BOARD OF COMMISSIONERS

MINUTES OF THE BOARD SESSION – Regular Session

Wednesday, May 18, 2016
9:00 a.m.

Senator Hearing Room
555 Court Street NE
Salem, OR 97301

PRESENT: Commissioner Kevin Cameron, Commissioner Sam Brentano, Commissioner Janet Carlson. Also present were John Lattimer as chief administrative officer, Scott Norris as county counsel and Kristy Witherell as recorder.

Commissioner Cameron called the meeting to order at 9:00 a.m.

PUBLIC COMMENT

None.

CONSENT

(Video Time 00:01:20)

SHERIFF'S OFFICE
Approve Amendment #4 to the contract for services with Consolidated Food Management to add $1,038,536 in funding and extend through June 30, 2017 for inmate food services at the jail.

MOTION: Commissioner Brentano moved for approval of the consent agenda. Seconded by Commissioner Carlson; motion carried. A voice vote was unanimous.

ACTION

(Video Time 00:02:17)

HEALTH
1. Consider approval of an order requesting transfer of Ambulance Service Area (ASA) #7 from Idanha-Detroit Rural Fire Protection to Lyons Rural Fire Protection District and Ambulance Service. (TO BE ACTED ON FOLLOWING PUBLIC HEARING) – Rod Calkins, Noah Olson

Summary of Presentation:

- May 4, 2016, the board received recommendations regarding transfer of ambulance service from Idanha-Detroit Rural Fire Protection to Lyons Rural Fire Protection District and Ambulance;
- It is very difficult to have an ambulance response in ASA #7;
- Not for a lack of community effort, it is a matter of logistics and funding;
- The volume of calls isn't there to maintain service;

- Most of the transports in the area have been advanced life support, which Idanha-Detroit Rural Fire Protection does not have the capability of transporting;
- Lyons Rural Fire Protection District and Ambulance has provided almost all support in ASA #7;
- Would like to recognize that Idanha-Detroit Rural Fire Protection has not missed a call in two years;
- If the transfer occurs, Lyons Rural Fire Protection District and Ambulance would be responsible for all ambulance response within the service area; and
- Lyons Rural Fire Protection District and Ambulance would also be responsible for current service area.

The motion was made after the public hearing.

(Video Time 00:08:55)

PUBLIC WORKS

2. Consider approval of an ordinance to amend Marion County Code section 12.05.26(A) (governing parks) authorizing deputies to issue citations for violations, by emergency procedure. – Alan Haley, Scott Norris

Summary of Presentation:

- Neither the Marion County Code nor state law explicitly authorizes sheriff's deputies to issue citations for Marion County code violations; and
- This amendment will allow deputies to issue code violation citations for parks ordinance violations.

> **MOTION:** Commissioner Brentano moved that the chair read the ordinance by title only twice. Seconded by Commissioner Carlson; motion carried. A voice vote was unanimous.

Commissioner Cameron read the ordinance by title only twice.

> **MOTION:** Commissioner Brentano moved for approval of an ordinance to amend Marion County Code section 12.05.26(A) (governing parks) authorizing deputies to issue citations for violations, by emergency procedure. Seconded by Commissioner Carlson; motion carried. A voice vote was unanimous.

PUBLIC HEARINGS
9:30 A.M.

(Video Time 00:14:30)

HEALTH

A. Public hearing to consider the Ambulance Service Area (ASA) Administrator's recommendation regarding transfer of ASA #7. – Rod Calkins, Noah Olson

Summary of Presentation:

- Marion County has franchises for a number of ambulance service areas in Marion County;

- Recommending that the board approve the order;
- Idanha-Detroit Rural Fire Protection should be commended on their effort to build a credible ambulance transport and first response;
- The concern is that it is not fiscally possible to sustain an ambulance in Idanha-Detroit;
- Lyons Rural Fire Protection District and Ambulance has been providing the response services over the last four years under contract with Idanha-Detroit Rural Fire Protection; and
- If approved, the transfer will be in effect on June 13, 2016.

TESTIMONY:
Support:
Sherry Bensema:

- Providing advanced life support transport under contract for four years;
- Board is fully in support of the transfer;
- Made staffing and budget changes to increase the support for the area;
- Tracking data over the last eight years in the Idanha-Detroit area:
    - Peak hours are 10:00 a.m. Friday – 10:00 p.m. Sunday; and
    - Experience heavy traffic Monday through Friday, but not impactful.
- Plan to put a basic life support car in the area between Gates and Detroit:
    - Will add a basic life support ambulance to the Marion County system.

Shawn Baird:

- Chair of the Marion County Ambulance Service Advisory Committee;
- Spent a considerable amount of time trying to establish the highest level of service working with a number of ambulance services spread throughout the county;
- The committee is very favorable of the transfer; and
- Will allow for consistent ambulance service in the area.

> **MOTION:** Commissioner Carlson moved to close the public hearing and approve an order for transfer of Ambulance Service Area (ASA) #7 from Idanha-Detroit Rural Fire Protection to Lyons Rural Fire Protection District and Ambulance Service. Seconded by Commissioner Brentano; motion carried. A voice vote was unanimous.

(Video Time 00:26:50)

PUBLIC WORKS

B. Public hearing for Zone Change/Comprehensive Plan (ZC/CP) Case #15-001/Coastal Forest Products, LLC, Clerks file #5704. – Joe Fennimore

Summary of Presentation:

- Application to change the zone from Exclusive Farm Use (EFU) to Industrial Zone and change the Comprehensive Plan designation from Primary Agriculture to Industrial;
- Property located on a 6.25 acre portion of a 7.14 acre parcel on Portland Road NE, Salem;
- The property is the site of the former North Salem Drive-In Theater;
- A 1.16 acre portion of the property fronting Portland Road is zoned commercial, while the remaining 6.25 acres is the subject of this application; is zoned EFU;

- The property contains a landscape supply business and retail sales are conducted on western, commercial zoned portion of the property;
- The area proposed for the zone change contains bulk storage and materials that are sold wholesale;
- Properties to the north and south are zoned Commercial and Industrial, which contains trailer sales and a wrecking yard;
- Properties to the east and west are zoned EFU and in farm use;
- The hearings officer held a public hearing on August 5, 2015 and on November 10, 2015, issuing a recommendation that the board deny the request;
- The property is subject to Statewide Planning Goal 3, Agricultural Lands;
- In order for the request to be approved, the applicant must justify an exception to this goal;
- There are three types of exceptions:
    - A property is too physically developed to be available for resource use:
        - The property itself is not suitable for farming because of wires and pavement left behind by the drive-in.
    - The land surrounding a property is developed to such an extent that the property is irrevocably committed to uses other than resource use; and
    - Requires the county to show other reasons why a goal exception is appropriate.
- In this case, the applicant is proposing a physically developed and irrevocably committed exception;
- In the recommendation, the hearing's officer discussed the goal exception beginning with finding 5 on page 7 and ultimately concluded that without the additional exception to Goal 3, it is not justified and recommends against it;
- The hearings officer concluded that additional information is required in order to satisfy Goals 6, 11, 12 and 13 as well as Rural Industrial Policy 2;
- Without the goal exception, the proposal cannot satisfy all of the Comprehensive Plan, policies and zone change criteria;
- In findings 2 on page 6, the hearings officer discussed the use of the property and is not convinced that the activity taking place on the portion of the property proposed for the zone change is an industrial use;
- The hearings officer concludes that the applicant must show the board in detail how the proposed use fits in the Industrial Zone;
- If it is concluded that the activity does fit in the Industrial Zone, then the applicant must evaluate the proposal based on the most intensive uses permitted in the industrial zone or place a Limited Use Overlay on the property permitting only the proposed use; and
- If completed, other uses listed in the zone could be made to require a conditional use permit.

TESTIMONY:

Support:

Don Kelley:

- Mr. Kelley submitted two letters of support into the record; *(See Attachment A & B)*
- Mr. Kelley submitted a stormwater report into record; *(See Attachment C)*
- Issue began two years ago when Coastal Forest Products, LLC was conducting a composting operation on the facility;

- Was following through on an operation that had been present on the property years before Coastal Forest Products, LLC purchased it;
- Did not have a proper permit required to compost;
- When applying for the composting permit, it was discovered that part of the property was not zoned properly;
- In response to the neighbor's concerns about composting, all composting was stopped;
- The Department of Environmental Equality (DEQ) proposed a fine as a result of running the composting operation:
    - Coastal Forest Products, LLC did not contest the fine;
    - Seized all composting operations; and
    - Does not intend to compost on property.
- When the property housed a drive-in movie theater, 30-36 inches of topsoil was removed from the property:
    - 8-12 inches of compacted gravel was replaced;
    - Wires and conduit was buried under the ground to supply speakers throughout the drive-in theater;
    - The foundation of the movie screen is still on the property;
    - Steel beam fencing and 3x3x3 foot concrete blocks line the property;
    - Septic tank is still on the property; and
    - Drainage ditch along the property line.
- A report was conducted by Frank Walker who concluded that the property was not able to be used as farm land;
- There are two access points into the property:
    - Portland Road; and
    - Lakeside Drive.
- In response to the neighbors complaining about traffic, Coastal Forest Products, LLC has taken all truck traffic off Lakeside Drive and routed it through Portland Road:
    - All traffic from Lakeside Drive amounts to 3.5 percent of total traffic.
- Coastal Forest Products, LLC responded to every issue the hearings officer had:
    - On page 4 of the hearings officer's report, Coastal Forest Products, LLC accepts the conditions;
    - The hearings officer ask for clarification whether the Industrial Zone is the correct zone:
        - The majority of the business is wholesale and the portion of the property is used to warehouse product for sale in the retail operation:
            - Feels like it's an appropriate zone designation for the property.
    - The original application included a request for Limited Use Overlay to limit it to their existing operation:
        - A staff report stated that the Limited Use Overlay was not appropriate and it was removed.
    - It is a small, oddly shaped piece property, which cannot be cultivated with a neighboring property and nothing can grow;
    - In regard to the irrevocably committed exception, a lot of the same applies:
        - It's a combination of development around the surrounding property and the development on the property that can be considered under the committed exception.
    - Accepts the proposed conditions under Goal 2;

    - Coastal Forest Products, LLC conducted a traffic count to satisfy Goal 11;
    - Hearings officer stated that Goal 13 could be satisfied with a Limited Use Overlay, which has been agreed to and accepted; and
    - Hearings officer stated that a Limited Use Overlay would be sufficient to satisfy Comprehensive Plan Rural Amendment Policy #2, which has been agreed to and accepted.
- Coastal Forest Products, LLC has been a good community member;
- This location is crucial to the operations of the business;
- With regard to compatibility with surrounding uses, this business has been in operation for 20 years:
    - Until the application was filed, there wasn't a complaint from any neighbor about the property; and
    - There's no record of neighbors complaining about the traffic.
- Noise had become an issue with compatibility:
    - Assumed the noise was coming from the business, but it was coming from the wrecking yard adjacent to the business;
    - Coastal Forest Products, LLC has installed OSHA approved back up alarms:
        - Preloading trucks in evening;
        - Changed hours to open later; and
        - Installed noise monitoring devices.

Opposition:

Joe Paratore

- Vice President of West Labish Drainage District;
- Owns Lakeside Nursery on Lakeside Drive;
- Has done a lot of homework regarding the type of business that Coastal Forest Products, LLC is doing because Mr. Paratore researched having a compost pile on his business:
    - Was told that he was too close to a drainage ditch, which would contaminate it.
- Sits on the Claggett Creek Water Conservation District;
- Believes that if the commissioners are going to grant the change, there should be some stipulations:
    - Paving facility to cut down on dust; and
    - Installing a wheel well wash station.
- Mr. Paratore has complained about traffic on Lakeside Drive;
- Prior to Coastal Forest Products, LLC purchasing the property, there was not an entrance from Lakeside Drive;
- Feels like the traffic study that was conducted has no validity because it wasn't done by an outside company;
- Witnesses 15-20 trucks entering Coastal Forest Products, LLC a day from Lakeside Drive;
- The roadway has been damaged from the trucks using Lakeside Drive;
- Feels that an underwater storage facility needs to beconstructed to prevent run off from the bark dust into the drainage ditch;
- If a flood type situation happens in the area, the likelihood of contamination into the drainage ditch is high;
- Has paid over $40 thousand to keep the drainage ditch clean;

- Mr. Kelley stated that Mr. Olson applied to be a part of the West Labish Drainage District:
    - Believes him becoming a member of the district isn't going to rectify the situation.
- The service district opposes the zoning change and requests that the county address the dust, contamination of soil and water run-off.

