|THOMPSON

YEARS

50

FOUNDED IN 1971

GEOTECHNICAL ENGINEERING INVESTIGATION
RFTA FACILITY EXPANSION
2307 WULFSOHN ROAD
GLENWOOD SPRINGS, COLORADO

Prepared For:

SAUNDERS, INC.
86 Inverness Place North
Englewood, CO 80112

Attention: Michael Hager
Senior Project Manager

Project No. GS06668.000-125

February 14, 2022

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SCOPE

CTL | Thompson, Inc. (CTL) has completed a geotechnical engineering investigation regarding the RFTA Expansion Project proposed at 2307 Wulfsohn Road in Glenwood Springs, Colorado. We conducted this investigation to evaluate subsurface conditions at the site and to provide geotechnical engineering information that can be utilized by Saunders Inc. and Keller-North America during design and cost estimating for the project. The scope of our investigation was generally set forth in our Proposal No. 21-0361. Our opinions and recommendations were developed from geotechnical and geophysical field data, as well as our laboratory testing and geotechnical engineering analysis.

SITE CONDITIONS

The RFTA Expansion Project is proposed at 2307 Wulfsohn Road, the previous location of the Municipal Operations Center (MOC) that was owned by the City of Glenwood Springs. A vicinity map with the location of the site is included as Figure 1. The MOC was deconstructed prior to our current geotechnical engineering investigation. A Roaring Fork Transit Authority (RFTA) facility is below (north) of the subject site. An aerial photograph of the site is shown on Figure 2.

The site is on the lower, northwest part of a large, alluvial fan that originates from the north face of Red Mountain. Natural ground surface at the subject site generally slopes down to the north and northwest. The previous MOC building was stepped into the natural slope of the site. The uphill (south) part of the building was constructed with one level. The downhill (north) part of the building had a lower level below the partial upper-level floor. We believe the pads below the two parts of the building were constructed with a combination of excavation

and fill placement. The foundation wall at the building step was approximately 16-feet high. The building was constructed on a footing foundation. A vehicle barn that was located south of the MOC building was also deconstructed. At the time of our subsurface investigation, the ground surface at the site was re-graded with two topographic benches near the elevations of the previous building levels. Both benches were being utilized for bus parking. Photographs of the site are included in the attached Appendix A.

PROPOSED CONSTRUCTION

Saunders, Inc. (Saunders) is providing services to RFTA on a potential design-build basis. Keller – North America (Keller) is a subcontractor to Saunders and is providing design-build services for the building foundation system. The RFTA Expansion Project currently contemplates a building at the location shown on Figure 3. This is the benched area (described above) that was graded after deconstruction of the MOC building. We understand the RFTA building will be a one and two-story, steel-frame structure with a footprint of approximately 28,000 square feet. The main level of the building will be used for bus parking.

The main-level floor will likely be an 8-inch thick, reinforced concrete slab-on-grade. Interior and exterior columns that comprise the building frame will be supported on drilled shafts. Column loads are anticipated to be between 300 and 500 kips. Preliminary design by Saunders and Keller indicates the drilled shafts will have diameters of 48 to 60 inches and lengths of 50 to 80 feet. At this writing, compaction-grouting to depths of 40 feet is proposed below the building footprint to improve support properties of the soils. Compaction grouting to greater depths is being considered.

CTL believes compaction grouting and drilled shafts are positive approaches to improve the support properties of the natural soils and reduce poten-

tial for differential movement of the building.

GEOTECHNICAL INVESTIGATION

The natural soils at the site are unsorted and unstratified debris-flow deposits consisting of silt, clay, sand, gravel, cobbles, and occasional boulders. The overburden soils are underlain at depth by bedrock of the Maroon and Eagle Valley Formations. These undisturbed alluvial fan deposits have significant potential for consolidation when wetted under building loads. Mitigation will be required.

For our geotechnical engineering investigation, subsurface conditions were investigated by drilling exploratory borings and excavating exploratory pits and trenches.

Two exploratory borings (TH-1 and TH-2) were drilled at the approximate locations shown on Figures 2 and 3 with a track-mounted drill rig and ODEX techniques that utilize a down-hole, pneumatic hammer to advance cased borings. Two exploratory pits (TP-1 and TP-2) and two exploratory trenches (Trench-1 and Trench-2) were excavated with a trackhoe at the approximate locations shown on Figures 2 and 3. Our subsurface investigation was directed by our engineer, who logged subsurface conditions encountered and obtained representative samples of the subsoils. Graphic logs of subsurface conditions found in our exploratory borings, pits, and trenches are shown on Figure 4.

Subsoils encountered in our exploratory borings consisted of 12 to 18 feet of existing fill, underlain by natural silty sand and clayey to silty gravel to the total drilled depths of 92 feet and 82 feet. Boulders and larger cobbles were penetrated from 80 to 92 feet in TH-1. Bedrock was not encountered in our borings. Our exploratory pits and trenches, excavated to maximum depths of 8 to 9 feet, ex-

posed variable thickness of existing fill over the underlying silty sand soil. The fill appeared to predominantly consist of the on-site clayey to silty sand and gravel with medium-size gravel. The fill contained minor amounts of construction debris. We also found pieces of grout columns, as well as drain rock, geofabric, and drain pipe. Photographs from our subsurface investigation are included in Appendix B.

The fill and natural soils generally ranged from loose to medium dense. Moisture contents were moist to slightly moist. We did not discern significant variation of density and moisture with depth in the natural soils. During drilling of TH-2, the steel casing dropped from self-weight between 8 and 10 feet. We believe this was due to a void resulting from caving of drain rock that was remanent from the previous building. Free groundwater was not found in our exploratory borings and pits. PVC pipe was installed in our borings and TP-2 to facilitate subsequent checks of groundwater.

Samples obtained from our exploratory borings, pits, and trenches were returned to our laboratory for pertinent testing. Due to the granular nature of the soils, we were unable to obtain samples suitable for accurate testing of in-situ shear strength and volume change potential. We estimated these parameters through correlation with results of gradation analyses and engineering index testing. Our testing included a large-scale gradation analysis on 900-pound soil sample from TP-1. Index testing indicated the on-site soils have low plasticity. Two samples tested contained 0.00 and 0.01 percent water-soluble sulfates. A standard Proctor test (ASTM D698) determined a maximum dry density of 128 pcf at a moisture content of 7.9 percent. Laboratory test results are provided in Appendix C.

GEOPHYSICAL INVESTIGATION

CTL retained Collier Geophysics (Collier) as a subconsultant to utilize multichannel analysis of surface waves (MASW) to assess the apparent depth to competent bedrock below the site. Three seismic lines were surveyed by Collier on January 19 and 20, 2022. These lines are indicated in the geophysical letter report that is attached as Appendix C. The MASW method utilizes geophones spaced along the lines to measure transmission of vibrational energy. For this project, supplemental noise for the analysis was provided by tamping of the bucket of a trackhoe on the ground surface.

Based on analysis of the field data, Collier opined that the measured shear wave velocity of 1,750 ft/sec at depths greater than 100 to 120 feet was representative of weathered bedrock below the site. This is consistent with exploratory borings by CTL, which did not encounter bedrock at the maximum drilled depth of 92 feet. Collier considers shear wave velocities of 2,000 to 3,000 ft/sec as indicative of competent bedrock. Additional discussion of the geophysical investigation is in the Collier letter report in Appendix C.

SITE EARTHWORK

Excavations

Our subsurface investigation indicates that excavations in the fill and natural soils at this site can be made with conventional, heavy-duty excavation equipment, such as medium-size dozers and large trackhoes. From a "trench safety" standpoint, sides of excavations must be sloped or retained to meet local, state, and federal safety regulations. We expect the soils found in excavations at this site will generally classify as Type C soils, based on OSHA criteria. Excava-

tions deeper than 5 feet should be sloped no steeper than 1.5 to 1 (horizontal to vertical) in Type C soils Contractors should identify the soils encountered in excavations and refer to OSHA standards to determine appropriate slopes.

Subexcavation and Structural Fill

The fill placed after deconstruction of the MOC building was not placed as structural fill that is suitable for support of a new building. Based on proposed floor elevation, it appears that a significant volume of fill will need to be removed and replaced with densely-compacted, structural fill prior to construction of the new building. We expect the onsite fill and natural soils can be used as structural fill, provided they are free of rocks larger than 4 inches, debris, and deleterious material. We recommend that soils imported for use as structural fill consist of an aggregate base course of pit run material. A sample of the proposed import soils should be submitted to our office for approval prior to hauling. Keller should comment on desired characteristics of the structural fill as it pertains to compaction grouting.

Structural fill soils below the building should be placed in loose lifts of about 8 inches thick, moisture-treated to within 2 percent of optimum moisture content and compacted to at least 98 percent of standard Proctor (ASTM D 698) maximum dry density. Our representative should be called to observe placement and test density and moisture content of structural fill.

Foundation Backfill

Proper placement and compaction of backfill soil adjacent to the building foundation will be important to control backfill settlement and reduce surface water infiltration into the backfill. We expect the onsite fill and natural soils can be

used as foundation backfill, provided they are free of rocks larger than 4 inches, debris, and deleterious material.

Backfill soil adjacent to the building should be placed in loose lifts of about 10 inches thick, moisture-treated to within 2 percent of optimum moisture content and compacted to at least 95 percent of standard Proctor (ASTM D 698) maximum dry density. Our representative should be called to observe placement and test density and moisture content of backfill soil.

SURFACE DRAINAGE

Surface drainage is critical to the performance of building foundations, floor slabs, and exterior concrete flatwork. Site grading should be designed and constructed to rapidly convey surface water away from the building. Proper surface drainage and irrigation practices can help control the amount of surface water that penetrates to foundation levels and contributes to settlement of foundations. Positive drainage away from the foundation and avoidance of irrigation near the foundation also help to avoid excessive wetting of backfill soils, which can lead to increased backfill settlement.

The ground surface surrounding the exterior of the building should be sloped to rapidly convey surface water away from the structure in all directions. We recommend a minimum constructed slope of at least 6 inches in the first 5 feet around the building. Backfill around the foundation should be moisture-treated and compacted pursuant to recommendations in the Foundation Backfill section. We recommend that the building be provided with roof drains or gutters and downspouts. The drains and/or downspouts should discharge well beyond the limits of all backfill. Splash blocks and/or extensions should be provided at all downspouts so water discharges onto the ground beyond the backfill.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentration of 0.00 and 0.01 percent in two samples of the soils from the site (see Table C-I). For this level of sulfate concentration, ACI 318-08, "*Code Requirements for Structural Concrete*", indicates there are no special cement requirements for sulfate resistance in concrete that is in contact with the subsoils.

In our experience, superficial damage may occur to the exposed surfaces of highly-permeable concrete, even when sulfate levels are relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious materials ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high-water tables. Concrete exposed to freezing and thawing should have a total air content of 6% $\pm$ 1.5%.

CONSTRUCTION OBSERVATIONS

We recommend that CTL be retained to provide construction observation and materials testing services for the project. This would allow us the opportunity to verify whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate. It is also beneficial to projects, from economic and practical standpoints, when there is continuity between engineering consultation and the construction observation and materials testing phases.

GEOTECHNICAL RISK

The concept of risk is an important aspect of any geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. We cannot provide a guarantee that the interaction between the soils and the proposed structure will lead to performance as desired or intended.

LIMITATIONS

The geotechnical and geophysical information obtained for this investigation provide a reasonable characterization of subsurface conditions at the site. Variations in the subsurface conditions not indicated by our data will occur.

This investigation was conducted in a manner consistent with that level of care and skill ordinarily exercised by geotechnical engineers currently practicing under similar conditions in the locality of this project. No warranty, express or implied, is made. Please contact us if you have questions or need additional information.

CTL | THOMPSON, INC.

COLORADO REGISTERED JOHN MECHLING 27429 PROFESSIONAL ENGINEER 2/14/22

John Mechling, P.E.
Senior Principal Engineer

Reviewed by:

COLORADO REGISTERED JAMES D. KELLOGG 38298 PROFESSIONAL ENGINEER 2/14/2022

James D. Kellogg, P.E.
Division Manager

JM:JDK:abr

0 500 1000

SCALE: 1" = 1000'

NOTE: SATELLITE IMAGE FROM MAXAR (COPYRIGHT 2021)



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PROJECT NO. GS06668.000-125

Vicinity Map

Fig. 1

LEGEND:

TH–1	APPROXIMATE LOCATION OF EXPLORATORY BORING
TP–1	APPROXIMATE LOCATION OF EXPLORATORY PIT
TRENCH–1	APPROXIMATE LOCATION OF EXPLORATORY TRENCH

0 100 200

SCALE: 1" = 200'



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Aerial Photograph

Fig. 2

LEGEND:

TH–1 APPROXIMATE LOCATION OF EXPLORATORY BORING

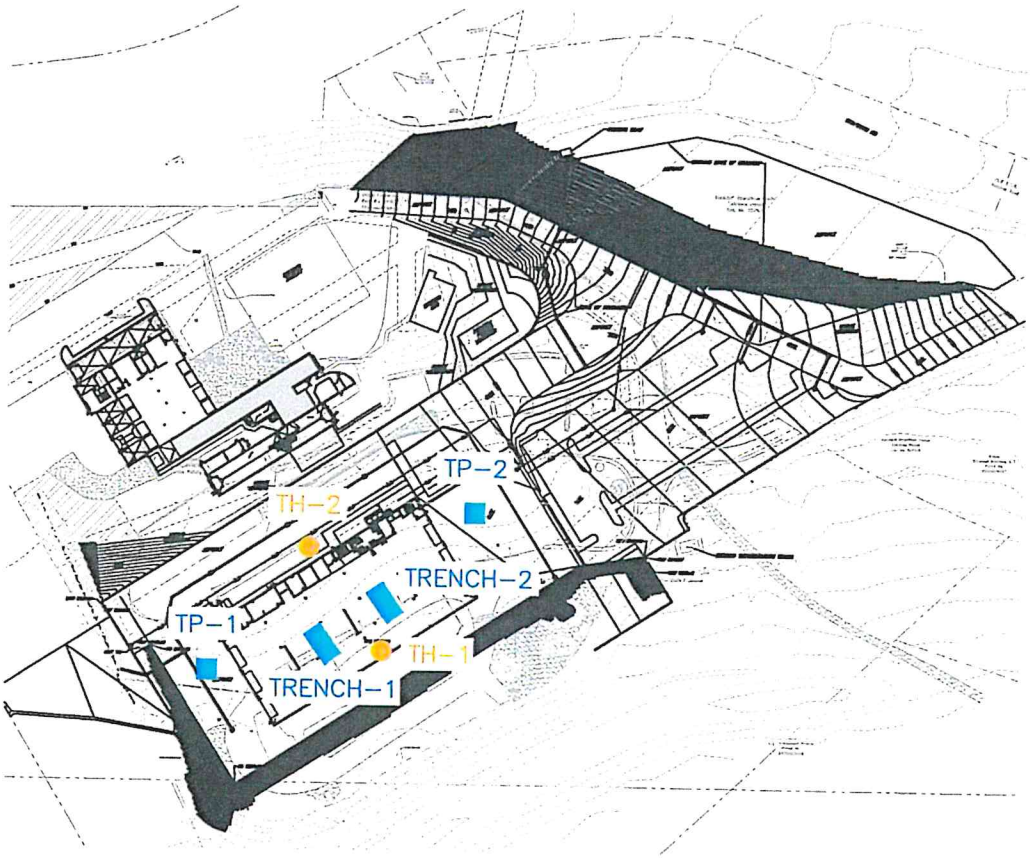
TP–1 APPROXIMATE LOCATION OF EXPLORATORY PIT

TRENCH–1 APPROXIMATE LOCATION OF EXPLORATORY TRENCH

0 100 200

SCALE: 1" = 200'

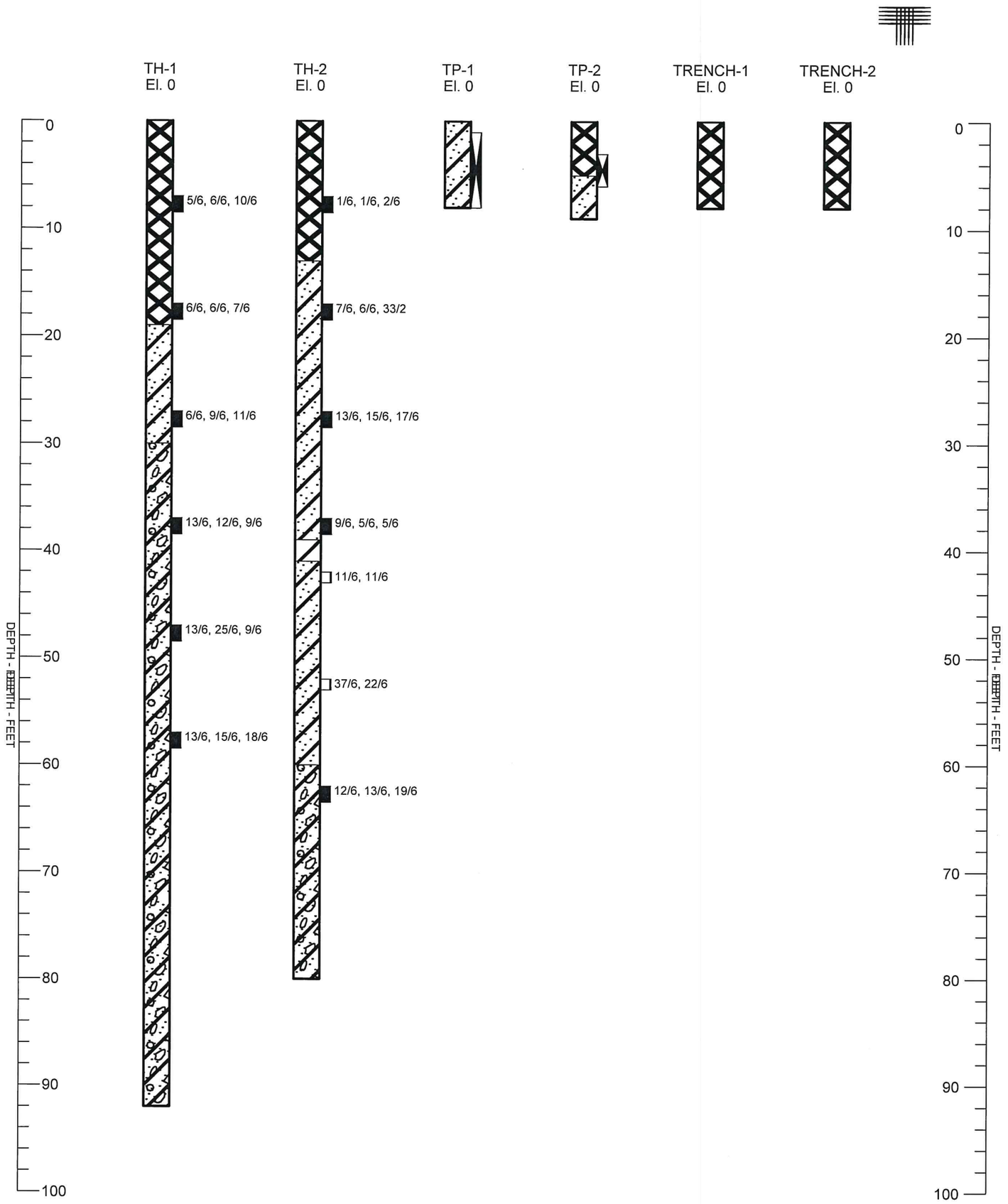
NOTE: BASE DRAWING BY STANTEC (DATED AUGUST 27, 2021)



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Proposed Construction

Fig. 3



SUMMARY LOGS OF EXPLORATORY BORINGS, PITS, AND TRENCHES

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FIG. 4

LEGEND:



EXCAVATION BACKFILL, GRAVEL, SAND, SILTY, MINOR CONSTRUCTION DEBRIS (E.G. PLASTIC, GEOFABRIC, WOOD), AREAS OF WASHED DRAIN ROCK, LOOSE TO MEDIUM DENSE, MOIST, RUST, BROWN.



SAND, CLAYEY TO SILTY, FINE TO MEDIUM GRAVEL, LOOSE TO MEDIUM DENSE, MOIST TO SLIGHTLY MOIST, RUST, BROWN. (SC-SM, SM, ML)



GRAVEL, SAND, CLAYEY TO SILTY, LENSES OF SILTY SAND, MEDIUM DENSE, SLIGHTLY MOIST TO MOIST, RUST, BROWN. (GC-GM, GM, SM)



DRIVE SAMPLE. THE SYMBOL 5/6 INDICATES 5 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.0-INCH O.D. CALIFORNIA-BARREL SAMPLER 6 INCHES.



DRIVE SAMPLE. THE SYMBOL 11/6 INDICATES 11 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. CALIFORNIA-BARREL SAMPLER 6 INCHES.



BULK SAMPLE FROM EXCAVATED SOILS.

NOTES:

1. EXPLORATORY BORINGS WERE DRILLED ON JANUARY 10, 11, AND 12, 2021 WITH A TRACK-MOUNTED DRILL RIG AND ODEX DRILLING TECHNIQUES THAT UTILIZE A DOWN-HOLE PERCUSSION HAMMER TO ADVANCE A CASED BORING.
2. EXPLORATORY PITS AND TRENCHES WERE EXCAVATED WITH A TRACKHOE ON JANUARY 19, 2021.
2. FREE GOUNDWATER WAS NOT FOUND IN OUR EXPLORATORY BORINGS, PITS, OR TRENCHES AT THE TIME OF DRILLING AND EXCAVATION.
3. PVC PIPE WAS INSTALLED IN TH-1, TH-2, AND TP-1 TO FACILITATE SUBSEQUENT CHECKS OF GROUNDWATER.
5. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS IN THIS REPORT.

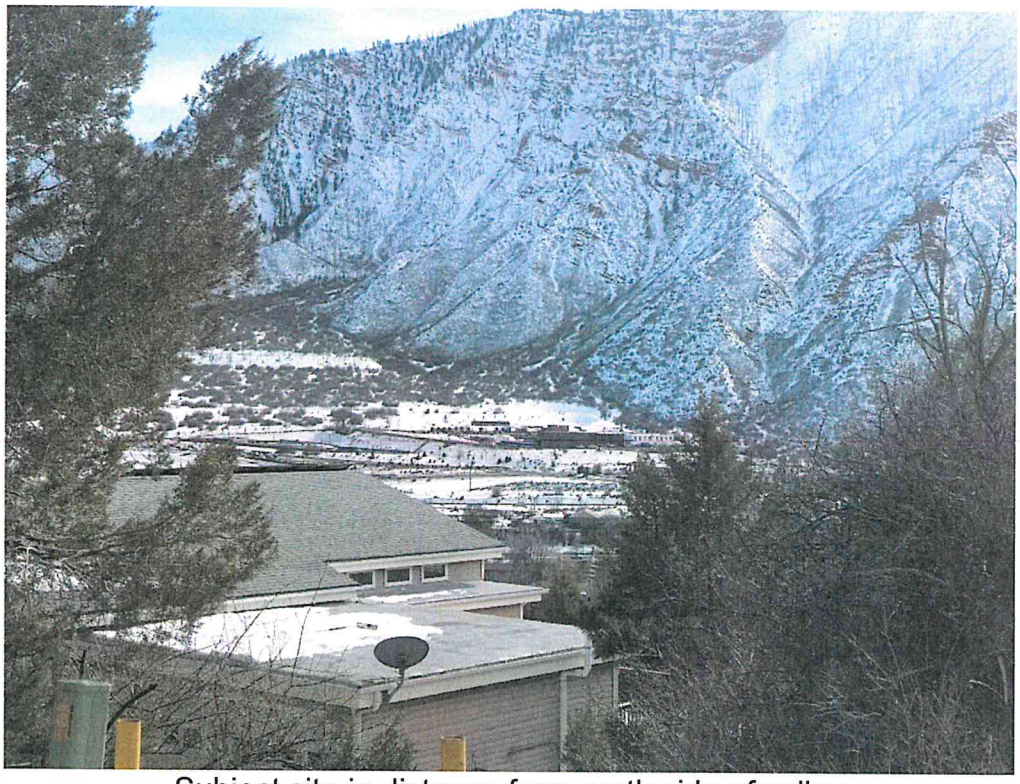
SUMMARY LEGEND OF EXPLORATORY BORINGS, PITS, AND TRENCHS

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RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

FIG. 5

APPENDIX A

SITE PHOTOGRAPHS



Subject site in distance from north side of valley



Looking north towards existing RFTA facility



Looking east across site



Looking south at site step



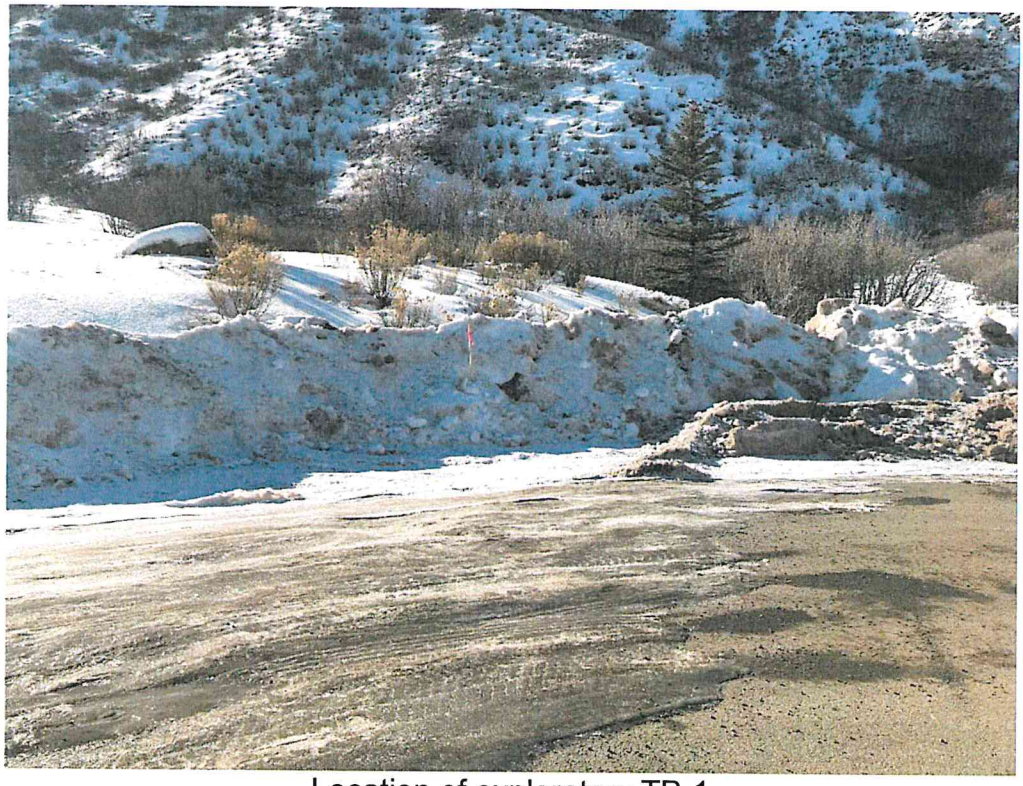
Looking west across site step



Looking southwest across site

APPENDIX B

PHOTOGRAPHS OF EXPLORATORY PITS AND TRENCHES



Location of exploratory TP-1



Soils excavated from TP-1



Location of exploratory boring TH-1



Soils excavated from TP- 2



Location of Trench 2



Soils and fabric excavated from Trench 2



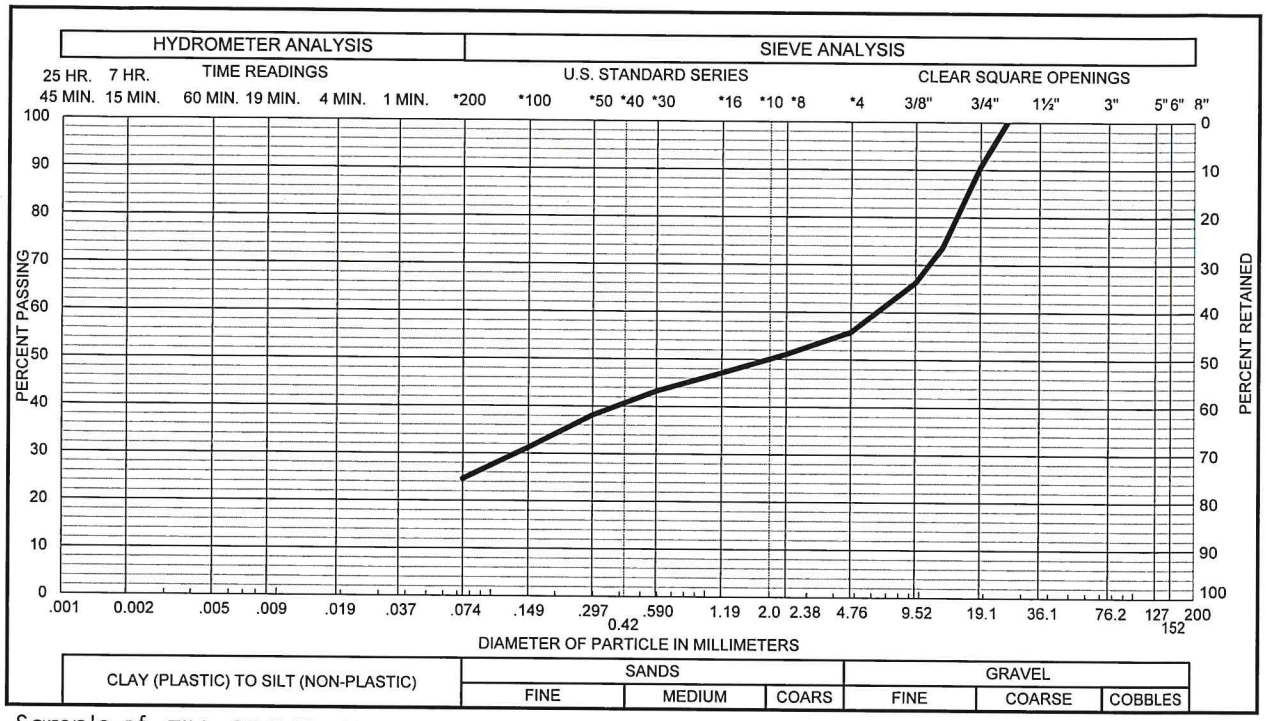
GeoFabric and drain rock encountered in Trench 2



Remanent of grout column from Trench 2

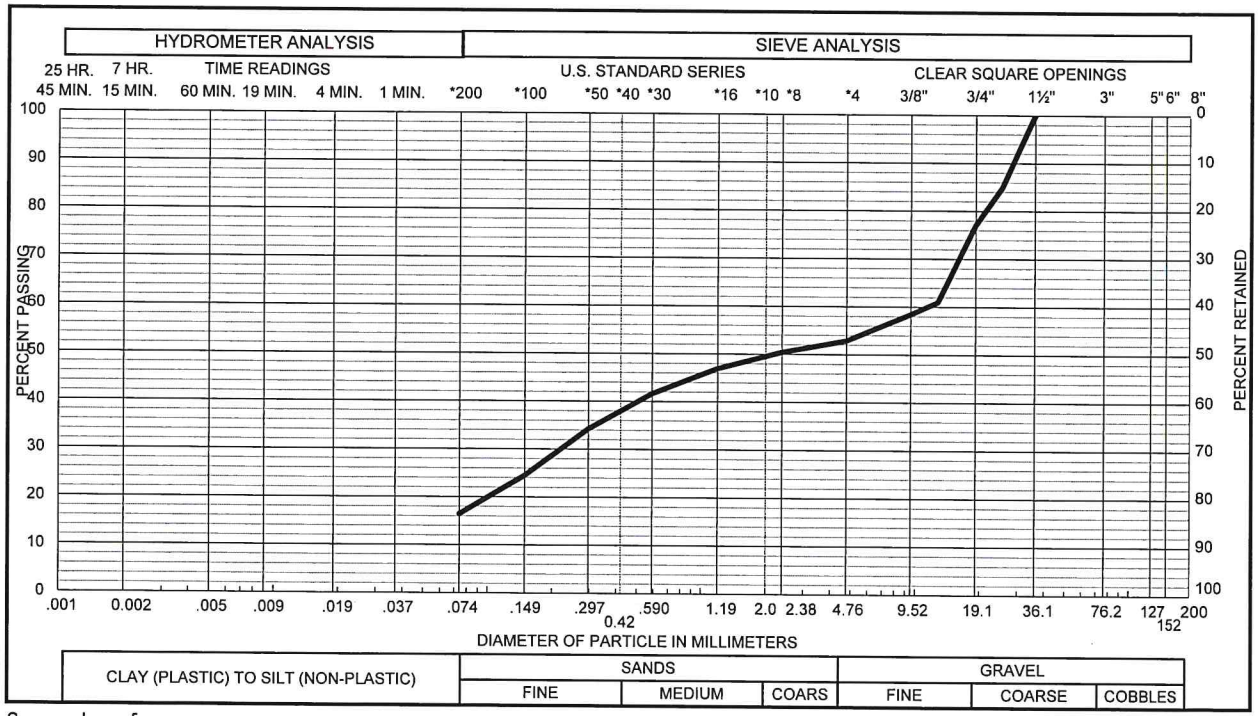
APPENDIX C

LABORATORY TESTING



Sample of FILL, GRAVEL, SILTY
From TH - 1 AT 17 FEET

GRAVEL	44 %	SAND	31 %
SILT & CLAY	25 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



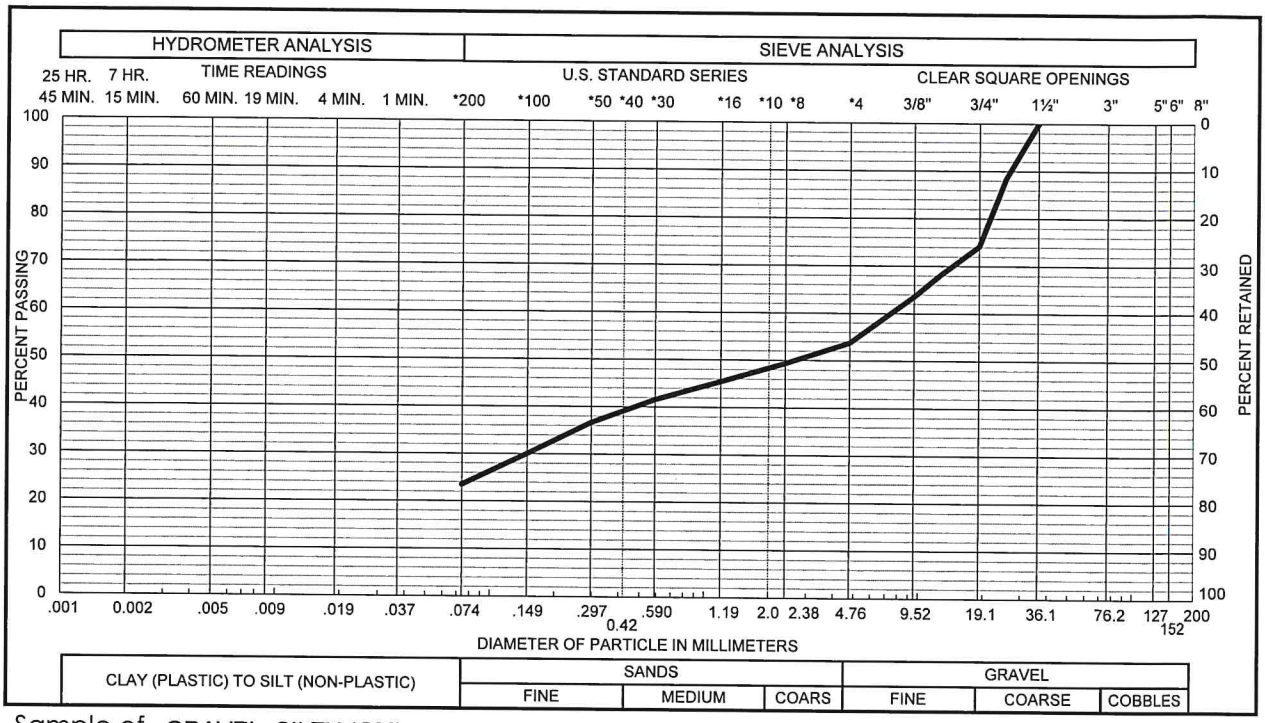
Sample of GRAVEL, SILTY (GM)
From TH - 1 AT 27 FEET

GRAVEL	47 %	SAND	37 %
SILT & CLAY	16 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

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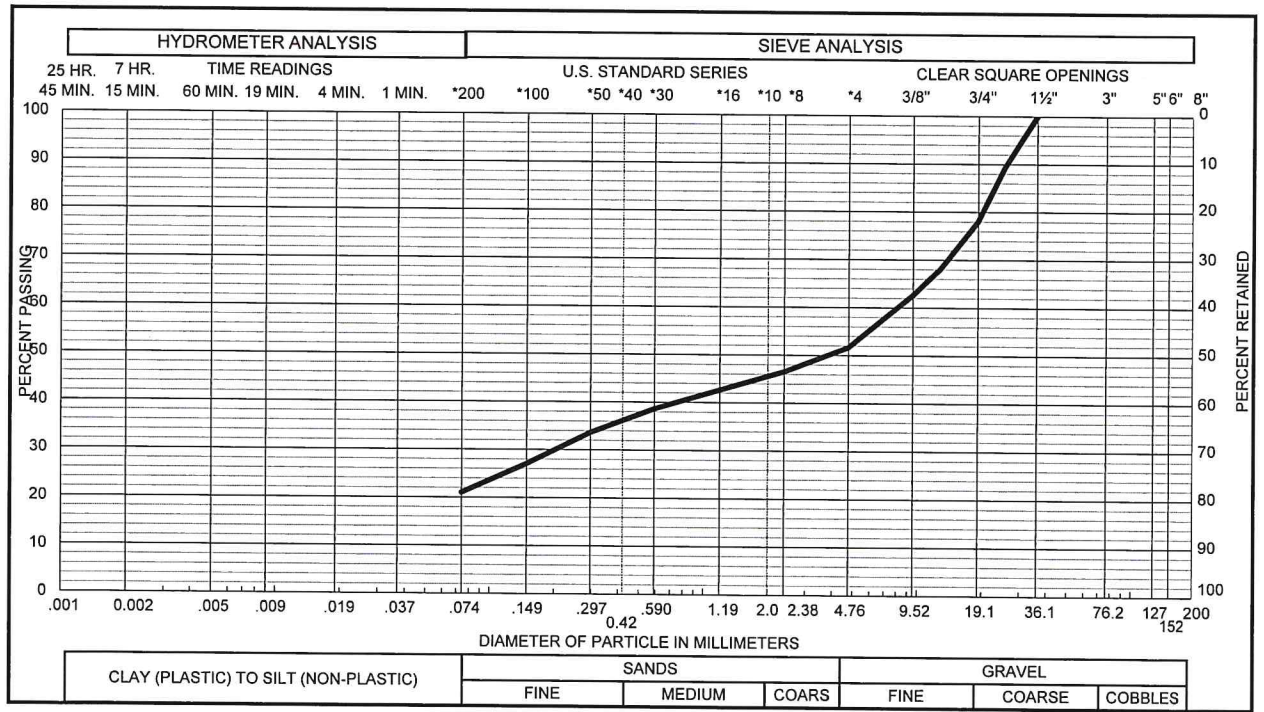
Gradation Test Results

FIG. C-1



Sample of GRAVEL, SILTY (GM)
From TH - 1 AT 47 FEET

GRAVEL	46 %	SAND	30 %
SILT & CLAY	24 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



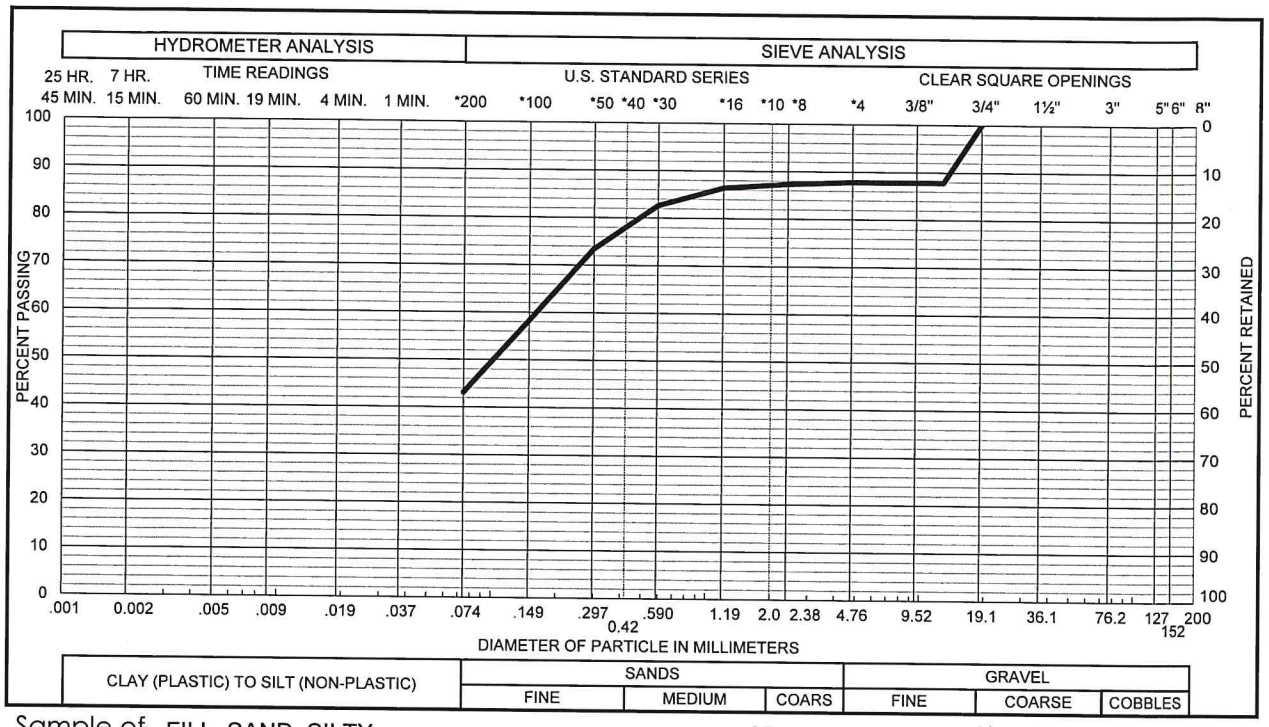
Sample of GRAVEL, SILTY (GM)
From TH - 1 AT 57 FEET

GRAVEL	48 %	SAND	31 %
SILT & CLAY	21 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

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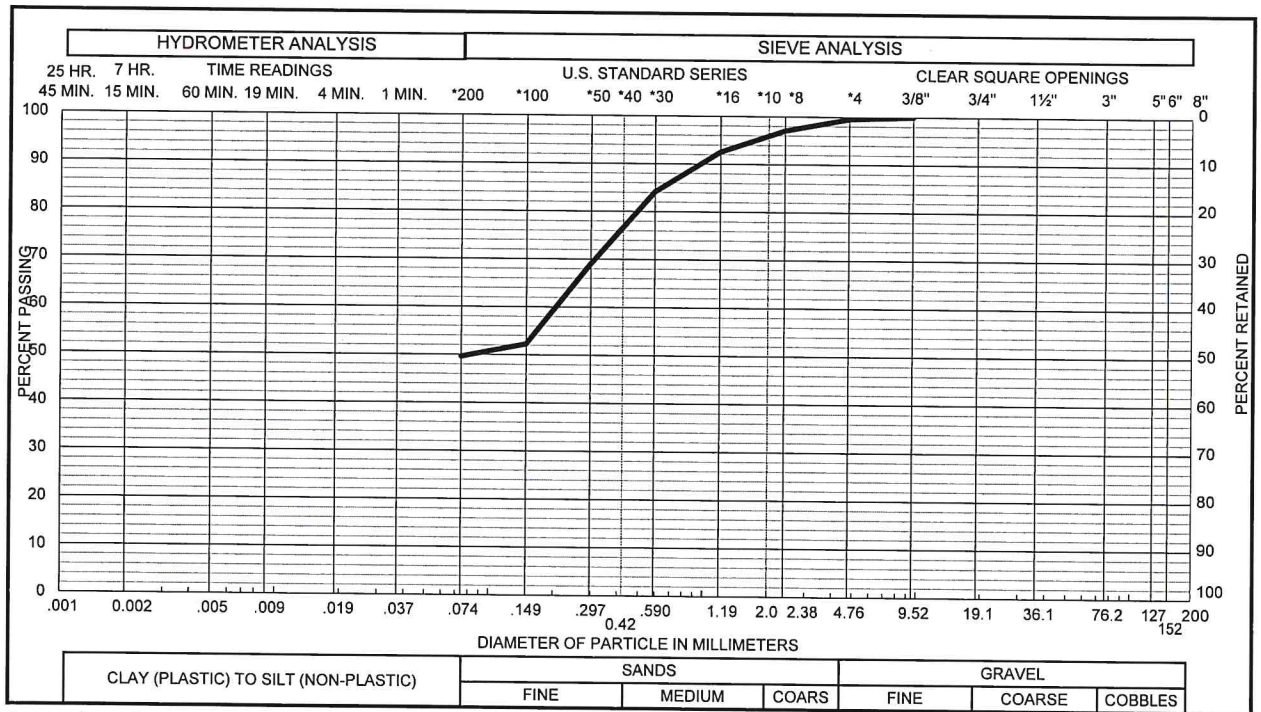
Gradation Test Results

FIG. C-2



Sample of FILL, SAND, SILTY
From TH - 2 AT 7 FEET

GRAVEL	12 %	SAND	45 %
SILT & CLAY	43 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



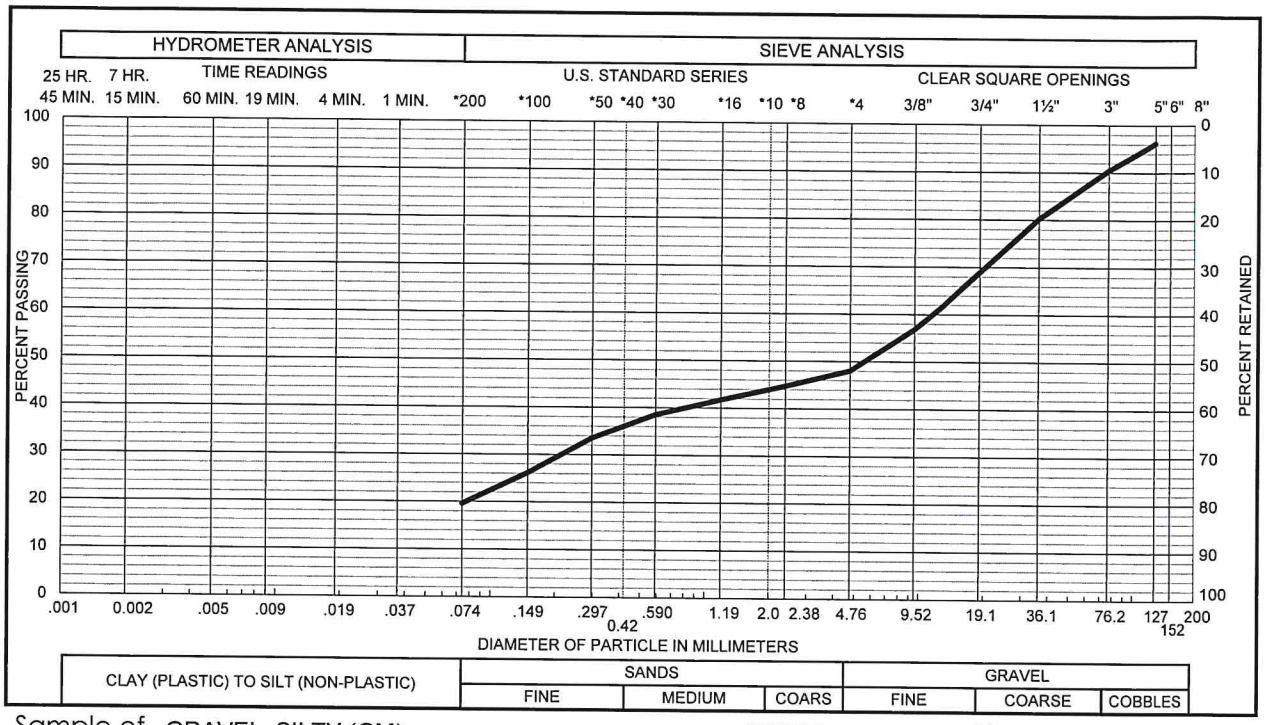
Sample of SAND, SILTY (SM)
From TH - 2 AT 37 FEET

GRAVEL	1 %	SAND	49 %
SILT & CLAY	50 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

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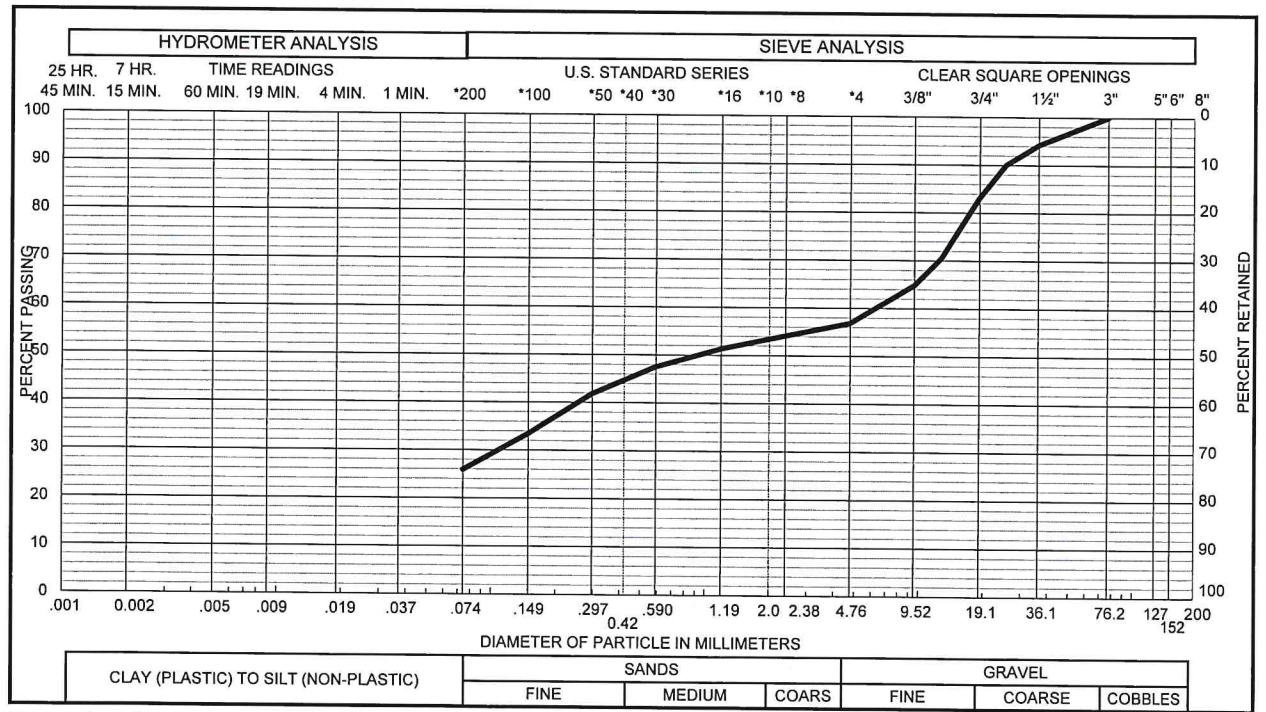
Gradation Test Results

FIG. C-3



Sample of GRAVEL, SILTY (GM)
From TP - 1 AT 1-8 FEET

GRAVEL	52 %	SAND	28 %
SILT & CLAY	20 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



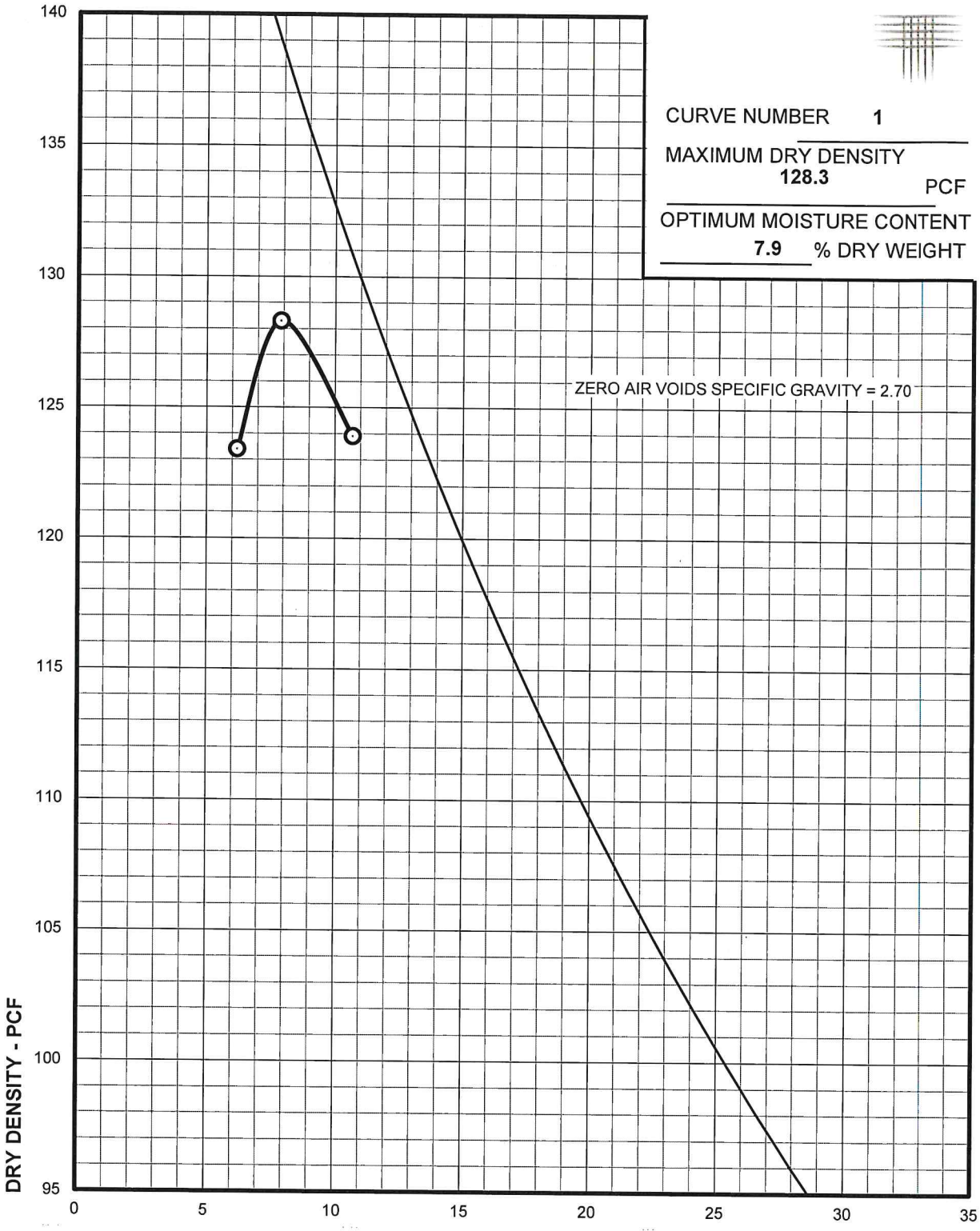
Sample of GRAVEL, SILTY (GM)
From TP - 2 AT 3-6 FEET

GRAVEL	43 %	SAND	31 %
SILT & CLAY	26 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

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PROJECT NO. GS06668.000-125

Gradation Test Results

FIG. C-4



Sample Description Gravel, Clayey to Silty
Red to Brown

Location On-Site Materials

Compaction Test Procedure ASTM D698
Method C

LIQUID LIMIT ____ %
PLASTICITY INDEX ____ %
GRAVEL ____ %
SAND ____ %
SILT AND CLAY ____ %

Compaction Test Results

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

Fig. C-5

TABLE C-I

SUMMARY OF LABORATORY TESTING
PROJECT NO. GS06668.000-125

EXPLORATORY BORING/PIT	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SOLUBLE SULFATES (%)	PERCENT GRAVEL (%)	PERCENT SAND (%)	PASSING NO. 200 SIEVE (%)	DESCRIPTION
				LIQUID LIMIT (%)	PLASTICITY INDEX (%)					
TH-1	17	5.8				0.00	44	31	25	FILL, GRAVEL, SILTY
TH-1	27	3.8					47	37	16	GRAVEL, SILTY (GM)
TH-1	47	5.4					46	30	24	GRAVEL, SILTY (GM)
TH-1	57	4.5					48	31	21	GRAVEL, SILTY (GM)
TH-2	7	12.9		NL	NP		12	45	43	FILL, SAND, SILTY
TH-2	37	8.5		NL	NP		1	49	50	SAND, SILTY (SM)
TP-1 (large-scale)	1-8					0.01	52	28	20	GRAVEL, SILTY (GM)
TP-2	3-6			NL	NP		43	31	26	GRAVEL, SILTY (GM)

APPENDIX D

COLLIER GEOPHYSICS LETTER REPORT

COLLIER GEOPHYSICS
Surface · Marine · Borehole

7711 W. 6th Ave., Ste G/H | Lakewood, CO 80214 | (720) 487-9200

February 8, 2022

John Mechling, P.E.
Principal Engineer

CTL Thompson, Inc.
234 Center Dr.
Glenwood Springs, CO 81601
(970) 945-2809

Email: jmechling@ctlthompson.com

RE: Geophysical Letter Report | Project # 22-007
RFTA Maintenance Facility Geophysical Investigation
Glenwood Springs, CO

At the request of CTL Thompson, Inc. (CTL), Collier Geophysics, LLC (Collier) conducted a geophysical investigation at the Roaring Fork Transportation Authority (RFTA) maintenance facility in Glenwood Springs, CO (Figure 1). The objectives of this seismic investigation are: 1) to image the lateral and vertical distribution of shear-wave velocity (Vs) of the overburden soils; and, 2) to identify depth to dense gravel, cobble and boulder that were not encountered in previous borings. To meet the objectives, Collier conducted a Multi-channel Analysis of Surface Waves (MASW) seismic investigation over the area of interest.

The investigation was performed January 19th and 20th, 2022 by Collier Geophysicists Daniel Mahoney and Samantha Shelafo, as well as one technician provided by CTL. The following report presents results from the geophysical investigation and summarizes the site conditions, field methods, data acquisition, and interpretation procedures. For further information regarding the details of the MASW technique, Collier can submit geophysical data acquisition and processing methods addenda upon request.



Figure 1: Site location *Google Earth Imagery (2022).*

Site Description

The site consisted of typical winter mountain conditions including a layer of ice present on paved surfaces and snow cover over frozen soil elsewhere. The seismic lines were positioned to avoid interference with vehicular traffic encountered at the site. The seismic lines were also positioned to maximize the area along the line in which conducive conditions existed for achieving good coupling between geophones and the ground. The western and southern ends of the site consisted of snow-covered slopes that required some digging to achieve good contact between geophones and the ground. Weather was cool with overcast to sunny skies.

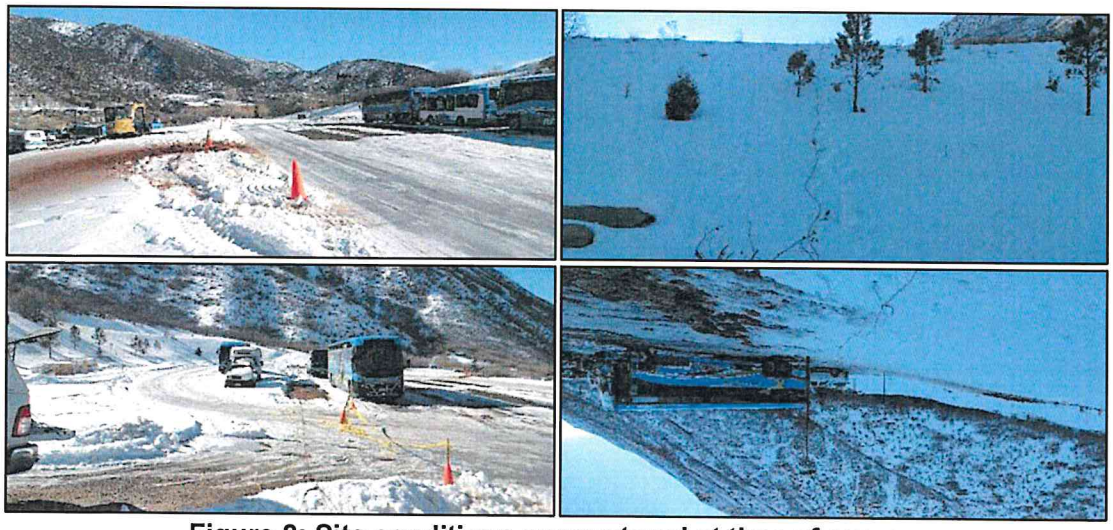


Figure 2: Site conditions encountered at time of survey.

Data Acquisition

A total of three (3) seismic lines were surveyed. Two (2) 710 foot long lines oriented approximately E-W were acquired as well as one (1) 470 foot long line oriented approximately N-S and intersecting the other 2 lines (**Figure 3**). Upon arrival at the site, the locations were adjusted from the proposed lines based on site conditions encountered, with approval from CTL personnel via a phone conversation. The northernmost E-W line (line 1) was located at the toe of a long berm running most of the length of the site and behind a bus holding area. The shorter 470 foot N-S line (line 2) was located at the far west end of the parking lot and positioned to be as far north as possible without experiencing a significant elevation drop. The southernmost E-W line (line 3) was located in a relatively flat area in the upper lot area.

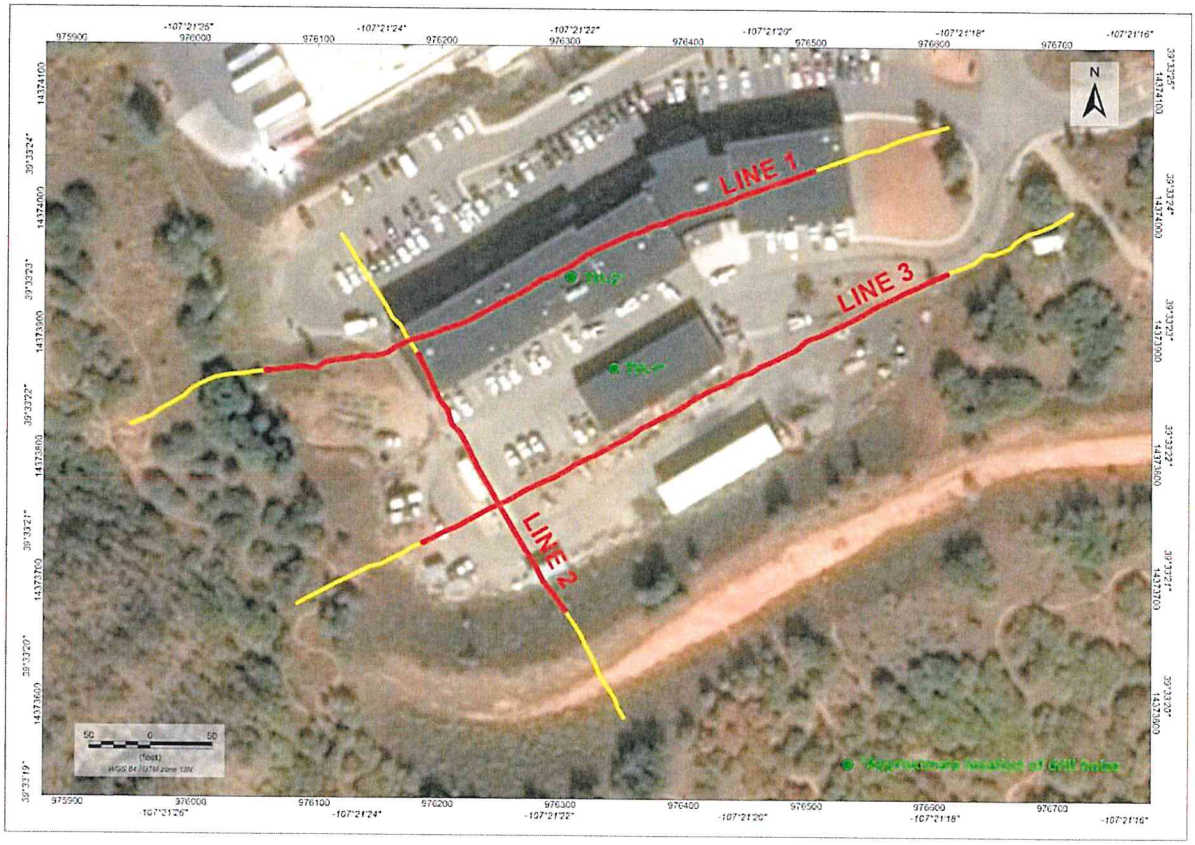


Figure 3: Line locations and orientations. *Yellow*: total line length(s), *Red*: MASW subsurface data coverage.

All lines were acquired as one 72 or 48 channel setup, depending on the proposed line length and space constraints, with geophones placed at 10 foot spacing for all lines. All geophone positions were measured with a Trimble Geo7x, a handheld GPS unit capable of sub-foot precision.

Seismic data were acquired using Geometrics Geode 24-channel digital seismographs, a state-of-the-art, 24-bit seismograph connected to a field laptop via an Ethernet cable. Data were collected using three 24 channel seismographs coupled together to collect up to 72 channels of passive MASW data. There are no predefined source points for passive-source surface seismic

surveys. Instead, the method uses ambient noise, or vibrational energy, that exists at a site. For this project, ambient noise consisted of vehicular traffic in the parking lot at the RFTA station as well as supplemental noise generated from an excavator bucket impacting the ground off the ends of the lines. Small-strain vibrations generated by sources propagate in all directions across a site. When using the passive surface wave method, this 'ambient signal' is the wave-energy measured and recorded for analysis. Twenty (20) unfiltered 30-second ambient vibrational energy records were stored for each live array of geophones, using a 2 millisecond (ms) sample rate. This ensures sufficient frequency content while also keeping the file size of each record manageable.

Data Processing

Multi-channel Analysis of Surface Waves (MASW)

Data processing is complex series of iterative sequences analyzing each shot record for dispersion of the surface waves recorded, combining the acquisition parameters and extracting the optimum offset traces. The dispersion curves generated are then run through an inversion algorithm – an iterative process of fitting a model to measured data - that produces a 1D velocity profile (sounding). 2D profiles generated by combining a series of 1D soundings typically represent the distribution of shear-wave velocities in overburden soils, showing any vertical or lateral variation due to stiffness (e.g., cementation or induration).

Passive MASW analysis consists of generating a frequency-velocity transform from the surface waves, picking the transformed data to derive a dispersion curve, and inverting this dispersion curve to create a layered shear-wave velocity (Vs) model. The inversion method consists of repeating the initial steps to derive a dispersion curve for multiple groups of records, using 24 geophones at a time. This generates a 1D Vs sounding model centered at each 24 geophone group (between the 12th and 13th geophone positions), every 30 feet down the seismic line. The 1D Vs models are inverted together, to generate a 2D Vs profile of the line. **Figure 4** illustrates the dispersion curve picking approach used for MASW soundings, with an example from this investigation.. The program ParkSEIS v3.0, by Park Seismic, was used to accomplish these steps.

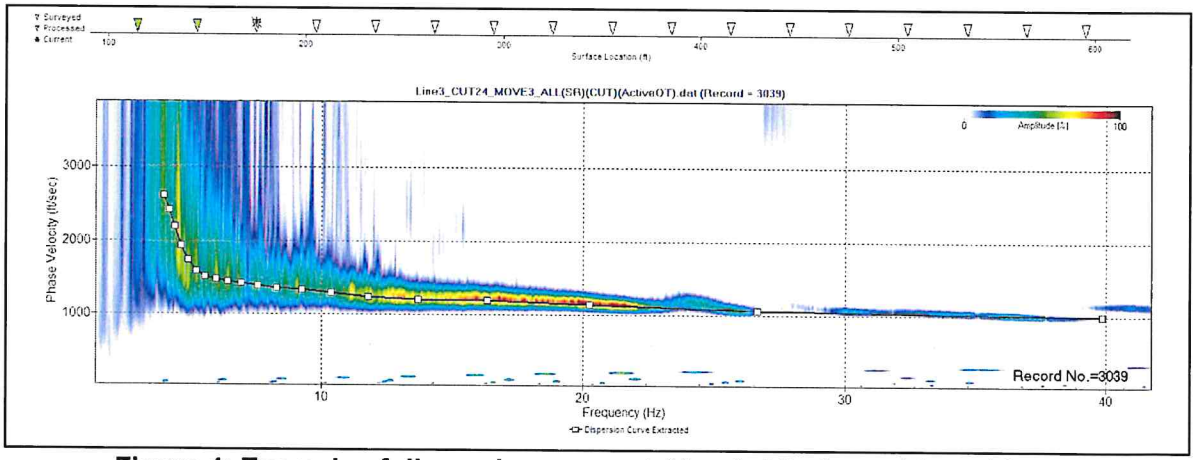


Figure 4: Example of dispersion curve picking (white boxes) from Line 3.

Because the 1D models are centered on a 24 geophone group, there is a difference between the surface line length from data collection and the subsurface coverage of the final processed 2D profile. The result is that the final 2D profile of subsurface coverage is shorter than the surface length. **Figure 3**, above, shows this difference, with the yellow lines representing the surface length of the seismic lines as deployed in the field, and the overlying red lines representing the subsurface coverage of the final 2D profiles.

Results and Discussion

The seismic results for each of the lines surveyed are presented in **Figure A-1**, appended to this report as an 11x17 inch figure in landscape format. The figure has four components: a color contour 2D Vs profile for Line 1, Line 2 and Line 3, and an aerial map showing line locations. Logs from two boreholes were provided by CTL and lithology logs are shown on the profile results – projected onto the plane of the profile lines.

The 2D profiles are presented using the same color scale line-to-line for the Vs results, where 'cool' colors (e.g. blue) represent lower velocity values and 'warm' colors (e.g., red) represent higher velocity values. Each of the Vs profiles are presented at the same horizontal and vertical scale for all lines.

The boreholes were drilled to 80-90 feet, and neither hole encountered bedrock. Where silty sand and clay transitioned to sand with gravel, Lines 1 and 3 show a Vs value of 1,150 ft/s corresponds well to the borehole depth of gravelly sand. A velocity of 1,750 ft/s has been chosen / interpreted to represent weathered bedrock and occurs at depths of greater than 100-120 feet below ground surface (bgs) on Lines 1 and 3. On Line 2, the 1,750 ft/s interval shallows uphill, to approximately 50 ft bgs. This is a conservative estimate to the depth of weathered bedrock; based on previous experience with this geologic environment, weathered bedrock may be at an even higher velocity, between 1,800 and 2,000 ft/s. Competent bedrock is interpreted to be at even greater depths, and likely will range from a Vs of 2,000 to 3,000 ft/s.

In addition to viewing each seismic profile in 2D, as presented on Figure A-1, the MASW profiles can be presented as a 3D representation of the 2D line results. **Figure A-2** displays two 3D perspective views of the model results, which show each of the Vs cross-sections and the correlation between the line intersection points. The 3D representation shows good velocity correlation between the lines at the 1,150, 1,750, and 2,350 ft/s contour intervals, improving confidence in the overall interpretation for depths to the gravel layer, weathered and competent bedrock, respectively.

Closure

The quality of the seismic data acquired during this investigation ranged from good to very good for the passive MASW method. Generally, the Vs correlates well to the borehole information, to the depths that drill control was achieved. The data quality and correlation between the MASW lines and the local geologic setting provides a high degree of confidence in the results presented herein.

The geophysical methods and field procedures defined in this report were applicable to the project objectives and have been successfully applied by Collier geophysicists to investigations of similar size and nature. However, sometimes field or subsurface conditions are different from those anticipated and the resultant data may not achieve the investigation objectives. Collier warrants that our services were performed within the limits prescribed for this project, with the usual thoroughness and competence of the geophysical profession. Collier conducted this project using the current standards of the geophysical industry and utilized in house quality control standards to produce a precise geophysical survey.

If you have any questions regarding the field procedures, data analyses, or the interpretive results presented herein, please do not hesitate to contact us. For further information regarding the details of MASW and SRT techniques, Collier can submit a more detailed description of the methods upon request. We appreciate working with you and look forward to providing CTL Thompson with geophysical services in the future.

Respectfully Submitted,

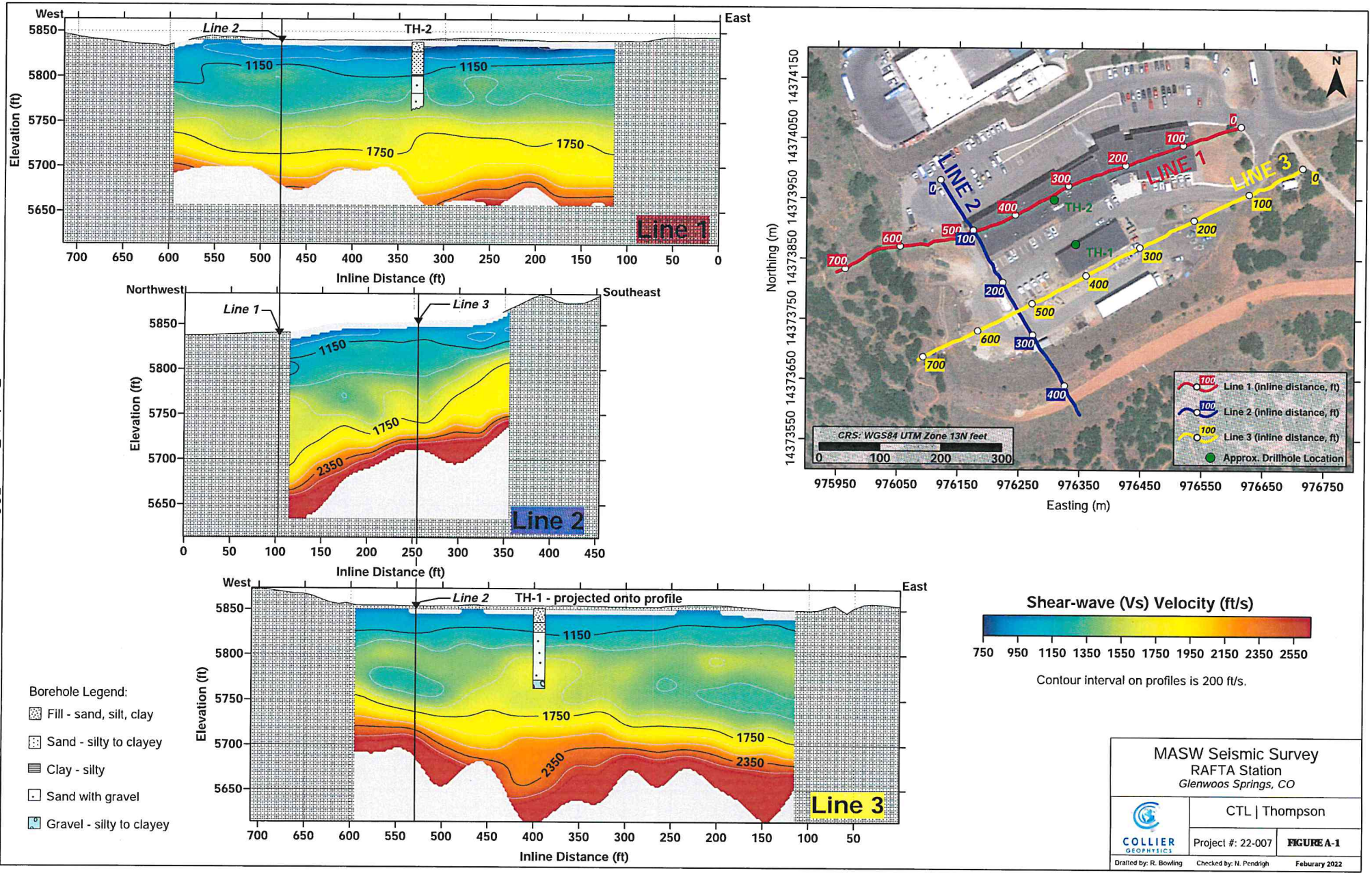
Collier Geophysics, LLC

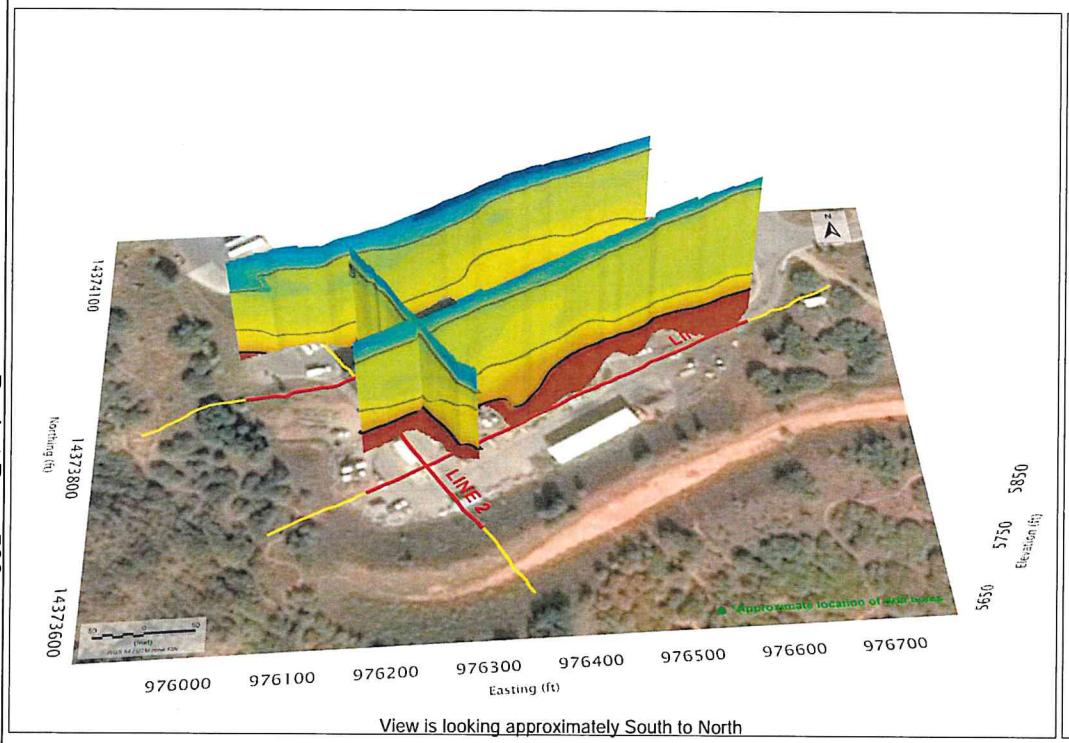
Nicole Pendrigh
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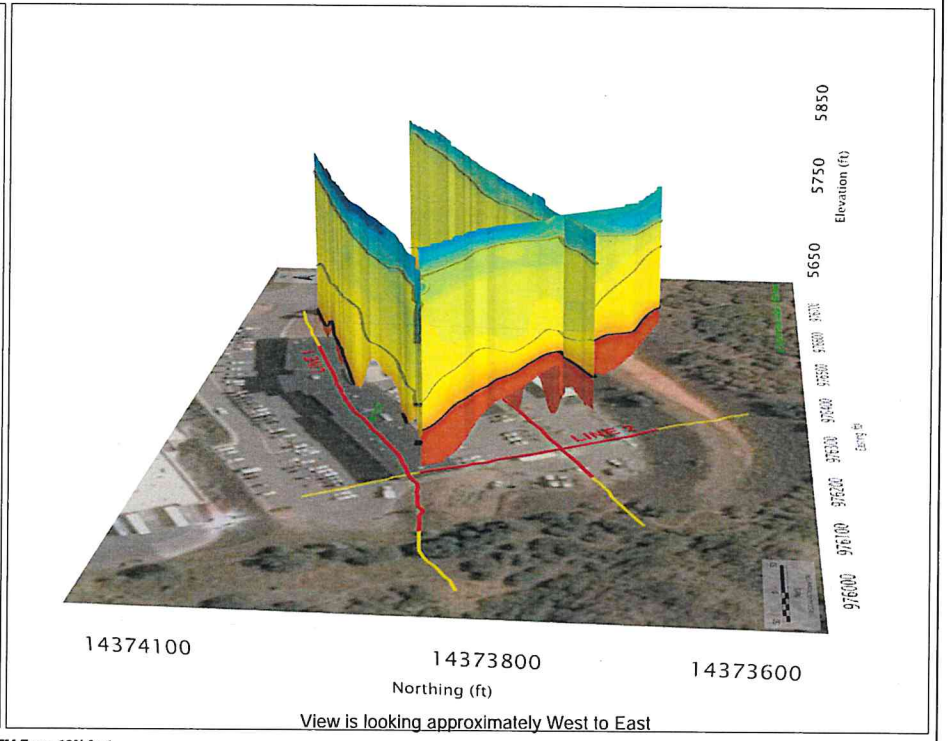
(1 copy e-mailed PDF format)

FIGURES


West
East
Line 2
TH-2
1150
1750
Line 1
Elevation (ft)
Inline Distance (ft)
Northwest
Southeast
Line 1
Line 3
2350
Line 2
West
East
Line 2
TH-1 - projected onto profile
2350
Line 3
Elevation (ft)
Inline Distance (ft)
Northing (m)
Easting (m)
N
LINE 1
LINE 2
LINE 3
TH-2
TH-1
CRS: WGS84 UTM Zone 13N feet
Line 1 (inline distance, ft)
Line 2 (inline distance, ft)
Line 3 (inline distance, ft)
Approx. Drillhole Location
Borehole Legend:
Fill - sand, silt, clay
Sand - silty to clayey
Clay - silty
Sand with gravel
Gravel - silty to clayey
Shear-wave (Vs) Velocity (ft/s)
750 950 1150 1350 1550 1750 1950 2150 2350 2550
Contour interval on profiles is 200 ft/s.
MASW Seismic Survey
RAFTA Station
Glenwoos Springs, CO
CTL | Thompson
COLLIER GEOPHYSICS
Project #: 22-007
FIGURE A-1
Drafted by: R. Bowling
Checked by: N. Pendrigh
Feburary 2022



View is looking approximately South to North



View is looking approximately West to East

CRS: WGS84 UTM Zone 13N feet

S-wave Velocity (ft/s)

1000 1250 1500 1750 2000 2250 2500

Contours for (top to bottom) 1,150 ft/s, 1,750 ft/s and 2,350 ft/s are presented as black lines on the 3D fence profiles.

MASW Seismic Survey 3D Views
RAFTA Station
Glenwoos Springs, CO

COLLIER GEOPHYSICS

CTL | Thompson

Project #: 22-007 **FIGURE A-2**

Drafted by: N. Pendrigh Checked by: P. Sirles Feburary 2022

CTL | THOMPSON
Founded in 1971

SUPPLEMENTAL GEOTECHNICAL ENGINEERING INVESTIGATION
RFTA FACILITY EXPANSION
2307 WULFSOHN ROAD
GLENWOOD SPRINGS, COLORADO

Prepared For:

SAUNDERS, INC.
86 Inverness Place North
Englewood, CO 80112

Attention: Michael Hager
Senior Project Manager

Project No. GS06668.000-125

April 6, 2022

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APPENDIX B – SLOPE STABILITY ANALYSES

SCOPE

CTL | Thompson, Inc. (CTL) has completed a supplemental geotechnical engineering investigation for the proposed RFTA Facility Expansion at 2307 Wulfsohn Road in Glenwood Springs, Colorado. Our previous report (Project No. GS0668.000-125; dated February 14, 2022) provided information to assist Saunders Inc. and Keller-North America with design and construction of drilled piers and compaction grouting for the proposed building. We conducted this supplemental investigation to obtain additional subsurface information to develop geotechnical engineering information regarding the excavation retention system and fill retaining wall that will be required to construct the building pad at the site. Our investigation included analyses of existing global stability and the effect of the planned earthwork, including appropriate earth retention systems. The scope of the supplemental geotechnical engineering investigation set forth in our Proposal No. GS 22-0135.

SITE CONDITIONS

The RFTA Expansion Project is proposed at 2307 Wulfsohn Road, which is the location of the previously-existing Municipal Operations Center (MOC) that was owned by the City of Glenwood Springs. A vicinity map with the location of the site is included as Figure 1. The MOC was deconstructed prior to our current geotechnical engineering investigation. A Roaring Fork Transit Authority (RFTA) facility is below (north) of the subject site. An aerial photograph of the site is shown on Figure 2.

Natural ground surface at the subject site generally slopes down to the north and northwest. A debris flow catchment basin is in the upper (south) part of the property. The previous MOC building was stepped into the natural slope of the site. The uphill (south) part of the building was constructed with one level.

The downhill (north) part of the building had a lower level below the partial upper-level floor. We believe the pads below the two parts of the building were constructed with a combination of excavation and fill placement. At the time of our subsurface investigation, the ground surface at the site was re-graded with two topographic benches near the elevations of the previous building levels. Both benches were being utilized for bus parking.

PROPOSED EARTHWORK

The RFTA Expansion Project currently contemplates a building at the location shown on Figure 3. The building pad will be constructed with a combination of excavation cut and fill placement. At this writing, the surface of the building pad is proposed at elevation 5850 feet. Existing ground surface elevation in the building pad area varies from about 5876 feet at the south to 5830 feet at the north. An earth retention system will be required for the excavation face that is proposed below the base of the embankment for the catchment basin. The face of the fill embankment will be just above the existing RFTA facility and will require a significant retaining wall. The excavation retention system and the retaining wall will be designed and constructed by specialty shoring contractors.

The RFTA building is currently planned as a one and two-story, steel-frame structure with a footprint of approximately 28,000 square feet. Keller – North America (Keller) is providing design-build services for the building foundation and floor system. Foundation and floor slab design is not within CTL's scope of services.

SUBSURFACE CONDITIONS

The natural soils at the site are unsorted and unstratified debris-flow deposits consisting of silt, clay, sand, gravel, cobbles, and occasional boulders. The overburden soils are underlain at depth by bedrock of the Maroon and Eagle Val-

ley Formations. These undisturbed alluvial fan deposits have significant potential for consolidation when wetted under building loads. A geophysical study performed as part of our previous investigation, indicates that bedrock below the site is at depths greater than 100 to 120 feet.

Subsurface conditions were investigated for our supplemental geotechnical engineering study by drilling eight exploratory borings (TH-1A through TH-8A) at the site. Exploratory borings were drilled at the approximate locations shown on Figure 2. The exploratory borings drilled for our previous geotechnical investigation (TH-1 and TH-2) are also indicated on the figure. Our borings, TH-1A through TH-8A, were drilled with a track-mounted drill rig and 6-inch diameter, hollow-stem auger. TH-1 and TH-2 were drilled with a track-mounted drill rig and ODEX techniques that utilize a down-hole, pneumatic hammer to advance cased borings. Our subsurface investigations were directed by our engineer, who logged subsurface conditions encountered in the borings and obtained representative samples of the subsoils. Graphic logs of subsurface conditions found in our exploratory borings are shown on Figures 4 through 6.

Our supplemental exploratory borings, TH-1A through TH-3A, were drilled in the south part of the site along the base of the embankment of the debris flow catchment basin. An excavation retention system will be required to retain the excavation cut proposed in this area. Subsoils encountered in the supplemental borings consisted of interlayered, silty sand and clayey to silty gravel to the total drilled depths of 31 to 35 feet. These soils were generally medium dense to dense and moist. Subsoils found in previous boring, TH-1, consisted of about 19 feet of existing fill, underlain by interlayered, natural silty sand and clayey to silty gravel to the total drilled depths of 92 feet. Boulders and larger cobbles were penetrated from 80 to 92 feet in TH-1.

Supplemental borings, TH-4A through TH-6A, were drilled along the north side of the site, above the existing RFTA facility. An earth retention wall will be required in this area to retain a significant thickness of fill. The soils encountered in these borings were nil to 34 feet of existing fill, underlain by interlayered, natural silty sand and clayey to silty gravel to the total drilled depth of 50 feet. Subsoils found in our previous boring, TH-2, consisted of 13 feet of existing fill, underlain by interlayered, natural silty sand and clayey to silty gravel to the total drilled depth of 82 feet.

TH-7A and TH-8A were drilled in the central part of the proposed building pad. Subsoils found in these borings were nil to 14 feet of existing fill, underlain by interlayered, natural silty sand and clayey to silty gravel to the total explored depth of 70 feet.

The existing fill at the site is predominantly clayey to silty sand and gravel with minor amounts of construction debris, including geofabric, drainpipe, screened rock, and remnants of grout columns. The fill and natural soils generally ranged from loose to medium dense. Moisture contents were moist to slightly moist. We did not discern significant variation of density and moisture with depth in the natural soils.

Groundwater seepage was encountered in TH-7A at a depth of approximately 7 to 9 feet at the time of drilling. Measurement the day after drilling found residual water in the bottom of the boring. PVC pipe was installed in our borings to facilitate subsequent checks of groundwater.

LABORATORY TESTING

Samples obtained from our exploratory borings were returned to our laboratory for pertinent testing. Laboratory testing included moisture/density, Atter-

berg limits, gradation analysis, swell-consolidation, unconfined compression, and water-soluble sulfates. Due to the granular nature of the soils, we were generally unable to obtain samples suitable for accurate testing of in-situ shear strength and volume change potential. We estimated these parameters through correlation with our gradation analyses and engineering index testing. Laboratory test results are provided in the attached Appendix A and summarized on Table A-I.

SLOPE STABILITY ANALYSES

Construction of the building pad for the RFTA Expansion will involve significant excavation at the uphill (south) side and thick fill at the downhill (north) side. Photographs of these areas are shown on Figures 7 and 8. An excavation retention system will be required to maintain stability of the slope above the cut. A retaining wall will be needed at the face of the fill embankment.

As part of our geotechnical engineering investigation, CTL evaluated existing site stability and the effect of the proposed construction. We requested that the civil engineer provide us with cross-sections of existing and proposed topography at two locations that CTL considers critical. These indicate existing and proposed ground surface elevations. The plan and profiles that we analyzed are shown on the Figures 9 and 10. Results of our slope stability analyses are in the attached Appendix B.

Uphill Excavation Area

Excavation depths of 10 to 15 feet are proposed at the uphill side of the building pad to attain the proposed elevation of 5850 feet. This excavation will be at the base of the berm for the debris flow catchment basin. Planned excavations into the existing debris fan slope will remove soil that is resisting slope movement, which will reduce stability. Excavation retention will be required to maintain

slope stability. We analyzed the global stability of the existing slope, as well as stability of the proposed excavation with soil nail and micropile earth retention systems. The internal stability of the soil nail and micropile systems were also checked.

Based on our analysis using the Morgenstern and Price limited equilibrium procedure, the existing slope geometry, including the embankment for the catchment basin, is at a factor of safety (FOS) of about 1.8. The FOS is the ratio of the forces resisting failure over the forces driving failure. A FOS of 1.8 indicates relative stability of existing conditions. The localized stability of the catchment basin berm is likely lower.

We analyzed a proposed excavation depth of 15 feet deep with two rows of soil nails and a row of micropiles. These systems are common in the area and are often used in combination. Our analyses indicate the slope with this excavation retention would be at an FOS of about 1.8. This indicates that less excavation retainage would have less resisting force than the soils that are proposed to be excavated.

Downhill Retaining Wall

A combination of excavation and fill is proposed at the north side of the proposed building footprint. The excavation depth of 22 feet will be predominantly in existing fill. A retaining wall will be required at this location. The bottom of the retaining wall will near the elevation of the lower level of the adjacent RFTA maintenance facility. Ultimately, fill thickness of up to 33 feet will be placed to attain the proposed building pad elevation of 5850 feet. A retaining wall system will be needed to limit vertical and horizontal movement of the fill material, which would adversely affect pavements and utilities.

We analyzed the global and internal stability of a mechanically stabilized earth (MSE) retaining wall, as well as a composite system consisting of MSE and soil nails. Our analyses considered a surcharge load of 200 psf to account for vehicle traffic. The earth retaining wall system will be designed and constructed by a specialty shoring contractor. Results of our slope stability analyses indicate that the composite system is preferrable. The contractor can likely design an MSE structure without the soil nails that will provide an acceptable FOS. We expect the on-site soils can be processed for use as structural fill between the geogrid reinforcement layers. Vehicle traffic will likely need to be setback at least 10 feet from the top of the wall.

LIMITATIONS

The geotechnical information obtained for this investigation provides a reasonable characterization of subsurface conditions at the site. Variations in the subsurface conditions not indicated by our data will occur.

This investigation was conducted in a manner consistent with that level of care and skill ordinarily exercised by geotechnical engineers currently practicing under similar conditions in the locality of this project. No warranty, express or implied, is made. Please contact us if you have questions or need additional information.

CTL | THOMPSON, INC.