Greg Bennett:

- Grower, farmer and member of the West Labish Water Control District; and
- Opposes the zone change.

Rick Breen:

- Lives on Lakeside Drive, approximately 300 yards past Coastal Forest Products, LLC;
- Owns three pieces of property on Lakeside;
- Coastal Forest Products, LLC has eluded to the fact that they have been in business for 20 years;
- Feels that the previous public hearing was quite extensive from both sides;
- Feels like the business has been breaking the law for the last four years by not complying with the EFU parameters;
- Feels like the industrial zone change would not put limitations on times the business could be open:
    - Could cause noise issues for neighbors.
- Has heard and seen delivery truck leave the property at 5:00 a.m.;
- Roads on Lakeside drive is full of potholes:
    - Believes the large trucks have degraded the road.
- Dust is a nuisance.

Support:

Don Kelley

- It appears that there is an adversarial relationship between the ditch district and Coastal Forest Products, LLC:
    - Partially a result of an interaction between Mr. Paratore and Mr. Jones.
- Shown good faith in having the study done;
- Has no problem with the conditions the hearings officer set forth;
- Ensures that any water leaving the property will be properly processed;
- The truck entrance was always on the property, it was blocked by boulders;
- The traffic has been rerouted to Portland Road;
- The DEQ fine was not for polluting the ditch, it was for not having a composting permit;
- There is no longer composting on the property;
- Business records show that the previous land owner, Abiqua Products, was composting on the property;
- In regards to the drainage to the property, the property drains in the drainage ditch;
- Coastal Forest Products, LLC obtained two access permits for Lakeside Drive and Portland Road;
- It is possible that trucks could leave the property early to make deliveries;
- Should be granted a Limited Use Overlay;

- There was a lot of difficulty with what land use laws meant when created in 1974:
    - Fast mapping was done to meet the deadline;
    - Not same technology as we have today; and
    - Unsure why the property in question was zoned EFU.
- The drive-in theater was in use at the time of the property being zoned EFU.

Noah Jones:

- If Oregon Department of Transportation were to grant a wider apron on Portland Road, they could close off Lakeside Drive entrance.

Board discussion:

- The main issue with the property is run-off into the drainage ditch;
- If Coastal Forest Products, LLC installs a detention pond on the property, that should resolve most of the issues;
- The front of the property on Portland Road is commercial;
- When Coastal Forest Products, LLC described what they do, it didn't fit into a specific category;
- The property is left to interpretation;
- Mr. Fennimore feels like zoning the property industrial would be appropriate;
- The difference between commercial and industrial zone are:
    - Industrial zone is considered more intensive:
        - It allows manufacturing and sales.
    - Commercial zone does not allow manufacturing.
- In this instance, allowing the Limited Use Overlay would be appropriate;
- Anything else that's listed in the industrial zone should require a conditional use permit:
    - If Coastal Forest Products, LLC decides to do something other than wholesale and sales on the property, a conditional use permit would be required.
- Coastal Forest Products, LLC could apply for a composting permit.
- As part of the Limited Use Overlay, the commissioners could prohibit composting on the site;
- Mr. Fennimore stated that there was not specific improvements on Lakeside Drive;
- In Mr. Fennimore's opinion, the information submitted by Mr. Walker is adequate evidence that a finding can be made;
- The applicant has responded to everything from the hearings officer's report;
- Would like to look into interior paving on the property; and
- The commissioners can condition the noise on the property.

> **MOTION:** Commissioner Carlson moved to close the public hearing and close the record and direct staff to go back and review additional evidence introduced into record and work with the applicant to come up with a list of conditions. Seconded by Commissioner Brentano; motion carried. A voice vote was unanimous.

Commissioner Cameron read the calendar.
Commissioner Cameron adjourned the meeting at 11:32 a.m.

CHAIR

COMMISSIONER

COMMISSIONER

Board Sessions can be viewed on-line at http://www.youtube.com/watch?v=VYF8Y6U7178.

Attachment A

To whom this may concern. 5-6-16

I Dan Harvey of 6285 Lakeside Dr NE Salem, OR am writing this to voice my opinion concerning the rezoning for Highway Fuel. As long as they follow all rules & regulations on drainage into ditch and as long as it doesn't effect my property or my drinking water I have no problem with it. All I ask is to keep noise to a minimum and to please install some type of screen so we aren't covered in bark dust anymore. It really is annoying. Other than that they have been fine neighbors to us I have no other complaints.

Dan Harvey

Attachment B

Dear Sir/Madam,

On behalf of Free Church Of God In Christ In Jesus Name, located at 6275 Lakeside Dr. Salem, OR. 97305 We wish to go on record as being supportive of the re-zoning change from EFU to industrial, for the property located at 6242 Portland Rd. Salem OR.

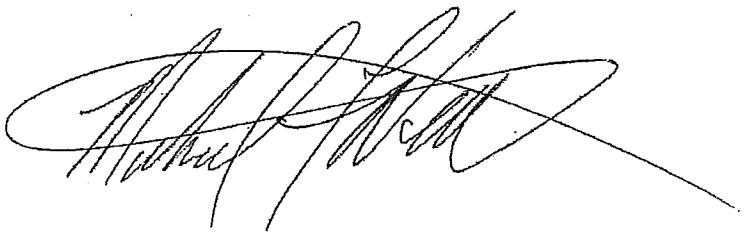
Our church is located directly abut the subject property. Our location holds services Saturday's, Sunday's with evening bible study's scheduled during the week.

We have received the utmost respect and considerations from HighWay Fuel Co. We have no complaints to noise levels or any other issues with this company's business practices.

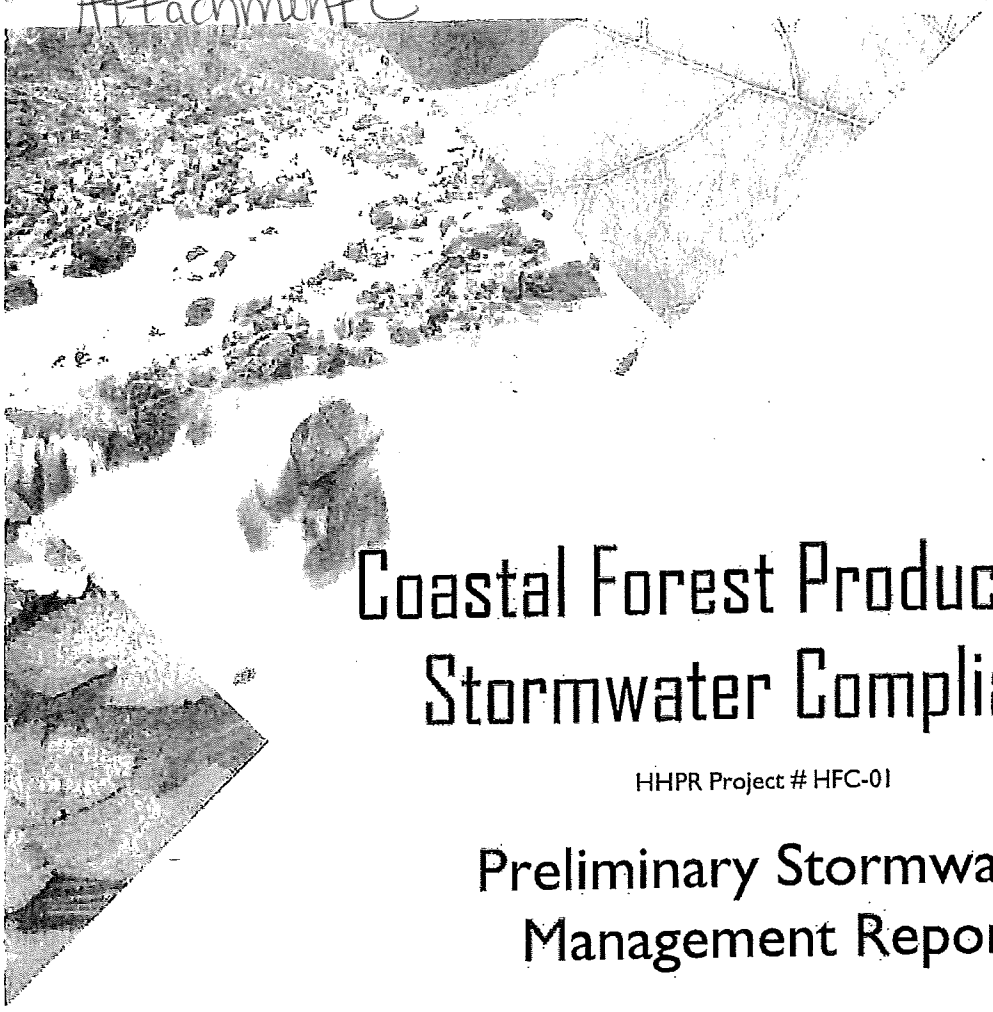
The local management team have proven to be true professionals and good neighbors. We want to go on record changing our earlier position in a letter to Marion County Planning and Zoning dated August 7, 2015

We are grateful to all of our neighbors, for the positive relationship that have been cultivated over the years. Free Church Of God In Christ In Jesus name would like to be supportive of all our neighbors whenever possible.

Blessings,
Pastor Michael F. Weaver
Free Church Of God In Christ In Jesus Name.
Ph. 503-933-4863
Email: rev.weaver.rmw@gmail.com



Attachment C



Harper
Houf Peterson
Righellis Inc.

Coastal Forest Products, LLC
Stormwater Compliance

HHPR Project # HFC-01

Preliminary Stormwater Management Report

January 2016

Prepared For:

Noah Jones
Coastal Forest Products, LLC
6242 Portland Road NE
Salem, OR 97305
P: 503-363-6444

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HHPR

ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

Table of Contents

Tables

Appendices

Project Overview and Description

The purpose of this report is to review the existing stormwater runoff management facilities at the site of Coastal Forest Products, LLC located at 6242 Portland Road NE in Salem, Oregon (See Appendix 1 for Vicinity Map). This report will identify stormwater management options to upgrade the facilities. It is understood that all said options will meet or exceed the requirements of Marion County's 2012 Stormwater Quality Treatment Engineering Standards for the site. Currently, Coastal Forest Products, LLC provides landscape supply, landscape services and erosion control products for residential and commercial uses.

The existing site consists of paved customer parking, accesses from Portland Road NE and Lakeside Drive NE, a sales office building, material storage areas and loading operations. Generally the site slopes from the NW to the SE at 0.50%. The total site encompasses the 7.4 acres. The area being required to provide stormwater management mitigation is 6.2 acres (See Appendix 1 for Predeveloped Conditions Basin Map).

Stormwater runoff management can be accomplished by constructing a biofiltration swale along the northeast side of the property combined with a stormwater detention pond located at the east access along Lakeside Drive NE or by constructing a combined treatment / detention facility in the same location (See Appendix 1 for Developed Conditions Basin Map).

Methodology

This stormwater management report is to present best management practices (BMP) for conveyance, infiltration, water quality treatment and detention to be installed at the Coastal Forest Products, LLC site. Design alternatives being presented meet the 2012 Marion County Stormwater Quality Treatment Engineering Standards, 1990 Marion County Engineering Standards Section V and the 2007 Clean Water Services Design and Construction Services Standards for an approved combined treatment / detention facility. Table 1 below summarizes the City's design criteria.

Table 1 – Marion County Stormwater Management Requirements

Design Requirement	City Criteria
Contributing Area (Section 1B)	100% of new or redeveloped area
Water Quality Design Flow (Section 2B)	0.83 inches per 24-hour period
Water Quality Design Volume (Section 2B)	1.38 inches per 24-hour period
Conveyance and Detention Design Storm (Table 9)	10-year Storm
Allowable Runoff Rate (Section 2b)	Predeveloped Conditions 5-year Storm
Required Storage Capacity (Section 2c)	Detain the difference between a 5-year predeveloped conditions storm and a 10-year developed conditions storm

The Natural Resource Conservation Service (NRCS) Soil Survey describes the soils onsite as Wapato Silty Clay Loam with a Hydrologic Soil Grouping C/D classification. 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 (See Appendix 2 for Soils Map and Hydrologic Grouping Table).