COLORADO REGISTERED JOHN MECHLING 27429 4/6/2018 PROFESSIONAL ENGINEER

John Mechling, P.E.
Senior Principal Engineer

Reviewed by:

James D. Kellogg

James D. Kellogg, P.E.
Division Manager

JM:JDK:abr

0 500 1000

SCALE: 1" = 1000'

NOTE: SATELLITE IMAGE FROM MAXAR (COPYRIGHT 2021)



SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

Vicinity Map

Fig. 1

LEGEND:

TH–1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING

TH–1A ● APPROXIMATE LOCATION OF SUPPLEMENTAL EXPLORATORY BORING

0 50 100

SCALE: 1" = 100'

NOTE: SATELLITE IMAGE FROM GOOGLE EARTH (DATED JUNE 2017)



SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

Aerial Photograph Fig. 2

LEGEND:

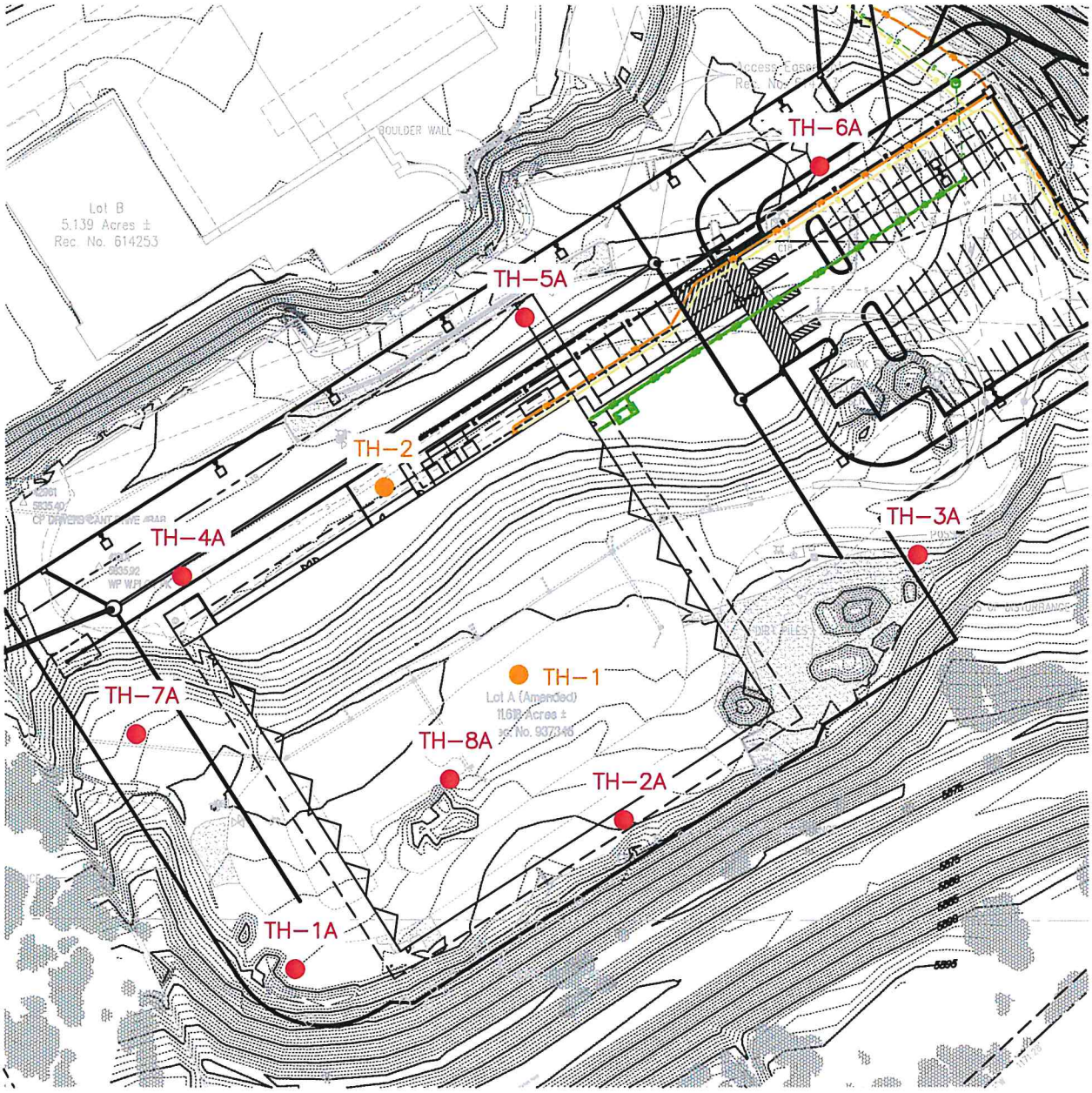
TH–1 APPROXIMATE LOCATION OF EXPLORATORY BORING

TH–1A APPROXIMATE LOCATION OF SUPPLEMENTAL EXPLORATORY BORING

0 50 100

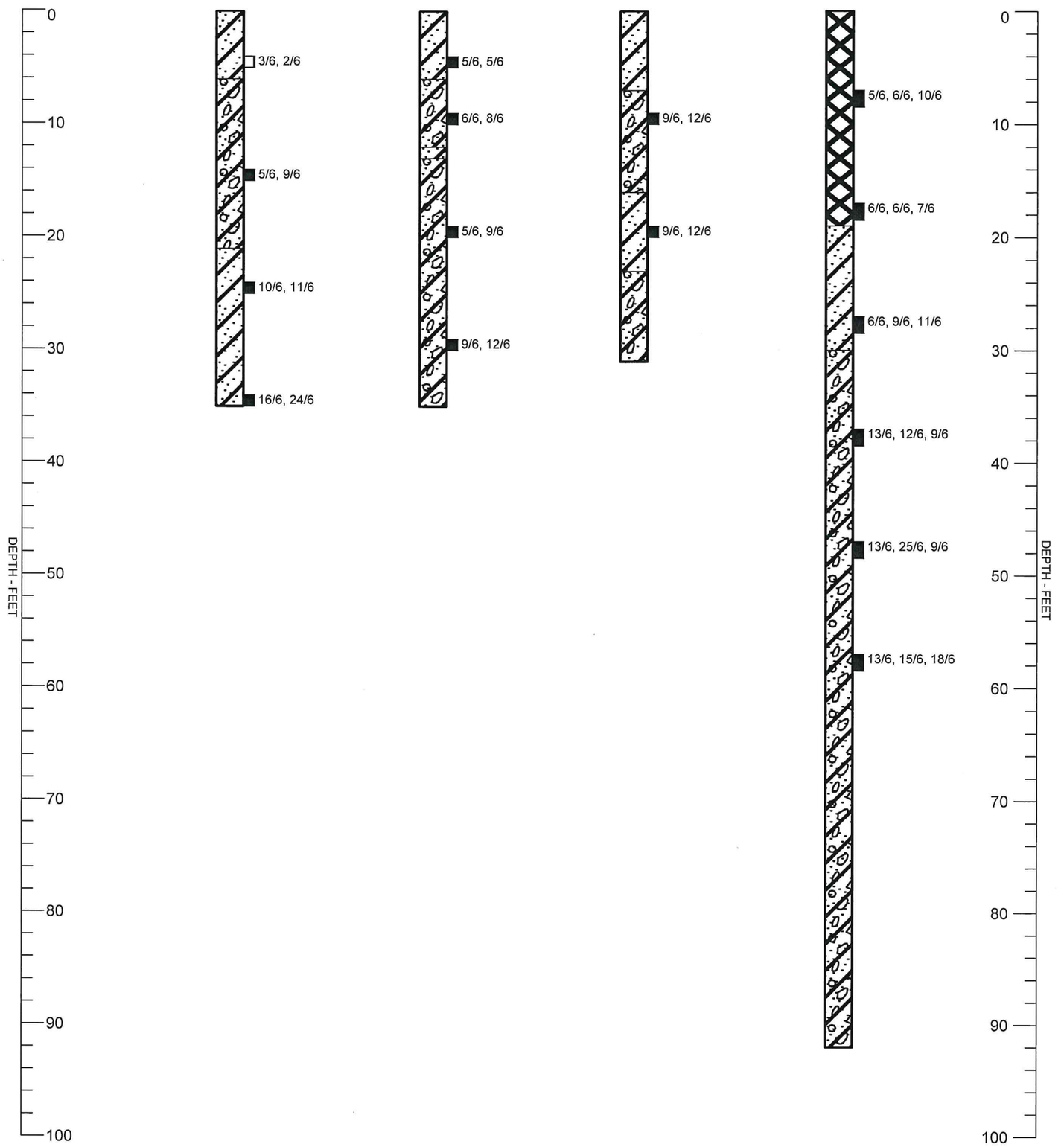
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NOTE: BASE DRAWING BY STANTEC (DATED FEBRUARY 22, 2022)



SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

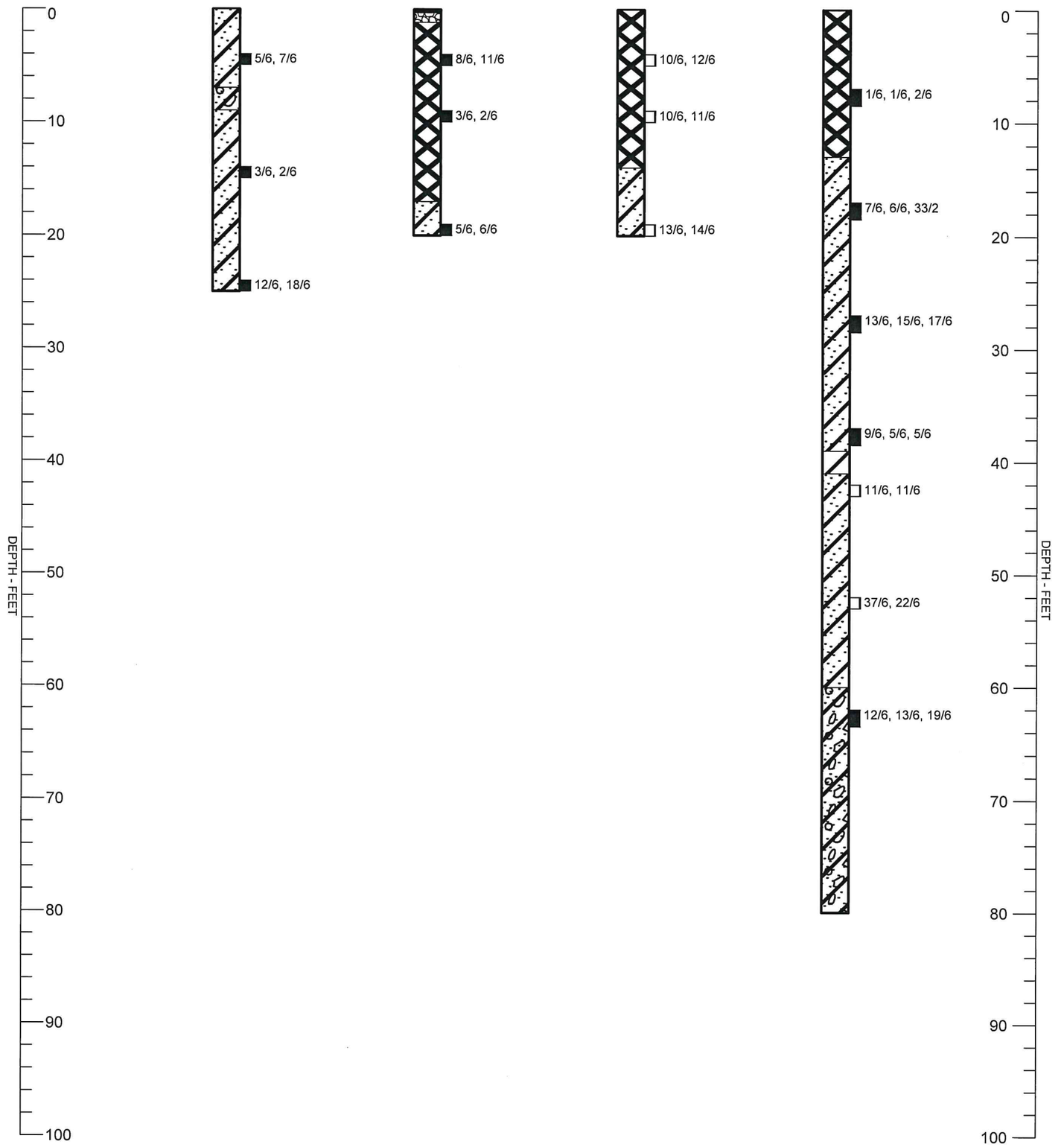
Proposed Construction **Fig. 3**



SUMMARY LOGS OF EXPLORATORY BORINGS

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

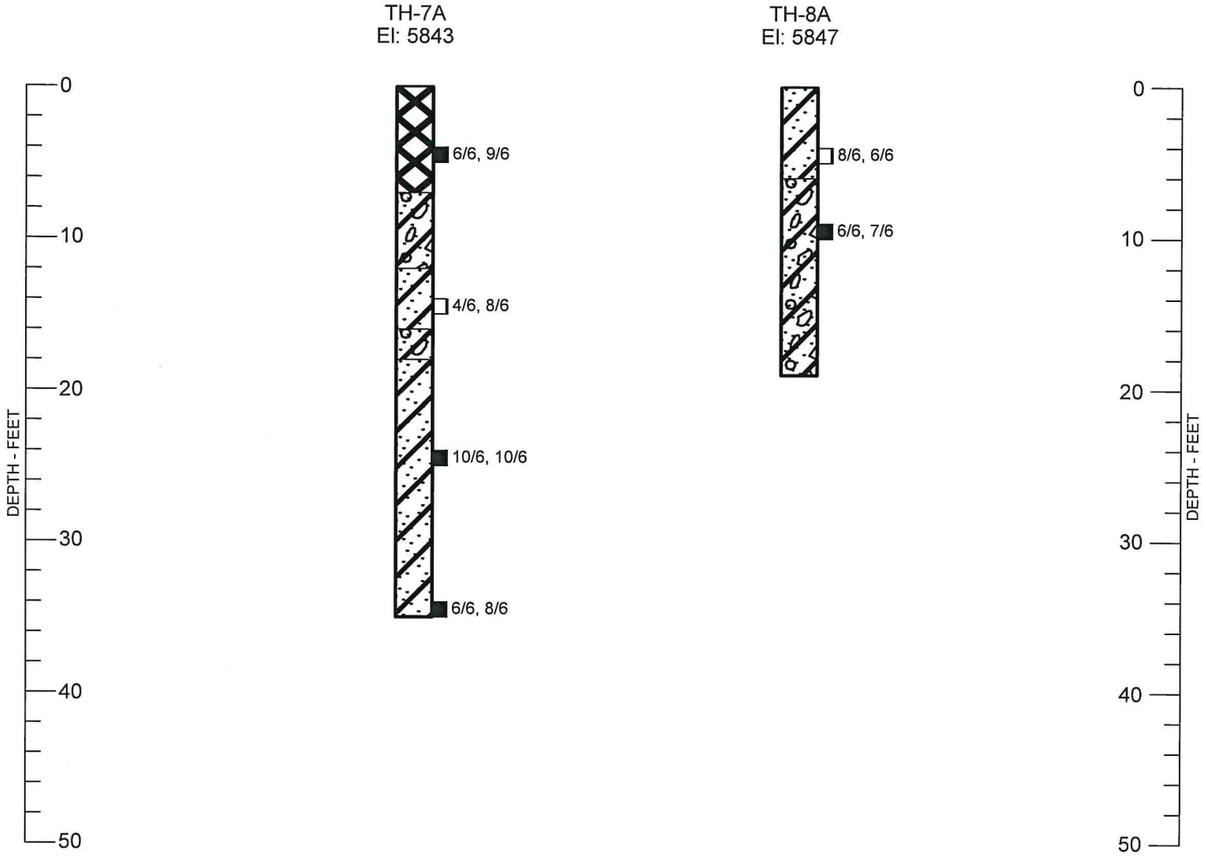
FIG. 4



SUMMARY LOGS OF EXPLORATORY BORINGS

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

FIG. 5



LEGEND:

- ASPHALT PAVEMENT
- AGGREGATE BASE COURSE
- EXCAVATION BACKFILL, GRAVEL, SAND, SILTY, MINOR CONSTRUCTION DEBRIS (E.G. PLASTIC, GEOFABRIC, WOOD), AREAS OF WASHED DRAIN ROCK, LOOSE TO MEDIUM DENSE, MOIST, RUST, BROWN.
- SAND, CLAYEY TO SILTY, FINE TO MEDIUM GRAVEL, LOOSE TO MEDIUM DENSE, MOIST TO SLIGHTLY MOIST, RUST, BROWN. (SC-SM, SM, ML)
- GRAVEL, SAND, CLAYEY TO SILTY, LENSES OF SILTY SAND, MEDIUM DENSE, SLIGHTLY MOIST TO MOIST, RUST, BROWN. (GC-GM, GM, SM)
- DRIVE SAMPLE. THE SYMBOL 3/6, 2/6 INDICATES THAT A TOTAL OF 5 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. CALIFORNIA-BARREL SAMPLER A TOTAL OF 12 INCHES.
- DRIVE SAMPLE. THE SYMBOL 5/6, 9/6 INDICATES THAT A TOTAL OF 14 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.0-INCH O.D. SPLIT-SPOON SAMPLER A TOTAL OF 12 INCHES.

NOTES:

1. SUPPLEMENTAL EXPLORATORY BORINGS TH-1A THROUGH TH-8A WERE DRILLED ON MARCH 14 AND 15, 2022 WITH A TRACK- MOUNTED DRILL RIG AND 6-INCH DIAMETER HOLLOW-STEM AUGER.
2. EXPLORATORY BORINGS TH-1 AND TH-2 WERE DRILLED ON JANUARY 10, 11, AND 12, 2021 WITH A TRACK- MOUNTED DRILL RIG AND ODEX DRILLING TECHNIQUES THAT UTILIZE A DOWN-HOLE PERCUSSION HAMMER TO ADVANCE A CASED BORING.
3. FREE GOUNDWATER WAS NOT FOUND IN OUR EXPLORATORY BORINGS AT THE TIME OF DRILLING. PVC PIPE WAS INSTALLED IN BORINGS TH-1A, TH-2A, TH-7A, TH-1, AND TH-2 TO FACILITATE SUBSEQUENT CHECKS OF GROUNDWATER.
4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS IN THIS REPORT.

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

SUMMARY LOGS OF EXPLORATORY BORINGS

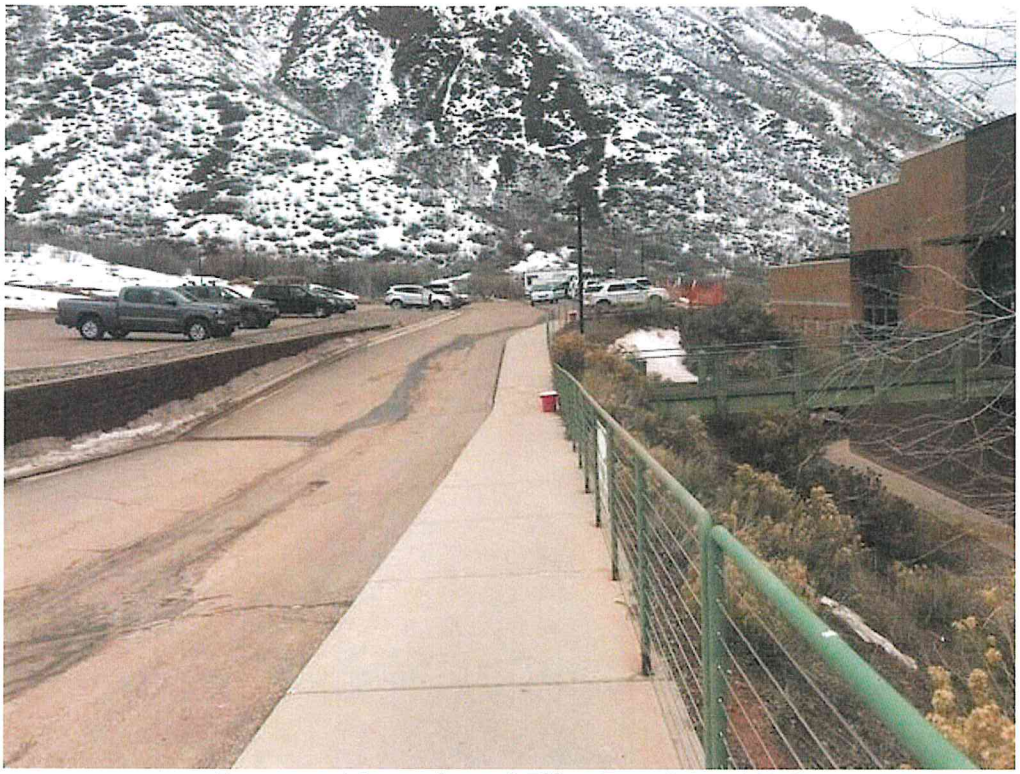
FIG. 6



Uphill Slope – Proposed Excavation Face



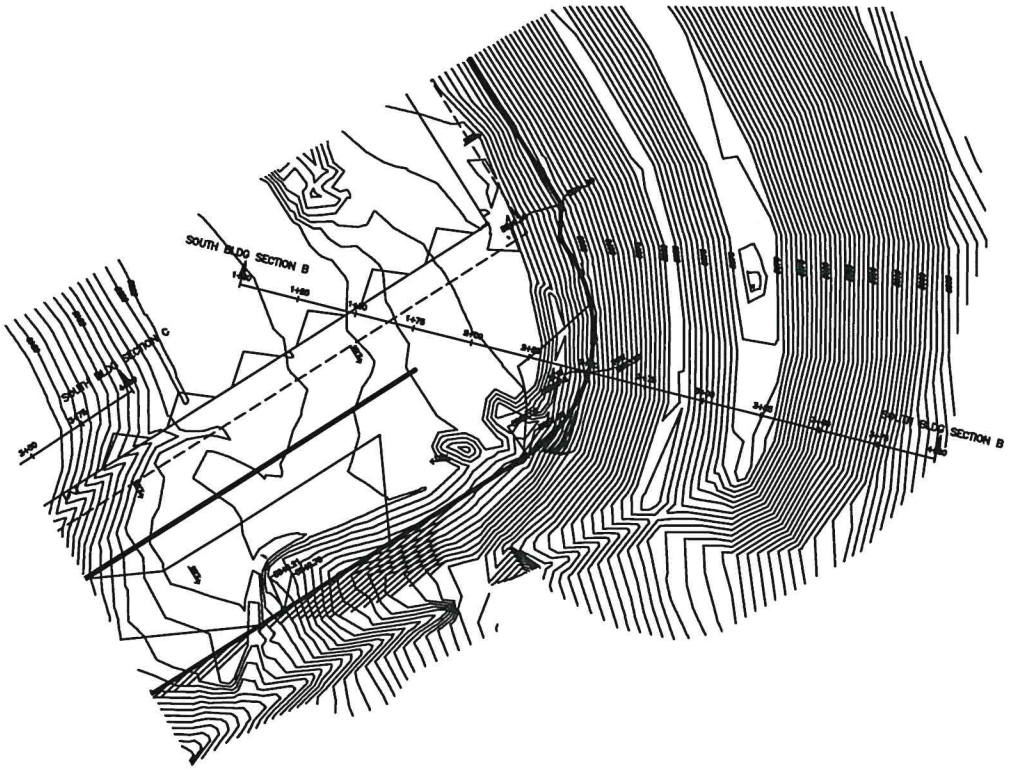
Debris Flow Catchment Basin

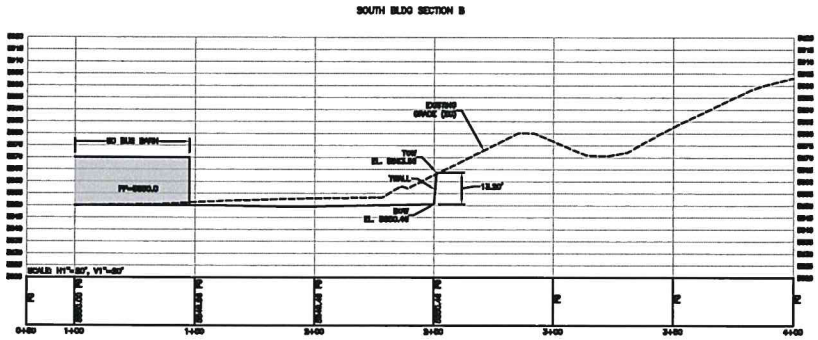


Proposed Location of Fill – Retaining Wall

NOT TO SCALE

NOTE: BASE DRAWING BY SGM, INC.





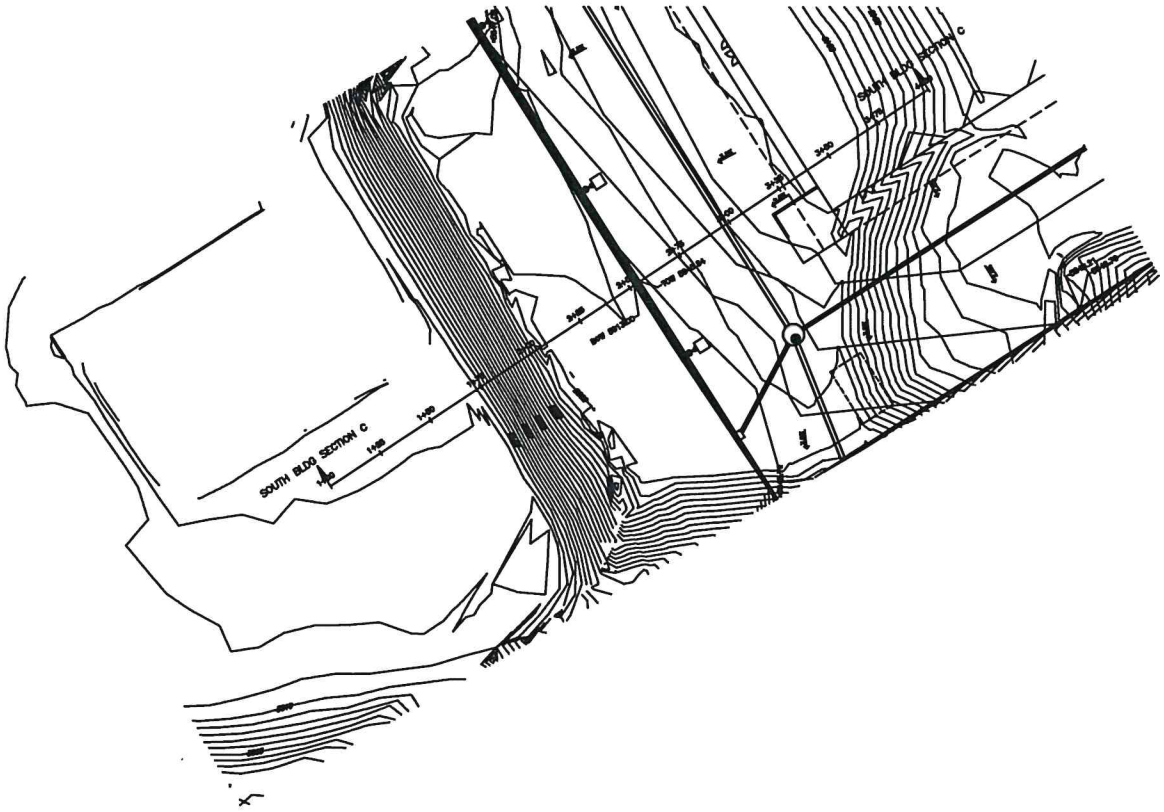
SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

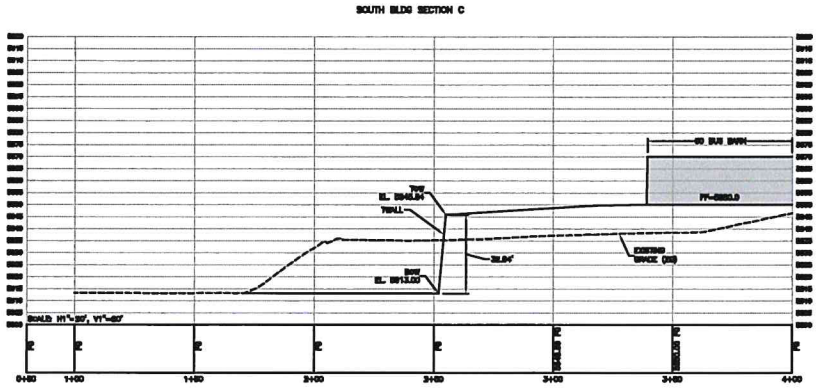
Excavation Plan and Profile

Fig. 9

NOT TO SCALE

NOTE: BASE DRAWING BY SGM, INC.





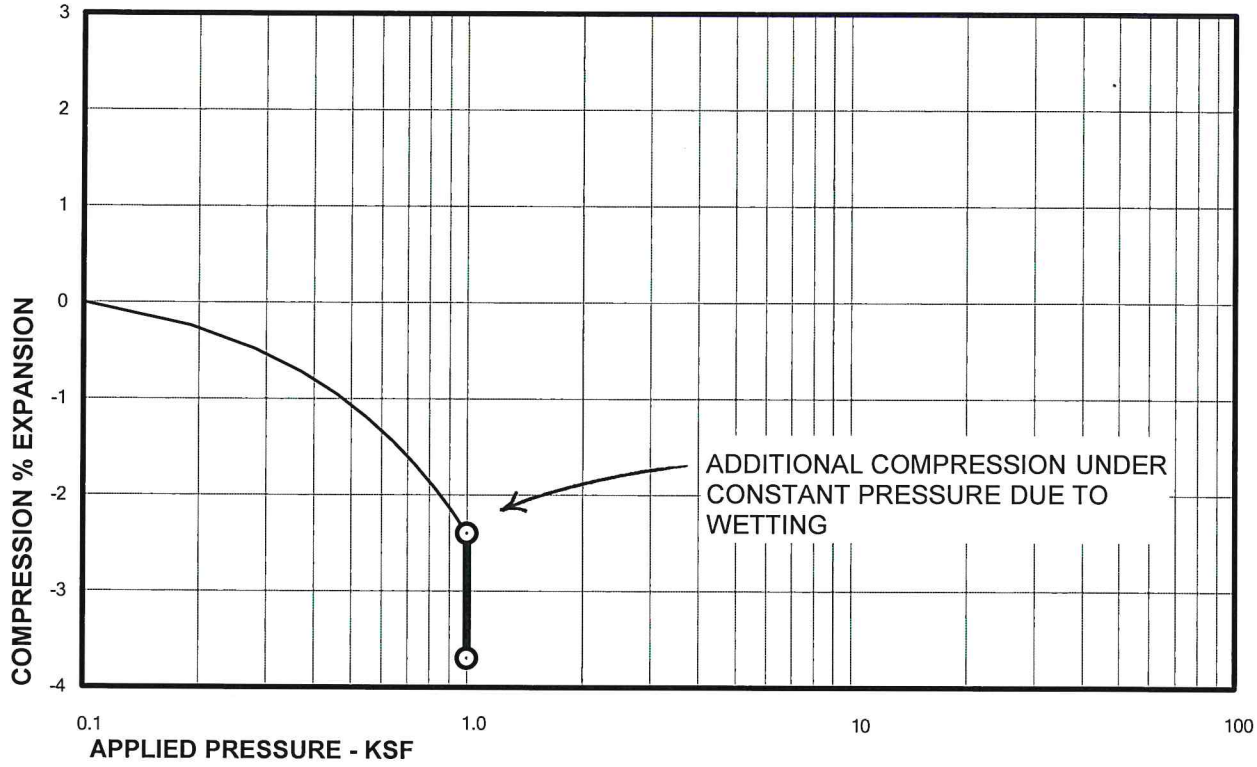
SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

Retaining Wall Plan and Profile

Fig. 10

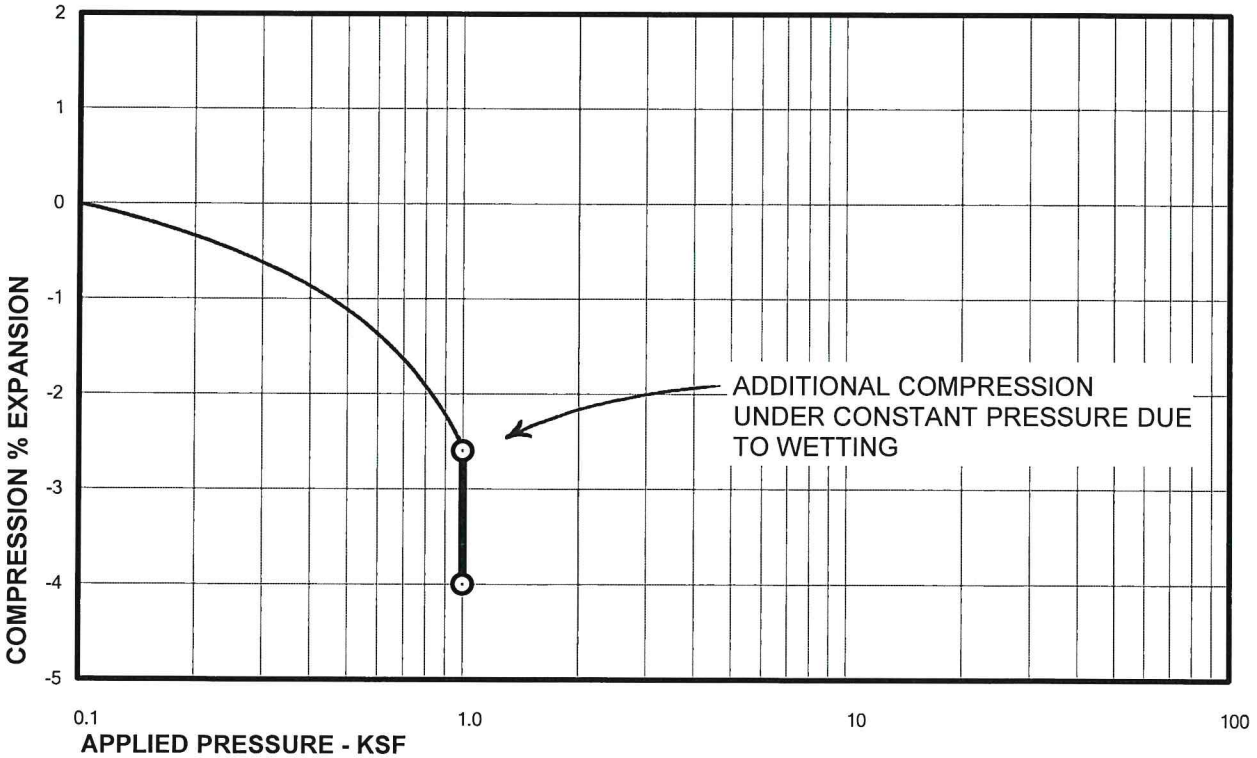
APPENDIX A

LABORATORY TEST RESULTS



Sample of SAND, SILTY (SM)
From TH-6A AT 4 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 9.1 %



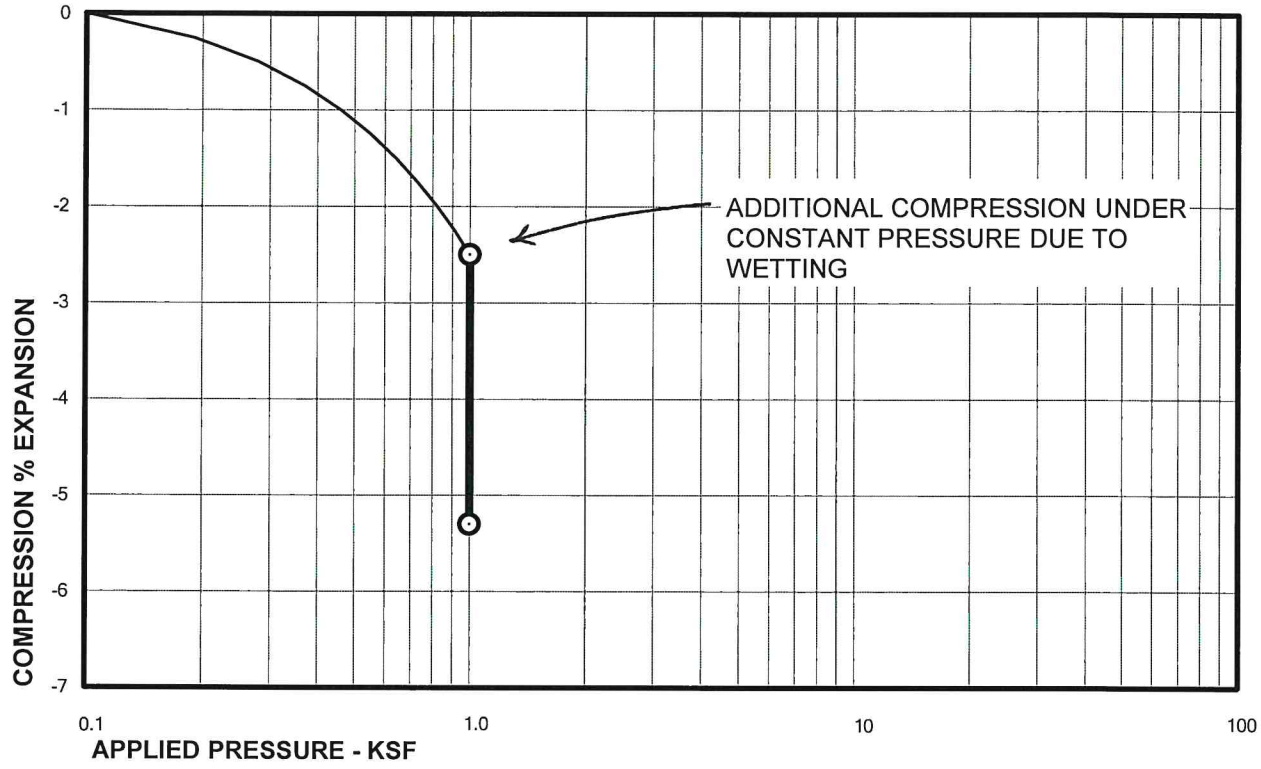
Sample of SAND, SILTY (SM)
From TH-6A AT 9 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 9.2 %

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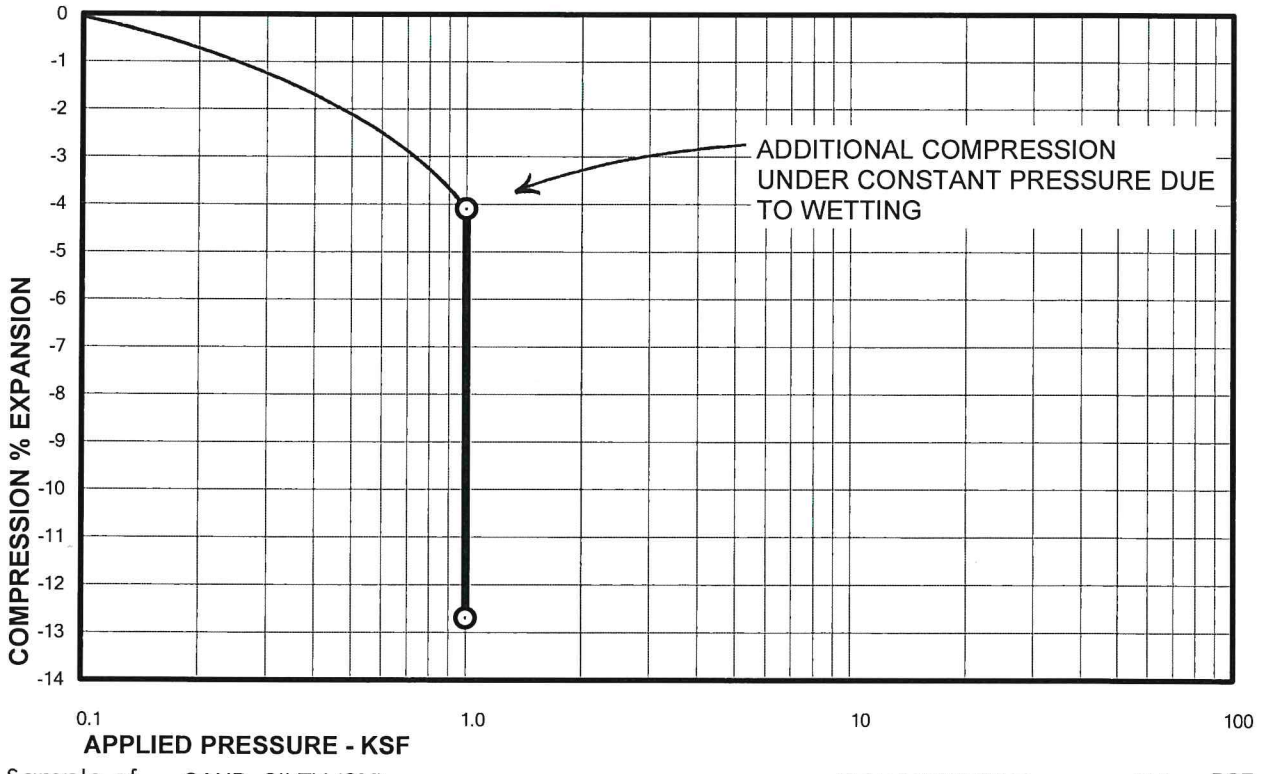
Swell-Consolidation Test Results

FIG. A-1



Sample of SAND, SILTY (SM)
From TH-7A AT 9 FEET

DRY UNIT WEIGHT= 98 PCF
MOISTURE CONTENT= 9.1 %



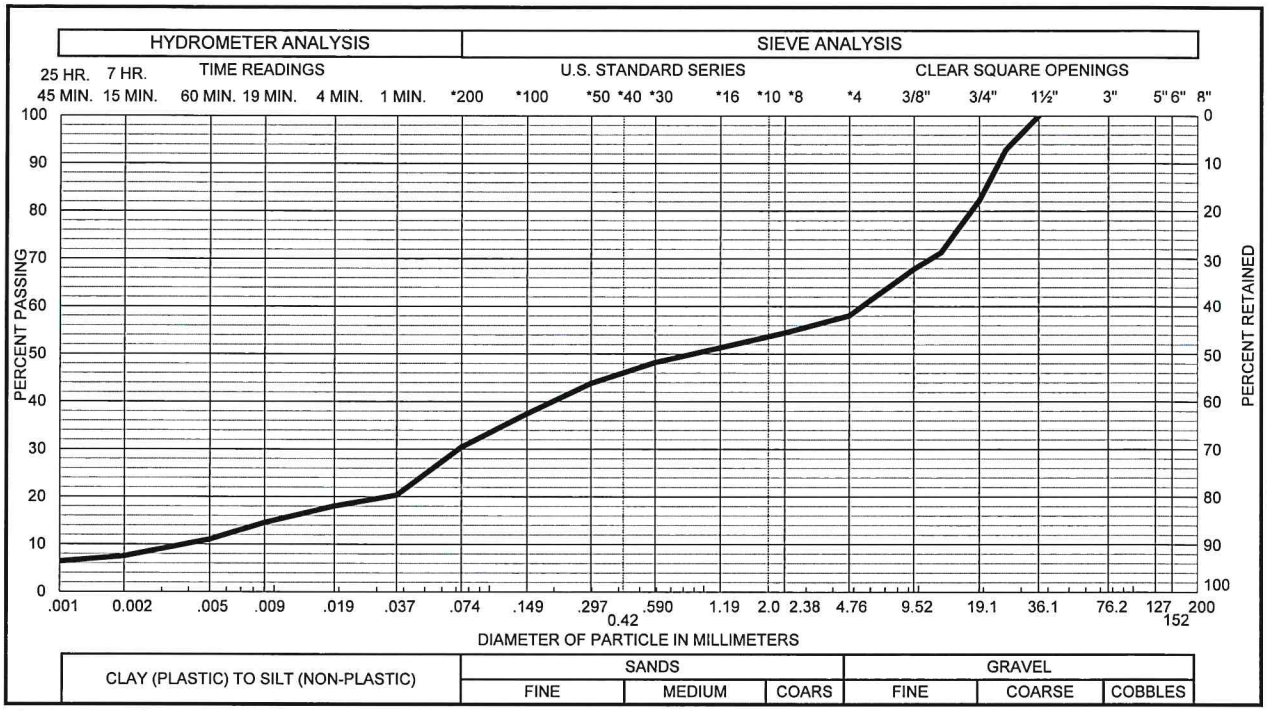
Sample of SAND, SILTY (SM)
From TH-8A AT 4 FEET

DRY UNIT WEIGHT= 111 PCF
MOISTURE CONTENT= 7.6 %

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

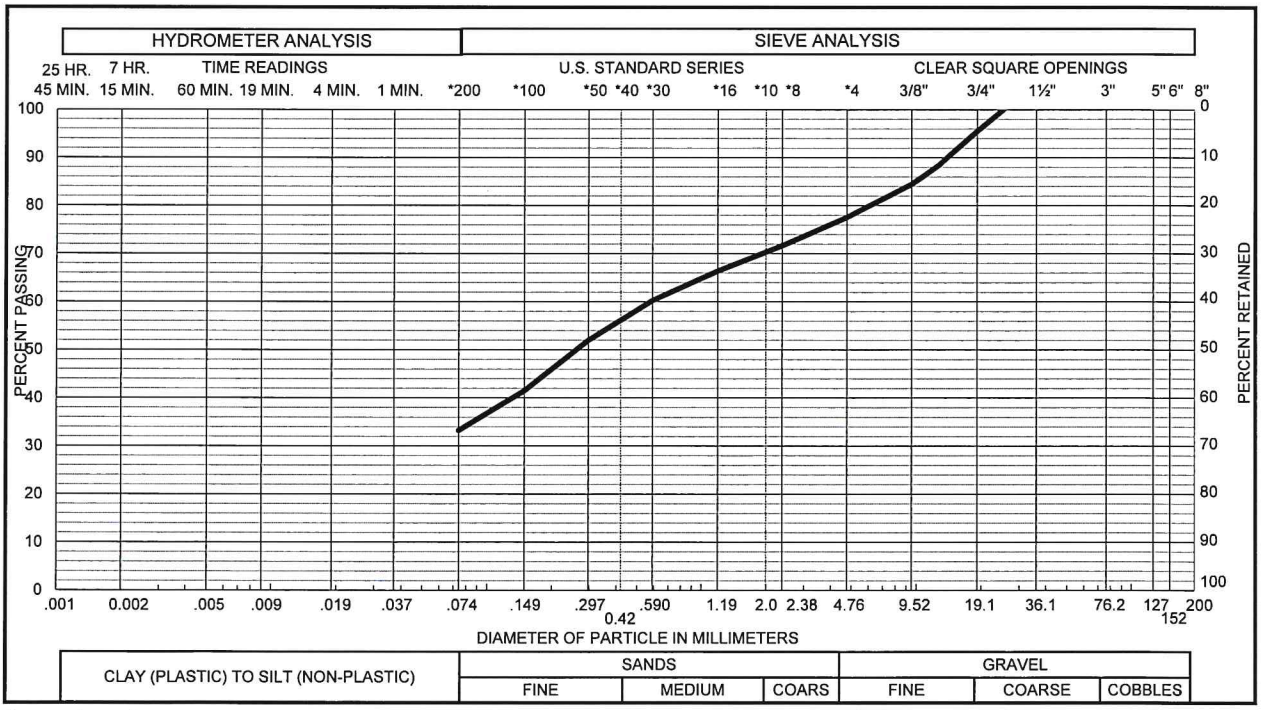
Swell-Consolidation Test Results

FIG. A-2



Sample of GRAVEL, SILTY (GM)
From TH - 1A AT 34 FEET

GRAVEL	42 %	SAND	28 %
SILT & CLAY	30 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



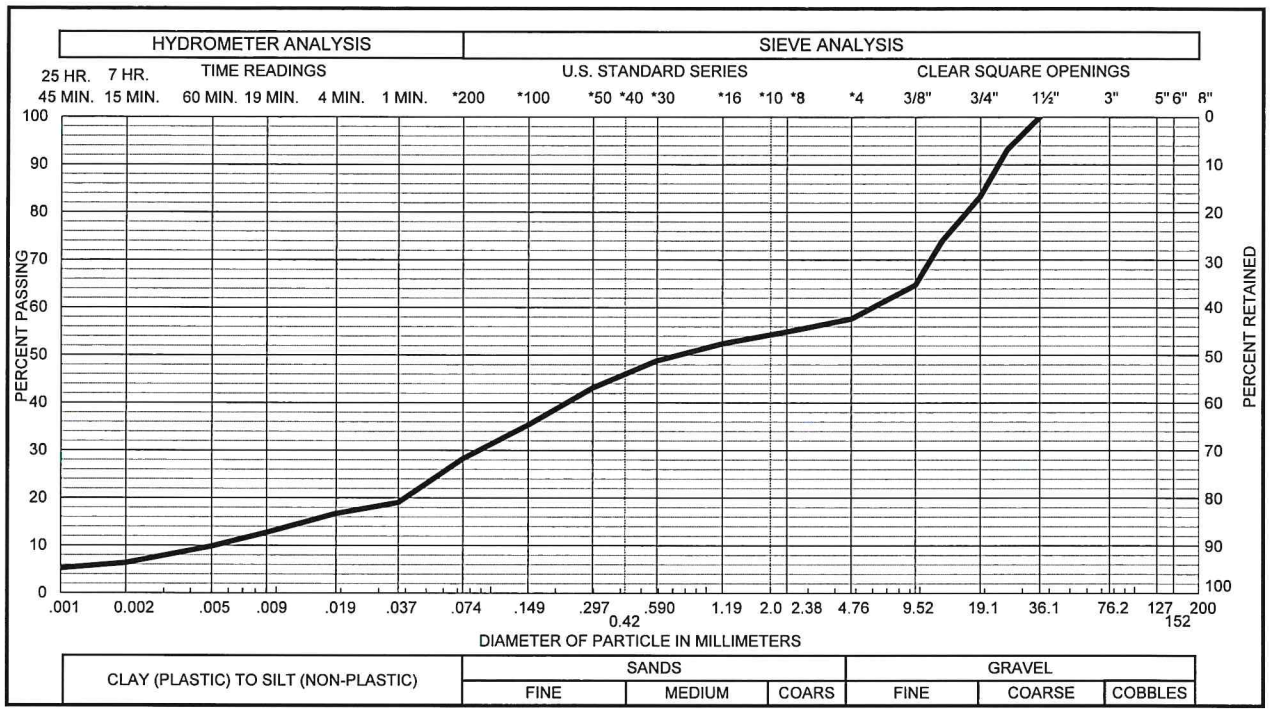
Sample of SAND, SILTY (SM)
From TH - 2A AT 4-12 FEET

GRAVEL	23 %	SAND	44 %
SILT & CLAY	33 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

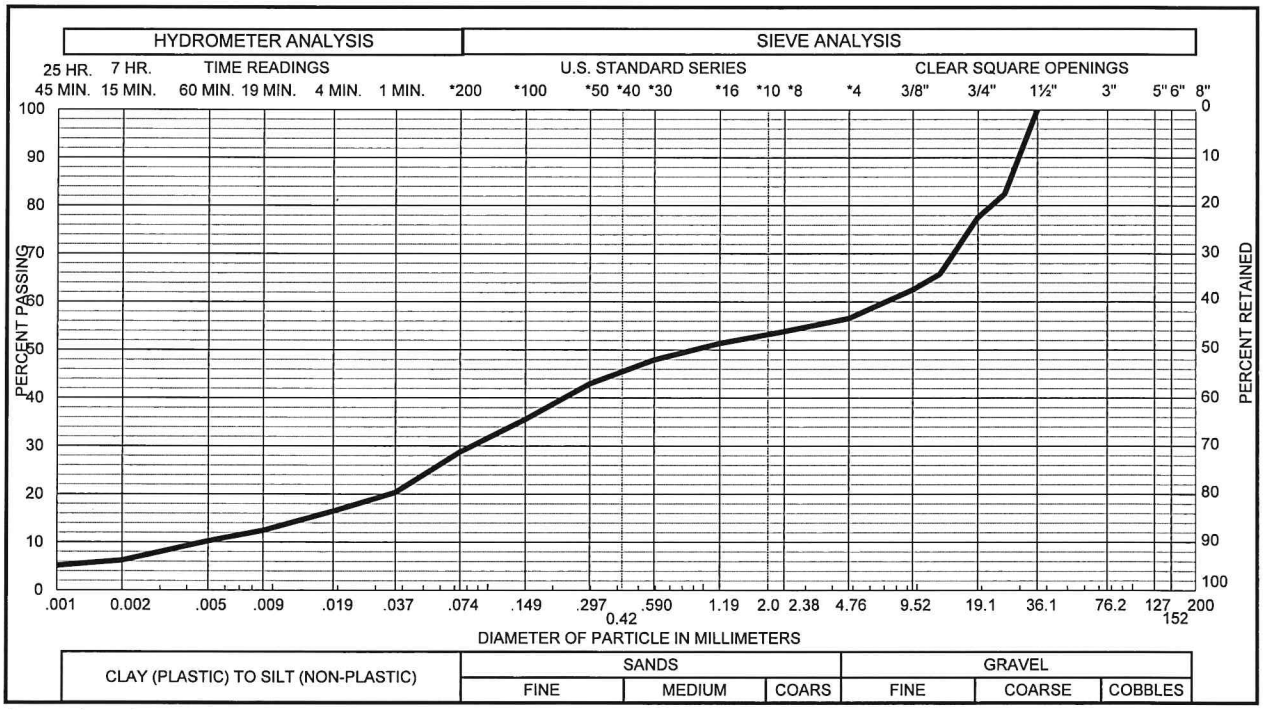
Gradation Test Results

FIG. A-3



Sample of GRAVEL, SILTY (GM)
From TH - 2A AT 9 FEET

GRAVEL	42 %	SAND	30 %
SILT & CLAY	28 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



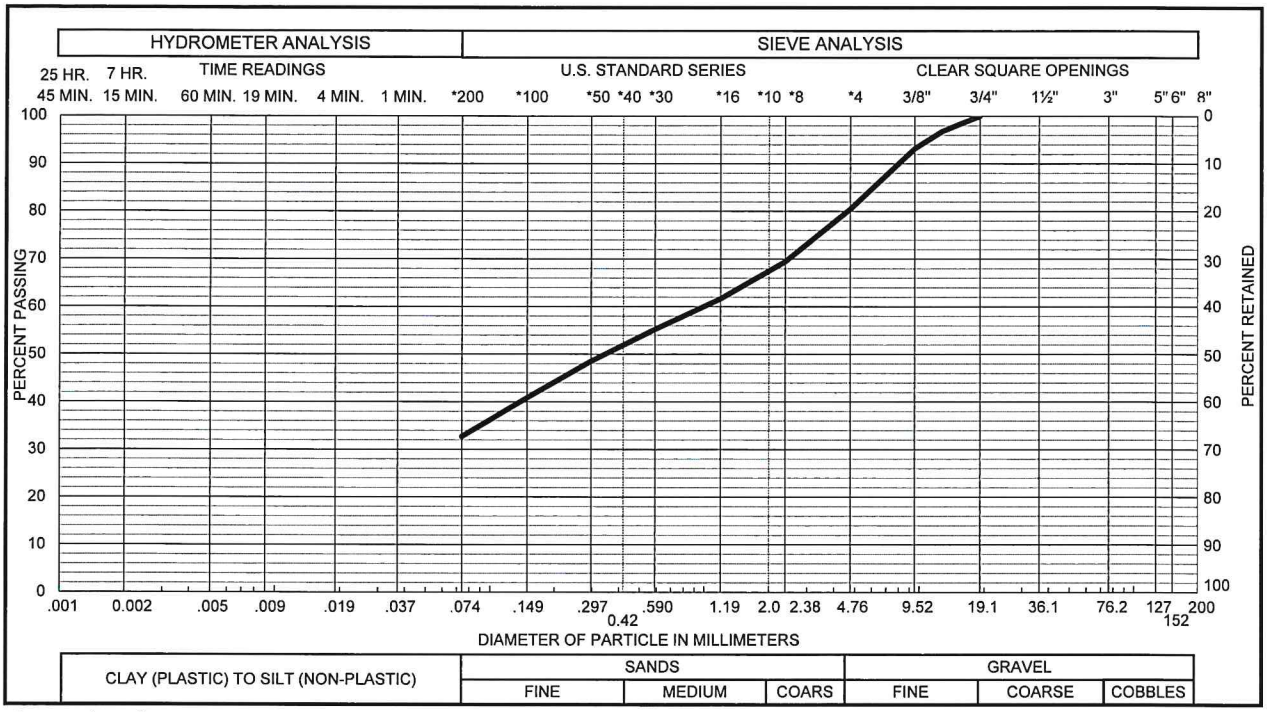
Sample of GRAVEL, SILTY (GM)
From TH - 3A AT 9 FEET

GRAVEL	44 %	SAND	27 %
SILT & CLAY	29 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

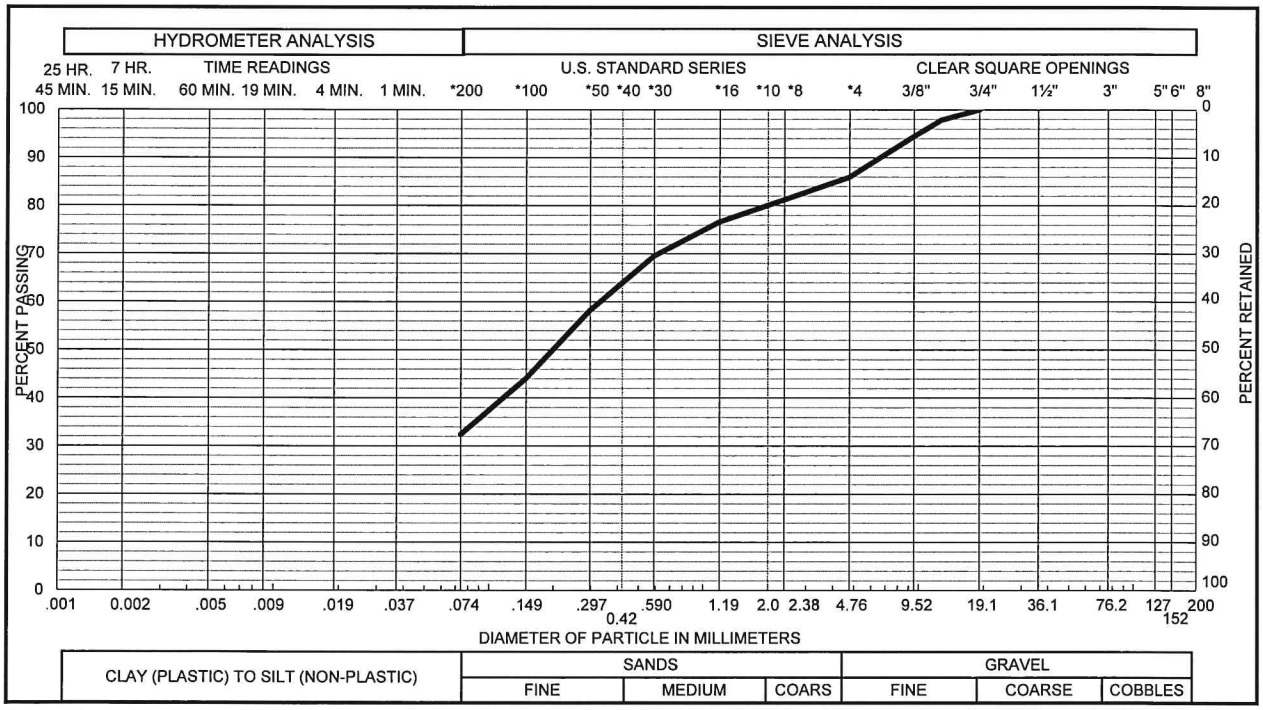
Gradation Test Results

FIG. A-4



Sample of SAND, SILTY (SM)
From TH - 3A AT 9-14 FEET

GRAVEL 20 % SAND 47 %
SILT & CLAY 33 % LIQUID LIMIT %
PLASTICITY INDEX %



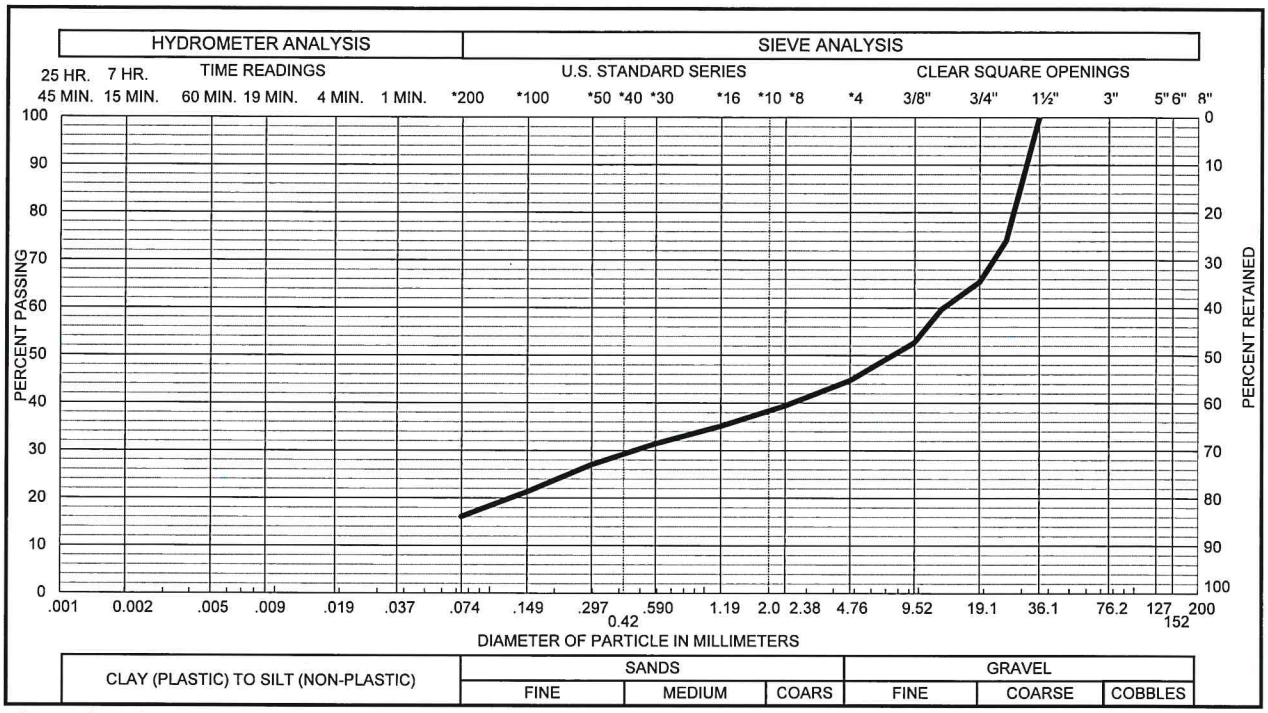
Sample of SAND, SILTY (SM)
From #REF!

GRAVEL #### % SAND ### %
SILT & CLAY 32 % LIQUID LIMIT %
PLASTICITY INDEX %

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

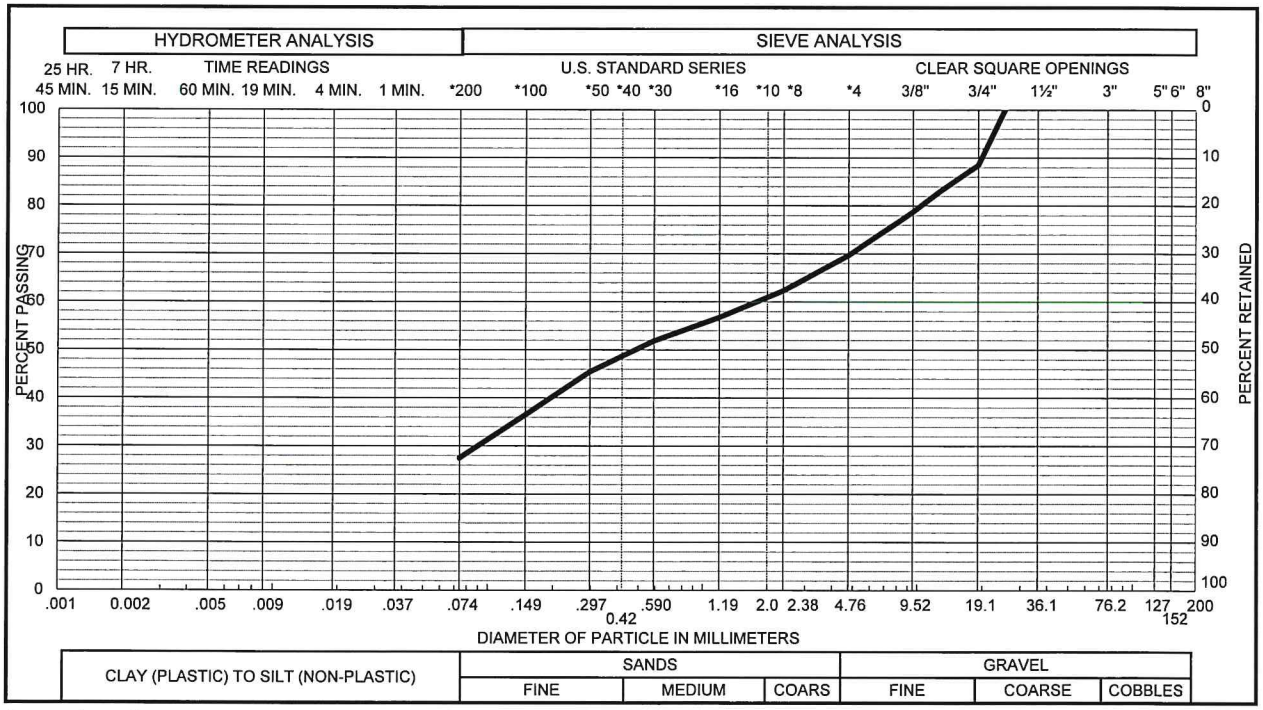
Gradation Test Results

FIG. A-5



Sample of SAND, SILTY (SM)
From #REF!

GRAVEL 55 % SAND 29 %
SILT & CLAY 16 % LIQUID LIMIT %
PLASTICITY INDEX %



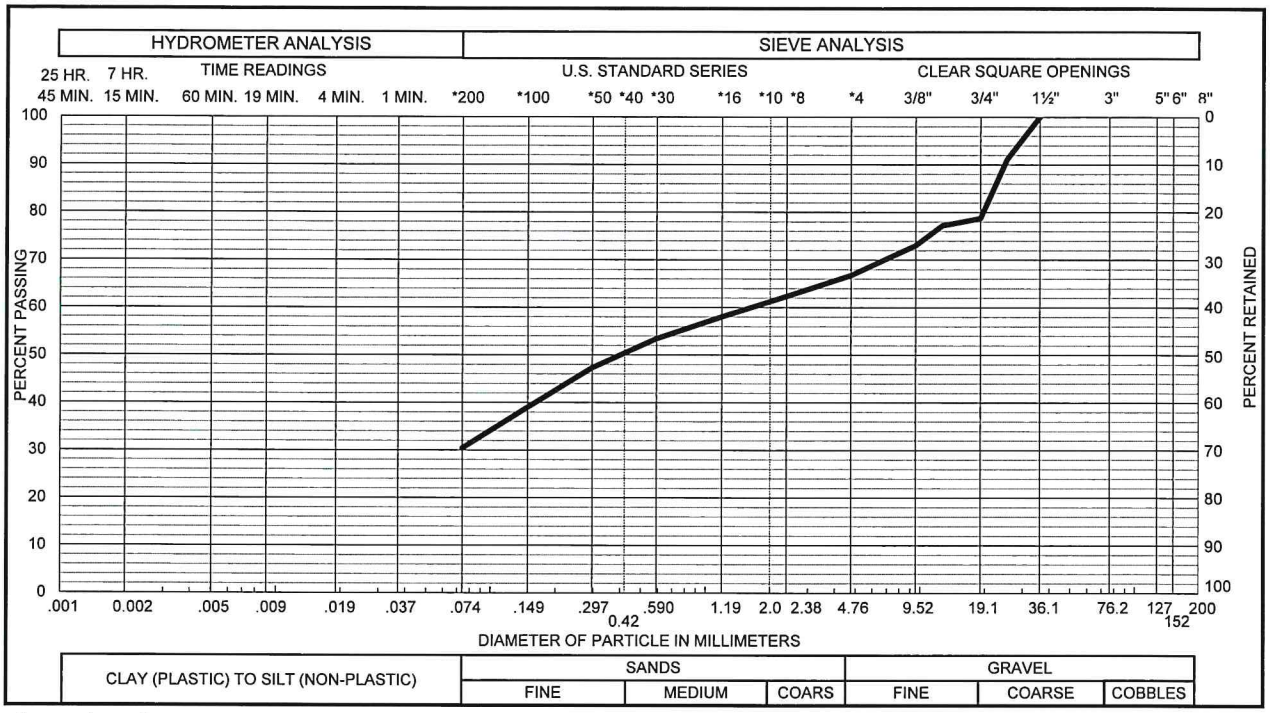
Sample of SAND, SILTY (SM)
From TH - 5A AT 9 FEET

GRAVEL 30 % SAND 42 %
SILT & CLAY 28 % LIQUID LIMIT %
PLASTICITY INDEX %

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

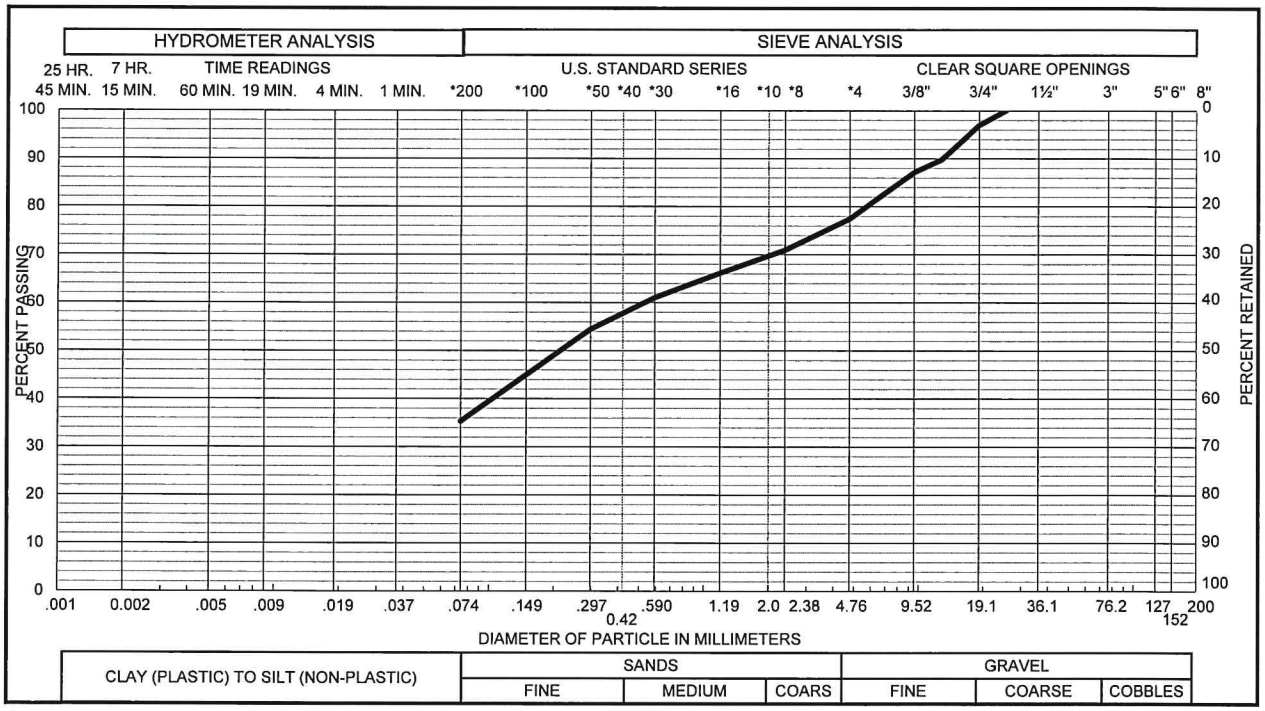
Gradation Test Results

FIG. A-6



Sample of GRAVEL, SILTY (GM)
From TH - 6A AT 19 FEET

GRAVEL	33 %	SAND	37 %
SILT & CLAY	30 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



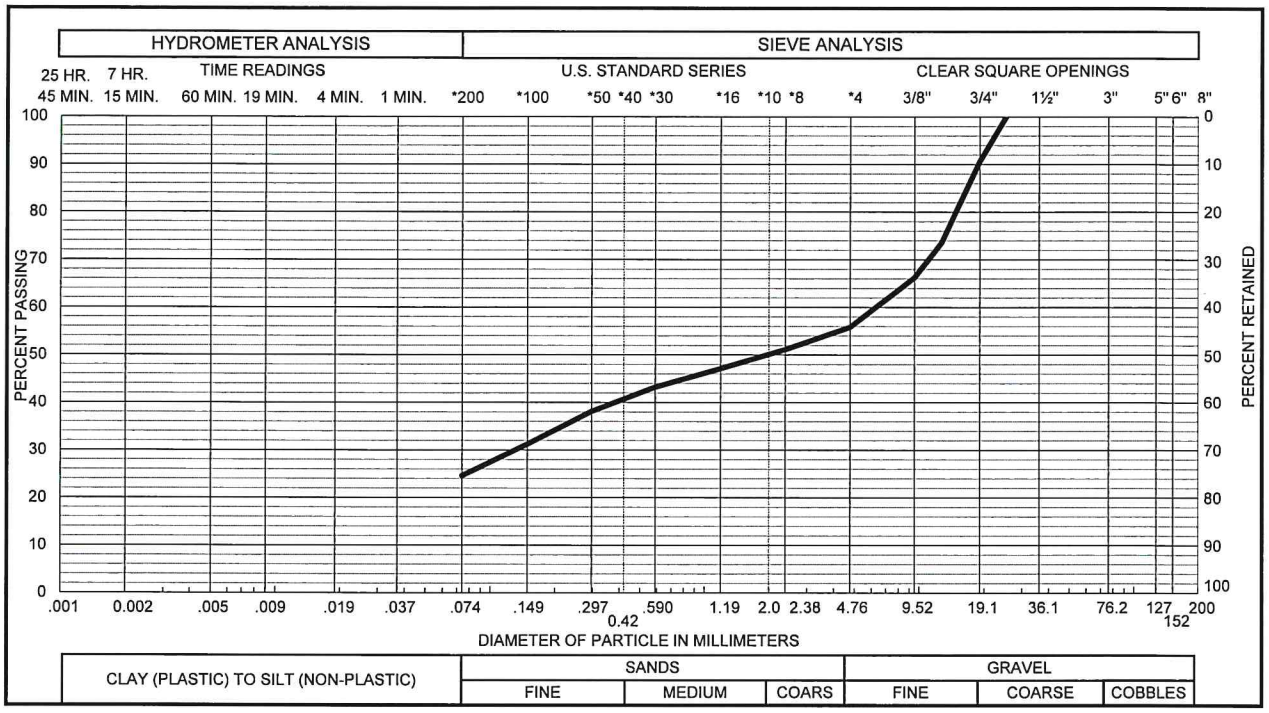
Sample of SAND, SILTY (SM)
From TH - 8A AT 4-14 FEET

GRAVEL	23 %	SAND	42 %
SILT & CLAY	35 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

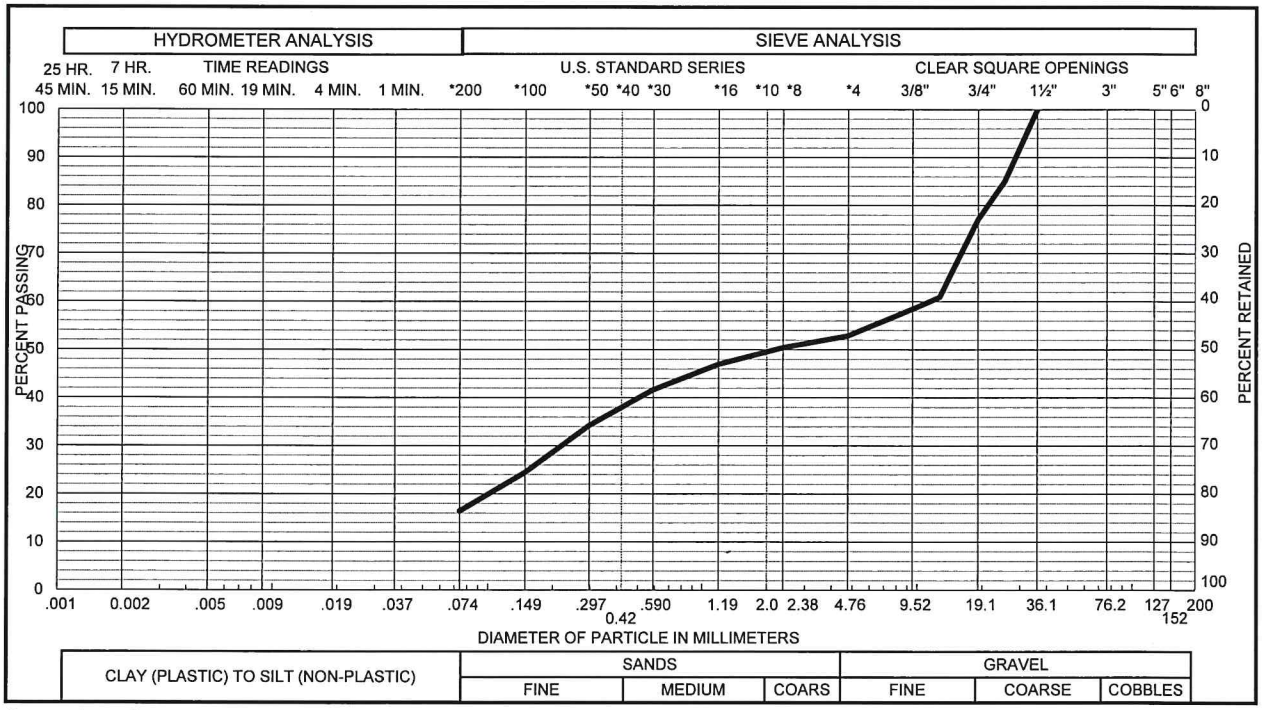
Gradation Test Results

FIG. A-7



Sample of FILL, GRAVEL, SILTY
From TH - 1 AT 17 FEET

GRAVEL	44 %	SAND	31 %
SILT & CLAY	25 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



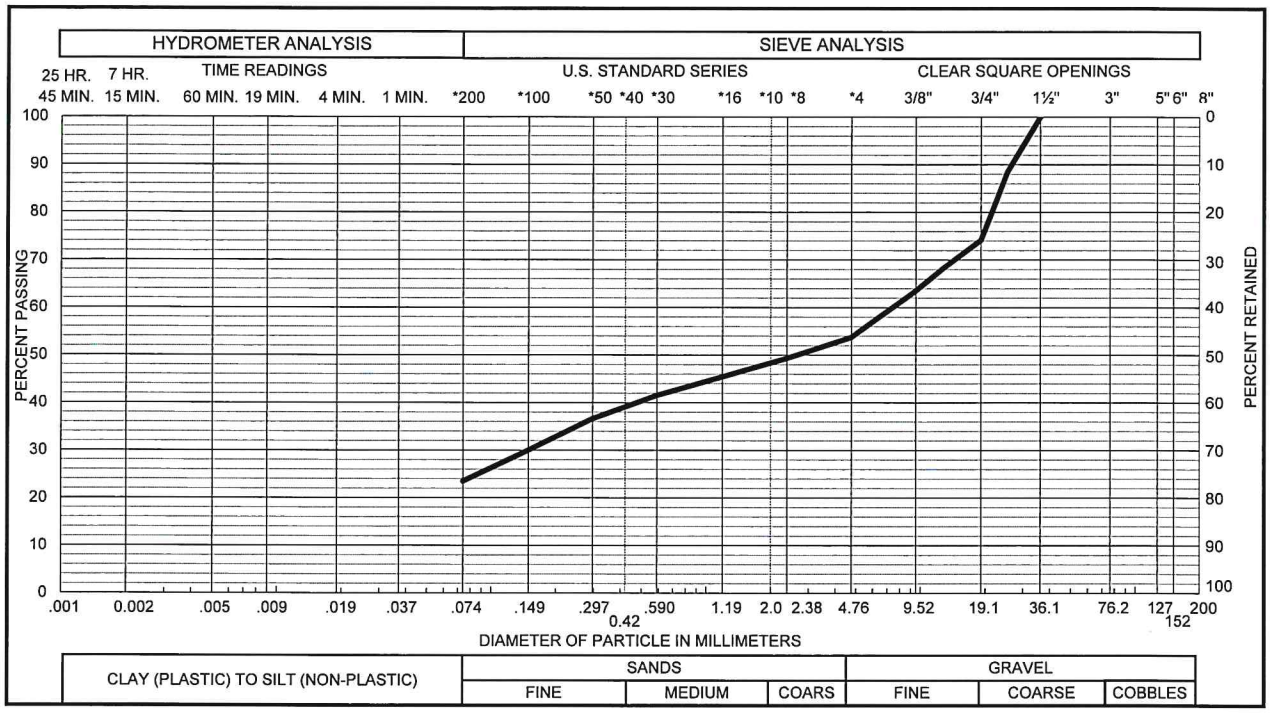
Sample of GRAVEL, SILTY (GM)
From TH - 1 AT 27 FEET

GRAVEL	47 %	SAND	37 %
SILT & CLAY	16 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

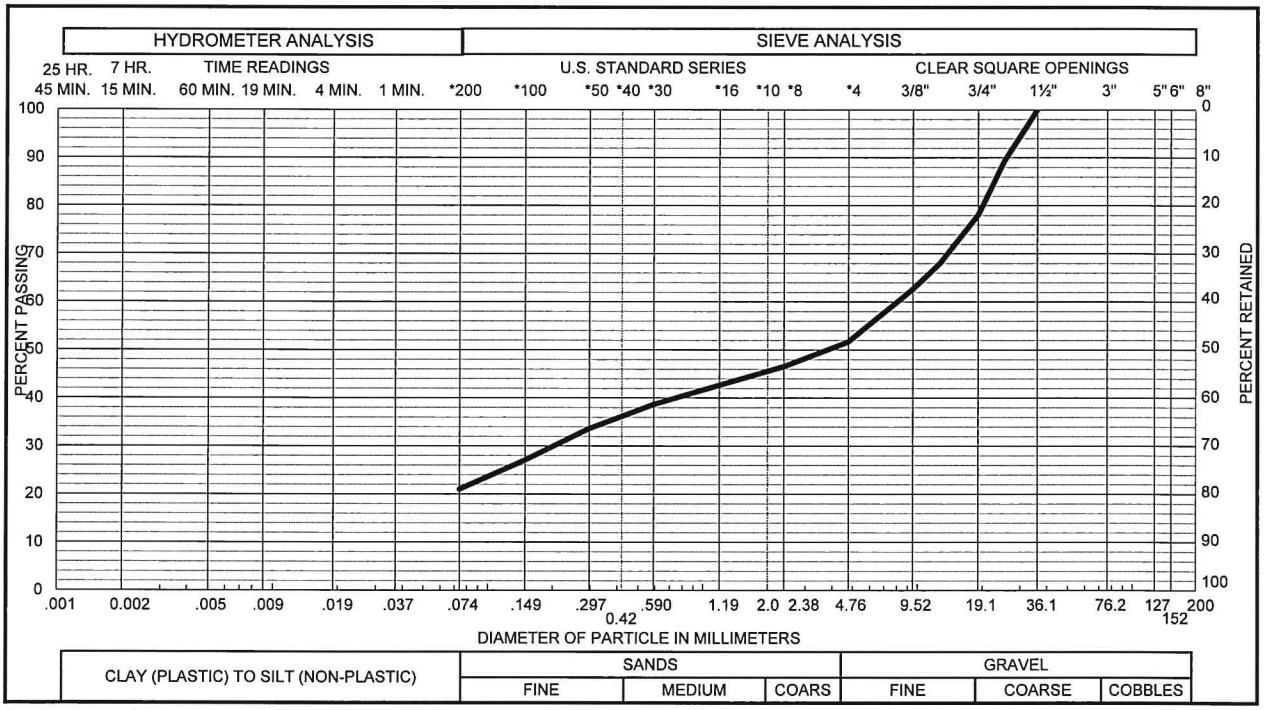
Gradation Test Results

FIG. A-8



Sample of GRAVEL, SILTY (GM)
From TH - 1 AT 47 FEET

GRAVEL	46 %	SAND	30 %
SILT & CLAY	24 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



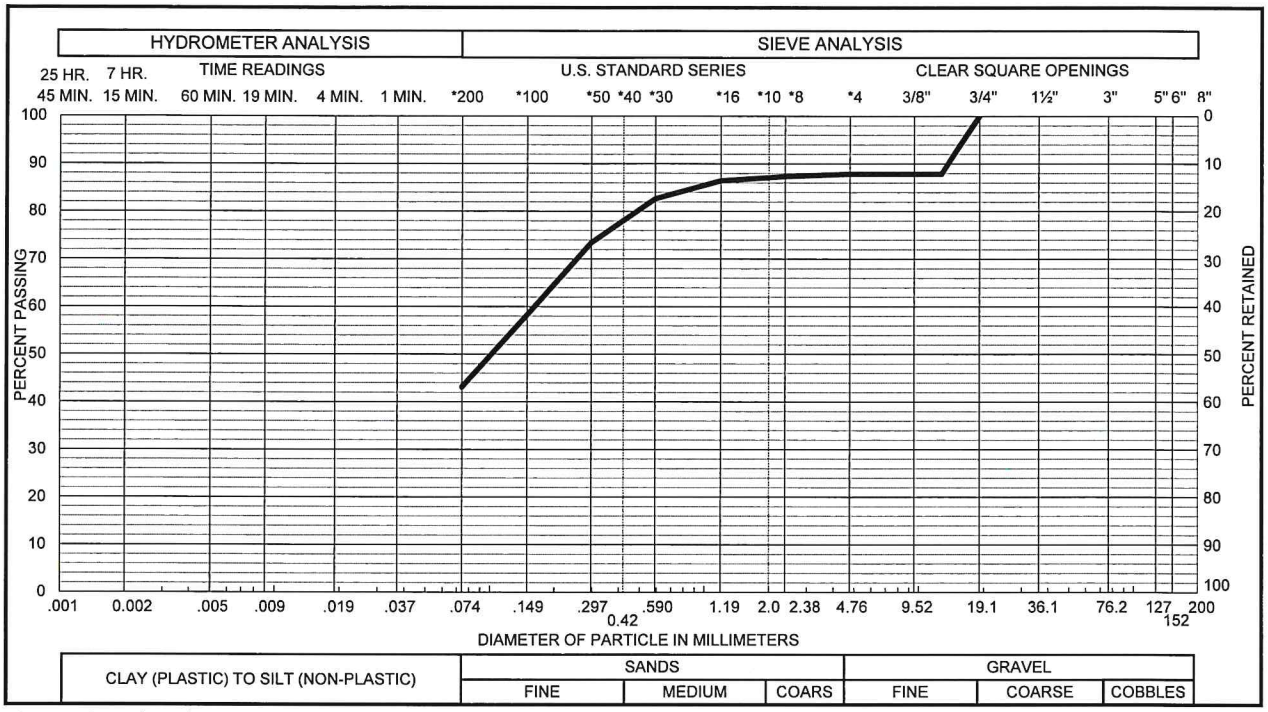
Sample of GRAVEL, SILTY (GM)
From TH - 1 AT 57 FEET

GRAVEL	48 %	SAND	31 %
SILT & CLAY	21 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

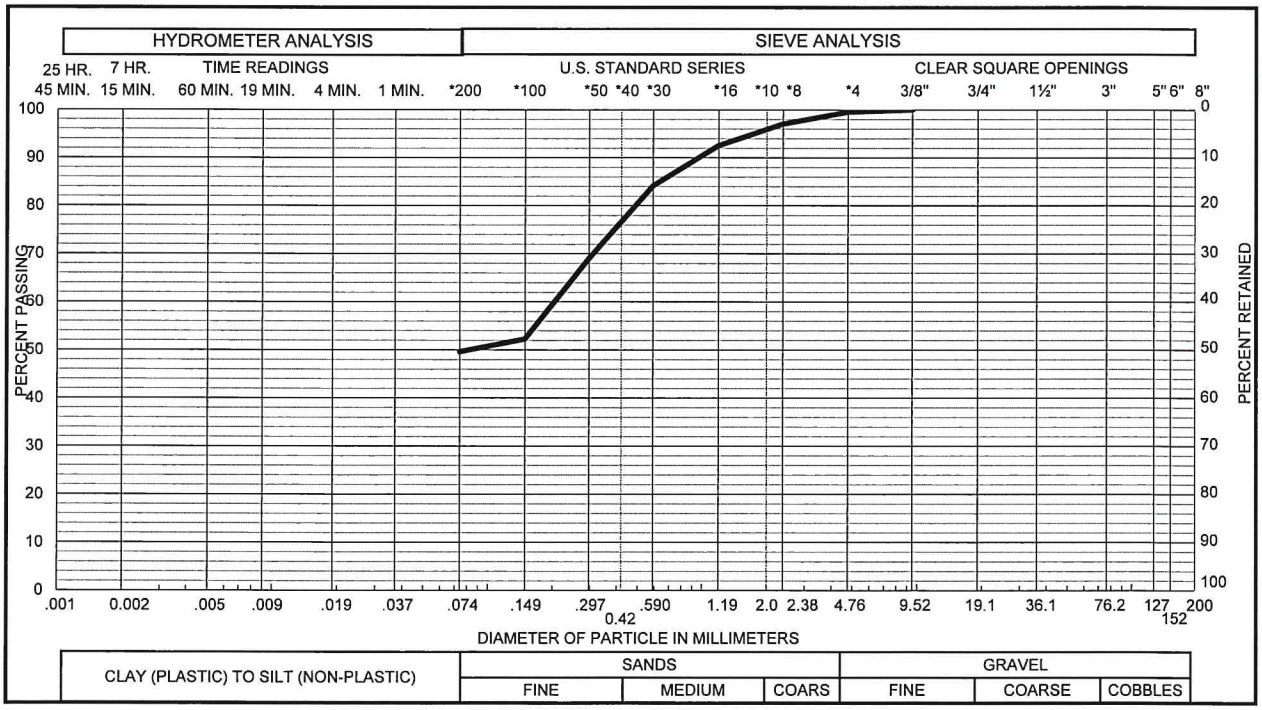
Gradation Test Results

FIG. A-9



Sample of FILL, SAND, SILTY
From TH - 7A AT 4-14 FEET

GRAVEL	12 %	SAND	45 %
SILT & CLAY	43 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



Sample of SAND, SILTY (SM)
From TH - 7A AT 24 FEET

GRAVEL	1 %	SAND	49 %
SILT & CLAY	50 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SAUNDERS, INC.
RFTA FACILITY EXPANSION
PROJECT NO. GS06668.000-125

Gradation Test Results

FIG. A-10

TABLE A-I

SUMMARY OF LABORATORY TESTING
PROJECT NO. GS06668.000-145

EXPLORATORY BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	*SWELL (%)	UNCONFINED COMPRESSION (PSF)	SOLUBLE SULFATES (%)	PERCENT GRAVEL (%)	PERCENT SAND (%)	PASSING NO. 200 SIEVE (%)	DESCRIPTION
TH-1A	4	10.9	104				1,434					SAND, SILTY (SM)
TH-1A	34	7.1							42	28	30	GRAVEL, SILTY (GM)
TH-2A	4-12	14.1		21	5				23	44	33	SAND, SILTY (SM)
TH-2A	9								42	30	28	GRAVEL, SILTY (GM)
TH-3A	9								44	27	29	GRAVEL, SILTY (GM)
TH-3A	9-14	6.0		21	6				20	47	33	SAND, SILTY (SM)
TH-5A	9	7.3						0.01	14	54	32	GRAVEL, SILTY (GM)
TH-6A	4	9.0	114			-1.3						SAND, SILTY (SM)
TH-6A	9	9.2	112			-1.4						SAND, SILTY (SM)
TH-6A	19	3.0							55	29	16	GRAVEL, SILTY (SM)
TH-7A	4-14	5.0		18	1				30	42	28	SAND, SILTY (SM)
TH-7A	14	9.1	98			-2.8						SAND, SILTY (SM)
TH-7A	24	5.8						0.00	33	37	30	SAND, SILTY (SM)
TH-8A	4	7.6	111			-8.6						SAND, SILTY (SM)
TH-8A	4-14	7.9		22	5				23	42	35	SAND, SILTY (SM)
TH-1	17	5.8						0.000	44	31	25	FILL, GRAVEL, SILTY
TH-1	27	3.8							47	37	16	GRAVEL, SILTY (GM)
TH-1	47	5.4							46	30	24	GRAVEL, SILTY (GM)
TH-1	57	4.5							48	31	21	GRAVEL, SILTY (GM)
TH-2	7	12.9		NL	NP				12	45	43	FILL, SAND, SILTY
TH-2	37	8.5		NL	NP				1	49	50	SAND, SILTY (SM)

* SWELL MEASURED UNDER 1,000 PSF APPLIED PRESSURE.
NEGATIVE VALUE INDICATES CONSOLIDATION.

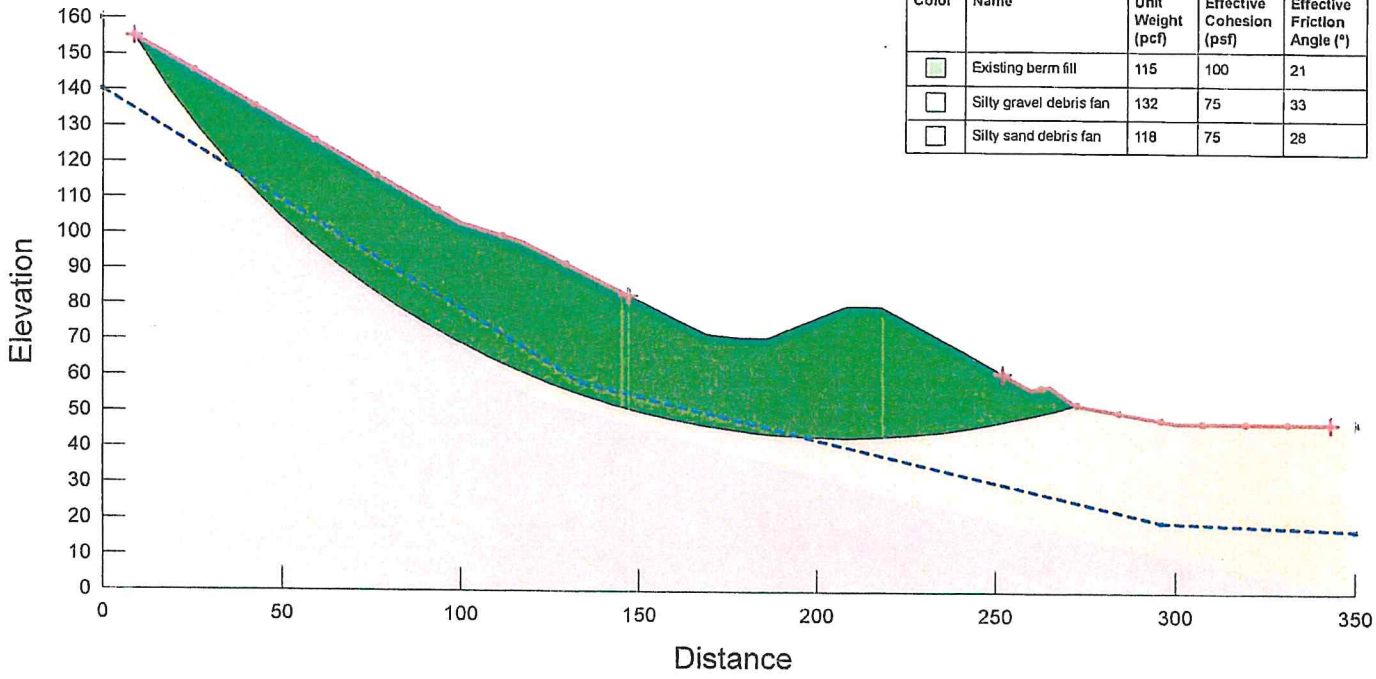
APPENDIX B

SLOPE STABILITY ANALYSES

RFTA Expansion
Glenwood Springs, Colorado
Existing Debris Fan and
Catch Basin Berm Condition

1.8

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Existing berm fill	115	100	21
	Silty gravel debris fan	132	75	33
	Silty sand debris fan	118	75	28

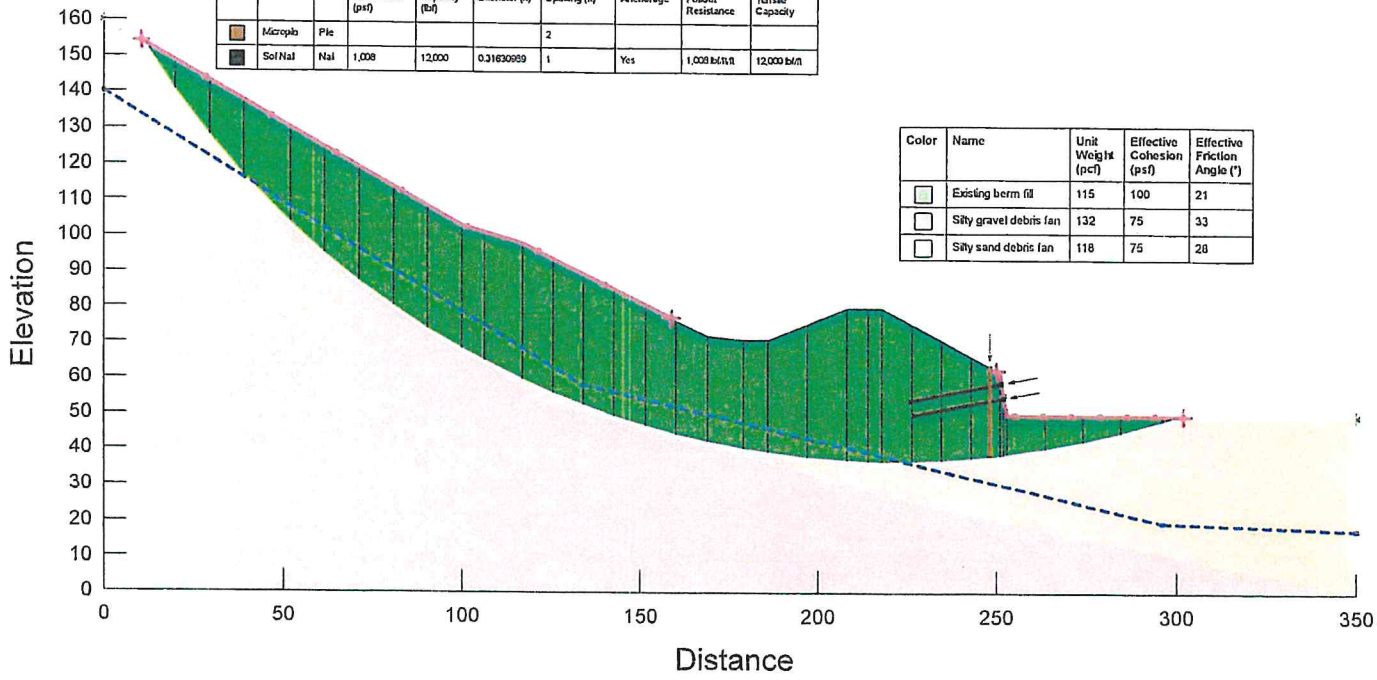


RFTA Expansion
Glenwood Springs, Colorado
Excavation Retention with Two Rows of Soil Nails and One Row of Micropiles

1.8

Color	Name	Type	Pullout Resistance (psf)	Tensile Capacity (lbf)	Bond Diameter (ft)	Out-of-Plane Spacing (ft)	Face Anchorage	Factored Pullout Resistance	Factored Tensile Capacity
	Micropile	Pile				2			
	Soil Nail	Nail	1,008	12,000	0.31630989	1	Yes	1,008 lbf/ft/ft	12,000 lbf/ft

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Existing berm fill	115	100	21
	Silty gravel debris fan	132	75	33
	Silty sand debris fan	118	75	28

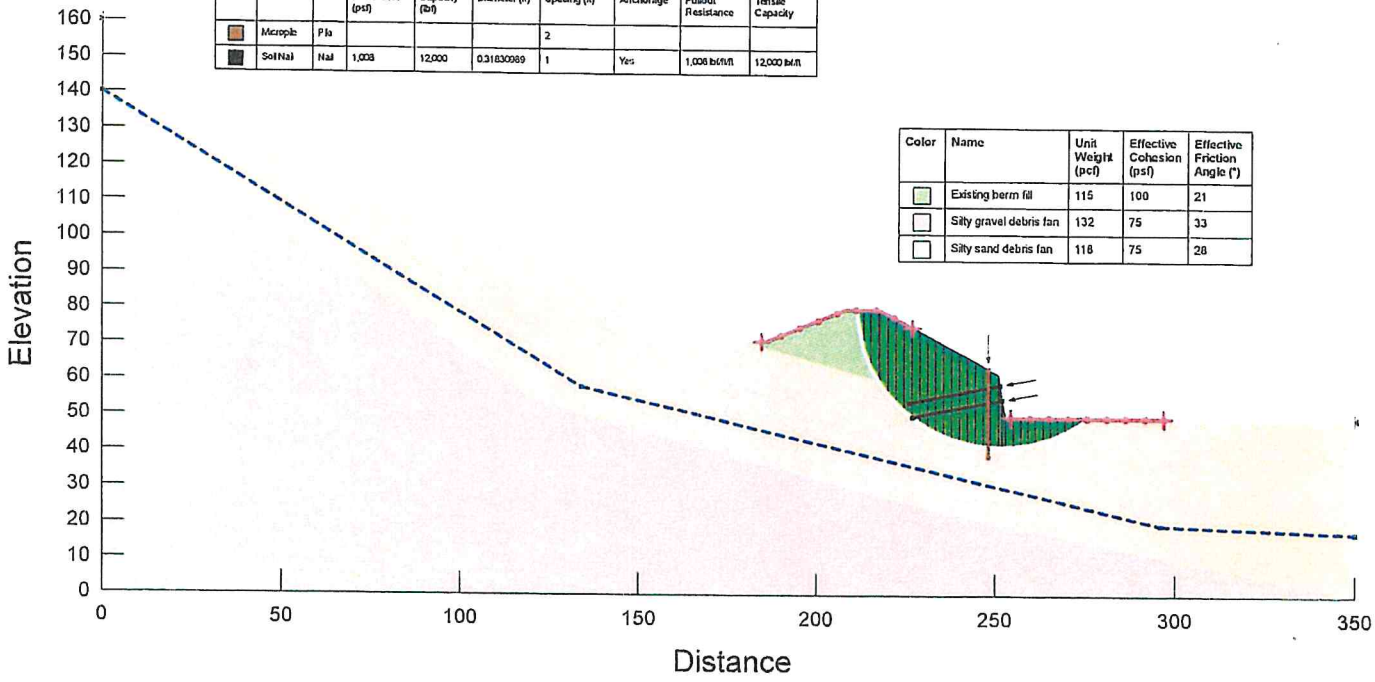


RFTA Expansion
Glenwood Springs, Colorado
Excavation Retention with Two Rows of Soil Nails and One Row of Micropiles

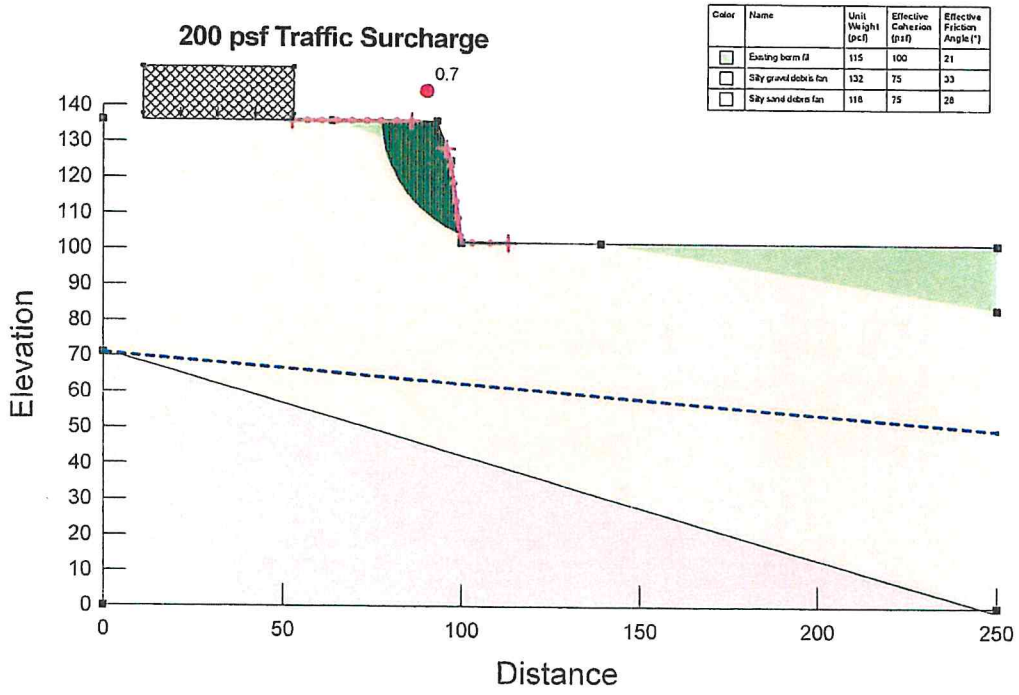
1.8

Color	Name	Type	Pullout Resistance (psf)	Tensile Capacity (lbf)	Bond Diameter (ft)	Out-of-Plane Spacing (ft)	Face Anchorage	Factored Pullout Resistance	Factored Tensile Capacity
	Micropile	Pile				2			
	Soil Nail	Nail	1,008	12,000	0.31830989	1	Yes	1,008 lbf/ft	12,000 lbf/ft

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Existing berm fill	115	100	21
	Silty gravel debris fan	132	75	33
	Silty sand debris fan	118	75	28



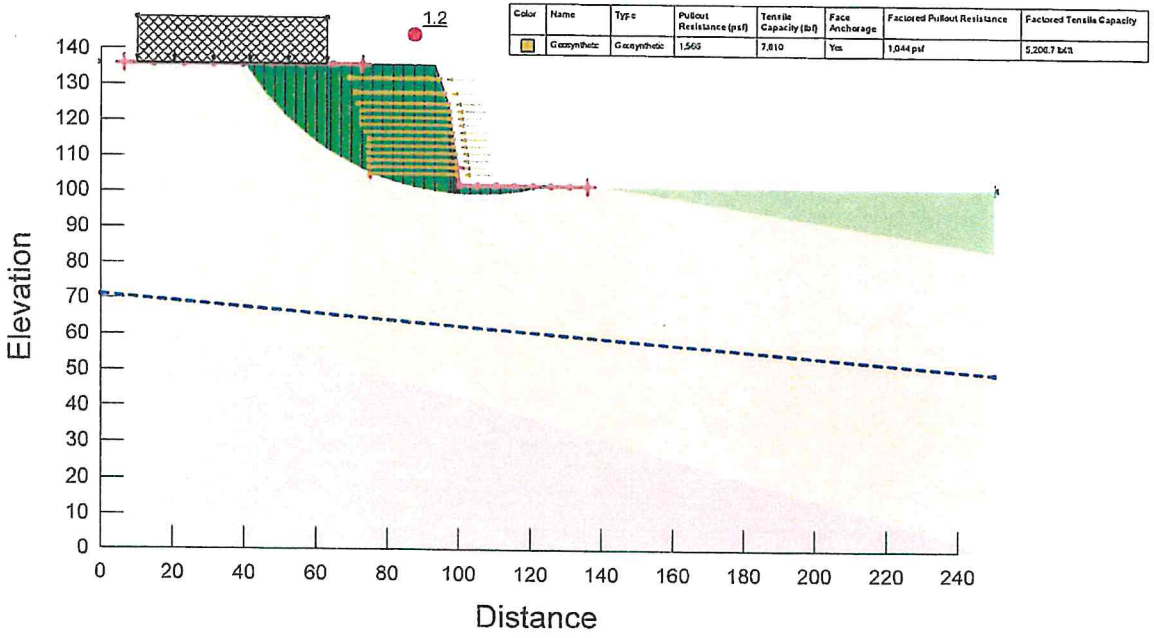
RFTA Expansion
Glenwood Springs, Colorado
Excavation without Retention



RFTA Expansion
Glenwood Springs, Colorado
Geosynthetic Reinforced Retaining Wall

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Existing berm fill	115	100	21
	Silty gravel debris fan	132	75	33
	Silty sand debris fan	116	75	28

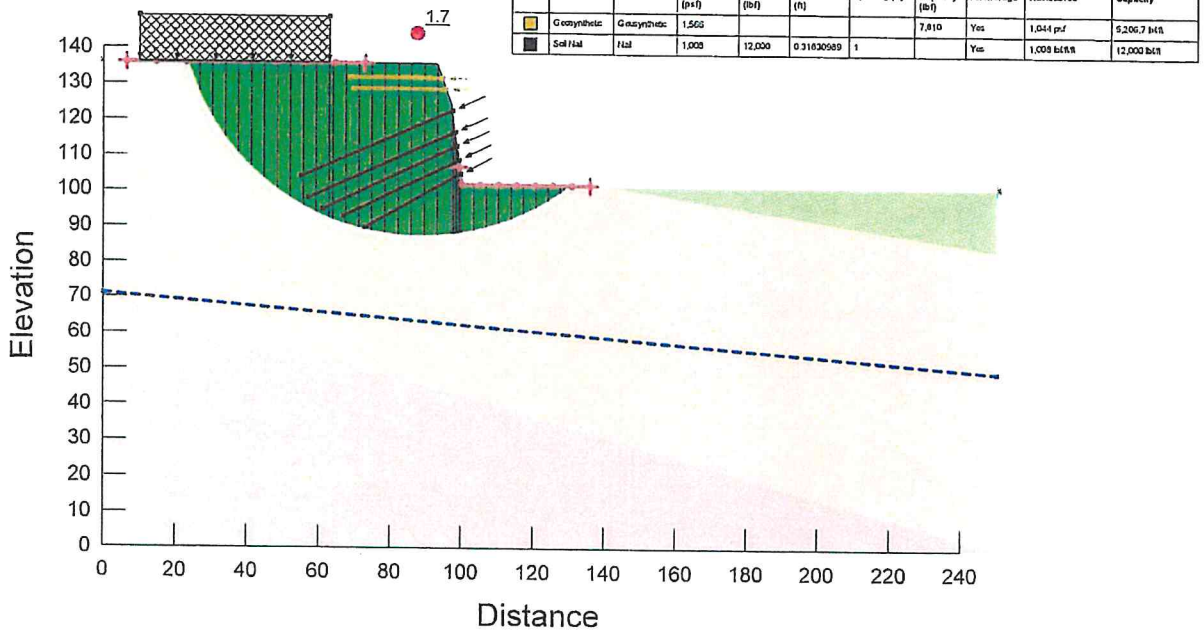
Color	Name	Type	Pullout Resistance (psf)	Tensile Capacity (lbf)	Face Anchorage	Factored Pullout Resistance	Factored Tensile Capacity
	Geosynthetic	Geosynthetic	1,566	7,810	Yes	1,044 psf	5,206.7 lbf/ft



RFTA Expansion
Glenwood Springs, Colorado
Geosynthetic Reinforced and
Soil Nailed Retaining Wall

Color	Name	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Existing berm fill	115	100	21
	Silty gravel debris fan	132	75	33
	Silty sand debris fan	118	75	26

Color	Name	Type	Pullout Resistance (psf)	Tensile Capacity (lbf)	Bond Diameter (ft)	Out-of-Plane Spacing (ft)	Tensile Capacity (lbf)	Face Anchorage	Factored Pullout Resistance	Factored Tensile Capacity
	Geosynthetic	Geosynthetic	1,500				7,810	Yes	1,044 plf	5,206.7 lbf/ft
	Soil Nail	Nail	1,000	12,000	0.31630989	1		Yes	1,000 lbf/ft	12,000 lbf/ft



April 6, 2022

Saunders, Inc.
86 Inverness Place North
Englewood, CO 80112

Attention: Michael Hager
Senior Project Manager

Subject: Earth Pressures and Pavements
RFTA Facility Expansion
2307 Wulfsohn Road
Glenwood Springs, Colorado
Project No. GS06668.000-125

CTL | Thompson, Inc. (CTL) performed a geotechnical engineering investigation regarding the RFTA Facility Expansion planned at 2307 Wulfsohn Road in Glenwood Springs, Colorado under our Project No. GS06668.000-125 (report dated February 14, 2022). We performed a supplemental geotechnical engineering investigation to obtain additional subsurface information to develop geotechnical engineering information regarding the excavation retention system and fill retaining wall that will be required to construct the building pad at the site Project No. GS06668.000-125 (report dated April 6, 2022). This letter is an addendum to our supplemental report to provide recommendations for lateral earth pressures and pavements.

Earth Pressures

It is possible that some foundation walls in the proposed building will retain earth. These walls will need to be designed for lateral earth pressures. Many factors affect the values of the design lateral earth pressure. These factors include, but are not limited to, the type, compaction, slope, and drainage of the backfill, and the rigidity of the wall against rotation and deflection.

In general, for a very rigid wall where negligible or very little deflection will occur, an "at-rest" lateral earth pressure should be used in design. For walls that can deflect or rotate 0.5 to 1 percent of wall height (depending upon the backfill types), design for a lower "active" lateral earth pressure may be appropriate. Our experience indicates typical below-grade walls in buildings can deflect or rotate slightly under normal design loads, and that this deflection results in satisfactory wall performance. Thus, the earth pressures on the walls will likely be between the "active" and "at-rest" conditions.

For backfill soils conforming with recommendations in the Foundation Wall Backfill below, that are not saturated, we recommend design of below-grade walls at this site using an equivalent fluid density of at least 45 pcf. This value assumes deflection; some minor cracking of walls may occur. If very little wall deflection is desired, a higher design value for the at-rest condition using an equivalent fluid pressure of 60 pcf is recommended. An equivalent fluid pressure of 325 pcf can be used for the "passive" earth pressure case.

Foundation Wall Backfill

Proper placement and compaction of foundation wall backfill is important to reduce infiltration of surface water and settlement of backfill from consolidation of backfill soils. This is especially important for backfill areas that will support exterior concrete flatwork or pavement. The excavated soils free of rocks larger than 4 inches in diameter, organics, and debris can be reused as backfill adjacent to foundation wall exteriors.

Backfill should be placed in loose lifts of approximately 10 inches thick or less, moisture-conditioned to within 2 percent of optimum moisture content, and compacted to at least 95 percent of standard Proctor (ASTM D 698) maximum dry density. Moisture content and density of the backfill should be checked during placement by a representative of our firm. Observation of the compaction procedure is necessary.

Subsurface Drainage

Water from precipitation and surface irrigation frequently infiltrates relatively permeable backfill placed adjacent to a building and collects on the surface of less permeable soils at foundation elevation. This process can cause wet or moist conditions after construction. To reduce the likelihood water pressure will develop behind earth retaining walls and the risk of wetting in below-grade areas, we recommend provision of a foundation wall drain behind foundation walls that will retain earth.

The foundation wall drain should consist of 4-inch diameter, slotted, PVC pipe encased in free-draining gravel. A prefabricated drainage composite should be placed adjacent to foundation walls that will retain earth. Care should be taken during backfill operations to prevent damage to drainage composites. The drain should discharge via a positive gravity outlet or lead to a sump where water can be removed by pumping. The gravity outlet should not be susceptible to clogging or freezing.

Pavement Subgrade Preparation

Paved entry aprons and parking areas will be adjacent to the building. After final grading, the subgrade soils below pavements should be scarified to a

depth of at least 12 inches and moisture-conditioned to within 2 percent of optimum moisture content. The subgrade soils should be compacted to at least 95 percent of standard Proctor (ASTM D698) maximum dry density. This process is also recommended beneath all concrete curb, gutter, and drainage pans. During construction, careful attention should be paid to compaction at curb lines and around manholes.

After the pavement subgrade soils have been compacted and tested, we recommend proof-rolling with a heavy, pneumatic-tired vehicle, such as a loaded dump truck or water truck. The proof-roll should be performed while moisture contents of the subgrade are still within recommended limits. Our representative should be called to observe proof-rolling. Drying of the subgrade prior to proof-roll or paving should be avoided. We can provide geotechnical engineering input if areas require stabilization.

Pavements

Our laboratory testing and engineering judgement indicate the natural soils, and fill built with the on-site soils, generally classify as AASHTO Group A-2-4. We estimate a subgrade resilient modulus (M_R) of 9,500 psi for these subgrade soils. Traffic loading information was not available at this writing. For preliminary design, we estimate a 20-year Equivalent Single Axle Load (ESAL) value of 3,200,000. Our initial pavement section alternatives are summarized on Table 1 below.

Table 1
Recommended Pavement Section Alternatives

Asphalt Concrete (AC)	Asphalt Concrete + Aggregate Base Course (AC + ABC)	Portland Cement Concrete (PCC)
8.0" AC	6.0" AC + 8.0" ABC	6.0" PCC

Our experience indicates problems with asphalt pavements can occur in areas where heavy vehicles drive and turn at low speeds. In areas of concentrated loading and turning movements by heavy vehicles, such as entrances and bus parking areas, we recommend Portland cement concrete pavement that is at least 6-inches thick.

A primary cause of early pavement deterioration is water infiltration into the pavement system. The addition of moisture usually results in softening of base course and subgrade and the eventual failure of the pavement. We recommend pavement surface be designed for rapid removal of surface water. Final grading should be carefully controlled so that design cross-slope is maintained and low spots in the subgrade, which could trap water are eliminated. Portland

cement concrete drainage pans should be considered in areas where water will be flowing across pavement surfaces.

Pavement Materials and Construction

The design of a pavement system is as a function of the quality of the paving materials and construction, as well as the support characteristics of the subgrade. If the pavement system is constructed of interior material, then the life and serviceability of the pavement will be substantially reduced.

Material properties and construction criteria for the pavement alternatives are provided below. These criteria were developed from analysis of the field and laboratory data and our experience. Materials planned for construction should be submitted and the applicable laboratory tests performed to verify compliance with the specifications.

Asphalt Concrete (AC)

1. HMA should be composed of a mixture of aggregate, filler, hydrated lime and asphalt cement. Some mixes may require polymer modified asphalt cement or make use of up to 20 percent reclaimed asphalt pavement (RAP). A job mix design is recommended and periodic checks on the job site should be made to verify compliance with specifications.

2. HMA should be relatively impermeable to moisture and should be designed with crushed aggregates that have a minimum of 80 percent of the aggregate retained on the No. 4 sieve with two mechanically fractured faces.

3. Gradations that approach the maximum density line (within 5 percent between the No. 4 and 50 sieves) should be avoided. A gradation with a nominal maximum size of 1 or 2 inches developed on the fine side of the maximum density line should be used.

4. Total void content, voids in the mineral aggregate (VMA) and voids filled should be considered in the selection of the optimum asphalt cement content. The optimum asphalt content should be selected at a total air void content of approximately 4 percent. The mixture should have a minimum VMA of 14 percent and between 65 percent and 80 percent of voids filled.

5. Asphalt cement should meet the requirements of the Superpave Performance Graded (PG) Binders. The minimum performing asphalt cement should be PG 58-28 for use in the Glenwood Springs area.

6. Hydrated lime should be added at the rate of 1 percent by dry weight of the aggregate and should be included in the amount passing the No. 200 sieve. Hydrated lime for aggregate pretreatment should conform to the requirements of ASTM C 207, Type N.

7. Paving should only be performed when subgrade temperatures are above 40°F and air temperature is at least 40°F and rising.

8. HMA should not be placed at a temperature lower than 245°F for mixes containing PG 58-28 asphalt, and 290°F for mixes containing polymer modified asphalt. The breakdown compaction should be completed before the mixture temperature drops 20°F.

9. The maximum compacted lift should be 3.0 inches and joints should be staggered. No joints should be placed within wheel paths.

10. HMA should be compacted to between 92 and 96 percent of Maximum Theoretical Density. The surface shall be sealed with a finish roller prior to the mix cooling to 185°F.

11. Placement and compaction of HMA should be observed and tested by a representative of our firm. Placement should not commence until the subgrade is properly prepared (or stabilized), tested and proof-rolled. Proof rolling should be performed with the heaviest machine available at the time. The proof-roller should be selected from machines providing both mass and high contact pressure.

Aggregate Base Course (ABC)

1. A Class 5 or 6 Colorado Department of Transportation (CDOT) specified aggregate base course should be used. A recycled concrete alternative which meets the Class 5 or 6 designation is also acceptable.

2. Aggregate base course should have a minimum Hveem stabilometer value of 78. Aggregate base course or recycled concrete material must be moisture stable. The change in R-value from 300 psi to 100 psi exudation pressure should be 12 points or less.

3. Aggregate base course or recycled concrete should be laid in thin lifts not to exceed 8 inches, moisture treated to within 2 percent of optimum moisture content, and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557, AASHTO T 180).

4. Placement and compaction of aggregate base course or recycled concrete should be observed and tested by a representative of our firm. Placement should not commence until the underlying subgrade is properly prepared and tested.

Portland Cement Concrete (PPC) Recommendations

1. Portland cement concrete should have a minimum compressive strength of 4,200 psi at 28 days and a minimum modulus of rupture (flexural strength) of 650 psi in the field. A CDOT approved Class P mix design is also acceptable. A job mix design is recommended and periodic checks on the job site should be made to verify compliance with specifications.

2. Portland cement Type I or II can be used at this site and should conform to ASTM C 150.

3. Portland cement concrete should not be placed when the subgrade or air temperature is below 40°F.

4. Free water should not be finished into the concrete surface and finishers should not use a steel trowel on the surface. Atomizing nozzle pressure sprayers for applying finishing compounds are recommended whenever the concrete surface becomes difficult to finish.

5. Curing of the Portland cement concrete should be accomplished by the use of a curing compound. The curing compound should be applied in accordance with manufacturer recommendations.

6. Curing procedures should be implemented, as necessary, to protect the pavement against moisture loss, rapid temperature change, freezing, and mechanical injury.

7. Construction joints, including longitudinal joints and transverse joints, should be formed during construction or sawed after the concrete has begun to set, but prior to uncontrolled cracking.

8. All joints should be properly sealed using a rod back-up and approved sealant.

9. Traffic should not be allowed on the pavement until it has properly cured and achieved at least 80 percent of the design strength, with saw joints already cut.

10. Placement of Portland cement concrete should be observed and tested by a representative of our firm. Placement should not commence until the subgrade is properly prepared and tested.

Limitations

The recommendations in this letter are based on preliminary civil engineering plans and assumptions about traffic loading. Additionally, variations in the subsurface conditions not indicated by our data will occur.

Our geotechnical investigation was conducted in a manner consistent with that level of care and skill ordinarily exercised by geotechnical engineers currently practicing under similar conditions in the locality of this project. No warranty, express or implied, is made. Please contact us if you have questions or need additional information.

CTL | THOMPSON, INC.

James D. Kellogg, P.E.
Division Manager

Reviewed by:

COLORADO REGISTERED JOHN MECHLING 27429 4/6/20 PROFESSIONAL ENGINEER

John Mechling, P.E.
Senior Principal Engineer

JDK:JM:abr

April 19, 2022

Saunders, Inc.
86 Inverness Place North
Englewood, CO 80112

Attention: Michael Hager
Senior Project Manager

Subject: Pavement Recommendations
RFTA Facility Expansion
2307 Wulfsohn Road
Glenwood Springs, Colorado
Project No. GS06668.000-125

CTL | Thompson, Inc. (CTL) provided preliminary pavement recommendations for the RFTA Facility Expansion planned at 2307 Wulfsohn Road in Glenwood Springs, Colorado (letter dated April 6, 2022). Subsequently, we were provided with a report by Ground Engineering Consultants, Inc. (GEC), dated May 4, 2018, that included traffic estimates. This letter provides revised pavement recommendations.

Based on the traffic loading estimates, CTL performed pavement calculations utilizing the 20-year Equivalent Single Axle Loads (ESAL) provided by GEC. ESAL values estimated by GEC for flexible pavements are 825,000 for bus traffic areas and 22,000 for automobile traffic areas. For rigid pavement areas, ESAL values of 20,500,000 for bus traffic areas and 33,000 for automobile traffic areas were estimated. CTL judges that the natural soils, and fill comprised of the on-site soils, generally classify as AASHTO Group A-2-4. We estimate a subgrade resilient modulus (M_R) of 5,000 psi for these subgrade soils. Revised pavement section alternatives from CTL are summarized on Tables 1 and 2 below.

Table 1
Flexible Pavement Section Alternatives

[1]Traffic Loading [2](ESAL)	Asphalt Concrete (AC)	Asphalt Concrete + Aggregate Base Course (AC + ABC)
Bus Traffic (825,000)	8.0" AC	6.0" AC + 12.0" ABC
Automobile Traffic (22,000)	5.0" AC	4.0" AC + 6.0" ABC

Notes: [1] 20-year design life.
[2] 18-kip Equivalent Single Axle Load provided by GEC

Table 2
Rigid Pavement Section Alternatives

[1]Traffic Loading [2](ESAL)	Portland Cement Concrete (PCC)
Bus Traffic (20,500,000)	12.0" PCC
Automobile Traffic (33,000)	6.0" PCC

Notes: [1] 20-year design life.
[2] 18-kip Equivalent Single Axle Load provided by GEC

Material properties and construction criteria for flexible and rigid pavements are provided in our letter dated April 6, 2022. Materials planned for construction should be submitted to CTL and the applicable laboratory tests performed to verify compliance with the specifications.

Significant excavation depths and thick fill are planned to construct the building pad. The performance of pavements will be dependent upon this earthwork. Some subexcavation and recompaction of natural soils will be needed prior to pavement construction. Close control of subexcavation and structural fill placement will be required by the materials engineering consultant.

Our pavement recommendations were developed in a manner consistent with that level of care and skill ordinarily exercised by geotechnical engineers and materials engineers currently practicing under similar conditions in the locality of this project. No warranty, express or implied, is made. Please contact us if you have questions or need additional information.

CTL | THOMPSON, INC.

Ryan R. Barbone, E.I.T.
Project Engineer

Reviewed by:

James D. Kellogg, P.E.
Division Manager

RRB:JDK:abr

CTL | THOMPSON
Founded in 1971

April 28, 2022

Saunders, Inc.
86 Inverness Place North
Englewood, CO 80112

Attention: Michael Hager
Senior Project Manager

Subject: Subexcavation During Earthwork
RFTA Facility Expansion
2307 Wulfsohn Road
Glenwood Springs, Colorado
Project No. GS06668.000-125

Past usage of the RFTA Facility Expansion site has resulted in variable subsurface conditions including existing fill and backfill, undisturbed and disturbed natural soils, compaction grout columns, and drain system components. These various conditions and materials will be encountered during earthwork to construct the building pad. This circumstance will increase potential risk of differential movement of pavements and concrete flatwork.

CTL recommends mitigation of this risk during grading to construct the building pad. We recommend that the soils below the cut areas of the pad be subexcavated to a depth of about 3 feet, moisture-treated, and recompacted as densely-compacted, structural fill. We expect the excavated soils can be used as structural fill, provided they are free of rocks larger than 4 inches, debris, and deleterious material.

Structural fill should be placed in loose lifts of about 8 inches thick, moisture-treated to within 2 percent of optimum moisture content and compacted to at least 98 percent of standard Proctor (ASTM D 698) maximum dry density. Our representative should be called to observe placement and test density and moisture content of structural fill.

We are available to discuss the contents of this letter. Please contact us if you have questions or need additional information.

CTL | THOMPSON, INC.

COLORADO LICENSED
JAMES D. KELLOGG
38298
4/28/2022
PROFESSIONAL ENGINEER

James D. Kellogg, P.E.
Division Manager

Reviewed by:

John Mechling, P.E.
Senior Principal Engineer

JDK:JM:abr

234 Center Drive | Glenwood Springs, Colorado 81601
Telephone: 970-945-2809 Fax: 970-945-7411

MEMORANDUM

TO: Merlin Maley, Stantec
FROM: Dan Cokley, PE, PTOE
DATE: March 31, 2022
PROJECT: RFA GMF 3/4/5/7 Traffic Impact Study
RE: City of Glenwood Springs TIS review dated March 4, 2022

This memo provides a response to the City of Glenwood Springs review comments of the traffic impact study (TIS) dated 2/18/22 prepared by SGM for Phase 3/4/5/7 of the RFTA GMF.

City of Glenwood Springs' comments are copied below with responses following:

1.b. A Master Traffic Study. Please include the most intensive use RFTA is considering. These uses should be broken down per phase in order to provide a baseline/guidance on the allowable trips generated for each phase.

i. This baseline could then be evaluated against at the time of future phase developments.

ii. As each phase is developed, a traffic letter would need to still be completed to indicate compliance with this report as it is, or an amendment to the report would need to be developed analyzing any proposed changes to the development configuration, traffic generation or phasing. Existing intersection conditions would need to be redocumented at the time of the proposed change, including intersection levels of service and queuing lengths.

- **The TIS considers the ultimate RFTA buildout and includes planned phases and associated trip generation and analysis by phase. Incremental analysis is provided in the 2/18/22 TIS and could be re-evaluated against future existing traffic volumes at the time of phased development.**

44. The City does not have confidence in the previous traffic studies that have been developed for the site. Please refer to the City's Engineering Standards Section 5.11.2 to develop a Traffic Impact Study documenting the existing conditions and the full development of the site and all phasing. Please analyze the following intersections:

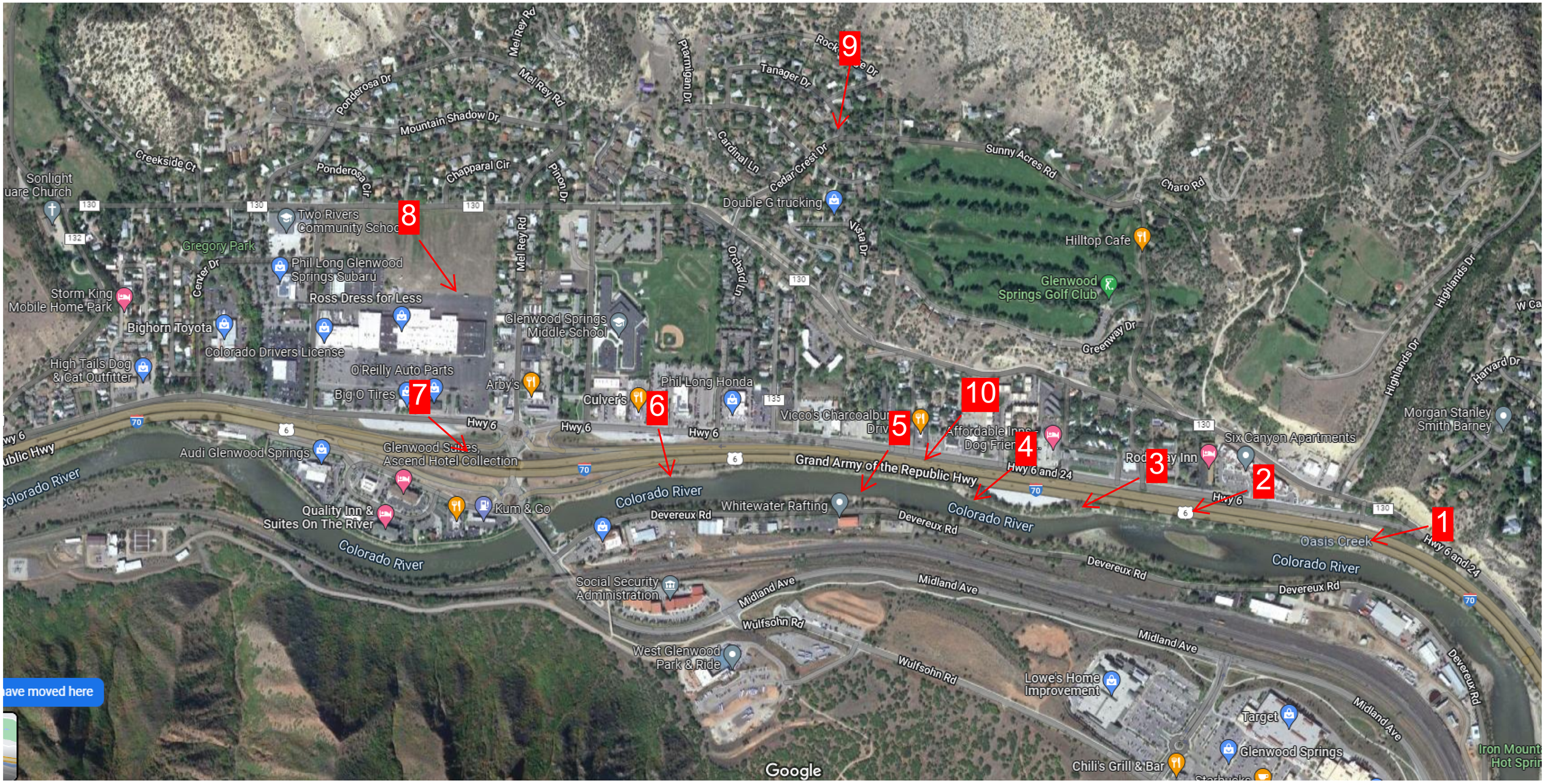
a. Grand Avenue and 9th Street
b. 9th and Colorado
c. 8th and Colorado
d. 8th and Midland
e. Midland and East Wulfsohn
f. Wulfsohn and East Meadows Drive
g. Wulfsohn and Market Street
h. Wulfsohn and West Meadows Drive
i. Wulfsohn and the intersection of the project drive (north and south legs)
j. Midland and West Wulfsohn

- **This TIS replaces the 2018 Shrewsberry study for the site and uses only the developed trip generation numbers for the 60-bus option, as the operations and logistics of that option have not changed significantly. All other data and analysis**

in the 2/18/22 TIS are based on SGM analysis and K-H MTS assumptions as documented within the TIS.

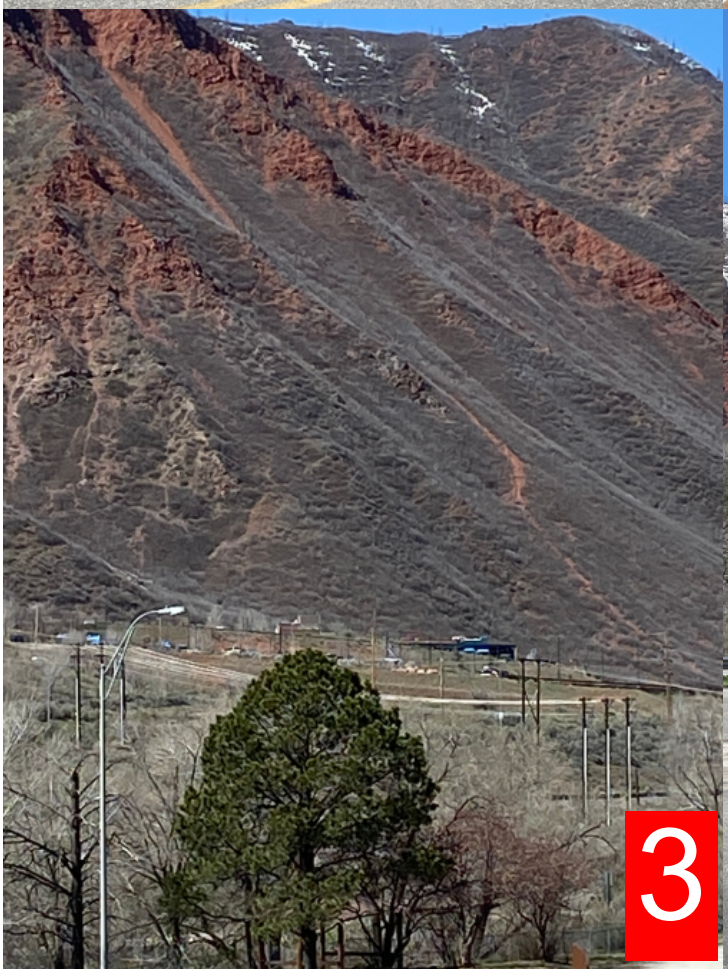
- **The 2/18/22 TIS provides trip distribution based on the K-H MTS, 90% westerly (toward Exit 114) and 10% easterly (toward 9th and Grand). The projected RFTA full buildout traffic considered in TIS will add <1% DHV to the East Wulfsohn / Midland intersection. Analysis of intersections a. through d. is superfluous as the TIS has already shown there is no impact at the East Wulfsohn intersection.**
- **The 2/18/22 TIS documents existing conditions based on the K-H MTS and the full phased development of the site.**

RFTA GMF 3457
Existing Conditions Photo Map
04/22/22




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Sunset
Ridge Villas
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SITE LEGEND:

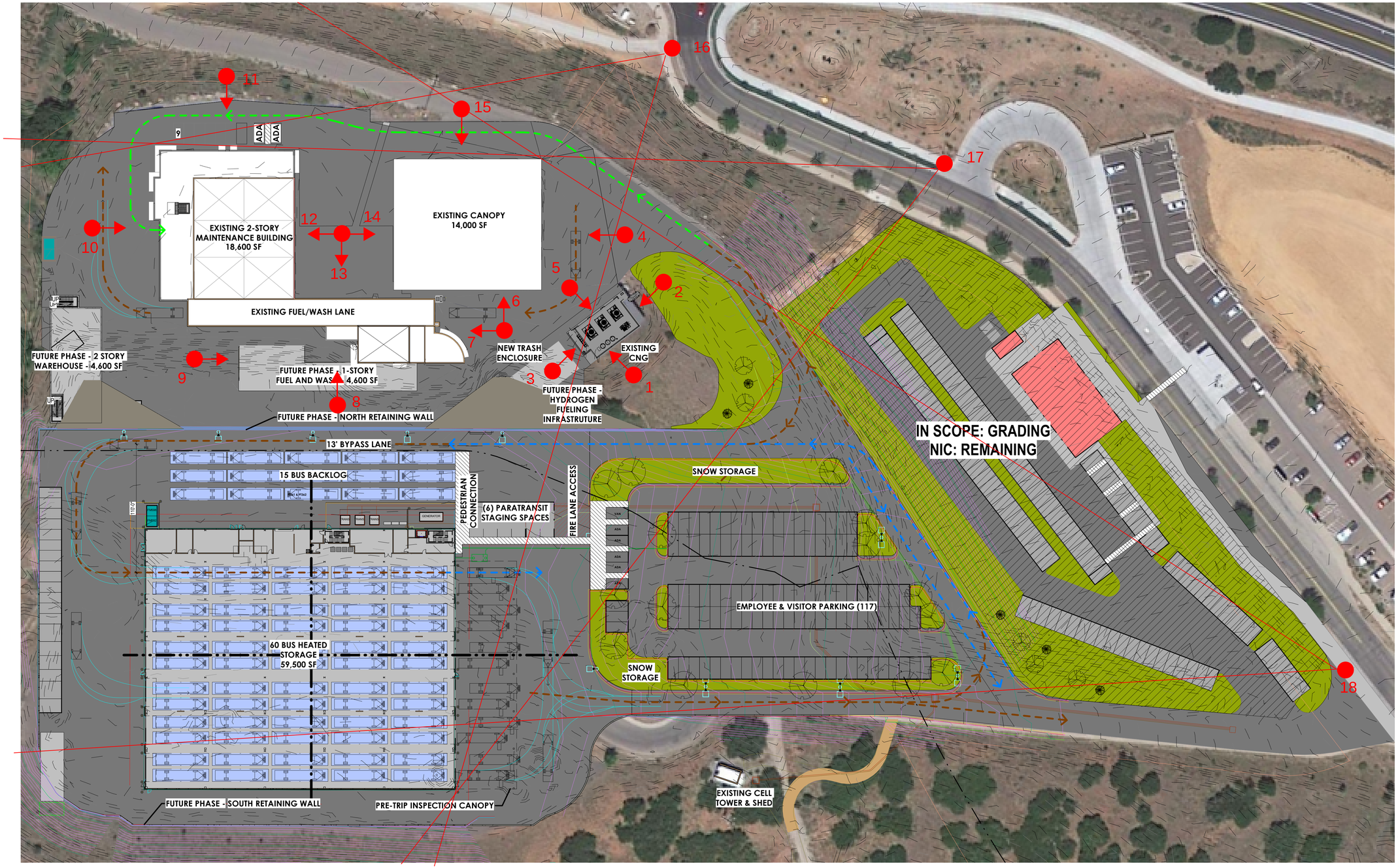
- HOT BITUMINOUS PAVEMENT
- PEDESTRIAN WALKWAY PAVEMENT
- LANDSCAPE AREA
- BUS STORAGE BUILDING
- TRASH AND RECYCLING ENCLOSURE

PARKING/STAGING LEGEND:

- EMPLOYEE PARKING
- PARATRANSIT
- BUS BACKLOG PARKING

LEGEND:

- CIRCULATION PATH OF OPERATORS
- CIRCULATION PATH OF SERVICE 'HOPPERS'
- CIRCULATION PATH OF MAINTENANCE
- PARCEL BOUNDARY LINE



1 ARCH SITE PLAN LE.R3
ASP-101-LE.R3 1" = 40'-0"

Stantec

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Denver, 80202-2424
Tel: (303) 295-1717 • www.stantec.com

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Consultants

SGM

bluegreen
www.bluegreenaspen.com

Legend

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - NEXT STEPS CONCEPTUAL PLAN

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

ARCH SITE PLAN LE.R3

LE SUBMITTAL 01/24/22.R1

ASP-101-LE.R3 STANTEC PROJECT #2270417345


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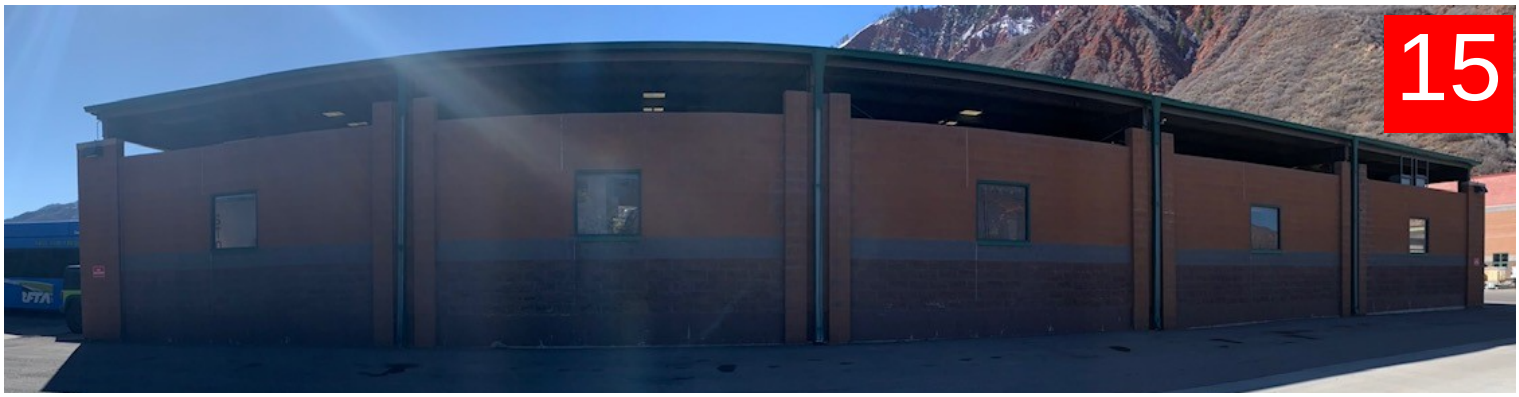

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RFTA GMF
PHASE 3 / 4 / 5 / 7



Prepared by

SGM

DAN COKLEY, PE, PTOE
LICENSE NO. 29799
2/18/22



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1.0 Introduction

This traffic impact study is prepared using the guidelines of a Colorado Department of Transportation (CDOT) Level Three Traffic Impact Study (TIS) and is purposed to satisfy City of Glenwood Springs Engineering Department request. This TIS provides an estimate for design hour traffic generation for the RFTA Glenwood Maintenance Facility (GMF) and adjacent Park and Ride lot proposed expansion which is planned to occur in several phases over several years.

The City has provided the Glenwood Meadows Master Traffic Study (MTS) prepared by Kimley-Horn (K-H) and dated April 2021. The MTS provides a comprehensive overview of the entire Meadows area, from the I-70 #114 interchange on the northwest to Midland and 8th Street to the south and reviews 2021, 2030, and 2040 scenarios that include the overall Glenwood Meadows projected development and consideration of increased background traffic. The MTS included the development of the RFTA GMF, and Park and Ride (Zone 5) in those scenarios. The RFTA programming for the MTS were obtained from the RFTA Regional Transit Center (RTC) Traffic Analysis prepared by Shrewsberry for RFTA dated March 2018.

This TIS uses the MTS as the basis for 2021 Baseline conditions. This TIS does not serve to replicate the 2030 and 2040 development scenarios presented in the MTS.

The purpose of this TIS is to replicate the 2021 Baseline operational conditions from the MTS and provide the trip generation, distribution, and traffic assignment for the current proposed RFTA programming by phase. It will provide an analysis of the study intersections for safety and operational impacts using the 2021 Baseline plus phased RFTA traffic.

The TIS also provides a comparison between the current RFTA programming to the 2018 programming presented in the RTC and applied in the MTS and the impact that may have on the traffic volumes and MTS recommendations.

The study area is depicted in Figure 1. The roadway network and the study intersections are shown, numbered 3 through 9. Roadway and intersection image for figure is provided from the K-H MTS. Intersection #3 in this TIS is the RFTA / Park and Ride intersection with Wulfsohn Road and was not included in the MTS.

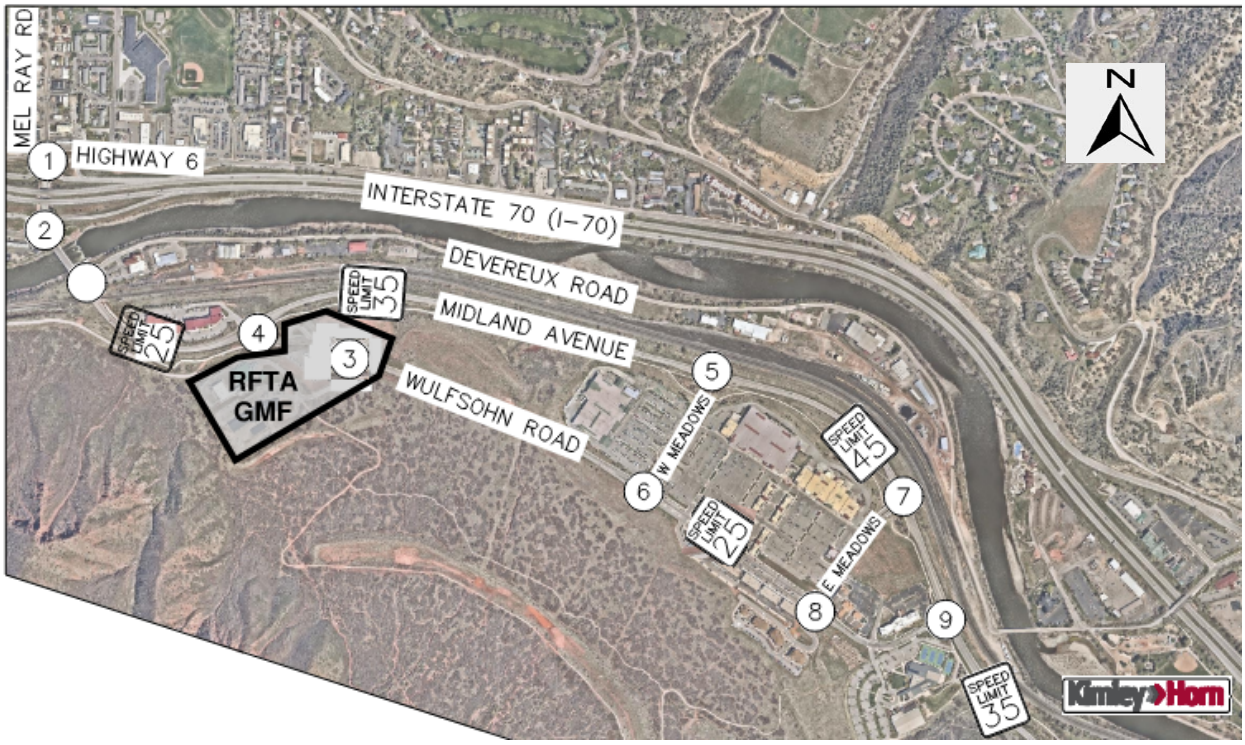


Figure 1 – Study Area

1.1 Project Description

The RFTA GMF project scope currently submitted to the City for Location and Extents review includes phases 3/4/5/7. Those phases and future phases are outlined below.

- **Phase 3/4/5/7** – Submitted January 2022 for L&E review. In total a 60-bus option is outlined in this study. (55,300sf bus storage, 13,100sf of new operations center (office space above bus storage), and a 4,620sf new fuel/wash lane that will add a second bus wash.
- **Phase 6** – 14,400 sf Administration building above of a 2,400 sf W Glenwood Transit Center
- **Phase 8** – 9,600sf Warehouse storage (future project)
- **Phase 9** – 74 employee housing units and 45 space Park and Ride expansion.

1.2 Location

As shown in Figure 1, the existing parcel(s) straddle Wulfsohn Road on the west end near Midland Ave. The existing GMF is on the south side and 85-space Park and Ride (P&R) lot on the north side of Wulfsohn.

2.0 Methodology and Assumptions

This traffic impact study has been prepared in accordance with section 2.3(5) of the State Highway Access Code (SHAC) and the methodology and assumptions are provided in this section. The assumptions will provide a conservative analysis for the purposes of assessing operational and safety traffic impacts resulting from the proposed phased development.

This analysis uses HCM 6th Edition methodology and was performed using the Synchro 11 analysis package to estimate the capacity of the intersections. The MOE's that are compared for this study include LOS, delay and 95th percentile queue length. The MOE's will be reported for each analysis scenario to determine if the current intersections operate adequately. The queue length reported is based upon the average of ten 60-minute Simtraffic modeling runs.

The traffic modeling output is contained in Appendix C.

Baseline Traffic

This TIS uses the MTS as the basis for 2021 Baseline conditions, the 2021 Existing Adjusted traffic volumes, Figure 5 from the MTS are used for this study. The 2021 existing baseline traffic volumes at the RFTA / P&R lot intersection with Midland Avenue were developed from and with the understanding of the P&R trip generation, RFTA GMF bus schedule, staffing requirements and office space coupled with volume balancing from the adjacent MTS 2021 intersection volumes (#4 and #6). The 2021 Baseline volumes are provided in Appendix A.

Analysis Years

The MTS provides a comprehensive overview of the entire Meadows area, and provides analysis for the 2021, 2030, and 2040 scenarios that include projected development and consideration of increased background traffic. This TIS will re-document the 2021 Baseline operational conditions from the MTS and analyze those baseline volumes plus phased RFTA traffic scenarios.

Trip Generation Rates

The proposed trip generation for the phased development is described by phase and land use type below, ITE Trip Generation is provided in Table 1.

- **Phase 3/4/5/7** – An increase from current operation to a 60-bus option is outlined in this study. This includes an increased bus schedule and associated staffing. Trip generation and volumes from Shrewberry RTC are replicated in this TIS and provided in Appendix B. 13,100sf of new operations center (office) Use General Office Building (Code 710) land use from ITE Trip Generation, 10th Edition.
- **Phase 6** – 14,400 sf Administration building. Use General Office Building (Code 710) land use from ITE Trip Generation, 10th Edition.
- **Phase 8** – 9,600sf Warehouse storage. No additional staffing, no additional trips.
- **Phase 9** – 74 employee housing units and additional 45-space Park and Ride expansion (total 130-space). Use Park and Ride (Code 090) and Multi-Family Housing, Mid-rise (Code 221) land uses from ITE Trip Generation, 10th Edition.

TABLE 1 - TRIP GENERATION

				Design Hour Rates	
	Number	ITE	Weekday	AM	PM
Land Use	of Units	Code	Rate	Rate	Rate
Park and Ride	130	90	3.80	0.45	0.62
Multi-Family (Mid-rise)	74	221	5.43	0.34	0.45
General Office Building (ksf)	14.4	710	11.25	2.78	1.25

TABLE 2 -- ACCESS TRIP DISTRIBUTION

ITE Ttrip Generation Manual, 10th Edition	Basis of Rate	Time Period Used Above	Weekday Design Hour Distribution			
			AM IN	AM OUT	PM IN	PM OUT
Park and Ride	Fitted Curve	Peak Hour adjacent Street	79%	26%	25%	75%
Multi-Family (Mid-rise)	Fitted Curve	Peak Hour adjacent Street	26%	74%	61%	39%
General Office Building (ksf)	Fitted Curve	Peak Hour adjacent Street	86%	14%	16%	84%

Design Hour Volume

The design hour volumes calculated in this study are based upon the peak hour of the adjacent street traffic for the proposed development land use types. The design hour volume used in this study is estimated to be the 30th highest hourly volume of the design year.

Trip Reductions

Multi-modal trips could consist of walking, biking, car-pooling and transit options. The proximity of the RFTA GMF to the Park and Ride lot and as the hub of the Colorado River and Roaring Fork valleys transit network that makes the location convenient for all transportation modes.

Glenwood Springs is an area known for hiking and biking, along with that comes increased percentages of valley residents who use those modes of transportation for commuting and other that trips typically would have been taken with vehicles. The typical US average walking and biking distance for a commute or other trip is 0.25 miles and 3 miles, respectively. With more prevalent use of alternative transportation in the region, it would be reasonable to assume those distances are increased in the area. The Glenwood Meadows mixed use area is within walking and biking distance from the site.

Given the multi-modal opportunities, a 10% reduction in trips associated with potential future employees (Operations and Administration buildings) and potential future residents (Multi-Family housing) is conservatively applied and summarized below.

- Phase 3/4/5/7 – 10% transit reduction applied to office
- Phase 6 – 10% transit reduction applied to office
- Phase 8 – No additional trips.
- Phase 9 – 10% transit reduction applied to housing

Project Traffic Distribution

Trip distribution per Figure 11 of the MTS, Zone 5 Trip Distribution, provided in Appendix A.

2.1 Intersection Capacity Analysis

AM and PM level of service estimates were prepared in accordance with the Highway Capacity Manual 6th Edition (Transportation Research Board, 2016). For signalized

intersections, the HCM measures level of service in terms of seconds of delay per vehicle. This is also a measure of driver discomfort, fuel consumption, and lost travel time. The table below relates the LOS to seconds of delay per vehicle at a signalized intersection.

Table 3 - Level of Service (LOS) Criteria Signalized Intersections

Level of Service	Delay (seconds)
A	< 10.0
B	10.1 to 20
C	20.1 to 35
D	35.1 to 55
E	55.1 to 80
F	> 80.0

Source: *Highway Capacity Manual*, 2016

For unsignalized intersections, the Highway Capacity Manual defines level of service and delay in terms of seconds of stopped delay per vehicle, which is based on the number of acceptable gaps in the conflicting traffic stream. In general, the traffic movements analyzed are those controlled by stop signs or yield signs, and the left turn movements from the uncontrolled major street. The following table represents the level of service criteria for unsignalized intersections:

Table 4 - Level of Service (LOS) Criteria Unsignalized Intersections

Level of Service	Delay (seconds)
A	< 10.0
B	10.1 to 15
C	15.1 to 25
D	25.1 to 35
E	35.1 to 50
F	> 50.0

Source: *Highway Capacity Manual*, 2016

The “overall” intersection level of service at a signalized or an unsignalized intersection corresponds with the average delay experienced on the minor street approaches and the uncontrolled major street movements. The unconflicted major street through movements are considered to have no delay. Because most of the intersection movements are major street movements with no delay, the overall intersection results in a LOS with less delay than the minor street approaches and conflicting major street movements (left turns) actually experience.

In general, CDOT and the City consider the overall intersection operation of LOS “D” or better acceptable during the peak hours. The goal is to also provide a similar LOS for each controlled intersection movement and/or approach.

This study will assess the operational measures of effectiveness (MOE’s) including Level of Service (LOS), Delay, and 95th percentile queue. The MOE analysis by movement provides an overview of all intersection approach and conflicting movements and provides a more realistic picture of operations by controlled movement or approach as experienced and perceived by users. The MOE’s also provide a valuable reference point for comparison of LOS, Delay and Queue between scenarios.

3.0 Baseline Traffic Conditions (2021)

3.1 Existing Roadways and Intersections

Roadway and intersection descriptions are provided in the K-H MTS and are accurate at the time of this study. 2021 Existing Adjusted Traffic volumes are used in this study and are presented from the MTS Figure 5 provided in Appendix A. The Synchro modeling was based on the MTS modeling inputs and serves to replicate the 2021 Baseline results from the MTS to provide a comparative baseline to understand potential impacts with the addition of the RFTA phased traffic volumes.

4.0 Baseline plus Project Traffic

4.1 Project Intersection

The RFTA GMF, P&R, and intersection #3 are shown in Figure 2 below.

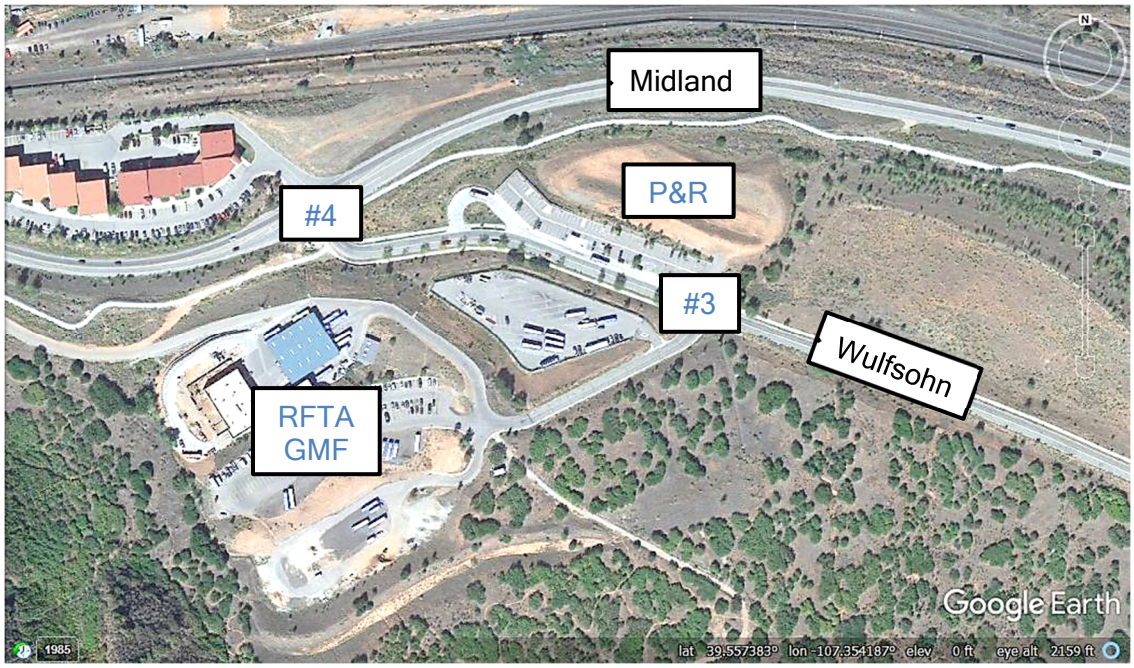


Figure 2 – RFTA GMF / Park and Ride Intersection with Wulfsohn Road

4.2 Project Access Trip Generation and Assignment

Using the trip generation rate and distribution assumptions provided in 3.0 Methodology the resulting trip generation by land use is provided in Table 5, trip generation by phase is provided in Table 6.

TABLE 5 -- ACCESS DESIGN HOURLY VOLUME BY LAND USE

			Weekday Design Hour Traffic			
	Number	Weekday	AM	AM	PM	PM
Land Use	of Units	Traffic	IN	OUT	IN	OUT
Multi-Family (Mid-rise)	74	402	7	19	20	13
Ph3-General Office Building (ksf)	13.1	148	33	5	3	14
Ph6-General Office Building (ksf)	14.4	162	34	6	3	15
HOUSING 10% Transit Reduction		*362*	*6*	*17*	*18*	*12*
***Ph3** OFFICE 10% Transit Reduction*		*133*	*30*	*5*	*3*	*13*
***Ph6** OFFICE 10% Transit Reduction*		*146*	*31*	*5*	*3*	*14*
Park and Ride (existing)	85	361	32	11	16	47
Park and Ride (Phase 9)	130	494	46	15	20	60
Park and RIde Increase	*45*	*133*	*14*	*4*	*4*	*13*
60 Bus Increase (PCE's)			*3*	*8*	*6*	*2*

TABLE 6 -- ACCESS DESIGN HOURLY VOLUME BY PHASE

	Weekday Design Hour Traffic			
	AM	AM	PM	PM
Land Use	IN	OUT	IN	OUT
Phase 3/5/5/7	33	13	9	15
Phase 6	31	5	3	14
Phase 8	0	0	0	0
Phase 9	20	21	22	25

The trip distribution and assignment at the RFTA / P&R and Wulfsohn Road intersection is provided by land use and by phase in Appendix C. Phased traffic volumes are further distributed using the assumptions in the MTS.

4.3 Intersection Capacity Analysis by Phase

Table 7 shows the overall LOS results of the capacity analysis for the existing study intersections for the following scenarios.

- 2021 Baseline
- Baseline + Ph 3/4/5/7
- Baseline + Ph 6
- Baseline + Ph 9

The phased scenarios are analyzed using cumulative traffic volumes.

MOE analysis is also presented in Table 7 and provides an overview of intersection approach movements baseline plus phased scenarios to understand the effect of project traffic volumes in addition to the 2021 Baseline traffic. All intersection approach movements operate at LOS C or better except for those highlighted in the table and summarized below.

The intersections with LOS D or lower to the east on Midland and Wulfsohn are not affected to any significance with the full RFTA buildout traffic volumes through Phase 9.

TABLE 7 - STUDY INTERSECTIONS OVERALL LOS AND MOE BY MOVEMENT SUMMARY

RFTA GMF TIS Operational Result Summary			Summary considers cumulative traffic volumes in succesive phases															
			2021 BASELINE				2021 + Phase 3/4/5/7				2021 + Phase 6				2021 + Phase 9			
Intersection	Approach Movement		Overal l LOS	Overal l Delay	LOS	Delay	Overal l LOS	Overal l Delay	LOS	Delay	Overal l LOS	Overal l Delay	LOS	Delay	Overal l LOS	Overal l Delay	LOS	Delay
#3 - Wulfsohn Road and RFTA / P&R	EB left	AM	A	5.1	A	7.3	A	5.5	A	7.3	A	4.5	A	7.3	A	4.7	A	7.4
		PM	A	3.3	A	7.5	A	3.7	A	7.5	A	4.1	A	7.5	A	4.9	A	7.6
	WB left	AM			A	7.6			A	7.6			A	7.8			A	7.8
		PM			A	7.5			A	7.7			A	7.7			A	7.7
	NB	AM			B	10.2			B	10.7			B	11.2			B	11.5
		PM			B	10.5			B	11.5			B	12			B	13.3
	SB	AM			A	9.5			A	9.5			A	9.7			A	9.5
		PM			A	10.5			A	10.6			A	10.6			B	10.7
#4 - Midland Avenue and Wulfsohn Road	EB left	AM	A	0.6	A	0	A	1	A	0	A	1.1	A	0	A	1.4	A	0
		PM	A	3.7	A	9.8	A	4.5	A	9.8	A	5.4	A	9.8	A	7.7	A	9.8
	WB left	AM			A	8.9			A	9			A	9.2			A	9.2
		PM			C	22.1			C	8.6			C	8.6			A	8.6
	NB	AM			B	12.2			B	14.5			B	14.7			C	15.7
		PM			E	39			E	45.5			F	52			F	68.6
	SB	AM			B	13.6			B	13.8			B	14.1			B	14.2
		PM			C	18.8			C	19			C	19			C	19.1
#5 - Midland Avenue and W Meadows Drive	EB	AM	C	24.7	C	26.6	C	24.7	C	26.6	C	24.7	C	26.7	C	24.8	C	26.8
		PM	C	22.6	C	26.3	C	22.6	C	26.3	C	22.6	C	26.3	C	22.6	C	26.3
	WB	AM			A	8.7			A	8.7			A	8.7			A	8.7
		PM			C	26.2			C	26.2			C	26.2			C	26.2
	NB	AM			D	44.7			D	44.7			D	44.8			D	44.9
		PM			B	12.4			B	12.4			B	12.4			B	12.5
#6 - W Meadows Road and Wulfsohn Road	EB left	AM	A	4.5	A	7.4	A	4.5	A	7.4	A	4.4	A	7.4	A	4.4	A	7.4
		PM	A	3.7	A	7.5	A	3.7	A	7.5	A	3.7	A	7.5	A	3.7	A	7.5
	WB	AM			ff				ff				ff				ff	
		PM			ff				ff				ff				ff	
	SB left	AM			A	9.2			A	9.2			A	9.3			A	9.3
		PM			A	9.7			A	9.7			A	9.7			A	9.7
#7 - Midland Avenue and E Meadows Drive	EB right	AM	A	0.8	D	26.5	A	0.8	D	26.5	A	0.8	D	26.5	A	0.8	D	26.6
		PM	A	2.7	A	8.6	A	2.7	A	8.6	A	2.7	A	8.6	A	2.7	A	8.6
(Midland Avenue orientation switches W-E to N-S)	NB left	AM			B	12.5			B	12.5			B	12.5			B	12.5
		PM			B	11.9			B	12			B	12			B	12.1
	SB	AM			ff				ff				ff				ff	
		PM			ff				ff				ff				ff	
#8 - E Meadows Road and Wulfsohn Road	EB left	AM	A	3	A	7.3	A	3	A	7.3	A	3	A	7.3	A	3	A	7.3
		PM	A	3.2	A	7.5	A	3.2	A	7.5	A	3.2	A	7.5	A	3.2	A	7.5
	WB left	AM			A	7.5			A	7.5			A	7.5			A	7.5
		PM			A	7.3			A	7.3			A	7.3			A	7.3
	NB	AM			A	9.3			A	9.8			A	9.8			A	9.8
		PM			A	9.5			A	9.5			A	10.3			A	10.3
	SB	AM			A	9.9			A	9.9			A	10			A	10
		PM			B	10			B	10			B	10			B	10
#9 - Midland Avenue and Wulfsohn Road	EB left	AM	A	0.6	D	26.3	A	0.6	D	26.3	A	0.6	D	26.6	A	0.6	D	26.6
		PM	A	1.2	C	24.7	A	1.2	C	24.8	A	1.2	C	24.9	A	1.2	C	25
(Midland Avenue orientation switches W-E to N-S)	WB	AM			ff				ff				ff				ff	
		PM			ff				ff				ff				ff	
	NB left	AM			B	12.6			B	12.6			B	12.6			B	12.6
		PM			A	9.2			A	9.3			A	9.3			A	9.3

BASELINE TRAFFIC - K-H MTS 2021 Adjusted Volumes

#5 - Midland Avenue and W Meadows Drive – AM NB Signal condition operates at LOS D with a delay of 44.7 seconds in the 2021 Baseline scenario. The LOS remains the same through the phasing scenarios with a Phase 9 delay of 44.9 seconds. There is no significant affect at this intersection.

#7 - Midland Avenue and E Meadows Drive - AM EB Stop condition operates at LOS D with a delay of 26.5 seconds in the 2021 Baseline scenario. The LOS remains the same through the phasing scenarios with a Phase 9 delay of 26.6 seconds. There is no significant affect at this intersection.

#9 - Midland Avenue and Wulfsohn Road (E) - AM EB Stop condition operates at LOS D with a delay of 26.3 seconds in the 2021 Baseline scenario. The LOS remains the same through the phasing scenarios with a Phase 9 delay of 26.6 seconds. There is no significant affect at this intersection.

Most of the project traffic will use the Midland Avenue and Wulfsohn Road (W) intersection. The summary results are discussed below.

#4 - Midland Avenue and Wulfsohn Road (W) – PM NB Stop condition operates at LOS E with a delay of 39 seconds in the 2021 Baseline scenario. The additional phased traffic gradually increases the delay and ultimately degrades to LOS F in the Phase 9 scenario with a delay of 68.6 seconds. The 95th percentile queue analysis shows a length of 120 ft in the 2021 Baseline scenario and a 275 ft queue length in the 2021 plus Phase 9 scenario. The EB right turn shows the need for 30 ft of storage in the 2021 Baseline scenario and 40 ft of storage in the 2021 plus Phase 9 scenario.

4.4 State Highway Access Permit Evaluation

Based on the State Highway Access Code (SHAC), an access permit is required when a change of greater than 20% occurs when accessing a state highway. Because there is not an existing permit for I-70 Exit #114, CDOT has directed to use the 2021 Existing Adjusted traffic volumes from the K-H MTS as the permit threshold, those volumes are calculated in Appendix A shown in Table 8. The table also presents the percentage of DHV added to the Exit #114 Interchange by phase and by phase cumulatively (sum). All individual and cumulative phases fall below the 20% threshold that requires a CDOT Access Permit.

TABLE 8 - I-70 DHV AND PERCENT 2021 DHV BY PHASE

PHASE	HOUR	DHV	% 2021 DHV
3/4/5/7	AM	54	5.8%
	PM	30	2.0%
6	AM	34	3.7%
6 (SUM)	AM	88	9.5%
6	PM	15	1.0%
6 (SUM)	PM	46	3.0%
9	AM	35	3.8%
9 (SUM)	AM	124	13.3%
9	PM	40	2.7%
9 (SUM)	PM	85	5.7%
	2021 DHV		
	AM	928	
	AM	1,500	

4.5 RFTA GMF and Park and Ride 2018 vs 2021 Program

The K-H MTS includes the RFTA programming that was presented in the 2018 Shrewsberry RTC. That programming is shown below in Figure 3.

1.1 External Site Analysis

As part of the expansion, traffic from various on-site sources is expected to increase as well. The *Feasibility Study*[1] provides information regarding additional traffic generated by the facility.

- Bus traffic will be expanded from 45 to 60 operating buses during the winter peak season.
- Bus drivers will also increase from 45 to 60 per day.
- Maintenance staff will increase from 21 to 28.
- Between the on-site parking garage and the park and ride lot on Wulfsohn Road, parking for employees and the public will increase from 85 spaces to 234 spaces combined.
- The quantity of administrative staff will remain at the same levels as today.

Figure 3 – RFTA GMF / P&R 2018 RTC Program

The 2021 RFTA programming was outlined in 2.1 Project Description and trip generation calculated in Tables 5 and 6. Table 9 presents the 2018 and 2021 DHV which show the 2021 proposed DHV's are 60% in the AM and 80% in the PM of the volumes used in the K-H MTS.

TABLE 9 - 2018 VS 2021 DHV COMPARISON

	Weekday Design Hour Traffic			
	AM	AM	PM	PM
	IN	OUT	IN	OUT
2021 DHV	84	39	33	53
2018 DHV	156	37	36	72
2021%	64%		80%	

This reduction is most significant for the AM in and PM out volumes due to the potential future housing and corresponding reduction in the overall Park and Ride spaces. Those land uses have a synergy that will reduce traffic due to the proximity of the park and ride, and to balance the AM and PM volumes, reducing the AM in and PM out peak traffic volumes.

4.6 RFTA GMF and P&R 2021 Program vs MTS 2030 / 2040 DHV's

The bubble diagrams below show the 2030 and 2040 DHV's from the MTS.

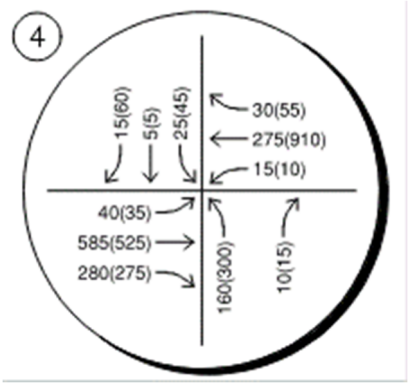


Figure 4 – MTS 2030 DHV

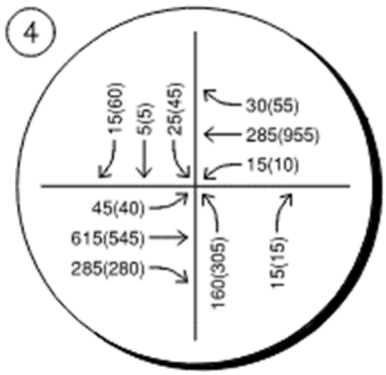


Figure 5 – MTS 2040 DHV

The table below calculates the percentage traffic contribution to the Wulfsohn Road leg of the Midland Avenue (W) intersection. The calculation includes accounting for the difference in the 2018 RFTA program included in the MTS and the 2021 program presented in this TIS.

TABLE 10 - WULFSOHN LEG - RFTA DHV %

Weekday Design Hour Traffic		
WULFSOHN LEG AT MIDLAND		
AM	PM	Scenario
123	86	2021 RFTA Program
193	108	2018 RFTA Program
465	605	2030 MTS
272	497	2030 MTS-18 RFTA
395	583	2030 MTS+21 RFTA
31%	**15%**	**2030 % RFTA**
480	615	2040 MTS
287	507	2040 MTS-18 RFTA
410	593	2040 MTS+21 RFTA
30%	**15%**	**2040 % RFTA**

The cumulative Phase 9 scenario traffic volumes on the Wulfsohn Road leg of the Midland Avenue west intersection are approximately 30% of the AM and 15% of the PM 2030 and 2040 traffic volumes for the overall buildout of the Glenwood Meadows area as presented in the K-H MTS. This calculation is done in the same manner as a CDOT Access Permit calculation.

5.0 Conclusions and Proposed Mitigation Measures

5.1 Summary of Conclusions

- The proposed project does not require a CDOT Access Permit for Phase 3/4/5/7 or future individual or cumulative phase scenarios.
- The 2021 traffic volumes are approximately 70% of the 2018 RFTA volumes used in the MTS.
- The cumulative Phase 9 scenario traffic volumes on the Wulfsohn Road leg of the Midland Avenue west intersection are approximately 30% of the AM and 15% of the PM 2030 and 2040 traffic volumes for the overall buildout of the Glenwood Meadows area as presented in the K-H MTS.
- Phase 3/4/5/7 traffic volumes have no significant effect on the existing roadway network and can be safely implemented without improvements and will not degrade the LOS, delay of safety of the existing roadway and intersections.

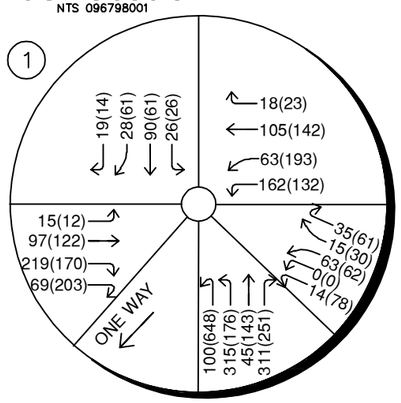
5.2 Proposed Mitigation Measures

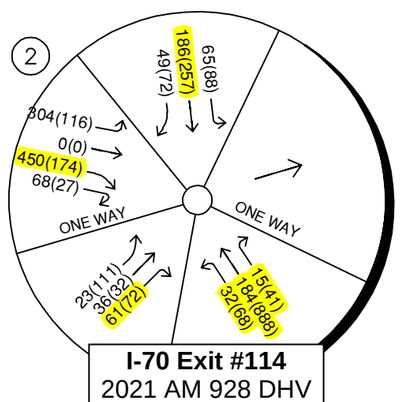
- Phase 3/4/5/7 can be implemented with no proposed mitigation recommended.

Appendix A

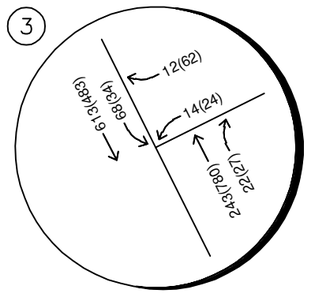
Traffic Volumes

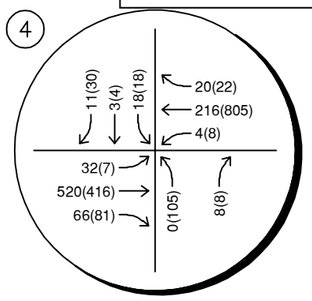
Kimley»Horn
NORTH
NTS 096798001

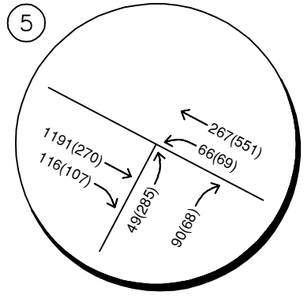


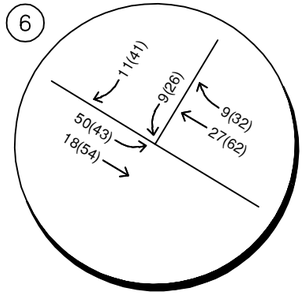


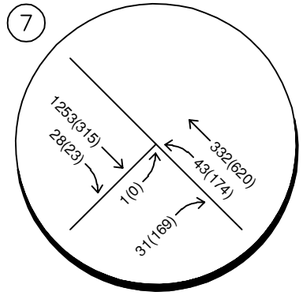
I-70 Exit #114
2021 AM 928 DHV
2021 PM 1500 DHV

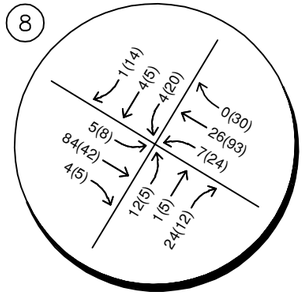


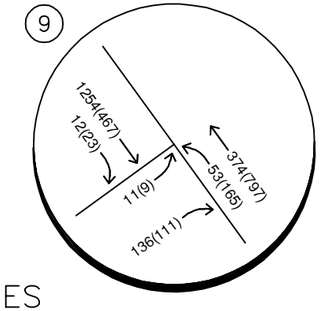


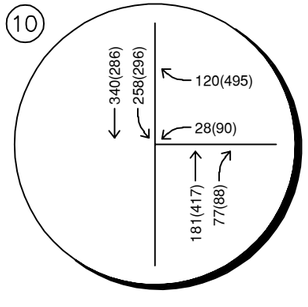


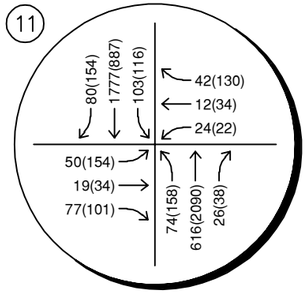












LEGEND

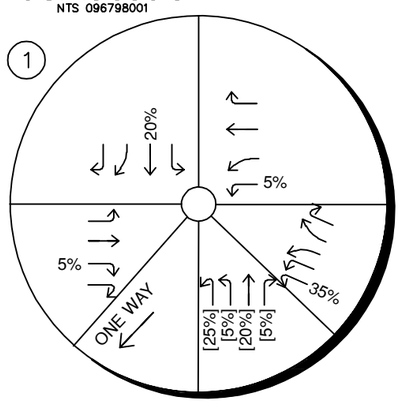
(X)	Study Area Key Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

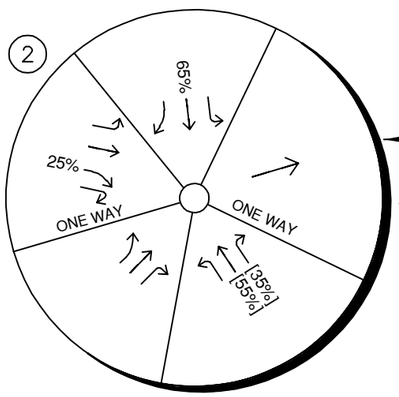
GLENDWOOD MEADOWS
MASTER TRAFFIC STUDY
GLENWOOD SPRINGS, CO
2021 EXISTING ADJUSTED TRAFFIC VOLUMES

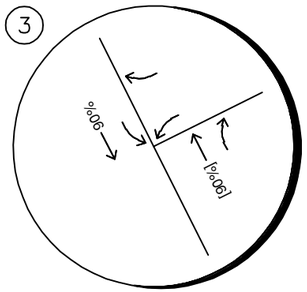
FIGURE 5

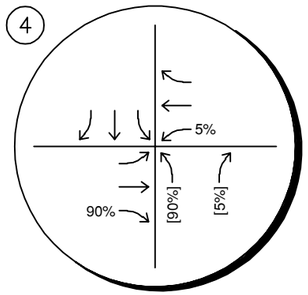
Kimley»Horn

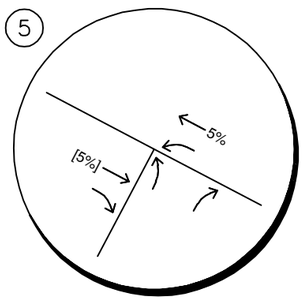
Kimley»Horn
NORTH
NTS 096798001

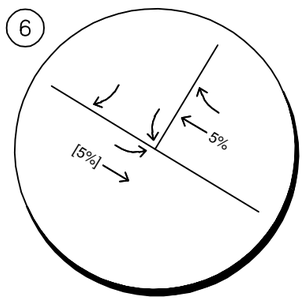


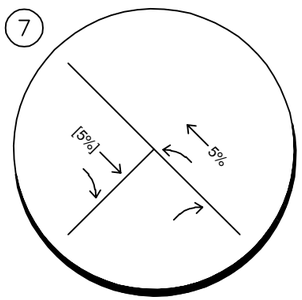


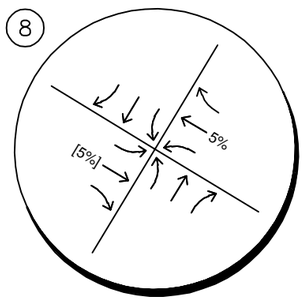


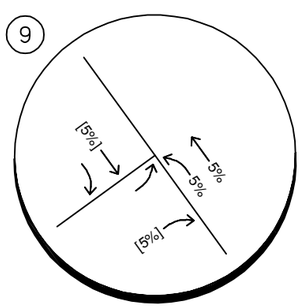


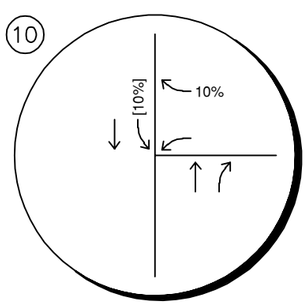


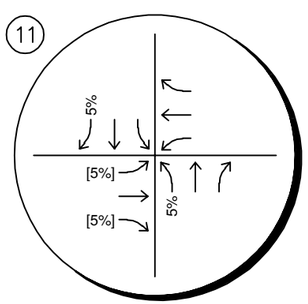












LEGEND

(X)	Study Area Key Intersection
XX%[XX%]	Entering[Exiting] Trip Distribution Percentage
XX%	External Trip Distribution

GLENDWOOD MEADOWS
MASTER TRAFFIC STUDY
GLENWOOD SPRINGS, CO
ZONE 5 TRIP DISTRIBUTION

FIGURE 11

Kimley»Horn

Appendix B

Trip Generation, Distribution, Assignment Worksheet

Trip Generation
ITE Trip Generation, 10th Edition

					Design Hour Rates					Weekday Design Hour Traffic				
Land Use	Number of Units	ITE Code	Weekday Rate	AM Rate	AM Entering	AM Exiting	PM Rate	PM Entering	PM Exiting	Weekday Traffic	AM IN	AM OUT	PM IN	PM OUT
Park and Ride	130	90	3.80	0.45	0.35	0.12	0.62	0.15	0.46	494	46	15	20	60
Multi-Family (Mid-rise)	74	221	5.43	0.34	0.09	0.25	0.45	0.27	0.17	402	7	19	20	13
Ph3-General Office Building (ksf)	13.1	710	11.30	2.96	2.55	0.41	1.30	0.21	1.09	148	33	5	3	14
Ph6-General Office Building (ksf)	14.4	710	11.25	2.78	2.39	0.39	1.25	0.20	1.05	162	34	6	3	15
General Office Building (emp)	96	710	4.94	0.49	0.40	0.08	0.51	0.10	0.41	474	39	8	10	39
HOUSING 10% Transit Reduction					***MULTI FAMILY HOUSING Transit Reduction***				*10%*	*362*	*6*	*17*	*18*	*12*
Ph3 *OFFICE 10% Transit Reduction*					***OFFICE Transit Reduction***				*10%*	*133*	*30*	*5*	*3*	*13*
Ph6 *OFFICE 10% Transit Reduction*					***OFFICE Transit Reduction***				*10%*	*146*	*31*	*5*	*3*	*14*

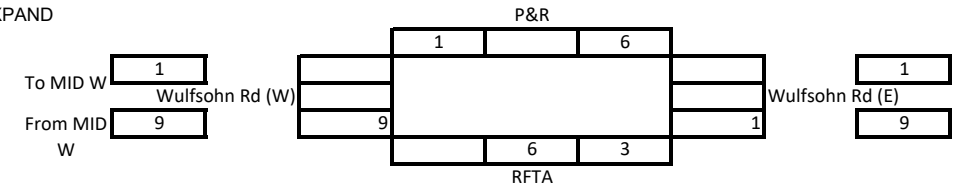
ITE Ttrip Generation Manual, 10th Edition	ITE Code	Basis of Rate	Time Period Used Above	Weekday Design Hour Distribution			
				AM IN	AM OUT	PM IN	PM OUT
Park and Ride	90	Fitted Curve	Peak Hour adjacent Street	79%	26%	25%	75%
Multi-Family (Mid-rise)	221	Fitted Curve	Peak Hour adjacent Street	26%	74%	61%	39%
General Office Building (ksf)	710	Fitted Curve	Peak Hour adjacent Street	86%	14%	16%	84%
General Office Building (emp)	710	Fitted Curve	Peak Hour adjacent Street	83%	17%	20%	80%

					Design Hour Rates					Weekday Design Hour Traffic				
Land Use	Number of Units	ITE Code	Weekday Rate	AM Rate	AM Entering	AM Exiting	PM Rate	PM Entering	PM Exiting	Weekday Traffic	AM IN	AM OUT	PM IN	PM OUT
Park and Ride (existing)	85	90	4.25	0.48	0.38	0.13	0.74	0.12	0.36	361	32	11	16	47
Park and Ride (Phase 9)	130	90	3.80	0.45	0.35	0.12	0.62	0.15	0.46	494	46	15	20	60
Park and RIde Increase	*45*									*133*	*14*	*4*	*4*	*13*
60 Bus Increase (PCE's)											*3*	*8*	*6*	*2*
Phase 3/5/5/7											33	13	9	15
Phase 6											31	5	3	14
Phase 8											0	0	0	0
Phase 9											20	21	22	25

TRIP DISTRIBUTION AND ASSIGNMENT at RFTA / P&R and WULFSOHN ROAD

Weekday AM

SHREWSBERRY - GMF 60-bus EXPAND
5-6am
10 out
10 staff in

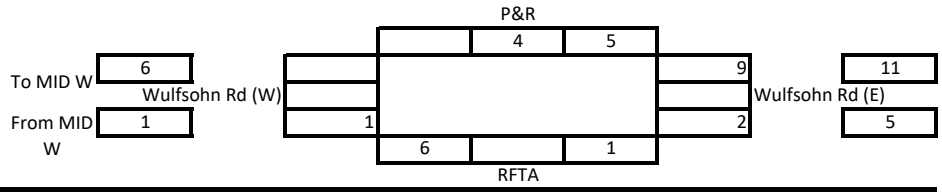


Weekday PM

7-8pm

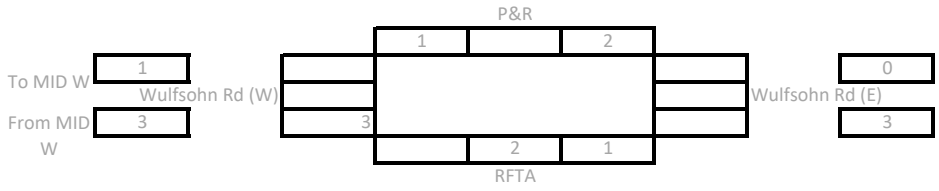
7 in
5 thru PnR
2 thru Midland EB

7 staff out



Weekday AM

19-20 BUS PULLOUT
Adj Street AM Peak
3 out
3 staff in

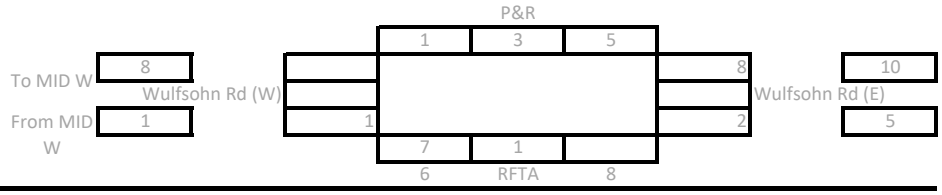


Weekday PM

Adj Street PM Peak

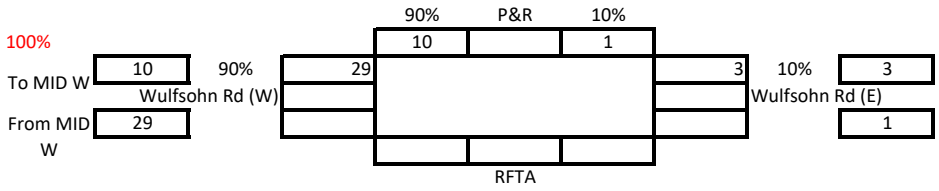
6 in
5 thru PnR
2 thru Midland EB

6 staff out

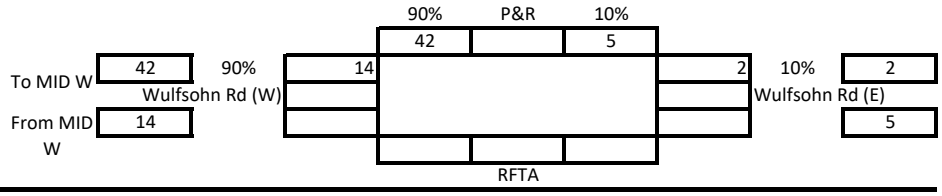


Weekday AM

Existing 85 space Park and Ride
Lot % Full 100%



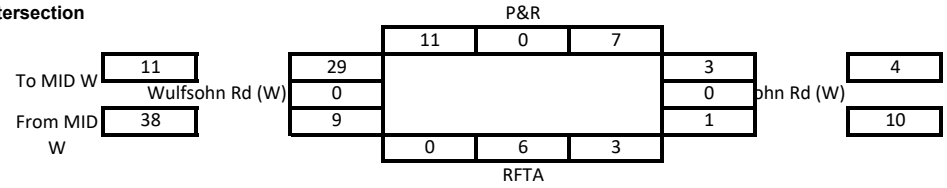
Weekday PM



Weekday AM

2021 Baseline RFTA GMF / PnR intersection

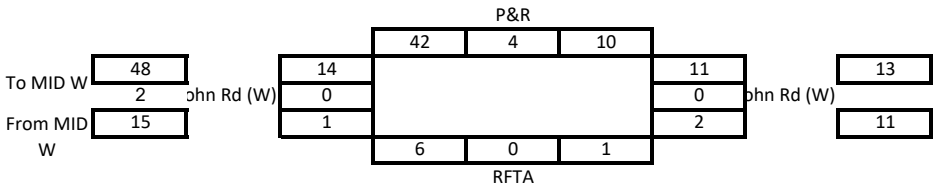
Bus Pullout + 85 space PnR



Weekday PM

2021 Baseline

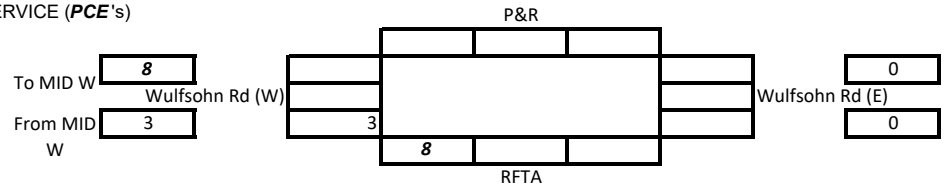
Bus Pullout + 85 space PnR



Weekday AM

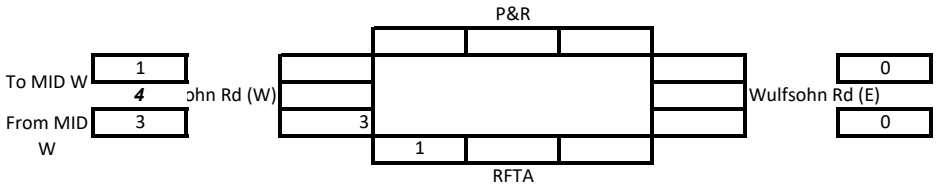
Phase 3/4/5/7 - EXPANDED BUS SERVICE (***PCE***'s)

AM PEAK ALL OUT



Weekday PM

PM PEAK ALL IN



Weekday AM

Phase 3/4/5/7 - OFFICE 13.1 ksf

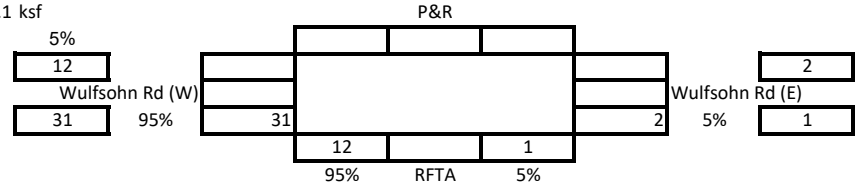
AM PEAK ALL OUT 90% 5%

TO MIDLAND (E) 1

TO MIDLAND (W) 11

FROM MIDLAND (E) 2

FROM MIDLAND (W) 28



Weekday PM

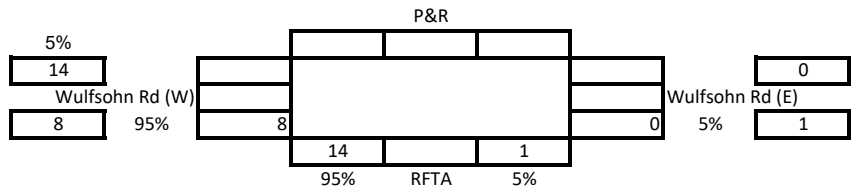
PM PEAK ALL IN 90% 5%

TO MIDLAND (E) 1

TO MIDLAND (W) 12

FROM MIDLAND (E) 0

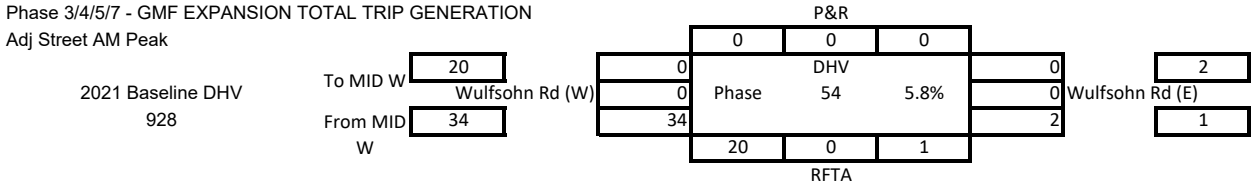
FROM MIDLAND (W) 7



Weekday AM

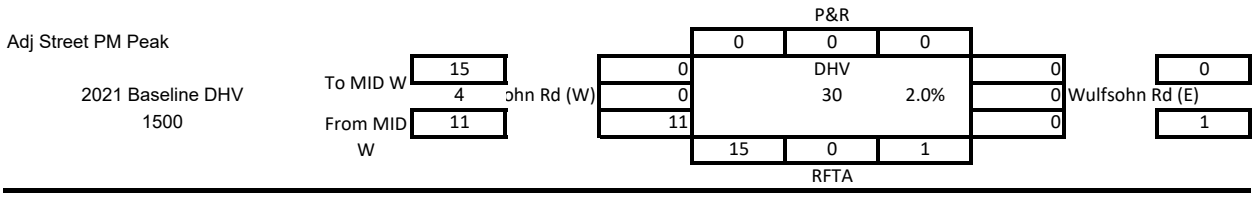
Phase 3/4/5/7 - GMF EXPANSION TOTAL TRIP GENERATION

Adj Street AM Peak



Weekday PM

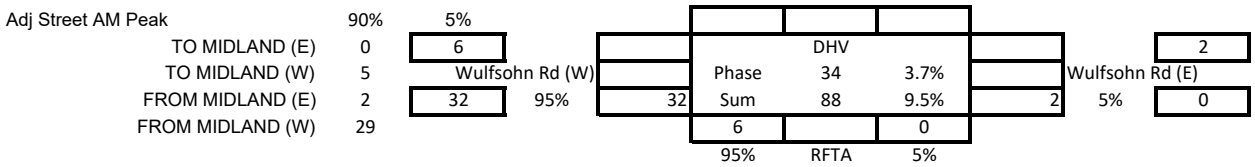
Adj Street PM Peak



Weekday AM

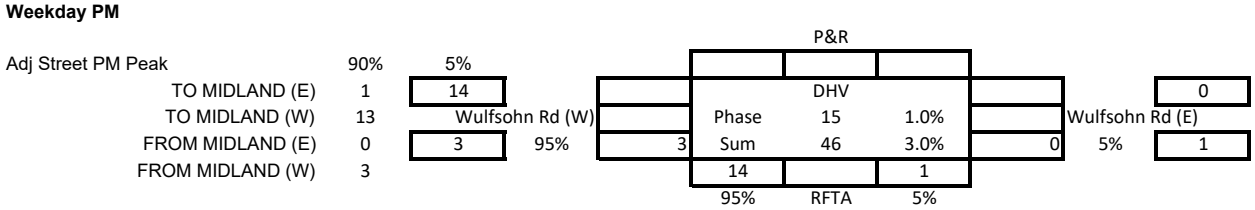
Phase 6 - ADMIN 14.4 ksf

Adj Street AM Peak



Weekday PM

Adj Street PM Peak



Weekday AM

Phase 9 - P&R +45 sp

Adj Street PM Peak	90%	5%		95%	P&R	5%		5%	
				4		0			
TO MIDLAND (E)	0	4	95%	13			1	5%	1
TO MIDLAND (W)	3	Wulfsohn Rd (W)						Wulfsohn Rd (E)	
FROM MIDLAND (E)	1	13							0
FROM MIDLAND (W)	12								
					RFTA				

Weekday PM

Adj Street PM Peak	90%	5%		95%	P&R	5%		5%	
				12		1			
TO MIDLAND (E)	1	12	95%	4			0	5%	0
TO MIDLAND (W)	11	Wulfsohn Rd (W)						Wulfsohn Rd (E)	
FROM MIDLAND (E)	0	4							1
FROM MIDLAND (W)	3								
					RFTA				

Weekday AM

Phase 9 - Housing

Adj Street PM Peak	90%	5%		95%	P&R	5%		5%	
				16		1			
TO MIDLAND (E)	1	16	95%	6			0	5%	0
TO MIDLAND (W)	15	Wulfsohn Rd (W)						Wulfsohn Rd (E)	
FROM MIDLAND (E)	0	6							1
FROM MIDLAND (W)	5								
					RFTA				

Weekday PM

Adj Street PM Peak	90%	5%		95%	P&R	5%		5%	
				11		1			
TO MIDLAND (E)	1	11	95%	17			1	5%	1
TO MIDLAND (W)	10	Wulfsohn Rd (W)						Wulfsohn Rd (E)	
FROM MIDLAND (E)	1	17							1
FROM MIDLAND (W)	15								
					RFTA				

Weekday AM

Phase 9 - TOTAL TRIP GENERATION

Adj Street PM Peak	90%	5%			P&R			
				20	0	1		
TO MIDLAND (E)	1	20	19		DHV		1	1
TO MIDLAND (W)	18	Wulfsohn Rd (W)	0	Phase	35	3.8%	0	Wulfsohn Rd (E)
FROM MIDLAND (E)	1	19	0	Sum	124	13.3%	0	1
FROM MIDLAND (W)	17			0	0	0		
					RFTA			