From the NRCS soils report, the existing soils have a Saturated Hydraulic Conductivity of 1.13 inches an hour. For preliminary design, a factor of safety of 2 was applied and an infiltration rate of 0.56 inches was used for the existing soils. Infiltration testing will be done prior to final design to verify assumptions if required.

In addition to traditional NRCS soil mapping of the existing underlying soils; a Report of Revised Soil Mapping was completed in May 2014 (See Appendix 2 for Report). This report was prepared for Land Use and Zoning purposed. Geotechnical investigations of the existing site soils were conducted and results concluded that the existing soils onsite have been severely altered by the site uses and operations throughout the years. The report found the existing site soils to be gravelly fill on compacted soil and coarse gravely, stony fill. Soils of this nature are indicative of low infiltration rates and soil groupings of a Class C or D classifications.

Based on the NRCS and geotechnical site investigations; the existing underlying soils were modeled as class C/D hydrologic soil grouping classification and have no infiltration rate.

Stormwater modeling was completed using the Santa Barbara 24-hour Urban Hydrograph method. Hydraflow Hydrographs 2014 software was used to analyze the storm events. The 24-hour rainfall depths were obtained from NOAA Atlas 2. Figures 25 thru 30 (See Appendix 2 for Figures).

A curve number of 77 was used for the Predeveloped Conditions (good conditions pasture, grassland or range). For developed conditions curve numbers of 98 (impervious area) and 77 (good conditions open space) were used. It is assumed that the future buildout of the site will be 80% impervious (See Appendix 2 for Table 5-8 Runoff Curve Numbers).

Time of concentrations were calculated using 2012 Marion County Stormwater Quality Treatment Engineering Standards Section 3.C.5 (See Appendix 2 for Documentation).

Table 2 - Predevelopment Conditions Basin

Basin / Facility ID	Area (acre)	Curve #	Time of Concentration (min)
1	6.2	77	75

Table 3 – Development Conditions Basin

Basin / Facility ID	Impervious Area (acre)	Pervious Area (acre)	Curve #'s	Time of Concentration (min)
1	5.0	1.2	77, 98	14, 24

Stormwater Management

Two options were analyzed for providing the required stormwater treatment and detention. Option 1 is sheet flowing or piping the runoff to a Biofiltration Swale located along the NE boundary of the property. The swale with outfall to a traditional detention pond located near the east access from Lakeside Drive NE. Option 2 is treating the runoff in a combined treatment / detention facility such as a Raingarden or Extended Dry Pond (See Appendix 3 for Hydrographs and Calculations).

OPTION 1 – BIOFILTRATION SWALE (TREATMENT)

Water Quality Flow (WQF) = 0.44 cfs
25-year Storm Flow = 4.80 cfs (use for conveyance calcs)
Residence Time = **9.8 minutes**
Longitudinal Slope = 0.50%
Swale Depth = 2 feet

Freeboard over the 25-year storm event = 0.50 feet
WQ Depth = 0.41 feet
Swale Width = 5 feet
Side Slope = 3H:1V
Swale Length = 100 feet
WQ Velocity = 0.17 fps

The proposed biofiltration swale meets water quality requirements by having a residence time of greater than 9 minutes, meeting all of the swale geometric design requirements and having 0.50 feet of minimum available freeboard in the large storm event (25-year).

OPTION 1 – DETENTION POND

Predeveloped 5-year Storm Flow = 0.58 cfs
5-year Storm Outflow from Pond = **0.50 cfs**
10-year Storm Outflow from Pond = **0.56 cfs**
Predeveloped 5-year Storm Volume = 24,105 cf
Developed 10-year Storm Volume = 63.819 cf
Difference in Storm Volumes = 63,819 – 24,105 = **39,714 cf**
Pond Storage Volume = 39,906 cf
Pond Bottom Area = 6,241 sf
Pond Depth = 4.6 feet
Pond Side Slope = 3H:1V
5-year Storm Event Depth = 3.0 feet
10-year Storm Event Depth = 3.7 feet
Freeboard over the 25-year storm event = 0.67 feet
Install Overlow Ditch Inlet @ Elevation = 3.8 feet
Install Flow Control 3.4" Orifice

The proposed detention pond meets detention requirements by releasing stormwater runoff at a slower rate than that of the predeveloped condition 5-year storm event and detaining difference between the 5-year predeveloped conditions storm volume and the 10-year developed conditions storm volume. The pond provides a minimum 0.50 feet of freeboard from the top of pond to the overflow ditch inlet structure.

OPTION 2 – COMBINED TREATMENT / DETENTION (CWS EXTENDED DRY BASIN)

Water Quality Volume (WQV) = 18,670 cf
Q = WQV / 48*60*60 = 0.11 cfs
Q release from Pond during WQ Storm = **0.11 cfs**

Predeveloped 5-year Storm Flow = 0.58 cfs
5-year Storm Outflow from Pond = **0.48 cfs**
10-year Storm Outflow from Pond = **0.56 cfs**
Predeveloped 5-year Storm Volume = 24,105 cf
Developed 10-year Storm Volume = 63.819 cf
Difference in Storm Volumes = 63,819 – 24,105 = **39,714 cf**
Pond Storage Volume = 39,906 cf
Pond Bottom Area = 6,241 sf
Pond Depth = 4.6 feet
Pond Side Slope = 3H:1V
5-year Storm Event Depth = 3.4 feet
10-year Storm Event Depth = 4.0 feet
Freeboard over the 25-year storm event = 0.48 feet
Install Overlow Ditch Inlet @ Elevation = 4.0 feet
Install 1.8" WQ Flow Orifice
Install 3.3" Flow Control Orifice

The proposed extended dry basin meets water quality requirements by detaining the water quality storm volume to a release rate of less than or equal to the required release rate.

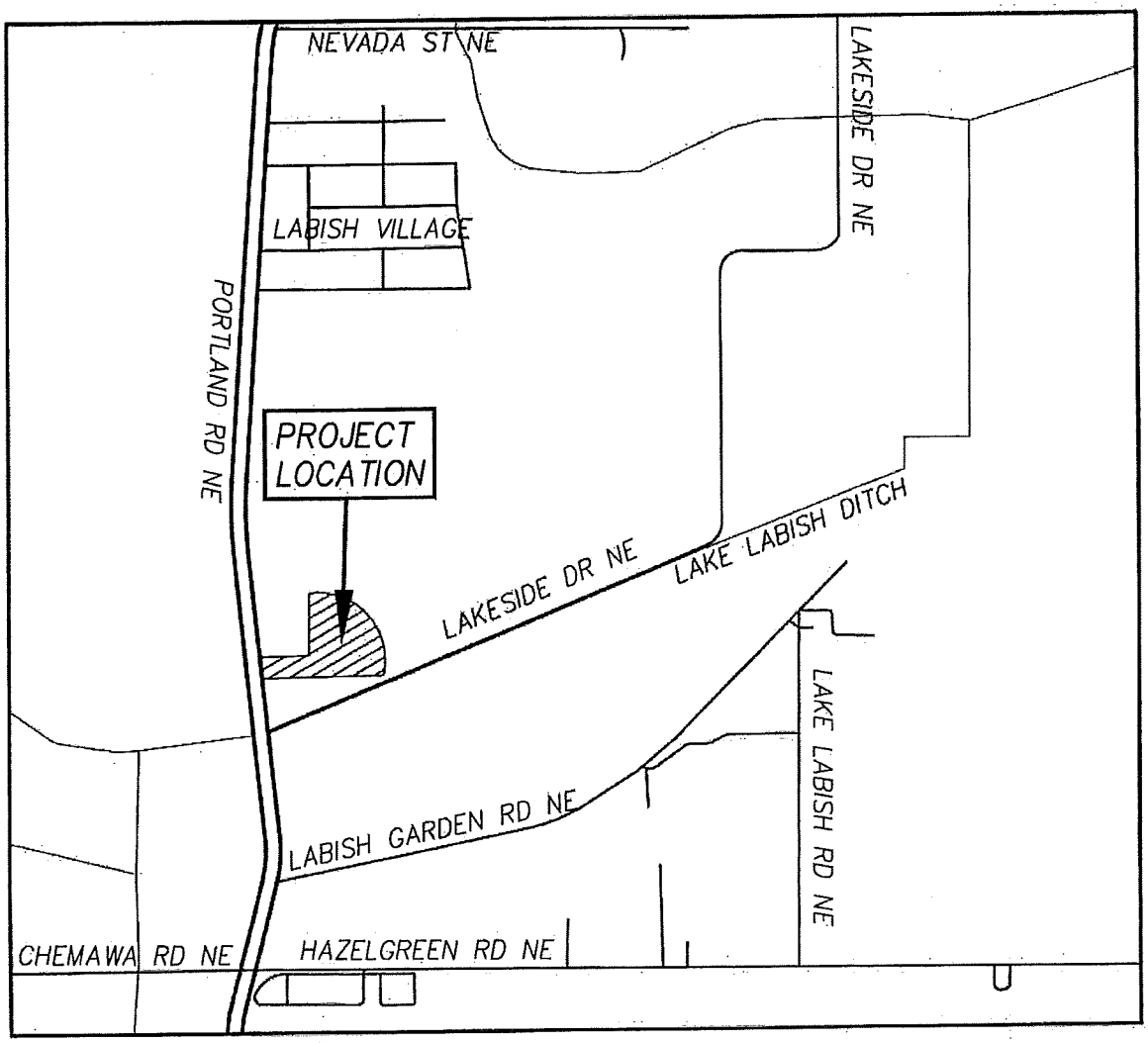
The proposed extended dry basin meets detention requirements by releasing stormwater runoff at a slower rate than that of the predeveloped condition 5-year storm event and detaining difference between the 5-year predeveloped conditions storm volume and the 10-year developed conditions storm volume. The pond provides a minimum 0.50 feet of freeboard from the top of pond to the overflow ditch inlet structure.

Conveyance and Downstream Analysis

Site stormwater conveyance piping will be designed to convey the 10-year Rational Method storm flows. Pipe sizing will be completed with the Final Stormwater Management Report.

There are no identified project downstream deficiencies and this project does not increase the peak flow to the existing storm system. Therefore, this project will not create any adverse impacts to the downstream system.

Appendix 1 – Maps



VICINITY MAP

NTS

SHEET NO			DESIGNED: BJB
1			DRAWN: BJB
			CHECKED: SWB
JOB NO	DATE	NO. DESCRIPTION	DATE: JANUARY 2016
HFC-01	REVISIONS		

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
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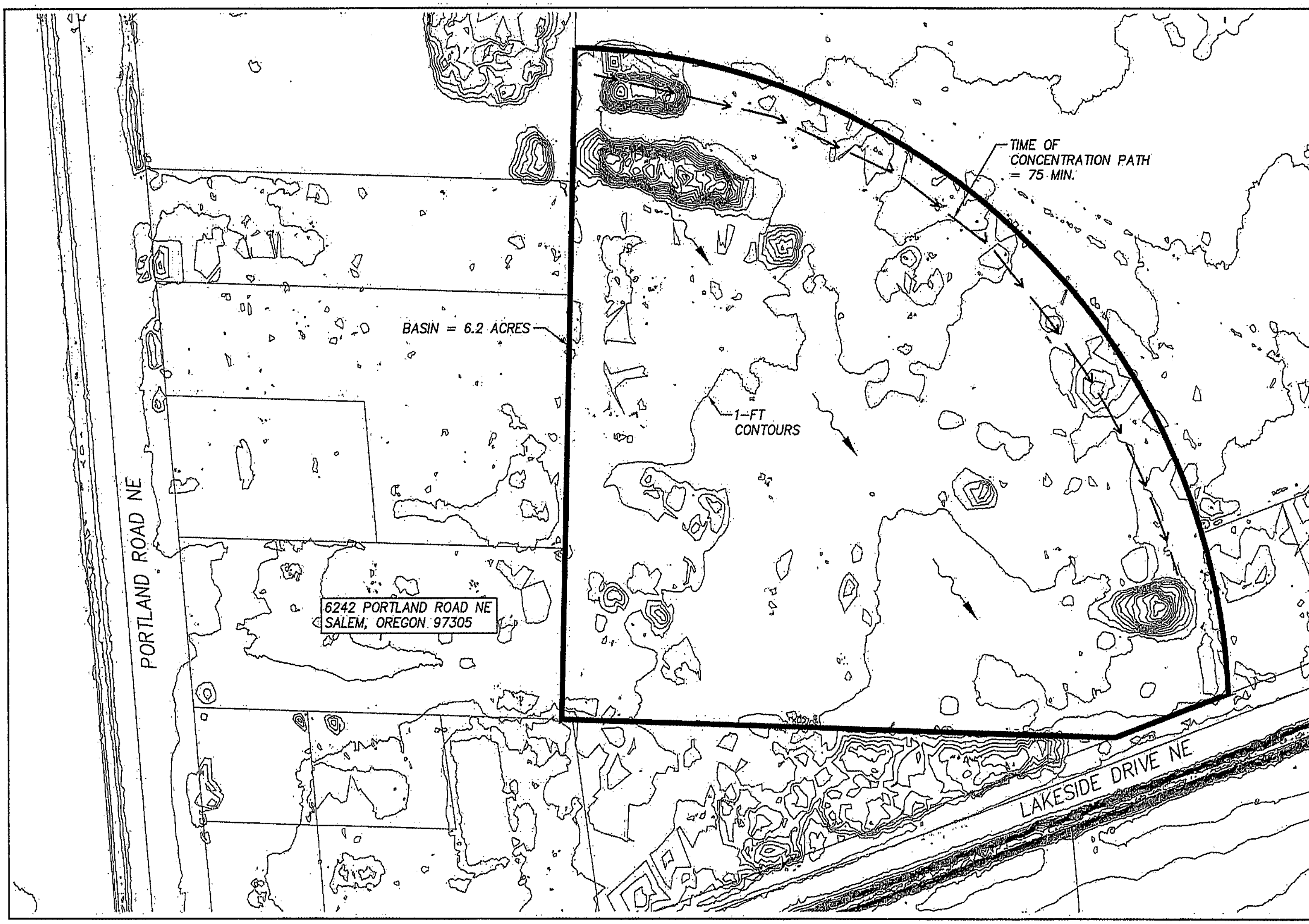
VICINITY MAP