Weekday PM

Adj Street PM Peak	90%	5%			P&R			
				23	0	1		
TO MIDLAND (E)	1	23	21		DHV		1	1
TO MIDLAND (W)	21	Wulfsohn Rd (W)	0	Phase	40	2.7%	0	Wulfsohn Rd (E)
FROM MIDLAND (E)	1	21	0	Sum	85	5.7%	0	1
FROM MIDLAND (W)	19			0		0		

Appendix A

Trip Generation, Trip Distribution, and Trip Assignment

shrewsberry

Project Name: RFTA POR Project No: 15-0276

Description: Trip Distribution & Assignment

Recorded By: JP Date: 1/2/18 p.1/5

Checked By: MPS Date: 1/5/18

RFTA Routes - Buses only - Existing

Direction of travel

H= Hogback/Rifle

AM Peak 2 exiting < 1 ~~to~~ midland W ✓
1 ~~to~~ Wulfsohn E ✓

PM Peak 2 entering < 1 ~~from~~ midland W ✓
1 ~~from~~ Wulfsohn E ✓

RFTA Peak 5:00-6:00 AM and 7:00-8:00 PM

RG= Ride Glenwood

AM Peak ø buses

PM Peak 1 entering → 1 from Wulfsohn E ✓
+ 2 Midland EB thru

L= Local Valley

AM Peak 2 exiting → ~~2~~ to Wulfsohn E ✓

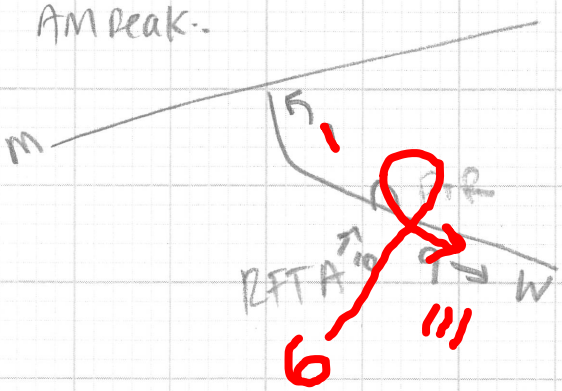
PM Peak 5 ~~stop~~ at Park & Ride but keep going ✓ (turn around)

BRT= Velo RFTA

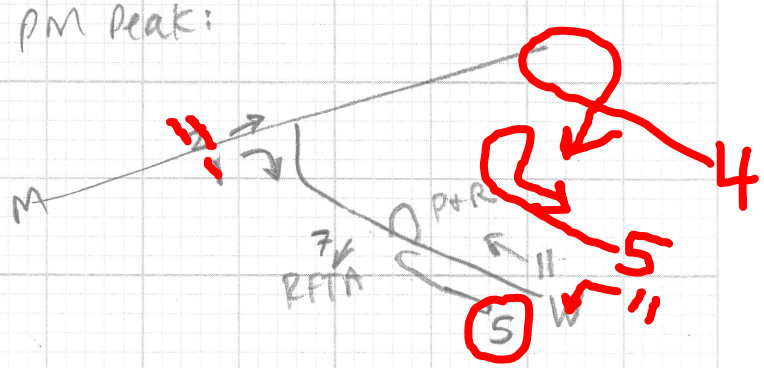
AM Peak ~~4~~ exiting to P&R then Wulfsohn E ✓

PM Peak 4 entering from P&R via Wulfsohn E

AM Peak:



PM Peak:



shrewsberry

Project Name: RFTA POR Project No: 15-0276

Description: Trip Distribution & Assignment

Recorded By: [signature] Date: 1/23/18 p. 2/5

Checked By: MPS Date: 1/24/18

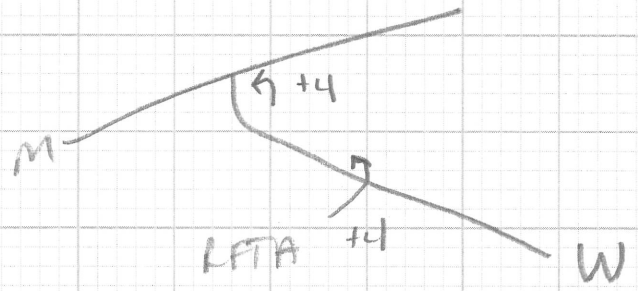
Expanded bus service:

AM Peak: +4 buses, all pull-out

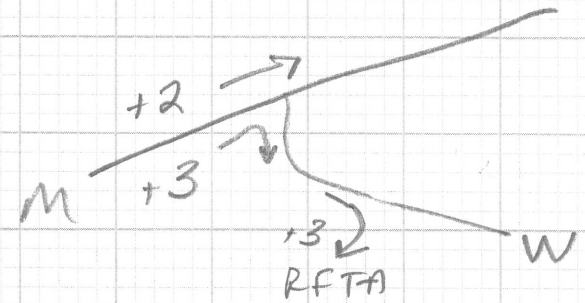
PM Peak: +3 buses, all pull-in

Assume all expansion buses go thru the Midland/Wolfsohn intersection - worst case scenario for the intersection

AM Peak

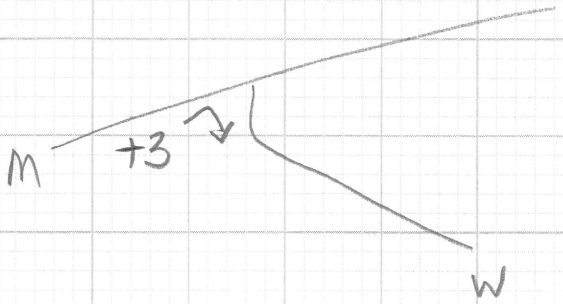


PM Peak

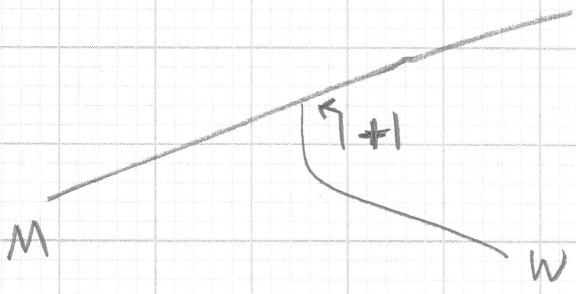


Expanded bus drivers:

AM Peak +3 enter



PM Peak +1 exit



shrewsberry

Project Name: RFTA POR Project No: 15-0276

Description: Trip Generation

Recorded By: [signature] Date: 1/23/18 p. 3/5

Checked By: MPS Date: 1/24/19

LU #90 Park and Ride Lot

Existing 85 spaces (on site + P+R Lot)
Proposed 324 total spaces (garage + P+R paddies)
(239 New Spaces)

AM Peak of Generater
T= 0.85 X - 73.83 84% entering

PM Peak of Generator
T= 0.44x + 5.74 24% entering

AM Peak

Existing T= 0.85(85) - 73.83
T= -1.58 → Negligible

Proposed T= 0.85(324) - 73.83
T= 202 trips < 170 entering, 32 exiting

PM peak

Existing T= 0.44 (85) + 5.74
T= 43 Trips < 10 entering, 33 exiting

Proposed T= 0.44(324) + 5.74
T= 148 trips < 36 entering, 112 exiting

Net increase +26 entering, +79 exiting

shrewsberry

Project Name: RFTA POR Project No: 15-0276

Description: Trip Distribution & Assignment

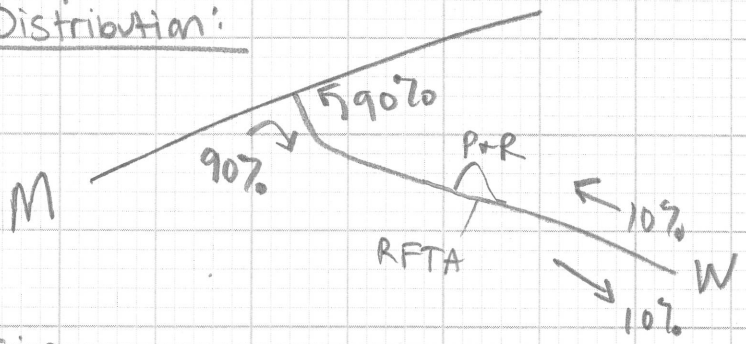
Recorded By: [illegible] Date: 1/23/18 p. 4/5

Checked By: MPS Date: 1/24/18

Park + Ride - Net increase

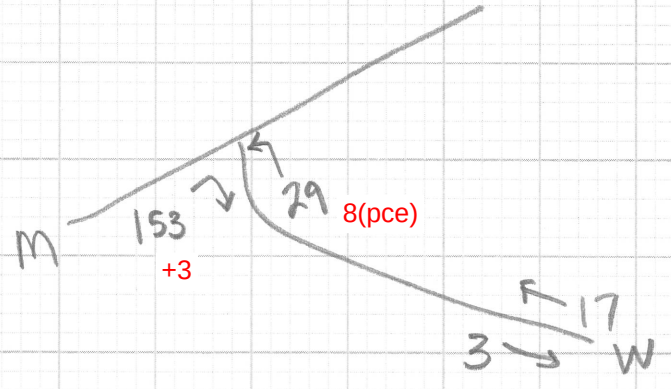
AM Peak 170 entering | PM Peak 26 entering
32 exiting | 79 exiting

Trip Distribution:

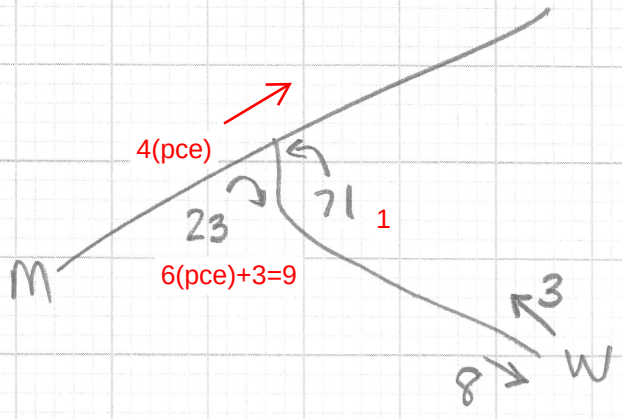


Trip Assignment:

AM Peak



PM Peak



Expanded Maintenance Staff:
None during these peak hours

shrewsberry

Project Name: RFTA POR Project No: 150276

Description: Trip Assignment

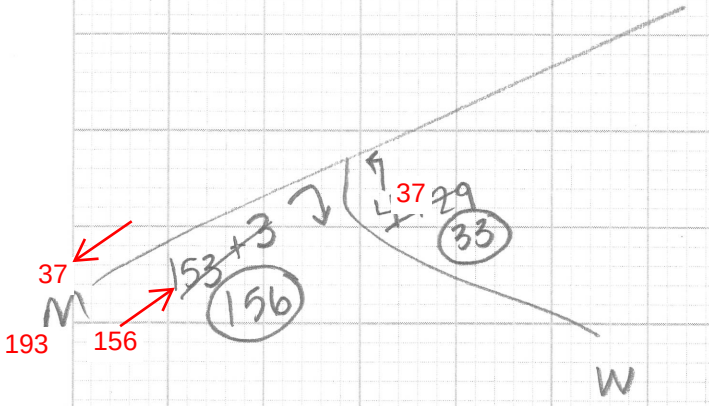
Recorded By: JP Date: 1/23/18 p.5/5

Checked By: MPS Date: 1/24/18

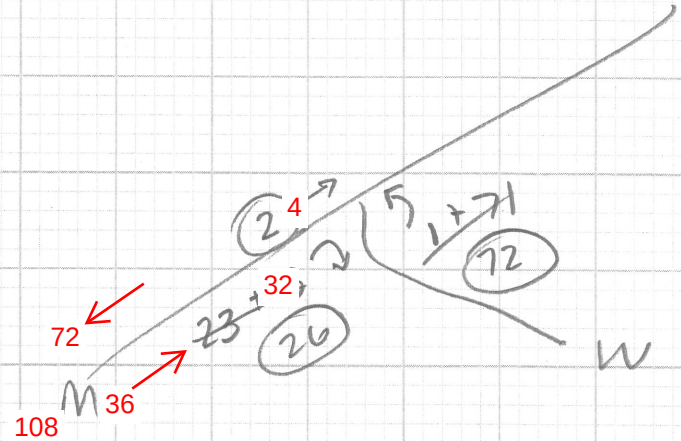
Total new traffic = Buses + drivers + Maint. staff (0) + office staff (0) + General Public (Park + Ride)

Total trip assignment

AM Peak



PM Peak



Appendix C

Synchro Output

RFTA GMF TIS
Operational Result Summary

Summary considers cumulative traffic volumes in succesive phases

Intersection	Approach Movement		2021 BASELINE				2021 + Phase 3/4/5/7				2021 + Phase 6				2021 + Phase 9			
			Overal l LOS	Overal l Delay	LOS	Delay	Overal l LOS	Overal l Delay	LOS	Delay	Overal l LOS	Overal l Delay	LOS	Delay	Overal l LOS	Overal l Delay	LOS	Delay
#3 - Wulfsohn Road and RFTA / P&R	EB left	AM	*A*	*5.1*	A	7.3	*A*	*5.5*	A	7.3	*A*	*4.5*	A	7.3	*A*	*4.7*	A	7.4
		PM	*A*	*3.3*	A	7.5	*A*	*3.7*	A	7.5	*A*	*4.1*	A	7.5	*A*	*4.9*	A	7.6
	WB left	AM			A	7.6			A	7.6			A	7.8			A	7.8
		PM			A	7.5			A	7.7			A	7.7			A	7.7
	NB	AM			B	10.2			B	10.7			B	11.2			B	11.5
		PM			B	10.5			B	11.5			B	12			B	13.3
	SB	AM			A	9.5			A	9.5			A	9.7			A	9.5
		PM			A	10.5			A	10.6			A	10.6			B	10.7
#4 - Midland Avenue and Wulfsohn Road	EB left	AM	*A*	*0.6*	A	0	*A*	*1*	A	0	*A*	*1.1*	A	0	*A*	*1.4*	A	0
		PM	*A*	*3.7*	A	9.8	*A*	*4.5*	A	9.8	*A*	*5.4*	A	9.8	*A*	*7.7*	A	9.8
	WB left	AM			A	8.9			A	9			A	9.2			A	9.2
		PM			C	22.1			C	8.6			C	8.6			A	8.6
	NB	AM			B	12.2			B	14.5			B	14.7			C	15.7
		PM			E	39			E	45.5			F	52			F	68.6
	SB	AM			B	13.6			B	13.8			B	14.1			B	14.2
		PM			C	18.8			C	19			C	19			C	19.1
#5 - Midland Avenue and W Meadows Drive	EB	AM	*C*	*24.7*	C	26.6	*C*	*24.7*	C	26.6	*C*	*24.7*	C	26.7	*C*	*24.8*	C	26.8
		PM	*C*	*22.6*	C	26.3	*C*	*22.6*	C	26.3	*C*	*22.6*	C	26.3	*C*	*22.6*	C	26.3
	WB	AM			A	8.7			A	8.7			A	8.7			A	8.7
		PM			C	26.2			C	26.2			C	26.2			C	26.2
	NB	AM			D	44.7			D	44.7			D	44.8			D	44.9
		PM			B	12.4			B	12.4			B	12.4			B	12.5
#6 - W Meadows Road and Wulfsohn Road	EB left	AM	*A*	*4.5*	A	7.4	*A*	*4.5*	A	7.4	*A*	*4.4*	A	7.4	*A*	*4.4*	A	7.4
		PM	*A*	*3.7*	A	7.5	*A*	*3.7*	A	7.5	*A*	*3.7*	A	7.5	*A*	*3.7*	A	7.5
	WB	AM			*ff*				*ff*				*ff*				*ff*	
		PM			*ff*				*ff*				*ff*				*ff*	
	SB left	AM			A	9.2			A	9.2			A	9.3			A	9.3
		PM			A	9.7			A	9.7			A	9.7			A	9.7
#7 - Midland Avenue and E Meadows Drive (Midland Avenue orientation switches W-E to N-S)	EB right	AM	*A*	*0.8*	D	26.5	*A*	*0.8*	D	26.5	*A*	*0.8*	D	26.5	*A*	*0.8*	D	26.6
		PM	*A*	*2.7*	A	8.6	*A*	*2.7*	A	8.6	*A*	*2.7*	A	8.6	*A*	*2.7*	A	8.6
	NB left	AM			B	12.5			B	12.5			B	12.5			B	12.5
		PM			B	11.9			B	12			B	12			B	12.1
	SB	AM			*ff*				*ff*				*ff*				*ff*	
		PM			*ff*				*ff*				*ff*				*ff*	
#8 - E Meadows Road and Wulfsohn Road	EB left	AM	*A*	*3*	A	7.3	*A*	*3*	A	7.3	*A*	*3*	A	7.3	*A*	*3*	A	7.3
		PM	*A*	*3.2*	A	7.5	*A*	*3.2*	A	7.5	*A*	*3.2*	A	7.5	*A*	*3.2*	A	7.5
	WB left	AM			A	7.5			A	7.5			A	7.5			A	7.5
		PM			A	7.3			A	7.3			A	7.3			A	7.3
	NB	AM			A	9.3			A	9.8			A	9.8			A	9.8
		PM			A	9.5			A	9.5			A	10.3			A	10.3
	SB	AM			A	9.9			A	9.9			A	10			A	10
		PM			B	10			B	10			B	10			B	10
#9 - Midland Avenue and Wulfsohn Road (Midland Avenue orientation switches W-E to N-S)	EB left	AM	*A*	*0.6*	D	26.3	*A*	*0.6*	D	26.3	*A*	*0.6*	D	26.6	*A*	*0.6*	D	26.6
		PM	*A*	*1.2*	C	24.7	*A*	*1.2*	C	24.8	*A*	*1.2*	C	24.9	*A*	*1.2*	C	25
	WB	AM			*ff*				*ff*				*ff*				*ff*	
		PM			*ff*				*ff*				*ff*				*ff*	
	NB left	AM			B	12.6			B	12.6			B	12.6			B	12.6
		PM			A	9.2			A	9.3			A	9.3			A	9.3

BASELINE TRAFFIC - K-H MTS 2021 Adjusted Volumes



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1191	116	66	267	49	90
Future Volume (veh/h)	1191	116	66	267	49	90
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1203	117	67	270	49	91
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1274	1080	183	1422	285	253
Arrive On Green	0.68	0.68	0.04	0.76	0.16	0.16
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	1203	117	67	270	49	91
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	64.7	2.9	1.2	4.6	2.7	5.8
Cycle Q Clear(g_c), s	64.7	2.9	1.2	4.6	2.7	5.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1274	1080	183	1422	285	253
V/C Ratio(X)	0.94	0.11	0.37	0.19	0.17	0.36
Avail Cap(c_a), veh/h	1387	1175	193	1544	285	253
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	6.2	27.1	3.8	40.9	42.2
Incr Delay (d2), s/veh	12.6	0.0	1.2	0.1	1.3	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	27.6	0.9	1.3	1.4	1.3	2.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.6	6.2	28.3	3.8	42.2	46.1
LnGrp LOS	C	A	C	A	D	D
Approach Vol, veh/h	1320			337	140	
Approach Delay, s/veh	26.6			8.7	44.7	
Approach LOS	C			A	D	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		22.5	8.9	81.2			90.1
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		18.0	5.0	83.5			93.0
Max Q Clear Time (g_c+I1), s		7.8	3.2	66.7			6.6
Green Ext Time (p_c), s		0.3	0.0	10.1			1.7

Intersection Summary	
HCM 6th Ctrl Delay	24.7
HCM 6th LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	270	107	69	551	285	68
Future Volume (veh/h)	270	107	69	551	285	68
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	297	118	76	605	313	75
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	509	431	307	704	917	816
Arrive On Green	0.27	0.27	0.05	0.38	0.51	0.51
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	297	118	76	605	313	75
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.3	4.8	2.4	24.6	8.5	2.0
Cycle Q Clear(g_c), s	11.3	4.8	2.4	24.6	8.5	2.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	509	431	307	704	917	816
V/C Ratio(X)	0.58	0.27	0.25	0.86	0.34	0.09
Avail Cap(c_a), veh/h	1279	1084	380	1551	917	816
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.0	23.6	19.6	23.7	11.8	10.2
Incr Delay (d2), s/veh	1.1	0.3	0.4	3.2	1.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	1.8	1.0	10.6	3.5	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.1	24.0	20.0	26.9	12.8	10.4
LnGrp LOS	C	C	C	C	B	B
Approach Vol, veh/h	415			681	388	
Approach Delay, s/veh	26.2			26.2	12.4	
Approach LOS	C			C	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		47.0	8.6	27.0		35.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		42.5	7.5	56.5		68.5
Max Q Clear Time (g_c+I1), s		10.5	4.4	13.3		26.6
Green Ext Time (p_c), s		1.3	0.0	2.2		4.5

Intersection Summary	
HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	29	35	9	20	0	14	0	6	10	9	0	11
Future Vol, veh/h	29	35	9	20	0	14	0	6	10	9	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	40	49	13	28	0	19	0	8	14	13	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	62	0	0	209	211	56	213	208	10
Stage 1	-	-	-	-	-	-	136	136	-	66	66	-
Stage 2	-	-	-	-	-	-	73	75	-	147	142	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1597	-	-	1541	-	-	748	686	1011	744	689	1071
Stage 1	-	-	-	-	-	-	867	784	-	945	840	-
Stage 2	-	-	-	-	-	-	937	833	-	856	779	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1597	-	-	1541	-	-	713	656	1011	702	659	1071
Mov Cap-2 Maneuver	-	-	-	-	-	-	713	656	-	702	659	-
Stage 1	-	-	-	-	-	-	844	764	-	920	825	-
Stage 2	-	-	-	-	-	-	907	818	-	813	759	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	4.3	9.4	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	840	1597	-	-	1541	-	-	866
HCM Lane V/C Ratio	0.026	0.025	-	-	0.018	-	-	0.032
HCM Control Delay (s)	9.4	7.3	0	-	7.4	0	-	9.3
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	520	66	4	216	20	0	0	8	18	3	11
Future Vol, veh/h	0	520	66	4	216	20	0	0	8	18	3	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	591	75	5	245	23	0	0	9	20	3	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	666	0	0	866	869	591	896	933	257
Stage 1	-	-	-	-	-	-	591	591	-	267	267	-
Stage 2	-	-	-	-	-	-	275	278	-	629	666	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1296	-	-	923	-	-	274	290	507	261	266	782
Stage 1	-	-	-	-	-	-	493	494	-	738	688	-
Stage 2	-	-	-	-	-	-	731	680	-	470	457	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	923	-	-	267	289	507	255	265	782
Mov Cap-2 Maneuver	-	-	-	-	-	-	381	386	-	363	360	-
Stage 1	-	-	-	-	-	-	493	494	-	738	685	-
Stage 2	-	-	-	-	-	-	712	677	-	462	457	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.1	12.2	13.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	507	1296	-	-	923	-	-	363	782
HCM Lane V/C Ratio	0.018	-	-	-	0.005	-	-	0.066	0.016
HCM Control Delay (s)	12.2	0	-	-	8.9	-	-	15.6	9.7
HCM Lane LOS	B	A	-	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	18	27	9	9	11
Future Vol, veh/h	50	18	27	9	9	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	25	38	13	13	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	208	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1555	-	-	-	780	1025
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1555	-	-	-	745	1025
Mov Cap-2 Maneuver	-	-	-	-	745	-
Stage 1	-	-	-	-	933	-
Stage 2	-	-	-	-	866	-

Approach	EB	WB	SB
HCM Control Delay, s	5.5	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1555	-	-	-	877
HCM Lane V/C Ratio	0.045	-	-	-	0.032
HCM Control Delay (s)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	43	322	1253	28	0	31
Future Vol, veh/h	43	322	1253	28	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	332	1292	29	0	32

Major/Minor	Major1			Major2		Minor2
Conflicting Flow All	1321	0	-	0	-	1292
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	523	-	-	-	0	199
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	523	-	-	-	-	199
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.5	0	26.5
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	199	523	-	-	-
HCM Lane V/C Ratio	0.161	0.085	-	-	-
HCM Control Delay (s)	26.5	12.5	-	-	-
HCM Lane LOS	D	B	-	-	-
HCM 95th %tile Q(veh)	0.6	0.3	-	-	-

Intersection	
Int Delay, s/veh	3

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	12	1	5	84	4	7	26	0	4	1
Future Vol, veh/h	12	1	5	84	4	7	26	0	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	76	76	76	76	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	1	7	111	5	9	34	0	5	1

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	183	114	34	0	0	116	0	0	196	34
Stage 1	128	-	-	-	-	-	-	-	52	-
Stage 2	55	-	-	-	-	-	-	-	144	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	778	939	1578	-	-	1473	-	-	763	1039
Stage 1	876	-	-	-	-	-	-	-	961	-
Stage 2	957	-	-	-	-	-	-	-	859	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	766	939	1578	-	-	1473	-	-	730	1039
Mov Cap-2 Maneuver	766	-	-	-	-	-	-	-	730	-
Stage 1	872	-	-	-	-	-	-	-	956	-
Stage 2	944	-	-	-	-	-	-	-	825	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.3	0.4	1.6	9.9
HCM LOS	A			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	766	927	1473	-	-	1578	-	-	742
HCM Lane V/C Ratio	0.021	0.035	0.006	-	-	0.004	-	-	0.016
HCM Control Delay (s)	9.8	9	7.5	0	-	7.3	0	-	9.9
HCM Lane LOS	A	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	136	53	374	1254	12
Future Vol, veh/h	11	136	53	374	1254	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	140	55	386	1293	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1789	-	1305	0	-	0
Stage 1	1293	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	89	0	530	-	-	-
Stage 1	257	0	-	-	-	-
Stage 2	612	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	80	-	530	-	-	-
Mov Cap-2 Maneuver	180	-	-	-	-	-
Stage 1	230	-	-	-	-	-
Stage 2	612	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.3	1.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	530	-	180	-	-	-
HCM Lane V/C Ratio	0.103	-	0.063	-	-	-
HCM Control Delay (s)	12.6	-	26.3	0	-	-
HCM Lane LOS	B	-	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	14	78	1	12	82	10	6	1	9	10	4	32
Future Vol, veh/h	14	78	1	12	82	10	6	1	9	10	4	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	108	1	17	114	14	8	1	13	14	6	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	128	0	0	109	0	0	327	309	109	309	302	121
Stage 1	-	-	-	-	-	-	147	147	-	155	155	-
Stage 2	-	-	-	-	-	-	180	162	-	154	147	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1458	-	-	1481	-	-	626	605	945	643	611	930
Stage 1	-	-	-	-	-	-	856	775	-	847	769	-
Stage 2	-	-	-	-	-	-	822	764	-	848	775	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1481	-	-	580	589	945	621	595	930
Mov Cap-2 Maneuver	-	-	-	-	-	-	580	589	-	621	595	-
Stage 1	-	-	-	-	-	-	844	764	-	835	760	-
Stage 2	-	-	-	-	-	-	768	755	-	824	764	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.9	10	9.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	742	1458	-	-	1481	-	-	804
HCM Lane V/C Ratio	0.03	0.013	-	-	0.011	-	-	0.079
HCM Control Delay (s)	10	7.5	0	-	7.5	0	-	9.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	416	81	8	805	22	105	0	8	18	4	30
Future Vol, veh/h	7	416	81	8	805	22	105	0	8	18	4	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	100	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	452	88	9	875	24	114	0	9	18	4	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	899	0	0	540	0	0	1392	1385	452	1417	1461	887
Stage 1	-	-	-	-	-	-	468	468	-	905	905	-
Stage 2	-	-	-	-	-	-	924	917	-	512	556	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	756	-	-	1028	-	-	119	143	608	115	129	343
Stage 1	-	-	-	-	-	-	575	561	-	331	355	-
Stage 2	-	-	-	-	-	-	323	351	-	545	513	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	756	-	-	1028	-	-	~ 105	140	608	112	126	343
Mov Cap-2 Maneuver	-	-	-	-	-	-	211	251	-	231	243	-
Stage 1	-	-	-	-	-	-	569	555	-	327	352	-
Stage 2	-	-	-	-	-	-	286	348	-	532	507	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	39	18.8
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	224	756	-	-	1028	-	-	233	343
HCM Lane V/C Ratio	0.548	0.01	-	-	0.008	-	-	0.096	0.095
HCM Control Delay (s)	39	9.8	-	-	8.5	-	-	22.1	16.6
HCM Lane LOS	E	A	-	-	A	-	-	C	C
HCM 95th %tile Q(veh)	3	0	-	-	0	-	-	0.3	0.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	54	63	32	26	41
Future Vol, veh/h	43	54	63	32	26	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	64	75	38	31	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	113	0	-	0	260	94
Stage 1	-	-	-	-	94	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1476	-	-	-	729	963
Stage 1	-	-	-	-	930	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1476	-	-	-	703	963
Mov Cap-2 Maneuver	-	-	-	-	703	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1476	-	-	-	842
HCM Lane V/C Ratio	0.035	-	-	-	0.095
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.7

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	174	620	315	23	0	169
Future Vol, veh/h	174	620	315	23	0	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	189	674	342	25	0	184

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	367	0	-	0	-	342
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	1192	-	-	-	0	701
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1192	-	-	-	-	701
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.9	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	701	1192	-	-	-
HCM Lane V/C Ratio	0.262	0.159	-	-	-
HCM Control Delay (s)	11.9	8.6	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	1	0.6	-	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	5	5	8	42	5	24	93	30	5	14
Future Vol, veh/h	5	5	8	42	5	24	93	30	5	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	8	44	5	25	98	32	5	15

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	237	47	130	0	0	49	0	0	236	114
Stage 1	63	-	-	-	-	-	-	-	164	-
Stage 2	174	-	-	-	-	-	-	-	72	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	717	1022	1455	-	-	1558	-	-	718	939
Stage 1	948	-	-	-	-	-	-	-	838	-
Stage 2	828	-	-	-	-	-	-	-	938	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	689	1022	1455	-	-	1558	-	-	692	939
Mov Cap-2 Maneuver	689	-	-	-	-	-	-	-	692	-
Stage 1	942	-	-	-	-	-	-	-	833	-
Stage 2	796	-	-	-	-	-	-	-	915	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.5	1.1	1.2	10
HCM LOS	A			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	689	872	1558	-	-	1455	-	-	758
HCM Lane V/C Ratio	0.008	0.021	0.016	-	-	0.006	-	-	0.054
HCM Control Delay (s)	10.3	9.2	7.3	0	-	7.5	0	-	10
HCM Lane LOS	B	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	111	165	797	467	23
Future Vol, veh/h	9	111	165	797	467	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	122	181	876	513	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1751	-	538	0	-	0
Stage 1	513	-	-	-	-	-
Stage 2	1238	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	94	0	1030	-	-	-
Stage 1	601	0	-	-	-	-
Stage 2	274	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	77	-	1030	-	-	-
Mov Cap-2 Maneuver	193	-	-	-	-	-
Stage 1	495	-	-	-	-	-
Stage 2	274	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.7	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1030	-	193	-	-	-
HCM Lane V/C Ratio	0.176	-	0.051	-	-	-
HCM Control Delay (s)	9.2	-	24.7	0	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.6	-	0.2	-	-	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1191	116	66	267	49	90
Future Volume (veh/h)	1191	116	66	267	49	90
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1203	117	67	270	49	91
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1274	1080	183	1422	285	253
Arrive On Green	0.68	0.68	0.04	0.76	0.16	0.16
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	1203	117	67	270	49	91
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	64.7	2.9	1.2	4.6	2.7	5.8
Cycle Q Clear(g_c), s	64.7	2.9	1.2	4.6	2.7	5.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1274	1080	183	1422	285	253
V/C Ratio(X)	0.94	0.11	0.37	0.19	0.17	0.36
Avail Cap(c_a), veh/h	1387	1175	193	1544	285	253
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	6.2	27.1	3.8	40.9	42.2
Incr Delay (d2), s/veh	12.6	0.0	1.2	0.1	1.3	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	27.6	0.9	1.3	1.4	1.3	2.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.6	6.2	28.3	3.8	42.2	46.1
LnGrp LOS	C	A	C	A	D	D
Approach Vol, veh/h	1320			337	140	
Approach Delay, s/veh	26.6			8.7	44.7	
Approach LOS	C			A	D	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		22.5	8.9	81.2			90.1
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		18.0	5.0	83.5			93.0
Max Q Clear Time (g_c+I1), s		7.8	3.2	66.7			6.6
Green Ext Time (p_c), s		0.3	0.0	10.1			1.7

Intersection Summary	
HCM 6th Ctrl Delay	24.7
HCM 6th LOS	C



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	274	107	69	551	285	68
Future Volume (veh/h)	274	107	69	551	285	68
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	301	118	76	605	313	75
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	509	431	304	704	917	816
Arrive On Green	0.27	0.27	0.05	0.38	0.51	0.51
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	301	118	76	605	313	75
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.5	4.8	2.4	24.6	8.5	2.0
Cycle Q Clear(g_c), s	11.5	4.8	2.4	24.6	8.5	2.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	509	431	304	704	917	816
V/C Ratio(X)	0.59	0.27	0.25	0.86	0.34	0.09
Avail Cap(c_a), veh/h	1279	1084	377	1551	917	816
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	23.6	19.6	23.7	11.8	10.2
Incr Delay (d2), s/veh	1.1	0.3	0.4	3.2	1.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	1.8	1.0	10.6	3.5	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.2	24.0	20.1	26.9	12.8	10.4
LnGrp LOS	C	C	C	C	B	B
Approach Vol, veh/h	419			681	388	
Approach Delay, s/veh	26.3			26.2	12.4	
Approach LOS	C			C	B	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		47.0	8.6	27.0			35.6
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		42.5	7.5	56.5			68.5
Max Q Clear Time (g_c+I1), s		10.5	4.4	13.5			26.6
Green Ext Time (p_c), s		1.3	0.0	2.3			4.5

Intersection Summary	
HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	29	35	20	21	0	14	21	6	11	9	0	11
Future Vol, veh/h	29	35	20	21	0	14	21	6	11	9	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	5	25	5	50	25	100	25	25	100	5
Mvmt Flow	40	49	28	29	0	19	29	8	15	13	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	77	0	0	218	220	63	223	225	10
Stage 1	-	-	-	-	-	-	143	143	-	68	68	-
Stage 2	-	-	-	-	-	-	75	77	-	155	157	-
Critical Hdwy	4.15	-	-	4.35	-	-	7.35	7.5	6.45	7.35	7.5	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	6.5	-	6.35	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	6.5	-	6.35	6.5	-
Follow-up Hdwy	2.245	-	-	2.425	-	-	3.725	4.9	3.525	3.725	4.9	3.345
Pot Cap-1 Maneuver	1578	-	-	1388	-	-	692	538	941	686	534	1063
Stage 1	-	-	-	-	-	-	808	625	-	888	680	-
Stage 2	-	-	-	-	-	-	880	673	-	796	615	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1578	-	-	1388	-	-	657	513	941	642	509	1063
Mov Cap-2 Maneuver	-	-	-	-	-	-	657	513	-	642	509	-
Stage 1	-	-	-	-	-	-	786	608	-	864	666	-
Stage 2	-	-	-	-	-	-	849	659	-	751	598	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.5	4.6	10.7	9.5
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	687	1578	-	-	1388	-	-	821
HCM Lane V/C Ratio	0.077	0.026	-	-	0.021	-	-	0.034
HCM Control Delay (s)	10.7	7.3	0	-	7.6	0	-	9.5
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	520	100	6	216	20	20	0	9	18	3	11
Future Vol, veh/h	0	520	100	6	216	20	20	0	9	18	3	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	591	114	7	245	23	23	0	10	20	3	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	705	0	0	870	873	591	924	976	257
Stage 1	-	-	-	-	-	-	591	591	-	271	271	-
Stage 2	-	-	-	-	-	-	279	282	-	653	705	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1296	-	-	893	-	-	272	289	507	250	251	782
Stage 1	-	-	-	-	-	-	493	494	-	735	685	-
Stage 2	-	-	-	-	-	-	728	678	-	456	439	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	893	-	-	264	287	507	244	249	782
Mov Cap-2 Maneuver	-	-	-	-	-	-	379	385	-	351	345	-
Stage 1	-	-	-	-	-	-	493	494	-	735	680	-
Stage 2	-	-	-	-	-	-	707	673	-	447	439	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	14.5	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	411	1296	-	-	893	-	-	350	782
HCM Lane V/C Ratio	0.08	-	-	-	0.008	-	-	0.068	0.016
HCM Control Delay (s)	14.5	0	-	-	9.1	-	-	16	9.7
HCM Lane LOS	B	A	-	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.2	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	18	27	9	9	11
Future Vol, veh/h	50	18	27	9	9	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	25	38	13	13	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	208	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1555	-	-	-	780	1025
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1555	-	-	-	745	1025
Mov Cap-2 Maneuver	-	-	-	-	745	-
Stage 1	-	-	-	-	933	-
Stage 2	-	-	-	-	866	-

Approach	EB	WB	SB
HCM Control Delay, s	5.5	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1555	-	-	-	877
HCM Lane V/C Ratio	0.045	-	-	-	0.032
HCM Control Delay (s)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	43	322	1253	28	0	31
Future Vol, veh/h	43	322	1253	28	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	332	1292	29	0	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1321	0	-	0	-	1292
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	523	-	-	-	0	199
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	523	-	-	-	-	199
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.5	0	26.5
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	199	523	-	-	-
HCM Lane V/C Ratio	0.161	0.085	-	-	-
HCM Control Delay (s)	26.5	12.5	-	-	-
HCM Lane LOS	D	B	-	-	-
HCM 95th %tile Q(veh)	0.6	0.3	-	-	-

Intersection	
Int Delay, s/veh	3

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	12	1	5	84	4	7	26	0	4	1
Future Vol, veh/h	12	1	5	84	4	7	26	0	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	76	76	76	76	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	1	7	111	5	9	34	0	5	1

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	183	114	34	0	0	116	0	0	196	34
Stage 1	128	-	-	-	-	-	-	-	52	-
Stage 2	55	-	-	-	-	-	-	-	144	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	778	939	1578	-	-	1473	-	-	763	1039
Stage 1	876	-	-	-	-	-	-	-	961	-
Stage 2	957	-	-	-	-	-	-	-	859	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	766	939	1578	-	-	1473	-	-	730	1039
Mov Cap-2 Maneuver	766	-	-	-	-	-	-	-	730	-
Stage 1	872	-	-	-	-	-	-	-	956	-
Stage 2	944	-	-	-	-	-	-	-	825	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.3	0.4	1.6	9.9
HCM LOS	A			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	766	927	1473	-	-	1578	-	-	742
HCM Lane V/C Ratio	0.021	0.035	0.006	-	-	0.004	-	-	0.016
HCM Control Delay (s)	9.8	9	7.5	0	-	7.3	0	-	9.9
HCM Lane LOS	A	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	136	53	374	1254	12
Future Vol, veh/h	11	136	53	374	1254	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	140	55	386	1293	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1789	-	1305	0	-	0
Stage 1	1293	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	89	0	530	-	-	-
Stage 1	257	0	-	-	-	-
Stage 2	612	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	80	-	530	-	-	-
Mov Cap-2 Maneuver	180	-	-	-	-	-
Stage 1	230	-	-	-	-	-
Stage 2	612	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.3	1.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	530	-	180	-	-	-
HCM Lane V/C Ratio	0.103	-	0.063	-	-	-
HCM Control Delay (s)	12.6	-	26.3	0	-	-
HCM Lane LOS	B	-	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	14	78	15	13	82	10	21	1	10	10	4	32
Future Vol, veh/h	14	78	15	13	82	10	21	1	10	10	4	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	25	25	5	50	25	100	25	50	100	25
Mvmt Flow	19	108	21	18	114	14	29	1	14	14	6	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	128	0	0	129	0	0	339	321	119	321	324	121
Stage 1	-	-	-	-	-	-	157	157	-	157	157	-
Stage 2	-	-	-	-	-	-	182	164	-	164	167	-
Critical Hdwy	4.15	-	-	4.35	-	-	7.35	7.5	6.45	7.6	7.5	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	6.5	-	6.6	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	6.5	-	6.6	6.5	-
Follow-up Hdwy	2.245	-	-	2.425	-	-	3.725	4.9	3.525	3.95	4.9	3.525
Pot Cap-1 Maneuver	1440	-	-	1326	-	-	574	465	874	549	463	872
Stage 1	-	-	-	-	-	-	794	615	-	744	615	-
Stage 2	-	-	-	-	-	-	769	610	-	737	608	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1326	-	-	528	452	874	527	450	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	528	452	-	527	450	-
Stage 1	-	-	-	-	-	-	783	606	-	734	606	-
Stage 2	-	-	-	-	-	-	712	601	-	713	599	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	1	11.5	10.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	599	1440	-	-	1326	-	-	712
HCM Lane V/C Ratio	0.074	0.014	-	-	0.014	-	-	0.09
HCM Control Delay (s)	11.5	7.5	0	-	7.8	0	-	10.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	420	94	9	805	22	118	0	9	18	4	30
Future Vol, veh/h	7	420	94	9	805	22	118	0	9	18	4	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	100	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	457	102	10	875	24	128	0	10	18	4	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	899	0	0	559	0	0	1399	1392	457	1436	1482	887
Stage 1	-	-	-	-	-	-	473	473	-	907	907	-
Stage 2	-	-	-	-	-	-	926	919	-	529	575	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	756	-	-	1012	-	-	~ 118	142	604	111	125	343
Stage 1	-	-	-	-	-	-	572	558	-	330	355	-
Stage 2	-	-	-	-	-	-	322	350	-	533	503	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	756	-	-	1012	-	-	~ 104	139	604	108	122	343
Mov Cap-2 Maneuver	-	-	-	-	-	-	210	250	-	227	240	-
Stage 1	-	-	-	-	-	-	566	552	-	326	351	-
Stage 2	-	-	-	-	-	-	285	347	-	519	497	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	45.5	19
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	220	756	-	-	1012	-	-	229	343
HCM Lane V/C Ratio	0.627	0.01	-	-	0.01	-	-	0.098	0.095
HCM Control Delay (s)	45.5	9.8	-	-	8.6	-	-	22.4	16.6
HCM Lane LOS	E	A	-	-	A	-	-	C	C
HCM 95th %tile Q(veh)	3.7	0	-	-	0	-	-	0.3	0.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	54	63	32	26	41
Future Vol, veh/h	43	54	63	32	26	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	64	75	38	31	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	113	0	-	0	260	94
Stage 1	-	-	-	-	94	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1476	-	-	-	729	963
Stage 1	-	-	-	-	930	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1476	-	-	-	703	963
Mov Cap-2 Maneuver	-	-	-	-	703	-
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1476	-	-	-	842
HCM Lane V/C Ratio	0.035	-	-	-	0.095
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.7

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	174	620	319	23	0	169
Future Vol, veh/h	174	620	319	23	0	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	189	674	347	25	0	184

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	372	0	-	0	-	347
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	1186	-	-	-	0	696
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1186	-	-	-	-	696
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.9	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	696	1186	-	-	-
HCM Lane V/C Ratio	0.264	0.159	-	-	-
HCM Control Delay (s)	12	8.6	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	1.1	0.6	-	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	5	5	8	42	5	24	93	30	5	14
Future Vol, veh/h	5	5	8	42	5	24	93	30	5	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	8	44	5	25	98	32	5	15

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	237	47	130	0	0	49	0	0	236	114
Stage 1	63	-	-	-	-	-	-	-	164	-
Stage 2	174	-	-	-	-	-	-	-	72	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	717	1022	1455	-	-	1558	-	-	718	939
Stage 1	948	-	-	-	-	-	-	-	838	-
Stage 2	828	-	-	-	-	-	-	-	938	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	689	1022	1455	-	-	1558	-	-	692	939
Mov Cap-2 Maneuver	689	-	-	-	-	-	-	-	692	-
Stage 1	942	-	-	-	-	-	-	-	833	-
Stage 2	796	-	-	-	-	-	-	-	915	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.5	1.1	1.2	10
HCM LOS	A			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	689	872	1558	-	-	1455	-	-	758
HCM Lane V/C Ratio	0.008	0.021	0.016	-	-	0.006	-	-	0.054
HCM Control Delay (s)	10.3	9.2	7.3	0	-	7.5	0	-	10
HCM Lane LOS	B	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	111	165	797	471	23
Future Vol, veh/h	9	111	165	797	471	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	122	181	876	518	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1756	-	543	0	-	0
Stage 1	518	-	-	-	-	-
Stage 2	1238	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	93	0	1026	-	-	-
Stage 1	598	0	-	-	-	-
Stage 2	274	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	77	-	1026	-	-	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	274	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.8	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1026	-	192	-	-	-
HCM Lane V/C Ratio	0.177	-	0.052	-	-	-
HCM Control Delay (s)	9.3	-	24.8	0	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.6	-	0.2	-	-	-



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1192	116	66	269	49	90
Future Volume (veh/h)	1192	116	66	269	49	90
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1204	117	67	272	49	91
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1275	1080	183	1422	284	253
Arrive On Green	0.68	0.68	0.04	0.76	0.16	0.16
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	1204	117	67	272	49	91
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	64.8	2.9	1.2	4.6	2.7	5.8
Cycle Q Clear(g_c), s	64.8	2.9	1.2	4.6	2.7	5.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1275	1080	183	1422	284	253
V/C Ratio(X)	0.94	0.11	0.37	0.19	0.17	0.36
Avail Cap(c_a), veh/h	1385	1174	192	1543	284	253
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	6.2	27.2	3.8	40.9	42.2
Incr Delay (d2), s/veh	12.6	0.0	1.2	0.1	1.3	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	27.7	0.9	1.3	1.4	1.3	2.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.7	6.2	28.4	3.8	42.2	46.2
LnGrp LOS	C	A	C	A	D	D
Approach Vol, veh/h	1321			339	140	
Approach Delay, s/veh	26.7			8.7	44.8	
Approach LOS	C			A	D	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		22.5	8.9	81.4		90.2
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		18.0	5.0	83.5		93.0
Max Q Clear Time (g_c+I1), s		7.8	3.2	66.8		6.6
Green Ext Time (p_c), s		0.3	0.0	10.0		1.7

Intersection Summary	
HCM 6th Ctrl Delay	24.7
HCM 6th LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	274	107	69	551	285	68
Future Volume (veh/h)	274	107	69	551	285	68
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	301	118	76	605	313	75
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	509	431	304	704	917	816
Arrive On Green	0.27	0.27	0.05	0.38	0.51	0.51
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	301	118	76	605	313	75
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.5	4.8	2.4	24.6	8.5	2.0
Cycle Q Clear(g_c), s	11.5	4.8	2.4	24.6	8.5	2.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	509	431	304	704	917	816
V/C Ratio(X)	0.59	0.27	0.25	0.86	0.34	0.09
Avail Cap(c_a), veh/h	1279	1084	377	1551	917	816
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	23.6	19.6	23.7	11.8	10.2
Incr Delay (d2), s/veh	1.1	0.3	0.4	3.2	1.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	1.8	1.0	10.6	3.5	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.2	24.0	20.1	26.9	12.8	10.4
LnGrp LOS	C	C	C	C	B	B
Approach Vol, veh/h	419			681	388	
Approach Delay, s/veh	26.3			26.2	12.4	
Approach LOS	C			C	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		47.0	8.6	27.0		35.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		42.5	7.5	56.5		68.5
Max Q Clear Time (g_c+I1), s		10.5	4.4	13.5		26.6
Green Ext Time (p_c), s		1.3	0.0	2.3		4.5

Intersection Summary	
HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	29	35	75	23	0	14	27	6	11	9	0	11
Future Vol, veh/h	29	35	75	23	0	14	27	6	11	9	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	5	25	5	50	25	100	25	25	100	5
Mvmt Flow	40	49	104	32	0	19	38	8	15	13	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	153	0	0	262	264	101	267	307	10
Stage 1	-	-	-	-	-	-	181	181	-	74	74	-
Stage 2	-	-	-	-	-	-	81	83	-	193	233	-
Critical Hdwy	4.15	-	-	4.35	-	-	7.35	7.5	6.45	7.35	7.5	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	6.5	-	6.35	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	6.5	-	6.35	6.5	-
Follow-up Hdwy	2.245	-	-	2.425	-	-	3.725	4.9	3.525	3.725	4.9	3.345
Pot Cap-1 Maneuver	1578	-	-	1299	-	-	646	505	895	641	474	1063
Stage 1	-	-	-	-	-	-	770	598	-	881	676	-
Stage 2	-	-	-	-	-	-	873	669	-	759	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1578	-	-	1299	-	-	611	479	895	597	449	1063
Mov Cap-2 Maneuver	-	-	-	-	-	-	611	479	-	597	449	-
Stage 1	-	-	-	-	-	-	748	581	-	856	659	-
Stage 2	-	-	-	-	-	-	839	652	-	715	547	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	4.9	11.2	9.7
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	638	1578	-	-	1299	-	-	787
HCM Lane V/C Ratio	0.096	0.026	-	-	0.025	-	-	0.035
HCM Control Delay (s)	11.2	7.3	0	-	7.8	0	-	9.7
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	520	127	8	216	20	24	0	10	18	3	11
Future Vol, veh/h	0	520	127	8	216	20	24	0	10	18	3	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	591	144	9	245	23	27	0	11	20	3	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	735	0	0	874	877	591	944	1010	257
Stage 1	-	-	-	-	-	-	591	591	-	275	275	-
Stage 2	-	-	-	-	-	-	283	286	-	669	735	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1296	-	-	870	-	-	270	287	507	242	240	782
Stage 1	-	-	-	-	-	-	493	494	-	731	683	-
Stage 2	-	-	-	-	-	-	724	675	-	447	425	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	870	-	-	262	284	507	235	238	782
Mov Cap-2 Maneuver	-	-	-	-	-	-	377	383	-	341	333	-
Stage 1	-	-	-	-	-	-	493	494	-	731	676	-
Stage 2	-	-	-	-	-	-	702	668	-	437	425	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	14.7	14.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	408	1296	-	-	870	-	-	340	782
HCM Lane V/C Ratio	0.095	-	-	-	0.01	-	-	0.07	0.016
HCM Control Delay (s)	14.7	0	-	-	9.2	-	-	16.4	9.7
HCM Lane LOS	B	A	-	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.2	0

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	18	29	9	9	11
Future Vol, veh/h	50	18	29	9	9	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	25	40	13	13	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	53	0	-	0	210	47
Stage 1	-	-	-	-	47	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1553	-	-	-	778	1022
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1553	-	-	-	743	1022
Mov Cap-2 Maneuver	-	-	-	-	743	-
Stage 1	-	-	-	-	931	-
Stage 2	-	-	-	-	866	-

Approach	EB	WB	SB
HCM Control Delay, s	5.5	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1553	-	-	-	874
HCM Lane V/C Ratio	0.045	-	-	-	0.032
HCM Control Delay (s)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	43	324	1254	28	0	31
Future Vol, veh/h	43	324	1254	28	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	334	1293	29	0	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1322	0	-	0	-	1293
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	523	-	-	-	0	199
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	523	-	-	-	-	199
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.5	0	26.5
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	199	523	-	-	-
HCM Lane V/C Ratio	0.161	0.085	-	-	-
HCM Control Delay (s)	26.5	12.5	-	-	-
HCM Lane LOS	D	B	-	-	-
HCM 95th %tile Q(veh)	0.6	0.3	-	-	-

Intersection	
Int Delay, s/veh	3

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	12	1	5	84	4	7	28	0	4	1
Future Vol, veh/h	12	1	5	84	4	7	28	0	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	76	76	76	76	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	1	7	111	5	9	37	0	5	1

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	186	114	37	0	0	116	0	0	199	37
Stage 1	128	-	-	-	-	-	-	-	55	-
Stage 2	58	-	-	-	-	-	-	-	144	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	775	939	1574	-	-	1473	-	-	760	1035
Stage 1	876	-	-	-	-	-	-	-	957	-
Stage 2	954	-	-	-	-	-	-	-	859	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	763	939	1574	-	-	1473	-	-	727	1035
Mov Cap-2 Maneuver	763	-	-	-	-	-	-	-	727	-
Stage 1	872	-	-	-	-	-	-	-	952	-
Stage 2	941	-	-	-	-	-	-	-	825	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.3	0.4	1.5	10
HCM LOS	A			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	763	927	1473	-	-	1574	-	-	739
HCM Lane V/C Ratio	0.021	0.035	0.006	-	-	0.004	-	-	0.016
HCM Control Delay (s)	9.8	9	7.5	0	-	7.3	0	-	10
HCM Lane LOS	A	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	136	55	376	1255	12
Future Vol, veh/h	11	136	55	376	1255	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	140	57	388	1294	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1796	-	1306	0	-	0
Stage 1	1294	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	88	0	530	-	-	-
Stage 1	257	0	-	-	-	-
Stage 2	608	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	78	-	530	-	-	-
Mov Cap-2 Maneuver	178	-	-	-	-	-
Stage 1	229	-	-	-	-	-
Stage 2	608	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.6	1.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	530	-	178	-	-	-
HCM Lane V/C Ratio	0.107	-	0.064	-	-	-
HCM Control Delay (s)	12.6	-	26.6	0	-	-
HCM Lane LOS	B	-	D	A	-	-
HCM 95th %tile Q(veh)	0.4	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	14	78	18	14	82	10	35	1	11	10	4	32
Future Vol, veh/h	14	78	18	14	82	10	35	1	11	10	4	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	25	25	5	50	25	100	25	50	100	25
Mvmt Flow	19	108	25	19	114	14	49	1	15	14	6	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	128	0	0	133	0	0	343	325	121	326	330	121
Stage 1	-	-	-	-	-	-	159	159	-	159	159	-
Stage 2	-	-	-	-	-	-	184	166	-	167	171	-
Critical Hdwy	4.15	-	-	4.35	-	-	7.35	7.5	6.45	7.6	7.5	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	6.5	-	6.6	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	6.5	-	6.6	6.5	-
Follow-up Hdwy	2.245	-	-	2.425	-	-	3.725	4.9	3.525	3.95	4.9	3.525
Pot Cap-1 Maneuver	1440	-	-	1322	-	-	570	462	872	545	459	872
Stage 1	-	-	-	-	-	-	792	613	-	742	613	-
Stage 2	-	-	-	-	-	-	767	608	-	734	605	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1322	-	-	524	449	872	523	446	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	524	449	-	523	446	-
Stage 1	-	-	-	-	-	-	781	604	-	732	604	-
Stage 2	-	-	-	-	-	-	710	599	-	709	597	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	1	12	10.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	576	1440	-	-	1322	-	-	710
HCM Lane V/C Ratio	0.113	0.014	-	-	0.015	-	-	0.09
HCM Control Delay (s)	12	7.5	0	-	7.8	0	-	10.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	420	97	8	805	22	131	0	10	18	4	30
Future Vol, veh/h	8	420	97	8	805	22	131	0	10	18	4	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	100	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	457	105	9	875	24	142	0	11	18	4	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	899	0	0	562	0	0	1399	1392	457	1438	1485	887
Stage 1	-	-	-	-	-	-	475	475	-	905	905	-
Stage 2	-	-	-	-	-	-	924	917	-	533	580	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	756	-	-	1009	-	-	~ 118	142	604	111	125	343
Stage 1	-	-	-	-	-	-	570	557	-	331	355	-
Stage 2	-	-	-	-	-	-	323	351	-	531	500	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	756	-	-	1009	-	-	~ 104	139	604	107	122	343
Mov Cap-2 Maneuver	-	-	-	-	-	-	210	250	-	227	240	-
Stage 1	-	-	-	-	-	-	563	550	-	327	352	-
Stage 2	-	-	-	-	-	-	286	348	-	515	494	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	52	19
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	220	756	-	-	1009	-	-	229	343
HCM Lane V/C Ratio	0.697	0.012	-	-	0.009	-	-	0.098	0.095
HCM Control Delay (s)	52	9.8	-	-	8.6	-	-	22.4	16.6
HCM Lane LOS	F	A	-	-	A	-	-	C	C
HCM 95th %tile Q(veh)	4.5	0	-	-	0	-	-	0.3	0.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	54	64	32	26	41
Future Vol, veh/h	43	54	64	32	26	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	64	76	38	31	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	114	0	-	0	261	95
Stage 1	-	-	-	-	95	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1475	-	-	-	728	962
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1475	-	-	-	702	962
Mov Cap-2 Maneuver	-	-	-	-	702	-
Stage 1	-	-	-	-	896	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1475	-	-	-	841
HCM Lane V/C Ratio	0.035	-	-	-	0.095
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.7

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	174	620	320	23	0	169
Future Vol, veh/h	174	620	320	23	0	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	189	674	348	25	0	184

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	373	0	-	0	-	348
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	1185	-	-	-	0	695
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1185	-	-	-	-	695
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.9	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	695	1185	-	-	-
HCM Lane V/C Ratio	0.264	0.16	-	-	-
HCM Control Delay (s)	12	8.6	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	1.1	0.6	-	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	5	5	8	42	5	24	94	30	5	14
Future Vol, veh/h	5	5	8	42	5	24	94	30	5	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	8	44	5	25	99	32	5	15

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	238	47	131	0	0	49	0	0	237	115
Stage 1	63	-	-	-	-	-	-	-	165	-
Stage 2	175	-	-	-	-	-	-	-	72	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	716	1022	1454	-	-	1558	-	-	717	937
Stage 1	948	-	-	-	-	-	-	-	837	-
Stage 2	827	-	-	-	-	-	-	-	938	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	688	1022	1454	-	-	1558	-	-	691	937
Mov Cap-2 Maneuver	688	-	-	-	-	-	-	-	691	-
Stage 1	942	-	-	-	-	-	-	-	832	-
Stage 2	795	-	-	-	-	-	-	-	915	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.5	1.1	1.2	10
HCM LOS	A			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	688	871	1558	-	-	1454	-	-	757
HCM Lane V/C Ratio	0.008	0.021	0.016	-	-	0.006	-	-	0.054
HCM Control Delay (s)	10.3	9.2	7.3	0	-	7.5	0	-	10
HCM Lane LOS	B	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	111	166	797	472	23
Future Vol, veh/h	9	111	166	797	472	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	122	182	876	519	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1759	-	544	0	-	0
Stage 1	519	-	-	-	-	-
Stage 2	1240	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	93	0	1025	-	-	-
Stage 1	597	0	-	-	-	-
Stage 2	273	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	76	-	1025	-	-	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	491	-	-	-	-	-
Stage 2	273	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.9	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1025	-	191	-	-	-
HCM Lane V/C Ratio	0.178	-	0.052	-	-	-
HCM Control Delay (s)	9.3	-	24.9	0	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.6	-	0.2	-	-	-



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1194	116	66	271	49	90
Future Volume (veh/h)	1194	116	66	271	49	90
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1206	117	67	274	49	91
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1276	1081	182	1423	284	253
Arrive On Green	0.68	0.68	0.04	0.76	0.16	0.16
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	1206	117	67	274	49	91
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	65.1	2.9	1.2	4.6	2.7	5.8
Cycle Q Clear(g_c), s	65.1	2.9	1.2	4.6	2.7	5.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1276	1081	182	1423	284	253
V/C Ratio(X)	0.95	0.11	0.37	0.19	0.17	0.36
Avail Cap(c_a), veh/h	1383	1172	191	1540	284	253
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.1	6.2	27.3	3.8	41.0	42.3
Incr Delay (d2), s/veh	12.8	0.0	1.2	0.1	1.3	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	27.8	0.9	1.3	1.4	1.3	2.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.8	6.2	28.6	3.8	42.4	46.3
LnGrp LOS	C	A	C	A	D	D
Approach Vol, veh/h	1323			341	140	
Approach Delay, s/veh	26.8			8.7	44.9	
Approach LOS	C			A	D	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		22.5	8.9	81.6		90.4
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		18.0	5.0	83.5		93.0
Max Q Clear Time (g_c+I1), s		7.8	3.2	67.1		6.6
Green Ext Time (p_c), s		0.3	0.0	9.9		1.7

Intersection Summary	
HCM 6th Ctrl Delay	24.8
HCM 6th LOS	C



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	276	107	69	553	285	68
Future Volume (veh/h)	276	107	69	553	285	68
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	303	118	76	608	313	75
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	512	434	305	707	914	814
Arrive On Green	0.27	0.27	0.05	0.38	0.51	0.51
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	303	118	76	608	313	75
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.6	4.8	2.4	24.8	8.6	2.0
Cycle Q Clear(g_c), s	11.6	4.8	2.4	24.8	8.6	2.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	512	434	305	707	914	814
V/C Ratio(X)	0.59	0.27	0.25	0.86	0.34	0.09
Avail Cap(c_a), veh/h	1276	1082	377	1547	914	814
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	23.6	19.6	23.7	11.9	10.3
Incr Delay (d2), s/veh	1.1	0.3	0.4	3.2	1.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	1.8	1.0	10.7	3.5	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.1	23.9	20.0	26.9	12.9	10.5
LnGrp LOS	C	C	C	C	B	B
Approach Vol, veh/h	421			684	388	
Approach Delay, s/veh	26.2			26.2	12.5	
Approach LOS	C			C	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		47.0	8.6	27.2		35.8
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		42.5	7.5	56.5		68.5
Max Q Clear Time (g_c+I1), s		10.6	4.4	13.6		26.8
Green Ext Time (p_c), s		1.3	0.0	2.3		4.5

Intersection Summary	
HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	48	35	75	24	0	15	12	6	11	10	0	31
Future Vol, veh/h	48	35	75	24	0	15	12	6	11	10	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	5	25	5	50	25	100	25	25	100	5
Mvmt Flow	67	49	104	33	0	21	17	8	15	14	0	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	21	0	0	153	0	0	333	322	101	324	364	11
Stage 1	-	-	-	-	-	-	235	235	-	77	77	-
Stage 2	-	-	-	-	-	-	98	87	-	247	287	-
Critical Hdwy	4.15	-	-	4.35	-	-	7.35	7.5	6.45	7.35	7.5	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	6.5	-	6.35	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	6.5	-	6.35	6.5	-
Follow-up Hdwy	2.245	-	-	2.425	-	-	3.725	4.9	3.525	3.725	4.9	3.345
Pot Cap-1 Maneuver	1575	-	-	1299	-	-	579	464	895	587	436	1061
Stage 1	-	-	-	-	-	-	719	562	-	878	673	-
Stage 2	-	-	-	-	-	-	855	666	-	708	529	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1575	-	-	1299	-	-	525	431	895	537	405	1061
Mov Cap-2 Maneuver	-	-	-	-	-	-	525	431	-	537	405	-
Stage 1	-	-	-	-	-	-	685	536	-	837	656	-
Stage 2	-	-	-	-	-	-	799	649	-	653	504	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	4.8	11.5	9.5
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	591	1575	-	-	1299	-	-	857
HCM Lane V/C Ratio	0.068	0.042	-	-	0.026	-	-	0.066
HCM Control Delay (s)	11.5	7.4	0	-	7.8	0	-	9.5
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	520	142	9	216	20	42	0	11	18	3	11
Future Vol, veh/h	0	520	142	9	216	20	42	0	11	18	3	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	591	161	10	245	23	48	0	13	20	3	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	752	0	0	876	879	591	955	1029	257
Stage 1	-	-	-	-	-	-	591	591	-	277	277	-
Stage 2	-	-	-	-	-	-	285	288	-	678	752	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1296	-	-	858	-	-	269	286	507	238	234	782
Stage 1	-	-	-	-	-	-	493	494	-	729	681	-
Stage 2	-	-	-	-	-	-	722	674	-	442	418	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	858	-	-	260	283	507	230	231	782
Mov Cap-2 Maneuver	-	-	-	-	-	-	376	383	-	336	326	-
Stage 1	-	-	-	-	-	-	493	494	-	729	673	-
Stage 2	-	-	-	-	-	-	699	666	-	431	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	15.7	14.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	397	1296	-	-	858	-	-	335	782
HCM Lane V/C Ratio	0.152	-	-	-	0.012	-	-	0.071	0.016
HCM Control Delay (s)	15.7	0	-	-	9.2	-	-	16.6	9.7
HCM Lane LOS	C	A	-	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.2	0

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	19	30	9	9	11
Future Vol, veh/h	50	19	30	9	9	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	26	42	13	13	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	55	0	-	0	213	49
Stage 1	-	-	-	-	49	-
Stage 2	-	-	-	-	164	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1550	-	-	-	775	1020
Stage 1	-	-	-	-	973	-
Stage 2	-	-	-	-	865	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1550	-	-	-	740	1020
Mov Cap-2 Maneuver	-	-	-	-	740	-
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	865	-

Approach	EB	WB	SB
HCM Control Delay, s	5.4	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1550	-	-	-	872
HCM Lane V/C Ratio	0.045	-	-	-	0.032
HCM Control Delay (s)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	43	326	1256	28	0	31
Future Vol, veh/h	43	326	1256	28	0	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	336	1295	29	0	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1324	0	-	0	-	1295
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	522	-	-	-	0	198
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	522	-	-	-	-	198
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.5	0	26.6
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	198	522	-	-	-
HCM Lane V/C Ratio	0.161	0.085	-	-	-
HCM Control Delay (s)	26.6	12.5	-	-	-
HCM Lane LOS	D	B	-	-	-
HCM 95th %tile Q(veh)	0.6	0.3	-	-	-

Intersection	
Int Delay, s/veh	3

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	12	1	5	85	4	7	29	0	4	1
Future Vol, veh/h	12	1	5	85	4	7	29	0	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	76	76	76	76	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	1	7	112	5	9	38	0	5	1

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	188	115	38	0	0	117	0	0	201	38
Stage 1	129	-	-	-	-	-	-	-	56	-
Stage 2	59	-	-	-	-	-	-	-	145	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	772	937	1572	-	-	1471	-	-	757	1034
Stage 1	875	-	-	-	-	-	-	-	956	-
Stage 2	953	-	-	-	-	-	-	-	858	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	760	937	1572	-	-	1471	-	-	724	1034
Mov Cap-2 Maneuver	760	-	-	-	-	-	-	-	724	-
Stage 1	871	-	-	-	-	-	-	-	951	-
Stage 2	940	-	-	-	-	-	-	-	824	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.3	0.4	1.5	10
HCM LOS	A			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	760	925	1471	-	-	1572	-	-	737
HCM Lane V/C Ratio	0.021	0.036	0.006	-	-	0.004	-	-	0.016
HCM Control Delay (s)	9.8	9	7.5	0	-	7.3	0	-	10
HCM Lane LOS	A	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	137	56	378	1257	12
Future Vol, veh/h	11	137	56	378	1257	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	141	58	390	1296	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1802	-	1308	0	-	0
Stage 1	1296	-	-	-	-	-
Stage 2	506	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	88	0	529	-	-	-
Stage 1	256	0	-	-	-	-
Stage 2	606	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	78	-	529	-	-	-
Mov Cap-2 Maneuver	178	-	-	-	-	-
Stage 1	228	-	-	-	-	-
Stage 2	606	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.6	1.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	529	-	178	-	-	-
HCM Lane V/C Ratio	0.109	-	0.064	-	-	-
HCM Control Delay (s)	12.6	-	26.6	0	-	-
HCM Lane LOS	B	-	D	A	-	-
HCM 95th %tile Q(veh)	0.4	-	0.2	-	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	78	18	13	82	11	35	1	11	11	4	55
Future Vol, veh/h	35	78	18	13	82	11	35	1	11	11	4	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	5	5	25	25	5	50	25	100	25	50	100	25
Mvmt Flow	49	108	25	18	114	15	49	1	15	15	6	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	129	0	0	133	0	0	418	384	121	385	389	122
Stage 1	-	-	-	-	-	-	219	219	-	158	158	-
Stage 2	-	-	-	-	-	-	199	165	-	227	231	-
Critical Hdwy	4.15	-	-	4.35	-	-	7.35	7.5	6.45	7.6	7.5	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	6.5	-	6.6	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	6.5	-	6.6	6.5	-
Follow-up Hdwy	2.245	-	-	2.425	-	-	3.725	4.9	3.525	3.95	4.9	3.525
Pot Cap-1 Maneuver	1438	-	-	1322	-	-	507	424	872	496	421	871
Stage 1	-	-	-	-	-	-	734	572	-	743	614	-
Stage 2	-	-	-	-	-	-	753	609	-	679	564	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1438	-	-	1322	-	-	440	402	872	467	400	871
Mov Cap-2 Maneuver	-	-	-	-	-	-	440	402	-	467	400	-
Stage 1	-	-	-	-	-	-	707	551	-	716	605	-
Stage 2	-	-	-	-	-	-	670	600	-	641	543	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	1	13.3	10.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	497	1438	-	-	1322	-	-	724
HCM Lane V/C Ratio	0.131	0.034	-	-	0.014	-	-	0.134
HCM Control Delay (s)	13.3	7.6	0	-	7.8	0	-	10.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	420	116	11	805	22	152	0	12	18	4	30
Future Vol, veh/h	7	420	116	11	805	22	152	0	12	18	4	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	25	100	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	100	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	457	126	12	875	24	165	0	13	18	4	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	899	0	0	583	0	0	1403	1396	457	1454	1510	887
Stage 1	-	-	-	-	-	-	473	473	-	911	911	-
Stage 2	-	-	-	-	-	-	930	923	-	543	599	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	756	-	-	991	-	-	~ 117	141	604	108	120	343
Stage 1	-	-	-	-	-	-	572	558	-	328	353	-
Stage 2	-	-	-	-	-	-	321	349	-	524	490	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	756	-	-	991	-	-	~ 103	138	604	104	117	343
Mov Cap-2 Maneuver	-	-	-	-	-	-	208	249	-	223	235	-
Stage 1	-	-	-	-	-	-	566	552	-	324	349	-
Stage 2	-	-	-	-	-	-	283	345	-	507	485	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	68.6	19.1
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	218	756	-	-	991	-	-	225	343
HCM Lane V/C Ratio	0.818	0.01	-	-	0.012	-	-	0.099	0.095
HCM Control Delay (s)	68.6	9.8	-	-	8.7	-	-	22.8	16.6
HCM Lane LOS	F	A	-	-	A	-	-	C	C
HCM 95th %tile Q(veh)	6.1	0	-	-	0	-	-	0.3	0.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	55	65	32	26	41
Future Vol, veh/h	43	55	65	32	26	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	65	77	38	31	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	115	0	-	0	263	96
Stage 1	-	-	-	-	96	-
Stage 2	-	-	-	-	167	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1474	-	-	-	726	960
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1474	-	-	-	700	960
Mov Cap-2 Maneuver	-	-	-	-	700	-
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	863	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1474	-	-	-	839
HCM Lane V/C Ratio	0.035	-	-	-	0.095
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.7

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	174	622	322	23	0	169
Future Vol, veh/h	174	622	322	23	0	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	175	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	189	676	350	25	0	184

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	375	0	-	0	-	350
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	3.318
Pot Cap-1 Maneuver	1183	-	-	-	0	693
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1183	-	-	-	-	693
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NE
HCM Control Delay, s	1.9	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NBL	NBT	SBT	SBR
Capacity (veh/h)	693	1183	-	-	-
HCM Lane V/C Ratio	0.265	0.16	-	-	-
HCM Control Delay (s)	12.1	8.6	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	1.1	0.6	-	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	5	5	8	43	5	24	95	30	5	14
Future Vol, veh/h	5	5	8	43	5	24	95	30	5	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	-	-	None	-	-	None	-	None
Storage Length	0	0	-	-	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	-	-	0	-	0	-
Grade, %	0	-	-	0	-	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	8	45	5	25	100	32	5	15

Major/Minor	Minor1			Major1			Major2			Minor2	
Conflicting Flow All	240	48	132	0	0	50	0	0	239	116
Stage 1	64	-	-	-	-	-	-	-	166	-
Stage 2	176	-	-	-	-	-	-	-	73	-
Critical Hdwy	7.12	6.22	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	6.12	-	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	714	1021	1453	-	-	1557	-	-	715	936
Stage 1	947	-	-	-	-	-	-	-	836	-
Stage 2	826	-	-	-	-	-	-	-	937	-
Platoon blocked, %				-	-		-	-		
Mov Cap-1 Maneuver	686	1021	1453	-	-	1557	-	-	689	936
Mov Cap-2 Maneuver	686	-	-	-	-	-	-	-	689	-
Stage 1	941	-	-	-	-	-	-	-	831	-
Stage 2	794	-	-	-	-	-	-	-	914	-

Approach	NB	SE	NW	SW
HCM Control Delay, s	9.5	1.1	1.2	10
HCM LOS	A			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	686	869	1557	-	-	1453	-	-	755
HCM Lane V/C Ratio	0.008	0.021	0.016	-	-	0.006	-	-	0.054
HCM Control Delay (s)	10.3	9.2	7.3	0	-	7.5	0	-	10
HCM Lane LOS	B	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	112	167	799	474	23
Future Vol, veh/h	9	112	167	799	474	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	275	0	250	-	-	175
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	123	184	878	521	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1767	-	546	0	-	0
Stage 1	521	-	-	-	-	-
Stage 2	1246	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	92	0	1023	-	-	-
Stage 1	596	0	-	-	-	-
Stage 2	271	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	75	-	1023	-	-	-
Mov Cap-2 Maneuver	190	-	-	-	-	-
Stage 1	489	-	-	-	-	-
Stage 2	271	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	25	1.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1023	-	190	-	-	-
HCM Lane V/C Ratio	0.179	-	0.052	-	-	-
HCM Control Delay (s)	9.3	-	25	0	-	-
HCM Lane LOS	A	-	D	A	-	-
HCM 95th %tile Q(veh)	0.7	-	0.2	-	-	-

Intersection: 3: RFTA/PnR & Wulfsohn

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	33	29	66	87
Average Queue (ft)	2	1	17	35
95th Queue (ft)	16	13	51	73
Link Distance (ft)	869	2127	592	291
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Wulfsohn & Midland

Movement	EB	EB	EB	WB	NB	SB	SB
Directions Served	L	T	R	L	LTR	LT	R
Maximum Queue (ft)	29	1	35	30	154	52	78
Average Queue (ft)	4	0	6	3	59	16	24
95th Queue (ft)	19	1	27	18	118	43	56
Link Distance (ft)		1807			869	201	201
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	100		25	100			
Storage Blk Time (%)			0				
Queuing Penalty (veh)			0				

Intersection: 3: RFTA/PnR & Wulfsohn

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	43	34	77	99
Average Queue (ft)	4	2	31	41
95th Queue (ft)	23	19	66	79
Link Distance (ft)	869	2127	592	291
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Wulfsohn & Midland

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	R	L	TR	LTR	LT	R
Maximum Queue (ft)	25	39	34	4	262	56	63
Average Queue (ft)	3	11	4	0	110	18	24
95th Queue (ft)	16	36	22	3	220	47	54
Link Distance (ft)				3407	869	201	201
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	100	25	100				
Storage Blk Time (%)		0					
Queuing Penalty (veh)		1					

GROUND
ENGINEERING

Geotechnical Evaluation
Roaring Fork Transportation Authority
Maintenance Facility
Glenwood Springs, Colorado
Revision 1



Prepared For:

Shrewsberry

2696 South Colorado Boulevard, Suite 585
Denver, Colorado 80202

Attention: Mr. Eric Rolle

Job Number: 17-3061 **May 4, 2018**

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PURPOSE AND SCOPE OF STUDY

This report presents the results of a geotechnical evaluation performed by GROUND Engineering Consultants, Inc. (GROUND) for Shrewsberry, in support of project planning and initial design of the proposed expansion of the Roaring Fork Transportation Authority maintenance facility at 2307 Wulfsohn Road in Glenwood Springs, Colorado. Our study was conducted in general accordance with GROUND's Proposal No. 1617-0048 Revised2, dated March 17, 2017.

A field exploration program was conducted to obtain information about the subsurface conditions. Material samples obtained during the subsurface exploration were tested in the laboratory to provide data on the engineering characteristics of the on-site soils. The results of the field exploration and laboratory testing are presented herein.

Additional information was obtained from other geotechnical evaluatitions of the site or nearby locations. These included HP Geotek (2001)[1], GROUND (2009)[2], CTL|Thompson (2010)[3] and Yeh & Associates, Inc. (2015, 2016)[4, 5] provided by Shrewsberry. Parties utilizing this report should review these reports and others relevant to the site.

This report has been prepared to summarize the data obtained and to present our findings and conclusions based on the proposed development/improvements and the subsurface conditions encountered. Proposed design parameters and a discussion of engineering considerations related to the proposed improvements for project planning and initial design are included herein. This report should be understood and utilized in

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[1] HP Geotech, 2001, *Geotechnical Study, Proposed RTA Facility, Wulfsohn Ranch, Glenwood Springs, Colorado, Job No. 100 848-1, prepared for FCI Constructors, Inc., dated February 27.*

[2] GROUND Engineering Consultants, Inc., 2009, *Limited Subsurface Exploration Program, Site Reconnaissance and Geotechnical Findings, Roaring Fork Transportation Authority, Bus Maintenance Center, Possible Building Movement/Displacement Assessment, Glenwood Springs, Colorado*, Job No. 09-6021, prepared for ARC Integrated Program Maintenance, dated October 22.

[3] CTL|Thompson, 2010, *Geotechnical Exploration and Evaluation, Potential Foundation and Floor Slab Remediation, RFTA Glenwood Maintenance Facility, Glenwood Springs, Colorado*, Project No. GS05451-130, prepared for MW Golden Constructors, dated June 11.

[4] Yeh & Associates, Inc., 2016, *Final Report, Geotechnical Investigation, RFTA West Glenwood Springs Park n Ride, Pavement and Retaining Wall Recommendations, Glenwood Springs, Colorado*, Project No. 214-244, prepared for SGM, Inc., dated July 30.

[5] Yeh & Associates, Inc., 2016, *Geotechnical Investigation, RFTA West Glenwood Springs, Retaining Wall Design/Build Recommendations, Glenwood Springs, Colorado*, Project No. 215-141, prepared for SGM, Inc., dated January 31.

its entirety and supplemented, as necessary. Specific sections of the text, drawings, graphs, tables, and other information contained within this report are intended to be understood in the context of the entire report. This includes the *Closure* section of the report which outlines important limitations on the information contained herein.

This report was prepared for project planning and design purposes of Shrewsberry, RFTA and the design-build teams based on our understanding of the project at the time of preparation of this report. The data, conclusions, opinions, and geotechnical parameters provided herein should not be construed to be sufficient for other parties or other purposes not specifically related to the design of the project.

The design-build team(s) utilizing this report should evaluate carefully the information and geotechnical parameters presented in this report. They must be understood to be based on the necessarily limited amount of geotechnical exploration and testing performed by GROUND. Deviations between what was reported herein and the actual surface and/or subsurface conditions may exist, and in some cases those deviations may be significant. We understand that foundation and floor systems, and general geotechnical approaches not discussed in this report may be considered by the design-build team(s). GROUND will be available to discuss our findings and conclusions upon request. To the extent that the parameters and other considerations herein are utilized in project design, however, the design-build team(s) are responsible to assess their applicability to their selected designs and obtain additional geotechnical exploration, testing and analyses, as necessary.

PROPOSED CONSTRUCTION

We understand that the proposed expansion will entail construction of a large, multi-story parking garage and administrative building on the east pad that likely will include two levels below or partially below grade, and at least one level above grade. Bus arrival and departure aprons (ramps) are planned for that building. The expansion will also include an addition on the northwest and southwest sides of the existing maintenance building. Structural loads for the proposed buildings and additions are anticipated to be moderate to high.

Other planned improvements include several retaining walls, repair and/or replacement of existing pavements, and construction of additional pavements. We also understand

that underground utility lines will be installed to serve the new building, and that the buildings will be surrounded by flatwork as well as by limited, local landscaping.

Additionally, we anticipate that material cuts and fills on the order of 20 feet may be required to achieve project lines and grades.

If the proposed construction differs significantly from that described above, GROUND should be notified to re-evaluate our conclusions and parameters.

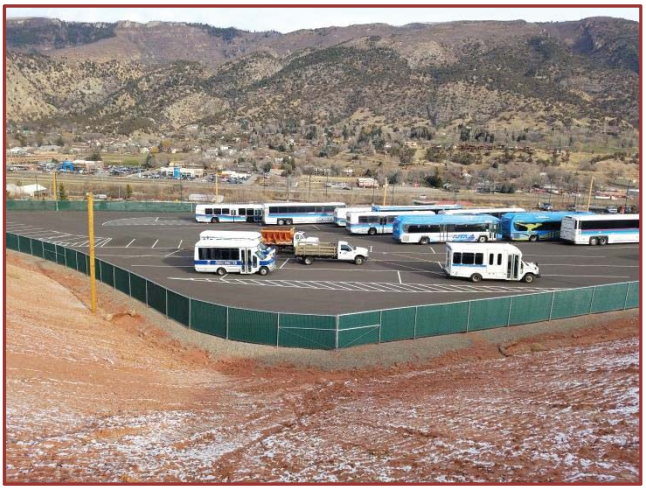
Performance Expectations Based on our experience in the project area, and conversations with Shrewsberry and RFTA, post-construction, foundation and floor movements on the order of 1 inch typically are acceptable and anticipated by owners, as are the resultant distress and maintenance measures.

We anticipate that movements of somewhat greater magnitude (2 to 4 inches) are acceptable and anticipated for flatwork and ancillary structures near the buildings. Assuming that traffic speeds will be relatively low, still greater movements (4+ inches locally) are acceptable and anticipated for the pavements.

GROUND will be available to discuss the risks and remedial approaches outlined in this report, as well as other potential approaches, upon request if post-construction movements of these magnitudes are not acceptable and anticipated.

SITE CONDITIONS

At the time of our subsurface exploration, the project site consisted of the existing maintenance facility and was bordered by Wulfsohn Road to the north and east, undeveloped land to the south and west, and Midland Avenue to the north. Undeveloped land and commercial facilities occupied the greater project area.



The ground surface at the project site was generally covered by topsoil,[6] asphalt and concrete pavement, and gravel surfacing. The slopes at the project site were generally relatively gentle to moderate and descended to the north and east locally. Relatively steep slopes and retained slopes were observed locally. Relatively steep slopes, approximately 20 feet in height, were observed along the west and south sides of eastern, asphalt paved parking area and were un-vegetated. Relatively steep, vegetated slopes were also observed along the southern margin of the site, and descended away from the site displaying approximately 40 feet of relief.

Additionally, relatively steep slopes, showing signs of previous mass wasting events (debris flows, mud flows, etc.) were observed to the south of the site as shown in the photograph at right. The top of the slope is approximately 2000 feet higher in elevation than the site and is approximately 4,700 feet to the south of the site.



The existing buildings at the project site – as repaired after prior settlement – appeared to be performing in a relatively satisfactory manner, given their apparent age. Additionally, some project pavements, primarily parking areas and areas that received high volumes of turning bus traffic, showed significant signs of distress, including alligator cracking and rutting. Other project pavement appeared to be performing in a relatively satisfactory manner, given their apparent age. Landscaping was also observed on site and included mature and juvenile trees, shrubs, and other relatively small vegetation.

[6] 'Topsoil' as used herein is defined geotechnically. The materials so described may or may not be suitable for landscaping or as a growth medium for such plants as may be proposed for the project.

SUBSURFACE EXPLORATION

Subsurface exploration for the project was conducted December of 2017. Seven (7) test holes were drilled with a conventional, truck-mounted drilling rig advancing 115mm ODEX drilling equipment to evaluate the subsurface conditions as well as to retrieve samples for laboratory testing and analysis for this scope. Of these, 5 test holes were drilled within or the near the proposed bus parking garage building footprint to depths between approximately 56 and 150 feet below existing grade. The remaining 2 test holes were drilled near the proposed maintenance building addition footprint to depths of about 76 to 101 feet. A GROUND engineer directed the subsurface exploration, logged the test holes in the field, and prepared the samples for transport to our laboratory.



Samples of the subsurface materials were retrieved with a 2-inch I.D. California liner sampler. The samplers were driven into the substrata with blows from a 140-pound hammer falling 30 inches, a procedure similar to the Standard Penetration Test described by ASTM Method D1586. Penetration resistance values, when properly evaluated, indicate the relative density or consistency of soils. Depths at which the samples were obtained and associated penetration resistance values are shown on the test hole logs.

The approximate locations of the test holes are shown in Figure 1. Logs of the test holes are presented in Figure 2. Explanatory notes and a legend for the logs are provided in Figure 3. More detailed logs of the test holes are provided in Appendix A.

The test holes are hung to approximate relative elevation in Figure 2, based on taking the elevation at Test Hole 3 to be ‘100’ and estimating the elevation differentials in the field. Because of the significant elevation differentials across the site, in GROUND’s opinion, the test hole locations and elevations should be determined more precisely by surveying. More precisely determined elevations may require modification of some

parameters in this report. If surveyed elevations are made available to GROUND, we will be available to review and update our findings and conclusions.

LABORATORY TESTING

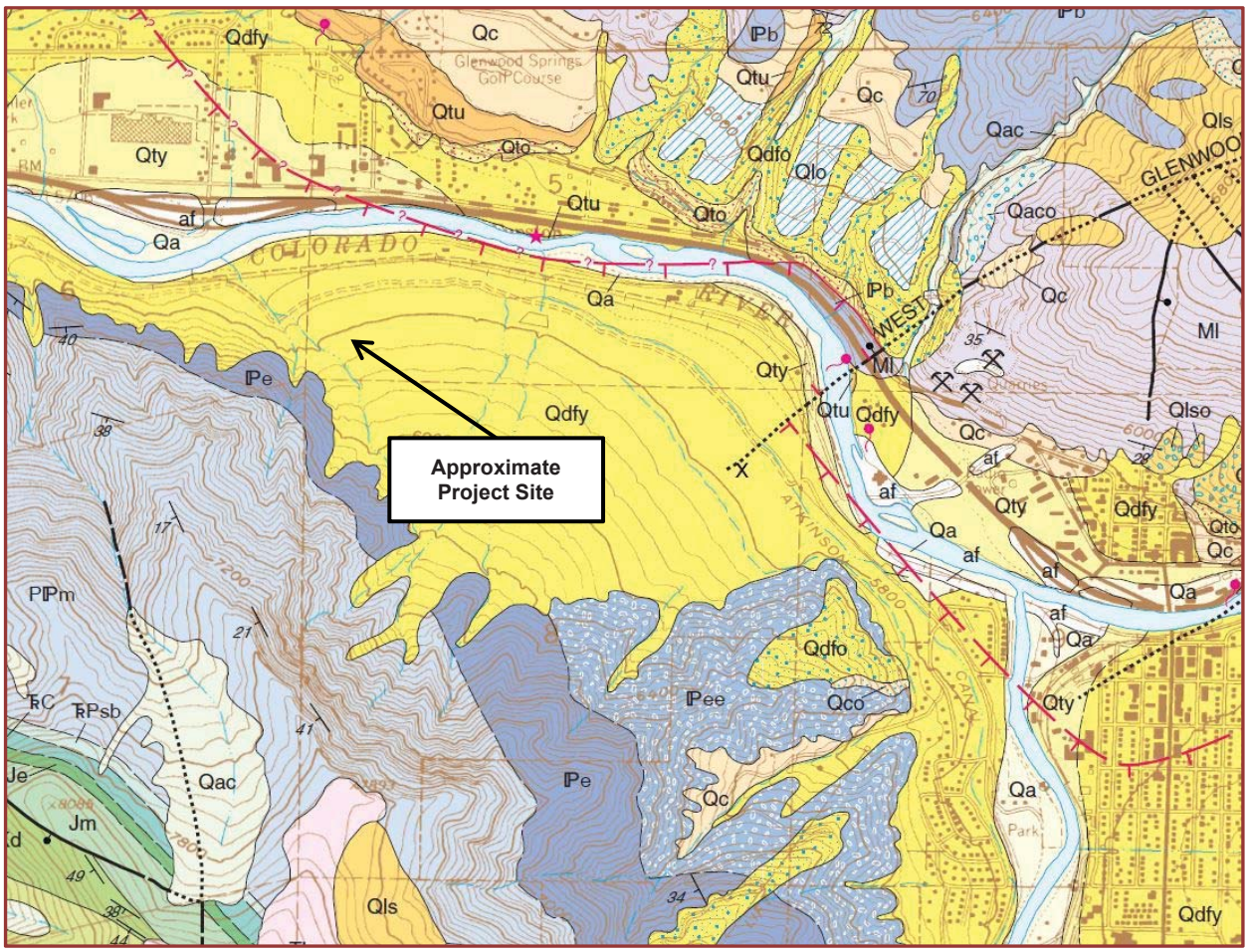
Samples retrieved from our test holes were examined and visually classified in the laboratory by the project engineer. Laboratory testing of soil samples included standard property tests, such as natural moisture contents, dry unit weights, grain size analyses, and Atterberg limits. Swell – consolidation, water-soluble sulfate, and a suite of corrosivity tests were completed on selected samples, as well. Laboratory tests were performed in general accordance with applicable ASTM protocols. Results of the laboratory testing program are summarized in Tables 1 and 2. A gradation plot is provided in Figure 4.

GEOLOGIC SETTING AND GEOLOGIC HAZARDS

Geologic Setting - Published geologic maps, e.g., Kirkham, Streufert, Cappa, Shaw, Allen, and Schroeder (2009)[7] depict the site as underlain by Holocene Younger Debris Flow Deposits (**Qdfy**). The surficial materials are mapped as underlain by the Middle Pennsylvanian Eagle Valley Evaporite (|**Pee**). A portion of that map is reproduced below.

The surficial, Younger Debris Flow Deposits consist of sands, gravels, silts and cobbles, with varying proportions of boulders and clays. These deposits approach or 200 feet in thickness in the upper portions of the debris flow fan, but thin downslope toward the river. Debris flow deposits typically are poorly consolidated and commonly are subject to hydro-consolidation ('collapse') upon loading and wetting. Additionally, the large clasts (cobbles and boulders), commonly present in the debris flow deposits, can be awkward or difficult to handle.

[7] Kirkham, R.M., Streufert, R.K., Cappa, J.A., Shaw, C.A., Allen, J.L., and Schroeder, T.J. II, 2009, *Geologic Map of the Glenwood Springs Quadrangle, Garfield County, Colorado*: Colorado Geological Survey, Map Series MS-38, scale 1:24,000



The Eagle Valley Evaporite in the project area consists largely of gypsum, anhydrite, halite, and mudstone (claystone and siltstone), sandstone, limestone, dolomite, and shale, interbedded on various scales. Beds of the Eagle Valley Evaporite are often very hard and difficult to excavate. Additionally, many materials present in the Eagle Valley Evaporite are subject to dissolution and are known to generate sink holes.[8]

Geologic Hazards

Expansive Soils Swelling clayey soils and bedrock change volume in response to changes in moisture content that can occur seasonally, or in response to changes in land use, including development. Expansion potentials vary with moisture contents,

[8] For example, in 2003, a sinkhole formed along the northern shoulder of Midland Avenue north the Target store, about ⅔ mile east of the site. This sinkhole was backfilled by the City of Glenwood Springs.

density, and details of the clay chemistry and mineralogy. Swelling soils beneath a structure can cause significant damage. The swell potential in any particular area can vary markedly both laterally and vertically. Moisture changes also occur unpredictably, resulting in conditions that cannot always be forecast.

The shallow earth materials underlying the site generally consisted of silty and clayey sands and gravels. The plasticity of the site soils ranged from non- to moderately plastic. A swell of 1.1 percent was measured in a sample of site soils. (See Table 1.) In our experience, limited potentials for swell should be anticipated at the site and adjacent areas.

Collapsible Soils Certain surficial deposits in the Glenwood Springs area, typically debris flow and alluvial fan deposits, are known to be susceptible to hydro-consolidation or "collapse." Hydro-consolidation consists of a significant volume loss due to re-structuring of the constituent grains of the soil to a more compact arrangement upon wetting and loading. Typically, the resultant volume loss is realized strongly differentially beneath a given structure. As with swelling soils, post-construction volume changes in the foundation soils can damage buildings and other improvements.

The project site occupies a portion of a large debris flow fan descending from the steep terrain to the southwest. The native soils encountered during our subsurface exploration program are interpreted by GROUND to be debris flow deposits. These materials have been mapped by White (2002)[9] as collapsible. Additionally, the Lincoln-Devore (1978)[10] study depicts the area as being within the severe hazard zone for hydro-consolidation in site soils. A severe hazard zone is described as having "a high probability of major and / or rapid settlement, accompanied by local piping and slope instability due to soil structure disruption."

Swell and consolidation testing performed on samples of site soils obtained for this evaluation indicated consolidations upon wetting up to 5.9 percent. Still greater consolidations – on the order of 8 and 9 percent – were reported Yeh & Associates, Inc. (2015, 2016) and measured by GROUND – in excess of 7 percent – farther east on the

[9] White, J.L., 2002, *Collapsible soils and evaporite karst hazards map of Roaring Fork River corridor, Garfield, Eagle and Pitkin Counties, Colorado:* Colorado Geological Survey Map Series MS-34, scale 1:50,000.

[10] Lincoln-Devore Engineers and Geologists, 1978, *Geologic Hazards of the Glenwood Springs Metropolitan Area – Garfield County, Colorado:* Colorado Geological Survey Open File Report 78-10.

same debris flow fan. Consolidations of more than 13 percent were measured in samples as deep as 40 feet by GROUND (2009) at locations near the RFTA bus maintenance building on this site for a preliminary study addressing distress to that facility.

Thus, the potential for soil "collapse" at this site is relatively high and should be considered in all aspects of project design and construction.

Radon Testing for the possible presence of radon gas prior to project development does not yield useful results regarding the potential accumulation of radon in completed structures. Radon accumulations typically are found in basements or other enclosed portions of buildings built in areas underlain at relatively shallow depths by granitic crystalline rock. The likelihood of encountering radon in concentrations exceeding applicable health standards on the subject site, underlain by relatively deep soils and sedimentary bedrock, is significantly lower.

Radon testing should be performed in each building on-site, after construction is completed. Proper ventilation usually is sufficient to mitigate potential radon accumulations. Building designs should accommodate such ventilation for all building areas.

Seismic Activity / Faulting Neither site reconnaissance nor review of available geologic maps indicated the trace of an active or potentially active fault traversing or immediately adjacent to the site. Therefore, the likelihood of surface fault rupture at the site is considered to be relatively low.

However, several sets of fault structures are mapped within 2 miles of the project site and include the unnamed faults along the Grand Hogback Monocline, the Dolan Gulch Fault, and the Glenwood Fault (Kirkham and Rogers, 1981[11]; Kirkham and others, 2009,[12] Colorado Geological Survey, 2008[13]). The most recent movement of these faults appears to have occurred in the Pliocene or Miocene.[8] The risk of this fault giving rise

[11] Kirkham, R.M., and W. P. Rogers, 1981, *Earthquake Potential in Colorado, A Preliminary Evaluation*, Colorado Geological Survey, Bulletin 43.

[12] Kirkham, R.M., Streufert, R.K., Cappa, J.A., Shaw, C.A., Allen, J.L., and Schroeder, T.J. II, 2009, *Geologic Map of the Glenwood Springs Quadrangle, Garfield County, Colorado*: Colorado Geological Survey, Map Series MS-38, scale 1:24,000

[13] Colorado Geological Survey, 2008, *Preliminary Quaternary Fault and Fold Database, and Map Server*, http://geosurvey.state.co.us/Default.aspx?tabid=453.

to damaging, earthquake-induced ground motions at the site is considered to be relatively low given the magnitudes of previously recorded events in the project area and last known movements of the fault.

Compared with other regions of Colorado, recorded earthquake frequency in the project area is moderate.

Slope Stability and Erosion Colton and others (1975)[14], as well as larger scale geologic maps providing coverage of the site that were reviewed for this study, did not depict landslide deposits on or adjacent to the subject site. However, a geologic map by Kirkham and others (2009)[7] depicts the site as being underlain by debris flow deposits as discussed above. Therefore, it is GROUND's opinion that the risk of slope stability hazards (debris flows, rock falls, landslides, etc.) associated with the steep slopes to the south and southwest is relatively high. Additionally, the Lincoln-Devore (1978)[6] depicts the western portion of the site as being with the zone of significant rock fall hazard. According the study, criteria for this zone "include (a) an identifiable source area for rocks and (b) the presence of fallen rocks with intermediate diameters of 2 feet or more." However, debris flow basis have been constructed upslope of the facility and the proposed improvements. As far as we are aware, those basins have been effective in preventing debris flows and other materials dislodged from the overlying slopes from reaching the site.

Slopes local to the site, were generally gentle to moderate, with several steep and retained slopes, as discussed in the *Site Conditions* section of this report. Therefore, the likelihood of project developments being affected by existing large scale, unanticipated slope instabilities local to the site is considered low to moderate. Because relatively large cuts and fills are planned for the site the risk of slope instability may be increased. Therefore, proposed or modified slopes should be analyzed for stability, as appropriate.

Flooding The subject property is approximately 900 feet south of the southern bank of the Colorado River and is approximately 130 feet higher in elevation. Significant fluctuation in the flow of streams can be expected during seasonal run periods and after large precipitation events, especially in the drainages upslope and south of the project

[14] Colton, R.B., J.A. Holligan, and L.W. Anderson, 1975, *Preliminary Map of Landslide Deposits, Denver 1° x 2° Quadrangle, Colorado*, U.S. Geological Survey, Miscellaneous Field Studies Map MF-705.

site. However, the project site is not shown on current FEMA Flood Insurance Rate Maps reviewed. Therefore the risk of flooding appears to be low. However, the site and proposed grade changes should be evaluated by a civil engineer in this regard.

Mining Activity and Mining Related Subsidence Review of U.S. Geological Survey geologic maps covering the site, such as Kirkham and others (2009)[7] and other available, published maps depicting areas of mining, do not indicate past mining activities on or adjacent to the subject parcel. Additionally, no evidence of past mining activity was identified at the project site during our subsurface exploration program.

Considering the information presented above, the risk of potential for surface subsidence associated with consolidation of former mine workings (as opposed dissolution/karst related) at depth appears to be low.

Dissolution Related Subsidence Geologic maps such as Kirkham and others (2009)[7] and White (2002)[5] indicate that the Eagle Valley Evaporite underlies the project site beneath the surficial deposits. This formation includes evaporite (salt, gypsum, etc.) deposits, limestones, or other materials vulnerable to subsurface dissolution. Therefore, the likelihood of sinkholes and subsidence (associated with such rock formations; not mine related) or other hazards related to subsurface dissolution appears to be high in the project area as a whole. In addition to the 2003 sinkhole noted above, we understand that similar features have developed on or near the project site, and in some cases, have historically been backfilled by debris, and other readily available materials.

The risk of a sinkhole developing within the footprint of a given building during its design life, however, is significantly lower, but it is not zero. The risk of sinkhole development at the site is broadly similar to that in much of Glenwood Springs.

SUBSURFACE CONDITIONS

Conditions Encountered in the Test Holes In general, the surface of the test holes approximately 2½ to 7 inches of asphalt[15] were penetrated before native silty sands and gravels that extended to depths of approximately 127 feet below existing grade. Beneath the native silty sands and gravels, clayey sands and gravels were encountered and extended to the depths explored. At Test Hole 4 approximately 6 inches of topsoil[16] were encountered at the surface overlying the native silty sands and gravels and at Test Hole 7 approximately 3 inches of gravel surfacing was encountered overlying the native silty sands and gravels.

We interpret the native silty sands and gravels to be debris flow deposits and the clayey sands and gravels to be older debris flow deposits interbedded with alluvial deposits.

Fill soils were not recognized in the test holes, but fills may be present across portions of the site, due the previous development of the site. The precise determination of fill depths is difficult in small diameter test holes and therefore, logged fill depths should be considered approximate. Delineation of the complete lateral and vertical extents of the fills at the site and their compositions was beyond our present scope of services. If more detailed information regarding fill extents and compositions at the site are of significance, they should be evaluated using test pits.

Cobbles and boulders up to 5 feet in dimension were encountered in test holes and larger sized clasts may be encountered in existing soils on site.

Silty Sands and Gravels generally consisted of clean to silty, fine to coarse sands and gravels with cobbles and boulders and local clays. They were dry to wet, non- to moderately plastic, loose to very dense, red to red brown and dark red brown. Wood and other plant material was noted locally in the upper portions of this section.

[15] Asphalt thicknesses are difficult to determine with precision in small diameter test holes. If existing pavement thicknesses are of significance to the project, then additional, larger diameter test holes should be drilled.

[16] 'Topsoil' as used herein is defined geotechnically. The materials so described may or may not be suitable for landscaping or as a growth medium for such plants as may be proposed for the project.

Clayey Sands and Gravels generally consisted of clean to clayey, fine to coarse sands and gravels with cobbles and boulders and local silts. They were dry to wet, non- to moderately plastic, dense to very dense, brown to gray brown in color.

Groundwater was encountered in Test Hole 1 at a depth of 115 feet below existing grade or a relative elevation of -19 feet at the time of drilling. The test holes were immediately backfilled due to safety concerns. Groundwater levels can be expected to fluctuate in response to annual and longer-term cycles of precipitation, irrigation, surface drainage, land use, and the development of transient, perched water conditions.

Swell-Consolidation Testing of selected samples of the on-site materials recovered from the test holes indicated consolidations of up to about 5.9 percent and swells up about 1.1 percent under various surcharge loads approximating in-place overburden pressures. (See Table 1.)

SEISMIC CLASSIFICATION

Based on extrapolation of available data to depth and our experience in the project area, we consider the site likely to meet the criteria for a Seismic Site Classification of **D** according to the 2012/15 IBC classification (Table 1613.5.2). (Exploration and/or shear wave velocity testing to a depth of 100 feet or more was not part of our present scope of services.) If, however, a quantitative assessment of the site seismic properties is desired, then shear wave velocity testing should be performed.

Using longitude and latitude coordinates obtained from Google Earth and the USGS's Seismic Design Maps Tool (http://geohazards.usgs.gov/designmaps/us/application.php), the project area is indicated to possess an S_{DS} value of **0.336** and an S_{D1} value of **0.132** for the site latitude and longitude and a Site Class of D. It is GROUND's opinion that these values for Site Class D are appropriate for use in design.

GEOTECHNICAL CONSIDERATIONS FOR DESIGN

The conclusions and parameters provided in this report were based on the data presented herein, our experience in the general project area with similar structures, and our engineering judgment with regard to the applicability of the data and methods of forecasting future performance. A variety of engineering parameters were considered as indicators of potential future soil movements. Our parameters and conclusions were based on our judgment of "likely movement potentials," (i.e., the amount of movement likely to be realized if site drainage is generally effective, estimated to a reasonable degree of engineering certainty) as well as our assumptions about the owner's willingness to accept geotechnical risk. "Maximum possible" movement estimates necessarily will be larger than those presented herein. They also have a significantly lower likelihood of being realized in our opinion, and generally require more expensive measures to address. We encourage Shrewsberry and the owner, upon receipt of this report, to discuss these risks and the geotechnical alternatives with us.

In addition to the risks and remedial approaches presented in this report, Shrewsberry and the owner also must understand the risk-cost trade-offs addressed by the civil and structural engineering disciplines in order to direct his design team to the portion of the Higher Cost / Lower Risk – Lower Cost / Higher Risk spectrum in which this project should be designed. If these risks are not understood, it is critical that additional information or clarification be requested so that the owner's expectations reasonably can be met.

Depth of Wetting at the Site The "depth of wetting" (the depth to which foundation soils will gain moisture and experience volume change over the design-life of a structure) estimated for a given site strongly affects the anticipated performance of structures at that site. Based on the data obtained at this site and our experience with similar geotechnical settings, a 'depth of wetting' of 20 feet was used to develop geotechnical recommendations for foundation system design. A depth of wetting of 20 feet is equal to or greater than the depth of wetting found at about 72 percent of the sites in the Front Range area of Colorado evaluated in a study by Walsh and others (2009).[17]

[17] Walsh, K.D., C.A. Colby, W.N. Houston and S.A. Houston, 2009, *Method for Evaluation of Depth of Wetting in Residential Areas*, Journal of Geotechnical and Geoenvironmental Engineering, American Society of Civil Engineers, Vol. 135, No. 2, pp. 169 – 176.

Given the environmental and geologic differences between the Colorado Front Range and the greater Glenwood Springs area, it is GROUND's opinion that a depth of wetting of 20 feet will be more conservative for this site in the Glenwood Springs area than it would be for a similar site in the Front Range.

'Depths of wetting' of 30, 40 or 70 feet or more have been considered (e.g., Chao and others, 2006)[18] and have been encountered locally in the field. Depths of wetting of such magnitudes, however, generally are in unusual geologic conditions such as steeply dipping sedimentary bedrock, or identified forensically in unusual circumstances such as a pipe leak that has remained un-repaired for an extended period. In our experience, such deep 'depths of wetting' are considered only rarely in engineering consulting practice in more typical geologic settings.

GROUND considers a 20-foot depth of wetting to be appropriately conservative for the proposed project and geologic environment. However, if Shrewsberry or RFTA prefers that a more conservative (or less conservative) 'depth of wetting' be used to develop geotechnical parameters for design, a geotechnical engineer should be retained to revise the parameters herein.

Geotechnical Risks As discussed in the *Geologic Setting And Geologic Hazards* section of this report, because of the presence of Eagle Valley Evaporite materials underlying the site, the proposed improvements are susceptible to sinkholes, etc. We understand that the risk of sinkhole development is understood by and accepted by the owner. GROUND is available to discuss further sinkhole and subsidence related risks, upon request. Otherwise, we have assumed that no further mitigative measures in that regard will be undertaken.

Similarly, although the proposed improvements are vulnerable, in principle, to rock falls and debris flows, etc., debris basins are in-place upslope of the site. Their continued effectiveness requires routine maintenance, however. The effectiveness of these basins and maintenance measures to date should be assessed during design by a civil engineer, and additional measures undertaken as appropriate. No further measures in

[18] Chao, K-C, D.D. Overton, and J.D. Miller, 2006, *The Effects of Site Conditions on the Predicted Time Rate of Heave*, Unsaturated Soils 2006, American Society of Civil Engineers, Special Publication No. 147, pp. 2086 – 2097.

that regard are provided herein. GROUND is available to discuss this concern upon request.

Hydro-consolidation or 'collapse' of debris fan deposit soils is, in GROUND's opinion, the primary geotechnical constraint on design of the proposed improvements. The consolidation potentials exceed those for swell significantly. The measured potentials for consolidation upon wetting, together with the selected depth of wetting were used to develop estimates of likely, post-construction movements.

The geotechnical conditions at the site entail significantly greater than typical risks of post-construction movements of improvements and resultant distress compared to many other sites in the project vicinity. Effective control of surface waters during and after construction is critical to achieving the intended performance of project improvements, as prior damage at the site demonstrates. In GROUND's opinion, the design-build team(s) should retain or include a geotechnical engineer to facilitate interpretation and application of the information and parameters in this report into project design.

Likely Post-construction Movements Based on the our data, the selected depth of wetting and our experience with similar sites, we estimate improvements supported directly on the existing site soils are subject to likely, post-construction, vertical movements of 7 to 9 inches where improvements bear directly on the site earth materials. Lateral movements will result as well. Foundation and slab/flatwork movements of these magnitudes can result in significant damage. Nearly all of the proposed improvements are vulnerable in this regard.

Movements of this magnitude have been encountered previously in the project area and increased maintenance measures should be anticipated compared to similar facilities in the area but not on a deep section of collapsible soils. In this setting, maintenance measures will include the periodic removal and replacement of improvements not supported on deep foundations.

GROUND considers several approaches to reduce post-construction movements at this site to be geotechnically feasible. A discussion of those methods and the corresponding reduced estimates of post-construction movements is provided below. (It should be noted that the estimates provided in this report do not include any movements that may result from sinkholes or similar features.)

General Foundation and Floor Types Due to the potential for hydro-consolidation in the existing site soils, the site soils will need to be improved (or replaced) in order to reduce estimates of likely post-construction movements in shallow foundations. Deep foundations bearing beneath the soils vulnerable to hydro-consolidation, however, is the most positive approach to reducing post-construction movements. Deep foundation systems likely will be quite deep at this site, however, based on assessment of the associated risks.

Supporting the proposed buildings and addition on deep, driven H-pile foundations, and providing them with structural floors also supported on piles will yield estimates of likely post-construction movements of about ½ inch. At minimum, such systems should bear below the selected depth of wetting. The risk of post-construction movements exceeding this estimate will tend to decrease with increasing pile length / bearing depth, as will the capacities of the piles. Geotechnical parameters for a driven H-pile foundation system are provided in the *Drive Pile Foundations* section of this report and geotechnical parameters for a Structural Floor or provided in the *Structural Floors* section of this report.

Both mat foundations and spread footing foundations appear feasible geotechnically, if the site soils are improved. Similarly, slab-on-grade floors also appear feasible if the site soils are improved by the methods discussed below. More detailed parameters for shallow foundations and for slab-on-grade floors are provided in *Shallow Foundations* and *Slab-on-Grade Floors* sections of this report.

In GROUND's opinion, there are several available options to improve the soils so that shallow foundations and/or slab-on-grade floors may be acceptable. These include

- Excavating the existing soils beneath a structure to a depth of at least 15 feet below footing bearing elevation, and replacing them with properly compacted fill. (The existing soils generally appeared suitable for re-use as compacted fill after removal of debris, boulders, etc.) We estimate that likely post-construction, vertical movements for structures supported on such fill sections would be approximately 1 inch. This estimate assumes that effective site drainage is established and maintained; such fill sections will not remove the all of the soils that are susceptible to hydro-consolidation. We consider the risk of post-construction movements in

excess of this estimate to be relatively low, but it is not zero and increases dramatically if site drainage is ineffective. A deeper remedial fill section can reduce this risk.

- Densifying the soils in-place using rammed aggregate piers. This would be done by a specialty designer/installer using the information from this report and from other studies at the site. Installation of rammed aggregate piers densifies the surrounding soils to the selected depth, increasing bearing capacity and reducing estimates of post-construction settlements for elements supported on them. Rammed aggregate piers also can be placed to densify the soils for slab-on-grade floors, typically on a wider spacing than beneath footings.

  Resultant bearing capacities and other foundation design parameters, as well as estimates of likely post-construction movement would be provided by the designer/installer. We anticipate that allowable bearing pressures of 5,000 or 6,000 psf and associated movement estimates of less than 1 inch could be achieved.

  The following firms can be contacted with regard to rammed aggregate piers:

  - Ground Improvement Engineering, 816 / 421 – 4334 for “geo-piers.”
  - Hayward Baker, Inc., 303 / 469 – 1136 for “vibro-piers.”

  Other firms may be available, as well. Like a compacted fill section, extending the zone of densified soils to greater depths would tend to reduce the likelihood of post-construction movement estimates to be exceeded.

- Similar in effect to using rammed aggregate piers improving the soils, compaction grouting can be used to densify the site soils. Compaction grouting also is performed by a specialty designer/contractor.

  GROUND estimates that if compaction grouting were performed to a depth of 30 feet below the lowest level floor (10 feet below the depth of wetting), then estimates of post-construction movement on the order of 1 inch could be achieved. Actual grouting program design, resultant bearing capacities and estimates of likely post-construction movements would be provided by the designer/contractor.

The following firms can be contacted with regard to compaction grouting:

- Hayward Baker, Inc., 303 / 469 – 1136
- Nicolson, 303 / 926 – 0411

Other compaction grouting firms may be available, as well. Again, increasing the depth of the zone of soils densified by compaction grouting would tend to reduce the likelihood of post-construction movement estimates to be exceeded.

DRIVEN PILE FOUNDATION SYSTEMS

It should be noted that the depths discussed herein refer to the existing ground surface at the time of our subsurface exploration. The contractor should make appropriate allowance for any changes in grades between the time of GROUND's field work and the time of pile installation. Lowering grades may not be sufficient to reduce driven pile lengths, however. Additionally, the following parameters are based on the conditions encountered in the test holes and should be confirmed by additional geotechnical studies prior to construction.

It should be noted that none of the pile lengths tabulated below reach local bedrock. Therefore, debris fan deposits with the potential for hydro-consolidation ("collapse") will remain beneath them with the potential for greater than anticipated settlements if those soils become wetted. Therefore, more deeply driven piles also will have a lesser risk of such greater settlements than less deeply driven piles.

Geotechnical Parameters for H-Pile Foundation Design

1) Driven piles to support the building should consist of heavy steel H-sections. We anticipate that HP 12 x 53, HP 12 x 74, HP 12 x 84, HP 14 x 89 sections will be used. Selection of pile size should consider anticipated pile depths.

2) Based on the strength of the sand and gravel layer underlying the site, the maximum pile load should not exceed a maximum service stress of **12,500 psi** for 50 ksi steel using the steel pile cross-sectional area.

3) The piles should be driven to practical refusal to achieve full capacity. However, examples of pile tip depth and estimated capacity are tabulated below for planning purposes for several pile sizes.

ANTICIPATED CAPACITY AND ANTICIPATED CORRESPONDING DEPTHS

Capacity	Depth			
	HP 12 x 53	HP 12 x 74	HP 12 x 84	HP 14 x 89
80 kips	45 feet	40 feet	45 feet	35 feet
140 kips	60 feet	60 feet	55 feet	50 feet
200 kips	85 feet	70 feet	70 feet	70 feet

Due to the inherent variability in the characteristics of the site soils as well as the depth to the sand and gravel layer, once a design pile length / tip elevation has been determined, the contractor should be prepared to advance the piles to depths at least 10 feet greater than the design depth.

It is critical at this site that a test pile program be performed prior to general installation to inform anticipated driving depths with the actual piles and driving equipment selected. Pile dynamic testing or other testing should be performed to confirm that design capacities are being achieved.

4) Post-installation down-drag on the piles will result from the 'collapse' of overburden materials through which the piles will be driven. Down-drag may be estimated as an equivalent fluid pressure of **29 pcf** applied to the box perimeter of the **H-pile between depths of 3 and 20 feet**.*

* 20 feet or the design depth of wetting if different from 20 feet

5) Geotechnical parameters for design of piles to resist lateral loads are provided in the *Lateral Loads* section of this letter.

6) Lateral resistance to horizontal forces also can be resisted by battered piles. It is normal to assume a battered pile can resist the same axial load as a vertical pile

of the same type and size driven to the same depth. The vertical and horizontal components of the load will depend on the batter inclinations.

Pile batters should not exceed 1:4 (horizontal : vertical).

7) Groups of closely spaced driven piles will require an appropriate reduction of the estimated capacities. Reduction of axial capacity generally can be avoided by spacing driven piles **at least 3 diameters** center to center. At this spacing or greater, no reduction in axial capacities or horizontal soil modulus values is required. The capacities of drilled piers spaced more closely than 3 diameters center to center should be reduced. Reduction factors can be obtained from the plot provided on Figure 5.

Linear arrays of driven piles, however, must be spaced **at least 8 diameters** center to center to avoid reductions in lateral capacity when loaded in line with the array (parallel to the line connecting the driven pile centers). The lateral capacities of piles in linear arrays spaced more closely than 8 diameters should be reduced. Reduction factors can be obtained from the plot provided on Figure 6.

8) Uplift on driven piles should be limited to 25 percent of the indicated vertical load capacities.

9) In order to allow pile dynamic testing (See below.) welded pile splices should be specified and compression splices not allowed.

Driven H-pile Installation Considerations

10) Driven H-piles should be installed per Section 502 of the current edition/revision of the CDOT *Standard Specifications for Road and Bridge Construction*.

11) Pre-construction condition surveys and vibration monitoring should be considered to assess the potential for damaging nearby improvements.

12) Each pile should be reinforced with a commercial, heavy duty, pile tip.

13) The pile-driving hammer should develop a minimum of **26,000 foot-pounds** of energy per blow for HP 10 x 57 piles and **42,000 foot-pounds** for HP 12 x 74 piles. However, the hammer generally should not develop more than **2,500 foot-pounds per square inch** of cross sectional area (e.g., 54,500 foot-pounds for HP 12 x 74 piles).

14) After the actual pile type and proposed hammer have been selected, a geotechnical engineer should be retained to perform a Wave Equation Analysis to determine if the driving hammer is sized adequately for the type of pile selected and the soils and bedrock materials into which the piles will be driven.

15) Pile dynamic testing should be performed using a pile driving analyzer (PDA) and signal matching at the start of pile installation to:

- Assess the condition of the pile,
- Evaluate the efficiency of the hammer,
- Measure the driving stress in the pile,
- Determine the static capacity of the pile, and
- Establish the pile driving criteria for required static capacity, or penetration into the sands and gravels. If dynamic testing is not performed, piles may be driven to greater depths than those needed to achieve capacity.

Pile dynamic testing should be performed during driving, prior to placement of concrete in the pile.

16) In addition, we suggest that a test pile installation program be performed to define better the driving conditions, appropriate pile hammer energy, installation depth, and refusal conditions.

Lateral loading tests performed at the start of pile installation also can be beneficial.

17) Where a pile cannot be advanced to at least the approximate, anticipated tip depth, it should be evaluated with regard to its capacity by the geotechnical engineer and the structural engineer.

SHALLOW FOUNDATIONS ON IMPROVED SOIL

Geotechnical Parameters for Shallow Foundation Design

1) Footings or a mat foundation should bear on a section of properly compacted fill soils or otherwise improved soils as discussed in the *Geotechnical Considerations for Design* section of this report.

2) We anticipate that footings or a mat foundation bearing on a properly compacted fill section may be designed for allowable bearing pressure of **2,500 psf**. Higher allowable bearing pressures may be possible, but likely will need to verified by testing of the soils after construction (i.e., load testing).

   We anticipate soils improved by rammed aggregate piers or compaction grouting, may be designed for an allowable bearing pressure to be determined by the rammed aggregate pier or compaction grouting designer / installer, as appropriate.

   In order to reduce differential settlements between footings along continuous footings, footing loads should be as uniform as possible. Differentially loaded footings will settle differentially.

3) Spread footings should have a minimum lateral dimension of **16 inches** for linear strip footings and **24 inches** for isolated pad footings. Actual footing dimensions should be determined by the structural engineer.

3) Footings generally should bear at 3½ feet below lowest adjacent finished grade for protection against frost. Where a below-grade level is present, no additional deepening of the footings is needed for frost protection.

4) Continuous foundation walls should be reinforced as designed to span an unsupported length of at least **10 feet**.

5) Geotechnical parameters for passive resistance to lateral foundation loads are provided in the *Lateral Earth Pressures* section of this report. The coefficient for frictional resistance to lateral loads should be determined by the rammed aggregate pier designer / installer.

6) Connections of all types must be flexible and/or adjustable to accommodate the anticipated, post-construction movements of the structure.

Shallow Foundation Construction

7) The contractor should take adequate care when making excavations not to compromise the bearing or lateral support for nearby improvements.

8) Footing / mat foundation excavation bottoms may expose loose, organic, or otherwise deleterious materials, including debris. Firm materials may become disturbed by the excavation process. All such unsuitable materials should be excavated and the foundations deepened.

9) Foundation-supporting soils may be disturbed or deform excessively under the wheel loads of heavy construction vehicles as the excavations approach footing bearing levels. Construction equipment should be as light as possible to limit development of this condition. The movement of vehicles over proposed foundation areas should be restricted.

10) All foundation subgrade should be properly compacted with a vibratory plate compactor prior to placement of concrete.

11) Fill placed against the sides of the footings should be properly compacted in accordance with the *Project Earthwork* section of this report.

STRUCTURAL FLOORS

We anticipate that structural floors will be utilized where the lowest level floors will be office space or similar applications. A structural floor should be utilized where appropriate as the floor system resulting in the least potential for post-construction floor movement, including differential movement. Entryway floor slabs and other exterior flatwork also should be constructed as structural floors where differential movements between the building and exterior flatwork is a concern.

A structural floor should be supported on grade beams and driven H-piles (or alternate foundation systems) in the same manner as the building structure. Requirements for the number and position of additional piers to support the floors will depend upon the span,

design load, and structural design, and should be developed by the structural engineer. Geotechnical information for design and installation of drilled piers are provided above. Additionally, it should be noted that structural floors tend to be flexible and move elastically under live loads. Building design also should account for floor movements of this type.

A structural floor should be constructed to spanning above a well-ventilated crawl space. The crawl space should be adequately sized to allow access to and maintenance of utility piping if placed beneath the floor. Piping connections through floors, grade beams, or foundation walls should allow for differential movement between the piping and the floor.

Alternatively, a structural floor may be constructed over a **6-inch** or thicker continuous void form; however, in our experience this entails a higher risk relative to constructing the floor over a crawl space, primarily related to effective construction and void collapse. Where a void form is used, appropriate protections should be provided to prevent soil from intruding laterally into the void.

A vapor barrier meeting ASTM E-1745 (Class “A”) should be considered for installation below all structurally supported floors and if utilized, should be properly attached/sealed to foundation walls/drilled piers above the void material. The sheet material should not be attached to horizontal surfaces such that condensate might drain to wood or corrodible metal surfaces.

Use of polyethylene (“poly”) sheeting as a vapor barrier is not suggested. Polyethylene (“poly”) sheeting (even if 15 mils in thickness which polyethylene sheeting commonly is not) does not meet the ASTM E-1745 criteria and is not suggested for use as vapor barrier material. It can be easily torn and/or punctured, does not possess the necessary tensile strength, gets brittle, tends to decompose over time, and has a relatively high permeance.

New buildings generally lack ventilation due primarily to systematic efforts to construct air-tight, energy-efficient structures. Therefore, areas such as crawl spaces beneath structural floors are typically areas of elevated humidity which never completely dry. This condition can be aggravated in some locations by shallow groundwater or a perched groundwater condition, which can result in saturated soils within several feet of

the finished building pad grade. Persistently warm, humid conditions in the presence of cellulose, which is found in many typical construction materials, creates an ideal environment for the growth of molds, fungi, and mildew. Published data suggest links between molds and illnesses. Therefore, crawl spaces beneath structural floors should be provided with adequate, active ventilation systems or other active mechanisms such as specially designed HVAC systems to reduce the potential for mold, fungus and mildew growth. Crawl spaces should be inspected periodically so that remedial measures can be taken in a timely manner, should mold, fungus, or mildew be present and require removal.

The owner must be willing to accept the risks of potential mold, fungus, and mildew growth when electing to utilize a structural floor system. Additionally, the contractor is solely responsible for the means and methods during construction including adequate ventilation, and any observation or testing performed during construction does not relieve the contractor of that responsibility.

All plumbing lines should be carefully tested before operation. Where utility lines enter through the floor, positive bond breaks should be provided. Utility lines can be displaced by soils and bedrock movements, which are not reflected in the building. Design and installation of associated fixtures should accommodate this potential differential movement, which could be on the order of 10 inches or more.

SLAB-ON-GRADE FLOORS

We anticipate that lowest level of the parking garage and similar building areas intended for vehicles or storage, etc., likely will be provided with slab-on-grade floors. A slab-on-grade floor is a higher risk, but commonly used, alternative to a structural floor. The geotechnical parameters below may be used for design of slab-on-grade floors for the proposed buildings or portions of buildings. ACI Sections 301/302/360 provide guidance regarding concrete slab-on-grade design and construction.

Geotechnical Parameters for Design of Slab-on-Grade Floors

1) A slab-on-grade floor should bear on a section of properly compacted fill soils or otherwise improved soils as discussed in the *Geotechnical Considerations for Design* section of this report.

The selected fill section should extend at full thickness across floor and at least **20 feet** laterally beyond the floor perimeter.

The thickness of the remedial fill section should be taken from the bottom of the slab + gravel layer system. (If the gravel layer is not installed, the remedial fill section should be correspondingly thickened.)

Anticipated criteria for fill placement and compaction are provided in the *Project Earthwork* section of this report.

2) Floor slabs should be adequately reinforced. Floor slab design, including slab thickness, concrete strength, jointing, and slab reinforcement should be developed by a structural engineer.

3) An allowable vertical modulus of subgrade reaction (**Kv**) of **150 tcf** (145 to 174 pci) may be used for design of a concrete, slab-on-grade floor bearing on the selected section of properly compacted fill. If compaction grouting or rammed aggregate piers are selected to improve the site soils, the appropriate soil improvement designer should be consulted regarding the appropriate Kv values for design.

   These values are for a 1-foot x 1-foot plate; they should be adjusted for slab dimension.

4) Floor slabs should be separated from all bearing walls and columns with slip joints, which allow unrestrained vertical movement.

   Slip joints should be observed periodically, particularly during the first several years after construction. Slab movement can cause previously free-slipping joints to bind. Measures should be taken to assure that slab isolation is maintained in order to reduce the likelihood of damage to walls and other interior improvements.

5) Concrete slabs-on-grade should be provided with properly designed control joints.

ACI, AASHTO, and other industry groups provide guidelines for proper design and construction concrete slabs-on-grade and associated jointing. The design and construction of such joints should account for cracking as a result of shrinkage, curling, tension, loading, and curing, as well as proposed slab use. Joint layout based on the slab design may require more frequent, additional, or deeper joints, and should reflect the configuration and proposed use of the slab.

Particular attention in slab joint layout should be paid to areas where slabs consist of interior corners or curves (e.g., at column blockouts or reentrant corners) or where slabs have high length to width ratios, significant slopes, thickness transitions, high traffic loads, or other unique features. The improper placement or construction of control joints will increase the potential for slab cracking.

6) Interior partitions resting on floor slabs should be provided with slip joints so that if the slabs move, the movement cannot be transmitted to the upper structure. This detail is also important for wallboards and doorframes. Slip joints should allow **2 inches or more** of vertical, differential movement. Accommodation for differential movement also should be made where partitions meet bearing walls.

7) Post-construction heave may not displace slab-on-grade floors and utility lines in the soils beneath them to the same extent. Design of floor penetrations, connections and fixtures should accommodate **up to 2 inches** of differential movement.

8) Moisture can be introduced into a slab subgrade during construction and additional moisture will be released from the slab concrete as it cures. GROUND recommends placement of a properly compacted layer of free-draining gravel, 4 or more inches in thickness, beneath the slabs. This layer will help distribute floor slab loadings, ease construction, reduce capillary moisture rise, and aid in drainage.

The free-draining gravel should contain **less than 5 percent** material passing the No. 200 Sieve, **more than 50 percent** retained on the No. 4 Sieve, and a maximum particle size of **2 inches**.

The capillary break and the drainage space provided by the gravel layer also may reduce the potential for excessive water vapor fluxes from the slab after construction as mix water is released from the concrete.

We understand, however, that professional experience and opinion differ with regard to inclusion of a free-draining gravel layer beneath slab-on-grade floors. If these issues are understood by the owner and appropriate measures are implemented to address potential concerns including slab curling and moisture fluxes, then the gravel layer may be deleted.

9) A vapor barrier beneath a building floor slab can be beneficial with regard to reducing exterior moisture moving into the building, through the slab, but can retard downward drainage of construction moisture. Uneven moisture release can result in slab curling. Elevated vapor fluxes can be detrimental to the adhesion and performance of many floor coverings and may exceed various flooring manufacturers' usage criteria.

Per the 2006 ACI *Location Guideline*, a vapor barrier is required under concrete floors when that floor is to receive moisture-sensitive floor covering and/or adhesives, or the room above that floor has humidity control.

Therefore, in light of the several, potentially conflicting effects of the use vapor-barriers, the owner and the architect and/or contractor should weigh the performance of the slab and appropriate flooring products in light of the intended building use, etc., during the floor system design process and the selection of flooring materials. Use of a plastic vapor-barrier membrane may be appropriate for some building areas and not for others.

In the event a vapor barrier is utilized, it should consist of a minimum 15 mil thickness, extruded polyolefin plastic (no recycled content or woven materials), maintain a permeance less than 0.01 perms per ASTM E-96 or ASTM F-1249, and comply with ASTM E-1745 (Class "A"). Vapor barriers should be installed in accordance with ASTM E-1643.

Polyethylene ("poly") sheeting (even if 15 mils in thickness which polyethylene sheeting commonly is not) does not meet the ASTM E-1745 criteria and is not

recommended for use as vapor barrier material. It can be easily torn and/or punctured, does not possess necessary tensile strength, gets brittle, tends to decompose over time, and has a relatively high permeance.

Construction Considerations for Slab-on-Grade Floors

10) Loose, soft, or otherwise unsuitable materials exposed on the prepared surface on which the floor slab will be cast should be excavated and replaced with properly compacted fill.

11) The fill section beneath a slab should be of uniform thickness.

12) Concrete floor slabs should be constructed and cured in accordance with applicable industry standards and slab design specifications.

13) All plumbing lines should be carefully tested before operation. Where plumbing lines enter through the floor, a positive bond break should be provided.

FOUNDATION WALLS

We understand that the proposed structure will have a below grade level. The following parameters and considerations should be used for foundation walls.

Wall Design Parameters Equivalent fluid pressures for use in design of foundation walls are provided in the *Lateral Loads* section of this report.

If select, granular fill is placed as foundation wall backfill, in order to realize the (lower) value for that material, then the select, granular fill should be placed behind the wall to a minimum distance equal or greater than half of the wall height. In such cases, a relatively low permeability soil (rather than the select, granular soil) should comprise the upper **1 foot** of the wall backfill to reduce infiltration into the backfill or other measures taken to reduce surface water infiltration. It may be necessary to import soil for this purpose.

Parameters for fill placement and compaction are provided in the *Project Earthwork* section of this report.

Foundation Wall Drainage As outlined in the *Subsurface Drainage* section of this report, a foundation wall should be provided with an underdrain at or below the base of the wall. Drainage elements backing the wall should convey water into the underdrain system. Damp-proofing should be applied to foundation wall exteriors as appropriate.

Foundation Wall Construction Considerations Wall backfill soils should be compacted properly, but the contractor should take care regarding compaction methods and efforts so that excessive lateral pressures on the walls do not result.

Some settlement of wall backfill will occur even where the material was placed and compacted correctly. This settlement likely will be differential, increasing with depth of fill. Re-grading to re-establish effective surface drainage away from the building should be anticipated.

Where shallowly founded structures or pavements are to be placed on backfilled zones, the associated risks should be understood by the owner. Structural design, pipe connections, etc., should take into account (differential) foundation wall backfill settlements. A geotechnical engineer should be retained to provide design parameters where improvements are placed in backfilled areas as such improvements are identified.

RETAINING WALLS

Both cantilevered walls and mechanically stabilized earth (MSE) walls appear feasible at this site to support grade changes. Given the potentials for post-construction settlements of structures at this site, because MSE walls are relatively flexible and more tolerant of post-construction strains, their use, particularly small-block MSE walls, appear to be a better option for most applications at this facility.

Cantilevered Walls The foundation systems outlined in the *Driven Pile Foundation Systems* and the *Shallow Foundations On Improved Soil* sections of this report are applicable to cantilevered walls, as well.

The parameters provided in the *Lateral Loads* section of this report may be used for design of cantilevered retaining walls at the site. The actual values used, however, must be verified by the contractor by additional testing at the time of wall construction. Wall

design should incorporate any upward sloping backfills, live loads such as traffic, construction equipment, material stockpiles, etc., and other surcharge pressures.

MSE Walls An MSE wall system will bear at shallow depths but is flexible and, in our experience, will be relatively tolerant of total and differential post-construction movements. Therefore, an MSE wall should bear on a section of properly compacted fill that extends to a depth of **3 or more feet** below wall bearing elevation at the toe of the wall. The remedial fill section should extend at a uniform thickness beneath the entire reinforced zone of the wall and to **at least 3 feet** laterally beyond that zone. Geotechnical parameters for fill placement and compaction are provided in the Project Earthwork section of this report.

Bearing capacity for an MSE retaining wall should be developed by the wall designer based on the width of the wall reinforced zone using the parameters presented below for retaining wall design and Meyerhoff or other appropriate bearing capacity methods. Movement potential and services limit states should be evaluated by the wall designer based on the soil conditions and anticipated wall bearing pressure. If soil improvements for bearing capacity and/or service limits are considered necessary, a geotechnical engineer should be retained to provide additional parameters and considerations.

Based on the available geotechnical data, we anticipate that the wall subgrade materials will typically consist of sands and clays. The estimated soil parameters for use in the retaining wall design for on-site material is summarized in the following table, and must be verified prior to and during the wall construction.

Material Type	**Moist Unit Weight** *(pcf)*	**Internal Friction Angle** *(degrees)*
Site Soils	125	30
CDOT Class 1 Structure Backfill	135	34

It should be noted that soil strength could be significantly reduced if the soils become wetted, and earth pressures realized that are greater than those tabulated above.

Therefore, effective surface drainage near the wall should be included in project design, and drainage should be maintained effectively after construction.

Wall Backfill Wall backfill materials should be selected by the wall designer. Where select, granular fill is called for, it should meet the requirements of CDOT Class 1 Structure Backfill, unless specified otherwise by the wall designer. We do not anticipate that significant volumes of the existing site soils will be suitable for use as retaining wall backfill.

Wall Drainage Retaining walls should be provided with appropriate drain systems, as developed by the wall designer. Wall drains should be designed to discharge into appropriate drainage structures. It likely will be necessary for the design-build team to coordinate the completion of wall drain systems between the retaining wall contractor and earthwork contractor. Regular maintenance should be provided to ensure that the system continues to function effectively.

Because of the soil conditions, drainage systems for an MSE wall should include a 'blanket' drain beneath the entire base of the reinforced zone and a 'chimney' drain placed on the back cut slope behind the reinforced zone. Both the blanket and chimney drains should consist of a layer of free-draining gravel at least 12 inches in thickness, isolated from the silty site soils by a layer of non-woven filter fabric (MiraFi® 140N or the equivalent).

The free-draining gravel should be naturally occurring (not recycled) material with **5 percent or less** passing the No. 200 Sieve and **50 percent or more** retained on the No. 4 Sieve, and have a maximum particle size of **2 inches**.

Like other components of a wall drainage system, the blanket and chimney drains should discharge into an appropriate drainage structure.

LATERAL LOADS

Equivalent Fluid Weights and Friction Coefficients The following equivalent fluid pressures may be used for the design of shallow foundations for project foundation walls.

Where the full passive soil pressure is used to resist lateral loads, it should be understood that significant lateral strains will be required to mobilize the full value indicated above, likely 1 inch or more. A reduced passive pressure can be used for reduced anticipated strains, however, as tabulated below. In GROUND's opinion, cohesion should be considered to be **0 psf** for both on-site soils and Class 1 Structure Backfill.

EQUIVALENT FLUID WEIGHTS (DRAINED CONDITION)

Backfill Material	Condition				Friction Coefficient
	Active	At-Rest	Passive	Passive (½ in. ± Strain)	
Site Soils	**42 pcf**	**63 pcf**	**335 psf** (to a maximum of 3,350 psf)	**200 psf** (to a maximum of 2,000 psf)	**0.38**
Select, Granular Fill (CDOT Class 1 Structure Backfill)	**39 pcf**	**60 pcf**	-	-	**0.45**

The active and at-rest earth unit weights provided above assume well drained conditions behind the wall and a horizontal backfill surface. Wall design should incorporate any upward sloping backfills, live loads such as construction equipment, material stockpiles, etc., and other surcharge pressures. The build-up of hydrostatic pressures behind a wall also will increase lateral earth pressures on the walls.

The criteria for CDOT Class 1 Structure Backfill are tabulated in the *Project Earthwork* section of this report.

Also note that the values provided above were based on a moist unit weight (γ') of 125 pcf and an angle of internal friction (ϕ) of 30 degrees for the on-site soils, and a γ' of 135 pcf and ϕ of 34 degrees, respectively, for CDOT Class 1 Structure Backfill and are un-factored. Appropriate factors of safety should be included in design calculations by the structural engineer.

Deep Foundations Resisting Lateral Loads Based on the data obtained for this study and our experience with similar sites and conditions, the following parameters may be used in lateral load analysis using "L-Pile" or a similar computer program. Geotechnical parameters for input into that program are tabulated below for the same simplified soil / bedrock profile. These include, unit wet weights (γ'), angles of internal friction (ϕ), cohesion (**c**), for the earth materials, as well as values for strain at 50 percent of failure stress (ε_{50}) and horizontal soil modulus (k). Again, resistance to lateral loads should be neglected in the upper **3 feet** of soils, whether fill or native.

Note the following table utilizes relative elevation as previously discussed in this report, not depth below existing grade.

GEOTECHNICAL PARAMETERS FOR LATERAL LOAD ANALYSIS USING L-PILE

Soil / Bedrock Material	Approximate Elevation Range	Parameter	Value
Native Soils *(model as Sand without Free Water)*	3 feet below FFE - -19 feet	γ'	125 pcf (0.0723 pci)
		ϕ	30 degrees
		k	0.311 x 10^6 pcf (180 pci)
Native Soils *(model as Sand with Free Water)*	< -19 feet	γ'	62.4 pcf (0.0362 pci)
		ϕ	30 degrees
		k	0.207 x 10^6 pcf (120 pci)

WATER-SOLUBLE SULFATES

The concentration of water-soluble sulfates measured in selected samples of site soils up to approximately 0.01 percent by weight. (See Table 2.) Such concentrations of soluble sulfates represent a **negligible** environment for sulfate attack on concrete exposed to these materials. Degrees of attack are based on the scale of 'negligible,' 'moderate,' 'severe' and 'very severe' as described in the "Design and Control of Concrete Mixtures," published by the Portland Cement Association (PCA). The Colorado Department of Transportation (CDOT) utilizes a corresponding scale with four classes of severity of sulfate exposure (Class 0 to Class 3) as described in the table below.

Although the results of laboratory testing indicate a negligible environment, the source material for the alluvial fan contains high concertation of sulfates (i.e., gypsum and other evaporite deposits). Therefore, it is GROUND's opinion that additional water-soluble sulfate testing should be performed.

REQUIREMENTS TO PROTECT AGAINST DAMAGE TO
CONCRETE BY SULFATE ATTACK FROM EXTERNAL SOURCES OF SULFATE

Severity of Sulfate Exposure	**Water-Soluble Sulfate ($SO_4^=$) In Dry Soil** *(%)*	**Sulfate (SO_4) In Water** *(ppm)*	**Water Cementitious Ratio** *(maximum)*	**Cementitious Material Requirements**
Class 0	0.00 to 0.10	0 to 150	0.45	Class 0
Class 1	0.11 to 0.20	151 to 1500	0.45	Class 1
Class 2	0.21 to 2.00	1501 to 10,000	0.45	Class 2
Class 3	2.01 or greater	10,001 or greater	0.40	Class 3

SOIL CORROSIVITY

Data were obtained to support an initial assessment of the potential for corrosion of ferrous metals in contact with earth materials at the site, based on the conditions at the time of GROUND's evaluation. The test results are summarized in Table 2.

Soil Resistivity In order to assess the "worst case" for mitigation planning, samples of materials retrieved from the test holes were tested for resistivity in the laboratory, after

being saturated with water, rather than in the field. Resistivity also varies inversely with temperature. Therefore, the laboratory measurements were made at a controlled temperature. Measurement of electrical resistivity indicated values between approximately 1,800 and 15,967 ohm-centimeters in samples of site soils.

pH Where pH is less than 4.0, soil serves as an electrolyte; the pH range of about 6.5 to 7.5 indicates soil conditions that are optimum for sulfate reduction. In the pH range above 8.5, soils are generally high in dissolved salts, yielding a low soil resistivity.[19] Testing indicated pH values of about 7.8.

Reduction-Oxidation testing indicated red-ox potential between approximately -74 and -77 millivolts. Such lows potential typically creates a more corrosive environment.

Sulfide Reactivity testing indicated 'trace' and 'positive' results in the site soils. The presence of sulfides in the soils suggests a more corrosive environment.

Corrosivity Assessment The American Water Works Association (AWWA) has developed a point system scale used to predict corrosivity. The scale is intended for protection of ductile iron pipe but is valuable for project steel selection. When the scale equals 10 points or higher, protective measures for ductile iron pipe are indicated. The AWWA scale is presented below.

The soil characteristics refer to the conditions at and above pipe installation depth. We anticipate that drainage at the site after construction will be effective. Nevertheless, based on the values obtained for the soil parameters, the fill and native soils appear to comprise a severely corrosive environment for ferrous metals (16½ points).

If additional information or evaluation is needed regarding soil corrosivity, then the American Water Works Association or a corrosion engineer should be contacted. It should be noted, however, that changes to the site conditions during construction, such as the import of other soils, or the intended or unintended introduction of off-site water, might alter corrosion potentials significantly.

[19] American Water Works Association ANSI/AWWA C105/A21.5-05 Standard.

Table A.1 Soil-Test Evaluation

Soil Characteristic / Value	Points
Soil Resistivity	
<1,500 ohm-cm	10
1,500 to 1,800 ohm-cm	8
1,800 to 2,100 ohm-cm	5
2,100 to 2,500 ohm-cm	2
2,500 to 3,000 ohm-cm	1
>3,000 ohm-cm	0
pH	
0 to 2.0	5
2.0 to 4.0	3
4.0 to 6.5	0
6.5 to 7.5	0 *
7.5 to 8.5	0
>8.5	3
Redox Potential	
< 0 (negative values)	5
0 to +50 mV	4
+50 to +100 mV	3½
> +100 mV	0
Sulfide Reactivity	
Positive	3½
Trace	2
Negative	0
Moisture	
Poor drainage, continuously wet	2
Fair drainage, generally moist	1
Good drainage, generally dry	0

* If sulfides are present and low or negative redox-potential results (< 50 mV) are obtained, add three (3) points for this range.

PROJECT EARTHWORK

The earthwork criteria below are based on our interpretation of the geotechnical conditions encountered in the test holes. Where these criteria differ from applicable municipal specifications, e.g., for trench backfill compaction along a public utility line, the latter should be considered to take precedence.

General Considerations Project grading should be performed as early as possible in the construction sequence to allow settlement of fills and surcharged ground to be realized to the greatest extent prior to subsequent construction.

Prior to earthwork construction, existing construction debris, vegetation, and other deleterious materials should be removed and disposed of off-site. Relic underground utilities should be abandoned in accordance with applicable regulations, removed as necessary, and properly capped.

Use of Existing Fill Soils Fill materials were not recognized in the test holes during subsurface exploration, but may be encountered on site. We anticipate that in general, the existing fill soils will be geotechnically suitable for re-use in project fills. Because the fill soils were sampled and tested, however, it is possible that some may not be suitable for re-use as compacted fill, due to the presence of deleterious materials such as trash, organic material, coarse cobbles and boulders, or construction debris. Excavated fill materials should be evaluated and tested, as appropriate, with regard to re-use.

Use of Existing Native Soils Based on the samples retrieved from the test holes, we anticipate that the existing site soils free of organic materials, coarse cobbles, boulders, or other deleterious materials will be suitable, in general, for re-use as compacted fill.

Fragments of rock and cobbles, (as well as inert construction debris, e.g., concrete or asphalt) up to **6 inches** in maximum dimension may be included in project fills, in general. Such materials should be evaluated on a case-by-case basis where identified during earthwork.

The contractor should anticipate encountering significant proportions of unsuitably coarse materials (coarse cobbles and boulders) from excavated site soils. These materials can be placed / wasted in non-structural areas as approved by RFTA.

Imported Fill Materials Materials imported to the site as (common) fill should be free of organic material, and other deleterious materials. Imported material should exhibit **less than 25 percent** passing the No. 200 Sieve and a plasticity index of **10 or less**. Materials proposed for import should be approved prior to transport to the site.

Material to be imported to the site as select, granular fill should meet the criteria for CDOT Class 1 Structure Backfill (tabulated below).

CDOT CLASS 1 STRUCTURE BACKFILL

Sieve Size or Parameter	Acceptable Range
2-inch	100% passing
No. 4	30% to 100% passing
No. 50	10% to 60% passing
No. 200	5% to 20% passing
Liquid Limit	$\leq$ 35
Plasticity Index	$\leq$ 6

Soils proposed for import as select, granular fill should be tested and approved prior to transport to the site.

Fill Platform Preparation Prior to filling, the top **12 inches** of in-place materials on which fill soils will be placed (except for utility trench bottoms where bedding will be placed) should be scarified, moisture conditioned and properly compacted in accordance with the criteria below to provide a uniform base for fill placement.

If surfaces to receive fill expose loose, wet, soft, or otherwise deleterious material, additional material should be excavated, or other measures taken to establish a firm platform for filling. A surface to receive fill must be effectively stable prior to placement of fill, including trench bottoms prior to placement of bedding.

General Considerations for Fill Placement Fill soils should be thoroughly mixed to achieve a uniform moisture content, placed in uniform lifts not exceeding 8 inches in loose thickness, and properly compacted.

No fill materials should be placed, worked, rolled while they are frozen, thawing, or during poor/inclement weather conditions.

Where soils on which foundation elements will be placed are exposed to freezing temperatures or repeated freeze – thaw cycling during construction – commonly due to water ponding in foundation excavations – bearing capacity typically is reduced and/or settlements increased due to the loss of density in the supporting soils. After periods of freezing conditions, the contractor should re-work areas affected by the formation of ice to re-establish adequate bearing support.

Care should be taken with regard to achieving and maintaining proper moisture contents during placement and compaction. Materials that are not properly moisture conditioned may exhibit significant pumping, rutting, and deflection at moisture contents near optimum and above. The contractor should be prepared to handle soils of this type, including the use of chemical stabilization, if necessary.

Compaction areas should be kept separate, and no lift should be covered by another until relative compaction and moisture content within the specified ranges are obtained.

Compaction Criteria Soils placed as fill should be compacted to **97 or more percent** of the maximum dry density at moisture contents **within 3 percent below and 2 above percent** of the optimum moisture content as determined by ASTM D1557, the 'modified Proctor.'

It should be noted that given the silt content of the site soils, achieving appropriate density when placing the soils at moisture contents above the optimum may be difficult.

Also, the moisture contents of the native soils generally were quite low. The contractor should be prepared to obtain and apply sufficient water to complete project earthwork.

Settlements Settlements will occur in newly filled ground, typically on the order of 1 to 2 percent of the fill depth, where fills are properly compacted. (Settlement from fill densification is distinct from remaining potential for volume change in native soils beneath the fill.) For a 12-foot fill, for example, that corresponds to a total settlement of about 2 inches. If fill placement is performed properly and is tightly controlled, in GROUND's experience the majority (on the order of 60 to 80 percent) of that settlement typically will take place during earthwork construction, provided the contractor achieves the compaction levels indicated herein. The remaining potential settlements likely will take several months or longer to be realized, and may be exacerbated if these fills are subjected to changes in moisture content.

Cut and Filled Slopes Permanent, graded slopes supported by local soils up to **20 feet** in height should be constructed no steeper than **2 : 1** (horizontal : vertical). Minor raveling or surficial sloughing should be anticipated on slopes cut at this angle until vegetation is well re-established. Surface drainage should be designed to direct water away from slope faces into designed drainage pathways or structures.

Steeper slope angles and heights may be possible but will require detailed slope stability analysis based on final proposed grading plans. A geotechnical engineer should be retained to evaluate this on a case-by-case basis.

To achieve adequate compaction on filled slopes, it may be beneficial to over-build the slopes and then trim them back.

Slope Creep Final grading plans for the project likely will include slopes that are 10 or more feet in height. In our experience, the silty, local soils supporting the slopes will tend to 'relax' or 'creep' downslope with time. Improvements placed in proximity to the tops-of-slope can be displaced and/or rotated by these soil movements with associated (typically limited) distress. Curbs, pavements, flatwork, fences, and other improvements that are intolerant of this displacement and potential distress should be set back from the tops-of-slope or anchored below the zone of 'active' or 'creeping' soils: typically about 4 feet.

Bulking and Shrinking For planning purposes, at least 12 percent shrinkage should be anticipated during handling and placement of site soils during earthwork. We understand, however, that shrinkages as high as 17 percent have been reported in similar soils in the project area.

EXCAVATION CONSIDERATIONS

Excavation Difficulty Coarse cobbles and boulders are common in the local debris fan deposits. The test holes for this study were advanced by means of conventional, truck-mounted, geotechnical drilling equipment using air percussion (ODEX) drilling methods to allow them to be advanced through the cobbles and boulders. In the test holes, cobbles and boulders were relatively common and boulders up to 5 feet in dimension were encountered. Therefore the contractor should be prepared to excavate, handle, process and export such materials. Additionally, due to the nature of the deposits underlying the project site, the contractor should anticipate that cobbles and boulders, larger than those described in the report, may be present in the site soils. For planning purposes, approximately 25 percent cobbles and boulders should be anticipated in site soils. Therefore, greater than typical efforts and equipment wear should be anticipated to excavate, handle and place these materials.

Similarly, although not recognized in the test holes, coarse materials including debris that may be difficult or awkward to excavate may be encountered locally in existing site fill soils.

Temporary Excavations and Personnel Safety Excavations in which personnel will be working must comply with all applicable OSHA Standards and Regulations, particularly CFR 29 Part 1926, OSHA Standards-Excavations, adopted March 5, 1990. The contractor's "responsible person" should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. GROUND has provided the information in this report solely as a service to Shrewsberry and is not assuming responsibility for construction site safety or the contractor's activities.

The contractor should take care when making excavations not to compromise the bearing or lateral support for any adjacent, existing improvements.

Temporary, un-shored excavation slopes up to **15 feet** in height, in general, should be cut no steeper than **1½ : 1** (horizontal : vertical) in the on-site soils in the absence of seepage. Some surface sloughing may occur on the slope faces at these angles. Should site constraints prohibit the use of the above-indicated slope angle, temporary shoring should be used. GROUND is available to provide shoring design upon request.

Groundwater and Surface Water Groundwater was measured in the Test Hole 1 at a depth of 115 feet below existing grade or a relative elevation of -19 feet. Therefore, groundwater (other than limited volumes of perched water) is not anticipated in relatively shallow project excavations.

Should seepage or flowing groundwater be encountered in project excavations, the slopes should be flattened as necessary to maintain stability or a geotechnical engineer should be retained to evaluate the conditions. The risk of slope instability will be significantly increased in areas of seepage along excavation slopes.

The contractor should take pro-active measures to control surface waters during construction and maintain good surface drainage conditions to direct waters away from excavations and into appropriate drainage structures. A properly designed drainage swale should be provided at the tops of the excavation slopes. In no case should water be allowed to pond near project excavations.

Temporary slopes should also be protected against water flowing down them. Water flow down slopes will result in erosion, sloughing and piping, and could lead to a slope failure.

UTILITY LATERAL INSTALLATION

The measures and criteria below are based on GROUND's evaluation of the local, geotechnical conditions. Where the parameters herein differ from applicable municipal requirements, the latter should be considered to govern.

Pipe Support The bearing capacity of the site soils appeared adequate, in general, for support of typical utility lines. The pipes + contents are less dense than the soils which will be displaced for installation. Therefore, in general GROUND anticipates no significant pipe settlements in these materials where properly bedded from loading alone. Significant settlements can develop from hydro-compactive soils collapse at this site, however.

Trench bottoms may expose existing fill soils, or soft, loose, or otherwise deleterious materials. Firm materials may be disturbed by the excavation process. All such unsuitable materials should be excavated and replaced with properly compacted fill. Where existing fill soils are left in place, locally greater pipe settlements may result, causing "bellies" in the pipes.

Areas allowed to pond water will require excavation and replacement with properly compacted fill. The contractor should take particular care to ensure adequate support near pipe joints which are less tolerant of extensional strains.

Where thrust blocks are needed, the parameters provided in the *Lateral Loads* section of this report may be used for design.

Trench Backfilling Some settlement of compacted soil trench backfill materials should be anticipated, even where all the backfill is placed and compacted correctly. Typical settlements are on the order of 1 to 2 percent of fill thickness. However, the need to compact to the lowest portion of the backfill must be balanced against the need to protect the pipe from damage from the compaction process. Some thickness of backfill may need to be placed at compaction levels lower than specified (or smaller compaction

equipment used together with thinner lifts) to avoid damaging the pipe. Protecting the pipe in this manner can result in somewhat greater surface settlements. Therefore, although other alternatives may be available, the following options are presented for consideration:

Controlled Low Strength Material Because of these limitations, a conservative approach consists of backfilling the entire depth of the trench (both bedding and common backfill zones) with "controlled low strength material" (CLSM), i.e., a lean, sand-cement slurry, "flowable fill," or similar material along all trench alignment reaches with low tolerances for surface settlements.

CLSM used as pipe bedding and trench backfill should exhibit a 28-day unconfined compressive strength between **50 to 150 psi** so that re-excavation is not unusually difficult.

Placement of the CLSM in several lifts or other measures likely will be necessary to avoid 'floating' the pipe. Measures also should be taken to maintain pipe alignment during CLSM placement.

Compacted Soil Backfilling Where compacted soil backfilling is employed, using the site soils or similar materials as backfill, the risk of backfill settlements entailed in the selection of this higher risk alternative must be anticipated and accepted by the designer and RFTA.

We anticipate that the on-site soils excavated from trenches will be suitable, in general, for use as common trench backfill within the above-described limitations. Backfill soils should be free of vegetation, organic debris and other deleterious materials. Fragments of rock, cobbles, and inert construction debris (e.g., concrete or asphalt) coarser than 3 inches in maximum dimension should not be incorporated into trench backfills.

Soils placed for compaction as trench backfill should be conditioned to a relatively uniform moisture content, placed and compacted in accordance with the parameters in the *Project Earthwork* section of this report.

Pipe Bedding Pipe bedding materials, placement and compaction should meet the specifications of the pipe manufacturer and applicable municipal standards. Bedding should be brought up uniformly on both sides of the pipe to reduce differential loadings.

As discussed above, the use of CLSM or similar material in lieu of granular bedding and compacted soil backfill should be considered where the tolerance for surface settlement is low. (Placement of CLSM as bedding to at least 12 inches above the pipe can protect the pipe and assist construction of a well-compacted conventional backfill, although possibly at an increased cost relative to the use of conventional bedding.)

If granular bedding is specified, the contractor should not anticipate that significant volumes of on-site soils will be suitable for that use. Materials proposed for use as pipe bedding should be tested for suitability prior to use.

With regard to potential migration of fines into granular pipe bedding, design and installation should follow ASTM D2321, Appendix X1.8. If the granular bedding does not meet filter criteria for the enclosing soils, then non-woven filter fabric (e.g., Mirafi® 140N, or the equivalent) should be placed around the bedding to reduce migration of fines into the bedding which can result in severe, local surface settlements. Where this protection is not provided, settlements can develop/continue several months or years after completion of the project. In addition, clay or concrete cut-off walls should be installed to interrupt the granular bedding section to reduce the rates and volumes of water transmitted along the sewer alignment which can contribute to migration of fines.

Other Considerations Because of the potential for collapsible soil settlements to result in significant, extensional strains to utility pipes, pipes should be provided with restrained joints to reduce the potential for failure at joints. Connections to the building or other structures on deep foundations should be flexible and easily replaced or adjusted. Non-pressurized lines should be evaluated periodically for deformations such as pipe ‘bellies’ that would impair their efficiency, and appropriate repairs made. Maintenance plans should anticipate greater than typical utility line maintenance and replacement.

SURFACE DRAINAGE

The site soils are relatively stable with regard to moisture content – volume relationships at their existing moisture contents. Other than the anticipated, post-placement settlement of fills, post-construction soil movements will result primarily from the introduction of water into the soils underlying the proposed structure, hardscaping and pavements. Based on the site surface and subsurface conditions encountered in this study, we do not anticipate a rise in the local water table sufficient to approach grade beam or floor elevations. Therefore, wetting of the soils likely will result from infiltrating surface waters (precipitation, irrigation, etc.), and water flowing along constructed pathways such as bedding in utility pipe trenches.

The following drainage measures should be followed both for during construction and as part of project design. The facility should be observed periodically to evaluate the surface drainage and identify areas where drainage is ineffective. Routine maintenance of site drainage should be undertaken throughout the design life of the proposed facility – routine maintenance may include the removal and replacement of improvements so that proper drainage may be re-established. If these measures are not implemented and maintained effectively, the movement estimates provided in this report could be exceeded.

1) Wetting or drying of the underslab areas should be avoided during and after construction. Permitting increases/variations in moisture to the adjacent or supporting soils may result in increased total and/or differential movements.

2) Positive surface drainage measures should be provided and maintained to reduce water infiltration into foundation soils of buildings, walls, etc., or into retaining wall backfill. Underdrains should not be relied upon in surface drainage design to collect and discharge surface waters.

   A minimum slope of **12 inches in the first 10 feet** in the areas not covered with pavement or concrete slabs should be established. For areas covered with asphalt pavement or concrete slabs, slopes **should comply with ADA requirements where required**. Increasing slopes to **a minimum of 3 percent in the first 10 feet** in the areas covered with pavement or concrete slabs will

reduce, but not eliminate, the potential for moisture infiltration and subsequent volume change of the underling soils.

In no case should water be allowed to pond near or adjacent to foundation elements, hardscaping, etc.

3) Drainage also should be established and maintained to direct water away from sidewalks and other hardscaping, retaining walls, as well as utility trench alignments which are not tolerant of increased post-construction movements.

The ground surface near foundation elements should be able to convey water away readily. Cobbles or other materials that tend to act as baffles and restrict surface flow should not be used to cover the ground surface near the foundations.

Where the ground surface does not convey water away readily, additional post-construction movements and distress should be anticipated.

4) In GROUND's experience, it is common during construction that in areas of partially completed paving or hardscaping, bare soil behind curbs and gutters, and utility trenches, water is allowed to pond after rain or snow-melt events. Wetting of the subgrade can result in loss of subgrade support and increased settlements / increase heave. By the time final grading has been completed, significant volumes of water can already have entered the subgrade, leading to subsequent distress and failures. The contractor should maintain effective site drainage throughout construction so that water is directed into appropriate drainage structures.

5) In no case should water be permitted to pond adjacent to or on sidewalks, hardscaping, or other improvements as well as utility trench alignments, which are likely to be adversely affected by moisture-volume changes in the underlying soils or flow of infiltrating water.

6) Roof downspouts and drains, if used, should discharge well beyond the perimeter of the structure foundation, or be provided with positive conveyance

off-site for collected waters. Downspouts should not be routed to discharge into an underdrain system.

If roof downspouts and drains are not used, then surface drainage design should anticipate concentrated volumes of water adjacent to the buildings.

7) Irrigation water – both that applied to landscaped areas and over-spray – commonly is a significant cause of distress to improvements. Where (near-) saturated soil conditions are sustained, distress to nearby improvements should be anticipated.

To reduce to potential for such distress, vegetation requiring watering should be located **10 or more feet** from a building perimeter, retaining wall, flatwork, or other improvements. Irrigation sprinkler heads should be deployed so that applied water is not introduced near or into foundation/subgrade soils. Landscape irrigation should be limited to the minimum quantities necessary to sustain healthy plant growth.

Use of drip irrigation systems can be beneficial for reducing over-spray beyond planters. Drip irrigation also can be beneficial for reducing the amounts of water introduced to building foundation soils, but only if the total volumes of applied water are controlled with regard to limiting that introduction. Controlling rates of moisture increase beneath the foundations, floors and other improvements should take higher priority than minimizing landscape plant losses.

Where plantings are desired within 10 feet of the building, plants should be placed in water-tight planters, constructed either in-ground or above-grade, to reduce moisture infiltration in the surrounding subgrade soils. Planters should be provided with positive drainage and landscape underdrains.

As an alternative involving only a limited increase in risk, the use of water-tight planters may be replaced by local shallow underdrains beneath the planter beds.

8) Plastic membranes should not be used to cover the ground surface near the building without careful consideration of other components of project drainage. Plastic membranes can be beneficial to directing surface waters away from the

building and toward drainage structures. However, they effectively preclude evaporation and transpiration of shallow soil moisture. Therefore, soil moisture tends to increase beneath a continuous membrane. Where plastic membranes are used, additional shallow, subsurface drains should be installed.

Perforated "weed barrier" membranes that allow ready evaporation from the underlying soils may be used.

9) Regular maintenance will be required to maintain effective surface drainage. Maintenance should be anticipated to include removal and replacement of sidewalk stones, curb and gutter, sections of pavement, etc., to restore effective drainage.

SUBSURFACE DRAINAGE

As a component of project civil design, properly functioning, subsurface drain systems ("underdrains") can be beneficial for collecting and discharging saturated subsurface waters. Although the subsurface drainage system anticipated for this project may consist of perimeter underdrains along the building perimeter and underdrains constructed beneath floor system, they are addressed as underdrains herein.

Underdrains will not collect water infiltrating under unsaturated (vadose) conditions, or moving via capillarity, however. In addition, if not properly constructed and maintained, underdrains can transfer water into foundation soils, rather than remove it. This will tend to induce heave or settlement of the subsurface soils, and may result in distress. Underdrains can, however, provide an added level of protection against relatively severe post-construction movements by draining saturated conditions near individual structures should they arise, and limiting the volume of wetted soil.

Because not all of the collapsible soils will removed and replaced, the proposed construction should be protected by an underdrain system. Damp-proofing should be applied to the exteriors of below-grade elements. The provision of Tencate MiraFi® G-Series backing (or comparable wall drain provisions) on the exteriors of (some) below-grade elements may be appropriate, depending on the intended use.

GROUND is available to discuss the above options and as well as other underdrain alternatives upon request.

Geotechnical Parameters for Underdrain Design Where an underdrain system is included in project drainage design, design should incorporate the parameters below. The actual underdrain layout, outlets, and locations should be developed by a civil engineer. Typical, cross-section details of an underdrain for this project are provided in Figures 7 and 8.

An underdrain system should be tested by the contractor after installation and after placement and compaction of the overlying backfill to verify that the system functions properly.

1) An underdrain system for a building should consist of perforated, rigid, PVC collection pipe at least **4 inches** in diameter, non-perforated, rigid, PVC discharge pipe at least **4 inches** in diameter, free-draining gravel, and filter fabric.

2) The free-draining gravel should be naturally occurring (not recycled) material with **5 percent or less** passing the No. 200 Sieve and **50 percent or more** retained on the No. 4 Sieve, and have a maximum particle size of **2 inches**.

3) Each collection pipe should be surrounded on the sides and top (only) with **6 or more inches** of free-draining gravel.

   The gravel surrounding the collection pipe(s) should be wrapped with filter fabric (Mirafi 140N® or the equivalent) to reduce the migration of fines into the drain system.

4) The underdrain system should be designed to discharge at least **10 gallons per minute** of collected water.

5) The high point(s) for the collection pipe flow lines should be below the grade beam or shallow foundation bearing elevation as shown on the detail. Multiple high points can be beneficial to reducing the depths to which the system would be installed.

The collection and discharge pipe for the underdrain system should be laid on a slope as determined by the underdrain designer.

Underdrain 'clean-outs' should be provided at intervals of no more than **150 feet** to facilitate maintenance of the underdrains. Clean-outs also should be provided at collection and discharge pipe elbows of **60 degrees or more**.

6) The underdrain discharge pipes should be connected to one or more sumps from which water can be removed by pumping, or to outlet(s) for gravity discharge. We suggest that collected waters be discharged directly into the storm sewer system, if possible.

7) Regular maintenance of the underdrain systems should be performed to insure that the system continues work properly.

PAVEMENT SECTIONS

A pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade. Performance of the pavement structure is directly related to the physical properties of the subgrade soils and traffic loadings.

Standard practice in pavement design describes a typical flexible pavement section as a "20-year" design pavement. However, a pavement should not be anticipated to remain in satisfactory condition without routine maintenance and rehabilitation procedures performed throughout the life of the pavement.

Pavement sections for the RFTA-maintained pavements at the subject facility were developed in general accordance with the guidelines and procedures of the American Association of State Highway and Transportation Officials (AASHTO) and local pavement construction practice.

Subgrade Materials Our data indicate that the shallow soils at the site classify primarily as A-1-b to A-4 soils in accordance with the AASHTO classification system, with group index values of 0. Soils with these classifications typically provide excellent to fair subgrade support.

A resilient modulus of 6,800 psi (equivalent to an R-Value of about 30) was estimated to be representative of the silty site soils and was used in the development of the pavement sections. If the upper 2+ feet of pavement subgrade, as constructed, exhibit a significantly higher resilient modulus or R-Value, then thinner pavement sections likely can be developed.

It is important to note that significant decreases in soil support have been observed as the moisture content increases above the optimum. Pavements that are not properly drained may experience a loss of the soil support and subsequent reduction in pavement life.

Anticipated Traffic The design 20-year, equivalent 18-kip single axle loadings ($ESAL_{18}$'s) were calculated using traffic data provided by Shrewsberry and CDOT loading parameters. These data indicated an average total of 512 vehicles per day over the design life of the pavement, for the areas that will receive both passenger vehicle and bus traffic. Of these vehicles, 172 vehicles were indicated to be busses. For the areas to receive only passenger vehicle traffic an average total of 340 vehicles per day over the design life of the pavement was indicated. Based on these data, a design value for flexible pavements of approximately 824,900 $ESAL_{18}$'s was calculated (20,586,000 $ESAL_{18}$'s for rigid pavements) for areas to receive bus and passenger vehicle traffic. For the areas to receive only passenger vehicle traffic, a design value for flexible pavements of approximately 21,900 $ESAL_{18}$'s was calculated (32,900 $ESAL_{18}$'s for rigid pavements) for areas to receive passenger vehicle traffic. These traffic loadings were used in design of the pavement structures for the RFTA Maintenance Facility Additions.

If design traffic loadings differ or change significantly from these assumed values, GROUND should be notified to re-evaluate the pavement sections below.

Pavement Sections The soil resilient modulus and the ESAL values were used to determine the required structural number for the project pavements which then was then used to develop the pavement sections based on the DARWin™ computer program that solves the 1993 AASHTO pavement equations. A reliability level of 85 percent and a terminal serviceability of 2.0 were utilized for design of the pavement sections. A structural coefficient of 0.44 was used for hot bituminous asphalt and 0.12 was used for

aggregate base course. The minimum pavement sections for a 20-year design are tabulated below.

Minimum Pavement Sections

Location	***Composite Section*** *(inches Asphalt / inches Aggregate Base)*	***Rigid Section*** *(inches Concrete / inches Aggregate Base)*
Passenger Vehicle Traffic Areas	**3 / 6**	**6 / 6**
Bus and Heavy Vehicle Routes, All Turning Areas		**8 / 6**

Truck loading and unloading areas, fire lanes, trash collection areas, as well as other pavement areas subjected to repeated turning stresses or heavy truck traffic should be provided with rigid pavements consisting of **8 or more inches** of portland cement concrete. All concrete sections should be underlain by **6 inches** of properly compacted CDOT Class 6 Aggregate Base Course.

Pavement Materials Asphalt pavement should consist of a bituminous plant mix composed of a mixture of aggregate and bituminous material. Asphalt mixture(s) should meet the requirements of a job-mix formula established by a qualified engineer as well as applicable CDOT design requirements.

Aggregate gradation **S** (nominal ¾-inch) and binder type **PG58-22** should be used for the lower lift(s), and gradation **SX** (nominal ½-inch) and binder type **PG64-28** for the top lift. Alternate binder types may be appropriate, however, based on local availability.

For the lower (S) lift(s), lift thicknesses generally should be between **2¼ and 3½ inches**. The top (SX) lift generally should be between **2 and 3 inches** in thickness.

Aggregate base material should meet the criteria of CDOT Class 6 Aggregate Base Course. Base course should be placed in and compacted in accordance with the standards in the *Project Earthwork* section of this report.

Pavement concrete should consist of a plant mix composed of a mixture of aggregate, portland cement and appropriate admixtures meeting the requirements of a job-mix formula established by a qualified engineer as well as applicable CDOT design requirements design requirements. Concrete should have a minimum modulus of rupture of third point loading of **650 psi**. Normally, concrete with a 28-day compressive strength of 4,500 psi should develop this modulus of rupture value. The concrete should be air-entrained with approximately 6 percent air and should have a minimum cement content of **6 sacks per cubic yard**. Maximum allowable slump should be **4 inches**.

These concrete mix design criteria should be coordinated with other project requirements including any criteria for sulfate resistance presented in the *Water-Soluble Sulfates* section of this report. To reduce surficial spalling resulting from freeze-thaw cycling, we suggest that pavement concrete meet the requirements of CDOT Class P concrete. In addition, the use of de-icing salts on concrete pavements during the first winter after construction will increase the likelihood of the development of scaling. Placement of flatwork concrete during cold weather so that it is exposed to freeze-thaw cycling before it is fully cured also increases its vulnerability to scaling. Concrete placing during cold weather conditions should be blanketed or tented to allow full curing. Depending on the weather conditions, this may result in 3 to 4 weeks of curing, and possibly more.

Concrete pavements should contain sawed or formed joints. CDOT and various industry groups provide guidelines for proper design and concrete construction and associated jointing. In GROUND's opinion, all concrete pavement joints at this facility should be fully tied and doweled. Example layouts for joints, as well as ties and dowels, which may be applicable, can be found in CDOT's M standards, found at the CDOT website: http://www.dot.state.co.us/DesignSupport/. PCA, ACI and ACPA publications also provide useful guidance in these regards. Joint spacings less than the 15-foot maximum indicated in in CDOT's M standards, e.g., 10 feet or 12 feet, may be beneficial to reduce concrete cracking.

Subgrade Preparation Although subgrade preparation to a depth of 12 inches is common in the general project area, the local soils are sufficiently expansive that we do not consider 12 inches to be a sufficient depth of subgrade preparation. Remedial earthwork to any depth will not prevent pavement distress on these soils, but will tend to

reduce it and improve perceived rideability. At this site, it likely that greater than typical maintenance measures, including the removal and replacement of pavements will be required.

Remedial Earthwork Due presence of collapsible soils at the site, the pavements should be constructed on a section of properly moisture-conditioned and compacted fill at least **3 feet** in thickness or a thickness that completely removes and replaces any local un-documented fill soils, whichever is greater. This section assumes that a) traffic speeds in the parking areas and driveways will be relatively slow, and b) the facility owner will be tolerant of significant total and differential pavement post-construction movements (on the order of several inches) and the associated maintenance costs that that are necessary to re-establish effective drainage, replace distressed pavement, etc. The as-constructed R-value or resilient modulus of the upper 2 feet this remedial section should be assessed to confirm that an R-value of at least 30 or an in-place resilient modulus of at least 6,800 psi has been achieved. Where it has not been achieved, the as-constructed fill soils should be replaced with properly compacted material that meets one of these criteria.

It must be understood that a 3-foot fill section will leave a great thickness of collapsible debris fan deposits in place beneath the pavements. The fill section is beneficial primarily to slow infiltration into the underlying native soils. Therefore, effective site drainage, crack sealing, etc., are important for good pavement performance and to limit increases in pavement maintenance.

Additionally, if a performance like project floors as discussed in other sections of this report is desired, for example at a drop-off / pick-up location, then a pavement should be constructed as a floor.

Criteria for placement and compaction of fill are provided in the *Project Earthwork* section of this report.

Subgrade preparation of the selected depth should extend the full width of the pavement from back-of-curb to back-of-curb. The subgrade for any sidewalks and other project hardscaping also should be prepared in the same manner.

Geotechnical criteria for fill placement and compaction are provided in the *Project Earthwork* section of this report. The contractor should be prepared to either dry the subgrade materials or moisten them, as needed, prior to compaction.

Proof Rolling Immediately prior to paving, the subgrade should be proof rolled with a heavily loaded, pneumatic tired vehicle. Areas that show excessive deflection during proof rolling should be excavated and replaced and/or stabilized. Areas allowed to pond prior to paving will require significant re-working prior to proof-rolling. Establishment of a firm paving platform (as indicated by proof rolling) is an additional requirement beyond proper fill placement and compaction. It is possible for soils to be compacted within the limits indicated in the *Project Earthwork* section of this report and fail proof rolling, particularly in the upper range of moisture content.

Temporary Fire Truck Access Commonly, construction sites are required by local fire departments to provide temporary access for emergence response. It has been GROUND's experience these access drives are to provide support for trucks weighing up to 90,000 pounds and are typically desired to be gravel/aggregate-surfaced.

Based on our experience, a temporary section consisting of at least 12 inches of aggregate meeting the requirements of CDOT Class 5 or Class 6 Aggregate Base Course or at least 8 inches of CDOT Class 5 or Class 6 Aggregate Base Course over a layer of stabilization geotextile/geofabric, such as Mirafi® RS380*i* or the equivalent, could be utilized provided the Owner understands that this section is for temporary access during construction only and is not a replacement or an equal alternate to the pavement section(s) that was indicated previously. The aggregate base course placed for this purpose should be compacted to at least 95 percent of the maximum modified Proctor dry density. It should be noted that the aggregate base course sections indicated above are not intended to support fire truck outriggers without cribbing or similar measures.

It should be understood that with any aggregate surface, shoving and displacement of the granular materials should be expected during repetitive vehicular/equipment loading. Therefore, regular maintenance should be implemented to ensure proper surface and subsurface drainage, repair distressed/damaged areas, and re-establish grades. Application of additional aggregate may be required in this regard. Additionally, the

ability of the aggregate temporary access drive to accommodate loads as indicated above is directly related to the quality of the subgrade materials on which the aggregate is placed, not only on the aggregate section. If water infiltrates these areas, additional rutting and other distress, including a reduction in capacity, will result, requiring additional maintenance.

Additional Observations The collection and diversion of surface drainage away from paved areas is extremely important to the satisfactory performance of the pavements. The subsurface and surface drainage systems should be carefully designed to ensure removal of the water from paved areas and subgrade soils. Allowing surface waters to pond on pavements will cause premature pavement deterioration. Where topography, site constraints, or other factors limit or preclude adequate surface drainage, pavements should be provided with edge drains to reduce loss of subgrade support. The long-term performance of the pavement also can be improved greatly by proper backfilling and compaction behind curbs, gutters, and sidewalks so that ponding is not permitted and water infiltration is reduced.

Landscape irrigation in planters adjacent to pavements and in “island” planters within paved areas should be carefully controlled or differential heave and/or rutting of the nearby pavements will result. Drip irrigation systems are suggested for such planters to reduce over-spray and water infiltration beyond the planters. Enclosing the soil in the planters with plastic liners and providing them with positive drainage also will reduce differential moisture increases in the surrounding subgrade soils.

In our experience, infiltration from planters adjacent to pavements is a principal source of moisture increase beneath those pavements. This wetting of the subgrade soils from infiltrating irrigation commonly leads to loss of subgrade support for the pavement with resultant accelerating distress, loss of pavement life and increased maintenance costs. This is particularly the case in the later stages of project construction after landscaping has been emplaced but heavy construction traffic has not ended. Heavy vehicle traffic over wetted subgrade commonly results in rutting and pushing of flexible pavements, and cracking of rigid pavements. In relatively flat areas where design drainage gradients necessarily are small, subgrade settlement can obstruct proper drainage and yield increased infiltration, exaggerated distress, etc. (These considerations apply to project flatwork, as well.)

Also, GROUND's experience indicates that longitudinal cracking is common in asphalt-pavements generally parallel to the interface between the asphalt and concrete structures such as curbs, gutters, or drain pans. Distress of this type is likely to occur even where the subgrade has been prepared properly and the asphalt has been compacted properly.

The anticipated traffic loading does not include excess loading conditions imposed by heavy construction vehicles. Consequently, heavily loaded concrete, lumber, and building material trucks can have a detrimental effect on the pavement.

Most pavements will not remain in satisfactory condition and achieve their "design lives" without regular maintenance and rehabilitation procedures performed throughout the life of the pavement. Maintenance and rehabilitation measures preserve, rather than improve, the structural capacity of the pavement structure. Therefore, an effective program of regular maintenance should be developed and implemented to seal cracks, repair distressed areas, and perform thin overlays throughout the lives of the pavements. The greatest benefit of pavement overlaying will be achieved by overlaying sound pavements that exhibit little or no distress.

Crack sealing should be performed at least annually and a fog seal/chip seal program should be performed on the pavements every 3 to 4 years. After approximately 8 to 10 years after construction, patching, additional crack sealing, and asphalt overlay may be required. Prior to overlays, it is important that all cracks be sealed with a flexible, rubberized crack sealant in order to reduce the potential for propagation of the crack through the overlay. If actual traffic loadings exceed the values used for development of the pavement sections, however, pavement maintenance measures will be needed on an accelerated schedule.

EXTERIOR FLATWORK

We anticipate that the exteriors of proposed buildings and other portions of the site will be provided with concrete flatwork. Like other site improvements, flatwork will experience post-construction movements as soil moisture contents increase after construction and distress likely will result. The following measures will help to reduce damages to these improvements, but will not prevent all movements. Critical flatwork including at entrances and exits should be constructed as a structural floor spanning or a

void or a crawlspace in a similar manner to project floors. In other areas where performance like project floors as discussed in other sections of this report is desired, project exterior flatwork should be constructed as a floor. Such areas should be identified by RFTA and likely will include flatwork that is adjacent to buildings.

1) Remedial earthwork to prepare flatwork subgrades is subject to the same factors discussed in the *Pavement Sections* section of this report, and should be undertaken to the same depth.

2) Prior to placement of flatwork, a proof roll should be performed to identify areas that exhibit instability and deflection. The deleterious soils in these areas should be removed and replaced with properly compacted fill. The contractor should take care to achieve and maintain compaction behind curbs to reduce differential sidewalk settlements. Passing a proof roll is an additional requirement to placing and compacting the subgrade fill soils within the specified ranges of moisture content and relative compaction in the *Project Earthwork* section of this report. Subgrade stabilization may be cost-effective in this regard.

3) Flatwork should be provided with control joints extending to an effective depth and spaced no more than **10 feet** apart, both ways. Narrow flatwork, such as sidewalks, likely will require more closely spaced joints.

4) In no case should exterior flatwork extend to under any portion of the building where there is less than **10 inches** of vertical clearance between the flatwork and any element of the building. Exterior flatwork in contact with brick, rock facades, or any other element of the building can cause damage to the structure if the flatwork experiences movements.

Construction and Drainage Between Buildings and Pavements Proper design, drainage, construction and maintenance of the areas between individual buildings and parking/driveway areas are critical to the satisfactory performance of the project. Sidewalks, entranceway slabs and roofs, fountains, raised planters and other highly visible improvements commonly are installed within these zones, and distress in or near these improvements is common. Commonly, proper soil preparation in these areas receives little attention during overlot construction because they fall between the building and pavement areas which typically are built with heavy equipment. Subsequent

landscaping and hardscape installation often is performed by multiple sub-contractors with light or hand equipment, and necessary over-excavation and soil processing is not performed. Consequently, subgrade soil conditions commonly deviate significantly from specified ranges. Therefore, the contractor should take particular care with regard to proper subgrade preparation in the immediate building exteriors.

Concrete Scaling Climatic conditions in the project area including relatively low humidity, large temperature changes and repeated freeze – thaw cycles, make it likely that project sidewalks and other exterior concrete will experience surficial scaling or spalling. The likelihood of concrete scaling can be increased by poor workmanship during construction, such as 'over-finishing' the surfaces. In addition, the use of de-icing salts on exterior concrete flatwork, particularly during the first winter after construction, will increase the likelihood of scaling. Even use of de-icing salts on nearby roadways, from where vehicle traffic can transfer them to newly placed concrete, can be sufficient to induce scaling. Typical quality control / quality assurance tests that are performed during construction for concrete strength, air content, etc., do not provide information with regard to the properties and conditions that give rise to scaling.

Removal and replacement of concrete that exhibits scaling may be required, even if the material was within specification and placed correctly. The contractor should be aware of the local conditions and requirements and be prepared to take measures to reduce the potential for scaling and/or replace concrete that scales.

In GROUND's experience, the measures below can be beneficial for reducing the likelihood of concrete scaling. It must be understood, however, that because of the other factors involved, including weather conditions and workmanship, surface damage to concrete can develop, even where all of these measures were followed. Also, the mix design criteria should be coordinated with other project requirements including criteria for sulfate resistance presented in the *Water-Soluble Sulfates* section of this report.

1) Maintaining a maximum water/cement ratio of 0.45 by weight for exterior concrete mixes.

2) Include Type F fly ash in exterior concrete mixes as 20 percent of the cementitious material.

3) Specify a minimum, 28-day, compressive strength of 4,500 psi for all exterior concrete.

4) Including 'fibermesh' in the concrete mix also may be beneficial for reducing surficial scaling.

5) Cure the concrete effectively at uniform temperature and humidity. This commonly will require fogging, blanketing and/or tenting, depending on the weather conditions. As long as 3 to 4 weeks of curing may be required, and possibly more.

6) Avoid placement of concrete during cold weather so that it is not exposed to freeze-thaw cycling before it is fully cured.

7) Avoid the use of de-icing salts on given reaches of flatwork through the first winter after construction.

We understand that commonly it may not be practical to implement some of these measures for reducing scaling due to safety considerations, project scheduling, etc. In such cases, additional costs for flatwork maintenance or reconstruction should be incorporated into project budgets.

Frost and Ice Considerations Nearly all soils other than relatively coarse, clean, granular materials are susceptible to loss of density if allowed to become saturated and exposed to freezing temperatures and repeated freeze – thaw cycling. The formation of ice in the underlying soils can result in heaving of pavements, flatwork, and other hardscaping ("ice jacking") in sustained cold weather up to 3 inches or more. This heaving can develop relatively rapidly. A portion of this movement typically is recovered when the soils thaw, but due to loss of soil density, some degree of displacement will remain. This can result even where the subgrade soils were prepared properly.

Where hardscape movements are a design concern, e.g., at doorways, replacement of the subgrade soils with 3½ or more feet of clean, coarse sand or gravel should be considered or supporting the element on foundations similar to the building and spanning over a void. Detailed guidance in this regard can be provided upon request. It should be noted that where such open graded granular soils are placed, water can

infiltrate and accumulate in the subsurface relatively easily, which can lead to increased settlement or heave from factors unrelated to ice formation. Therefore, where a section of open graded granular soils are placed, a local underdrain system should be provided to discharge collected water. GROUND will be available to discuss these concerns upon request.

CLOSURE

Materials Testing RFTA and/or the design-build team should consider retaining a geotechnical engineer to perform materials testing during construction. The performance of such testing or lack thereof, however, in no way alleviates the burden of the contractor or subcontractor from constructing in a manner that conforms to applicable project documents and industry standards. The contractor or pertinent subcontractor is ultimately responsible for managing the quality of his work; furthermore, testing by the geotechnical engineer does not preclude the contractor from obtaining or providing whatever services that he deems necessary to complete the project in accordance with applicable documents.

Limitations This report has been prepared for Shrewsberry and RFTA as it pertains to project planning, and design and bid development for the proposed maintenance facility addition as described herein. It should not be assumed to contain sufficient information for other parties or other purposes. Shrewsberry, has agreed to the terms, conditions, and liability limitations outlined in the proposal between Shrewsberry and GROUND. Reliance on our report by the design-build team(s) for the project is granted under the same terms, conditions and liability limitations. Reliance upon our report is not granted to any other party. Requests for other third-party reliance should be directed to GROUND in writing; granting reliance by GROUND is not guaranteed.

In addition, GROUND has assumed that project construction will commence by Fall 2018. Any changes in project plans or schedule should be brought to the attention of a geotechnical engineer, in order that the geotechnical conclusions in this report may be re-evaluated and, as necessary, modified, due to (potential) changes in the site, project plans and/or the state of geotechnical practice.

The geotechnical conclusions in this report were based on subsurface information from a limited number of exploration points, as shown in Figure 1, as well as the means and methods described herein. Subsurface conditions were interpolated between and extrapolated beyond these locations. It is not possible to guarantee the subsurface conditions are as indicated in this report. Actual conditions exposed during construction may differ from those encountered during site exploration. This variability should be anticipated by the design-build contractor who, therefore, should obtain such additional geotechnical information as necessary to address such concerns.

In addition, a sub-contractor who obtains information from this report for development of his scope of work or cost estimates does so solely at his own risk and may find the geotechnical information in this report to be inadequate for his purposes or find the geotechnical conditions described herein to be at variance with his experience in the greater project area. The contractor should obtain the additional geotechnical information that is necessary to develop his workscope or cost estimates with sufficient precision. This includes, but is not limited to, information regarding excavation conditions, earth material usage, current depths to groundwater, etc. Because of the necessarily limited nature of the subsurface exploration performed for this study, the contractor should be allowed to evaluate the site using test pits or other means to obtain additional subsurface information to prepare his bid.

If during construction, surface, soil, bedrock, or groundwater conditions appear to be at variance with those described herein, a geotechnical engineer should be retained at once, so that our conclusions for this site may be re-evaluated in a timely manner and dependent aspects of project design can be modified, as necessary.

The materials encountered on-site were stable at their natural moisture content, but may change volume or lose bearing capacity or stability with changes in moisture content. Performance of the proposed structure and pavement will depend on implementation of the measures outlined in this report and on proper maintenance after construction is completed. Water is a significant cause of volume change in soils and rock, and the subject site is more than typically vulnerable in this regard. Allowing moisture infiltration may result in movements which will exceed estimates provided herein and should therefore be expected by Shrewsberry, RFTA and the design-build team.

ALL DEVELOPMENT CONTAINS INHERENT RISKS. It is important that ALL aspects of this report, as well as the estimated performance (and limitations with any such estimations) of proposed improvements are understood by Shrewsberry, RFTA and others utilizing this report. Utilizing the geotechnical parameters and measures herein for planning, design, and/or construction constitutes understanding and acceptance of the conclusions with regard to risk and other information provided herein, associated improvement performance, as well as the limitations inherent within such estimates. Ensuring correct interpretation of the contents of this report by others is not the responsibility of GROUND. If any information referred to herein is not well understood, it is imperative that Shrewsberry contact the author or a GROUND principal immediately. We will be available to meet to discuss the risks and remedial approaches presented in this report, as well as other potential approaches, upon request.

This report was prepared in accordance with generally accepted soil and foundation engineering practice in the Garfield County area at the date of preparation. The parameters provided herein are in general accordance with the City of Glenwood Springs' uniform codes. Applicable codes at the time of construction may contain criteria regarding performance of structures and/or site improvements which may differ from those provided herein. Our office should be contacted regarding any apparent disparity.

GROUND makes no warranties, either expressed or implied, as to the professional data, opinions or conclusions contained herein. Because of numerous considerations that are beyond GROUND's control, the economic or technical performance of the project cannot be guaranteed in any respect**.**

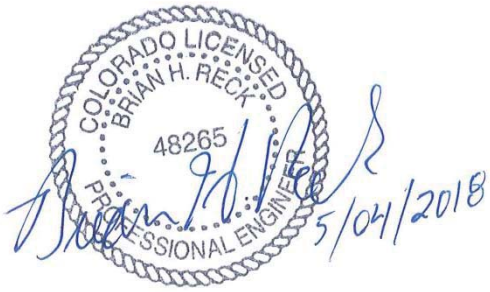
This document, together with the concepts and conclusions presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Re-use of, or improper reliance on this document without written authorization and adaption by GROUND Engineering Consultants, Inc., shall be without liability to GROUND Engineering Consultants, Inc.

GROUND appreciates the opportunity to complete this portion of the project and welcomes the opportunity to provide Shrewsberry or the owner with a proposal for construction observation and materials testing.

Sincerely,

GROUND Engineering Consultants, Inc.

Ben Fellbaum, P.G.



Reviewed by Brian H. Reck, P.G., C.E.G., P.E.



GOOGLE EARTH AERIAL IMAGE (06/23/2017)

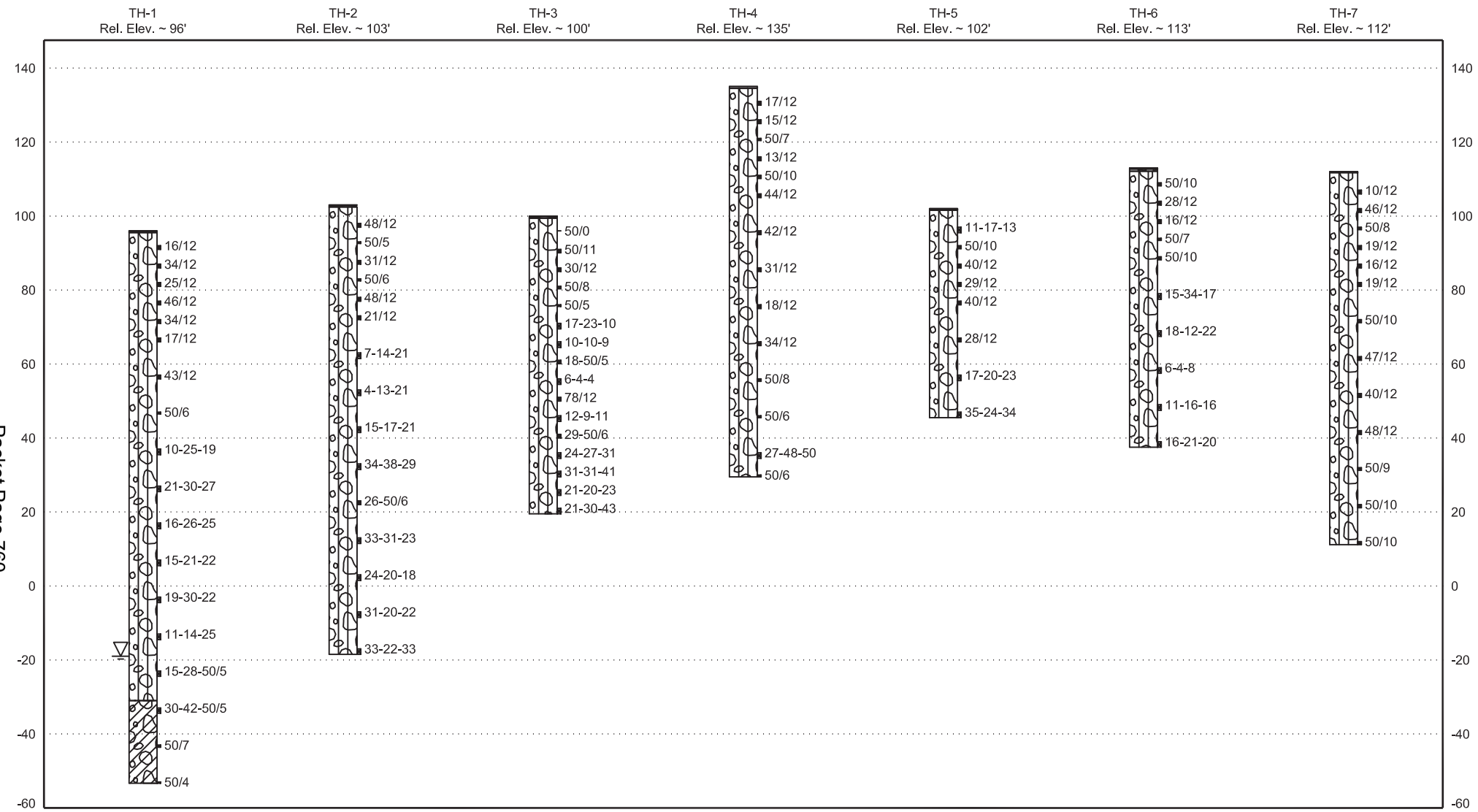
1
Indicates test hole number and approximate location.

(Not to Scale)

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LOCATION OF TEST HOLES

JOB NO.: 17-3061	FIGURE: 1
CADFILE NAME: 3061SITE.DWG	



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LOGS OF TEST HOLES

JOB NO.: 17-3061	FIGURE: 2
CADFILE NAME: 3061SITE.DWG	

LEGEND:

 Topsoil  Road Base  Asphalt



Silty Sands and Gravels: Clean to silty, fine to coarse sands and gravels with cobbles and boulders and local clays. They were dry to wet, non- to moderately plastic, loose to very dense, red to red brown and dark red brown. Wood and other plant material was noted locally in the upper portions of this section.



Clayey Sands and Gravels: Clean to clayey, fine to coarse sands and gravels with cobbles and boulders and local silts. They were dry to wet, non- to moderately plastic, dense to very dense, brown to gray brown in color.

 Drive sample, 2-inch I.D. California liner sample

23/12 Drive sample blow count, indicates 23 blows of a 140-pound hammer falling 30 inches were required to drive the sampler 12 inches.

 Drive sample, 1-3/8 inch I.D. standard sample

20/25/30 Drive sample blow count, indicates 20, 25, and 30 blows of a 140-pound hammer falling 30 inches were required to drive the sampler 18 inches.

 Depth to water level.

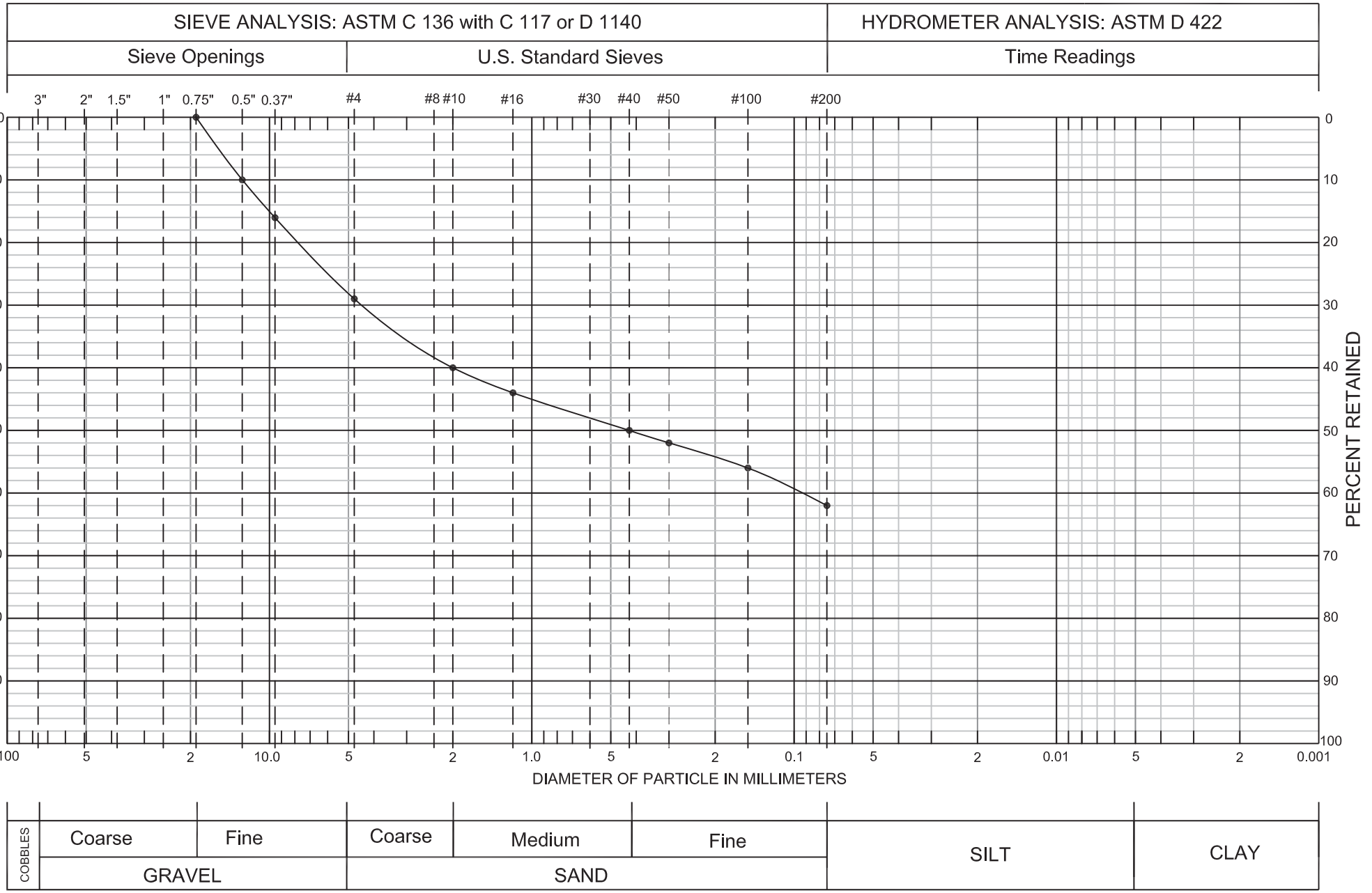
NOTES:

1) Test holes were drilled on 12/11 through 12/15/2017 with 115mm diameter ODEX augers.
2) Locations of the test holes were measured approximately by pacing from features shown on the site plan provided.
3) Elevations of the test holes were measured relative to site features and the logs of the test holes are hung to relative elevations.
4) The test hole locations and elevations should be considered accurate only to the degree implied by the method used.
5) The lines between materials shown on the test hole logs represent the approximate boundaries between material types and the transitions may be gradual.
6) Groundwater level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level may occur with time.
7) The material descriptions on this legend are for general classification purposes only. See the full text of this report for descriptions of the site materials and related information.
8) All test holes were immediately backfilled upon completion of drilling, unless otherwise specified in this report.