COASTAL FOREST PRODUCTS, LLC STORMWATER COMPLIANCE

SALEM, OREGON



PREDEVELOPED CONDITIONS BASIN MAP
COASTAL FOREST PRODUCTS, LLC STORMWATER COMPLIANCE
SALEM, OREGON

Harper Houf Peterson Righellis Inc.

DESIGNED:	BJB
DRAWN:	BJB
CHECKED:	SWB
DATE	JANUARY 2016

REVISIONS

DATE	NO	DESCRIPTION

SHEET NO. 2

JOB NO. HFC-01

JOB NO	SHEET NO
HFCO-01	3

DATE	NO	DESCRIPTION

REVISIONS

DESIGNED: BJB
DRAWN: BJB
CHECKED: SWB
DATE: JANUARY 2016

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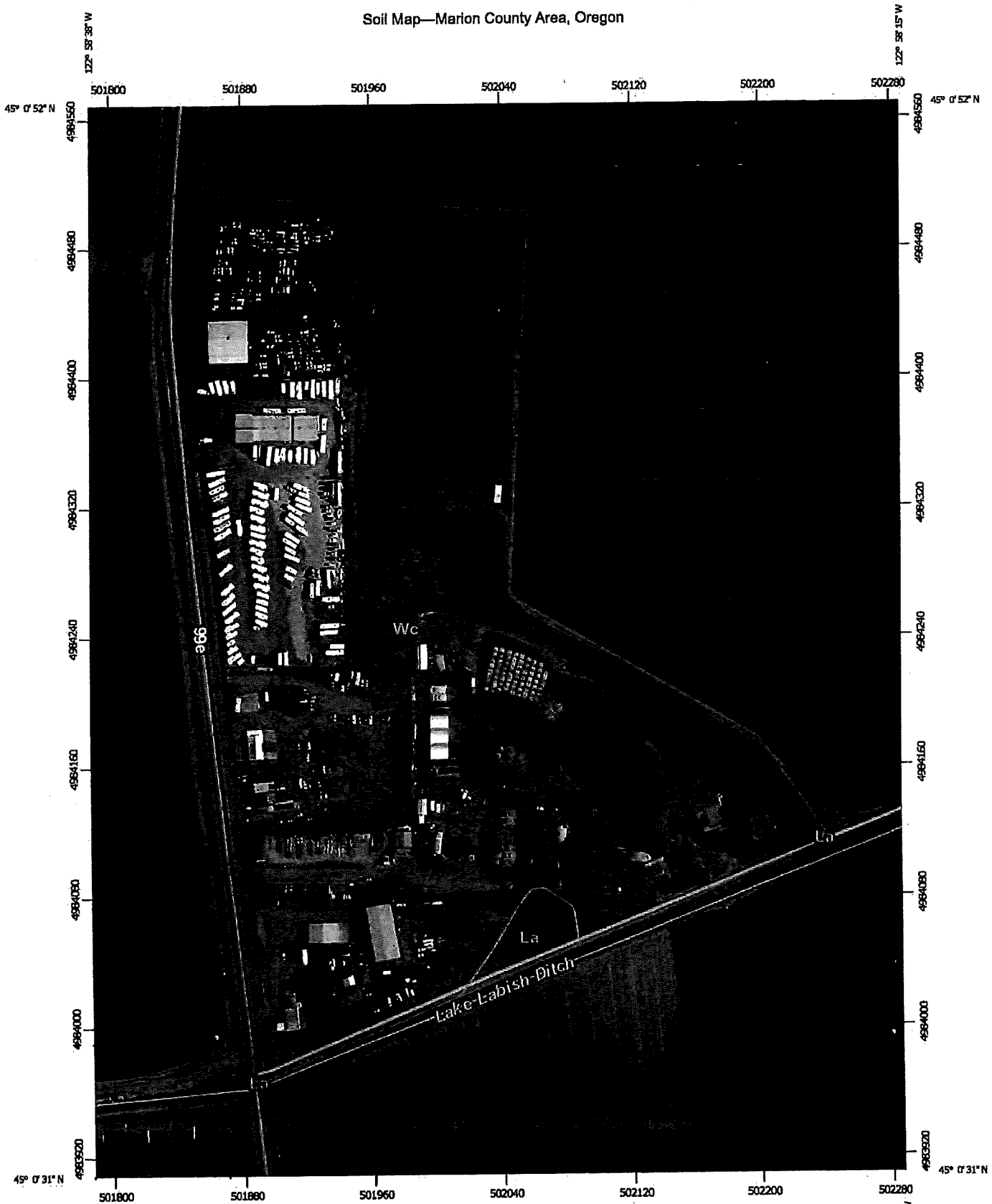
DEVELOPED CONDITIONS BASIN
COASTAL FOREST PRODUCTS, LLC STORMWATER COMPLIANCE
SALEM, OREGON

Appendix 2 – Methodology

Soil Map—Marion County Area, Oregon



Map Scale: 1:3,220 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 0.9100
- > 0.9100 and <= 8.0000
- Not rated or not available

Soil Rating Lines

- <= 0.9100
- > 0.9100 and <= 8.0000
- Not rated or not available

Soil Rating Points

- <= 0.9100
- > 0.9100 and <= 8.0000
- 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 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Marion County Area, Oregon
Survey Area Data: Version 12, Sep 18, 2015

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

Date(s) aerial images were photographed: Jun 15, 2015—Jun 23, 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.

Map Unit Legend

Marion County Area, Oregon (OR643)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
La	Labish silty clay loam	0.5	1.7%
Wc	Wapato silty clay loam	30.6	98.3%
Totals for Area of Interest		**31.1**	**100.0%**

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

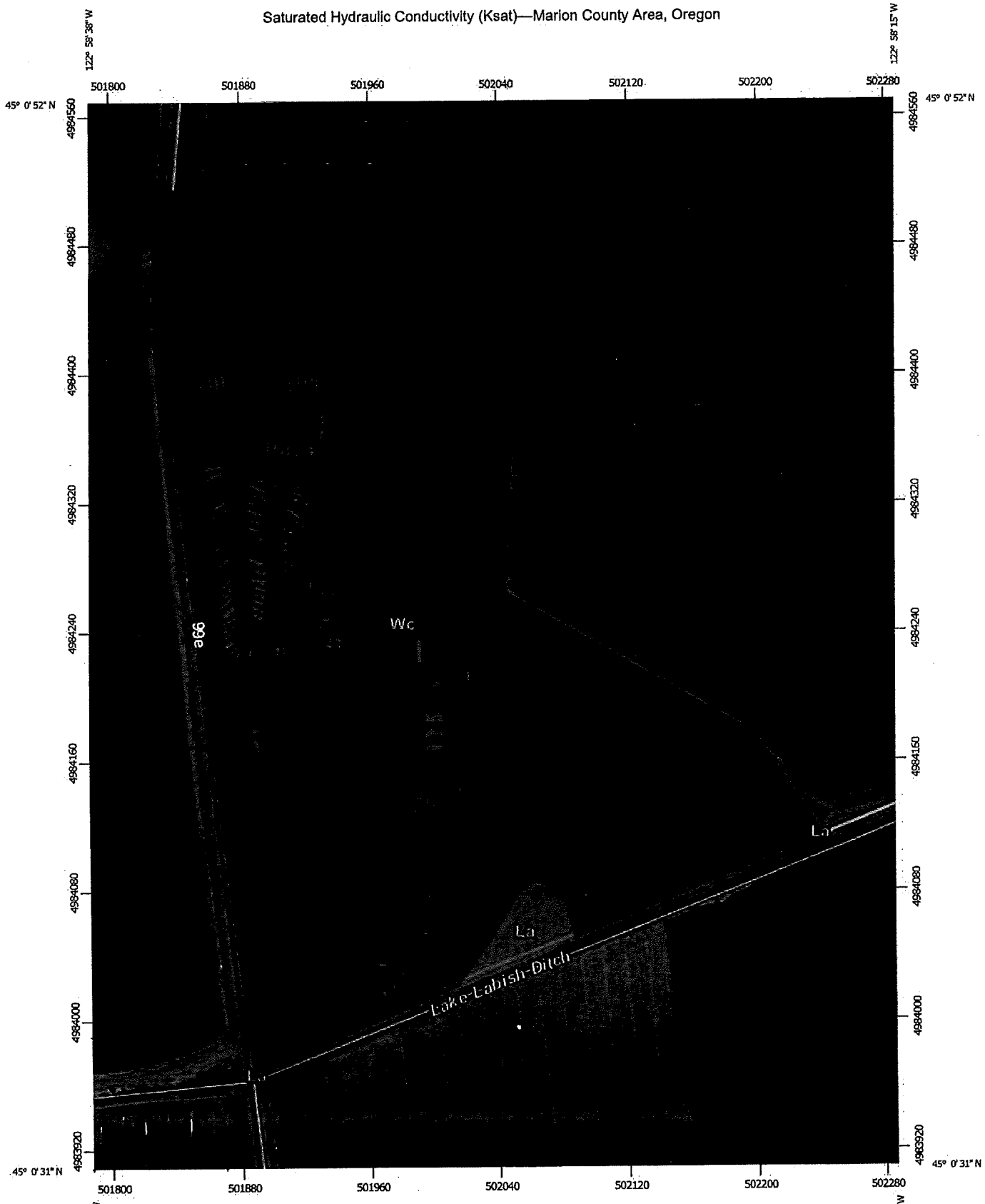
Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba).

Engineering Properties–Marion County Area, Oregon

Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
La—Labish silty clay loam														
Labish	85	C/D	0-3	Silty clay loam	OH	A-7	0-0-0	0-0-0	100-100-100	100-100-100	90-95-100	85-90-95	60-70-80	20-25-30
			3-60	Clay, silty clay	OH, MH	A-7	0-0-0	0-0-0	100-100-100	100-100-100	90-95-100	85-90-95	60-70-80	20-25-30
Wc—Wapato silty clay loam														
Wapato	90	C/D	0-16	Silty clay loam	ML	A-6	0-0-0	0-0-0	100-100-100	100-100-100	95-98-100	85-90-95	35-38-40	10-13-15
			16-60	Silty clay loam, silt loam	ML	A-6, A-4	0-0-0	0-0-0	100-100-100	100-100-100	95-98-100	80-88-95	30-35-40	5-10-15

Data Source Information

Soil Survey Area: Marion County Area, Oregon
Survey Area Data: Version 12, Sep 18, 2015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502200
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Map Scale: 1:3,220 if printed on A portrait (8.5" x 11") sheet.
Meters
0 45 90 180 270
Feet
0 150 300 600 900
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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Date(s) aerial images were photographed: Jun 15, 2015—Jun 23, 2015

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Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Marion County Area, Oregon (OR643)				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
La	Labish silty clay loam	0.9100	0.5	1.7%
Wc	Wapato silty clay loam	8.0000	30.6	98.3%
Totals for Area of Interest			31.1	100.0%

Description

$8 \frac{MM}{sec} = 1.13 \frac{in}{hr}$

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Report of Revised Soil Mapping on 6.3-Acre EFU Part of a 7.41-Acre Parcel, Tax Lot 062W31A01100,

May 2, 2014

For: Coastal Forest Products LLC,
6242 Portland Road NE
Salem, Oregon 97305

By: Andy Gallagher
Soil Scientist
CPSSc/SC 03114

Andy Gallagher, Soil Scientist PO Box 2233 Corvallis, OR 97333
Red Hill Soils
541-745-7878 avg@redhillsoil.com

SOIL REPORT

1. GENERAL INFORMATION

A. TITLE: Report of Revised Soil Mapping on EFU Part of a 7.41 Acre Parcel, Tax Lot 062W31A01100,

B. LANDOWNER: Coastal Forest Products LLC, 6242 Portland Road NE, Salem, Oregon 97305.

C. SOIL SCIENTIST AND CERTIFICATION NUMBER:
Andy Gallagher ARCPACS CPSSc/SC 03114

D. LAND USE CASE FILE NUMBER:

E. COUNTY: Marion County, Oregon.

F. LOCATION: Lot 1100, Sec. 32, T. 6N., R.2W.

G. PRESENT ZONING: The 6.3 acre part of the parcel that is evaluated here is currently zoned Exclusive Farm Use (EFU) and part of the lot on the west end is zoned Commercial.

H. CURRENT LAND USE: Compost, bark and landscape materials business..

I. PURPOSE OF INVESTIGATION: Many decisions about land use and zoning are based on soil maps. This property was previously mapped at 1:20,000 scale, which is generally too small a scale for detailed land use planning and decision making. High intensity soil mapping of this parcel was done to provide a map that shows the composition of soils at the level needed for intensive land use planning in order to more accurately estimate the percentages of soils by Land Capability Class. The information provided here is based on a high intensity (Order-1) soil survey of this parcel. This report provides revised relative amounts of Land Capability Classes for an application for a conditional use permit.

2. PREVIOUS MAPPING/BACKGROUND

This property was previously mapped in the Soil Survey of the Marion County Area as compiled into NRCS Web soil survey website (Figure 2). The NRCS soil map showed 100 percent Wapato (F*ine-silty, mixed, superactive, mesic, Fluvaquentic Endoaquolls)* (map symbol Wc) soils. NRCS mapped a drainage swale to the south Labish soils (*Fine, montmorillonitic, acid, mesic Cumulic Humaquepts)* poorly drained soils mapped right up to the south property line on the NRCS map.

This site had a former life as a drive-in movie. For those who have never been to or that don't remember drive-in movies, there was a large parking lot in about a quarter pie shape with the large movie screen in the corner of the pie piece. There was a high earthen berm pushed up on the curved outside perimeter of the pie, opposite the screen. The berm served several purposes. It was a place to put the topsoil that was scraped up before crushed rock and gravel were placed for the paving the parking lot. The berm also served to buffer noise from the movie and discouraged non-payers from watching the movie off site. This is background information that helps inform the level of disturbance the soils that has taken previous to the current use. In other words the agricultural suitability of the site was destroyed decades before the current business began operation here.

3. METHODS

A. LEVEL ORDER OF SURVEY USED IN THIS FIELD SURVEY: The current soil investigation is a high intensity (Order-1) soil survey. It is used as a basis for making the soil classification and soil map for this parcel. Six soil borings were made for an average sampling intensity of one boring per acre. Soil observations were made to best define soil boundary lines.

B. DATE OF FIELD INVESTIGATIONS: Field work was done on March 18, 2014.

C. FIELD METHODS: Methods used for observation included soil borings from soil pits to classify soils. Soil colors were determined moist, using a Munsell Color Chart. Borings locations and property corners were recorded with a GPS receiver and compiled into a soil map following processing with GIS and AUTOCAD software. Percentages of revised soil map unit areas were calculated from the revised map using AutoCAD software.

D. LIMITATIONS ENCOUNTERED: I could not sample under large piles of bark and compost but managed to put soil observation pits on perimeter of yard and in middle of yard and worked around the piles providing what I consider a representative sample of what is under the yard. .

4. RESULTS:

A. GEOLOGY OVERVIEW: The native soils of this property formed on floodplain deposits and the sediments are silty and clayey alluvium. There is recent human deposited gravel and stone over most of this property.

B. LANDFORMS AND TOPOGRAPHY: This parcel is located on a broad floodplain that is nearly level to very gently undulating. The current ground surface has been graded and pretty much leveled but with grading that allows surface drainage. Relief is very low and elevation ranges from about 140 to 145 feet above msl.

C. SITE HYDROLOGY:

The native soils were poorly drained as evidenced by hydric soil morphology (redoximorphic features) present in the buried soils. The hydrology of the site has been altered by severe compaction of the silty and clayey alluvium and overlying fill. Surface water soaks into the overlying coarse gravel layers and perches on the compacted fills and compacted buried soils. Soil excavations in several places filled rapidly with this water, when we dug soil pits. Soils are poorly drained and runoff can be rapid off of these compacted soils. Site water drains to the southeast corner of the property..

D. DESCRIPTION OF REVISED SOIL MAP UNITS

Revised Soil Map Units

Soils on this parcel are revised and reclassified based on high intensity soil mapping. Native soils have been largely truncated and filled over most of the property,

Map Unit
A Extremely Gravelly Fill on Compacted Silty and Clayey Truncated and Buried Alluvial Soils.

The soils are altered to such a degree here that they do not generally resemble the native soil. The original surface on the native soils that were mapped here would have been considerably thicker than is currently observed in the buried soil, which indicates the surface was removed prior to filling. There is 8 to 12 inches of compacted gravel and extremely gravelly clay in the top layer of fill and the underlying fill layers and buried soils. Under the gravel layer the fill is another 4 to 36 inches thick.

A native buried surface is at a depth of 12 to 36 inches and is very dark gray to black silty clay loam to silty clay. The contact zone between the paving gravel and the fill and soils is very mixed and compacted. This zone is severely root restrictive and would be a terrible seed bed if it was on the surface. The buried soils do not resemble the Wapato series.

Soil compaction has had the effect of creating perched water zones in the fill and beneath the fill in the truncated and buried soil. Where Wapato soils are classified as Capability Class 3 because they can typically be artificially drained even though they are poorly drained, it is because the soils are medium textured and if not compacted the soils can be artificially drained to allow crop production. The altered soils in Map Unit A would not respond to artificial drainage as well as native undisturbed Wapato soils would. The surface is currently hard packed gravel pavement over most all of the site. These soils with extremely gravelly fill

and compacted subsoil are Class 4 at best and are more like Class 6 where fill and compaction are deeper.

B Pavement

This part of the property is paved drive with concrete or asphalt This is not considered soil and does really have a capability class rating, but for the purpose of evaluating its suitability to agriculture it would have a Capability Class greater than 6.

C Gravel and Rock Fill

This is coarse gravelly sand fill in the upper part and very coarse stone and gravel fill in the lower part. These soils have very severe limitations and are not suited to growing crops. The lower level has so much coarse rock we could not dig beneath it with the backhoe. Water flooded into the soil pits apparently with a perched water table on the underlying clay sediments. These materials are Class 6

D Display Garden (not sampled)

This is a small area that is a landscaping display with grass and other plants. We did not excavate in this area because it was a display therefore it is being treated as Class 3. There was enough Class 4 and 6 soil observed on the balance of the site without digging up this area.

Table 1: PREVIOUS AND REVISED SOIL MAPPING UNITS WITH LAND CAPABILITY CLASS FOR THE 6.3-ACRE EFU ZONED PORTION OF PARCEL.

Previous Map Symbol	Revised Map Symbol	Soil Series Name	Capability Class (subclass)	Previous Map*		Revised Map	
				Acres	-%-	Acres	-%-
Wc	--	Wapato	3w	6.3	100	0	0
-	A	Gravelly fill on compacted soil	4s	0	0	4.33	69
-	B	Pavement	6s	0	0	0.93	15
-	C	Coarse gravelly, stony fill	6s	0	0	0.84	14
-	D	Landscape display area	3	0	0	0.14	2
Total				**6.3**	**100**	**6.3**	**100**

Table 2. Summary Soil Boring Data

Boring	Soil Series	Capability Class	Depth of gravelly fill (in)	Depth of compacted fill/subsoil (in)
1	Fill on truncated Wapato	4s	8	12
2	Fill on truncated/ poorly drained	4s	11	24
3	Fill	4s	12	36
4	Pavement	Not rated	No data	No data
5	Coarse gravelly sand fill over stone fill	6s	32+	No data
6	Coarse gravelly sand fill over stone fill	6s	30+	30+

5. SUMMARY AND CONCLUSIONS:

Soils are remapped in a high intensity (Order-1) soil survey on the 6.3 acre part of the parcel that is currently zoned as EFU acre parcel to more detailed level (Order 1) suited to site specific information for the purpose of land use planning decisions relative to permitting conditional use permit for a commercial landscape material business.

The soils on this parcel were severely altered during its life as a drive in movie when the soil surface was scraped off and then the site was paved with gravel and compacted. Smaller areas were paved with hard pavement. In the revised soil map, the soils are predominantly (98%) Capability Class 4 and 6 within the 6.3 acres currently zoned EFU. This is a significant change from the NRCS map that showed 100% Class 3 Wapato soils on this property (Capability Class 3)

6. REFERENCES:

Soil Survey of Marion County Area, Oregon on the NRCS Web Soil Survey.

7. MAPS AND ATTACHMENTS:

a. Figure 1. Vicinity Map.
b. Figure 2. Previous Soil Map (NRCS Web soil survey)
c. Figure 3. Topographic Map and Site Condition Map
d. Figure 4. Assessors Map
e. Figure 5. Revised Soil Map of the Project Site and Location of Soil Borings
f. Soil Profile Notes and Site Observation Notes

Figure 1. Vicinity Map (property location at A)

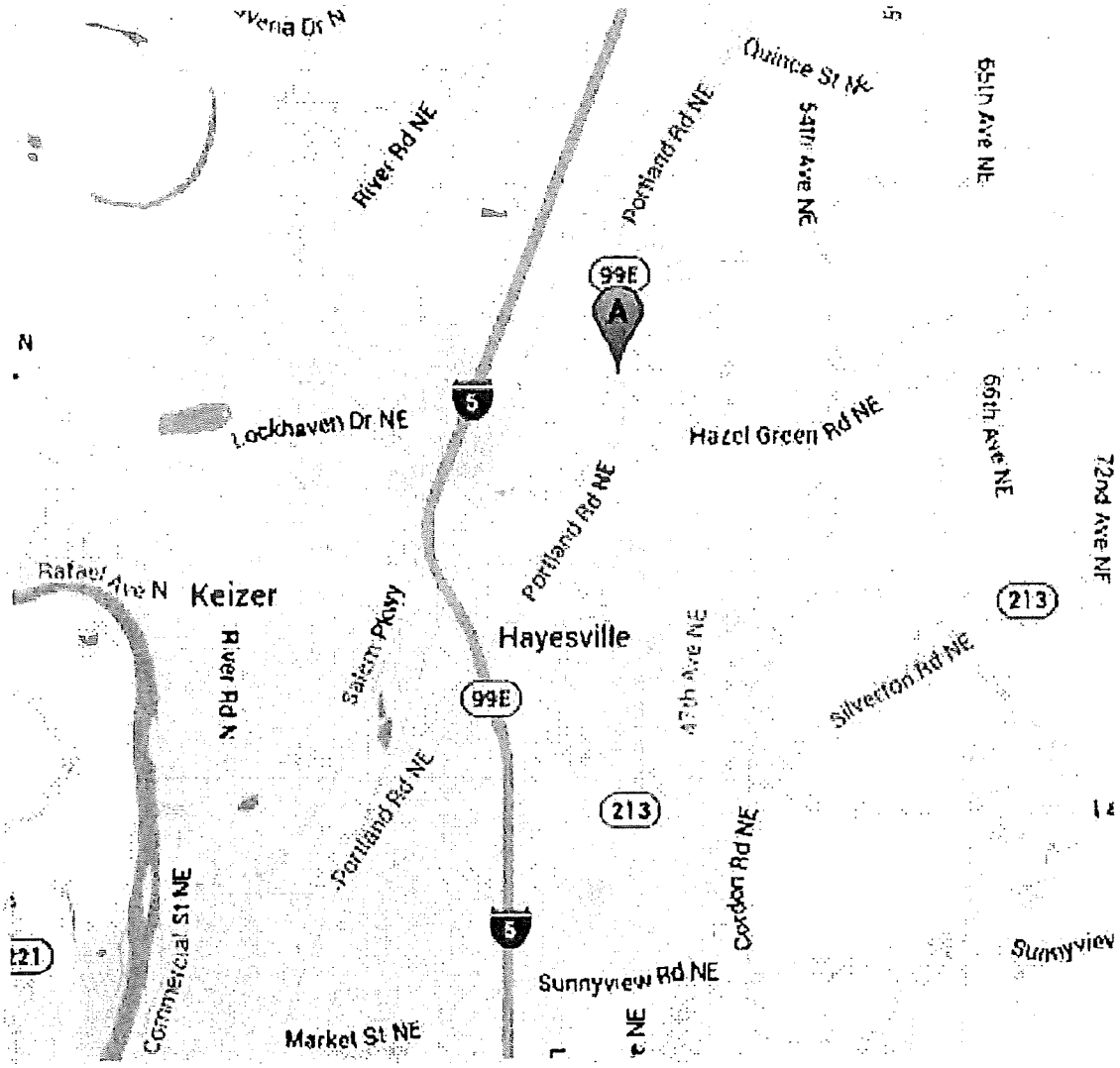


Figure 2. NRCS Soil Map Data Layer on aerial image.