GROUND
ENGINEERING CONSULTANTS

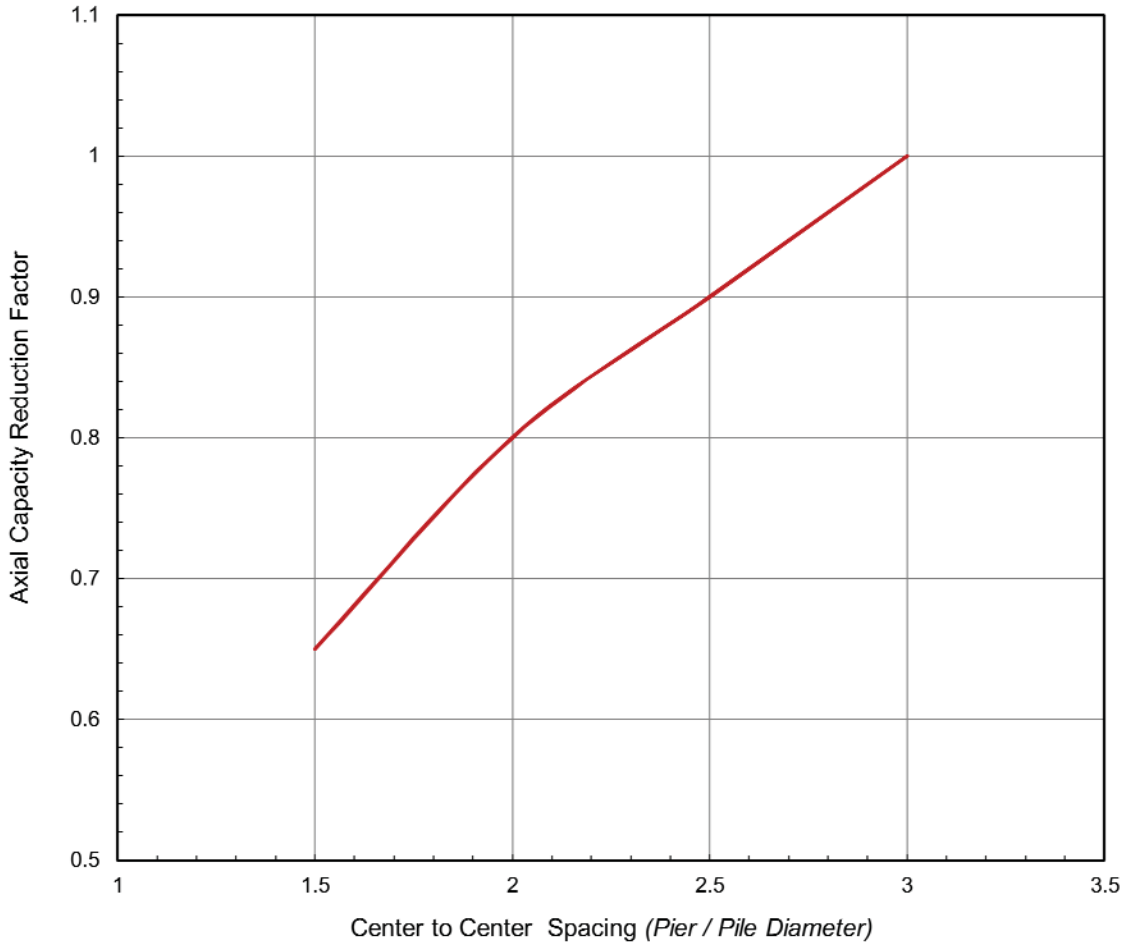
LEGEND AND NOTES

JOB NO.: 17-3061	FIGURE: 3
CADFILE NAME: 3061LEG.DWG	



Packet Page 762

Sample Location: Test Hole 1 at 129 feet	Gravel: 29 % Sand: 33 % Silt and Clay: 38 %	GROUND ENGINEERING CONSULTANTS
Sample Description: Silty, Clayey SAND with Gravel; A-4(0)	LL = 24 PI = 5	GRADATION TEST RESULTS
		JOB NO.: 17-3061 FIGURE: 4
		CADFILE NAME: 3061GRAD.DWG

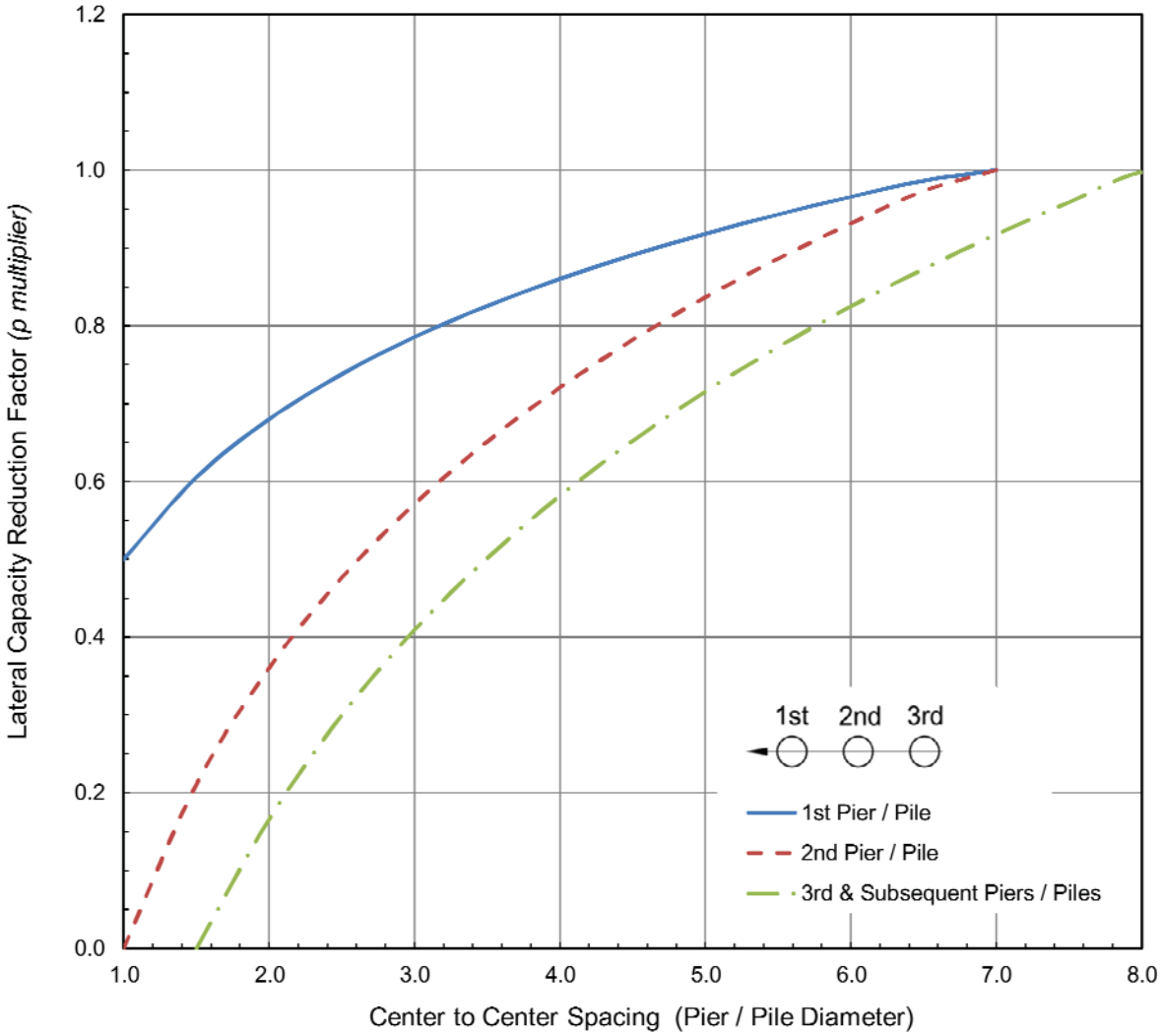


Axial Capacity Reductions as Functions of Closely Spaced Pier / Pile Elements.

The graph above provides estimated reductions in total axial capacity for closely spaced piers.

Pier / Pile reductions should be interpolated from the graph above.

GROUND ENGINEERING CONSULTANTS	
AXIAL CAPACITY REDUCTION FACTORS FOR CLOSELY SPACED PIERS / PILES	
JOB NO.: 17-3061	FIGURE: 5
CADFILE NAME: 3061APR.DWG	



Lateral Capacity Reductions (p multipliers) as Functions of Closely Spaced Pier / Pile Elements

The "1st" or "lead" pier / pile is the element that leads movement in the direction that the lateral load will cause the piers to deflect, as shown .

For lateral loads oriented perpendicular to the row of piers / piles, use the 1st pier / pile p-multiplier.

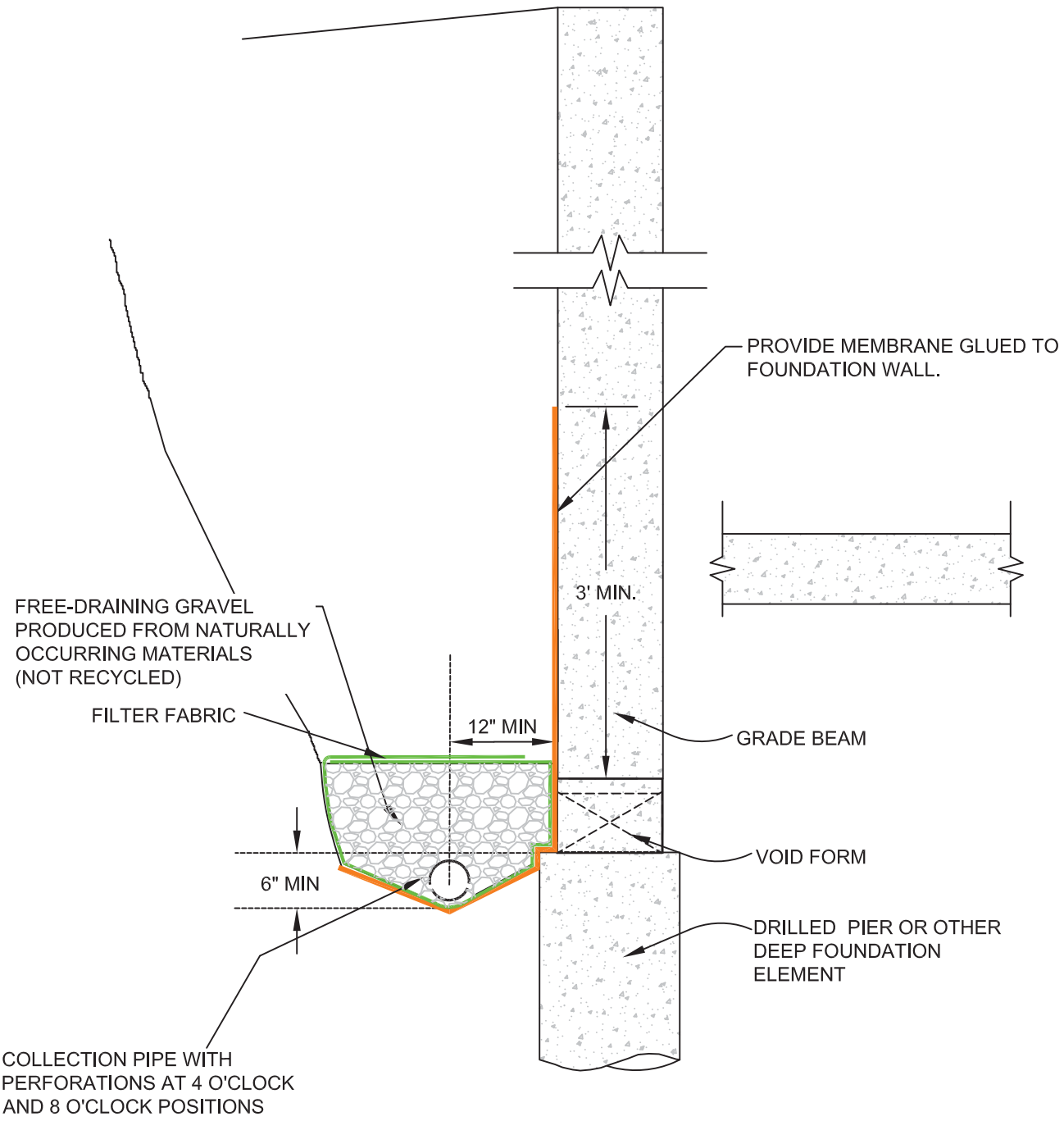
Pier / Pile reductions should be interpolated from the graph above.

Figure to be reproduced in color for clarity.

GROUND
ENGINEERING CONSULTANTS

LATERAL CAPACITY
REDUCTION FACTORS
FOR CLOSELY SPACED PIERS / PILES

JOB NO.: 17-3061	FIGURE: 6
CADFILE NAME: 3061LLPR.DWG	



SEE TEXT FOR ADDITIONAL INFORMATION

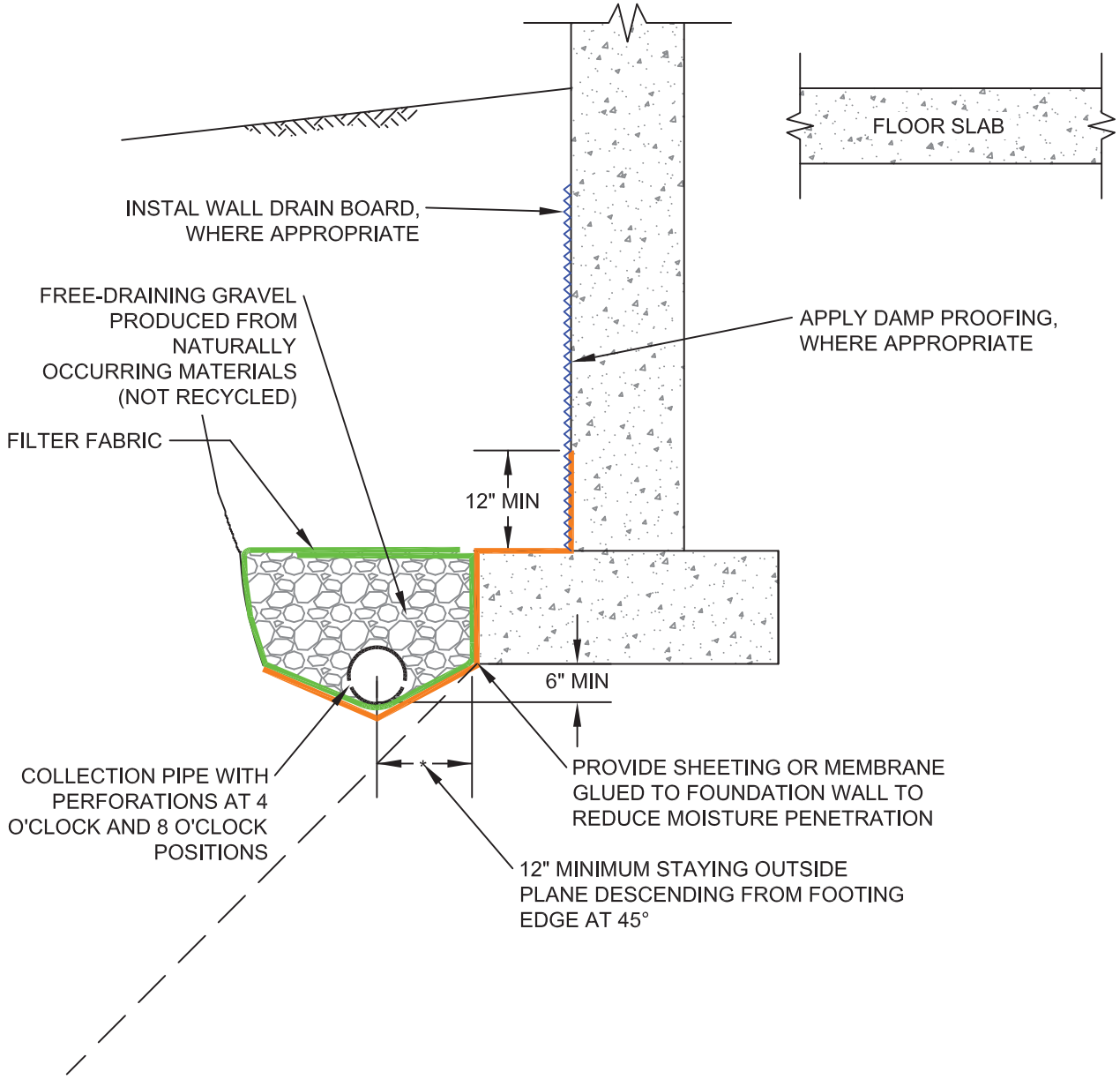
AT THE TIME OF PREPARATION OF THIS TYPICAL DETAIL, BUILDING AND DRAINAGE PLANS HAD NOT BEEN DEVELOPED FULLY. MODIFICATION OF THE DETAIL MAY BE NECESSARY AS PART OF FINAL DESIGN. GROUND CAN BE CONTACTED BY THE CIVIL ENGINEER IN THIS REGARD

NOTES:
1. THIS IS NOT A DESIGN-LEVEL DRAWING. IT SHOULD BE USED SOLELY FOR GENERAL INFORMATIONAL PURPOSES ONLY. ACTUAL UNDERDRAIN DESIGN SHOULD BE COMPLETED BY OTHERS.
2. THE UNDERDRAIN SYSTEM MUST BE TESTED BY THE CONTRACTOR AFTER INSTALLATION AND BACKFILLING TO VERIFY THAT IT FUNCTIONS PROPERLY.
3. INCLUSION OF THIS FIGURE IN CONSTRUCTION DOCUMENTS IS DONE SO AT THE DOCUMENT PREPARER'S RISK.
4. REPRODUCTION OF THIS DOCUMENT SHOULD BE IN COLOR.

GROUND
ENGINEERING CONSULTANTS

TYPICAL UNDERDRAIN DETAIL FOR DEEP FOUNDATIONS

JOB NO: 17-3061	FIGURE: 7
CADFILE NAME: 3061DRAIN01.DWG	



SEE TEXT FOR ADDITIONAL INFORMATION

NOTES:
1. THIS IS NOT A DESIGN-LEVEL DRAWING. IT SHOULD BE USED SOLELY FOR GENERAL INFORMATION PURPOSES ONLY. ACTUAL UNDERDRAIN DESIGN SHOULD BE COMPLETED BY OTHERS.
2. THE UNDERDRAIN SYSTEM MUST BE TESTED BY THE CONTRACTOR AFTER INSTALLATION AND BACKFILLING TO VERIFY THAT IT FUNCTIONS PROPERLY.
3. INCLUSION OF THIS FIGURE IN CONSTRUCTION DOCUMENTS IS DONE SO AT THE DOCUMENT PREPARER'S RISK.
4. REPRODUCTION OF THIS DOCUMENT SHOULD BE IN COLOR.

GROUND
ENGINEERING CONSULTANTS

TYPICAL UNDERDRAIN DETAIL
FOR SHALLOW FOUNDATIONS

JOB NO.: 17-3061	FIGURE: 8
CADFILE NAME: 3061DRAIN02.DWG	

GROUND ENGINEERING

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

Sample Location		Natural	Natural	Gradation		Percent	Atterberg Limits		Percent	USCS	AASHTO	Soil or
Test Hole No.	Depth *(feet)*	Moisture Content *(%)*	Dry Density *(pcf)*	Gravel *(%)*	Sand *(%)*	Passing No. 200 Sieve	Liquid Limit	Plasticity Index	Swell (Surcharge Pressure)	Classifi-cation	Classifi-cation (GI)	Bedrock Type
1	4	9.4	SD	-	-	48	24	1	-	SM	A-4 (0)	Silty SAND
1	9	5.8	118.1	-	-	30	22	1	-	SM	A-2-4 (0)	Silty SAND with Gravel
1	19	5.3	SD	-	-	17	NV	NP	-0.1 (1,100 psf)	SM	A-1-b (0)	Silty SAND with Gravel
1	29	-	-	-	-	-	-	-	-0.5 (3,000 psf)	SM	A-1-b (0)	Silty SAND with Gravel
1	69	2.0	SD	-	-	16	21	3	-	SM	A-1-b (0)	Silty SAND with Gravel
1	129	11.7	SD	29	33	38	24	5	-	SC-SM	A-4 (0)	Silty, Clayey SAND with Gravel
2	30	3.4	117.4	-	-	34	22	2	-0.1 (3,700 psf)	SM	A-2-4 (0)	Silty SAND
2	50	2.7	SD	-	-	20	22	19	-	SC	A-2-6 (0)	Clayey SAND with Gravel
2	80	2.7	SD	-	-	19	23	4	-	SC-SM	A-1-b (0)	Siltly, Clayey SAND with Gravel
2	120	5.7	SD	-	-	13	NV	NP	-	SM	A-1-b (0)	Silty SAND with Gravel
3	34	2.2	SD	-	-	22	NV	NP	-	SM	A-1-b (0)	Silty SAND with Gravel
3	49	-	-	-	-	-	-	-	-0.1 (5,800 psf)	SM	A-2-4 (0)	Silty SAND with Gravel
3	54	3.0	SD	-	-	27	NV	NP	-	SM	A-2-4 (0)	Silty SAND with Gravel
3	79	3.6	SD	-	-	22	NV	NP	-	SM	A-2-4 (0)	Silty SAND with Gravel
4	10	11.9	116.7	-	-	33	26	5	-	SC-SM	A-2-4 (0)	Silty, Clayey SAND
4	19	7.9	111.0	-	-	32	24	1	-	SM	A-2-4 (0)	Silty SAND
4	39	2.6	SD	-	-	50	25	5	-	CL-ML	A-4 (0)	Silty CLAY with Sand and Gravel

SD = Sample Disturbed, NV = Non-Viscous, NP = Non-Plastic

Job No. 17-3061

GROUND ENGINEERING

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

Sample Location		Natural	Natural	Gradation		Percent	Atterberg Limits		Percent	USCS	AASHTO	Soil or
Test Hole No.	Depth *(feet)*	Moisture Content *(%)*	Dry Density *(pcf)*	Gravel *(%)*	Sand *(%)*	Passing No. 200 Sieve	Liquid Limit	Plasticity Index	Swell (Surcharge Pressure)	Classifi-cation	Classifi-cation (GI)	Bedrock Type
4	69	-	-	-	-	-	-	-	-3.2 (4,800 psf)	SC-SM	A-1-b (0)	Silty, Clayey SAND with Gravel
5	5	1.9	SD	-	-	18	22	5	-	SC-SM	A-1-b (0)	Silty, Clayey SAND with Gravel
5	15	1.7	SD	-	-	9	18	1	-	SP-SM	A-1-b (0)	SAND with Silt and Gravel
5	25	2.4	SD	-	-	23	22	2	-	SM	A-1-b (0)	Silty SAND with Gravel
6	4	8.1	SD	-	-	37	25	7	1.1 (500 psf)	SC-SM	A-4 (0)	Silty, Clayey SAND
6	9	6.5	SD	-	-	21	28	7	-0.1 (1,100 psf)	SC-SM	A-2-4 (0)	Silty, Clayey SAND with Gravel
6	19	2.4	SD	-	-	8	22	2	-	SP-SM	A-1-b (0)	SAND with Silt and Gravel
6	34	2.6	SD	-	-	14	NV	NP	-	SM	A-1-b (0)	Silty SAND with Gravel
6	54	2.3	SD	-	-	18	22	4	-	SC-SM	A-1-b (0)	Silty, Clayey SAND with Gravel
6	74	2.9	SD	-	-	12	23	1	-	SP-SM	A-1-b (0)	SAND with Silt and Gravel
7	10	6.2	117.3	-	-	26	23	2	-	SM	A-2-4 (0)	Silty SAND with Gravel
7	15	-	-	-	-	-	-	-	-2.2 (1,900 psf)	SM	A-2-4 (0)	Silty SAND
7	20	5.5	SD	-	-	35	23	3	-	SM	A-2-4 (0)	Silty SAND
7	25	-	-	-	-	-	-	-	-2.9 (3,100 psf)	SM	A-2-4 (0)	Silty SAND
7	30	6.0	113.2	-	-	31	22	2	-4.0 (3,700 psf)	SM	A-2-4 (0)	Silty SAND
7	50	3.8	SD	-	-	14	NV	NP	-5.9 (6,000 psf)	SM	A-1-b (0)	Silty SAND with Gravel
7	80	1.9	SD	-	-	12	22	1	-	SP-SM	A-1-b (0)	SAND with Silt and Gravel
7	100	1.3	SD	-	-	7	22	2	-	SP-SM	A-1-b (0)	SAND with Silts and Gravel

SD = Sample Disturbed, NV = Non-Viscous, NP = Non-Plastic

Job No. 17-3061

GROUND ENGINEERING

TABLE 2
SUMMARY OF SOIL CORROSION TEST RESULTS

Sample Location		Water Soluble Sulfates	pH	Redox Potential	Sulfides Content	Resistivity	USCS Classifi-cation	Soil or Bedrock Type
Test Hole No.	Depth *(feet)*	*(%)*		*(mV)*		*(ohm-cm)*		
4	19	<0.01	7.8	-74	Positive	6,145	SM	Silty SAND
5	10	0.01	7.8	-77	Trace	1,800	SM	Silty SAND
7	15	<0.01	7.8	-75	Postive	15,967	SM	Silty SAND

Job No. 17-3061

Appendix A

Detailed Logs of the Test Holes

GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-1

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/12/17 **COMPLETED** 12/12/17
GROUND ELEVATION 96 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
▽ **AT TIME OF DRILLING** 115.00 ft / Elev -19.00 ft

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
96	0		Approximately 2.5 inches asphalt pavement.											
			Approximately 3 inches road base.											
			Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to wet, red to red brown.											
91	5			CAL	16/12	9.4	SD			48	24	1		
86	10			CAL	34/12	5.8	118.1			30	22	1		
81	15			CAL	25/12									
76	20			CAL	46/12	5.3	SD			17	NV	NP	0.1 @ 1,100	
71	25			CAL	34/12									
66	30			CAL	17/12								0.5 @ 3,000	
61	35													

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
61	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to wet, red to red brown. *(continued)*											
56	40			CAL	43/12									
51	45													
46	50			CAL	50/6									
41	55													
36	60			SS	10-25-19 (44)									
31	65													
26	70			SS	21-30-27 (57)	2.0	SD			16	21	3		
21	75													

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GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
21	75		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to wet, red to red brown. *(continued)*											
16	80			SS	16-26-25 (51)									
11	85													
6	90			SS	15-21-22 (43)									
1	95													
-4	100			SS	19-30-22 (52)									
-9	105													
-14	110			SS	11-14-25 (39)									
-19	115													

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-1

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
-19	115		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to wet, red to red brown. *(continued)*											
-24	120			SS	15-28-50/5"									
-29	125		Clayey, SANDS and GRAVELS with Cobbles; Fine to coarse grained, non to moderately plastic, dense to very dense, very moist to wet, gray brown to brown.											
-34	130			SS	30-42-50/5"	11.7	SD	29	33	38	24	5		
-39	135													
-44	140			CAL	50/7									
-49	145													
				CAL	50/4									

Bottom of borehole at 149.3 feet.

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-2

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/13/17 **COMPLETED** 12/13/17
GROUND ELEVATION 103 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
AT TIME OF DRILLING --- Not Encountered

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
103	0		Approximately 6.75 inches asphalt pavement.											
			Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to dense, red to red brown.											
98	5			CAL	48/12									
93	10			CAL	50/5									
88	15			CAL	31/12									
83	20			CAL	50/6									
78	25			CAL	48/12									
73	30			CAL	21/12	3.4	117.4			34	22	2	0.1 @ 3,700	
68	35													

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
68	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to dense, red to red brown. *(continued)*											
63	40			SS	7-14-21 (35)									
58	45													
53	50			SS	4-13-21 (34)	2.7	SD			20	22	19		
48	55													
43	60			SS	15-17-21 (38)									
38	65													
33	70			SS	34-38-29 (67)									
28	75													

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GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
28	75		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to dense, red to red brown. *(continued)*											
23	80			SS	26-50/6"	2.7	SD			19	23	4		
18	85													
13	90			SS	33-31-23 (54)									
8	95													
3	100			SS	24-20-18 (38)									
-2	105													
-7	110			SS	31-20-22 (42)									
-12	115													

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-2

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS		% Swell at Surcharge (psf)	Unconfined Strength (psf)
											Liquid Limit	Plasticity Index		
-12	115		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to dense, red to red brown. *(continued)*											
-17	120			SS	33-22-33 (55)	5.7	SD			13	NV	NP		

Bottom of borehole at 121.5 feet.

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-3

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/11/17 **COMPLETED** 12/11/17
GROUND ELEVATION 100 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
AT TIME OF DRILLING --- Not Encountered

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
100	0		Approximately 7 inches asphalt pavement.											
			Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to moist, loose to very dense, red to red brown.											
95	5			CAL	50/0									
90	10			CAL	50/11									
85	15			CAL	30/12									
80	20			CAL	50/8									
75	25			CAL	50/5									
70	30			SS	17-23-10 (33)									
65	35			SS	10-10-9	2.2	SD			22	NV	NP		

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
65	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to moist, loose to very dense, red to red brown. *(continued)*		(19)									
60	40			SS	18-50/5"									
55	45			SS	6-4-4 (8)									
50	50			CAL	78/12								0.1 @ 5,800	
45	55			SS	12-9-11 (20)	3.0	SD			27	NV	NP		
40	60			SS	29-50/6"									
35	65			SS	24-27-31 (58)									
30	70			SS	31-31-41 (72)									
25	75			SS	21-20-23									

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
25	75		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to moist, loose to very dense, red to red brown. *(continued)*		(43)									
20	80			SS	21-30-43 (73)	3.6	SD			22	NV	NP		

Bottom of borehole at 80.5 feet.

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-4

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/14/17 **COMPLETED** 12/14/17
GROUND ELEVATION 135 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
AT TIME OF DRILLING --- Not Encountered

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
135	0		Approximately 6 inches topsoil.											
			Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to very dense, red to dark red brown, wood and other plant material was present in the upper 27 feet.											
130	5			CAL	17/12									
125	10			CAL	15/12	11.9	116.7			33	26	5		
120	15			CAL	50/7									
115	20			CAL	13/12	7.9	111.0			32	24	1		
110	25			CAL	50/10									
105	30			CAL	44/12									
100	35													

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
100	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to very dense, red to dark red brown, wood and other plant material was present in the upper 27 feet. *(continued)*											
95	40			CAL	42/12	2.6	SD			50	25	5		
90	45													
85	50			CAL	31/12									
80	55													
75	60			CAL	18/12									
70	65													
65	70			CAL	34/12								3.2 @ 4,800	
60	75													

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GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-4

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
60	75		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to very moist, medium dense to very dense, red to dark red brown, wood and other plant material was present in the upper 27 feet. *(continued)*											
55	80			CAL	50/8									
50	85													
45	90			CAL	50/6									
40	95													
35	100			SS	27-48-50 (98)									
30	105			SS	50/6"									

Bottom of borehole at 105.5 feet.

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-5

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/13/17 **COMPLETED** 12/13/17
GROUND ELEVATION 102 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
AT TIME OF DRILLING --- Not Encountered

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
102	0		Approximately 2.25 inches asphalt pavement. Approximately 3 inches road base. Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, no- to slightly plastic, dry to moist, dense, red to red brown.											
97	5			SS	11-17-13 (30)	1.9	SD			18	22	5		
92	10			CAL	50/10									
87	15			CAL	40/12	1.7	SD			9	18	1		
82	20			CAL	29/12									
77	25			CAL	40/12	2.4	SD			23	22	2		
72	30													
67	35													

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GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-5

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
67	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, no- to slightly plastic, dry to moist, dense, red to red brown. *(continued)*	CAL	28/12									
62	40													
57	45			SS	17-20-23 (43)									
52	50													
47	55			SS	35-24-34 (58)									

Bottom of borehole at 56.5 feet.

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-6

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/15/17 **COMPLETED** 12/15/17
GROUND ELEVATION 113 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
AT TIME OF DRILLING --- Not Encountered

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
113	0		Approximately 3.5 inches asphalt pavement.											
			Approximately 7 inches road base.											
			Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to moist, red to red brown to white.											
108	5			CAL	50/10	8.1	SD			37	25	7	1.1 @ 500	
103	10			CAL	28/12	6.5	SD			21	28	7	0.1 @ 1,100	
98	15			CAL	16/12									
93	20			CAL	50/7	2.4	SD			8	22	2		
88	25			CAL	50/10									
83	30													
78	35			SS	15-34-17	2.6	SD			14	NV	NP		

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
78	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to moderately plastic, dry to moist, red to red brown to white. *(continued)*		(51)									
73	40													
68	45			SS	18-12-22 (34)									
63	50													
58	55			SS	6-4-8 (12)	2.3	SD			18	22	4		
53	60													
48	65			SS	11-16-16 (32)									
43	70													
38	75			SS	16-21-20	2.9	SD			12	23	1		

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS		% Swell at Surcharge (psf)	Unconfined Strength (psf)
											Liquid Limit	Plasticity Index		
38	75				(41)									
			Bottom of borehole at 75.5 feet.											

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GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-7

CLIENT Shrewsberry
PROJECT NAME RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061
PROJECT LOCATION Glenwood Springs, CO

DATE STARTED 12/14/17 **COMPLETED** 12/14/17
GROUND ELEVATION 112 ft **HOLE SIZE** 5 inch

DRILLING CONTRACTOR Authentic
NORTHING

DRILLING METHOD ODEX
EASTING

LOGGED BY BAF **CHECKED BY** BHR
GROUND WATER LEVELS:
AT TIME OF DRILLING --- Not Encountered

NOTES
AFTER DRILLING N / A --- N / A

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
112	0		Approximately 3 inches gravel.											
			Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to moist, dark red to red to red brown.											
107	5			CAL	10/12									
102	10			CAL	46/12	6.2	117.3			26	23	2		
97	15			CAL	50/8								2.2 @ 1,900	
92	20			CAL	19/12	5.5	SD			35	23	3		
87	25			CAL	16/12								2.9 @ 3,100	
82	30			CAL	19/12	6.0	113.2			31	22	2	4.0 @ 3,700	
77	35													

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
77	35		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to moist, dark red to red to red brown. *(continued)*											
72	40			CAL	50/10									
67	45													
62	50			CAL	47/12	3.8	SD			14	NV	NP	5.9 @ 6,000	
57	55													
52	60			CAL	40/12									
47	65													
42	70			CAL	48/12									
37	75													

GROUND LOG - GROUND TEMPLATE.GDT - 1/11/18 14:46 - C:\USERS\CLINTON.MYERS\DESKTOP\CURRENT PROJECT\3061.GPJ

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GROUND
ENGINEERING CONSULTANTS

BORING NUMBER TH-7

CLIENT Shrewsberry **PROJECT NAME** RFTA Glenwood Springs Maintenance Facility

GROUND PROJECT #: 17-3061 **PROJECT LOCATION** Glenwood Springs, CO

Elevation (ft)	Depth (ft)	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Blow Count CAL=12" Typ SS=18" Typ	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Gravel	Percent Sand	Percent Passing No. 200 Sieve	ATTERBERG LIMITS: Liquid Limit	ATTERBERG LIMITS: Plasticity Index	% Swell at Surcharge (psf)	Unconfined Strength (psf)
37	75		Silty SAND and GRAVEL with Cobbles and Boulders; Fine to coarse grained, non- to slightly plastic, dry to moist, dark red to red to red brown. *(continued)*											
32	80			CAL	50/9	1.9	SD			12	22	1		
27	85													
22	90			CAL	50/10									
17	95													
12	100			CAL	50/10	1.3	SD			7	22	2		

Bottom of borehole at 100.8 feet.

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GROUND
ENGINEERING

April 9, 2021

Subject: Additional Geotechnical Parameters for Site Retaining Walls, **Roaring Fork Transportation Authority Maintenance Facility**, Glenwood Springs, Colorado

Job No. 20-6611

Mr. Eric Rolle, P.E.
Shrewsberry & Associates, LLC
2696 South Colorado Boulevard, Suite 460
Denver, Colorado 80222

Dear Mr. Rolle:

GROUND Engineering Consultants, Inc. (GROUND) performed a subsurface exploration program to develop geotechnical parameters in support of project planning and initial design of the proposed expansion of the Roaring Fork Transportation Authority maintenance facility located in Glenwood Springs, Colorado. Our findings and conclusions were presented in a report dated May 4, 2018 [1]. Reference is made to that report for a description of the site surface and subsurface conditions, our general geotechnical findings and conclusions, and the limitations on our services, that also apply to GROUND's conclusions herein. We consider all parameters and considerations in that report not specifically superseded herein to remain valid.

Our May 4, 2018, report included comments regarding retaining wall drainage including, "… Because of the soil conditions, drainage systems for an MSE wall should include a 'blanket' drain beneath the entire base of the reinforced zone and a 'chimney' drain placed on the back cut slope behind the reinforced zone. Both the blanket and chimney drains should consist of a layer of free-draining gravel at least 12 inches in thickness, isolated from the silty site soils by a layer of non-woven filter fabric (Mirafi® 140N or the equivalent)."

Based on the initial construction of the site retaining walls, the following comments should be added to the above paragraph:

However, where

[1] GROUND Engineering Consultants, Inc., 2018, *Geotechnical Evaluation, Roaring Fork Transportation Authority Maintenance Facility, Glenwood Springs, Colorado, Revision 1*, Job No. 17-3061, prepared for Shrewsberry & Associates, LLC, dated May 4, 2018

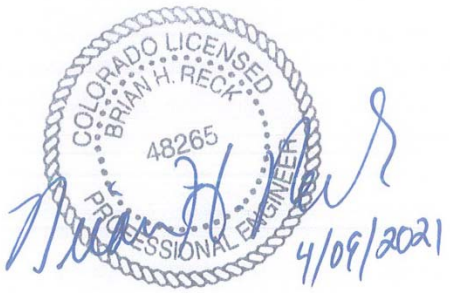
a) a remedial section of compacted subgrade fill/backfill is constructed beneath an MSE wall, and
b) the wall backfill consists of similar soils to the fill comprising the remedial subgrade fill/backfill section,

the blanket drain should then be placed at the base and across the entire base of the remedial fill/backfill section, and the chimney drain at the back cut slope should extend down to the blanket drain at base of the remedial fill/backfill section.

We trust that this provided the additional information that you needed at this time. If you have any questions, please contact this office.

Sincerely,

GROUND Engineering Consultants, Inc.



Brian H. Reck, P.G., C.E.G., P.E.



Reviewed by Hsien-Hsiang (Sean) Chiang, Ph.D., P.E.

January 24, 2021

City of Glenwood Springs Engineering
101 8th St, Glenwood Springs, CO 81601

RE: RFTA Bus Barn Preliminary Drainage Analysis Findings

Dear City of Glenwood Springs Engineering Department,

RFTA plans to make improvements to their bus operations headquarters within the project site shown on the attached Vicinity Map. Improvements include the addition of a new bus storage facility and a new parking layout. To proceed with the drainage design of the project, a preliminary drainage analysis of the area that drains through the site and all the way to the Colorado River was performed for both existing and proposed conditions. The findings presented below should assist with design decisions as it pertains to downstream capacity of existing storm sewers. The findings should also help the city conclude which drainage requirements would be of benefit as it pertains to stormwater management.

Existing Conditions

The total basin area included in this study was 231.06 acres. According to the NRCS Websoil Survey, hydrologic soil groups in the drainage area include A, B and D soils. Attached is the NRCS soil report. Of the total area, 174.83 acres of runoff discharges to the west and 56.23 acres of runoff discharges to the north.

Per City request, we are also analyzing additional basins adjacent to our site that we are not impacting directly, but have potentially associated drainage elements to, at a minimum, assess and calibrate so there is a more “overall” understanding of the various systems in this region of West Glenwood. Some basins are far below other infrastructure and other basins are not impacted at all by our site. The attached existing drainage exhibit, part one, shows the extents of the existing basins, the two discharge locations and basins that are considered onsite versus offsite. Looking at the attached existing drainage exhibit, part two, shows the existing drainage patterns through the site.

Existing Conditions – Discharge to the West

Runoff discharging from the west, shown on the attached drainage exhibit part two, drains to an existing 24-inch pipe located beneath the Midland Avenue multi-use path. The discharge from the 24-inch pipe is conveyed through a series of other pipes and ditches before entering an existing 48-inch pipe, located beneath the Midland Avenue and railroad tracks intersection, to ultimately discharge to the Colorado River.

It’s worth noting that in basin 300, there is an existing inlet that has no outlet pipe. This has been verified from 2022 site investigation and past SGM survey data. In addition, the pipe that goes into the basin 300 inlet collects flows from basins 400, 410, 420 and 430 from an inlet in basin 400. Because these structures have no effective discharge location, they were ignored in this analysis and all upstream flows are assumed to bypass these two existing structures.

Existing Conditions – Discharge to the North

Runoff discharging from the north, shown on the attached drainage exhibit part two, drains to an existing 18-inch pipe located beneath Midland Avenue. The discharge from the 18-inch pipe is conveyed to a ditch south of the railroad tracks before entering an existing 48-inch pipe, located beneath the railroad tracks, to enter another ditch, then another 48-inch pipe beneath Devereux Road to ultimately discharge to the Colorado River. The size of all three of these pipes were verified in 2022.

It should be noted that Existing Drainage Exhibits Part 1 and Part 2 show the extents of existing impervious. However, development has already been approved within basins 810 and 820 as a part of the Meadows development. In addition, basin 710 is owned by RFTA and could be developed. Therefore, it was assumed that 80% of the area of basins 710, 810 and 820 are impervious.

Upstream of the existing 18-inch pipe, the existing RFTA operations site includes several stormwater management features. These include a debris catch basin uphill (south) of the site, water quality ponds that serve the West Glenwood Park and Ride and culverts that convey stormwater beneath trails and roads as needed.

There are two concerns with regards to the debris catch basin to the south of the project site, shown on the attached Existing Drainage Exhibit Part 2. First, below in figure 1, shows that the outlet to the debris catch basin is clogged with a significant amount of sediment and could easily be fully plugged if not remedied. Second, the emergency overflow of the debris catch basin does not discharge to the same place the pipe discharges to. Looking at the Existing Drainage Exhibit Part 2, the debris catch basin has the pipe discharging to basin 340, but the emergency spillway discharges into basin 600. This occurs because there is a low point in the rim of the debris catch basin on the east side that is two feet lower than the likely intended emergency spillway on the west side. In the unlikely event that the debris catch basin makes use of the emergency spillway, it will discharge to basin 600, not basin 340.



Figure 1: Debris catch basin Outlet Clogged with Sediment

Soils

The site is a known area of poor and varying soil conditions. Eagle Valley Evaporite, expansive or collapsive soils, generally due to hydro-consolidation have a history of revealing themselves in the entire Meadows area to the river, even as recent as a notable sink hole in 2003 along Midland Avenue. Such conditions encourage, as infrastructure allows, consideration of evacuating water off site as quickly as possible and not storing water on site except as absolutely necessary.

Proposed Conditions

The total basin area included in the proposed condition was 231.06 acres. Of the total area, 174.78 acres of runoff discharges to the west and 56.28 acres of runoff discharges to the north. From the existing to the proposed condition, the total impervious area will decrease by 0.03 acres.

Upstream of the discharge locations, new drainage infrastructure will be designed to convey stormwater runoff per the Glenwood Engineering Standards. As this is a preliminary drainage analysis, detailed sizing of proposed pipes has not been completed yet.

Methods

HydroCAD version 10.10-6a was used for the hydrological analysis and routing of hydrographs through pond structures. Hydrographs were generated using SCS method and hydrograph routing was performed using TR-55. A type-II, 6-hour distribution, modeled over a period of 24 hours was used generate the hydrographs. The precipitation depth used in the SCS method was obtained from NOAA Atlas 14, attached, where the 25 and 100-year, 6-hour storm events have rainfall depths of 1.36 inches and 1.68 inches, respectively. The storm events included in the modeling output include the 25-year and 100-year storm events.

SCS method uses curve numbers to generate hydrographs, which are a function of imperviousness, hydrologic soil group, and landscape description. The extents of the existing impervious was digitized, shown in the attached HydroCAD diagrams. The hydrologic soil group was obtained from the NRCS Web Soil Survey. See attached soils report. The landscape description used to obtain curve numbers was Pinyon/Juniper range in fair condition. Table one, below, summarizes the curve numbers used in this analysis.

Table 1: Curve Number Summary Table

Curve Numbers for Pinyon/Juniper Range in Fair Condition					
Description	Impervious	A Soils	B Soils	C Soils	D Soils
Curve Number	98	58	58	73	80

The time of concentration was assumed to be 5 minutes for all basins, except for basins 310, 340, 360 and 820. As this is a preliminary analysis, this was a conservative assumption.

The parameters for the outlet structures at each pond node were obtained from past survey, past plans, LiDAR data and field observations. The sources for the structure data are included in the pond node notes in the attached HydroCAD model output. In the final drainage analysis, existing outlet structures will be verified with survey data.

Results

During the 100-year precipitation event, most pond nodes and reach nodes have sufficient conveyance capacity to convey the 100-year peak flow rates without over topping and spilling in the existing and proposed condition. Pond nodes P100 and P110 have some spill occurring. However, the amount of spill is small at less than 2 cfs for both the existing and proposed condition. Table 2, below, summarizes the peak flow rates at key discharge points. Detailed modeling output for the 100-year storm event is attached.

Table 2: 100 Year Event Peak Flow Rates

Discharge Locations	West	North
Existing Peak Flow (cfs)	21.90 cfs	50.42 cfs
Proposed Peak Flow (cfs)	20.37 cfs	50.41 cfs

Table 2, below, summarizes the pipe capacity calculations for the two existing pipes that directly discharge to the Colorado River. Pipe capacity was calculated using manning's equation while assuming the hydraulic grade line is at the top of the pipe.

Table 2: 100-Year Event Conveyance Capacity Calculation Summary

Pipe Label	**PIPE FLOW** SUM (cfs)	Slope (ft/ft)	Dia. (in.)	n	Qfull (cfs)	Vfull (ft/sec)	Excess Capacity (cfs)
Ex 48" Pipe West	**20.37**	0.0100	48	0.013	143.64	11.4	123.3
Ex 48" Pipe North	**50.41**	0.0370	48	0.013	276.30	22.0	225.9

Recommendation for Drainage Design Requirements - Detention

As it pertains to the detention requirement, the results presented in the previous section were expected. The reduction of impervious area decreased the peak flowrate. In addition, calculations in the previous section show that the downstream conveyance structures have sufficient capacity to convey the peak flow with only some spill, less than 2 cfs, occurring at pond nodes P100 and P110.

For runoff that drains to the west, the peak flowrate decreased by 1.53 cfs from 21.90 cfs to 20.37 cfs. The existing 48-inch pipe beneath Midland Avenue has sufficient capacity to convey the 100-year storm event.

For the runoff that drains to the north, the peak flowrate decreased by 0.01 cfs from 50.42 cfs to 50.41 cfs. The existing 48-inch pipe beneath Devereux Road has sufficient capacity to convey the 100-year storm event.

Since downstream structures have sufficient conveyance capacity for the 100-year storm event, the detention requirement should be waived. In addition, existing poor soils on site, when present with standing water, can compromise the structural integrity of nearby structures. Therefore, it's preferred to

move runoff through the site quickly, while operating within the existing downstream conveyance capacity.

Recommendation for Drainage Design Requirements – Water Quality

As it pertains to water quality, there are a few ways that water quality can be provided. First, there are three existing sedimentation ponds, located in basin 620, 640 and 650 in the HydroCAD existing and proposed drainage exhibits. In the existing conditions, 6.91 acres of runoff discharge to an existing sedimentation pond. In the proposed condition, 6.93 acres of runoff discharge to an existing sedimentation pond.

Additional water quality treatment can be provided by improving the outlet structure to the debris catch basin, pond P360. As shown in figure 1, above, the existing outlet has little benefit for water quality. The installation of a structure with small vertical orifices at some elevation above the pond bottom will help settle out accumulated sediment.

Another way to provide water quality would be adding sumps to the proposed inlets. The preliminary storm sewer layout includes 16 inlets that will serve basin 350 and 680 in the proposed condition.

Conclusion

The purpose of this preliminary drainage analysis was to understand the current level of service provided by the existing drainage system and to clarify the drainage requirements in the proposed condition. The analysis of the existing conditions found that the site has sufficient capacity to convey the 100-year storm with some spill, less than 2 cfs, occurring at pond nodes P100 and P110. The proposed condition will result in a net reduction of impervious area by 0.03 acres, thereby decreasing the peak runoff. None the less, the detention should be waived as downstream conveyance pipes are shown to have sufficient capacity for both the existing and proposed condition. As for water quality, the proposed condition will provide water quality through the existing sedimentation ponds P620, P630 and P640. Additional water quality, if required, can be provided through improving the debris catch basin outlet structure and installation of inlets with sumps. SGM hopes that the City agrees with the assessments made in this report and that this report provides useful information to the City with regards to drainage patterns in the vicinity of the RFTA bus operations facility.



Project: Glenwood Springs Maintenance Facility – Heated Vehicle Storage

Vicinity Map



Source: Garfield County qPublic.net GIS Data Viewer

Hydrologic Soil Group—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Watershed_Shapefile_Jan23)



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: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 14, Sep 2, 2021

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

Date(s) aerial images were photographed: Sep 24, 2015—Nov 2, 2015

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
2	Arle-Ansari-Rock outcrop complex, 12 to 65 percent slopes	B	80.2	34.7%
9	Badland	D	26.5	11.5%
11	Begay sandy loam, 6 to 12 percent slopes	A	15.3	6.6%
15	Chilton channery loam, 12 to 25 percent slopes	A	73.9	32.0%
67	Torriorthents-Rock outcrop complex, steep	D	35.0	15.2%
73	Water		0.1	0.1%
Totals for Area of Interest			**231.1**	**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

NOAA Atlas 14, Volume 8, Version 2
Location name: Glenwood Springs, Colorado, USA*
Latitude: 39.5574°, Longitude: -107.3563°
Elevation: 5796.18 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.125** (0.098-0.161)	**0.178** (0.140-0.230)	**0.261** (0.205-0.339)	**0.328** (0.256-0.428)	**0.417** (0.311-0.560)	**0.483** (0.352-0.660)	**0.546** (0.384-0.768)	**0.608** (0.409-0.882)	**0.685** (0.443-1.03)	**0.741** (0.469-1.14)
10-min	**0.183** (0.144-0.236)	**0.260** (0.205-0.336)	**0.383** (0.300-0.496)	**0.481** (0.375-0.627)	**0.611** (0.455-0.821)	**0.707** (0.515-0.967)	**0.799** (0.562-1.13)	**0.890** (0.599-1.29)	**1.00** (0.649-1.51)	**1.09** (0.686-1.67)
15-min	**0.223** (0.176-0.288)	**0.317** (0.250-0.410)	**0.467** (0.366-0.605)	**0.586** (0.457-0.765)	**0.745** (0.554-1.00)	**0.862** (0.628-1.18)	**0.975** (0.686-1.37)	**1.09** (0.731-1.58)	**1.22** (0.791-1.84)	**1.32** (0.837-2.03)
30-min	**0.295** (0.233-0.382)	**0.414** (0.326-0.535)	**0.599** (0.470-0.777)	**0.746** (0.581-0.973)	**0.937** (0.696-1.25)	**1.08** (0.782-1.47)	**1.21** (0.848-1.69)	**1.33** (0.896-1.93)	**1.49** (0.960-2.23)	**1.59** (1.01-2.45)
60-min	**0.391** (0.308-0.505)	**0.513** (0.404-0.664)	**0.707** (0.554-0.917)	**0.860** (0.670-1.12)	**1.06** (0.789-1.42)	**1.21** (0.879-1.65)	**1.35** (0.946-1.89)	**1.48** (0.995-2.14)	**1.64** (1.06-2.46)	**1.76** (1.11-2.70)
2-hr	**0.486** (0.387-0.620)	**0.613** (0.488-0.783)	**0.814** (0.646-1.04)	**0.974** (0.768-1.25)	**1.18** (0.892-1.56)	**1.34** (0.986-1.80)	**1.48** (1.06-2.05)	**1.62** (1.11-2.32)	**1.80** (1.18-2.66)	**1.92** (1.23-2.91)
3-hr	**0.569** (0.457-0.720)	**0.686** (0.550-0.869)	**0.872** (0.697-1.11)	**1.02** (0.811-1.30)	**1.22** (0.930-1.61)	**1.37** (1.02-1.83)	**1.51** (1.09-2.08)	**1.65** (1.14-2.35)	**1.83** (1.21-2.69)	**1.96** (1.26-2.95)
6-hr	**0.741** (0.602-0.925)	**0.844** (0.684-1.05)	**1.01** (0.820-1.27)	**1.16** (0.930-1.46)	**1.36** (1.06-1.78)	**1.52** (1.15-2.02)	**1.68** (1.23-2.30)	**1.85** (1.29-2.60)	**2.07** (1.39-3.02)	**2.25** (1.46-3.33)
12-hr	**0.922** (0.758-1.13)	**1.05** (0.863-1.30)	**1.27** (1.04-1.57)	**1.46** (1.18-1.81)	**1.72** (1.35-2.22)	**1.93** (1.48-2.53)	**2.15** (1.59-2.90)	**2.38** (1.68-3.30)	**2.69** (1.82-3.85)	**2.93** (1.92-4.27)
24-hr	**1.12** (0.933-1.36)	**1.29** (1.07-1.56)	**1.57** (1.30-1.91)	**1.81** (1.49-2.22)	**2.16** (1.72-2.75)	**2.44** (1.89-3.15)	**2.73** (2.04-3.63)	**3.03** (2.16-4.15)	**3.45** (2.36-4.87)	**3.77** (2.51-5.42)
2-day	**1.36** (1.14-1.62)	**1.55** (1.30-1.85)	**1.87** (1.57-2.25)	**2.16** (1.80-2.60)	**2.57** (2.07-3.24)	**2.91** (2.28-3.71)	**3.26** (2.47-4.28)	**3.64** (2.63-4.92)	**4.15** (2.87-5.79)	**4.56** (3.06-6.45)
3-day	**1.52** (1.29-1.80)	**1.74** (1.47-2.06)	**2.11** (1.78-2.51)	**2.43** (2.04-2.91)	**2.89** (2.35-3.60)	**3.26** (2.58-4.12)	**3.65** (2.77-4.74)	**4.05** (2.94-5.42)	**4.60** (3.20-6.35)	**5.04** (3.40-7.06)
4-day	**1.66** (1.41-1.95)	**1.90** (1.61-2.24)	**2.30** (1.95-2.72)	**2.64** (2.23-3.14)	**3.13** (2.55-3.86)	**3.52** (2.79-4.41)	**3.92** (2.99-5.05)	**4.34** (3.16-5.76)	**4.91** (3.43-6.72)	**5.35** (3.63-7.45)
7-day	**2.01** (1.73-2.34)	**2.26** (1.95-2.64)	**2.69** (2.31-3.15)	**3.06** (2.61-3.59)	**3.58** (2.94-4.36)	**3.99** (3.19-4.93)	**4.41** (3.40-5.60)	**4.84** (3.56-6.34)	**5.43** (3.83-7.33)	**5.89** (4.03-8.09)
10-day	**2.31** (2.00-2.67)	**2.58** (2.23-2.98)	**3.03** (2.61-3.51)	**3.41** (2.92-3.98)	**3.95** (3.27-4.76)	**4.37** (3.53-5.36)	**4.81** (3.73-6.06)	**5.26** (3.89-6.83)	**5.87** (4.16-7.86)	**6.34** (4.37-8.64)
20-day	**3.16** (2.78-3.60)	**3.50** (3.07-3.98)	**4.05** (3.54-4.63)	**4.52** (3.92-5.18)	**5.16** (4.32-6.12)	**5.67** (4.62-6.83)	**6.18** (4.85-7.65)	**6.70** (5.01-8.55)	**7.40** (5.30-9.73)	**7.93** (5.52-10.6)
30-day	**3.87** (3.43-4.37)	**4.29** (3.79-4.85)	**4.97** (4.37-5.63)	**5.53** (4.84-6.29)	**6.29** (5.29-7.37)	**6.88** (5.64-8.19)	**7.45** (5.88-9.13)	**8.04** (6.05-10.1)	**8.80** (6.35-11.5)	**9.37** (6.57-12.4)
45-day	**4.79** (4.27-5.35)	**5.33** (4.75-5.96)	**6.19** (5.49-6.95)	**6.89** (6.07-7.77)	**7.81** (6.61-9.05)	**8.50** (7.02-10.0)	**9.17** (7.28-11.1)	**9.82** (7.43-12.2)	**10.6** (7.72-13.7)	**11.2** (7.93-14.8)
60-day	**5.58** (5.00-6.20)	**6.24** (5.59-6.94)	**7.28** (6.49-8.12)	**8.10** (7.18-9.07)	**9.17** (7.78-10.5)	**9.95** (8.24-11.6)	**10.7** (8.51-12.8)	**11.4** (8.65-14.1)	**12.3** (8.91-15.6)	**12.9** (9.11-16.8)

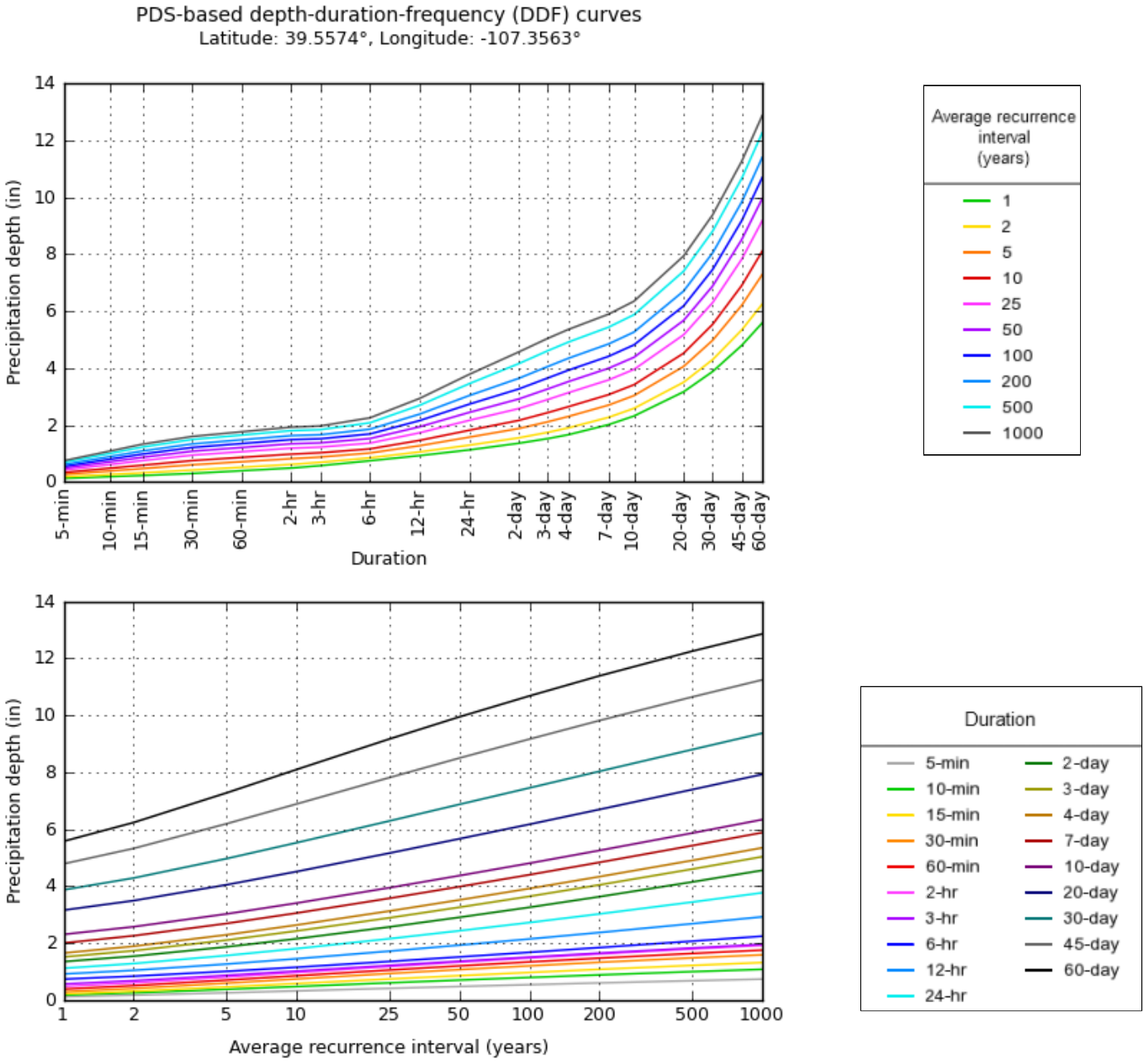
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



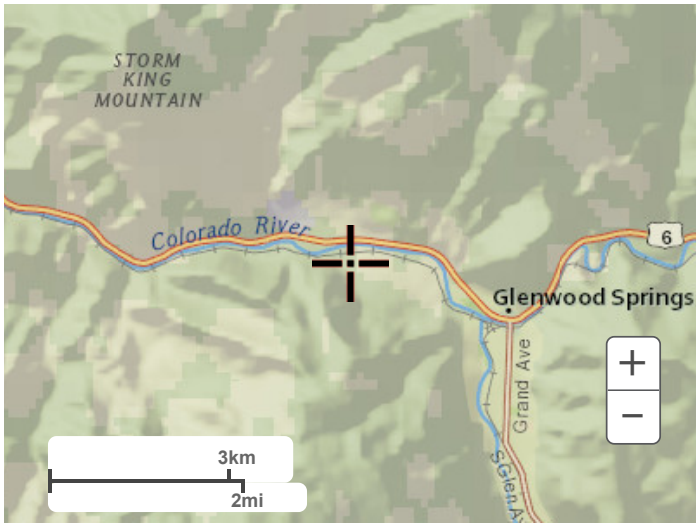
NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Wed Oct 20 14:37:24 2021

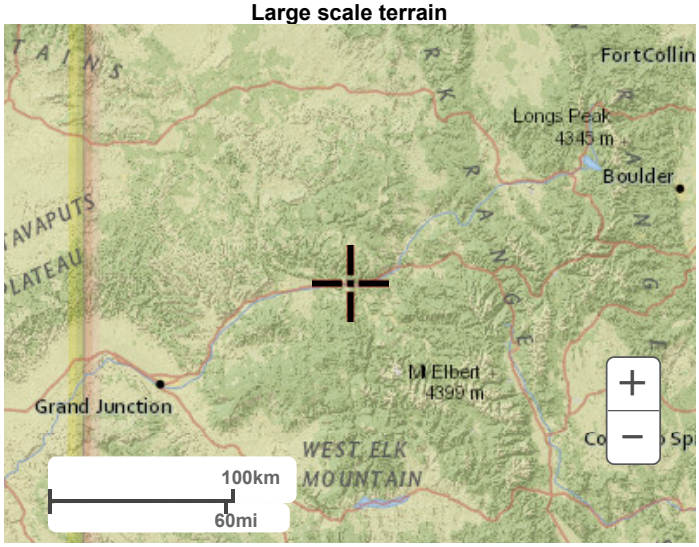
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Maps & aerials

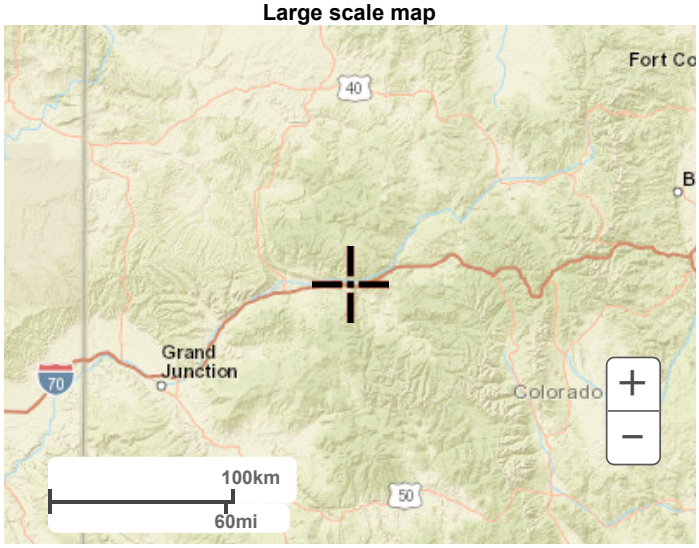
Small scale terrain



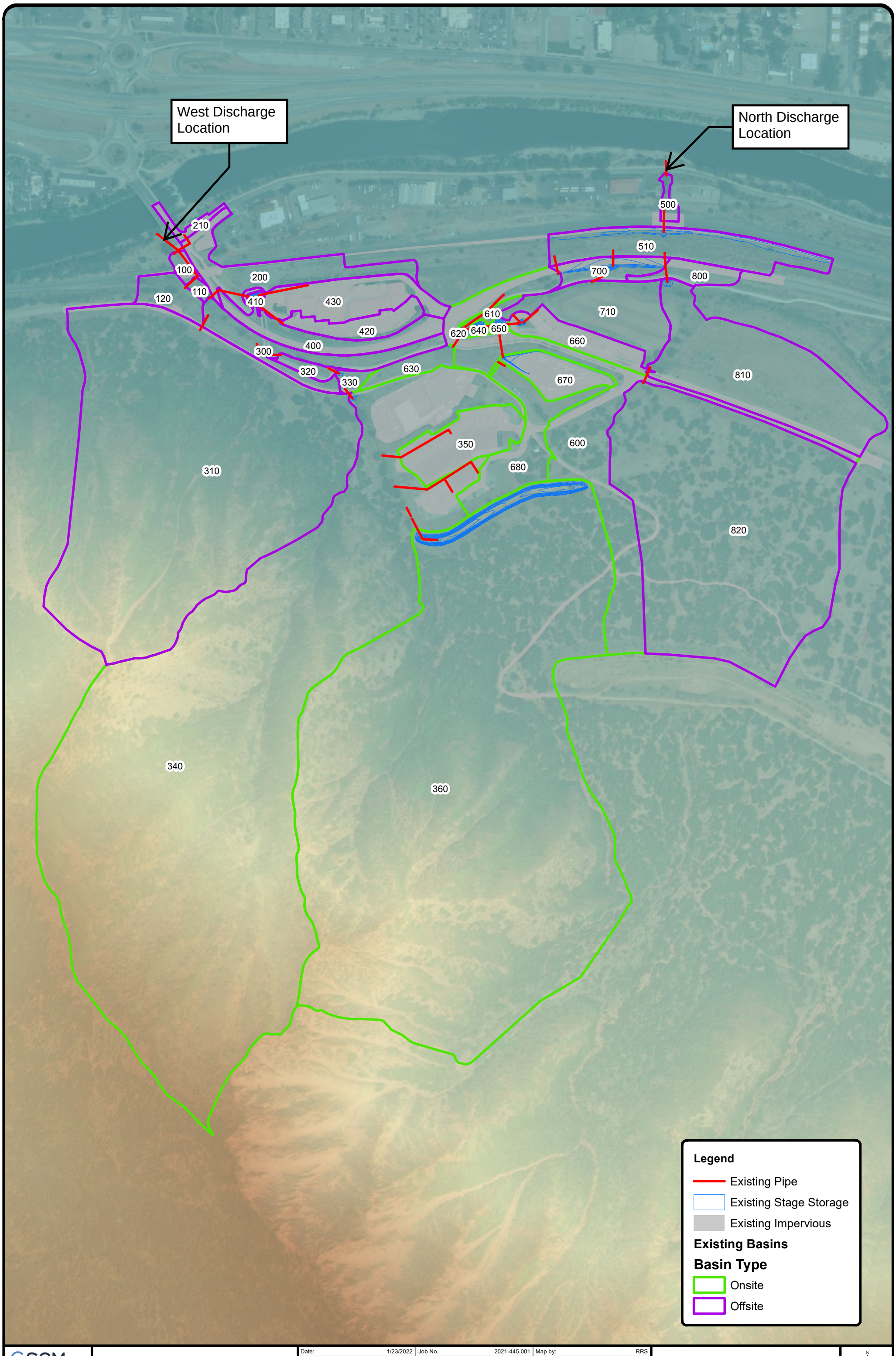
Large scale terrain



Large scale map



Large scale aerial



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Glenwood Springs, CO 81601
970.945.1004
www.sgm-inc.com

Existing Drainage Exhibit Part 1

RFTA, Glenwood Springs, CO

Date:	1/23/2022	Job No.	2021-445.001
Map by:	RRS		
Coordinate System:		Projection:	
Data Sources:	xxxx, xxxx, xxxxx xxxxx, xxx	Page:	xxxx
File:	I:\2021\2021-445-RftaBusBarn\001-CivilEng\H-Dwgs\GIS\MXDs\Existing_Drainage_Narrative_Exhibit_Part1.mxd		

The information displayed above is intended for general planning purposes. Refer to legal documentation/data sources for descriptions/locations.

0 360 720 Feet

1 inch = 375 feet

N W E S

Colorado River

North Discharge
Existing 48-inch pipe
Capacity - 143 cfs
100 yr Design Flow - 21.90 cfs

Devereux Road

Existing 18-inch pipe

Railroad Tracks

North Discharge
Existing 48-inch pipe
Capacity - 276 cfs
100 yr Design Flow - 50.42 cfs

Existing 48-inch pipe

Midland Avenue

Midland Avenue
Multi-use Path

Existing Inlet with no outlet pipe.

Existing 24-inch pipe

Wulfson Rd

Existing Debris Catch Basin

100 110 120 200 210 300 310 320 330 340 350 360 400 410 420 430 500 510 600 610 620 630 640 650 660 670 680 700 710 800 810 820

Legend

- Existing Pipe
- Existing Stage Storage
- Existing Impervious

Existing Basins

Basin Type

- Onsite
- Offsite

SGM
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Glenwood Springs, CO 81601
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Existing Drainage Exhibit Part 2

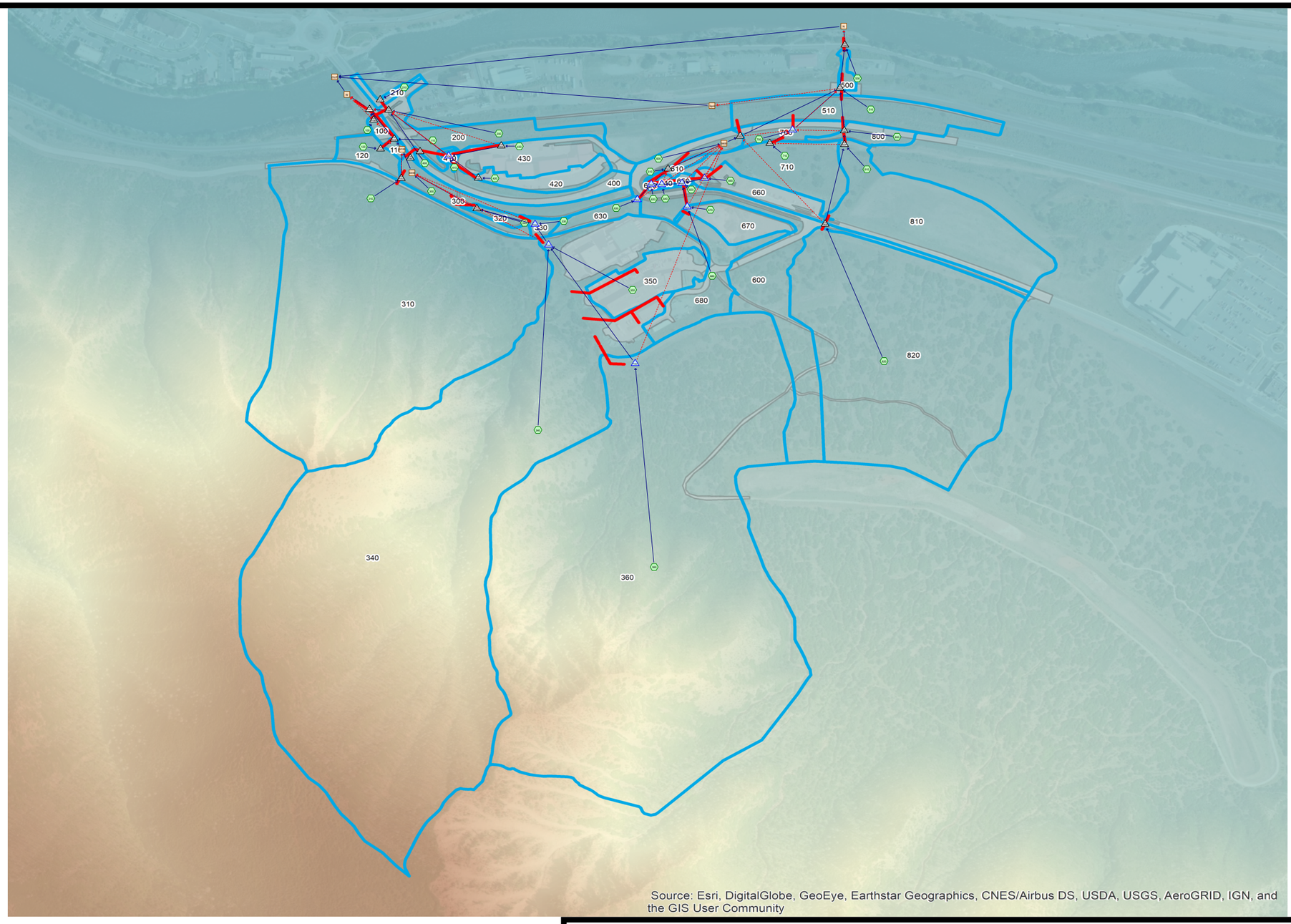
RFTA, Glenwood Springs, CO

Date:	12/22/2021	Job No.	2021-445.001	Map by:	RRS
Coordinate System:				Projection:	
Data Sources:	xxxx, xxxx, xxxxx xxxxx, xxx			Page:	XX/XX/XXXX
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The information displayed above is intended for general planning purposes. Refer to legal documentation/data sources for descriptions/locations.

0 280 560 Feet

1 inch = 208 feet



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Existing

Prepared by SGM, Printed 1/23/2022

HydroCAD® 10.10-6a s/n 10941 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25yr	Type II 6-hr		Default	6.00	1	1.36	2
2	100yr	Type II 6-hr		Default	6.00	1	1.68	2

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth=0.20"
Tc=5.0 min CN=79 Runoff=0.13 cfs 0.004 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=63 Runoff=0.00 cfs 0.000 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=64 Runoff=0.00 cfs 0.001 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=69 Runoff=0.07 cfs 0.010 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth=1.14"
Tc=5.0 min CN=98 Runoff=0.81 cfs 0.029 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=65 Runoff=0.01 cfs 0.003 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth=0.01"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=0.15 cfs 0.026 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=69 Runoff=0.01 cfs 0.001 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=63 Runoff=0.00 cfs 0.000 af

Subcatchment340: Runoff Area=62.550 ac 5.12% Impervious Runoff Depth=0.03"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=0.65 cfs 0.138 af

Subcatchment350: Runoff Area=2.533 ac 89.62% Impervious Runoff Depth=0.81"
Tc=5.0 min CN=94 Runoff=5.37 cfs 0.171 af

Subcatchment360: Runoff Area=63.142 ac 0.56% Impervious Runoff Depth=0.05"
Flow Length=3,685' Tc=12.3 min CN=70 Runoff=1.83 cfs 0.278 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth=0.25"
Tc=5.0 min CN=81 Runoff=1.23 cfs 0.040 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=90 Runoff=1.94 cfs 0.060 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth=0.81"
Tc=5.0 min CN=94 Runoff=5.68 cfs 0.181 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth=0.03"
Tc=5.0 min CN=68 Runoff=0.00 cfs 0.001 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=64 Runoff=0.02 cfs 0.003 af

Subcatchment600: Runoff Area=8.420 ac 28.66% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=69 Runoff=0.20 cfs 0.030 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.000 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.757 ac 16.25% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=64 Runoff=0.00 cfs 0.001 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth=0.88"
Tc=5.0 min CN=95 Runoff=3.48 cfs 0.113 af

Subcatchment670: Runoff Area=1.437 ac 88.66% Impervious Runoff Depth=0.75"
Tc=5.0 min CN=93 Runoff=2.83 cfs 0.089 af

Subcatchment680: Runoff Area=2.882 ac 17.70% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=65 Runoff=0.02 cfs 0.003 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth=0.16"
Tc=5.0 min CN=77 Runoff=0.37 cfs 0.014 af

Subcatchment710: Runoff Area=3.271 ac 80.01% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=90 Runoff=5.09 cfs 0.157 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth=0.14"
Tc=5.0 min CN=76 Runoff=0.24 cfs 0.009 af

Subcatchment810: Runoff Area=8.130 ac 80.00% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=90 Runoff=12.66 cfs 0.390 af

Subcatchment820: Runoff Area=23.436 ac 80.00% Impervious Runoff Depth=0.58"
Flow Length=1,968' Tc=16.1 min CN=90 Runoff=23.55 cfs 1.124 af

Reach N: Inflow=33.57 cfs 1.934 af
Outflow=33.57 cfs 1.934 af

Reach OUT: Inflow=47.20 cfs 2.796 af
Outflow=47.20 cfs 2.796 af

Reach S100: Avg. Flow Depth=0.26' Max Vel=4.08 fps Inflow=5.37 cfs 0.617 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=5.35 cfs 0.617 af

Reach S300: Avg. Flow Depth=0.41' Max Vel=4.91 fps Inflow=5.38 cfs 0.590 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=41.25 cfs Outflow=5.37 cfs 0.590 af

Reach S600: Avg. Flow Depth=0.19' Max Vel=1.99 fps Inflow=0.80 cfs 0.236 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=18.32 cfs Outflow=0.80 cfs 0.236 af

Reach Spill: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach W: Inflow=13.71 cfs 0.862 af
Outflow=13.71 cfs 0.862 af

Pond 802P: Peak Elev=5,762.86' Inflow=28.36 cfs 1.514 af
Primary=28.36 cfs 1.514 af Secondary=0.00 cfs 0.000 af Outflow=28.36 cfs 1.514 af

Pond P-OUT: Peak Elev=5,696.86' Inflow=13.52 cfs 0.843 af
Primary=13.52 cfs 0.843 af Secondary=0.00 cfs 0.000 af Outflow=13.52 cfs 0.843 af

Pond P100: Peak Elev=5,702.80' Inflow=0.92 cfs 0.095 af
Primary=0.73 cfs 0.075 af Secondary=0.19 cfs 0.019 af Outflow=0.92 cfs 0.095 af

Pond P110: Peak Elev=5,708.02' Inflow=5.35 cfs 0.617 af
Primary=4.56 cfs 0.527 af Secondary=0.79 cfs 0.090 af Outflow=5.35 cfs 0.617 af

Pond P120: Peak Elev=5,724.74' Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P200: Peak Elev=5,703.01' Inflow=8.40 cfs 0.241 af
Primary=8.40 cfs 0.241 af Secondary=0.00 cfs 0.000 af Outflow=8.40 cfs 0.241 af

Pond P210: Peak Elev=5,704.12' Inflow=0.81 cfs 0.029 af
Primary=0.81 cfs 0.029 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.029 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.01' Inflow=0.15 cfs 0.026 af
Primary=0.15 cfs 0.026 af Secondary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.026 af

Pond P320: Peak Elev=5,748.87' Inflow=5.38 cfs 0.588 af
Primary=5.38 cfs 0.588 af Secondary=0.00 cfs 0.000 af Outflow=5.38 cfs 0.588 af

Pond P330: Peak Elev=5,874.00' Storage=0.000 af Inflow=5.38 cfs 0.586 af
Primary=5.38 cfs 0.586 af Secondary=0.00 cfs 0.000 af Outflow=5.38 cfs 0.586 af

Pond P340: Peak Elev=5,789.33' Storage=0.003 af Inflow=5.38 cfs 0.587 af
Primary=5.38 cfs 0.586 af Secondary=0.00 cfs 0.000 af Outflow=5.38 cfs 0.586 af

Pond P360: Peak Elev=5,870.47' Storage=0.154 af Inflow=1.83 cfs 0.278 af
Primary=0.49 cfs 0.278 af Secondary=0.00 cfs 0.000 af Outflow=0.49 cfs 0.278 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.40' Storage=4,113 cf Inflow=7.63 cfs 0.241 af
Primary=6.52 cfs 0.162 af Secondary=0.00 cfs 0.000 af Outflow=6.52 cfs 0.162 af

Pond P420: Peak Elev=5,750.65' Inflow=1.94 cfs 0.060 af
Primary=1.94 cfs 0.060 af Secondary=0.00 cfs 0.000 af Outflow=1.94 cfs 0.060 af

Pond P430: Peak Elev=5,740.61' Inflow=5.68 cfs 0.181 af
Primary=5.68 cfs 0.181 af Secondary=0.00 cfs 0.000 af Outflow=5.68 cfs 0.181 af

Pond P500: Peak Elev=5,708.12' Inflow=33.57 cfs 1.934 af
Primary=33.57 cfs 1.934 af Secondary=0.00 cfs 0.000 af Outflow=33.57 cfs 1.934 af

Pond P510: Peak Elev=5,736.12' Inflow=33.56 cfs 1.933 af
Primary=33.56 cfs 1.933 af Secondary=0.00 cfs 0.000 af Outflow=33.56 cfs 1.933 af

Pond P600: Peak Elev=5,754.08' Inflow=0.80 cfs 0.236 af
Primary=0.80 cfs 0.236 af Secondary=0.00 cfs 0.000 af Outflow=0.80 cfs 0.236 af

Pond P610: Peak Elev=5,766.33' Inflow=0.69 cfs 0.206 af
Primary=0.69 cfs 0.206 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.206 af

Pond P620: Peak Elev=5,765.34' Storage=0.000 af Inflow=0.69 cfs 0.206 af
Primary=0.69 cfs 0.206 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.206 af

Pond P630: Peak Elev=5,771.00' Storage=0.000 af Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P640: Peak Elev=5,771.38' Storage=0.032 af Inflow=0.86 cfs 0.206 af
Primary=0.69 cfs 0.206 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.206 af

Pond P650: Peak Elev=5,777.90' Storage=0.096 af Inflow=6.30 cfs 0.206 af
Primary=0.86 cfs 0.206 af Secondary=0.00 cfs 0.000 af Outflow=0.86 cfs 0.206 af

Pond P660: Peak Elev=5,779.28' Storage=0.001 af Inflow=3.48 cfs 0.113 af
Primary=3.47 cfs 0.113 af Secondary=0.00 cfs 0.000 af Outflow=3.47 cfs 0.113 af

Pond P670: Peak Elev=5,797.00' Storage=0.000 af Inflow=2.83 cfs 0.093 af
Primary=2.83 cfs 0.093 af Secondary=0.00 cfs 0.000 af Outflow=2.83 cfs 0.093 af

Pond P700: Peak Elev=5,752.01' Storage=7 cf Inflow=5.43 cfs 0.171 af
Primary=5.43 cfs 0.171 af Secondary=0.00 cfs 0.000 af Outflow=5.43 cfs 0.171 af

Pond P710: Peak Elev=5,759.29' Inflow=5.09 cfs 0.157 af
Primary=5.09 cfs 0.157 af Secondary=0.00 cfs 0.000 af Outflow=5.09 cfs 0.157 af

Pond P800: Peak Elev=5,749.30' Inflow=28.58 cfs 1.523 af
Primary=28.58 cfs 1.523 af Secondary=0.00 cfs 0.000 af Outflow=28.58 cfs 1.523 af

Pond P820: Peak Elev=5,812.69' Inflow=23.55 cfs 1.124 af
Primary=23.55 cfs 1.124 af Secondary=0.00 cfs 0.000 af Outflow=23.55 cfs 1.124 af

Total Runoff Area = 231.057 ac Runoff Volume = 2.877 af Average Runoff Depth = 0.15"
79.27% Pervious = 183.148 ac 20.73% Impervious = 47.909 ac

Summary for Subcatchment 100:

Runoff = 0.13 cfs @ 2.99 hrs, Volume= 0.004 af, Depth= 0.20"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 0.07 cfs @ 3.04 hrs, Volume= 0.010 af, Depth= 0.04"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af, Depth= 1.14"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.01 cfs @ 4.45 hrs, Volume= 0.003 af, Depth= 0.01"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af, Depth= 0.01"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.01 cfs @ 3.04 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 0.65 cfs @ 3.51 hrs, Volume= 0.138 af, Depth= 0.03"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	3.200	98	Impervious
*	1.238	58	A soils
*	38.326	58	B Soils
*	19.786	80	D soils
	62.550	67	Weighted Average
	59.350		94.88% Pervious Area
	3.200		5.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 5.37 cfs @ 2.96 hrs, Volume= 0.171 af, Depth= 0.81"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.270	98	Impervious
*	0.263	58	A soils
	2.533	94	Weighted Average
	0.263		10.38% Pervious Area
	2.270		89.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 1.83 cfs @ 3.16 hrs, Volume= 0.278 af, Depth= 0.05"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.355	98	Impervious
*	12.956	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	63.142	70	Weighted Average
	62.787		99.44% Pervious Area
	0.355		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 1.23 cfs @ 2.98 hrs, Volume= 0.040 af, Depth= 0.25"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af, Depth= 0.58"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af, Depth= 0.81"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.00 cfs @ 3.37 hrs, Volume= 0.001 af, Depth= 0.03"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.02 cfs @ 6.00 hrs, Volume= 0.003 af, Depth= 0.01"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 0.20 cfs @ 3.04 hrs, Volume= 0.030 af, Depth= 0.04"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.413	98	Impervious
*	6.007	58	A soils
	8.420	69	Weighted Average
	6.007		71.34% Pervious Area
	2.413		28.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P610 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.123	98	Impervious
*	0.634	58	A soils
	0.757	64	Weighted Average
	0.634		83.75% Pervious Area
	0.123		16.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 3.48 cfs @ 2.96 hrs, Volume= 0.113 af, Depth= 0.88"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 2.83 cfs @ 2.96 hrs, Volume= 0.089 af, Depth= 0.75"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.274	98	Impervious
*	0.163	58	A soils
	1.437	93	Weighted Average
	0.163		11.34% Pervious Area
	1.274		88.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 0.02 cfs @ 4.45 hrs, Volume= 0.003 af, Depth= 0.01"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.510	98	Impervious
*	2.372	58	A soils
	2.882	65	Weighted Average
	2.372		82.30% Pervious Area
	0.510		17.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 0.37 cfs @ 2.99 hrs, Volume= 0.014 af, Depth= 0.16"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af, Depth= 0.58"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.617	98	Impervious
*	0.654	58	A Soils
	3.271	90	Weighted Average
	0.654		19.99% Pervious Area
	2.617		80.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.24 cfs @ 3.00 hrs, Volume= 0.009 af, Depth= 0.14"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 12.66 cfs @ 2.97 hrs, Volume= 0.390 af, Depth= 0.58"
Routed to Pond 802P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	6.504	98	Impervious
*	1.626	58	A Soils
	8.130	90	Weighted Average
	1.626		20.00% Pervious Area
	6.504		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af, Depth= 0.58"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	18.749	98	Impervious
*	4.687	58	A soils
	23.436	90	Weighted Average
	4.687		20.00% Pervious Area
	18.749		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Reach N:

Inflow Area = 56.231 ac, 62.47% Impervious, Inflow Depth = 0.41" for 25yr event
Inflow = 33.57 cfs @ 3.00 hrs, Volume= 1.934 af
Outflow = 33.57 cfs @ 3.00 hrs, Volume= 1.934 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

Inflow Area = 231.057 ac, 20.73% Impervious, Inflow Depth = 0.15" for 25yr event
Inflow = 47.20 cfs @ 3.00 hrs, Volume= 2.796 af
Outflow = 47.20 cfs @ 3.00 hrs, Volume= 2.796 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S100:

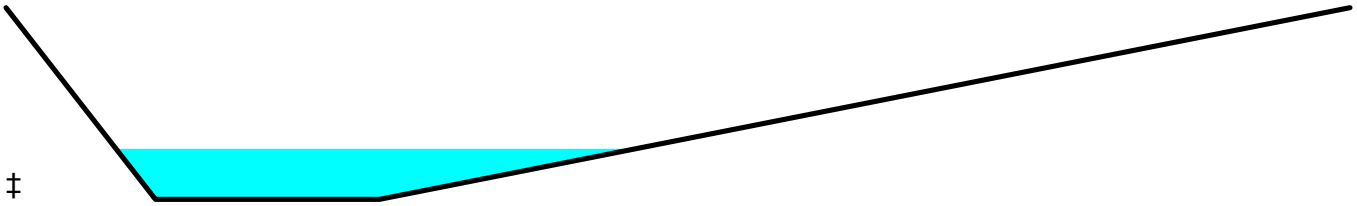
Ditch Parameters from SGM 2015 Survey

Inflow Area = 164.355 ac, 4.16% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 5.37 cfs @ 2.97 hrs, Volume= 0.617 af
Outflow = 5.35 cfs @ 2.98 hrs, Volume= 0.617 af, Atten= 0%, Lag= 0.3 min
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.08 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.16 fps, Avg. Travel Time= 0.8 min

Peak Storage= 144 cf @ 2.98 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 6.95'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

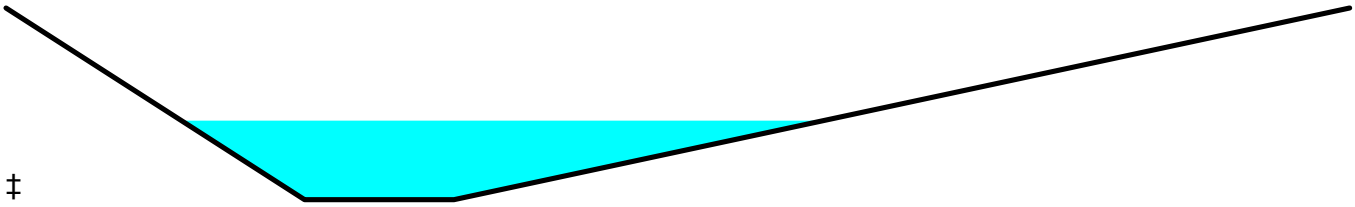
Ditch Parameters from SGM 2015 Survey

Inflow Area = 131.137 ac, 4.85% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 5.38 cfs @ 2.97 hrs, Volume= 0.590 af
Outflow = 5.37 cfs @ 2.97 hrs, Volume= 0.590 af, Atten= 0%, Lag= 0.3 min
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.91 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.77 fps, Avg. Travel Time= 0.7 min

Peak Storage= 120 cf @ 2.97 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 4.30'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 41.25 cfs

1.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 6.0 '/' Top Width= 9.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S600:

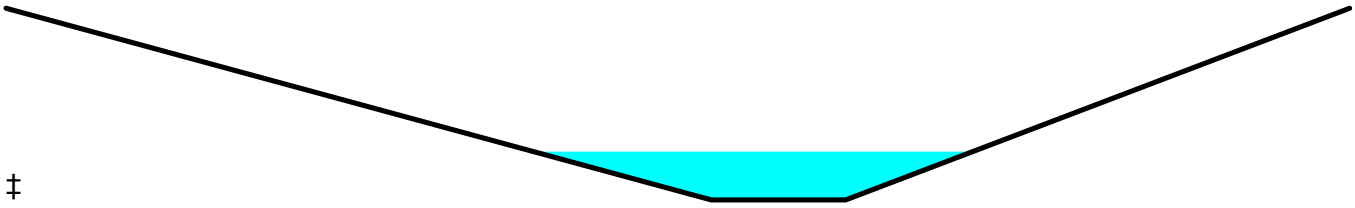
Parameters from 2015 SGM survey

Inflow Area = 15.559 ac, 36.81% Impervious, Inflow Depth = 0.18" for 25yr event
Inflow = 0.80 cfs @ 4.44 hrs, Volume= 0.236 af
Outflow = 0.80 cfs @ 4.46 hrs, Volume= 0.236 af, Atten= 0%, Lag= 1.5 min
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.99 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 3.2 min

Peak Storage= 106 cf @ 4.46 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 3.27'
Bank-Full Depth= 0.75' Flow Area= 4.1 sf, Capacity= 18.32 cfs

1.00' x 0.75' deep channel, n= 0.030 Short grass
Side Slope Z-value= 7.0 5.0 '/' Top Width= 10.00'
Length= 263.0' Slope= 0.0266 '/'
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Summary for Reach Spill:

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

Inflow Area = 174.826 ac, 7.31% Impervious, Inflow Depth = 0.06" for 25yr event
Inflow = 13.71 cfs @ 2.99 hrs, Volume= 0.862 af
Outflow = 13.71 cfs @ 2.99 hrs, Volume= 0.862 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 802P:

Inflow Area = 31.566 ac, 80.00% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 28.36 cfs @ 3.02 hrs, Volume= 1.514 af
Outflow = 28.36 cfs @ 3.02 hrs, Volume= 1.514 af, Atten= 0%, Lag= 0.0 min
Primary = 28.36 cfs @ 3.02 hrs, Volume= 1.514 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,762.86' @ 3.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=28.35 cfs @ 3.02 hrs HW=5,762.86' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 28.35 cfs @ 4.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

Inflow Area = 174.826 ac, 7.31% Impervious, Inflow Depth = 0.06" for 25yr event
Inflow = 13.52 cfs @ 2.99 hrs, Volume= 0.843 af
Outflow = 13.52 cfs @ 2.99 hrs, Volume= 0.843 af, Atten= 0%, Lag= 0.0 min
Primary = 13.52 cfs @ 2.99 hrs, Volume= 0.843 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,696.86' @ 2.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#2 Secondary 5,705.05' **60.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=13.44 cfs @ 2.99 hrs HW=5,696.85' (Free Discharge)
└**1=Culvert** (Inlet Controls 13.44 cfs @ 3.86 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth = 4.14" for 25yr event
Inflow = 0.92 cfs @ 2.98 hrs, Volume= 0.095 af
Outflow = 0.92 cfs @ 2.98 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 2.98 hrs, Volume= 0.075 af
Routed to Pond P-OUT :
Secondary = 0.19 cfs @ 2.98 hrs, Volume= 0.019 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.80' @ 2.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.70 cfs @ 2.98 hrs HW=5,702.80' (Free Discharge)
└**2=Culvert** (Passes 0.70 cfs of 27.15 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.70 cfs @ 0.81 fps)

Secondary OutFlow Max=0.18 cfs @ 2.98 hrs HW=5,702.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Weir Controls 0.18 cfs @ 0.58 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

Inflow Area = 165.473 ac, 4.24% Impervious, Inflow Depth = 0.04" for 25yr event
Inflow = 5.35 cfs @ 2.98 hrs, Volume= 0.617 af
Outflow = 5.35 cfs @ 2.98 hrs, Volume= 0.617 af, Atten= 0%, Lag= 0.0 min
Primary = 4.56 cfs @ 2.98 hrs, Volume= 0.527 af
Routed to Pond P-OUT :
Secondary = 0.79 cfs @ 2.98 hrs, Volume= 0.090 af
Routed to Pond P100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.02' @ 2.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.44 cfs @ 2.98 hrs HW=5,708.02' (Free Discharge)
└**3=Culvert** (Passes 4.44 cfs of 132.80 cfs potential flow)
└**2=Culvert** (Passes 4.44 cfs of 78.48 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 4.44 cfs @ 1.12 fps)

Secondary OutFlow Max=0.77 cfs @ 2.98 hrs HW=5,708.02' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.77 cfs @ 0.80 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth = 0.01" for 25yr event
Inflow = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.74' @ 6.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 6.00 hrs HW=5,724.74' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 132.87 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.05 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth = 0.32" for 25yr event
Inflow = 8.40 cfs @ 3.00 hrs, Volume= 0.241 af
Outflow = 8.40 cfs @ 3.00 hrs, Volume= 0.241 af, Atten= 0%, Lag= 0.0 min
Primary = 8.40 cfs @ 3.00 hrs, Volume= 0.241 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.01' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.36 cfs @ 3.00 hrs HW=5,703.01' (Free Discharge)
└**2=Culvert** (Passes 8.36 cfs of 26.49 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 8.36 cfs @ 1.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth = 1.14" for 25yr event
Inflow = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af
Outflow = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,704.12' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.80 cfs @ 2.96 hrs HW=5,704.12' (Free Discharge)
└**2=Culvert** (Passes 0.80 cfs of 26.42 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 0.80 cfs @ 1.11 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P310:

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth = 0.01" for 25yr event
Inflow = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af
Outflow = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af
Routed to Reach S100 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.01' @ 6.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.06 cfs @ 6.01 hrs HW=5,746.01' (Free Discharge)
2=Culvert (Passes 0.06 cfs of 95.97 cfs potential flow)
1=Orifice/Grate (Weir Controls 0.06 cfs @ 0.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

Inflow Area = 128.862 ac, 4.63% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 5.38 cfs @ 2.97 hrs, Volume= 0.588 af
Outflow = 5.38 cfs @ 2.97 hrs, Volume= 0.588 af, Atten= 0%, Lag= 0.0 min
Primary = 5.38 cfs @ 2.97 hrs, Volume= 0.588 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,748.87' @ 2.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900

n= 0.013, Flow Area= 7.07 sf

#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.36 cfs @ 2.97 hrs HW=5,748.87' (Free Discharge)
└**2=Culvert** (Passes 5.36 cfs of 71.12 cfs potential flow)
└**1=Culvert** (Inlet Controls 5.36 cfs @ 3.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM plans 2015

Inflow Area = 128.510 ac, 4.56% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 5.38 cfs @ 2.97 hrs, Volume= 0.586 af
Outflow = 5.38 cfs @ 2.97 hrs, Volume= 0.586 af, Atten= 0%, Lag= 0.0 min
Primary = 5.38 cfs @ 2.97 hrs, Volume= 0.586 af
Routed to Pond P320 :
Secondary = 0.00 cfs @ 2.97 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,874.00' @ 2.97 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 0.586 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (313.1 - 313.1)

Volume	Invert	Avail.Storage	Storage Description
#1	5,874.00'	0.006 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,874.00	0.002	0.000	0.000
5,875.00	0.010	0.006	0.006

Device	Routing	Invert	Outlet Devices
#1	Primary	5,773.50'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,773.50' / 5,767.98' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,874.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=150.89 cfs @ 2.97 hrs HW=5,874.00' (Free Discharge)
└**1=Culvert** (Inlet Controls 150.89 cfs @ 48.03 fps)

Secondary OutFlow Max=0.00 cfs @ 2.97 hrs HW=5,874.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.04 fps)

Summary for Pond P340:

Pipe size and amount of sediment in pipe field verified.
Down stream invert from SGM survey.
Upstream Invert estimated from survey contours.