Figure 3. Site Condition Map Topographic map of the study area. (Contour 5 ft)

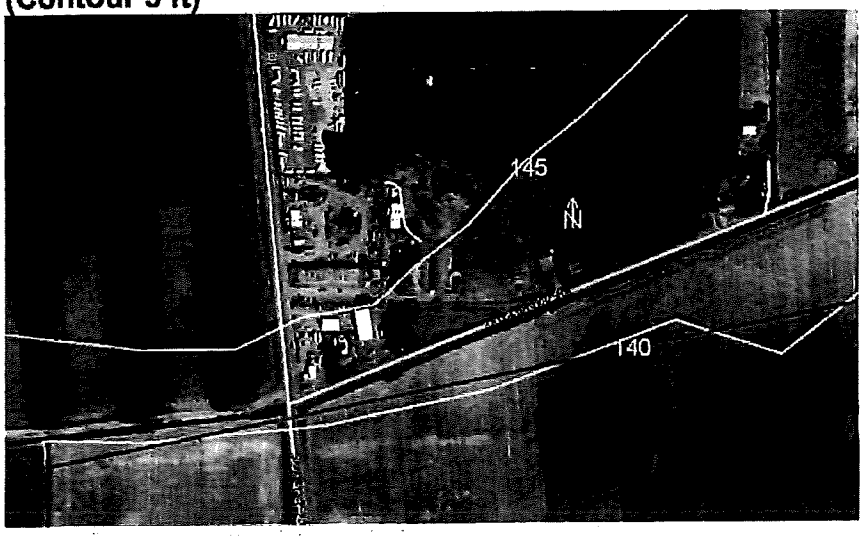


Figure 4. Assessor's map the parcel under consideration lot 01100 (source ORMAP).

Figure 5: Revised Soil Map of the Project Site and Location of Soil Borings outlined in blue. (Approximate Scale 1:2200)

Revised Soil Map Legend

A **Extremely Gravelly Fill on Buried Silty, Alluvial Soil.**

B **Pavement**

C **Gravel and Rock Fill**

D **Display Garden (not sampled)**

Soil Profile Boring Log and Site Observation Notes
High Intensity soil mapping of soils.

1 Gravelly Fill and compacted soils on truncated Wapato soils
Class 4

Horizon	Depth	Color	Texture	Redox
Fill	0 -8	black and gray	xgrc and cl	
A	8-12	2.5Y2/1	extremely compacted SICL	
C	12-36	10YR6/1	sicl	7,5YR5/6

(C-horizon is very compacted to 24 inches.)

2 Gravel fill on compacted poorly drained soil Class 4

Horizon	Depth	Color	Texture	Redox
Fill 1	0-11	black	xgr c, extremely compact.	
Fill 2	11-24	2.5Y3/, N 2/	c extremely compact.	
C1	24-42	2.5Y6/1, 6/2	sic	7.5YR5/6
C2	42-60	N4/	sicl	

3 Fill extremely cobbly clay, 36 inches of compacted fills. Class 4

Horizon	Depth	Color	Texture	Redox
Fill 1	0-12	2.5Y2/1 and7.4YR4/4	xcb c	
Fill 2	12-16	mixed	vgrsic	
Fill 3	16-36	N 4/	c	

4 Pavement, part of yard that is paved. Class 8.

5 Coarse gravelly sand fill over stone fill. Class 6

Horizon	Depth	Color	Texture	Redox
Fill 1	0-32		sand and gravel fill	
Fill 2	32+		large stone	

Note pit filled with water, suspect a buried impervious compacted clay layer like the one observed in boring 3 is under the stone and gravel.

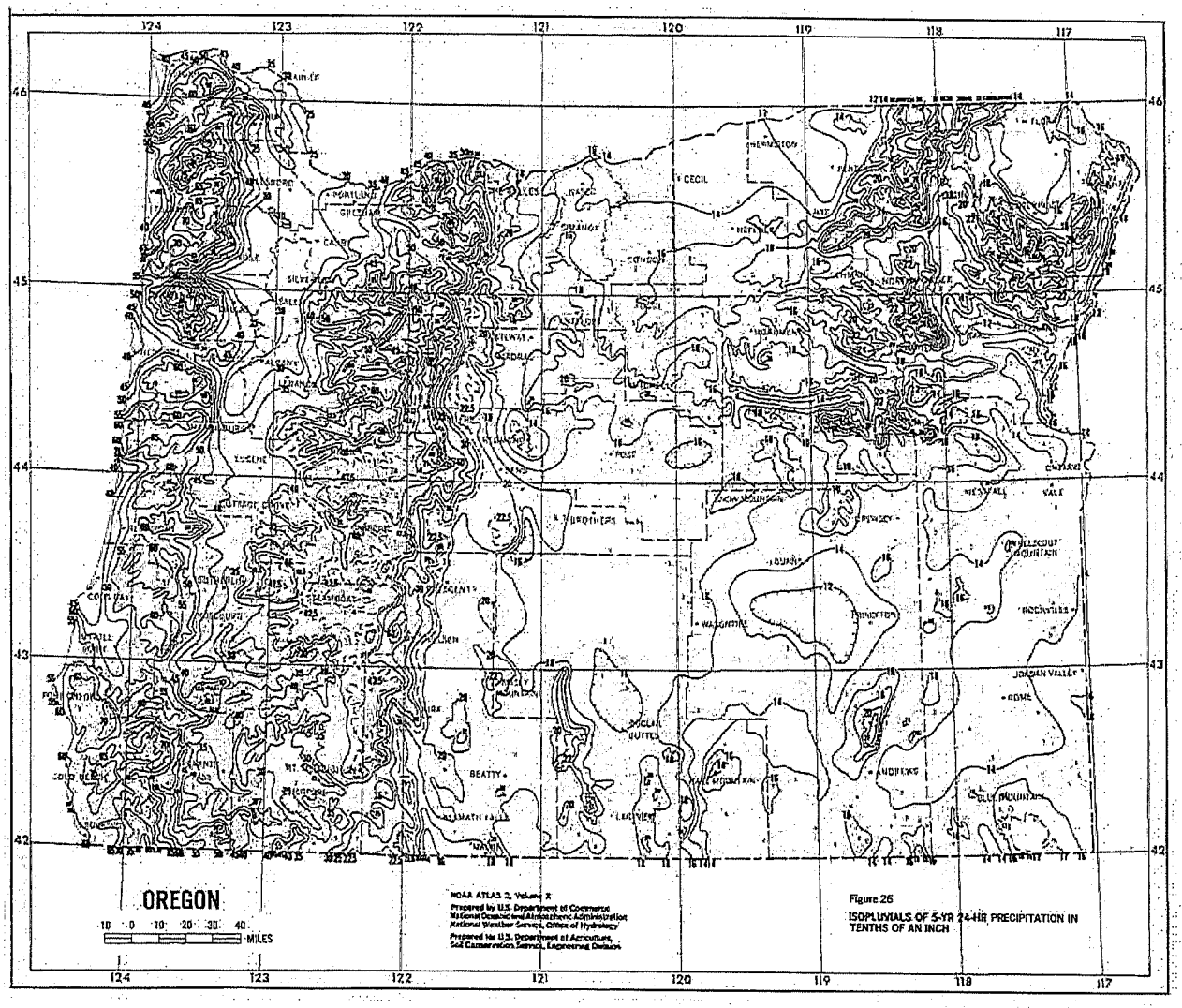
6 Coarse gravelly sand fill over stone fill Class 6

Horizon	Depth	Color	Texture	Redox
Fill 1	0-30		sand and gravel fill	
Fill 2	30+		large stone (very difficult digging with backhoe)	

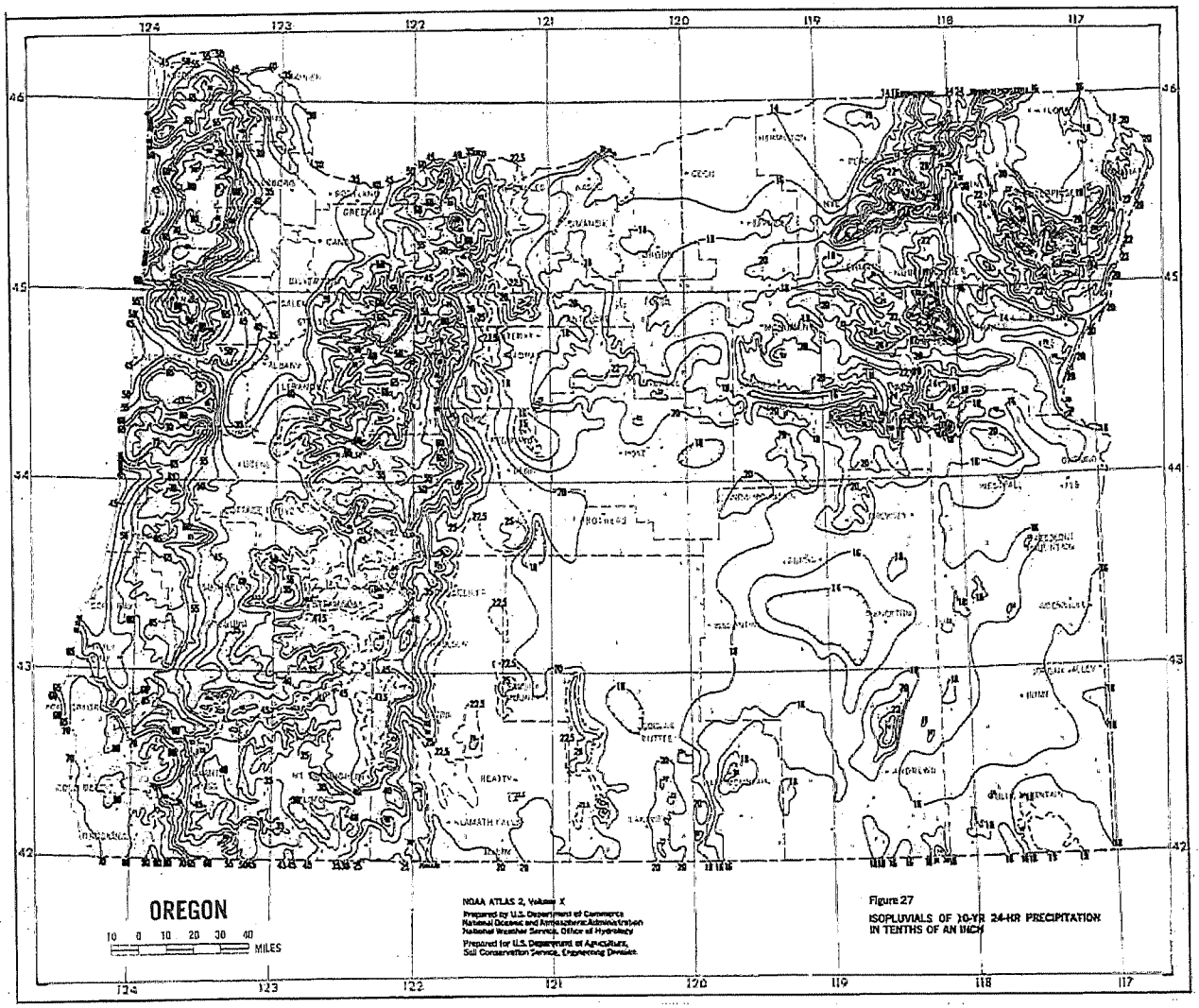
End of Boring Log

Andy Gallagher ARCPACS CPSSc/SC 03114

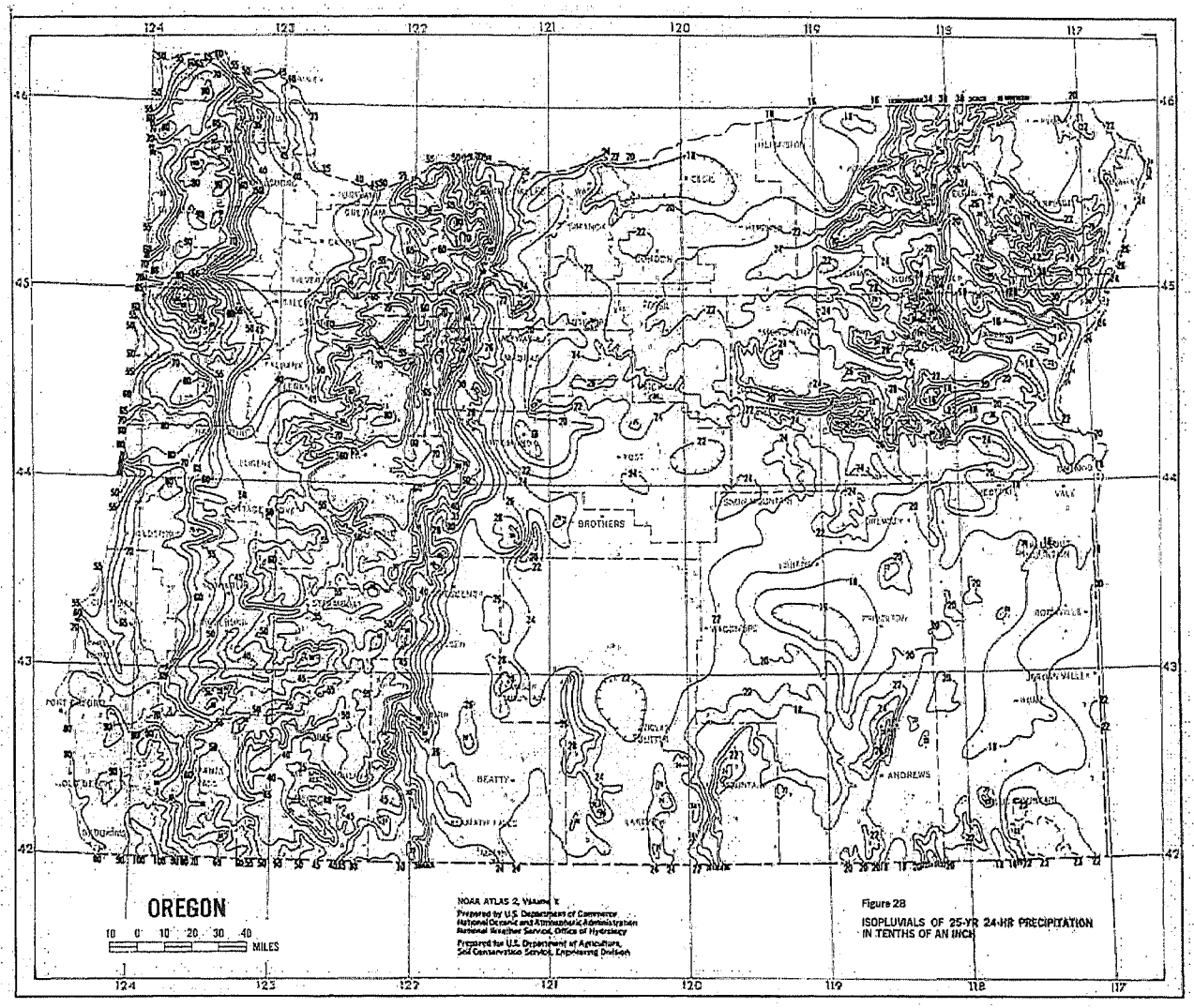
Andy Gallagher
I am the author of this document
06/04/15 06:02:03


OREGON
10 0 10 20 30 40
MILES
NOAA ATLAS 2, Volume X
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture
Soil Conservation Service, Engineering Division
Figure 26
ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

SALEM = 3 IN/HR



SALEM = 3.5 IN/HR


OREGON
10 0 10 20 30 40
MILES
NOAA ATLAS 2, Volume X
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture
Soil Conservation Service, Engineering Division
Figure 28
ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH
BROTHERS
BEATTY
ANDREWS

SALEM = 4 IN/HR

TABLE 5-8 RUNOFF CURVE NUMBERS

Cover Description		CN For Hydrologic Soil Group			
		A	B	C	D
Urban Areas	Source: NRCS TR55 Table 2-2a (1986)				
	% Impervious				
Open space					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover >75%)		39	61	74	80
Impervious Areas					
Paved parking lots, roofs, driveways (excluding right-of-way)		98	98	98	98
Streets and roads					
Paved: curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Urban districts					
Commercial and Business	85	89	92	94	92
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acres or less (town houses)	65	77	85	90	92
¼ acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
½ acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Agricultural Lands	Source: NRCS TR55 Table 2-2c (1986)				
	Hydrologic Condition				
Pasture, grassland, or range- continuous forage for grazing					
<50% ground cover or heavily grazed with no mulch	Poor	68	79	86	89
<50 to 75% ground cover and not heavily grazed	Fair	49	69	79	84
>75% ground cover and lightly or only occasionally grazed	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay	-	30	58	71	78
Brush – weed-grass mixture with brush as the major element					
<50% ground cover	Poor	48	67	77	83
<50 to 75% ground cover	Fair	35	56	70	77
>75% ground cover	Good	30	48	65	73
Woods-grass combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods					
Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning	Poor	45	66	77	83
Woods are grazed but no burned, and some forest litter covers the soil	Fair	36	60	73	79
Woods are protected from grazing a, and litter and brush adequately cover the soil	Good	30	55	70	77
Impervious Surface Reduction Facilities	Source: Portland Stormwater Management Manual (2008)				
Type	Hydrologic condition				
Pervious Pavement		76	85	89	n/a
Trees					
New and/or existing evergreen	-	36	60	73	79
New and/or existing deciduous	-	36	60	73	79
Green roof	Good	n/a	61	n/a	n/a
Roof Garden	Good	n/a	48	n/a	n/a
Contained Planter box	Good	n/a	48	n/a	n/a
Infiltration and Flow-through Planter box	Good	n/a	48	n/a	n/a

n/a – not applicable

5. Time of Concentration "T_c"

Calculations for time of concentration should be divided into segments: sheet flow, shallow concentrated flow, and channel/pipe flow. The time of concentration is calculated as the sum of the travel times for each discrete segment of the longest flow path.

- Overland sheet flow is shallow flow over a plane surface. It occurs in the furthest upstream segment of the drainage path, which is located immediately downstream from the drainage divide. The length of the overland sheet flow segment is the shorter of (1) the distance between the drainage divide and the upper end of a defined channel, or (2) a distance of 300 feet. The sheet flow time of concentration can be calculated with overland flow kinematic wave equation, using roughness coefficients shown in Table 5-9.

TABLE 5-9 MANNING'S ROUGHNESS COEFFICIENT 'N' FOR SHEET FLOW

Surface Type	n
Impervious Areas	0.014
Gravel Pavement	0.02
Developed: Landscape Areas (Except Lawns)	0.08
Undeveloped: Meadow, Pasture, or Farm	0.15
Developed: Lawns	0.24
Developed: Vegetated swale: Mowed grass	0.20
Unmowed grass	0.24
Other dense vegetation	0.30
Undeveloped: Mixed	0.30
Undeveloped: Woodland and Forest	0.40

- For overland flow distances greater than 300 feet, sheet flow typically becomes shallow concentrated flow until it finds a defined channel. The average velocity is a function of watercourse slope and surface type and can be approximated using Figure 5-6. For slopes less than 0.005 feet per feet, the following equations can be used to determine the average flow velocity of the shallow concentrated flow.

For unpaved surfaces: $V = 16.1345 \times S^{0.5}$
For paved surfaces: $V = 20.3282 \times S^{0.5}$
Where: V = Velocity in feet per second
S = Slope in feet per foot

- Manning's equation for channelized flow shall be used to calculate velocities in channels and pipes. Manning's roughness coefficients for pipes and channels are shown in Table 5-10 and 5-11, respectively. Note that new PVC or HDPE pipe likely have a manufacturer's 'n' value of approximately 0.009. However, regardless of pipe material, sand, grit, and slime will build up on pipe walls. This results in true 'n' values over time of approximately 0.013. As a consequence, a Manning's roughness coefficient of 0.013 shall be used for design of PVC or HDPE piping systems. If an alternative piping material is approved, either the pipe manufacturer's recommended coefficient shall be used or an 'n' value of 0.013, whichever is greater.

5. Rainfall Intensity "I"

The peak rainfall intensity shall be derived from ODOT's rainfall intensity-duration-recurrence (IDR) curves for a given zone. Rainfall zones for Marion County are shown in Figure 5-2. The IDR curves for Zones 5, 7, and 8 are shown in Figures 5-3 through 5-5. The design storm duration is typically based on the longest time of concentration for the drainage area.