Inflow Area = 128.225 ac, 4.54% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 5.38 cfs @ 2.96 hrs, Volume= 0.587 af
Outflow = 5.38 cfs @ 2.97 hrs, Volume= 0.586 af, Atten= 0%, Lag= 0.2 min
Primary = 5.38 cfs @ 2.97 hrs, Volume= 0.586 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,789.33' @ 2.97 hrs Surf.Area= 0.004 ac Storage= 0.003 af

Plug-Flow detention time= 1.4 min calculated for 0.586 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (313.1 - 312.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,788.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,788.00	0.001	0.000	0.000
5,790.00	0.005	0.006	0.006
5,792.00	0.024	0.029	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,788.67'	**42.0" Round Culvert w/ 8.0" inside fill** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,788.00' / 5,785.25' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 8.34 sf
#2	Secondary	5,791.00'	**50.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.37 cfs @ 2.97 hrs HW=5,789.33' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.37 cfs @ 2.57 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,788.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
Amount of sediment in pipe field verified.
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side.

Inflow Area = 63.142 ac, 0.56% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 1.83 cfs @ 3.16 hrs, Volume= 0.278 af
Outflow = 0.49 cfs @ 6.14 hrs, Volume= 0.278 af, Atten= 73%, Lag= 179.0 min
Primary = 0.49 cfs @ 6.14 hrs, Volume= 0.278 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.47' @ 6.14 hrs Surf.Area= 0.212 ac Storage= 0.154 af

Plug-Flow detention time= 136.4 min calculated for 0.278 af (100% of inflow)
Center-of-Mass det. time= 136.4 min (398.1 - 261.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	4.919 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,868.00	0.001	0.000	0.000
5,869.00	0.004	0.003	0.003
5,870.00	0.136	0.070	0.072
5,871.00	0.298	0.217	0.290
5,872.00	0.461	0.379	0.669
5,873.00	0.544	0.503	1.171
5,874.00	0.624	0.584	1.755
5,875.00	0.705	0.664	2.420
5,876.00	0.788	0.746	3.166
5,877.00	0.875	0.831	3.998
5,878.00	0.967	0.921	4.919

Device	Routing	Invert	Outlet Devices
#1	Primary	5,867.85'	**15.0" Round Culvert w/ 12.0" inside fill** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.17 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.49 cfs @ 6.14 hrs HW=5,870.47' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.49 cfs @ 2.82 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth = 0.72" for 25yr event
Inflow = 7.63 cfs @ 2.96 hrs, Volume= 0.241 af
Outflow = 6.52 cfs @ 3.00 hrs, Volume= 0.162 af, Atten= 15%, Lag= 2.4 min
Primary = 6.52 cfs @ 3.00 hrs, Volume= 0.162 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.40' @ 3.00 hrs Surf.Area= 1,721 sf Storage= 4,113 cf

Plug-Flow detention time= 48.2 min calculated for 0.162 af (67% of inflow)
Center-of-Mass det. time= 20.2 min (223.7 - 203.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=6.48 cfs @ 3.00 hrs HW=5,736.40' (Free Discharge)
└**2=Culvert** (Passes 6.48 cfs of 19.20 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 6.48 cfs @ 2.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P420:

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af
Outflow = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.65' @ 2.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.94 cfs @ 2.97 hrs HW=5,750.65' (Free Discharge)
└**2=Culvert** (Passes 1.94 cfs of 14.99 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 1.94 cfs @ 1.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth = 0.81" for 25yr event
Inflow = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af
Outflow = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min
Primary = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.61' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.67 cfs @ 2.96 hrs HW=5,740.61' (Free Discharge)
└**2=Culvert** (Passes 5.67 cfs of 12.14 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 5.67 cfs @ 1.82 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

Inflow Area = 56.231 ac, 62.47% Impervious, Inflow Depth = 0.41" for 25yr event
Inflow = 33.57 cfs @ 3.00 hrs, Volume= 1.934 af
Outflow = 33.57 cfs @ 3.00 hrs, Volume= 1.934 af, Atten= 0%, Lag= 0.0 min
Primary = 33.57 cfs @ 3.00 hrs, Volume= 1.934 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,708.12' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=33.53 cfs @ 3.00 hrs HW=5,708.12' (Free Discharge)
1=Culvert (Inlet Controls 33.53 cfs @ 4.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

Inflow Area = 55.972 ac, 62.64% Impervious, Inflow Depth = 0.41" for 25yr event
Inflow = 33.56 cfs @ 3.00 hrs, Volume= 1.933 af
Outflow = 33.56 cfs @ 3.00 hrs, Volume= 1.933 af, Atten= 0%, Lag= 0.0 min
Primary = 33.56 cfs @ 3.00 hrs, Volume= 1.933 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.12' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=33.54 cfs @ 3.00 hrs HW=5,736.12' (Free Discharge)
1=Culvert (Inlet Controls 33.54 cfs @ 4.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

Inflow Area = 15.559 ac, 36.81% Impervious, Inflow Depth = 0.18" for 25yr event
Inflow = 0.80 cfs @ 4.46 hrs, Volume= 0.236 af
Outflow = 0.80 cfs @ 4.46 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 4.46 hrs, Volume= 0.236 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,754.08' @ 4.46 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,755.50'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.80 cfs @ 4.46 hrs HW=5,754.08' (Free Discharge)
└**1=Culvert** (Passes 0.80 cfs of 8.74 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.80 cfs @ 0.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.28' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610:

Information from SGM plans 2014

Inflow Area = 7.139 ac, 46.44% Impervious, Inflow Depth = 0.35" for 25yr event
Inflow = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af
Outflow = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.0 min
Primary = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,766.33' @ 4.81 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.50'	**24.0" Round Culvert** L= 106.2' Ke= 0.500 Inlet / Outlet Invert= 5,761.50' / 5,761.00' S= 0.0047 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,766.80'	**45.0' long + 30.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Device 1	5,766.20'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.69 cfs @ 4.81 hrs HW=5,766.33' (Free Discharge)
└**1=Culvert** (Passes 0.69 cfs of 27.36 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.69 cfs @ 1.16 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM plans 2014

Inflow Area = 6.908 ac, 47.89% Impervious, Inflow Depth = 0.36" for 25yr event
Inflow = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af
Outflow = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.3 min
Primary = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af
Routed to Pond P610 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.34' @ 4.81 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 0.5 min calculated for 0.206 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (278.8 - 278.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,765.00	0.001	0.000	0.000
5,766.00	0.003	0.002	0.002
5,767.00	0.007	0.005	0.007
5,768.00	0.013	0.010	0.017
5,769.00	0.023	0.018	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.00'	**24.0" Round Culvert** L= 125.0' Ke= 0.500 Inlet / Outlet Invert= 5,765.00' / 5,761.50' S= 0.0280 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.69 cfs @ 4.81 hrs HW=5,765.34' (Free Discharge)
1=Culvert (Inlet Controls 0.69 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

Inflow Area = 0.757 ac, 16.25% Impervious, Inflow Depth = 0.01" for 25yr event
Inflow = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 6.01 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.6 min
Primary = 0.00 cfs @ 6.01 hrs, Volume= 0.001 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.00' @ 6.01 hrs Surf.Area= 0.004 ac Storage= 0.000 af

Plug-Flow detention time= 2.4 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 2.4 min (301.0 - 298.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,771.00'	0.004 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,771.00	0.004	0.000	0.000
5,772.00	0.004	0.004	0.004

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.22'	**24.0" Round Culvert** L= 72.0' Ke= 0.500 Inlet / Outlet Invert= 5,769.22' / 5,768.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,771.40'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,771.00'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 6.01 hrs HW=5,771.00' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 12.95 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,771.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P640:

Information from SGM plans 2014

Inflow Area = 6.073 ac, 52.45% Impervious, Inflow Depth = 0.41" for 25yr event
Inflow = 0.86 cfs @ 3.19 hrs, Volume= 0.206 af
Outflow = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af, Atten= 20%, Lag= 96.9 min
Primary = 0.69 cfs @ 4.81 hrs, Volume= 0.206 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.38' @ 4.81 hrs Surf.Area= 0.022 ac Storage= 0.032 af

Plug-Flow detention time= 25.2 min calculated for 0.206 af (100% of inflow)
Center-of-Mass det. time= 25.2 min (278.2 - 252.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	0.175 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,769.00	0.006	0.000	0.000
5,770.00	0.012	0.009	0.009
5,771.00	0.019	0.016	0.024
5,772.00	0.027	0.023	0.047
5,773.00	0.036	0.031	0.079
5,774.00	0.047	0.041	0.120
5,775.00	0.063	0.055	0.175

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.50'	**24.0" Round Culvert** L= 61.5' Ke= 0.500 Inlet / Outlet Invert= 5,765.50' / 5,765.00' S= 0.0081 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**55.0' long + 10.0 '/' SideZ x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Device 1	5,774.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.69 cfs @ 4.81 hrs HW=5,771.38' (Free Discharge)
└**1=Culvert** (Passes 0.69 cfs of 33.40 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.69 cfs @ 7.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,769.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P650:

Information from SGM plans 2014

Inflow Area = 5.967 ac, 53.38% Impervious, Inflow Depth = 0.41" for 25yr event
Inflow = 6.30 cfs @ 2.96 hrs, Volume= 0.206 af
Outflow = 0.86 cfs @ 3.19 hrs, Volume= 0.206 af, Atten= 86%, Lag= 13.5 min
Primary = 0.86 cfs @ 3.19 hrs, Volume= 0.206 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.90' @ 3.19 hrs Surf.Area= 0.043 ac Storage= 0.096 af

Plug-Flow detention time= 50.0 min calculated for 0.206 af (100% of inflow)
Center-of-Mass det. time= 50.0 min (252.9 - 203.0)

Volume	Invert	Avail.Storage	Storage Description
#1	5,774.00'	0.155 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,774.00	0.009	0.000	0.000
5,775.00	0.016	0.012	0.012
5,776.00	0.024	0.020	0.032
5,777.00	0.034	0.029	0.061
5,778.00	0.044	0.039	0.101
5,779.00	0.064	0.054	0.155

Device	Routing	Invert	Outlet Devices
#1	Primary	5,770.50'	**24.0" Round Culvert** L= 71.0' Ke= 0.500 Inlet / Outlet Invert= 5,770.50' / 5,769.00' S= 0.0211 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,778.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,773.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.86 cfs @ 3.19 hrs HW=5,777.90' (Free Discharge)
└**1=Culvert** (Passes 0.86 cfs of 38.27 cfs potential flow)
  └**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.86 cfs @ 9.91 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,774.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM plans 2014

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth = 0.88" for 25yr event
Inflow = 3.48 cfs @ 2.96 hrs, Volume= 0.113 af
Outflow = 3.47 cfs @ 2.97 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.3 min
Primary = 3.47 cfs @ 2.97 hrs, Volume= 0.113 af
  Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.28' @ 2.97 hrs Surf.Area= 0.003 ac Storage= 0.001 af

Plug-Flow detention time= 0.1 min calculated for 0.113 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (199.9 - 199.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	0.077 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,779.00	0.002	0.000	0.000
5,780.00	0.006	0.004	0.004
5,781.00	0.011	0.008	0.012
5,782.00	0.018	0.014	0.027
5,783.00	0.082	0.050	0.077

Device	Routing	Invert	Outlet Devices
#1	Primary	5,778.40'	**18.0" Round Culvert** L= 78.8' Ke= 0.500 Inlet / Outlet Invert= 5,778.40' / 5,774.00' S= 0.0558 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.46 cfs @ 2.97 hrs HW=5,779.28' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.46 cfs @ 3.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

Inflow Area = 4.319 ac, 41.31% Impervious, Inflow Depth = 0.26" for 25yr event
Inflow = 2.83 cfs @ 2.96 hrs, Volume= 0.093 af
Outflow = 2.83 cfs @ 2.96 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min
Primary = 2.83 cfs @ 2.96 hrs, Volume= 0.093 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,797.00' @ 2.96 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (206.8 - 206.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,797.00'	0.061 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,797.00	0.005	0.000	0.000
5,798.00	0.024	0.014	0.014
5,799.00	0.068	0.046	0.061

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,792.27'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,792.27' / 5,777.57' S= 0.2854 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.98 cfs @ 2.96 hrs HW=5,797.00' (Free Discharge)
└**1=Culvert** (Passes 16.98 cfs of 36.88 cfs potential flow)
└**3=Culvert** (Inlet Controls 16.98 cfs @ 9.61 fps)
└**4=Orifice/Grate** (Passes 16.98 cfs of 37.44 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,797.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

Inflow Area = 4.330 ac, 72.03% Impervious, Inflow Depth = 0.47" for 25yr event
Inflow = 5.43 cfs @ 2.97 hrs, Volume= 0.171 af
Outflow = 5.43 cfs @ 2.97 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min
Primary = 5.43 cfs @ 2.97 hrs, Volume= 0.171 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.01' @ 2.97 hrs Surf.Area= 610 sf Storage= 7 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= 0.0 min calculated for 0.171 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (210.4 - 210.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.35 cfs @ 2.97 hrs HW=5,752.01' (Free Discharge)
└**2=Culvert** (Inlet Controls 13.35 cfs @ 7.56 fps)
└**1=Orifice/Grate** (Passes 13.35 cfs of 36.68 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

Inflow Area = 3.271 ac, 80.01% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af
Outflow = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,759.29' @ 2.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.08 cfs @ 2.97 hrs HW=5,759.29' (Free Discharge)
└**1=Culvert** (Barrel Controls 5.08 cfs @ 4.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 79.14% Impervious, Inflow Depth = 0.56" for 25yr event
Inflow = 28.58 cfs @ 3.02 hrs, Volume= 1.523 af
Outflow = 28.58 cfs @ 3.02 hrs, Volume= 1.523 af, Atten= 0%, Lag= 0.0 min
Primary = 28.58 cfs @ 3.02 hrs, Volume= 1.523 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,749.30' @ 3.02 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=28.56 cfs @ 3.02 hrs HW=5,749.30' (Free Discharge)
2=Culvert (Inlet Controls 28.56 cfs @ 4.74 fps)
1=Orifice/Grate (Passes 28.56 cfs of 120.60 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P820:

Inflow Area = 23.436 ac, 80.00% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af
Outflow = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af, Atten= 0%, Lag= 0.0 min
Primary = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af
Routed to Pond 802P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.69' @ 3.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=23.51 cfs @ 3.09 hrs HW=5,812.69' (Free Discharge)
└**2=Culvert** (Passes 23.51 cfs of 116.22 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 23.51 cfs @ 2.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth=0.35"
Tc=5.0 min CN=79 Runoff=0.25 cfs 0.008 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=63 Runoff=0.00 cfs 0.001 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=64 Runoff=0.02 cfs 0.004 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth=0.12"
Tc=5.0 min CN=69 Runoff=0.56 cfs 0.027 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth=1.46"
Tc=5.0 min CN=98 Runoff=1.02 cfs 0.037 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth=0.06"
Tc=5.0 min CN=65 Runoff=0.10 cfs 0.012 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth=0.05"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=0.78 cfs 0.138 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth=0.12"
Tc=5.0 min CN=69 Runoff=0.07 cfs 0.003 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=63 Runoff=0.01 cfs 0.001 af

Subcatchment340: Runoff Area=62.550 ac 5.12% Impervious Runoff Depth=0.09"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=4.87 cfs 0.448 af

Subcatchment350: Runoff Area=2.533 ac 89.62% Impervious Runoff Depth=1.10"
Tc=5.0 min CN=94 Runoff=7.15 cfs 0.232 af

Subcatchment360: Runoff Area=63.142 ac 0.56% Impervious Runoff Depth=0.13"
Flow Length=3,685' Tc=12.3 min CN=70 Runoff=9.78 cfs 0.697 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth=0.41"
Tc=5.0 min CN=81 Runoff=2.15 cfs 0.067 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=90 Runoff=2.76 cfs 0.086 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth=1.10"
Tc=5.0 min CN=94 Runoff=7.57 cfs 0.246 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=68 Runoff=0.04 cfs 0.002 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=64 Runoff=0.09 cfs 0.015 af

Subcatchment600: Runoff Area=8.420 ac 28.66% Impervious Runoff Depth=0.12"
Tc=5.0 min CN=69 Runoff=1.67 cfs 0.081 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.000 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.757 ac 16.25% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=64 Runoff=0.02 cfs 0.003 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth=1.18"
Tc=5.0 min CN=95 Runoff=4.56 cfs 0.151 af

Subcatchment670: Runoff Area=1.437 ac 88.66% Impervious Runoff Depth=1.03"
Tc=5.0 min CN=93 Runoff=3.83 cfs 0.123 af

Subcatchment680: Runoff Area=2.882 ac 17.70% Impervious Runoff Depth=0.06"
Tc=5.0 min CN=65 Runoff=0.13 cfs 0.015 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth=0.29"
Tc=5.0 min CN=77 Runoff=0.78 cfs 0.025 af

Subcatchment710: Runoff Area=3.271 ac 80.01% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=90 Runoff=7.24 cfs 0.225 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth=0.26"
Tc=5.0 min CN=76 Runoff=0.53 cfs 0.018 af

Subcatchment810: Runoff Area=8.130 ac 80.00% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=90 Runoff=17.99 cfs 0.560 af

Subcatchment820: Runoff Area=23.436 ac 80.00% Impervious Runoff Depth=0.83"
Flow Length=1,968' Tc=16.1 min CN=90 Runoff=34.06 cfs 1.616 af

Reach N: Inflow=50.42 cfs 2.835 af
Outflow=50.42 cfs 2.835 af

Reach OUT: Inflow=72.09 cfs 4.761 af
Outflow=72.09 cfs 4.761 af

Reach S100: Avg. Flow Depth=0.34' Max Vel=4.69 fps Inflow=8.83 cfs 1.530 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=8.82 cfs 1.530 af

Reach S300: Avg. Flow Depth=0.51' Max Vel=5.53 fps Inflow=8.52 cfs 1.392 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=41.25 cfs Outflow=8.52 cfs 1.392 af

Reach S600: Avg. Flow Depth=0.29' Max Vel=2.54 fps Inflow=2.17 cfs 0.373 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=18.32 cfs Outflow=2.04 cfs 0.373 af

Reach Spill: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach W: Inflow=21.90 cfs 1.926 af
Outflow=21.90 cfs 1.926 af

Pond 802P: Peak Elev=5,763.33' Inflow=41.38 cfs 2.176 af
Primary=41.38 cfs 2.176 af Secondary=0.00 cfs 0.000 af Outflow=41.38 cfs 2.176 af

Pond P-OUT: Peak Elev=5,697.23' Inflow=21.60 cfs 1.878 af
Primary=21.60 cfs 1.878 af Secondary=0.00 cfs 0.000 af Outflow=21.60 cfs 1.878 af

Pond P100: Peak Elev=5,702.83' Inflow=1.50 cfs 0.233 af
Primary=1.19 cfs 0.185 af Secondary=0.31 cfs 0.048 af Outflow=1.50 cfs 0.233 af

Pond P110: Peak Elev=5,708.06' Inflow=8.85 cfs 1.535 af
Primary=7.53 cfs 1.310 af Secondary=1.31 cfs 0.225 af Outflow=8.85 cfs 1.535 af

Pond P120: Peak Elev=5,724.74' Inflow=0.02 cfs 0.004 af
Primary=0.02 cfs 0.004 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

Pond P200: Peak Elev=5,703.14' Inflow=13.54 cfs 0.383 af
Primary=13.54 cfs 0.383 af Secondary=0.00 cfs 0.000 af Outflow=13.54 cfs 0.383 af

Pond P210: Peak Elev=5,704.14' Inflow=1.02 cfs 0.037 af
Primary=1.02 cfs 0.037 af Secondary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.037 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.05' Inflow=0.78 cfs 0.138 af
Primary=0.78 cfs 0.138 af Secondary=0.00 cfs 0.000 af Outflow=0.78 cfs 0.138 af

Pond P320: Peak Elev=5,749.10' Inflow=8.42 cfs 1.381 af
Primary=8.42 cfs 1.381 af Secondary=0.00 cfs 0.000 af Outflow=8.42 cfs 1.381 af

Pond P330: Peak Elev=5,874.00' Storage=0.000 af Inflow=8.36 cfs 1.377 af
Primary=8.36 cfs 1.377 af Secondary=0.00 cfs 0.000 af Outflow=8.36 cfs 1.377 af

Pond P340: Peak Elev=5,789.55' Storage=0.004 af Inflow=8.36 cfs 1.377 af
Primary=8.36 cfs 1.376 af Secondary=0.00 cfs 0.000 af Outflow=8.36 cfs 1.376 af

Pond P360: Peak Elev=5,871.72' Storage=0.547 af Inflow=9.78 cfs 0.697 af
Primary=0.58 cfs 0.697 af Secondary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.697 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.53' Storage=4,342 cf Inflow=10.33 cfs 0.332 af
Primary=9.96 cfs 0.253 af Secondary=0.00 cfs 0.000 af Outflow=9.96 cfs 0.253 af

Pond P420: Peak Elev=5,750.69' Inflow=2.76 cfs 0.086 af
Primary=2.76 cfs 0.086 af Secondary=0.00 cfs 0.000 af Outflow=2.76 cfs 0.086 af

Pond P430: Peak Elev=5,740.68' Inflow=7.57 cfs 0.246 af
Primary=7.57 cfs 0.246 af Secondary=0.00 cfs 0.000 af Outflow=7.57 cfs 0.246 af

Pond P500: Peak Elev=5,708.69' Inflow=50.42 cfs 2.835 af
Primary=50.42 cfs 2.835 af Secondary=0.00 cfs 0.000 af Outflow=50.42 cfs 2.835 af

Pond P510: Peak Elev=5,736.70' Inflow=50.39 cfs 2.833 af
Primary=50.39 cfs 2.833 af Secondary=0.00 cfs 0.000 af Outflow=50.39 cfs 2.833 af

Pond P600: Peak Elev=5,754.16' Inflow=2.04 cfs 0.373 af
Primary=2.04 cfs 0.373 af Secondary=0.00 cfs 0.000 af Outflow=2.04 cfs 0.373 af

Pond P610: Peak Elev=5,766.34' Inflow=0.83 cfs 0.292 af
Primary=0.83 cfs 0.292 af Secondary=0.00 cfs 0.000 af Outflow=0.83 cfs 0.292 af

Pond P620: Peak Elev=5,765.37' Storage=0.001 af Inflow=0.82 cfs 0.291 af
Primary=0.82 cfs 0.291 af Secondary=0.00 cfs 0.000 af Outflow=0.82 cfs 0.291 af

Pond P630: Peak Elev=5,771.01' Storage=0.000 af Inflow=0.02 cfs 0.003 af
Primary=0.02 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.003 af

Pond P640: Peak Elev=5,772.40' Storage=0.059 af Inflow=5.00 cfs 0.288 af
Primary=0.81 cfs 0.288 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.288 af

Pond P650: Peak Elev=5,778.29' Storage=0.114 af Inflow=8.38 cfs 0.288 af
Primary=5.00 cfs 0.288 af Secondary=0.00 cfs 0.000 af Outflow=5.00 cfs 0.288 af

Pond P660: Peak Elev=5,779.44' Storage=0.001 af Inflow=4.56 cfs 0.151 af
Primary=4.54 cfs 0.151 af Secondary=0.00 cfs 0.000 af Outflow=4.54 cfs 0.151 af

Pond P670: Peak Elev=5,797.00' Storage=0.000 af Inflow=3.84 cfs 0.137 af
Primary=3.84 cfs 0.137 af Secondary=0.00 cfs 0.000 af Outflow=3.84 cfs 0.137 af

Pond P700: Peak Elev=5,752.02' Storage=11 cf Inflow=7.99 cfs 0.251 af
Primary=7.99 cfs 0.251 af Secondary=0.00 cfs 0.000 af Outflow=7.99 cfs 0.251 af

Pond P710: Peak Elev=5,759.63' Inflow=7.24 cfs 0.225 af
Primary=7.24 cfs 0.225 af Secondary=0.00 cfs 0.000 af Outflow=7.24 cfs 0.225 af

Pond P800: Peak Elev=5,749.77' Inflow=41.84 cfs 2.194 af
Primary=41.84 cfs 2.194 af Secondary=0.00 cfs 0.000 af Outflow=41.84 cfs 2.194 af

Pond P820: Peak Elev=5,812.88' Inflow=34.06 cfs 1.616 af
Primary=34.06 cfs 1.616 af Secondary=0.00 cfs 0.000 af Outflow=34.06 cfs 1.616 af

Total Runoff Area = 231.057 ac Runoff Volume = 4.841 af Average Runoff Depth = 0.25"
79.27% Pervious = 183.148 ac 20.73% Impervious = 47.909 ac

Summary for Subcatchment 100:

Runoff = 0.25 cfs @ 2.98 hrs, Volume= 0.008 af, Depth= 0.35"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.00 cfs @ 3.38 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af, Depth= 0.05"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 0.56 cfs @ 3.01 hrs, Volume= 0.027 af, Depth= 0.12"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af, Depth= 1.46"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.10 cfs @ 3.03 hrs, Volume= 0.012 af, Depth= 0.06"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af, Depth= 0.05"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.07 cfs @ 3.01 hrs, Volume= 0.003 af, Depth= 0.12"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.01 cfs @ 3.38 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 4.87 cfs @ 3.08 hrs, Volume= 0.448 af, Depth= 0.09"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	3.200	98	Impervious
*	1.238	58	A soils
*	38.326	58	B Soils
*	19.786	80	D soils
	62.550	67	Weighted Average
	59.350		94.88% Pervious Area
	3.200		5.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 7.15 cfs @ 2.96 hrs, Volume= 0.232 af, Depth= 1.10"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.270	98	Impervious
*	0.263	58	A soils
	2.533	94	Weighted Average
	0.263		10.38% Pervious Area
	2.270		89.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 9.78 cfs @ 3.10 hrs, Volume= 0.697 af, Depth= 0.13"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.355	98	Impervious
*	12.956	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	63.142	70	Weighted Average
	62.787		99.44% Pervious Area
	0.355		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 2.15 cfs @ 2.98 hrs, Volume= 0.067 af, Depth= 0.41"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af, Depth= 0.83"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af, Depth= 1.10"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.04 cfs @ 3.01 hrs, Volume= 0.002 af, Depth= 0.10"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.09 cfs @ 3.33 hrs, Volume= 0.015 af, Depth= 0.05"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 1.67 cfs @ 3.01 hrs, Volume= 0.081 af, Depth= 0.12"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.413	98	Impervious
*	6.007	58	A soils
	8.420	69	Weighted Average
	6.007		71.34% Pervious Area
	2.413		28.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 6.00 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P610 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.02 cfs @ 3.33 hrs, Volume= 0.003 af, Depth= 0.05"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.123	98	Impervious
*	0.634	58	A soils
	0.757	64	Weighted Average
	0.634		83.75% Pervious Area
	0.123		16.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 4.56 cfs @ 2.96 hrs, Volume= 0.151 af, Depth= 1.18"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 3.83 cfs @ 2.96 hrs, Volume= 0.123 af, Depth= 1.03"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.274	98	Impervious
*	0.163	58	A soils
	1.437	93	Weighted Average
	0.163		11.34% Pervious Area
	1.274		88.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 0.13 cfs @ 3.03 hrs, Volume= 0.015 af, Depth= 0.06"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.510	98	Impervious
*	2.372	58	A soils
	2.882	65	Weighted Average
	2.372		82.30% Pervious Area
	0.510		17.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 0.78 cfs @ 2.98 hrs, Volume= 0.025 af, Depth= 0.29"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af, Depth= 0.83"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.617	98	Impervious
*	0.654	58	A Soils
	3.271	90	Weighted Average
	0.654		19.99% Pervious Area
	2.617		80.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.53 cfs @ 2.98 hrs, Volume= 0.018 af, Depth= 0.26"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 17.99 cfs @ 2.96 hrs, Volume= 0.560 af, Depth= 0.83"
Routed to Pond 802P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	6.504	98	Impervious
*	1.626	58	A Soils
	8.130	90	Weighted Average
	1.626		20.00% Pervious Area
	6.504		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af, Depth= 0.83"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	18.749	98	Impervious
*	4.687	58	A soils
	23.436	90	Weighted Average
	4.687		20.00% Pervious Area
	18.749		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Reach N:

Inflow Area = 56.231 ac, 62.47% Impervious, Inflow Depth = 0.61" for 100yr event
Inflow = 50.42 cfs @ 3.00 hrs, Volume= 2.835 af
Outflow = 50.42 cfs @ 3.00 hrs, Volume= 2.835 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

Inflow Area = 231.057 ac, 20.73% Impervious, Inflow Depth = 0.25" for 100yr event
Inflow = 72.09 cfs @ 3.00 hrs, Volume= 4.761 af
Outflow = 72.09 cfs @ 3.00 hrs, Volume= 4.761 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S100:

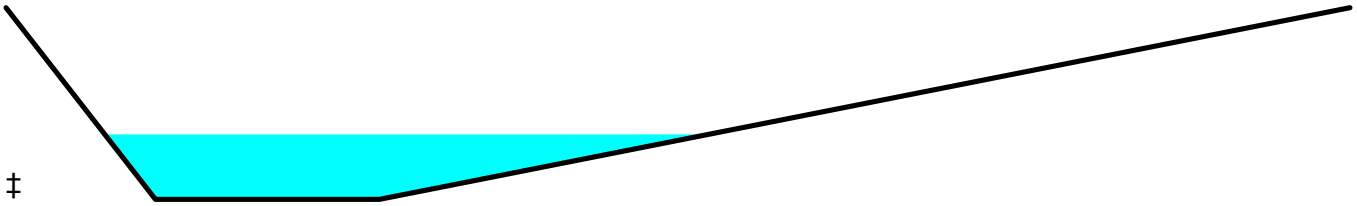
Ditch Parameters from SGM 2015 Survey

Inflow Area = 164.355 ac, 4.16% Impervious, Inflow Depth = 0.11" for 100yr event
Inflow = 8.83 cfs @ 3.03 hrs, Volume= 1.530 af
Outflow = 8.82 cfs @ 3.04 hrs, Volume= 1.530 af, Atten= 0%, Lag= 0.3 min
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.69 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.22 fps, Avg. Travel Time= 0.8 min

Peak Storage= 207 cf @ 3.04 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 8.09'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

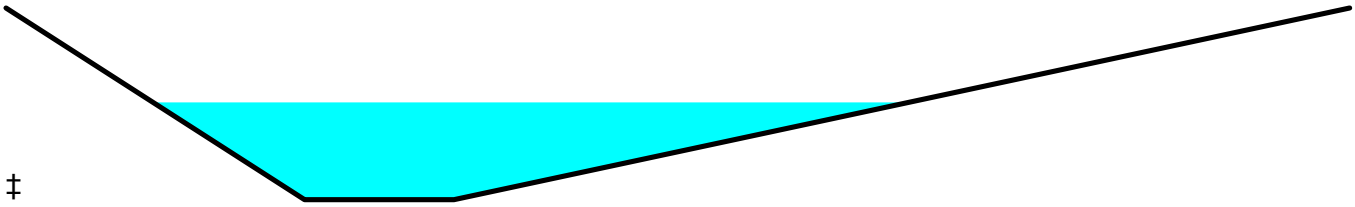
Ditch Parameters from SGM 2015 Survey

Inflow Area = 131.137 ac, 4.85% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 8.52 cfs @ 3.02 hrs, Volume= 1.392 af
Outflow = 8.52 cfs @ 3.02 hrs, Volume= 1.392 af, Atten= 0%, Lag= 0.2 min
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.53 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.83 fps, Avg. Travel Time= 0.6 min

Peak Storage= 169 cf @ 3.02 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 5.06'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 41.25 cfs

1.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 6.0 '/' Top Width= 9.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S600:

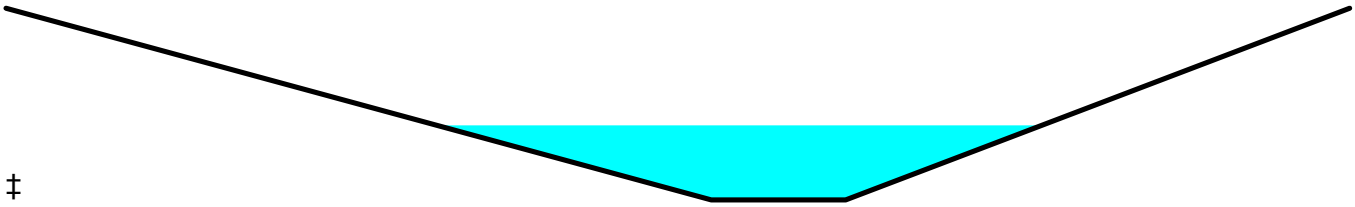
Parameters from 2015 SGM survey

Inflow Area = 15.559 ac, 36.81% Impervious, Inflow Depth = 0.29" for 100yr event
Inflow = 2.17 cfs @ 3.01 hrs, Volume= 0.373 af
Outflow = 2.04 cfs @ 3.03 hrs, Volume= 0.373 af, Atten= 6%, Lag= 1.3 min
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.54 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.53 fps, Avg. Travel Time= 2.9 min

Peak Storage= 211 cf @ 3.03 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 4.50'
Bank-Full Depth= 0.75' Flow Area= 4.1 sf, Capacity= 18.32 cfs

1.00' x 0.75' deep channel, n= 0.030 Short grass
Side Slope Z-value= 7.0 5.0 '/' Top Width= 10.00'
Length= 263.0' Slope= 0.0266 '/'
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Summary for Reach Spill:

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

Inflow Area = 174.826 ac, 7.31% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 21.90 cfs @ 2.99 hrs, Volume= 1.926 af
Outflow = 21.90 cfs @ 2.99 hrs, Volume= 1.926 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 802P:

Inflow Area = 31.566 ac, 80.00% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 41.38 cfs @ 3.02 hrs, Volume= 2.176 af
Outflow = 41.38 cfs @ 3.02 hrs, Volume= 2.176 af, Atten= 0%, Lag= 0.0 min
Primary = 41.38 cfs @ 3.02 hrs, Volume= 2.176 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,763.33' @ 3.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=41.36 cfs @ 3.02 hrs HW=5,763.32' (Free Discharge)
1=Culvert (Inlet Controls 41.36 cfs @ 5.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

Inflow Area = 174.826 ac, 7.31% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 21.60 cfs @ 2.99 hrs, Volume= 1.878 af
Outflow = 21.60 cfs @ 2.99 hrs, Volume= 1.878 af, Atten= 0%, Lag= 0.0 min
Primary = 21.60 cfs @ 2.99 hrs, Volume= 1.878 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,697.23' @ 2.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#2 Secondary 5,705.05' **60.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=21.55 cfs @ 2.99 hrs HW=5,697.23' (Free Discharge)
└**1=Culvert** (Inlet Controls 21.55 cfs @ 4.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth = 10.18" for 100yr event
Inflow = 1.50 cfs @ 3.02 hrs, Volume= 0.233 af
Outflow = 1.50 cfs @ 3.02 hrs, Volume= 0.233 af, Atten= 0%, Lag= 0.0 min
Primary = 1.19 cfs @ 3.02 hrs, Volume= 0.185 af
Routed to Pond P-OUT :
Secondary = 0.31 cfs @ 3.02 hrs, Volume= 0.048 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.83' @ 3.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.18 cfs @ 3.02 hrs HW=5,702.83' (Free Discharge)
└**2=Culvert** (Passes 1.18 cfs of 27.26 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 1.18 cfs @ 0.97 fps)

Secondary OutFlow Max=0.31 cfs @ 3.02 hrs HW=5,702.83' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Weir Controls 0.31 cfs @ 0.69 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

Inflow Area = 165.473 ac, 4.24% Impervious, Inflow Depth = 0.11" for 100yr event
Inflow = 8.85 cfs @ 3.04 hrs, Volume= 1.535 af
Outflow = 8.85 cfs @ 3.04 hrs, Volume= 1.535 af, Atten= 0%, Lag= 0.0 min
Primary = 7.53 cfs @ 3.04 hrs, Volume= 1.310 af
Routed to Pond P-OUT :
Secondary = 1.31 cfs @ 3.04 hrs, Volume= 0.225 af
Routed to Pond P100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.06' @ 3.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.42 cfs @ 3.04 hrs HW=5,708.06' (Free Discharge)
└**3=Culvert** (Passes 7.42 cfs of 133.45 cfs potential flow)
└**2=Culvert** (Passes 7.42 cfs of 78.83 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 7.42 cfs @ 1.33 fps)

Secondary OutFlow Max=1.29 cfs @ 3.04 hrs HW=5,708.06' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 1.29 cfs @ 0.94 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth = 0.05" for 100yr event
Inflow = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.74' @ 3.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 3.33 hrs HW=5,724.74' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 132.87 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth = 0.51" for 100yr event
Inflow = 13.54 cfs @ 2.98 hrs, Volume= 0.383 af
Outflow = 13.54 cfs @ 2.98 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min
Primary = 13.54 cfs @ 2.98 hrs, Volume= 0.383 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.14' @ 2.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.53 cfs @ 2.98 hrs HW=5,703.14' (Free Discharge)
└**2=Culvert** (Passes 13.53 cfs of 27.07 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 13.53 cfs @ 2.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth = 1.46" for 100yr event
Inflow = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af
Outflow = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,704.14' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.01 cfs @ 2.96 hrs HW=5,704.14' (Free Discharge)
└**2=Culvert** (Passes 1.01 cfs of 26.51 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 1.01 cfs @ 1.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P310:

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth = 0.05" for 100yr event
Inflow = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af
Outflow = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af
Routed to Reach S100 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.05' @ 3.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.74 cfs @ 3.37 hrs HW=5,746.05' (Free Discharge)
↑—**2=Culvert** (Passes 0.74 cfs of 96.23 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.74 cfs @ 0.76 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

Inflow Area = 128.862 ac, 4.63% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 8.42 cfs @ 3.02 hrs, Volume= 1.381 af
Outflow = 8.42 cfs @ 3.02 hrs, Volume= 1.381 af, Atten= 0%, Lag= 0.0 min
Primary = 8.42 cfs @ 3.02 hrs, Volume= 1.381 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.10' @ 3.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900

n= 0.013, Flow Area= 7.07 sf

#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.41 cfs @ 3.02 hrs HW=5,749.10' (Free Discharge)
└**2=Culvert** (Passes 8.41 cfs of 73.01 cfs potential flow)
└**1=Culvert** (Inlet Controls 8.41 cfs @ 3.57 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM plans 2015

Inflow Area = 128.510 ac, 4.56% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 8.36 cfs @ 3.02 hrs, Volume= 1.377 af
Outflow = 8.36 cfs @ 3.02 hrs, Volume= 1.377 af, Atten= 0%, Lag= 0.0 min
Primary = 8.36 cfs @ 3.02 hrs, Volume= 1.377 af
Routed to Pond P320 :
Secondary = 0.00 cfs @ 3.02 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,874.00' @ 3.02 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 1.377 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (441.8 - 441.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,874.00'	0.006 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,874.00	0.002	0.000	0.000
5,875.00	0.010	0.006	0.006

Device	Routing	Invert	Outlet Devices
#1	Primary	5,773.50'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,773.50' / 5,767.98' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,874.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=150.89 cfs @ 3.02 hrs HW=5,874.00' (Free Discharge)
└**1=Culvert** (Inlet Controls 150.89 cfs @ 48.03 fps)

Secondary OutFlow Max=0.00 cfs @ 3.02 hrs HW=5,874.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.06 fps)

Summary for Pond P340:

Pipe size and amount of sediment in pipe field verified.
Down stream invert from SGM survey.
Upstream Invert estimated from survey contours.

Inflow Area = 128.225 ac, 4.54% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 8.36 cfs @ 3.01 hrs, Volume= 1.377 af
Outflow = 8.36 cfs @ 3.02 hrs, Volume= 1.376 af, Atten= 0%, Lag= 0.2 min
Primary = 8.36 cfs @ 3.02 hrs, Volume= 1.376 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,789.55' @ 3.02 hrs Surf.Area= 0.004 ac Storage= 0.004 af

Plug-Flow detention time= 1.2 min calculated for 1.376 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (441.9 - 441.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,788.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,788.00	0.001	0.000	0.000
5,790.00	0.005	0.006	0.006
5,792.00	0.024	0.029	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,788.67'	**42.0" Round Culvert w/ 8.0" inside fill** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,788.00' / 5,785.25' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 8.34 sf
#2	Secondary	5,791.00'	**50.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.35 cfs @ 3.02 hrs HW=5,789.55' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.35 cfs @ 2.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,788.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
Amount of sediment in pipe field verified.
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side.

Inflow Area = 63.142 ac, 0.56% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 9.78 cfs @ 3.10 hrs, Volume= 0.697 af
Outflow = 0.58 cfs @ 6.19 hrs, Volume= 0.697 af, Atten= 94%, Lag= 185.3 min
Primary = 0.58 cfs @ 6.19 hrs, Volume= 0.697 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,871.72' @ 6.19 hrs Surf.Area= 0.416 ac Storage= 0.547 af

Plug-Flow detention time= 397.2 min calculated for 0.697 af (100% of inflow)
Center-of-Mass det. time= 397.4 min (642.9 - 245.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	4.919 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,868.00	0.001	0.000	0.000
5,869.00	0.004	0.003	0.003
5,870.00	0.136	0.070	0.072
5,871.00	0.298	0.217	0.290
5,872.00	0.461	0.379	0.669
5,873.00	0.544	0.503	1.171
5,874.00	0.624	0.584	1.755
5,875.00	0.705	0.664	2.420
5,876.00	0.788	0.746	3.166
5,877.00	0.875	0.831	3.998
5,878.00	0.967	0.921	4.919

Device	Routing	Invert	Outlet Devices
#1	Primary	5,867.85'	**15.0" Round Culvert w/ 12.0" inside fill** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.17 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.58 cfs @ 6.19 hrs HW=5,871.72' (Free Discharge)
1=Culvert (Barrel Controls 0.58 cfs @ 3.32 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth = 0.99" for 100yr event
Inflow = 10.33 cfs @ 2.96 hrs, Volume= 0.332 af
Outflow = 9.96 cfs @ 2.98 hrs, Volume= 0.253 af, Atten= 4%, Lag= 1.1 min
Primary = 9.96 cfs @ 2.98 hrs, Volume= 0.253 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.53' @ 2.98 hrs Surf.Area= 1,765 sf Storage= 4,342 cf

Plug-Flow detention time= 38.3 min calculated for 0.253 af (76% of inflow)
Center-of-Mass det. time= 14.6 min (215.8 - 201.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=9.95 cfs @ 2.98 hrs HW=5,736.53' (Free Discharge)
└**2=Culvert** (Passes 9.95 cfs of 19.44 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.95 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af
Outflow = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.69' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.75 cfs @ 2.96 hrs HW=5,750.69' (Free Discharge)
└**2=Culvert** (Passes 2.75 cfs of 15.08 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.75 cfs @ 1.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth = 1.10" for 100yr event
Inflow = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af
Outflow = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min
Primary = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.68' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.56 cfs @ 2.96 hrs HW=5,740.68' (Free Discharge)
└**2=Culvert** (Passes 7.56 cfs of 12.24 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 7.56 cfs @ 2.01 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

Inflow Area = 56.231 ac, 62.47% Impervious, Inflow Depth = 0.61" for 100yr event
Inflow = 50.42 cfs @ 3.00 hrs, Volume= 2.835 af
Outflow = 50.42 cfs @ 3.00 hrs, Volume= 2.835 af, Atten= 0%, Lag= 0.0 min
Primary = 50.42 cfs @ 3.00 hrs, Volume= 2.835 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,708.69' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=50.09 cfs @ 3.00 hrs HW=5,708.69' (Free Discharge)
1=Culvert (Inlet Controls 50.09 cfs @ 5.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

Inflow Area = 55.972 ac, 62.64% Impervious, Inflow Depth = 0.61" for 100yr event
Inflow = 50.39 cfs @ 3.00 hrs, Volume= 2.833 af
Outflow = 50.39 cfs @ 3.00 hrs, Volume= 2.833 af, Atten= 0%, Lag= 0.0 min
Primary = 50.39 cfs @ 3.00 hrs, Volume= 2.833 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.70' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=50.34 cfs @ 3.00 hrs HW=5,736.70' (Free Discharge)
1=Culvert (Inlet Controls 50.34 cfs @ 5.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

Inflow Area = 15.559 ac, 36.81% Impervious, Inflow Depth = 0.29" for 100yr event
Inflow = 2.04 cfs @ 3.03 hrs, Volume= 0.373 af
Outflow = 2.04 cfs @ 3.03 hrs, Volume= 0.373 af, Atten= 0%, Lag= 0.0 min
Primary = 2.04 cfs @ 3.03 hrs, Volume= 0.373 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,754.16' @ 3.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,755.50'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.03 cfs @ 3.03 hrs HW=5,754.16' (Free Discharge)
└**1=Culvert** (Passes 2.03 cfs of 9.03 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 2.03 cfs @ 1.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.28' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610:

Information from SGM plans 2014

Inflow Area = 7.139 ac, 46.44% Impervious, Inflow Depth = 0.49" for 100yr event
Inflow = 0.83 cfs @ 4.32 hrs, Volume= 0.292 af
Outflow = 0.83 cfs @ 4.32 hrs, Volume= 0.292 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 4.32 hrs, Volume= 0.292 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,766.34' @ 4.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.50'	**24.0" Round Culvert** L= 106.2' Ke= 0.500 Inlet / Outlet Invert= 5,761.50' / 5,761.00' S= 0.0047 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,766.80'	**45.0' long + 30.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Device 1	5,766.20'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.82 cfs @ 4.32 hrs HW=5,766.34' (Free Discharge)
↑**1=Culvert** (Passes 0.82 cfs of 27.42 cfs potential flow)
↑**3=Orifice/Grate** (Weir Controls 0.82 cfs @ 1.23 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.50' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM plans 2014

Inflow Area = 6.908 ac, 47.89% Impervious, Inflow Depth = 0.51" for 100yr event
Inflow = 0.82 cfs @ 4.30 hrs, Volume= 0.291 af
Outflow = 0.82 cfs @ 4.30 hrs, Volume= 0.291 af, Atten= 0%, Lag= 0.3 min
Primary = 0.82 cfs @ 4.30 hrs, Volume= 0.291 af
Routed to Pond P610 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.37' @ 4.30 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 0.5 min calculated for 0.291 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (291.3 - 290.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,765.00	0.001	0.000	0.000
5,766.00	0.003	0.002	0.002
5,767.00	0.007	0.005	0.007
5,768.00	0.013	0.010	0.017
5,769.00	0.023	0.018	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.00'	**24.0" Round Culvert** L= 125.0' Ke= 0.500 Inlet / Outlet Invert= 5,765.00' / 5,761.50' S= 0.0280 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.82 cfs @ 4.30 hrs HW=5,765.37' (Free Discharge)
1=Culvert (Inlet Controls 0.82 cfs @ 2.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

Inflow Area = 0.757 ac, 16.25% Impervious, Inflow Depth = 0.05" for 100yr event
Inflow = 0.02 cfs @ 3.33 hrs, Volume= 0.003 af
Outflow = 0.02 cfs @ 3.35 hrs, Volume= 0.003 af, Atten= 0%, Lag= 1.3 min
Primary = 0.02 cfs @ 3.35 hrs, Volume= 0.003 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.01' @ 3.35 hrs Surf.Area= 0.004 ac Storage= 0.000 af

Plug-Flow detention time= 2.3 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (263.9 - 261.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,771.00'	0.004 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,771.00	0.004	0.000	0.000
5,772.00	0.004	0.004	0.004

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.22'	**24.0" Round Culvert** L= 72.0' Ke= 0.500 Inlet / Outlet Invert= 5,769.22' / 5,768.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,771.40'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,771.00'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 3.35 hrs HW=5,771.01' (Free Discharge)
└**1=Culvert** (Passes 0.02 cfs of 13.04 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,771.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P640:

Information from SGM plans 2014

Inflow Area = 6.073 ac, 52.45% Impervious, Inflow Depth = 0.57" for 100yr event
Inflow = 5.00 cfs @ 3.04 hrs, Volume= 0.288 af
Outflow = 0.81 cfs @ 4.38 hrs, Volume= 0.288 af, Atten= 84%, Lag= 80.4 min
Primary = 0.81 cfs @ 4.38 hrs, Volume= 0.288 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,772.40' @ 4.38 hrs Surf.Area= 0.031 ac Storage= 0.059 af

Plug-Flow detention time= 41.5 min calculated for 0.288 af (100% of inflow)
Center-of-Mass det. time= 41.5 min (291.1 - 249.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	0.175 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,769.00	0.006	0.000	0.000
5,770.00	0.012	0.009	0.009
5,771.00	0.019	0.016	0.024
5,772.00	0.027	0.023	0.047
5,773.00	0.036	0.031	0.079
5,774.00	0.047	0.041	0.120
5,775.00	0.063	0.055	0.175

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.50'	**24.0" Round Culvert** L= 61.5' Ke= 0.500 Inlet / Outlet Invert= 5,765.50' / 5,765.00' S= 0.0081 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**55.0' long + 10.0 '/' SideZ x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Device 1	5,774.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.81 cfs @ 4.38 hrs HW=5,772.40' (Free Discharge)
└**1=Culvert** (Passes 0.81 cfs of 36.75 cfs potential flow)
  └**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.81 cfs @ 9.31 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,769.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P650:

Information from SGM plans 2014

Inflow Area = 5.967 ac, 53.38% Impervious, Inflow Depth = 0.58" for 100yr event
Inflow = 8.38 cfs @ 2.96 hrs, Volume= 0.288 af
Outflow = 5.00 cfs @ 3.04 hrs, Volume= 0.288 af, Atten= 40%, Lag= 4.4 min
Primary = 5.00 cfs @ 3.04 hrs, Volume= 0.288 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,778.29' @ 3.04 hrs Surf.Area= 0.050 ac Storage= 0.114 af

Plug-Flow detention time= 47.3 min calculated for 0.288 af (100% of inflow)
Center-of-Mass det. time= 47.3 min (249.6 - 202.3)

Volume	Invert	Avail.Storage	Storage Description
#1	5,774.00'	0.155 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,774.00	0.009	0.000	0.000
5,775.00	0.016	0.012	0.012
5,776.00	0.024	0.020	0.032
5,777.00	0.034	0.029	0.061
5,778.00	0.044	0.039	0.101
5,779.00	0.064	0.054	0.155

Device	Routing	Invert	Outlet Devices
#1	Primary	5,770.50'	**24.0" Round Culvert** L= 71.0' Ke= 0.500 Inlet / Outlet Invert= 5,770.50' / 5,769.00' S= 0.0211 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,778.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,773.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.97 cfs @ 3.04 hrs HW=5,778.29' (Free Discharge)
└**1=Culvert** (Passes 4.97 cfs of 39.42 cfs potential flow)
  └**3=Orifice/Grate** (Weir Controls 4.06 cfs @ 1.77 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.90 cfs @ 10.36 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,774.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM plans 2014

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth = 1.18" for 100yr event
Inflow = 4.56 cfs @ 2.96 hrs, Volume= 0.151 af
Outflow = 4.54 cfs @ 2.97 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.4 min
Primary = 4.54 cfs @ 2.97 hrs, Volume= 0.151 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.44' @ 2.97 hrs Surf.Area= 0.004 ac Storage= 0.001 af

Plug-Flow detention time= 0.1 min calculated for 0.151 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (197.8 - 197.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	0.077 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,779.00	0.002	0.000	0.000
5,780.00	0.006	0.004	0.004
5,781.00	0.011	0.008	0.012
5,782.00	0.018	0.014	0.027
5,783.00	0.082	0.050	0.077

Device	Routing	Invert	Outlet Devices
#1	Primary	5,778.40'	**18.0" Round Culvert** L= 78.8' Ke= 0.500 Inlet / Outlet Invert= 5,778.40' / 5,774.00' S= 0.0558 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.53 cfs @ 2.97 hrs HW=5,779.44' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.53 cfs @ 3.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

Inflow Area = 4.319 ac, 41.31% Impervious, Inflow Depth = 0.38" for 100yr event
Inflow = 3.84 cfs @ 2.96 hrs, Volume= 0.137 af
Outflow = 3.84 cfs @ 2.96 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
Primary = 3.84 cfs @ 2.96 hrs, Volume= 0.137 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,797.00' @ 2.96 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 0.137 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (207.2 - 207.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,797.00'	0.061 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,797.00	0.005	0.000	0.000
5,798.00	0.024	0.014	0.014
5,799.00	0.068	0.046	0.061

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,792.27'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,792.27' / 5,777.57' S= 0.2854 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.98 cfs @ 2.96 hrs HW=5,797.00' (Free Discharge)
└**1=Culvert** (Passes 16.98 cfs of 36.88 cfs potential flow)
└**3=Culvert** (Inlet Controls 16.98 cfs @ 9.61 fps)
└**4=Orifice/Grate** (Passes 16.98 cfs of 37.52 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,797.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

Inflow Area = 4.330 ac, 72.03% Impervious, Inflow Depth = 0.70" for 100yr event
Inflow = 7.99 cfs @ 2.97 hrs, Volume= 0.251 af
Outflow = 7.99 cfs @ 2.97 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min
Primary = 7.99 cfs @ 2.97 hrs, Volume= 0.251 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.02' @ 2.97 hrs Surf.Area= 620 sf Storage= 11 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= 0.0 min calculated for 0.251 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (207.7 - 207.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.37 cfs @ 2.97 hrs HW=5,752.02' (Free Discharge)
└**2=Culvert** (Inlet Controls 13.37 cfs @ 7.56 fps)
└**1=Orifice/Grate** (Passes 13.37 cfs of 36.75 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

Inflow Area = 3.271 ac, 80.01% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af
Outflow = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af, Atten= 0%, Lag= 0.0 min
Primary = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,759.63' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.22 cfs @ 2.96 hrs HW=5,759.63' (Free Discharge)
└**1=Culvert** (Barrel Controls 7.22 cfs @ 4.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 79.14% Impervious, Inflow Depth = 0.81" for 100yr event
Inflow = 41.84 cfs @ 3.02 hrs, Volume= 2.194 af
Outflow = 41.84 cfs @ 3.02 hrs, Volume= 2.194 af, Atten= 0%, Lag= 0.0 min
Primary = 41.84 cfs @ 3.02 hrs, Volume= 2.194 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,749.77' @ 3.02 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=41.80 cfs @ 3.02 hrs HW=5,749.77' (Free Discharge)
2=Culvert (Inlet Controls 41.80 cfs @ 5.28 fps)
1=Orifice/Grate (Passes 41.80 cfs of 134.53 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P820:

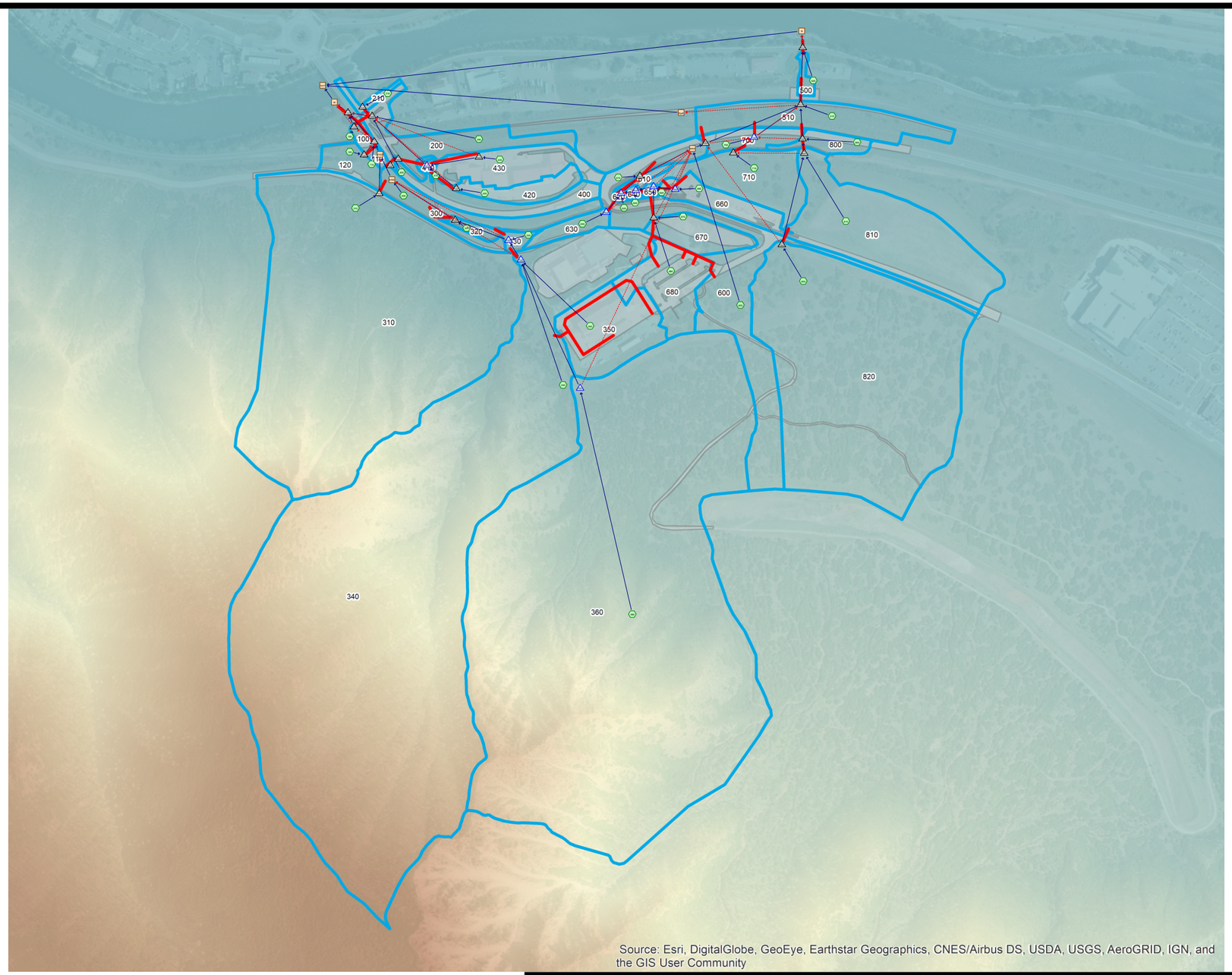
Inflow Area = 23.436 ac, 80.00% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af
Outflow = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af, Atten= 0%, Lag= 0.0 min
Primary = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af
Routed to Pond 802P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.88' @ 3.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=34.05 cfs @ 3.09 hrs HW=5,812.88' (Free Discharge)
└**2=Culvert** (Passes 34.05 cfs of 119.22 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 34.05 cfs @ 3.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)



Subcat Reach Pond Link

Routing Diagram for 2021-445.001 Proposed

Prepared by SGM, Printed 1/23/2022

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25yr	Type II 6-hr		Default	6.00	1	1.36	2
2	100yr	Type II 6-hr		Default	6.00	1	1.68	2

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth=0.20"
Tc=5.0 min CN=79 Runoff=0.13 cfs 0.004 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=63 Runoff=0.00 cfs 0.000 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=64 Runoff=0.00 cfs 0.001 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=69 Runoff=0.07 cfs 0.010 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth=1.14"
Tc=5.0 min CN=98 Runoff=0.81 cfs 0.029 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=65 Runoff=0.01 cfs 0.003 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth=0.01"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=0.15 cfs 0.026 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=69 Runoff=0.01 cfs 0.001 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=63 Runoff=0.00 cfs 0.000 af

Subcatchment340: Runoff Area=61.210 ac 3.81% Impervious Runoff Depth=0.03"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=0.64 cfs 0.135 af

Subcatchment350: Runoff Area=3.824 ac 59.62% Impervious Runoff Depth=0.33"
Tc=5.0 min CN=84 Runoff=3.41 cfs 0.106 af

Subcatchment360: Runoff Area=63.142 ac 0.57% Impervious Runoff Depth=0.05"
Flow Length=3,685' Tc=12.3 min CN=70 Runoff=1.83 cfs 0.278 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth=0.25"
Tc=5.0 min CN=81 Runoff=1.23 cfs 0.040 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=90 Runoff=1.94 cfs 0.060 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth=0.81"
Tc=5.0 min CN=94 Runoff=5.68 cfs 0.181 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth=0.03"
Tc=5.0 min CN=68 Runoff=0.00 cfs 0.001 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=64 Runoff=0.02 cfs 0.003 af

Subcatchment600: Runoff Area=8.446 ac 28.25% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=69 Runoff=0.20 cfs 0.030 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.000 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.745 ac 15.03% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=64 Runoff=0.00 cfs 0.001 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth=0.88"
Tc=5.0 min CN=95 Runoff=3.48 cfs 0.113 af

Subcatchment670: Runoff Area=1.584 ac 49.12% Impervious Runoff Depth=0.18"
Tc=5.0 min CN=78 Runoff=0.66 cfs 0.023 af

Subcatchment680: Runoff Area=2.771 ac 67.70% Impervious Runoff Depth=0.37"
Tc=5.0 min CN=85 Runoff=2.74 cfs 0.084 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth=0.16"
Tc=5.0 min CN=77 Runoff=0.37 cfs 0.014 af

Subcatchment710: Runoff Area=3.270 ac 80.00% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=90 Runoff=5.09 cfs 0.157 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth=0.14"
Tc=5.0 min CN=76 Runoff=0.24 cfs 0.009 af

Subcatchment810: Runoff Area=8.130 ac 80.00% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=90 Runoff=12.66 cfs 0.390 af

Subcatchment820: Runoff Area=23.436 ac 80.00% Impervious Runoff Depth=0.58"
Flow Length=1,968' Tc=16.1 min CN=90 Runoff=23.55 cfs 1.124 af

Reach N: Inflow=33.54 cfs 1.949 af
Outflow=33.54 cfs 1.949 af

Reach OUT: Inflow=45.48 cfs 2.743 af
Outflow=45.48 cfs 2.743 af

Reach S100: Avg. Flow Depth=0.21' Max Vel=3.59 fps Inflow=3.45 cfs 0.548 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=3.44 cfs 0.548 af

Reach S300: Avg. Flow Depth=0.34' Max Vel=4.38 fps Inflow=3.46 cfs 0.522 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=41.25 cfs Outflow=3.45 cfs 0.522 af

Reach S600: Avg. Flow Depth=0.19' Max Vel=1.99 fps Inflow=0.81 cfs 0.251 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=18.32 cfs Outflow=0.81 cfs 0.251 af

Reach Spill: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach W: Inflow=11.96 cfs 0.794 af
Outflow=11.96 cfs 0.794 af

Pond 802P: Peak Elev=5,762.86' Inflow=28.36 cfs 1.514 af
Primary=28.36 cfs 1.514 af Secondary=0.00 cfs 0.000 af Outflow=28.36 cfs 1.514 af

Pond P-OUT: Peak Elev=5,696.77' Inflow=11.83 cfs 0.777 af
Primary=11.83 cfs 0.777 af Secondary=0.00 cfs 0.000 af Outflow=11.83 cfs 0.777 af

Pond P100: Peak Elev=5,702.79' Inflow=0.64 cfs 0.085 af
Primary=0.50 cfs 0.067 af Secondary=0.13 cfs 0.017 af Outflow=0.64 cfs 0.085 af

Pond P110: Peak Elev=5,707.99' Inflow=3.44 cfs 0.549 af
Primary=2.93 cfs 0.469 af Secondary=0.50 cfs 0.080 af Outflow=3.44 cfs 0.549 af

Pond P120: Peak Elev=5,724.74' Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P200: Peak Elev=5,703.01' Inflow=8.40 cfs 0.241 af
Primary=8.40 cfs 0.241 af Secondary=0.00 cfs 0.000 af Outflow=8.40 cfs 0.241 af

Pond P210: Peak Elev=5,704.12' Inflow=0.81 cfs 0.029 af
Primary=0.81 cfs 0.029 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.029 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.01' Inflow=0.15 cfs 0.026 af
Primary=0.15 cfs 0.026 af Secondary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.026 af

Pond P320: Peak Elev=5,748.69' Inflow=3.46 cfs 0.519 af
Primary=3.46 cfs 0.519 af Secondary=0.00 cfs 0.000 af Outflow=3.46 cfs 0.519 af

Pond P330: Peak Elev=5,874.00' Storage=0.000 af Inflow=3.46 cfs 0.518 af
Primary=3.46 cfs 0.518 af Secondary=0.00 cfs 0.000 af Outflow=3.46 cfs 0.518 af

Pond P340: Peak Elev=5,789.17' Storage=0.003 af Inflow=3.46 cfs 0.519 af
Primary=3.46 cfs 0.518 af Secondary=0.00 cfs 0.000 af Outflow=3.46 cfs 0.518 af

Pond P360: Peak Elev=5,870.47' Storage=0.154 af Inflow=1.83 cfs 0.278 af
Primary=0.49 cfs 0.278 af Secondary=0.00 cfs 0.000 af Outflow=0.49 cfs 0.278 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.40' Storage=4,113 cf Inflow=7.63 cfs 0.241 af
Primary=6.52 cfs 0.162 af Secondary=0.00 cfs 0.000 af Outflow=6.52 cfs 0.162 af

Pond P420: Peak Elev=5,750.65' Inflow=1.94 cfs 0.060 af
Primary=1.94 cfs 0.060 af Secondary=0.00 cfs 0.000 af Outflow=1.94 cfs 0.060 af

Pond P430: Peak Elev=5,740.61' Inflow=5.68 cfs 0.181 af
Primary=5.68 cfs 0.181 af Secondary=0.00 cfs 0.000 af Outflow=5.68 cfs 0.181 af

Pond P500: Peak Elev=5,708.12' Inflow=33.54 cfs 1.949 af
Primary=33.54 cfs 1.949 af Secondary=0.00 cfs 0.000 af Outflow=33.54 cfs 1.949 af

Pond P510: Peak Elev=5,736.12' Inflow=33.54 cfs 1.948 af
Primary=33.54 cfs 1.948 af Secondary=0.00 cfs 0.000 af Outflow=33.54 cfs 1.948 af

Pond P600: Peak Elev=5,754.08' Inflow=0.81 cfs 0.251 af
Primary=0.81 cfs 0.251 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.251 af

Pond P610: Peak Elev=5,766.33' Inflow=0.71 cfs 0.221 af
Primary=0.71 cfs 0.221 af Secondary=0.00 cfs 0.000 af Outflow=0.71 cfs 0.221 af

Pond P620: Peak Elev=5,765.34' Storage=0.000 af Inflow=0.71 cfs 0.221 af
Primary=0.71 cfs 0.221 af Secondary=0.00 cfs 0.000 af Outflow=0.71 cfs 0.221 af

Pond P630: Peak Elev=5,771.00' Storage=0.000 af Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P640: Peak Elev=5,771.47' Storage=0.034 af Inflow=0.87 cfs 0.221 af
Primary=0.70 cfs 0.221 af Secondary=0.00 cfs 0.000 af Outflow=0.70 cfs 0.221 af

Pond P650: Peak Elev=5,777.91' Storage=0.097 af Inflow=6.83 cfs 0.221 af
Primary=0.87 cfs 0.221 af Secondary=0.00 cfs 0.000 af Outflow=0.87 cfs 0.221 af

Pond P660: Peak Elev=5,779.28' Storage=0.001 af Inflow=3.48 cfs 0.113 af
Primary=3.47 cfs 0.113 af Secondary=0.00 cfs 0.000 af Outflow=3.47 cfs 0.113 af

Pond P670: Peak Elev=5,796.39' Inflow=3.38 cfs 0.108 af
Primary=3.38 cfs 0.108 af Secondary=0.00 cfs 0.000 af Outflow=3.38 cfs 0.108 af

Pond P700: Peak Elev=5,752.01' Storage=7 cf Inflow=5.43 cfs 0.171 af
Primary=5.43 cfs 0.171 af Secondary=0.00 cfs 0.000 af Outflow=5.43 cfs 0.171 af

Pond P710: Peak Elev=5,759.29' Inflow=5.09 cfs 0.157 af
Primary=5.09 cfs 0.157 af Secondary=0.00 cfs 0.000 af Outflow=5.09 cfs 0.157 af

Pond P800: Peak Elev=5,749.30' Inflow=28.58 cfs 1.523 af
Primary=28.58 cfs 1.523 af Secondary=0.00 cfs 0.000 af Outflow=28.58 cfs 1.523 af

Pond P820: Peak Elev=5,812.69' Inflow=23.55 cfs 1.124 af
Primary=23.55 cfs 1.124 af Secondary=0.00 cfs 0.000 af Outflow=23.55 cfs 1.124 af

Total Runoff Area = 231.057 ac Runoff Volume = 2.823 af Average Runoff Depth = 0.15"
79.27% Pervious = 183.166 ac 20.73% Impervious = 47.891 ac

Summary for Subcatchment 100:

Runoff = 0.13 cfs @ 2.99 hrs, Volume= 0.004 af, Depth= 0.20"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 0.07 cfs @ 3.04 hrs, Volume= 0.010 af, Depth= 0.04"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af, Depth= 1.14"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.01 cfs @ 4.45 hrs, Volume= 0.003 af, Depth= 0.01"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af, Depth= 0.01"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.01 cfs @ 3.04 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 0.64 cfs @ 3.51 hrs, Volume= 0.135 af, Depth= 0.03"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.335	98	Impervious
*	1.289	58	A soils
*	38.152	58	B Soils
*	19.434	80	D soils
	61.210	67	Weighted Average
	58.875		96.19% Pervious Area
	2.335		3.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 3.41 cfs @ 2.98 hrs, Volume= 0.106 af, Depth= 0.33"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.280	98	Impervious
*	1.102	58	A soils
*	0.044	58	B soils
*	0.398	80	D soils
	3.824	84	Weighted Average
	1.544		40.38% Pervious Area
	2.280		59.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 1.83 cfs @ 3.16 hrs, Volume= 0.278 af, Depth= 0.05"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.361	98	Impervious
*	12.950	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	63.142	70	Weighted Average
	62.781		99.43% Pervious Area
	0.361		0.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 1.23 cfs @ 2.98 hrs, Volume= 0.040 af, Depth= 0.25"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af, Depth= 0.58"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af, Depth= 0.81"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.00 cfs @ 3.37 hrs, Volume= 0.001 af, Depth= 0.03"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.02 cfs @ 6.00 hrs, Volume= 0.003 af, Depth= 0.01"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 0.20 cfs @ 3.04 hrs, Volume= 0.030 af, Depth= 0.04"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.386	98	Impervious
*	6.060	58	A soils
	8.446	69	Weighted Average
	6.060		71.75% Pervious Area
	2.386		28.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P610 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.112	98	Impervious
*	0.633	58	A soils
	0.745	64	Weighted Average
	0.633		84.97% Pervious Area
	0.112		15.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 3.48 cfs @ 2.96 hrs, Volume= 0.113 af, Depth= 0.88"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 0.66 cfs @ 2.99 hrs, Volume= 0.023 af, Depth= 0.18"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.778	98	Impervious
*	0.806	58	A soils
	1.584	78	Weighted Average
	0.806		50.88% Pervious Area
	0.778		49.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 2.74 cfs @ 2.97 hrs, Volume= 0.084 af, Depth= 0.37"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	1.876	98	Impervious
*	0.895	58	A soils
	2.771	85	Weighted Average
	0.895		32.30% Pervious Area
	1.876		67.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 0.37 cfs @ 2.99 hrs, Volume= 0.014 af, Depth= 0.16"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af, Depth= 0.58"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	2.616	98	Impervious
*	0.654	58	A Soils
	3.270	90	Weighted Average
	0.654		20.00% Pervious Area
	2.616		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.24 cfs @ 3.00 hrs, Volume= 0.009 af, Depth= 0.14"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 12.66 cfs @ 2.97 hrs, Volume= 0.390 af, Depth= 0.58"
Routed to Pond 802P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	6.504	98	Impervious
*	1.626	58	A Soils
	8.130	90	Weighted Average
	1.626		20.00% Pervious Area
	6.504		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af, Depth= 0.58"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 25yr Rainfall=1.36"

	Area (ac)	CN	Description
*	18.749	98	Impervious
*	4.687	58	A soils
	23.436	90	Weighted Average
	4.687		20.00% Pervious Area
	18.749		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Reach N:

Inflow Area = 56.280 ac, 63.89% Impervious, Inflow Depth = 0.42" for 25yr event
Inflow = 33.54 cfs @ 3.00 hrs, Volume= 1.949 af
Outflow = 33.54 cfs @ 3.00 hrs, Volume= 1.949 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

Inflow Area = 231.057 ac, 20.73% Impervious, Inflow Depth = 0.14" for 25yr event
Inflow = 45.48 cfs @ 3.00 hrs, Volume= 2.743 af
Outflow = 45.48 cfs @ 3.00 hrs, Volume= 2.743 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S100:

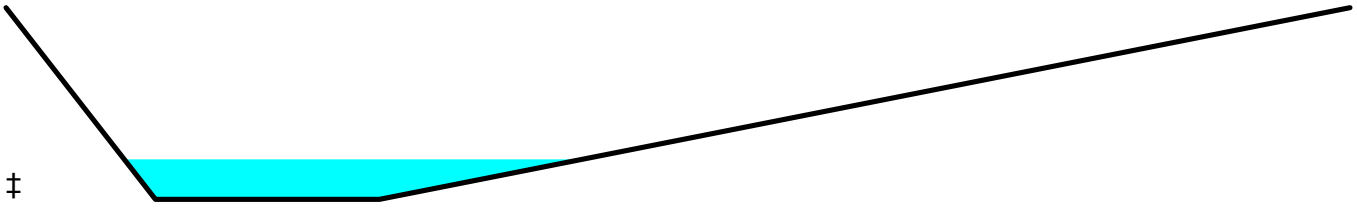
Ditch Parameters from SGM 2015 Survey

Inflow Area = 164.306 ac, 3.65% Impervious, Inflow Depth = 0.04" for 25yr event
Inflow = 3.45 cfs @ 2.99 hrs, Volume= 0.548 af
Outflow = 3.44 cfs @ 3.00 hrs, Volume= 0.548 af, Atten= 0%, Lag= 0.4 min
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.59 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.17 fps, Avg. Travel Time= 0.8 min

Peak Storage= 105 cf @ 3.00 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 6.14'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

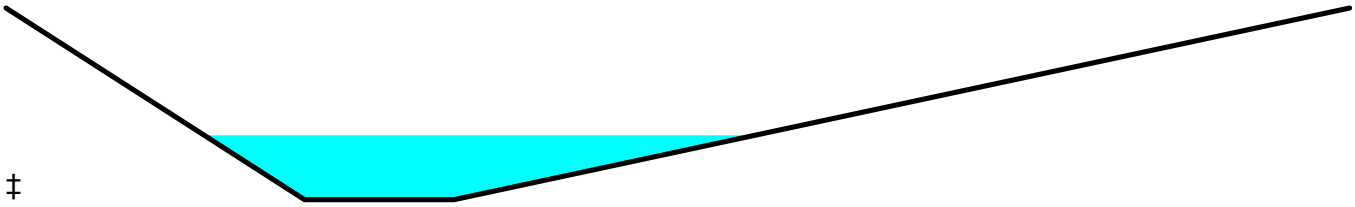
Ditch Parameters from SGM 2015 Survey

Inflow Area = 131.088 ac, 4.21% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 3.46 cfs @ 2.98 hrs, Volume= 0.522 af
Outflow = 3.45 cfs @ 2.99 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.3 min
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.38 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.79 fps, Avg. Travel Time= 0.7 min

Peak Storage= 87 cf @ 2.99 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 3.69'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 41.25 cfs

1.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 6.0 '/' Top Width= 9.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S600:

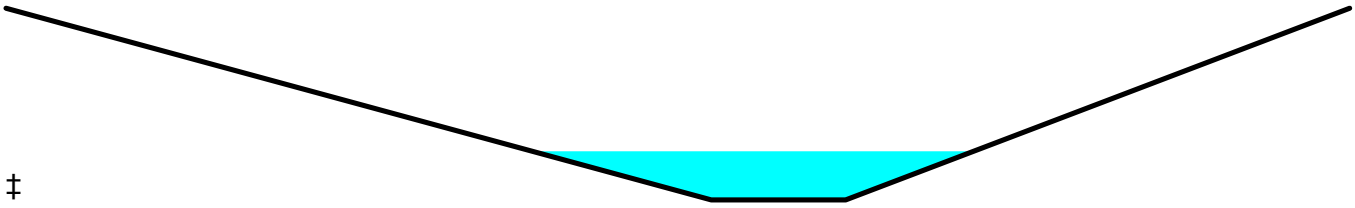
Parameters from 2015 SGM survey

Inflow Area = 15.609 ac, 42.03% Impervious, Inflow Depth = 0.19" for 25yr event
Inflow = 0.81 cfs @ 4.67 hrs, Volume= 0.251 af
Outflow = 0.81 cfs @ 4.70 hrs, Volume= 0.251 af, Atten= 0%, Lag= 1.4 min
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.99 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 3.1 min

Peak Storage= 107 cf @ 4.70 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 3.28'
Bank-Full Depth= 0.75' Flow Area= 4.1 sf, Capacity= 18.32 cfs

1.00' x 0.75' deep channel, n= 0.030 Short grass
Side Slope Z-value= 7.0 5.0 '/' Top Width= 10.00'
Length= 263.0' Slope= 0.0266 '/'
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Summary for Reach Spill:

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

Inflow Area = 174.777 ac, 6.83% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 11.96 cfs @ 3.00 hrs, Volume= 0.794 af
Outflow = 11.96 cfs @ 3.00 hrs, Volume= 0.794 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 802P:

Inflow Area = 31.566 ac, 80.00% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 28.36 cfs @ 3.02 hrs, Volume= 1.514 af
Outflow = 28.36 cfs @ 3.02 hrs, Volume= 1.514 af, Atten= 0%, Lag= 0.0 min
Primary = 28.36 cfs @ 3.02 hrs, Volume= 1.514 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,762.86' @ 3.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=28.35 cfs @ 3.02 hrs HW=5,762.86' (Free Discharge)
1=Culvert (Inlet Controls 28.35 cfs @ 4.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

Inflow Area = 174.777 ac, 6.83% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 11.83 cfs @ 3.00 hrs, Volume= 0.777 af
Outflow = 11.83 cfs @ 3.00 hrs, Volume= 0.777 af, Atten= 0%, Lag= 0.0 min
Primary = 11.83 cfs @ 3.00 hrs, Volume= 0.777 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,696.77' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#2 Secondary 5,705.05' **60.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=11.79 cfs @ 3.00 hrs HW=5,696.77' (Free Discharge)
└**1=Culvert** (Inlet Controls 11.79 cfs @ 3.73 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth = 3.70" for 25yr event
Inflow = 0.64 cfs @ 2.99 hrs, Volume= 0.085 af
Outflow = 0.64 cfs @ 2.99 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 2.99 hrs, Volume= 0.067 af
Routed to Pond P-OUT :
Secondary = 0.13 cfs @ 2.99 hrs, Volume= 0.017 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.79' @ 2.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.49 cfs @ 2.99 hrs HW=5,702.79' (Free Discharge)
└**2=Culvert** (Passes 0.49 cfs of 27.09 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.49 cfs @ 0.72 fps)

Secondary OutFlow Max=0.13 cfs @ 2.99 hrs HW=5,702.79' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.51 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

Inflow Area = 165.424 ac, 3.73% Impervious, Inflow Depth = 0.04" for 25yr event
Inflow = 3.44 cfs @ 3.00 hrs, Volume= 0.549 af
Outflow = 3.44 cfs @ 3.00 hrs, Volume= 0.549 af, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 3.00 hrs, Volume= 0.469 af
Routed to Pond P-OUT :
Secondary = 0.50 cfs @ 3.00 hrs, Volume= 0.080 af
Routed to Pond P100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,707.99' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.80 cfs @ 3.00 hrs HW=5,707.99' (Free Discharge)
└**3=Culvert** (Passes 2.80 cfs of 132.37 cfs potential flow)
└**2=Culvert** (Passes 2.80 cfs of 78.25 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.80 cfs @ 0.96 fps)

Secondary OutFlow Max=0.48 cfs @ 3.00 hrs HW=5,707.99' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.48 cfs @ 0.68 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth = 0.01" for 25yr event
Inflow = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.74' @ 6.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 6.00 hrs HW=5,724.74' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 132.87 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.05 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth = 0.32" for 25yr event
Inflow = 8.40 cfs @ 3.00 hrs, Volume= 0.241 af
Outflow = 8.40 cfs @ 3.00 hrs, Volume= 0.241 af, Atten= 0%, Lag= 0.0 min
Primary = 8.40 cfs @ 3.00 hrs, Volume= 0.241 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.01' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.36 cfs @ 3.00 hrs HW=5,703.01' (Free Discharge)
└**2=Culvert** (Passes 8.36 cfs of 26.49 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 8.36 cfs @ 1.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth = 1.14" for 25yr event
Inflow = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af
Outflow = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 2.96 hrs, Volume= 0.029 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,704.12' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.80 cfs @ 2.96 hrs HW=5,704.12' (Free Discharge)
└**2=Culvert** (Passes 0.80 cfs of 26.42 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 0.80 cfs @ 1.11 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P310:

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth = 0.01" for 25yr event
Inflow = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af
Outflow = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 6.01 hrs, Volume= 0.026 af
Routed to Reach S100 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.01' @ 6.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.06 cfs @ 6.01 hrs HW=5,746.01' (Free Discharge)
↑—**2=Culvert** (Passes 0.06 cfs of 95.97 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.06 cfs @ 0.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

Inflow Area = 128.813 ac, 3.97% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 3.46 cfs @ 2.98 hrs, Volume= 0.519 af
Outflow = 3.46 cfs @ 2.98 hrs, Volume= 0.519 af, Atten= 0%, Lag= 0.0 min
Primary = 3.46 cfs @ 2.98 hrs, Volume= 0.519 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,748.69' @ 2.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900

n= 0.013, Flow Area= 7.07 sf

#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.45 cfs @ 2.98 hrs HW=5,748.69' (Free Discharge)
↑**2=Culvert** (Passes 3.45 cfs of 69.64 cfs potential flow)
↑**1=Culvert** (Inlet Controls 3.45 cfs @ 2.82 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' (Free Discharge)
↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM plans 2015

Inflow Area = 128.461 ac, 3.90% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 3.46 cfs @ 2.98 hrs, Volume= 0.518 af
Outflow = 3.46 cfs @ 2.98 hrs, Volume= 0.518 af, Atten= 0%, Lag= 0.0 min
Primary = 3.46 cfs @ 2.98 hrs, Volume= 0.518 af
Routed to Pond P320 :
Secondary = 0.00 cfs @ 2.98 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,874.00' @ 2.98 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 0.518 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (330.4 - 330.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,874.00'	0.006 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,874.00	0.002	0.000	0.000
5,875.00	0.010	0.006	0.006

Device	Routing	Invert	Outlet Devices
#1	Primary	5,773.50'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,773.50' / 5,767.98' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,874.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=150.89 cfs @ 2.98 hrs HW=5,874.00' (Free Discharge)
└**1=Culvert** (Inlet Controls 150.89 cfs @ 48.03 fps)

Secondary OutFlow Max=0.00 cfs @ 2.98 hrs HW=5,874.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.04 fps)

Summary for Pond P340:

Pipe size and amount of sediment in pipe field verified.
Down stream invert from SGM survey.
Upstream Invert estimated from survey contours.

Inflow Area = 128.176 ac, 3.88% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 3.46 cfs @ 2.98 hrs, Volume= 0.519 af
Outflow = 3.46 cfs @ 2.98 hrs, Volume= 0.518 af, Atten= 0%, Lag= 0.2 min
Primary = 3.46 cfs @ 2.98 hrs, Volume= 0.518 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,789.17' @ 2.98 hrs Surf.Area= 0.003 ac Storage= 0.003 af

Plug-Flow detention time= 1.4 min calculated for 0.518 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (330.5 - 329.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,788.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,788.00	0.001	0.000	0.000
5,790.00	0.005	0.006	0.006
5,792.00	0.024	0.029	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,788.67'	**42.0" Round Culvert w/ 8.0" inside fill** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,788.00' / 5,785.25' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 8.34 sf
#2	Secondary	5,791.00'	**50.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.45 cfs @ 2.98 hrs HW=5,789.17' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.45 cfs @ 2.24 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,788.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
Amount of sediment in pipe field verified.
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side.

Inflow Area = 63.142 ac, 0.57% Impervious, Inflow Depth = 0.05" for 25yr event
Inflow = 1.83 cfs @ 3.16 hrs, Volume= 0.278 af
Outflow = 0.49 cfs @ 6.14 hrs, Volume= 0.278 af, Atten= 73%, Lag= 179.0 min
Primary = 0.49 cfs @ 6.14 hrs, Volume= 0.278 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,870.47' @ 6.14 hrs Surf.Area= 0.212 ac Storage= 0.154 af

Plug-Flow detention time= 136.4 min calculated for 0.278 af (100% of inflow)
Center-of-Mass det. time= 136.4 min (398.1 - 261.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	4.919 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,868.00	0.001	0.000	0.000
5,869.00	0.004	0.003	0.003
5,870.00	0.136	0.070	0.072
5,871.00	0.298	0.217	0.290
5,872.00	0.461	0.379	0.669
5,873.00	0.544	0.503	1.171
5,874.00	0.624	0.584	1.755
5,875.00	0.705	0.664	2.420
5,876.00	0.788	0.746	3.166
5,877.00	0.875	0.831	3.998
5,878.00	0.967	0.921	4.919

Device	Routing	Invert	Outlet Devices
#1	Primary	5,867.85'	**15.0" Round Culvert w/ 12.0" inside fill** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.17 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.49 cfs @ 6.14 hrs HW=5,870.47' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.49 cfs @ 2.82 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth = 0.72" for 25yr event
Inflow = 7.63 cfs @ 2.96 hrs, Volume= 0.241 af
Outflow = 6.52 cfs @ 3.00 hrs, Volume= 0.162 af, Atten= 15%, Lag= 2.4 min
Primary = 6.52 cfs @ 3.00 hrs, Volume= 0.162 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.40' @ 3.00 hrs Surf.Area= 1,721 sf Storage= 4,113 cf

Plug-Flow detention time= 48.2 min calculated for 0.162 af (67% of inflow)
Center-of-Mass det. time= 20.2 min (223.7 - 203.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=6.48 cfs @ 3.00 hrs HW=5,736.40' (Free Discharge)
↑—**2=Culvert** (Passes 6.48 cfs of 19.20 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 6.48 cfs @ 2.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P420:

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af
Outflow = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 1.94 cfs @ 2.97 hrs, Volume= 0.060 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.65' @ 2.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.94 cfs @ 2.97 hrs HW=5,750.65' (Free Discharge)
└**2=Culvert** (Passes 1.94 cfs of 14.99 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 1.94 cfs @ 1.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth = 0.81" for 25yr event
Inflow = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af
Outflow = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min
Primary = 5.68 cfs @ 2.96 hrs, Volume= 0.181 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.61' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.67 cfs @ 2.96 hrs HW=5,740.61' (Free Discharge)
└**2=Culvert** (Passes 5.67 cfs of 12.14 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 5.67 cfs @ 1.82 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

Inflow Area = 56.280 ac, 63.89% Impervious, Inflow Depth = 0.42" for 25yr event
Inflow = 33.54 cfs @ 3.00 hrs, Volume= 1.949 af
Outflow = 33.54 cfs @ 3.00 hrs, Volume= 1.949 af, Atten= 0%, Lag= 0.0 min
Primary = 33.54 cfs @ 3.00 hrs, Volume= 1.949 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,708.12' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=33.51 cfs @ 3.00 hrs HW=5,708.12' (Free Discharge)
1=Culvert (Inlet Controls 33.51 cfs @ 4.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

Inflow Area = 56.021 ac, 64.07% Impervious, Inflow Depth = 0.42" for 25yr event
Inflow = 33.54 cfs @ 3.00 hrs, Volume= 1.948 af
Outflow = 33.54 cfs @ 3.00 hrs, Volume= 1.948 af, Atten= 0%, Lag= 0.0 min
Primary = 33.54 cfs @ 3.00 hrs, Volume= 1.948 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.12' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=33.51 cfs @ 3.00 hrs HW=5,736.12' (Free Discharge)
1=Culvert (Inlet Controls 33.51 cfs @ 4.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

Inflow Area = 15.609 ac, 42.03% Impervious, Inflow Depth = 0.19" for 25yr event
Inflow = 0.81 cfs @ 4.70 hrs, Volume= 0.251 af
Outflow = 0.81 cfs @ 4.70 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 4.70 hrs, Volume= 0.251 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,754.08' @ 4.70 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,755.50'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.81 cfs @ 4.70 hrs HW=5,754.08' (Free Discharge)
└**1=Culvert** (Passes 0.81 cfs of 8.74 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.81 cfs @ 0.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.28' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610:

Information from SGM plans 2014

Inflow Area = 7.163 ac, 58.27% Impervious, Inflow Depth = 0.37" for 25yr event
Inflow = 0.71 cfs @ 5.02 hrs, Volume= 0.221 af
Outflow = 0.71 cfs @ 5.02 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.0 min
Primary = 0.71 cfs @ 5.02 hrs, Volume= 0.221 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,766.33' @ 5.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.50'	**24.0" Round Culvert** L= 106.2' Ke= 0.500 Inlet / Outlet Invert= 5,761.50' / 5,761.00' S= 0.0047 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,766.80'	**45.0' long + 30.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Device 1	5,766.20'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.70 cfs @ 5.02 hrs HW=5,766.33' (Free Discharge)
└**1=Culvert** (Passes 0.70 cfs of 27.37 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.70 cfs @ 1.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM plans 2014

Inflow Area = 6.932 ac, 60.11% Impervious, Inflow Depth = 0.38" for 25yr event
Inflow = 0.71 cfs @ 5.01 hrs, Volume= 0.221 af
Outflow = 0.71 cfs @ 5.02 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.3 min
Primary = 0.71 cfs @ 5.02 hrs, Volume= 0.221 af
Routed to Pond P610 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.34' @ 5.02 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 0.5 min calculated for 0.221 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (289.3 - 288.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,765.00	0.001	0.000	0.000
5,766.00	0.003	0.002	0.002
5,767.00	0.007	0.005	0.007
5,768.00	0.013	0.010	0.017
5,769.00	0.023	0.018	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.00'	**24.0" Round Culvert** L= 125.0' Ke= 0.500 Inlet / Outlet Invert= 5,765.00' / 5,761.50' S= 0.0280 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.70 cfs @ 5.02 hrs HW=5,765.34' (Free Discharge)
1=Culvert (Inlet Controls 0.70 cfs @ 1.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

Inflow Area = 0.745 ac, 15.03% Impervious, Inflow Depth = 0.01" for 25yr event
Inflow = 0.00 cfs @ 6.00 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 6.01 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.6 min
Primary = 0.00 cfs @ 6.01 hrs, Volume= 0.001 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.00' @ 6.01 hrs Surf.Area= 0.004 ac Storage= 0.000 af

Plug-Flow detention time= 2.4 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 2.4 min (301.0 - 298.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,771.00'	0.004 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,771.00	0.004	0.000	0.000
5,772.00	0.004	0.004	0.004

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.22'	**24.0" Round Culvert** L= 72.0' Ke= 0.500 Inlet / Outlet Invert= 5,769.22' / 5,768.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,771.40'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,771.00'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 6.01 hrs HW=5,771.00' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 12.95 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,771.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P640:

Information from SGM plans 2014

Inflow Area = 6.109 ac, 66.38% Impervious, Inflow Depth = 0.43" for 25yr event
Inflow = 0.87 cfs @ 3.34 hrs, Volume= 0.221 af
Outflow = 0.70 cfs @ 5.02 hrs, Volume= 0.221 af, Atten= 19%, Lag= 100.3 min
Primary = 0.70 cfs @ 5.02 hrs, Volume= 0.221 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.47' @ 5.02 hrs Surf.Area= 0.023 ac Storage= 0.034 af

Plug-Flow detention time= 26.8 min calculated for 0.221 af (100% of inflow)
Center-of-Mass det. time= 26.8 min (288.7 - 261.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	0.175 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,769.00	0.006	0.000	0.000
5,770.00	0.012	0.009	0.009
5,771.00	0.019	0.016	0.024
5,772.00	0.027	0.023	0.047
5,773.00	0.036	0.031	0.079
5,774.00	0.047	0.041	0.120
5,775.00	0.063	0.055	0.175

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.50'	**24.0" Round Culvert** L= 61.5' Ke= 0.500 Inlet / Outlet Invert= 5,765.50' / 5,765.00' S= 0.0081 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**55.0' long + 10.0 '/' SideZ x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Device 1	5,774.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.70 cfs @ 5.02 hrs HW=5,771.47' (Free Discharge)
└**1=Culvert** (Passes 0.70 cfs of 33.73 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.70 cfs @ 8.06 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,769.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P650:

Information from SGM plans 2014

Inflow Area = 6.003 ac, 67.55% Impervious, Inflow Depth = 0.44" for 25yr event
Inflow = 6.83 cfs @ 2.97 hrs, Volume= 0.221 af
Outflow = 0.87 cfs @ 3.34 hrs, Volume= 0.221 af, Atten= 87%, Lag= 22.3 min
Primary = 0.87 cfs @ 3.34 hrs, Volume= 0.221 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,777.91' @ 3.34 hrs Surf.Area= 0.043 ac Storage= 0.097 af

Plug-Flow detention time= 52.7 min calculated for 0.220 af (100% of inflow)
Center-of-Mass det. time= 52.7 min (261.9 - 209.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,774.00'	0.155 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,774.00	0.009	0.000	0.000
5,775.00	0.016	0.012	0.012
5,776.00	0.024	0.020	0.032
5,777.00	0.034	0.029	0.061
5,778.00	0.044	0.039	0.101
5,779.00	0.064	0.054	0.155

Device	Routing	Invert	Outlet Devices
#1	Primary	5,770.50'	**24.0" Round Culvert** L= 71.0' Ke= 0.500 Inlet / Outlet Invert= 5,770.50' / 5,769.00' S= 0.0211 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,778.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,773.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.87 cfs @ 3.34 hrs HW=5,777.91' (Free Discharge)
└**1=Culvert** (Passes 0.87 cfs of 38.30 cfs potential flow)
  └**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.87 cfs @ 9.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,774.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM plans 2014

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth = 0.88" for 25yr event
Inflow = 3.48 cfs @ 2.96 hrs, Volume= 0.113 af
Outflow = 3.47 cfs @ 2.97 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.3 min
Primary = 3.47 cfs @ 2.97 hrs, Volume= 0.113 af
  Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.28' @ 2.97 hrs Surf.Area= 0.003 ac Storage= 0.001 af

Plug-Flow detention time= 0.1 min calculated for 0.113 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (199.9 - 199.8)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	0.077 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,779.00	0.002	0.000	0.000
5,780.00	0.006	0.004	0.004
5,781.00	0.011	0.008	0.012
5,782.00	0.018	0.014	0.027
5,783.00	0.082	0.050	0.077

Device	Routing	Invert	Outlet Devices
#1	Primary	5,778.40'	**18.0" Round Culvert** L= 78.8' Ke= 0.500 Inlet / Outlet Invert= 5,778.40' / 5,774.00' S= 0.0558 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.46 cfs @ 2.97 hrs HW=5,779.28' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.46 cfs @ 3.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

Inflow Area = 4.355 ac, 60.94% Impervious, Inflow Depth = 0.30" for 25yr event
Inflow = 3.38 cfs @ 2.98 hrs, Volume= 0.108 af
Outflow = 3.38 cfs @ 2.98 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min
Primary = 3.38 cfs @ 2.98 hrs, Volume= 0.108 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,796.39' @ 2.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,792.27'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,792.27' / 5,777.57' S= 0.2854 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.32 cfs @ 2.98 hrs HW=5,796.39' (Free Discharge)
└**1=Culvert** (Passes 3.32 cfs of 36.27 cfs potential flow)
└**3=Culvert** (Passes 3.32 cfs of 15.62 cfs potential flow)
└**4=Orifice/Grate** (Weir Controls 3.32 cfs @ 1.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,777.47' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

Inflow Area = 4.329 ac, 72.03% Impervious, Inflow Depth = 0.47" for 25yr event
Inflow = 5.43 cfs @ 2.97 hrs, Volume= 0.171 af
Outflow = 5.43 cfs @ 2.97 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min
Primary = 5.43 cfs @ 2.97 hrs, Volume= 0.171 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.01' @ 2.97 hrs Surf.Area= 610 sf Storage= 7 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= 0.0 min calculated for 0.170 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (210.4 - 210.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.35 cfs @ 2.97 hrs HW=5,752.01' (Free Discharge)
└**2=Culvert** (Inlet Controls 13.35 cfs @ 7.56 fps)
└**1=Orifice/Grate** (Passes 13.35 cfs of 36.68 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

Inflow Area = 3.270 ac, 80.00% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af
Outflow = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Primary = 5.09 cfs @ 2.97 hrs, Volume= 0.157 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,759.29' @ 2.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.08 cfs @ 2.97 hrs HW=5,759.29' (Free Discharge)
1=Culvert (Barrel Controls 5.08 cfs @ 4.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 79.14% Impervious, Inflow Depth = 0.56" for 25yr event
Inflow = 28.58 cfs @ 3.02 hrs, Volume= 1.523 af
Outflow = 28.58 cfs @ 3.02 hrs, Volume= 1.523 af, Atten= 0%, Lag= 0.0 min
Primary = 28.58 cfs @ 3.02 hrs, Volume= 1.523 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.30' @ 3.02 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=28.56 cfs @ 3.02 hrs HW=5,749.30' (Free Discharge)
↑**2=Culvert** (Inlet Controls 28.56 cfs @ 4.74 fps)
↑**1=Orifice/Grate** (Passes 28.56 cfs of 120.60 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' (Free Discharge)
↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P820:

Inflow Area = 23.436 ac, 80.00% Impervious, Inflow Depth = 0.58" for 25yr event
Inflow = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af
Outflow = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af, Atten= 0%, Lag= 0.0 min
Primary = 23.55 cfs @ 3.09 hrs, Volume= 1.124 af
Routed to Pond 802P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.69' @ 3.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=23.51 cfs @ 3.09 hrs HW=5,812.69' (Free Discharge)
↑**2=Culvert** (Passes 23.51 cfs of 116.22 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 23.51 cfs @ 2.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' (Free Discharge)
↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment100: Runoff Area=0.274 ac 52.55% Impervious Runoff Depth=0.35"
Tc=5.0 min CN=79 Runoff=0.25 cfs 0.008 af

Subcatchment110: Runoff Area=0.154 ac 12.99% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=63 Runoff=0.00 cfs 0.001 af

Subcatchment120: Runoff Area=0.964 ac 15.66% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=64 Runoff=0.02 cfs 0.004 af

Subcatchment200: Runoff Area=2.823 ac 27.98% Impervious Runoff Depth=0.12"
Tc=5.0 min CN=69 Runoff=0.56 cfs 0.027 af

Subcatchment210: Runoff Area=0.301 ac 100.00% Impervious Runoff Depth=1.46"
Tc=5.0 min CN=98 Runoff=1.02 cfs 0.037 af

Subcatchment300: Runoff Area=2.275 ac 17.63% Impervious Runoff Depth=0.06"
Tc=5.0 min CN=65 Runoff=0.10 cfs 0.012 af

Subcatchment310: Runoff Area=33.218 ac 1.44% Impervious Runoff Depth=0.05"
Flow Length=1,934' Tc=7.8 min CN=64 Runoff=0.78 cfs 0.138 af

Subcatchment320: Runoff Area=0.352 ac 28.69% Impervious Runoff Depth=0.12"
Tc=5.0 min CN=69 Runoff=0.07 cfs 0.003 af

Subcatchment330: Runoff Area=0.285 ac 12.98% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=63 Runoff=0.01 cfs 0.001 af

Subcatchment340: Runoff Area=61.210 ac 3.81% Impervious Runoff Depth=0.09"
Flow Length=2,825' Tc=9.5 min CN=67 Runoff=4.77 cfs 0.438 af

Subcatchment350: Runoff Area=3.824 ac 59.62% Impervious Runoff Depth=0.53"
Tc=5.0 min CN=84 Runoff=5.48 cfs 0.168 af

Subcatchment360: Runoff Area=63.142 ac 0.57% Impervious Runoff Depth=0.13"
Flow Length=3,685' Tc=12.3 min CN=70 Runoff=9.78 cfs 0.697 af

Subcatchment400: Runoff Area=1.940 ac 57.11% Impervious Runoff Depth=0.41"
Tc=5.0 min CN=81 Runoff=2.15 cfs 0.067 af

Subcatchment410: Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment420: Runoff Area=1.249 ac 81.18% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=90 Runoff=2.76 cfs 0.086 af

Subcatchment430: Runoff Area=2.682 ac 89.93% Impervious Runoff Depth=1.10"
Tc=5.0 min CN=94 Runoff=7.57 cfs 0.246 af

Subcatchment500: Runoff Area=0.259 ac 25.48% Impervious Runoff Depth=0.10"
Tc=5.0 min CN=68 Runoff=0.04 cfs 0.002 af

Subcatchment510: Runoff Area=3.707 ac 15.94% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=64 Runoff=0.09 cfs 0.015 af

Subcatchment600: Runoff Area=8.446 ac 28.25% Impervious Runoff Depth=0.12"
Tc=5.0 min CN=69 Runoff=1.67 cfs 0.081 af

Subcatchment610: Runoff Area=0.231 ac 3.03% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=59 Runoff=0.00 cfs 0.000 af

Subcatchment620: Runoff Area=0.078 ac 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment630: Runoff Area=0.745 ac 15.03% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=64 Runoff=0.02 cfs 0.003 af

Subcatchment640: Runoff Area=0.106 ac 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment650: Runoff Area=0.115 ac 0.87% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment660: Runoff Area=1.533 ac 91.32% Impervious Runoff Depth=1.18"
Tc=5.0 min CN=95 Runoff=4.56 cfs 0.151 af

Subcatchment670: Runoff Area=1.584 ac 49.12% Impervious Runoff Depth=0.32"
Tc=5.0 min CN=78 Runoff=1.30 cfs 0.042 af

Subcatchment680: Runoff Area=2.771 ac 67.70% Impervious Runoff Depth=0.57"
Tc=5.0 min CN=85 Runoff=4.29 cfs 0.132 af

Subcatchment700: Runoff Area=1.059 ac 47.40% Impervious Runoff Depth=0.29"
Tc=5.0 min CN=77 Runoff=0.78 cfs 0.025 af

Subcatchment710: Runoff Area=3.270 ac 80.00% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=90 Runoff=7.24 cfs 0.225 af

Subcatchment800: Runoff Area=0.810 ac 45.56% Impervious Runoff Depth=0.26"
Tc=5.0 min CN=76 Runoff=0.53 cfs 0.018 af

Subcatchment810: Runoff Area=8.130 ac 80.00% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=90 Runoff=17.99 cfs 0.560 af

Subcatchment820: Runoff Area=23.436 ac 80.00% Impervious Runoff Depth=0.83"
Flow Length=1,968' Tc=16.1 min CN=90 Runoff=34.06 cfs 1.616 af

Reach N: Inflow=50.41 cfs 2.871 af
Outflow=50.41 cfs 2.871 af

Reach OUT: Inflow=70.67 cfs 4.723 af
Outflow=70.67 cfs 4.723 af

Reach S100: Avg. Flow Depth=0.33' Max Vel=4.59 fps Inflow=8.14 cfs 1.456 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=90.68 cfs Outflow=8.13 cfs 1.456 af

Reach S300: Avg. Flow Depth=0.49' Max Vel=5.39 fps Inflow=7.70 cfs 1.318 af
n=0.030 L=110.0' S=0.0636 '/' Capacity=41.25 cfs Outflow=7.70 cfs 1.318 af

Reach S600: Avg. Flow Depth=0.29' Max Vel=2.54 fps Inflow=2.18 cfs 0.409 af
n=0.030 L=263.0' S=0.0266 '/' Capacity=18.32 cfs Outflow=2.05 cfs 0.409 af

Reach Spill: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach W: Inflow=20.37 cfs 1.852 af
Outflow=20.37 cfs 1.852 af

Pond 802P: Peak Elev=5,763.33' Inflow=41.38 cfs 2.176 af
Primary=41.38 cfs 2.176 af Secondary=0.00 cfs 0.000 af Outflow=41.38 cfs 2.176 af

Pond P-OUT: Peak Elev=5,697.17' Inflow=20.11 cfs 1.806 af
Primary=20.11 cfs 1.806 af Secondary=0.00 cfs 0.000 af Outflow=20.11 cfs 1.806 af

Pond P100: Peak Elev=5,702.82' Inflow=1.36 cfs 0.222 af
Primary=1.07 cfs 0.176 af Secondary=0.28 cfs 0.046 af Outflow=1.36 cfs 0.222 af

Pond P110: Peak Elev=5,708.06' Inflow=8.16 cfs 1.461 af
Primary=6.95 cfs 1.247 af Secondary=1.21 cfs 0.214 af Outflow=8.16 cfs 1.461 af

Pond P120: Peak Elev=5,724.74' Inflow=0.02 cfs 0.004 af
Primary=0.02 cfs 0.004 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

Pond P200: Peak Elev=5,703.14' Inflow=13.54 cfs 0.383 af
Primary=13.54 cfs 0.383 af Secondary=0.00 cfs 0.000 af Outflow=13.54 cfs 0.383 af

Pond P210: Peak Elev=5,704.14' Inflow=1.02 cfs 0.037 af
Primary=1.02 cfs 0.037 af Secondary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.037 af

Pond P300: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P310: Peak Elev=5,746.05' Inflow=0.78 cfs 0.138 af
Primary=0.78 cfs 0.138 af Secondary=0.00 cfs 0.000 af Outflow=0.78 cfs 0.138 af

Pond P320: Peak Elev=5,749.04' Inflow=7.60 cfs 1.307 af
Primary=7.60 cfs 1.307 af Secondary=0.00 cfs 0.000 af Outflow=7.60 cfs 1.307 af

Pond P330: Peak Elev=5,874.00' Storage=0.000 af Inflow=7.54 cfs 1.303 af
Primary=7.54 cfs 1.303 af Secondary=0.00 cfs 0.000 af Outflow=7.54 cfs 1.303 af

Pond P340: Peak Elev=5,789.49' Storage=0.004 af Inflow=7.54 cfs 1.304 af
Primary=7.54 cfs 1.302 af Secondary=0.00 cfs 0.000 af Outflow=7.54 cfs 1.302 af

Pond P360: Peak Elev=5,871.72' Storage=0.547 af Inflow=9.78 cfs 0.697 af
Primary=0.58 cfs 0.697 af Secondary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.697 af

Pond P400: Peak Elev=0.00'
Primary=0.00 cfs 0.000 af

Pond P410: Peak Elev=5,736.53' Storage=4,342 cf Inflow=10.33 cfs 0.332 af
Primary=9.96 cfs 0.253 af Secondary=0.00 cfs 0.000 af Outflow=9.96 cfs 0.253 af

Pond P420: Peak Elev=5,750.69' Inflow=2.76 cfs 0.086 af
Primary=2.76 cfs 0.086 af Secondary=0.00 cfs 0.000 af Outflow=2.76 cfs 0.086 af

Pond P430: Peak Elev=5,740.68' Inflow=7.57 cfs 0.246 af
Primary=7.57 cfs 0.246 af Secondary=0.00 cfs 0.000 af Outflow=7.57 cfs 0.246 af

Pond P500: Peak Elev=5,708.69' Inflow=50.41 cfs 2.871 af
Primary=50.41 cfs 2.871 af Secondary=0.00 cfs 0.000 af Outflow=50.41 cfs 2.871 af

Pond P510: Peak Elev=5,736.70' Inflow=50.37 cfs 2.869 af
Primary=50.37 cfs 2.869 af Secondary=0.00 cfs 0.000 af Outflow=50.37 cfs 2.869 af

Pond P600: Peak Elev=5,754.16' Inflow=2.05 cfs 0.409 af
Primary=2.05 cfs 0.409 af Secondary=0.00 cfs 0.000 af Outflow=2.05 cfs 0.409 af

Pond P610: Peak Elev=5,766.35' Inflow=0.88 cfs 0.328 af
Primary=0.88 cfs 0.328 af Secondary=0.00 cfs 0.000 af Outflow=0.88 cfs 0.328 af

Pond P620: Peak Elev=5,765.38' Storage=0.001 af Inflow=0.87 cfs 0.327 af
Primary=0.87 cfs 0.327 af Secondary=0.00 cfs 0.000 af Outflow=0.87 cfs 0.327 af

Pond P630: Peak Elev=5,771.01' Storage=0.000 af Inflow=0.02 cfs 0.003 af
Primary=0.02 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.003 af

Pond P640: Peak Elev=5,772.87' Storage=0.074 af Inflow=6.37 cfs 0.324 af
Primary=0.86 cfs 0.324 af Secondary=0.00 cfs 0.000 af Outflow=0.86 cfs 0.324 af

Pond P650: Peak Elev=5,778.36' Storage=0.117 af Inflow=10.12 cfs 0.324 af
Primary=6.37 cfs 0.324 af Secondary=0.00 cfs 0.000 af Outflow=6.37 cfs 0.324 af

Pond P660: Peak Elev=5,779.44' Storage=0.001 af Inflow=4.56 cfs 0.151 af
Primary=4.54 cfs 0.151 af Secondary=0.00 cfs 0.000 af Outflow=4.54 cfs 0.151 af

Pond P670: Peak Elev=5,796.45' Inflow=5.59 cfs 0.173 af
Primary=5.59 cfs 0.173 af Secondary=0.00 cfs 0.000 af Outflow=5.59 cfs 0.173 af

Pond P700: Peak Elev=5,752.02' Storage=11 cf Inflow=7.99 cfs 0.251 af
Primary=7.99 cfs 0.251 af Secondary=0.00 cfs 0.000 af Outflow=7.99 cfs 0.251 af

Pond P710: Peak Elev=5,759.63' Inflow=7.24 cfs 0.225 af
Primary=7.24 cfs 0.225 af Secondary=0.00 cfs 0.000 af Outflow=7.24 cfs 0.225 af

Pond P800: Peak Elev=5,749.77' Inflow=41.84 cfs 2.194 af
Primary=41.84 cfs 2.194 af Secondary=0.00 cfs 0.000 af Outflow=41.84 cfs 2.194 af

Pond P820: Peak Elev=5,812.88' Inflow=34.06 cfs 1.616 af
Primary=34.06 cfs 1.616 af Secondary=0.00 cfs 0.000 af Outflow=34.06 cfs 1.616 af

Total Runoff Area = 231.057 ac Runoff Volume = 4.803 af Average Runoff Depth = 0.25"
79.27% Pervious = 183.166 ac 20.73% Impervious = 47.891 ac

Summary for Subcatchment 100:

Runoff = 0.25 cfs @ 2.98 hrs, Volume= 0.008 af, Depth= 0.35"
Routed to Pond P100 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.144	98	Impervious
*	0.130	58	A soils
	0.274	79	Weighted Average
	0.130		47.45% Pervious Area
	0.144		52.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 110:

Runoff = 0.00 cfs @ 3.38 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Pond P110 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.020	98	Impervious
*	0.134	58	A soils
	0.154	63	Weighted Average
	0.134		87.01% Pervious Area
	0.020		12.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 120:

Runoff = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af, Depth= 0.05"
Routed to Pond P120 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.151	98	Impervious
*	0.813	58	A soils
	0.964	64	Weighted Average
	0.813		84.34% Pervious Area
	0.151		15.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 200:

Runoff = 0.56 cfs @ 3.01 hrs, Volume= 0.027 af, Depth= 0.12"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.790	98	Impervious
*	2.033	58	A soils
	2.823	69	Weighted Average
	2.033		72.02% Pervious Area
	0.790		27.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 210:

Runoff = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af, Depth= 1.46"
Routed to Pond P210 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.301	98	Impervious
	0.301		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 300:

Runoff = 0.10 cfs @ 3.03 hrs, Volume= 0.012 af, Depth= 0.06"
Routed to Reach S300 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.401	98	Impervious
*	1.255	58	A Soils
*	0.619	58	B Soils
	2.275	65	Weighted Average
	1.874		82.37% Pervious Area
	0.401		17.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 310:

Runoff = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af, Depth= 0.05"
Routed to Pond P310 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.479	98	Impervious
*	0.831	58	A soils
*	23.913	58	B Soils
*	7.995	80	D soils
	33.218	64	Weighted Average
	32.739		98.56% Pervious Area
	0.479		1.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	200	0.3900	0.85		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
1.9	1,290	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
2.0	444	0.0200	3.72	44.69	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.8	1,934	Total			

Summary for Subcatchment 320:

Runoff = 0.07 cfs @ 3.01 hrs, Volume= 0.003 af, Depth= 0.12"
Routed to Pond P320 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.101	98	Impervious
*	0.194	58	A Soils
*	0.057	58	B Soils
	0.352	69	Weighted Average
	0.251		71.31% Pervious Area
	0.101		28.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 330:

Runoff = 0.01 cfs @ 3.38 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Pond P330 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.037	98	Impervious
*	0.248	58	A soils
	0.285	63	Weighted Average
	0.248		87.02% Pervious Area
	0.037		12.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 340:

Runoff = 4.77 cfs @ 3.08 hrs, Volume= 0.438 af, Depth= 0.09"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.335	98	Impervious
*	1.289	58	A soils
*	38.152	58	B Soils
*	19.434	80	D soils
	61.210	67	Weighted Average
	58.875		96.19% Pervious Area
	2.335		3.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	200	0.2200	0.67		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
3.9	2,365	0.1500	10.20	122.39	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
0.7	260	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
9.5	2,825	Total			

Summary for Subcatchment 350:

Runoff = 5.48 cfs @ 2.97 hrs, Volume= 0.168 af, Depth= 0.53"
Routed to Pond P340 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.280	98	Impervious
*	1.102	58	A soils
*	0.044	58	B soils
*	0.398	80	D soils
	3.824	84	Weighted Average
	1.544		40.38% Pervious Area
	2.280		59.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 360:

Runoff = 9.78 cfs @ 3.10 hrs, Volume= 0.697 af, Depth= 0.13"
Routed to Pond P360 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.361	98	Impervious
*	12.950	58	A soils
*	16.315	58	B soils
*	33.516	80	D Soils
	63.142	70	Weighted Average
	62.781		99.43% Pervious Area
	0.361		0.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	200	0.3700	0.83		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
0.9	630	0.1900	11.48	137.75	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
7.4	2,855	0.0600	6.45	77.41	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
12.3	3,685	Total			

Summary for Subcatchment 400:

Runoff = 2.15 cfs @ 2.98 hrs, Volume= 0.067 af, Depth= 0.41"
Routed to Pond P200 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.108	98	Impervious
*	0.832	58	A Soils
	1.940	81	Weighted Average
	0.832		42.89% Pervious Area
	1.108		57.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 410:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P410 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.084	58	A soils
	0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 420:

Runoff = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af, Depth= 0.83"
Routed to Pond P420 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.014	98	Impervious
*	0.235	58	A Soils
	1.249	90	Weighted Average
	0.235		18.82% Pervious Area
	1.014		81.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 430:

Runoff = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af, Depth= 1.10"
Routed to Pond P430 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.412	98	Impervious
*	0.270	58	A Soils
	2.682	94	Weighted Average
	0.270		10.07% Pervious Area
	2.412		89.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 500:

Runoff = 0.04 cfs @ 3.01 hrs, Volume= 0.002 af, Depth= 0.10"
Routed to Pond P500 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.066	98	Impervious
*	0.193	58	A Soils
	0.259	68	Weighted Average
	0.193		74.52% Pervious Area
	0.066		25.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 510:

Runoff = 0.09 cfs @ 3.33 hrs, Volume= 0.015 af, Depth= 0.05"
Routed to Pond P510 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.591	98	Impervious
*	3.116	58	A Soils
	3.707	64	Weighted Average
	3.116		84.06% Pervious Area
	0.591		15.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 600:

Runoff = 1.67 cfs @ 3.01 hrs, Volume= 0.081 af, Depth= 0.12"
Routed to Reach S600 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.386	98	Impervious
*	6.060	58	A soils
	8.446	69	Weighted Average
	6.060		71.75% Pervious Area
	2.386		28.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 610:

Runoff = 0.00 cfs @ 6.00 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P610 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.007	98	Impervious
*	0.224	58	A soils
	0.231	59	Weighted Average
	0.224		96.97% Pervious Area
	0.007		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 620:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P620 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.078	58	A soils
	0.078		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 630:

Runoff = 0.02 cfs @ 3.33 hrs, Volume= 0.003 af, Depth= 0.05"
Routed to Pond P630 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.112	98	Impervious
*	0.633	58	A soils
	0.745	64	Weighted Average
	0.633		84.97% Pervious Area
	0.112		15.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 640:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P640 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.106	58	A Soils
	0.106		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 650:

Runoff = 0.00 cfs @ 6.01 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Pond P650 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.001	98	Impervious
*	0.114	58	A soils
	0.115	58	Weighted Average
	0.114		99.13% Pervious Area
	0.001		0.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 660:

Runoff = 4.56 cfs @ 2.96 hrs, Volume= 0.151 af, Depth= 1.18"
Routed to Pond P660 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.400	98	Impervious
*	0.133	58	A soils
	1.533	95	Weighted Average
	0.133		8.68% Pervious Area
	1.400		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 670:

Runoff = 1.30 cfs @ 2.98 hrs, Volume= 0.042 af, Depth= 0.32"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.778	98	Impervious
*	0.806	58	A soils
	1.584	78	Weighted Average
	0.806		50.88% Pervious Area
	0.778		49.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 680:

Runoff = 4.29 cfs @ 2.97 hrs, Volume= 0.132 af, Depth= 0.57"
Routed to Pond P670 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	1.876	98	Impervious
*	0.895	58	A soils
	2.771	85	Weighted Average
	0.895		32.30% Pervious Area
	1.876		67.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 700:

Runoff = 0.78 cfs @ 2.98 hrs, Volume= 0.025 af, Depth= 0.29"
Routed to Pond P700 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.502	98	Impervious
*	0.557	58	A Soils
	1.059	77	Weighted Average
	0.557		52.60% Pervious Area
	0.502		47.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 710:

Assumed development of this parcel owned by RFTA is completed.
Assumed watershed is 80% impervious.

Runoff = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af, Depth= 0.83"
Routed to Pond P710 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	2.616	98	Impervious
*	0.654	58	A Soils
	3.270	90	Weighted Average
	0.654		20.00% Pervious Area
	2.616		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 800:

Runoff = 0.53 cfs @ 2.98 hrs, Volume= 0.018 af, Depth= 0.26"
Routed to Pond P800 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	0.369	98	Impervious
*	0.441	58	A Soils
	0.810	76	Weighted Average
	0.441		54.44% Pervious Area
	0.369		45.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 810:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 17.99 cfs @ 2.96 hrs, Volume= 0.560 af, Depth= 0.83"
Routed to Pond 802P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	6.504	98	Impervious
*	1.626	58	A Soils
	8.130	90	Weighted Average
	1.626		20.00% Pervious Area
	6.504		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 820:

Assumed development of the Meadows is completed.
Assumed watershed is 80% impervious.

Runoff = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af, Depth= 0.83"
Routed to Pond P820 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 6-hr 100yr Rainfall=1.68"

	Area (ac)	CN	Description
*	18.749	98	Impervious
*	4.687	58	A soils
	23.436	90	Weighted Average
	4.687		20.00% Pervious Area
	18.749		80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	200	0.0700	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 1.29"
2.9	910	0.0400	5.27	63.20	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
5.4	858	0.0100	2.63	31.60	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.060
16.1	1,968	Total			

Summary for Reach N:

Inflow Area = 56.280 ac, 63.89% Impervious, Inflow Depth = 0.61" for 100yr event
Inflow = 50.41 cfs @ 3.00 hrs, Volume= 2.871 af
Outflow = 50.41 cfs @ 3.00 hrs, Volume= 2.871 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach OUT:

Inflow Area = 231.057 ac, 20.73% Impervious, Inflow Depth = 0.25" for 100yr event
Inflow = 70.67 cfs @ 3.00 hrs, Volume= 4.723 af
Outflow = 70.67 cfs @ 3.00 hrs, Volume= 4.723 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach S100:

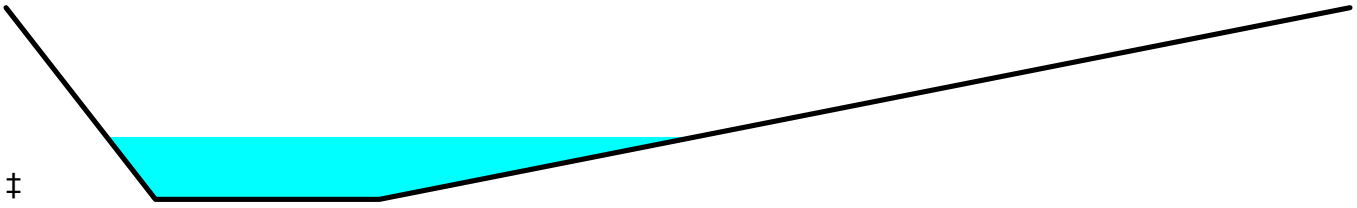
Ditch Parameters from SGM 2015 Survey

Inflow Area = 164.306 ac, 3.65% Impervious, Inflow Depth = 0.11" for 100yr event
Inflow = 8.14 cfs @ 3.05 hrs, Volume= 1.456 af
Outflow = 8.13 cfs @ 3.05 hrs, Volume= 1.456 af, Atten= 0%, Lag= 0.3 min
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.59 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.24 fps, Avg. Travel Time= 0.8 min

Peak Storage= 195 cf @ 3.05 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 7.89'
Bank-Full Depth= 1.00' Flow Area= 10.5 sf, Capacity= 90.68 cfs

3.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 13.0 '/' Top Width= 18.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S300:

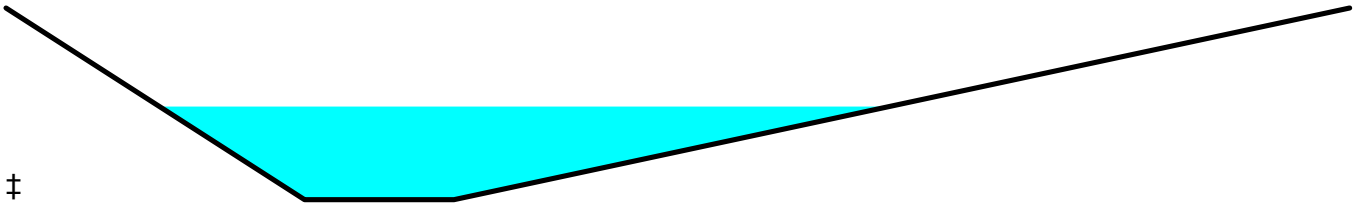
Ditch Parameters from SGM 2015 Survey

Inflow Area = 131.088 ac, 4.21% Impervious, Inflow Depth = 0.12" for 100yr event
Inflow = 7.70 cfs @ 3.03 hrs, Volume= 1.318 af
Outflow = 7.70 cfs @ 3.04 hrs, Volume= 1.318 af, Atten= 0%, Lag= 0.3 min
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.39 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.85 fps, Avg. Travel Time= 0.6 min

Peak Storage= 157 cf @ 3.04 hrs
Average Depth at Peak Storage= 0.49' , Surface Width= 4.88'
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 41.25 cfs

1.00' x 1.00' deep channel, n= 0.030 Short grass
Side Slope Z-value= 2.0 6.0 '/' Top Width= 9.00'
Length= 110.0' Slope= 0.0636 '/'
Inlet Invert= 5,715.00', Outlet Invert= 5,708.00'



‡

Summary for Reach S600:

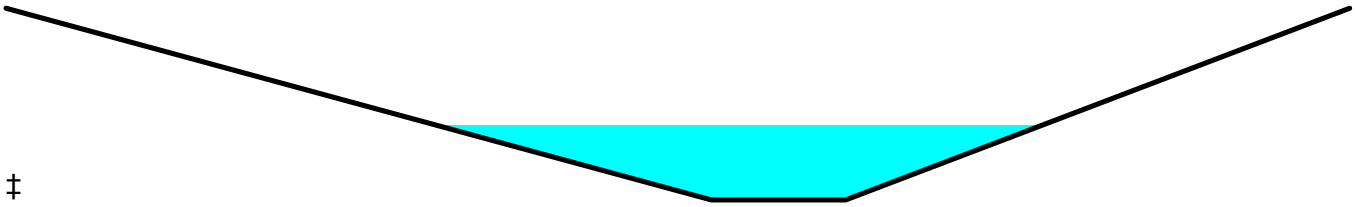
Parameters from 2015 SGM survey

Inflow Area = 15.609 ac, 42.03% Impervious, Inflow Depth = 0.31" for 100yr event
Inflow = 2.18 cfs @ 3.01 hrs, Volume= 0.409 af
Outflow = 2.05 cfs @ 3.04 hrs, Volume= 0.409 af, Atten= 6%, Lag= 1.3 min
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.54 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.55 fps, Avg. Travel Time= 2.8 min

Peak Storage= 212 cf @ 3.04 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 4.51'
Bank-Full Depth= 0.75' Flow Area= 4.1 sf, Capacity= 18.32 cfs

1.00' x 0.75' deep channel, n= 0.030 Short grass
Side Slope Z-value= 7.0 5.0 '/' Top Width= 10.00'
Length= 263.0' Slope= 0.0266 '/'
Inlet Invert= 5,761.00', Outlet Invert= 5,754.00'



‡

Summary for Reach Spill:

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach W:

Inflow Area = 174.777 ac, 6.83% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 20.37 cfs @ 2.99 hrs, Volume= 1.852 af
Outflow = 20.37 cfs @ 2.99 hrs, Volume= 1.852 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 802P:

Inflow Area = 31.566 ac, 80.00% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 41.38 cfs @ 3.02 hrs, Volume= 2.176 af
Outflow = 41.38 cfs @ 3.02 hrs, Volume= 2.176 af, Atten= 0%, Lag= 0.0 min
Primary = 41.38 cfs @ 3.02 hrs, Volume= 2.176 af
Routed to Pond P800 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P710 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,763.33' @ 3.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,760.93'	**48.0" Round Culvert** L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 5,760.93' / 5,747.36' S= 0.2154 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,764.00'	**20.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=41.36 cfs @ 3.02 hrs HW=5,763.32' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 41.36 cfs @ 5.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,760.93' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-OUT:

From SGM 2015 survey data
Pipe slope is assumed as 1%

Inflow Area = 174.777 ac, 6.83% Impervious, Inflow Depth = 0.12" for 100yr event
Inflow = 20.11 cfs @ 2.99 hrs, Volume= 1.806 af
Outflow = 20.11 cfs @ 2.99 hrs, Volume= 1.806 af, Atten= 0%, Lag= 0.0 min
Primary = 20.11 cfs @ 2.99 hrs, Volume= 1.806 af
Routed to Reach W :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,697.17' @ 2.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,695.57'	**48.0" Round Culvert** L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 5,695.57' / 5,694.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#2 Secondary 5,705.05' **60.0" Horiz. Orifice/Grate** C= 0.600
Limited to weir flow at low heads

Primary OutFlow Max=20.08 cfs @ 2.99 hrs HW=5,697.16' (Free Discharge)
1=Culvert (Inlet Controls 20.08 cfs @ 4.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,695.57' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond P100:

From SGM 2015 survey data
Pipe slope is assumed at 1%

Inflow Area = 0.274 ac, 52.55% Impervious, Inflow Depth = 9.71" for 100yr event
Inflow = 1.36 cfs @ 3.04 hrs, Volume= 0.222 af
Outflow = 1.36 cfs @ 3.04 hrs, Volume= 0.222 af, Atten= 0%, Lag= 0.0 min
Primary = 1.07 cfs @ 3.04 hrs, Volume= 0.176 af
Routed to Pond P-OUT :
Secondary = 0.28 cfs @ 3.04 hrs, Volume= 0.046 af
Routed to Reach W :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,702.82' @ 3.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.74'	**36.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.58'	**24.0" Round Culvert** L= 24.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.58' / 5,698.34' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,702.74'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.07 cfs @ 3.04 hrs HW=5,702.82' (Free Discharge)
2=Culvert (Passes 1.07 cfs of 27.24 cfs potential flow)
1=Orifice/Grate (Weir Controls 1.07 cfs @ 0.93 fps)

Secondary OutFlow Max=0.28 cfs @ 3.04 hrs HW=5,702.82' (Free Discharge)
3=Broad-Crested Rectangular Weir (Weir Controls 0.28 cfs @ 0.66 fps)

Summary for Pond P110:

From SGM 2015 survey data
48" upstream invert assumed to match 36" invert

Inflow Area = 165.424 ac, 3.73% Impervious, Inflow Depth = 0.11" for 100yr event
Inflow = 8.16 cfs @ 3.05 hrs, Volume= 1.461 af
Outflow = 8.16 cfs @ 3.05 hrs, Volume= 1.461 af, Atten= 0%, Lag= 0.0 min
Primary = 6.95 cfs @ 3.05 hrs, Volume= 1.247 af
Routed to Pond P-OUT :
Secondary = 1.21 cfs @ 3.05 hrs, Volume= 0.214 af
Routed to Pond P100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,708.06' @ 3.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,707.90'	**96.0" x 108.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	5,701.20'	**36.0" Round Culvert** L= 12.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,700.77' S= 0.0358 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Primary	5,701.20'	**48.0" Round Culvert** L= 143.0' Ke= 0.500 Inlet / Outlet Invert= 5,701.20' / 5,697.83' S= 0.0236 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#4	Secondary	5,707.90'	**8.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.84 cfs @ 3.05 hrs HW=5,708.06' (Free Discharge)
└**3=Culvert** (Passes 6.84 cfs of 133.33 cfs potential flow)
└**2=Culvert** (Passes 6.84 cfs of 78.77 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 6.84 cfs @ 1.29 fps)

Secondary OutFlow Max=1.19 cfs @ 3.05 hrs HW=5,708.06' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 1.19 cfs @ 0.92 fps)

Summary for Pond P120:

Orifice elevation from 2015 sgm survey data
Assumed pipe slope of 10%

Inflow Area = 0.964 ac, 15.66% Impervious, Inflow Depth = 0.05" for 100yr event
Inflow = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 3.33 hrs, Volume= 0.004 af
Routed to Pond P110 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P110 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,724.74' @ 3.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,724.74'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,708.00'	**36.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,708.00' / 5,702.20' S= 0.1000 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,725.00'	**10.0' long + 2.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 3.33 hrs HW=5,724.74' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 132.87 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,708.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P200:

Outlet info from SGM 2015 survey data

Inflow Area = 9.079 ac, 61.96% Impervious, Inflow Depth = 0.51" for 100yr event
Inflow = 13.54 cfs @ 2.98 hrs, Volume= 0.383 af
Outflow = 13.54 cfs @ 2.98 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min
Primary = 13.54 cfs @ 2.98 hrs, Volume= 0.383 af
Routed to Pond P-OUT :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-OUT :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,703.14' @ 2.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,702.65'	**36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,698.94'	**24.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 5,698.94' / 5,698.13' S= 0.0140 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,705.43'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.53 cfs @ 2.98 hrs HW=5,703.14' (Free Discharge)
└**2=Culvert** (Passes 13.53 cfs of 27.07 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 13.53 cfs @ 2.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,698.94' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond P210:

Outlet informaiton from 2015 SGM survey information

Inflow Area = 0.301 ac,100.00% Impervious, Inflow Depth = 1.46" for 100yr event
Inflow = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af
Outflow = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 2.96 hrs, Volume= 0.037 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,704.14' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,704.00'	**72.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,700.07'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,700.07' / 5,698.96' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Secondary	5,704.26'	**20.0' long + 10.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.01 cfs @ 2.96 hrs HW=5,704.14' (Free Discharge)
└**2=Culvert** (Passes 1.01 cfs of 26.51 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 1.01 cfs @ 1.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,700.07' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P300:

This inlet has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, there is a pipe that goes into this structure from the east. However, the inlet on the east side of the road is 2 feet lower than the inlet on the west side of the road.

Therefore, this inlet and the one pipe that goes into it, do not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,714.58'	**48.0" W x 72.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P310:

Inflow Area = 33.218 ac, 1.44% Impervious, Inflow Depth = 0.05" for 100yr event
Inflow = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af
Outflow = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 3.37 hrs, Volume= 0.138 af
Routed to Reach S100 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S100 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,746.05' @ 3.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,746.00'	**60.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,736.56'	**36.0" Round Culvert** L= 78.0' Ke= 0.500 Inlet / Outlet Invert= 5,736.56' / 5,735.00' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#3	Secondary	5,747.00'	**120.0' long + 100.0 '/' SideZ x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.74 cfs @ 3.37 hrs HW=5,746.05' (Free Discharge)
↑—**2=Culvert** (Passes 0.74 cfs of 96.23 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 0.74 cfs @ 0.76 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,736.56' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P320:

Outlet parameters from SGM plans

Inflow Area = 128.813 ac, 3.97% Impervious, Inflow Depth = 0.12" for 100yr event
Inflow = 7.60 cfs @ 3.03 hrs, Volume= 1.307 af
Outflow = 7.60 cfs @ 3.03 hrs, Volume= 1.307 af, Atten= 0%, Lag= 0.0 min
Primary = 7.60 cfs @ 3.03 hrs, Volume= 1.307 af
Routed to Reach S300 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.04' @ 3.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,748.00'	**36.0" Round Culvert** L= 78.7' Ke= 0.500 Inlet / Outlet Invert= 5,748.00' / 5,743.00' S= 0.0635 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	5,743.00'	**36.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 5,743.00' / 5,739.00' S= 0.0800 '/' Cc= 0.900

n= 0.013, Flow Area= 7.07 sf

#3	Secondary	5,751.50'	**25.0' long + 50.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.59 cfs @ 3.03 hrs HW=5,749.04' (Free Discharge)
└**2=Culvert** (Passes 7.59 cfs of 72.54 cfs potential flow)
└**1=Culvert** (Inlet Controls 7.59 cfs @ 3.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,743.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P330:

Information from SGM plans 2015

Inflow Area = 128.461 ac, 3.90% Impervious, Inflow Depth = 0.12" for 100yr event
Inflow = 7.54 cfs @ 3.04 hrs, Volume= 1.303 af
Outflow = 7.54 cfs @ 3.04 hrs, Volume= 1.303 af, Atten= 0%, Lag= 0.0 min
Primary = 7.54 cfs @ 3.04 hrs, Volume= 1.303 af
Routed to Pond P320 :
Secondary = 0.00 cfs @ 3.04 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,874.00' @ 3.04 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 0.0 min calculated for 1.303 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (456.9 - 456.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,874.00'	0.006 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,874.00	0.002	0.000	0.000
5,875.00	0.010	0.006	0.006

Device	Routing	Invert	Outlet Devices
#1	Primary	5,773.50'	**24.0" Round Culvert** L= 46.0' Ke= 0.500 Inlet / Outlet Invert= 5,773.50' / 5,767.98' S= 0.1200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,874.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=150.89 cfs @ 3.04 hrs HW=5,874.00' (Free Discharge)
└**1=Culvert** (Inlet Controls 150.89 cfs @ 48.03 fps)

Secondary OutFlow Max=0.00 cfs @ 3.04 hrs HW=5,874.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.05 fps)

Summary for Pond P340:

Pipe size and amount of sediment in pipe field verified.
Down stream invert from SGM survey.
Upstream Invert estimated from survey contours.

Inflow Area = 128.176 ac, 3.88% Impervious, Inflow Depth = 0.12" for 100yr event
Inflow = 7.54 cfs @ 3.03 hrs, Volume= 1.304 af
Outflow = 7.54 cfs @ 3.04 hrs, Volume= 1.302 af, Atten= 0%, Lag= 0.2 min
Primary = 7.54 cfs @ 3.04 hrs, Volume= 1.302 af
Routed to Pond P330 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S300 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,789.49' @ 3.04 hrs Surf.Area= 0.004 ac Storage= 0.004 af

Plug-Flow detention time= 1.2 min calculated for 1.302 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (457.0 - 456.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,788.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,788.00	0.001	0.000	0.000
5,790.00	0.005	0.006	0.006
5,792.00	0.024	0.029	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,788.67'	**42.0" Round Culvert w/ 8.0" inside fill** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,788.00' / 5,785.25' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 8.34 sf
#2	Secondary	5,791.00'	**50.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.53 cfs @ 3.04 hrs HW=5,789.49' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.53 cfs @ 2.86 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,788.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P360:

Pipe size and inverts from JR Harris & Company Plans 2014
Amount of sediment in pipe field verified.
NOTE: the spill location goes to the 200 basins. The "designed" spillway on the west side of the basin is one to two feet higher than the "physical" spillway on the east side.

Inflow Area = 63.142 ac, 0.57% Impervious, Inflow Depth = 0.13" for 100yr event
Inflow = 9.78 cfs @ 3.10 hrs, Volume= 0.697 af
Outflow = 0.58 cfs @ 6.19 hrs, Volume= 0.697 af, Atten= 94%, Lag= 185.3 min
Primary = 0.58 cfs @ 6.19 hrs, Volume= 0.697 af
Routed to Pond P340 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,871.72' @ 6.19 hrs Surf.Area= 0.416 ac Storage= 0.547 af

Plug-Flow detention time= 397.2 min calculated for 0.697 af (100% of inflow)
Center-of-Mass det. time= 397.4 min (642.9 - 245.5)

Volume	Invert	Avail.Storage	Storage Description
#1	5,868.00'	4.919 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,868.00	0.001	0.000	0.000
5,869.00	0.004	0.003	0.003
5,870.00	0.136	0.070	0.072
5,871.00	0.298	0.217	0.290
5,872.00	0.461	0.379	0.669
5,873.00	0.544	0.503	1.171
5,874.00	0.624	0.584	1.755
5,875.00	0.705	0.664	2.420
5,876.00	0.788	0.746	3.166
5,877.00	0.875	0.831	3.998
5,878.00	0.967	0.921	4.919

Device	Routing	Invert	Outlet Devices
#1	Primary	5,867.85'	**15.0" Round Culvert w/ 12.0" inside fill** L= 175.0' Ke= 0.500 Inlet / Outlet Invert= 5,866.85' / 5,865.98' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.17 sf
#2	Secondary	5,877.00'	**75.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.58 cfs @ 6.19 hrs HW=5,871.72' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.58 cfs @ 3.32 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,868.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P400:

This inlet drains to another inlet that has no outlet pipe - this has been verified from 2022 site investigation and 2015 SGM survey data

In addition, this inlet has a rim elevation that is 2 feet lower than the rim elevation of the next downstream inlet on the west side of Midland Avenue.

Therefore, this inlet does not meaningfully contribute to stormwater conveyance in the 100 year event.

Device	Routing	Invert	Outlet Devices
#1	Primary	5,712.40'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond P410:

Outlet parameters from SGM plans

Inflow Area = 4.015 ac, 85.33% Impervious, Inflow Depth = 0.99" for 100yr event
Inflow = 10.33 cfs @ 2.96 hrs, Volume= 0.332 af
Outflow = 9.96 cfs @ 2.98 hrs, Volume= 0.253 af, Atten= 4%, Lag= 1.1 min
Primary = 9.96 cfs @ 2.98 hrs, Volume= 0.253 af
Routed to Pond P200 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.53' @ 2.98 hrs Surf.Area= 1,765 sf Storage= 4,342 cf

Plug-Flow detention time= 38.3 min calculated for 0.253 af (76% of inflow)
Center-of-Mass det. time= 14.6 min (215.8 - 201.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5,733.00'	9,848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,733.00	771	0	0
5,734.00	994	883	883
5,735.00	1,278	1,136	2,019
5,736.00	1,587	1,433	3,451
5,737.00	1,921	1,754	5,205
5,738.00	2,281	2,101	7,306
5,739.00	2,802	2,542	9,848

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,736.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,730.56'	**18.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 5,730.56' / 5,710.00' S= 0.1399 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,738.50'	**135.0' long + 100.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=9.95 cfs @ 2.98 hrs HW=5,736.53' (Free Discharge)
└**2=Culvert** (Passes 9.95 cfs of 19.44 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 9.95 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,733.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P420:

Inflow Area = 1.249 ac, 81.18% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af
Outflow = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 2.96 hrs, Volume= 0.086 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,750.69' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.50'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,746.80'	**18.0" Round Culvert** L= 147.5' Ke= 0.500 Inlet / Outlet Invert= 5,746.80' / 5,735.00' S= 0.0800 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,751.50'	**10.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.75 cfs @ 2.96 hrs HW=5,750.69' (Free Discharge)
└**2=Culvert** (Passes 2.75 cfs of 15.08 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.75 cfs @ 1.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,746.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P430:

Inflow Area = 2.682 ac, 89.93% Impervious, Inflow Depth = 1.10" for 100yr event
Inflow = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af
Outflow = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min
Primary = 7.57 cfs @ 2.96 hrs, Volume= 0.246 af
Routed to Pond P410 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P200 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,740.68' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,740.30'	**36.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,737.80'	**18.0" Round Culvert** L= 224.5' Ke= 0.500 Inlet / Outlet Invert= 5,737.80' / 5,735.00' S= 0.0125 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,741.00'	**220.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.56 cfs @ 2.96 hrs HW=5,740.68' (Free Discharge)
└**2=Culvert** (Passes 7.56 cfs of 12.24 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 7.56 cfs @ 2.01 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,737.80' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P500:

Inflow Area = 56.280 ac, 63.89% Impervious, Inflow Depth = 0.61" for 100yr event
Inflow = 50.41 cfs @ 3.00 hrs, Volume= 2.871 af
Outflow = 50.41 cfs @ 3.00 hrs, Volume= 2.871 af, Atten= 0%, Lag= 0.0 min
Primary = 50.41 cfs @ 3.00 hrs, Volume= 2.871 af
Routed to Reach N :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach N :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 5,708.69' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,706.00'	**48.0" Round Culvert** L= 53.0' Ke= 0.500 Inlet / Outlet Invert= 5,706.00' / 5,704.00' S= 0.0377 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,812.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=50.08 cfs @ 3.00 hrs HW=5,708.69' (Free Discharge)
1=Culvert (Inlet Controls 50.08 cfs @ 5.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,706.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P510:

Inflow Area = 56.021 ac, 64.07% Impervious, Inflow Depth = 0.61" for 100yr event
Inflow = 50.37 cfs @ 3.00 hrs, Volume= 2.869 af
Outflow = 50.37 cfs @ 3.00 hrs, Volume= 2.869 af, Atten= 0%, Lag= 0.0 min
Primary = 50.37 cfs @ 3.00 hrs, Volume= 2.869 af
Routed to Pond P500 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach Spill :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,736.70' @ 3.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,734.00'	**48.0" Round Culvert** L= 135.0' Ke= 0.500 Inlet / Outlet Invert= 5,734.00' / 5,727.00' S= 0.0519 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	5,737.00'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=50.33 cfs @ 3.00 hrs HW=5,736.69' (Free Discharge)
1=Culvert (Inlet Controls 50.33 cfs @ 5.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,734.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P600:

Information from SGM survey 2014

Inflow Area = 15.609 ac, 42.03% Impervious, Inflow Depth = 0.31" for 100yr event
Inflow = 2.05 cfs @ 3.04 hrs, Volume= 0.409 af
Outflow = 2.05 cfs @ 3.04 hrs, Volume= 0.409 af, Atten= 0%, Lag= 0.0 min
Primary = 2.05 cfs @ 3.04 hrs, Volume= 0.409 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,754.16' @ 3.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,752.28'	**18.0" Round Culvert** L= 73.0' Ke= 0.500 Inlet / Outlet Invert= 5,752.28' / 5,750.87' S= 0.0193 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,755.50'	**5.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,754.00'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.04 cfs @ 3.04 hrs HW=5,754.16' (Free Discharge)
└**1=Culvert** (Passes 2.04 cfs of 9.03 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 2.04 cfs @ 1.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.28' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P610:

Information from SGM plans 2014

Inflow Area = 7.163 ac, 58.27% Impervious, Inflow Depth = 0.55" for 100yr event
Inflow = 0.88 cfs @ 3.88 hrs, Volume= 0.328 af
Outflow = 0.88 cfs @ 3.88 hrs, Volume= 0.328 af, Atten= 0%, Lag= 0.0 min
Primary = 0.88 cfs @ 3.88 hrs, Volume= 0.328 af
Routed to Reach S600 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,766.35' @ 3.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,761.50'	**24.0" Round Culvert** L= 106.2' Ke= 0.500 Inlet / Outlet Invert= 5,761.50' / 5,761.00' S= 0.0047 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,766.80'	**45.0' long + 30.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Device 1	5,766.20'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.87 cfs @ 3.88 hrs HW=5,766.35' (Free Discharge)
└**1=Culvert** (Passes 0.87 cfs of 27.45 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.87 cfs @ 1.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,761.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P620:

Information from SGM plans 2014

Inflow Area = 6.932 ac, 60.11% Impervious, Inflow Depth = 0.57" for 100yr event
Inflow = 0.87 cfs @ 3.81 hrs, Volume= 0.327 af
Outflow = 0.87 cfs @ 3.81 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.3 min
Primary = 0.87 cfs @ 3.81 hrs, Volume= 0.327 af
Routed to Pond P610 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,765.38' @ 3.81 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 0.5 min calculated for 0.327 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (304.2 - 303.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,765.00'	0.035 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,765.00	0.001	0.000	0.000
5,766.00	0.003	0.002	0.002
5,767.00	0.007	0.005	0.007
5,768.00	0.013	0.010	0.017
5,769.00	0.023	0.018	0.035

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.00'	**24.0" Round Culvert** L= 125.0' Ke= 0.500 Inlet / Outlet Invert= 5,765.00' / 5,761.50' S= 0.0280 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,768.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.87 cfs @ 3.81 hrs HW=5,765.38' (Free Discharge)
1=Culvert (Inlet Controls 0.87 cfs @ 2.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,765.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P630:

Information from SGM plans 2014
Assumed pipe slope of 1%

Inflow Area = 0.745 ac, 15.03% Impervious, Inflow Depth = 0.05" for 100yr event
Inflow = 0.02 cfs @ 3.33 hrs, Volume= 0.003 af
Outflow = 0.02 cfs @ 3.35 hrs, Volume= 0.003 af, Atten= 0%, Lag= 1.3 min
Primary = 0.02 cfs @ 3.35 hrs, Volume= 0.003 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,771.01' @ 3.35 hrs Surf.Area= 0.004 ac Storage= 0.000 af

Plug-Flow detention time= 2.3 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (263.9 - 261.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,771.00'	0.004 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,771.00	0.004	0.000	0.000
5,772.00	0.004	0.004	0.004

Device	Routing	Invert	Outlet Devices
#1	Primary	5,769.22'	**24.0" Round Culvert** L= 72.0' Ke= 0.500 Inlet / Outlet Invert= 5,769.22' / 5,768.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,771.40'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,771.00'	**24.0" Horiz. Orifice/Grate X 0.60** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 3.35 hrs HW=5,771.01' (Free Discharge)
└**1=Culvert** (Passes 0.02 cfs of 13.04 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,771.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P640:

Information from SGM plans 2014

Inflow Area = 6.109 ac, 66.38% Impervious, Inflow Depth = 0.64" for 100yr event
Inflow = 6.37 cfs @ 3.04 hrs, Volume= 0.324 af
Outflow = 0.86 cfs @ 4.00 hrs, Volume= 0.324 af, Atten= 86%, Lag= 57.7 min
Primary = 0.86 cfs @ 4.00 hrs, Volume= 0.324 af
Routed to Pond P620 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P610 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,772.87' @ 4.00 hrs Surf.Area= 0.035 ac Storage= 0.074 af

Plug-Flow detention time= 49.7 min calculated for 0.324 af (100% of inflow)
Center-of-Mass det. time= 49.7 min (304.1 - 254.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5,769.00'	0.175 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,769.00	0.006	0.000	0.000
5,770.00	0.012	0.009	0.009
5,771.00	0.019	0.016	0.024
5,772.00	0.027	0.023	0.047
5,773.00	0.036	0.031	0.079
5,774.00	0.047	0.041	0.120
5,775.00	0.063	0.055	0.175

Device	Routing	Invert	Outlet Devices
#1	Primary	5,765.50'	**24.0" Round Culvert** L= 61.5' Ke= 0.500 Inlet / Outlet Invert= 5,765.50' / 5,765.00' S= 0.0081 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,774.50'	**55.0' long + 10.0 '/' SideZ x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#3	Device 1	5,774.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,768.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.86 cfs @ 4.00 hrs HW=5,772.87' (Free Discharge)
└**1=Culvert** (Passes 0.86 cfs of 38.17 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.86 cfs @ 9.87 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,769.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P650:

Information from SGM plans 2014

Inflow Area = 6.003 ac, 67.55% Impervious, Inflow Depth = 0.65" for 100yr event
Inflow = 10.12 cfs @ 2.97 hrs, Volume= 0.324 af
Outflow = 6.37 cfs @ 3.04 hrs, Volume= 0.324 af, Atten= 37%, Lag= 3.9 min
Primary = 6.37 cfs @ 3.04 hrs, Volume= 0.324 af
Routed to Pond P640 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,778.36' @ 3.04 hrs Surf.Area= 0.051 ac Storage= 0.117 af

Plug-Flow detention time= 47.5 min calculated for 0.324 af (100% of inflow)
Center-of-Mass det. time= 47.5 min (254.4 - 206.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5,774.00'	0.155 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,774.00	0.009	0.000	0.000
5,775.00	0.016	0.012	0.012
5,776.00	0.024	0.020	0.032
5,777.00	0.034	0.029	0.061
5,778.00	0.044	0.039	0.101
5,779.00	0.064	0.054	0.155

Device	Routing	Invert	Outlet Devices
#1	Primary	5,770.50'	**24.0" Round Culvert** L= 71.0' Ke= 0.500 Inlet / Outlet Invert= 5,770.50' / 5,769.00' S= 0.0211 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Secondary	5,778.50'	**25.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,778.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	5,773.50'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.33 cfs @ 3.04 hrs HW=5,778.35' (Free Discharge)
└**1=Culvert** (Passes 6.33 cfs of 39.60 cfs potential flow)
  ├**3=Orifice/Grate** (Weir Controls 5.42 cfs @ 1.95 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.91 cfs @ 10.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,774.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P660:

Information from SGM plans 2014

Inflow Area = 1.533 ac, 91.32% Impervious, Inflow Depth = 1.18" for 100yr event
Inflow = 4.56 cfs @ 2.96 hrs, Volume= 0.151 af
Outflow = 4.54 cfs @ 2.97 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.4 min
Primary = 4.54 cfs @ 2.97 hrs, Volume= 0.151 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,779.44' @ 2.97 hrs Surf.Area= 0.004 ac Storage= 0.001 af

Plug-Flow detention time= 0.1 min calculated for 0.151 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (197.8 - 197.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5,779.00'	0.077 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
5,779.00	0.002	0.000	0.000
5,780.00	0.006	0.004	0.004
5,781.00	0.011	0.008	0.012
5,782.00	0.018	0.014	0.027
5,783.00	0.082	0.050	0.077

Device	Routing	Invert	Outlet Devices
#1	Primary	5,778.40'	**18.0" Round Culvert** L= 78.8' Ke= 0.500 Inlet / Outlet Invert= 5,778.40' / 5,774.00' S= 0.0558 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,782.50'	**55.0' long + 30.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.53 cfs @ 2.97 hrs HW=5,779.44' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.53 cfs @ 3.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,779.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P670:

Information from SGM plans 2014

Inflow Area = 4.355 ac, 60.94% Impervious, Inflow Depth = 0.48" for 100yr event
Inflow = 5.59 cfs @ 2.97 hrs, Volume= 0.173 af
Outflow = 5.59 cfs @ 2.97 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min
Primary = 5.59 cfs @ 2.97 hrs, Volume= 0.173 af
Routed to Pond P650 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach S600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,796.45' @ 2.97 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,777.47'	**18.0" Round Culvert** L= 77.5' Ke= 0.500 Inlet / Outlet Invert= 5,777.47' / 5,774.00' S= 0.0448 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,798.50'	**10.0' long + 5.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#3	Device 1	5,792.27'	**18.0" Round Culvert** L= 51.5' Ke= 0.500 Inlet / Outlet Invert= 5,792.27' / 5,777.57' S= 0.2854 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#4	Device 3	5,796.24'	**68.0" x 35.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.23 cfs @ 2.97 hrs HW=5,796.45' (Free Discharge)
└**1=Culvert** (Passes 5.23 cfs of 36.33 cfs potential flow)
└**3=Culvert** (Passes 5.23 cfs of 15.75 cfs potential flow)
└**4=Orifice/Grate** (Weir Controls 5.23 cfs @ 1.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,777.47' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P700:

Parameters from 2015 SGM survey

Inflow Area = 4.329 ac, 72.03% Impervious, Inflow Depth = 0.70" for 100yr event
Inflow = 7.99 cfs @ 2.97 hrs, Volume= 0.251 af
Outflow = 7.99 cfs @ 2.97 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min
Primary = 7.99 cfs @ 2.97 hrs, Volume= 0.251 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P510 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,752.02' @ 2.97 hrs Surf.Area= 620 sf Storage= 11 cf
Flood Elev= 5,753.00' Surf.Area= 2,443 sf Storage= 1,515 cf

Plug-Flow detention time= 0.0 min calculated for 0.251 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (207.7 - 207.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5,752.00'	21,022 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5,752.00	587	0	0
5,753.00	2,443	1,515	1,515
5,754.00	9,324	5,884	7,399
5,755.00	17,923	13,624	21,022

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,750.40'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,748.80'	**18.0" Round Culvert** L= 67.0' Ke= 0.500 Inlet / Outlet Invert= 5,748.80' / 5,747.05' S= 0.0261 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Secondary	5,754.50'	**250.0' long + 100.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.37 cfs @ 2.97 hrs HW=5,752.02' (Free Discharge)
└**2=Culvert** (Inlet Controls 13.37 cfs @ 7.56 fps)
└**1=Orifice/Grate** (Passes 13.37 cfs of 36.75 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,752.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P710:

Outlet parameters from SGM plans

Inflow Area = 3.270 ac, 80.00% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af
Outflow = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af, Atten= 0%, Lag= 0.0 min
Primary = 7.24 cfs @ 2.96 hrs, Volume= 0.225 af
Routed to Pond P700 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,759.63' @ 2.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5,758.10'	**18.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 5,758.10' / 5,757.60' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Secondary	5,760.00'	**27.0' long + 40.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.22 cfs @ 2.96 hrs HW=5,759.63' (Free Discharge)
1=Culvert (Barrel Controls 7.22 cfs @ 4.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,758.10' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P800:

Parameters from SGM 2015 survey.

Inflow Area = 32.376 ac, 79.14% Impervious, Inflow Depth = 0.81" for 100yr event
Inflow = 41.84 cfs @ 3.02 hrs, Volume= 2.194 af
Outflow = 41.84 cfs @ 3.02 hrs, Volume= 2.194 af, Atten= 0%, Lag= 0.0 min
Primary = 41.84 cfs @ 3.02 hrs, Volume= 2.194 af
Routed to Pond P510 :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P700 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,749.77' @ 3.02 hrs
Flood Elev= 5,755.00'

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,741.50'	**72.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,747.36'	**48.0" Round Culvert** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 5,747.36' / 5,745.29' S= 0.0318 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf

#3	Secondary	5,754.00'	**10.0' long + 2.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=41.80 cfs @ 3.02 hrs HW=5,749.77' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 41.80 cfs @ 5.28 fps)
↑—**1=Orifice/Grate** (Passes 41.80 cfs of 134.53 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,741.50' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P820:

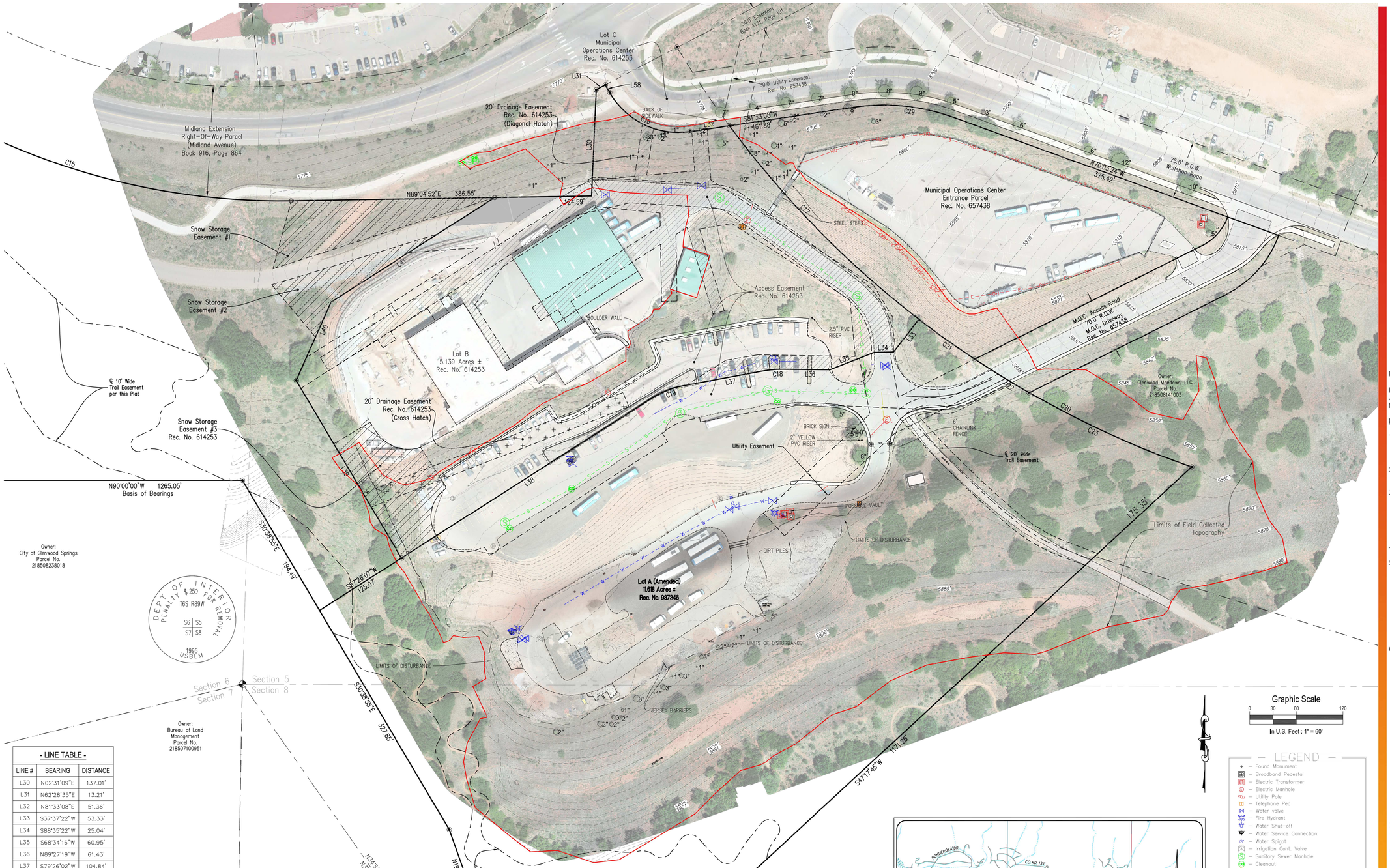
Inflow Area = 23.436 ac, 80.00% Impervious, Inflow Depth = 0.83" for 100yr event
Inflow = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af
Outflow = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af, Atten= 0%, Lag= 0.0 min
Primary = 34.06 cfs @ 3.09 hrs, Volume= 1.616 af
Routed to Pond 802P :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P600 :

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5,812.88' @ 3.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	5,812.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	5,807.00'	**48.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 5,807.00' / 5,805.90' S= 0.0145 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#3	Secondary	5,814.00'	**10.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=34.05 cfs @ 3.09 hrs HW=5,812.88' (Free Discharge)
↑—**2=Culvert** (Passes 34.05 cfs of 119.22 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 34.05 cfs @ 3.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5,807.00' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)



- LINE TABLE -

LINE #	BEARING	DISTANCE
L30	N02°31'09"E	137.01'
L31	N62°28'35"E	13.21'
L32	N81°33'08"E	51.36'
L33	S37°37'22"W	53.33'
L34	S88°35'22"W	25.04'
L35	S68°34'16"W	60.95'
L36	N89°27'19"W	61.43'
L37	S79°26'02"W	104.84'
L38	S57°26'07"W	383.56'
L39	N30°38'55"W	265.78'
L40	N23°56'20"E	110.36'
L41	N57°26'02"E	250.08'
L58	S29°23'02"E	11.11'

- CURVE TABLE -

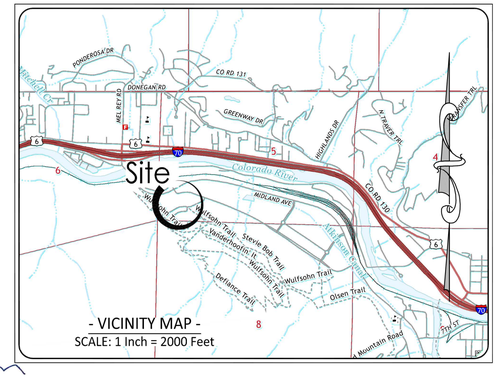
CURVE #	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C15	580.98'	880.00'	37°49'37"	S72°00'20"E	570.49'
C16	122.26'	102.00'	68°40'40"	S63°54'57"E	115.07'
C17	349.50'	1260.00'	15°53'34"	S44°25'51"E	348.38'
C18	25.60'	132.00'	11°06'39"	S84°59'22"W	25.56'
C19	41.47'	108.00'	21°59'55"	S68°26'04"W	41.21'
C20	400.77'	1260.00'	18°13'27"	S61°29'29"E	399.08'
C21	88.40'	1260.00'	4°01'12"	S54°23'22"E	88.38'
C22	82.30'	1260.00'	3°44'33"	S58°16'05"E	82.29'
C23	230.06'	1260.00'	10°27'42"	S65°22'22"E	229.74'
C29	130.08'	262.50'	28°23'30"	N84°15'09"W	128.75'

SURVEYOR'S CERTIFICATE:

I, Joshua L. Wilson, being a Registered Professional Land Surveyor, licensed in the State of Colorado, do hereby certify that this map of existing conditions was prepared on January 20, 2022, from a survey performed most recently on January 4, 2022, under my direct supervision and checking, and that both the survey and map are true and accurate to the best of my knowledge and belief.

Joshua L. Wilson
Colorado P.L.S # 38417
For, and on behalf of SGM

COLORADO LICENSED
JOSHUA L. WILSON
38417
1-20-22
PROFESSIONAL LAND SURVEYOR



- VICINITY MAP -
SCALE: 1 Inch = 2000 Feet

Graphic Scale
0 30 60 120
In U.S. Feet : 1" = 60'

LEGEND
- Found Monument
- Broadband Pedestal
- Electric Transformer
- Electric Manhole
- Utility Pole
- Telephone Ped
- Water valve
- Fire Hydrant
- Water Shut-off
- Water Service Connection
- Water Spigot
- Irrigation Cont. Valve
- Sanitary Sewer Manhole
- Cleanout
- Gas Valve
- Storm Manhole
- Drain Inlet
- Gate post/Bollard
- Typical Tree Size Labels — Indicates one tree, 8"trunk (DBH) — Deciduous Tree
- Typical Tree Size Labels — Indicates two trees, 10"trunk (DBH) — Evergreen Tree
- Overhead Electric Line
- Flowline
- Fenceline
- Guardrail
- Overhead Telephone Line
- Concrete
- Stone
- Gravel
- Asphalt Paving

Stantec

Stantec Architecture, Inc.
999 18th Street, Suite 202
Denver, CO 80202
Tel: (303) 295.1717 • www.stantec.com

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SAUNDERS

Consultants

SGM

bluegreen
www.bluegreenaspen.com

PROPERTY DESCRIPTION:

LOT A (AMENDED), GLENWOOD SPRINGS MUNICIPAL OPERATION CENTER, PER FIRST AMENDED PLAT RECEPTION NO. 937346 & MOC DRIVEWAY, GLENWOOD MEADOWS #1 MINOR SUB PER PLAT RECEPTION NO. 657438.

NOTES:

1. Basis of Bearings: Bearings based on South line of Lot D, as per the First Amended Plat, Reception No. 937346, Garfield County, N90°00'00"W, between two 18" Long, 5/8" Diameter Rebars & 1 ¼"Green Plastic Caps Marked LS 38417.
2. This map has been prepared pursuant to client request for an Existing Conditions Map.
3. Date of field survey : Includes data from survey initiated in 2019, with latest field survey date of January 4, 2022. This Existing Conditions Map contains topography and existing conditions taken from an UAV Drone Flight performed by SGM. Information within the RED limits line shown hereon has be field surveyed. Areas outside of said RED line are shown using the UAV Drone information and will need to be verified and updated once snow and ice has melted.
4. Units of linear measurements are displayed in US Survey Feet.
5. Vertical Information:

   Datum and Benchmark: Elevation information shown hereon is based upon GPS observations utilizing OPUS, Geoid 12B to derive the NGVD29 elevation of 5824.7' at the top of a 18"Long, 5/8" Diameter Rebar & 2 ¼"Green Plastic Cap Marked LS 38417, at the east end of the South line of Lot D, as per the First Amended Plat, Reception No. 937346, Garfield County.

   Contour Interval: 1 Foot Minor, 5 Foot Major.
6. Any subsurface utilities not shown, were not marked by appropriate utility companies at the time of this survey and therefore may not be shown hereon. Underground utilities locates have not been marked recently for the purpose of this work. Only paint marks and utility pin flags on the ground surface were surveyed by SGM as part of this survey. Client/contractor must contact specific utility companies to verify both the location and depth of respective utilities. Additional surveying work would be required to show any such subsurface utility locations on this drawing. SGM will not be responsible for protection of subsurface utilities.

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - LOCATION & EXTENT

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

EXISTING CONDITIONS MAP

N
60' 30' 0' 60' 120'
SCALE: 1" = 60'

01/18/22

C2

STANTEC PROJECT #2270417345

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - NEXT STEPS CONCEPTUAL SITE PLAN

RFTA GMF3457

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

Stantec Project Number: 2270417345
Client Project Number: 15-040

THE INFORMATION ON THE FOLLOWING SHEETS IS FOR FUTURE ADDENDUM PLANNING ONLY

SITE LEGEND:

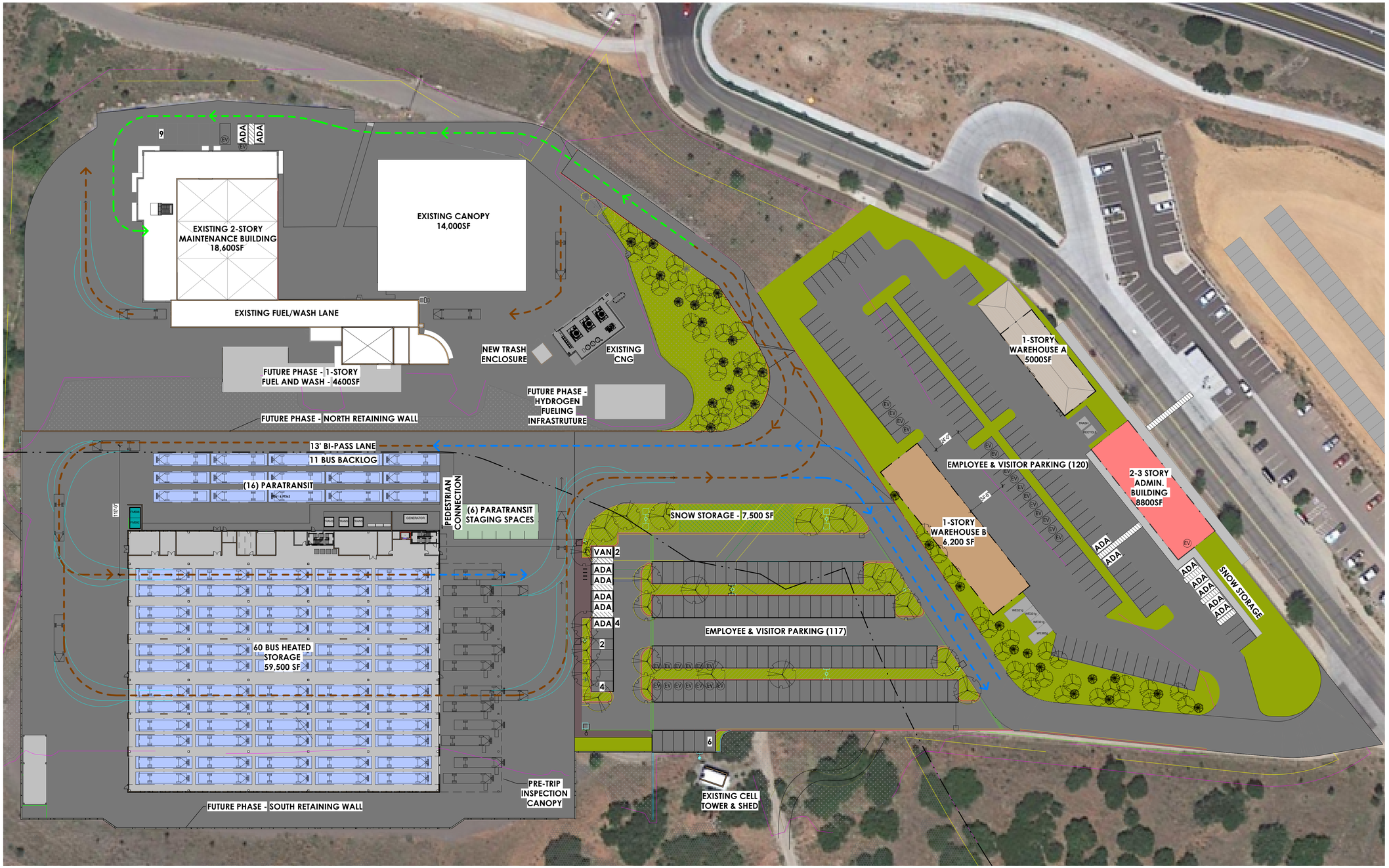
- HOT BITUMINOUS PAVEMENT
- PEDESTRIAN WALKWAY PAVEMENT
- LANDSCAPE AREA
- BUS STORAGE BUILDING
- TRASH AND RECYCLING ENCLOSURE

PARKING/STAKING LEGEND:

- EMPLOYEE PARKING
- PARATRANSIT
- BUS BACKLOG PARKING

LEGEND:

- CIRCULATION PATH OF OPERATORS
- CIRCULATION PATH OF SERVICE 'HOPPERS'
- CIRCULATION PATH OF MAINTENANCE
- PARCEL BOUNDARY LINE



1 NEXT STEPS CONCEPTUAL PLAN
ASP-102-LE 1" = 40'-0"

Stantec

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Legend

Client/Project Logo

RFTA
Roaring Fork Transportation Authority

Client/Project

GLENWOOD SPRINGS MAINTENANCE FACILITY - BUS STORAGE & OPERATIONS - NEXT STEPS CONCEPTUAL PLAN

2307 WULFSOHN RD.,
GLENWOOD SPRINGS, CO 81601

NEXT STEPS CONCEPTUAL PLAN

N

ASP-102-LE

01/24/22

STANTEC PROJECT #227041734S

Overview and Need

A political subdivision of the State of Colorado, the Roaring Fork Transportation Authority ("RFTA") is also the regional transit and alternative transportation agency for three rural counties and eight towns in central Colorado. RFTA operates along Interstate 70 (I-70) from Rifle to Glenwood Springs and State Highway 82 Bus Rapid Transit Corridor from Glenwood Springs to Aspen. Under service agreements, RFTA provides municipal transit services for the Cities of Aspen and Glenwood Springs and provides paratransit service for persons with disabilities who reside within Carbondale, Glenwood Springs, New Castle Silt, Rifle, Parachute, and unincorporated Garfield County. RFTA also operates the Rio Grande Trail for local and regional bicycle and pedestrian travel and supports the regional shared bike program, WE-cycle.

In November 2018, voters in the Roaring Fork Valley authorized a 2.65 mill levy to expand and enhance the region's public transportation and related services. RFTA will use this funding along with various State and Federal grants and a local match from bond proceeds to enhance and expand the capabilities of the Authority's current Wulfsohn Road campus.

RFTA's intent to relocate critical functions, such as Operations, to the Wulfsohn Road campus addresses RFTA's vital need to recruit and retain employees. Currently, Operations is located in Pitkin County at the Aspen Maintenance Facility, while most employees live in Glenwood Springs and the Colorado River corridor. Requiring employees to commute to Aspen has made it difficult for RFTA to attract and retain qualified employees.

As represented in the included site plan and supporting drawings, the proposed improvements entail a new two-story Operations Building that provides storage for 30-buses, light maintenance, pre-departure checks, as well as bus dispatch. The building is designed to be expanded into a 60-bus facility when additional funding is available. A site plan that illustrates this expansion and other adjacent improvements is provided for context only and is not a part of this land use review request.

The dispatch center on the second floor will house a dispatch cluster, support offices, changing rooms, and restrooms. Staff amenities such as a fitness room, a drivers' gathering space, a kitchen, and a walkout balcony with views to the hillside are also in the plan. Adjacent support parking and much of the bus circulation and queuing improvements will also be completed.

Sustainable features are also planned for in the proposed improvements. Infrastructure to enable electric vehicle charging is included. Bioswales and other water quality techniques, xeric planting design, and native vegetation are also proposed. Led lighting is a key component of the lighting design.

The project site is comprised of three parcels owned and previously developed by RFTA. Currently, the site is used for overflow employee and other vehicle parking, surplus materials and equipment storage, and assorted miscellaneous uses. The prior development of the project site created terraces through extensive site work, and the proposed improvements maximize the use of this previous work to the extent practicable.

With this Location and Extents land use application, the RFTA team seeks approval of this critical Operations Building and associated site improvements. These upgrades will significantly

improve RFTA's ability to serve the City of Glenwood Springs - and the region's - multi-modal transportation needs effectively.

Location and Extent Approval Criteria

In reviewing a proposed location and extent application, the Planning Commission shall consider whether or not the proposed location and extent:

i. Is consistent with the Comprehensive Plan and other City plans and policies;
ii. Is consistent with the general purpose and intent of this Code; and
iii. Minimizes adverse impacts to the health, safety, and welfare of the inhabitants of the surrounding areas and the City.

This application demonstrates how the proposed improvements meet these criteria.

Comprehensive Plan Consistency

One of the key challenges facing Glenwood Springs documented in the Comprehensive Plan is Increased traffic and congestion on Grand Avenue. RFTAs role as transit provider for the Citys transit system as well as the regional transit system operatorand its ability to effectively provide these transit servicesdepends on the proposed improvements. Effective transit service considerably helps the City address this traffic and congestion challenge by removing vehicles from Grand Avenue.

The proposed project also helps the City achieve is Vision Statement and key Community Goals by addressing critical transportation needs.

> *Vision StatementThe City of Glenwood Springs desires to maintain its small town character and preserve its cultural and natural resources by implementing a proactive plan to achieve directed and balanced development, social and economic diversity and address its transportation needs.*

RFTAs success allows the City to achieve several community goals, either directly, such as addressing transportation needs, or by enabling other goals to be achieved, like directing development into a compact form. These goals are identified below:

Community Goal - Promote long-term, sustainable, diverse economic development

- Objective/Strategy (Enabling)Direct development into a compact form: infill and redevelopment
- Objective/Strategy (Direct)Maintain the role as regional center
- Objective/Strategy (Direct)Retain role as regional center

Community Goal - Address transportation needs and provide multiple convenient travel choices

- Objective/Strategy (Direct)Strengthen transit and plan for transit hubs
- Objective/Strategy (Enabling)Direct development into a compact form: infill and redevelopment
- Objective/Strategy (Enabling)Improve Grand Avenue traffic flow while promoting a pedestrian-friendly Downtown
- Objective/Strategy (Enabling) Encourage reduction of single-occupant vehicles and encourage alternate travel modes through land use planning and community design
- Objective/Strategy (Enabling) Create complete streets to encourage alternative modes of travel (including WE-cycle shared bike program and the Rio Grande Trail, both supported or operated by RFTA)

Community Goal - Preserve small town character while maintaining the livability of Glenwood Springs and increasing the vibrancy and commercial success of the downtown

- Objective/Strategy (Enabling)Direct development into a compact form: infill and redevelopment
- Objective/Strategy (Enabling)Direct growth inward

Community Goal - Direct development to locations and building forms that are cost-effective to serve

- Objective/Strategy (Direct)Direct growth to areas where utilities and services can be provided efficiently
- Objective/Strategy (Enabling)Retain role as regional center
- Objective/Strategy (Enabling)Direct growth inward

Community Goal - Support social diversity

- Objective/Strategy (Enabling)Direct development into a compact form: infill and redevelopment
- Objective/Strategy (Direct)Require good design for mixed-use and higher density projects
- Objective/Strategy (Enabling)Retain role as regional center
- Objective/Strategy (Enabling)Direct growth inward

Additional Objectives and Strategies in the Comprehensive Plan also identify allocating land for utility expansion. This was done recently to create the RFTA Wulfsohn Road campus, and the proposed improvements fit into the Authority's expansion.

City Limits/Urban Growth Boundary/Future Land Use

The proposed improvements are located within the city limits and the Citys urban growth boundary. The project site is land currently owned by RFTA and already developed for the Glenwood Maintenance Facility. The propertys current and proposed uses are consistent with its future land use designation of industrial.

Other City Plans and Policies Consistency

The proposed improvements to increase RFTAs effectiveness are supported by several city plans and policies. A few key plans are highlighted below:

Long Range Transportation Plan 2015-2035

A vision of multi-modal transportation is described in this plan with the understanding that this transportation approach supports other community goals and enhanced quality of life.

Downtown Plan

Transportation improvements figure heavily in the Plans goals and objectives, including reducing traffic on Grand Avenue in order to maintain a pedestrian atmosphere. A Transportation Scenario is presented, and the Preferred Scenario highlights transit and trail use as key elements.

On-Demand Transit Study

Providing enhanced service using an on-demand model is considered as a part of this study. It is understood that enhanced transit service can provide a viable travel mode alternative while reducing congestion, parking demand and improved air quality.

Confluence Plan

Infill development of this key underutilized area is a primary objective of the plan. Multi-model transportation is emphasized, including use of RFTAs Rio Grande Trail for regional bicycle connectivity. Continued and enhanced transit is anticipated to serve this area once developed. RFTAs ability to maintain and expand its capacity to provide additional transit service is dependent upon the proposed Operations improvements.

Engineering Standards

General Conditions

1.3 Design Standards

The proposed improvements are compliant with the standards referenced in this section. Compliance demonstration is provided in responses contained elsewhere in this application.

Wastewater

The proposed improvements are compliant with the standards referenced in this section. Demonstration of compliance will be provided as a part of building permit application.

Water

The proposed improvements are compliant with the standards referenced in this section. Demonstration of compliance will be provided as a part of building permit application.

Stormwater

4.2 General Considerations
The grading and stormwater design of the proposed improvements meet the intent and principles of this standards section, including considering needs early in the design process and employing low-impact techniques. More information regarding compliance with this sections standards and principles is contained in the Grading, and Drainage Report provided as a part of the application.

Transportation

5.10 Parking Design

The proposed parking area meets the standards of this section, including minimum and maximum grades and accessible parking stalls. Compliance is demonstrated in the responses contained elsewhere in this application.

5.11 Traffic Impact Analysis Standards

A Traffic Study is provided as a part of this application and addresses the standards contained in this section. Additional study requested by the City Engineer is in progress and will be included in response to provided Engineering review comments.

5.12 Design Variances

No variances are requested at this time.

Electrical

The proposed improvements are compliant with the standards referenced in this section. Demonstration of compliance will be provided as a part of building permit application.

070.010.070 Nonconformities

Relief from nonconformities is not requested as a part of this application.

Article 070.20: Zoning Districts

070.020.020 Summary of Dimensional Standards

b) Mixed Use and Commercial Districts

The subject property consists of three parcels - one zoned Mixed Use Corridor, and the remaining two zoned Light Industrial. Compliance with the more restrictive of the two districts dimensional standards is demonstrated.

Mixed Use Corridor District (MU1)

Lot Standards, Minimum

Lot Are - provided: 3.2 ac/137,130 sf, required: none

Landscape Area - provided: 53%, required: 15%

Setbacks

Front, minimum - provided: 25 ft, required: 5 ft

Front, maximum from other streets - provided: 25 ft, required: 25 ft

Side, minimum - provided: 10 ft, required: 5 ft

Rear, without alley, minimum - provided: 10 ft, required 7.5 ft

Building Standards, Maximum

Building Height - provided: na, required: 40 ft

c) Other Nonresidential Districts

Light Industrial District (I1)
Lot Standards, Minimum

Lot Areaprovided: 16.75 ac/729,695 sf, required: 10,000 sf

Landscape Areaprovided: 59%, required: 10%

Setbacks

Front, minimum - provided: 25 ft, required: 20 ft

Side, minimum - provided: 10 ft, required: 10 ft

Rear, minimum - provided: 10 ft, required 10 ft

Building Standards, Maximum
Building Height - provided: 38 ft, required: 40 ft

070.020.90 Mixed Use Corridor District (MU1 District)

The purpose of the district is to provide a mixed use environment with walkable and active streetscapes, including lighter intensity commercial and housing. The proposed improvements within this district include grading and access work and provide opportunity for future phases to include envisioned housing, office, and other permitted mixed uses. The proposed uses comply with the dimensional and other key standards as described in this application.

070.020.140 Light Industrial District (I1 District)

The purpose of the district is to accommodate office, service, commercial, and lower intensity industrial uses. Uses take place mostly indoors with minimal outdoor storage and assembly. The proposed improvements within this district include transit, major repair, and administrative/quasi-governmental office uses, which are all permitted. The proposed uses comply with the dimensional and other key standards as described in this application.

070.020.190 Measurements and Exceptions

b) Lot and Site Requirements

The proposed improvements comply with these requirements.

c) Setbacks

The proposed improvements comply with these requirements.

d) Building Height

The proposed building complies with building height requirements, including parapets and authorized exceptions for elevator tower and rooftop mechanical.

Article 070.030: Use Regulations

070.030.030 Use Specific Standards

b) Performance Standards for All Uses

The applicant will comply with all Federal, State, County, and City regulations related to air quality, hazardous material storage and use, odors, light and glare, noise, and vibration. Evidence of compliance will be provided at building permit or certificate of occupancy issuance.

Article 70.040 Development Standards

070.040.020 Sensitive Area Protection

c) Development in Areas of Geologic Hazard

The purpose of this subsection is to promote public health, safety, and general welfare and to minimize public and private losses due to geologic conditions. The project site is included within the Hazard Mitigation District given the extent of existing development and is affected by hydrocompactive soils, slope instability, and potentially debris flows and rockfall.

The details of these mitigation measures will be included in a future building permit application. Site design strategies of eliminating irrigation at building foundations, directing stormwater away from buildings, and other measures comply with geotechnical recommendations to further protect the proposed structures and pavements. Slope instability through collapsing soils is also considered a risk that can be mitigated. Evidence of previous debris flows in areas near the project site have also been identified, and the site is located within a mapped debris flow fan. Debris basins were previously constructed upslope of the project site. More detail on the project sites geologic conditions and hazards can be found in the provided Geotechnical Report.

070.40.50 Landscaping, Screening, and Fencing

c) General Landscaping Standards

The proposed improvements include 58% of landscape area, compared to 10 and 15% required for the I1 and M1 zone districts. The type and amount of plant material meet or exceed the

minimum requirements of this section. The locations of plant material are also compliant, with special attention given to geotechnical recommendations to eliminate plant material adjacent to building foundations. The applicant proposes to preserve significant stands of existing native vegetation as a part of the project, which exceeds what is required to meet the landscape standards. Street trees along Wulfsohn Road are not affected by the proposed improvements and comply with these standards.

e) Parking Area Landscaping

Parking area landscaping also meets the code requirements. Landscaping area exceeds the 10% of total surface area required (31% provided), as well as the 10 sf/parking space standard (111 sf/parking space provided). Islands area minimum of nine feet wide, and terminus islands are provided. The proposed planting materials meet the required standards, included one tree/8 parking space, and planting strips and areas to screen views of the parking and drive aisles are also provided.

f) Screening, Fencing, and Walls

Refuse containers are proposed to be screened from view in a manner that is compliant with these standards. The location of the refuse containers is to the rear of the building and well away from the public entrance and parking area. The containers are still accessible to trash haulers and wont require vehicle maneuvering into public rights-of-way.

Ground mounted mechanical and utility equipment located on the west-facing side of the building will be screened from the public entrance and parking area using an opaque screen or wall. Other utilities sited within the parking area will be located in a subgrade vault or screened with opaque plant materials to soften and screen views. Fire hydrants will be kept accessible while softening their visibility. Roof mounted mechanical, and utility equipment will be screened from view to the extent practicable by the parapet.

A 300 lf retaining wall is proposed near the southern parking area drive/exit aisle. The wall includes a recession/projection to minimize wall mass since it exceeds 30 feet in length. The height ranges between 14.5 and 2 feet but is less than 6 feet compared to natural grade. The wall is not proposed to be terraced with intermediate planting areas due to geotechnical recommendations to avoid wetting planting areas at structural foundations.

g) Landscaping Evaluation Procedure

A Planting Plan is included to demonstrate compliance with this code subsection. Due to hydrocompactive soils, planting is not proposed adjacent to the building, but the plan demonstrates compliance with the code.

h) Installation and Maintenance

It is the intent of the applicant to install the proposed landscape improvements, including irrigation, prior to certificate of occupancy issuance. However, if unforeseen events affect the construction schedule, a security will be provided to ensure completion per this code section.

The proposed landscape improvements will also comply with additional standards contained in this section, including a professionally designed irrigation system and appropriate maintenance practices. Certain clumps of native vegetation, less than 14-inch caliper in size, are proposed for removal as a part of this application and are identified on the Landscape Plan sheets.

070.40.60 Off-Street Parking and Loading

c) Calculation of Off-Street Parking and Loading Requirements

The proposed improvements include 117 parking spaces. The required number of parking spaces is 83, based on a 1ps/300 sf ratio for the buildings administrative/office uses and 1ps/1000 sf ratio for the bus maintenance and repair uses. Existing overflow parking spaces are removed during the proposed improvements. These spaces were provided for a building that was recently demolished and are no longer required.

d) Number of Off-Street Parking Spaces Required

The proposed parking satisfies the required number of spaces for the I1 zone district. Due to the nature of the facility as a transit terminal, the number of parking spaces that can be provided are not limited to a maximum that is included within the M1 zone district.

f) Bicycle Parking

Bicycle parking is provided in compliance with the standards. Nine spaces are required based on the proposed 117 vehicle parking spaces. Bike parking spaces are located within 50 feet of the buildings public entrance for short-term parking. The remaining bike parking spaces are located adjacent to the vehicle parking area. The design of the bike parking areas meet the provided criteria.

g) Loading Requirements

Since shipping and receiving is not a proposed activity, loading areas are not required. Loading and unloading activities occur in other existing areas of the RFTA campus.

h) Parking and Loading Area Use and Design

The proposed parking areas meet the code standards for use and design. The parking area is located within 500 feet of the buildings principal entrance, includes required stall dimensions, and is surfaced with asphalt and/or concrete. Due to the unique nature of the proposed facility and the need to accommodate bus circulation and segregate it from vehicle and pedestrian circulation, the parking area is located between the building and the front property line.

Adequate snow storage for parking, paved circulation, sidewalks, and other hardscapes is included and conforms with the provided standards. The plan takes advantage of certain landscape areas, pavement areas outside of circulation/parking use, and up to 10% of required parking spaces and 34 spaces in excess of the 83 spaces required.

Parking area landscaping also meets the code requirements. Landscaping area exceeds the 10% of total surface area required (31% provided), as well as the 10 sf/parking space standard (111 sf/parking space provided). Islands area minimum of nine feet wide, and terminus islands are provided. The proposed planting materials meet the required standards, included one tree/8 parking space, and planting strips and areas to screen views of the parking and drive aisles are also provided.

070.40.70 Access and Circulation

c) Multimodal Transportation System

The proposed improvements support the Citys goals for encouraging various travel modes. Site-specific pedestrian walkways and bike parking encourage multi-modal transportation for visitors and some employees. Because most RFTA employees will arrive and depart outside transit operations time, reliance on transit as a travel mode is not possible.

d) Developer Responsibility for Access and Circulation Improvements

Access to the project site already exists along a RFTA-owned drive and will be used for the proposed improvements. Slight modifications to the internal circulation network will be made to maintain existing access that RFTA, the City of Glenwood Springs, and other utility providers currently use. No improvements to the intersection of the RFTA access drive and Wulfsohn Road are required.

e) Streets, Alleys and Vehicular Circulation

No modifications to the existing vehicle circulation are proposed, other than the realignment of an internal road described above. The existing circulation system meets the requirements of this code section.

f) Pedestrian Circulation

Existing and proposed sidewalks meet the requirements of this code section. The existing and proposed sidewalks deviate from certain design standards given the unique industrial nature of the proposed uses. The sidewalk widths vary between 5 and 10 feet and are attached to curbs in most instances. Sidewalks connect pedestrians to building entrances and parking areas, as well as to off-site sidewalks and transit. The proposed sidewalk design details comply with those contained in this code section.

g) Bicycle Circulation

The proposed improvements encourage bicycle travel by providing convenient bike parking and shared use of travel lanes. Separate bike travel lanes are not required.

070.40.90 Nonresidential and Mixed Use Site and Building Design

d) Nonresidential and Mixed Use Site Design Standards

The proposed site design complies with these standards. The building is oriented parallel to Wulfsohn Road to the extent possible given the existing site disturbance. Climatic conditions have been considered in the design, including holding snow and stormwater on the flat roofs. While the primary entrance is located on the north side of the building, it is protected from snow and falling ice. The primary entrance is also clearly identified and faces Wulfsohn Road.

The parking area is located between the building and the front property line, as described earlier in this application. Due to the unique nature of the proposed uses, this location for the parking best satisfies safety requirements to separate vehicle and bus circulation to the greatest extent possible.
Refuse containers are proposed in an enclosure located at the southwest corner of the building. This location minimizes views and odors as experienced from public rights of way and neighboring properties. The design of the container area and enclosure meets the required standards.

e) Nonresidential and Mixed Use Building Design Standards

The proposed building meets the intent of this code section. The design includes material, texture, and color changes, as well as elevation plane changes to articulate a necessarily large building. The building is further articulated with varying roof height and architectural details. The proposed color palette is compatible with the surrounding hillside. There are glazed windows and articulated doors that provide interest and pedestrian scale to the front-facing façade. Other building facades employ actual and false windows and doors to satisfy these code standards.

The customer entrance uses windows and doors to create transparency. The entrance is denoted with building signage as well as a canopy. The buildings roofs are flat and include parapets to help conceal mechanical equipment. Maximum height is 38 feet, including parapet and elevator tower. The roofs are articulated on the north, and west-facing elevations which are the more visible ones, and the south and east-facing elevations benefit from the setback elevation of the second-story element.

Building materials will comply with the code standards, and are currently proposed to be metal, concrete, and/or stucco. The materials are also non-reflective and will be used on all elevations without giving preference to the front public elevation. All materials are intended to be durable to not only withstand local climatic conditions but also bus operations. Roofing materials will be TPO or other acceptable materials from this section of the code that are appropriate for flat roofs. Roof color will comply with these standards.

070.40.100 Exterior Lighting

c) Lighting Districts Established

Lighting District 1 applies to the project site given its proposed industrial use and I1 and M1 zone districts. The intent of the proposed lighting is to comply with the code, including providing adequate lighting for bus operations.

d) Demonstration of Compliance

An Exterior Lighting Plan is included to demonstrate compliance with this code subsection.

e) Prohibited Lighting Types

The proposed lighting types are energy efficient LED fixtures.

f) General Lighting Requirements for All Lighting Districts

The proposed lighting design is compliant with the standards, including on-site lighting level and light trespass for District 1. Compliance measurement will occur during detailed design prior to building permit submission and/or post-installation but prior to certificate of occupancy issuance.

Lighting controls will extinguish exterior lighting during non-work hours, with the exception of required security lighting. Surface parking lighting are proposed to be full cut-off fixtures with lower illumination levels than the maximums specified. The fixtures mounting heights are less than the maximum height of 35 feet.

g) Supplemental Lighting Standards - District 1

The proposed lighting is compliant with these additional standards.

070.40.110 Signs

g) General Sign Regulations

A building identification sign is proposed to help demarcate the buildings entrance. It is assumed that other informational and directional signs that will not require sign permits will be considered prior to building permit submission. The intent of the proposed signs is to communicate information in a way that is compatible with the site and this code sections purpose.

The building identification sign is 28 sf in size, which is less than the 126 sf allowed based on a building elevation of 126 feet. The sign is proposed to be 2 feet in height.

h) Specific Sign Type Standards

The proposed sign is an attached wall type that is designed to be compatible with the building elevation and materials. It is also located on the front building façade visible from adjacent parking and driveways.

i) Summary of Permanent Sign Standards

One attached wall sign is proposed for RFTA Operations, the single building occupant. The sign height is lower than the top of wall.

l) Sign Installation and Maintenance

The proposed sign will comply with the requirements of this code section.