FIGURE 5-2 RAINFALL ZONE MAP FOR MARION COUNTY

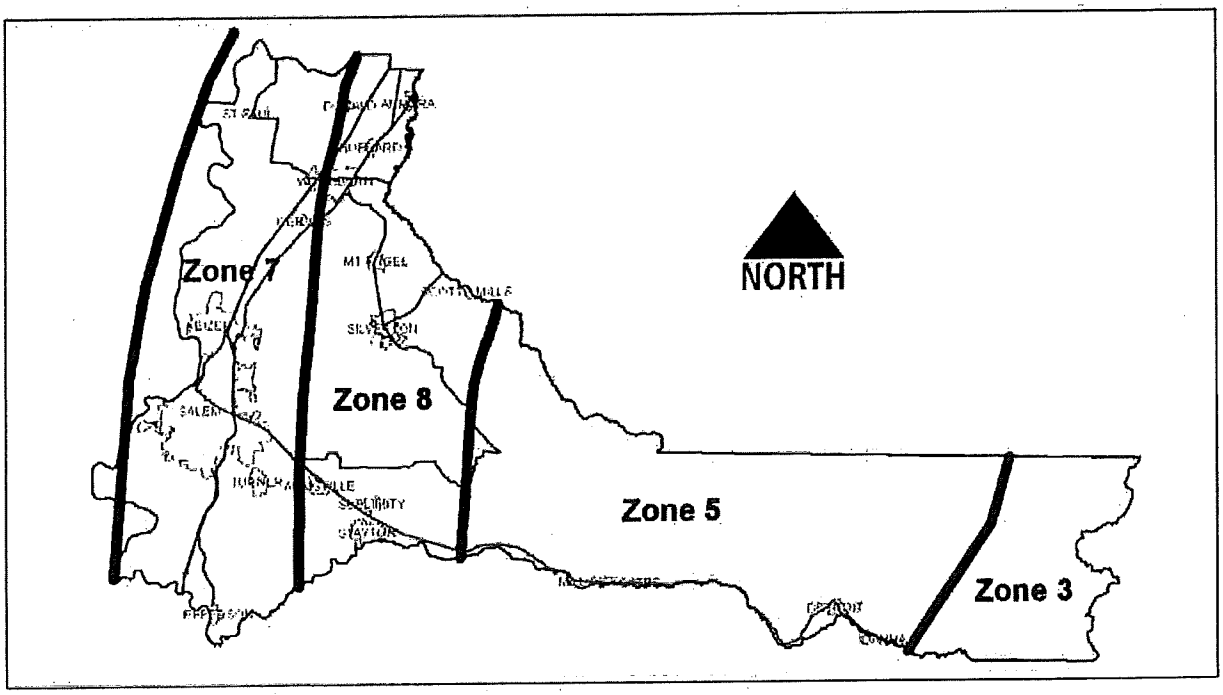


FIGURE 5-4 IDR CURVES FOR ZONE 7

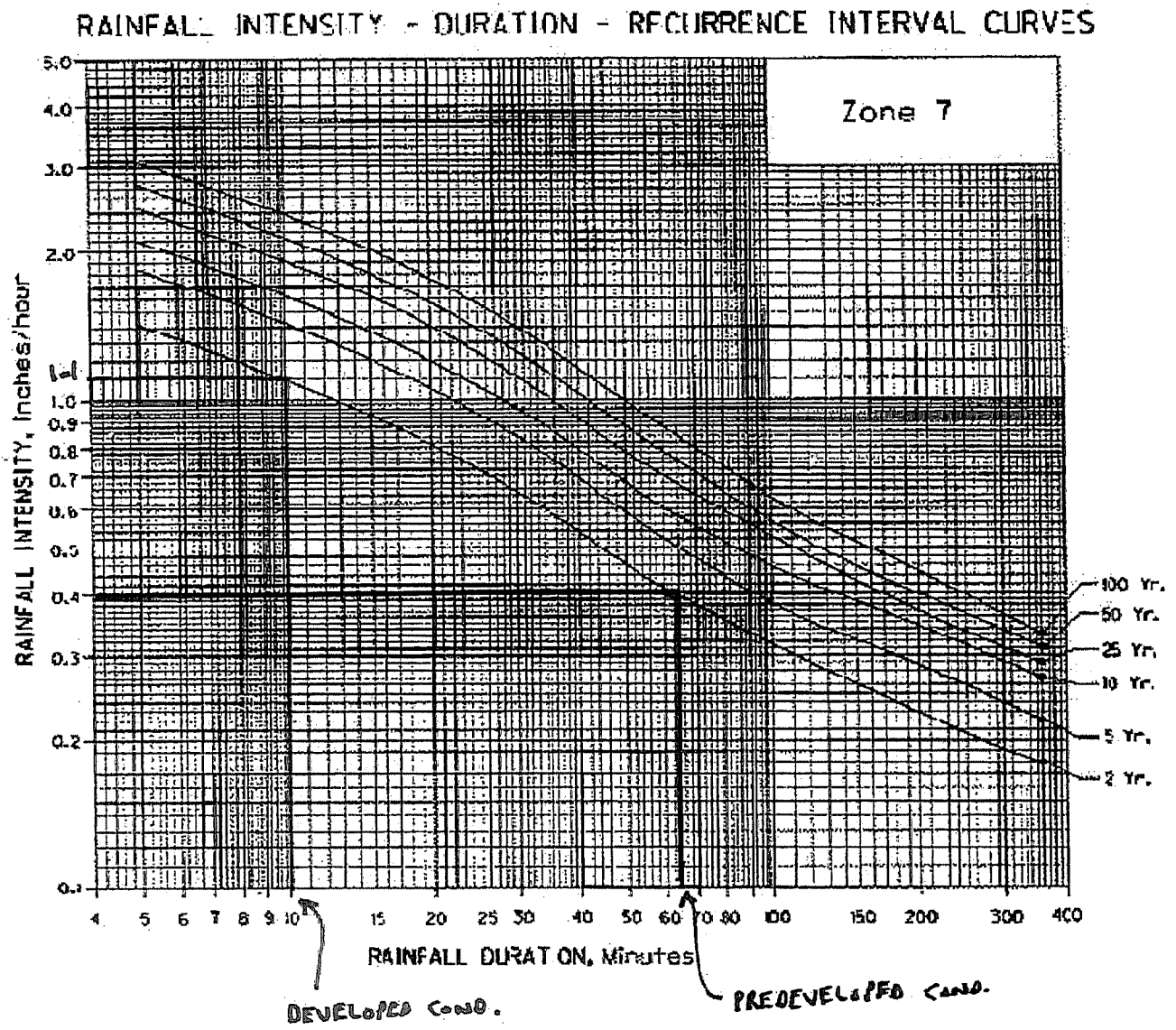
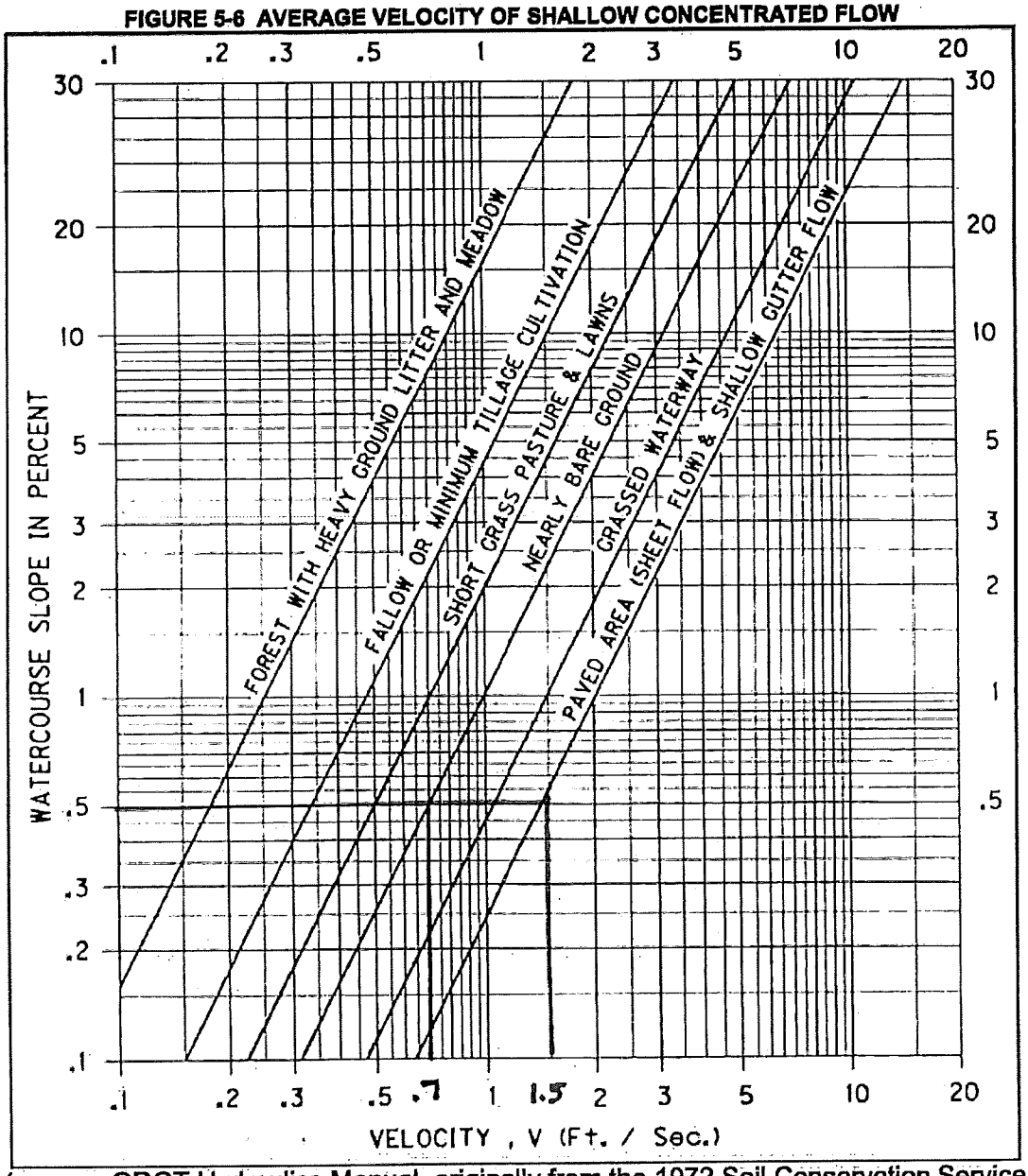


FIGURE 5-6 AVERAGE VELOCITY OF SHALLOW CONCENTRATED FLOW



(source: ODOT Hydraulics Manual, originally from the 1972 Soil Conservation Service Handbook)

Coastal Forest Products, LLC Stormwater Compliance
Time of Concentration Calculations
January 2016

Curve Numbers

77	Predevelopement - Good Condtions Pasture (Type C/D Soil)
77	Good Conditions Open Space (Type C/D Soil)
98	Impervious Area

Manning's "n" Values

0.30	Table 4D-4 (Pre-Developed: Mixed)
0.14	Table 4D-4 (Impervious Area)

Predeveloped Conditions Basin

Basin ID	Total Area (acre)	CN
1	6.2	77

Developed Conditions Basin

Basin ID	Impervious Area (acre)	CN	Pervious Area (acre)	CN	Overall Area (acre)
1	5.0	98	1.2	77	6.2

Predeveloped Conditions Time of Concentrations

	Sheet Flow					Shallow Concentrated Flow				Pipe Flow			
Basin ID	Length (ft)	Manings (n)	* Rainfall Intensity (in/hr)	Average Slope (%)	Travel Time (min)	Length (ft)	Average Slope (%)	Velocity from Figure 5-6 (ft/sec)	Travel Time (min)	Length (ft)	Average Slope (%)	Travel Time (min)	**Total Time of Concentration (min)**
1	300	0.15	0.4	0.50	64.55	420	0.50	0.7	10.00	N/A	N/A	N/A	**74.55**

* Use Figure 5-4 to Calcuate I

Developed Conditions Time of Concentrations

	Sheet Flow					Shallow Concentrated Flow				Pipe Flow			
Basin ID	Length (ft)	Manings (n)	* Rainfall Intensity (in/hr)	Average Slope (%)	Travel Time (min)	Length (ft)	Average Slope (%)	Velocity from Figure 5-6 (ft/sec)	Travel Time (min)	Length (ft)	Average Slope (%)	Travel Time (min)	**Total Time of Concentration (min)**
1	300	0.014	1.1	0.50	10.38	320	0.50	1.5	3.56	N/A	N/A	N/A	**13.94**

* Use Figure 5-4 to Calcuate I

Appendix 3 – Stormwater Management Calculations

will be allowed in the public right-of-way or special setback area unless they are outside the footprint of the ultimate design section of the road.

B. WATER QUALITY DESIGN FLOWS AND VOLUMES

The Water Quality Flow (WQF) for water treatment facilities shall be determined in accordance with the hydrologic calculation methods contained in *Section 3* of these Standards, using the following design storm depths or intensities:

- When permitted in *Section 3A* to use the Rational Method, the water quality design storm intensity shall be 0.17 inches per hour
- When required in *Section 3A* to use a hydrograph method, the water quality design storm event shall be 0.83 inches per 24-hour period using the NRCS Type 1A 24-hour rainfall distribution.

When the Water Quality Volume (WQV) is required for stormwater quality treatment facility design, it shall be based on the volume of runoff from the water quality design storm event of 1.38 inches per 24-hour period[1] using an analytical method acceptable to the Director.

C. TREATMENT FACILITY DESIGN STANDARDS

Required water quality treatment facilities shall conform to the following standards.

1. Biofiltration Swales

Biofiltration swales are long, narrow grassy or vegetated channels engineered to convey and treat stormwater runoff, allowing pollutants to settle and filter out as the water flows through the facility. In addition to providing pollution reduction, they can also manage flow rates and volumes. They may be seeded or planted with grasses (grassy swale) or herbaceous plants (vegetated swale).

Hydraulic Criteria

- Design flow: WQF
- Minimum hydraulic residence time: 9 minutes
- Maximum water quality design depth: grass: 4 inches for grass; other vegetation: ¾ vegetation height when established, up to a maximum 8 inches
- Minimum longitudinal slope: 0.5%
- Minimum freeboard: 0.5 feet (for facilities not protected from high flows)
- Manning's 'n' (for sheet flow) value: reference Table 5-9 for "vegetated swale"
- Maximum velocity: 1.0 feet per second at WQF

Other Structural Criteria

- Provide an energy dissipater at the entrance to swale, with a minimum length of 4 feet. It will be designed to reduce velocities and spread the flow across the swale cross section.
- Install intermediate flow spreaders at a minimum of 50 foot intervals.
- Minimum length: 100 feet
- Minimum bottom width: 2 feet
- Side slope: 3H:1V or flatter
- Provide an approved outlet structure for all flows

[1] The 24-hour rainfall depth for the WQF and WQV are different because they are based on different assumptions for water quality design storms.

Hydrograph Report

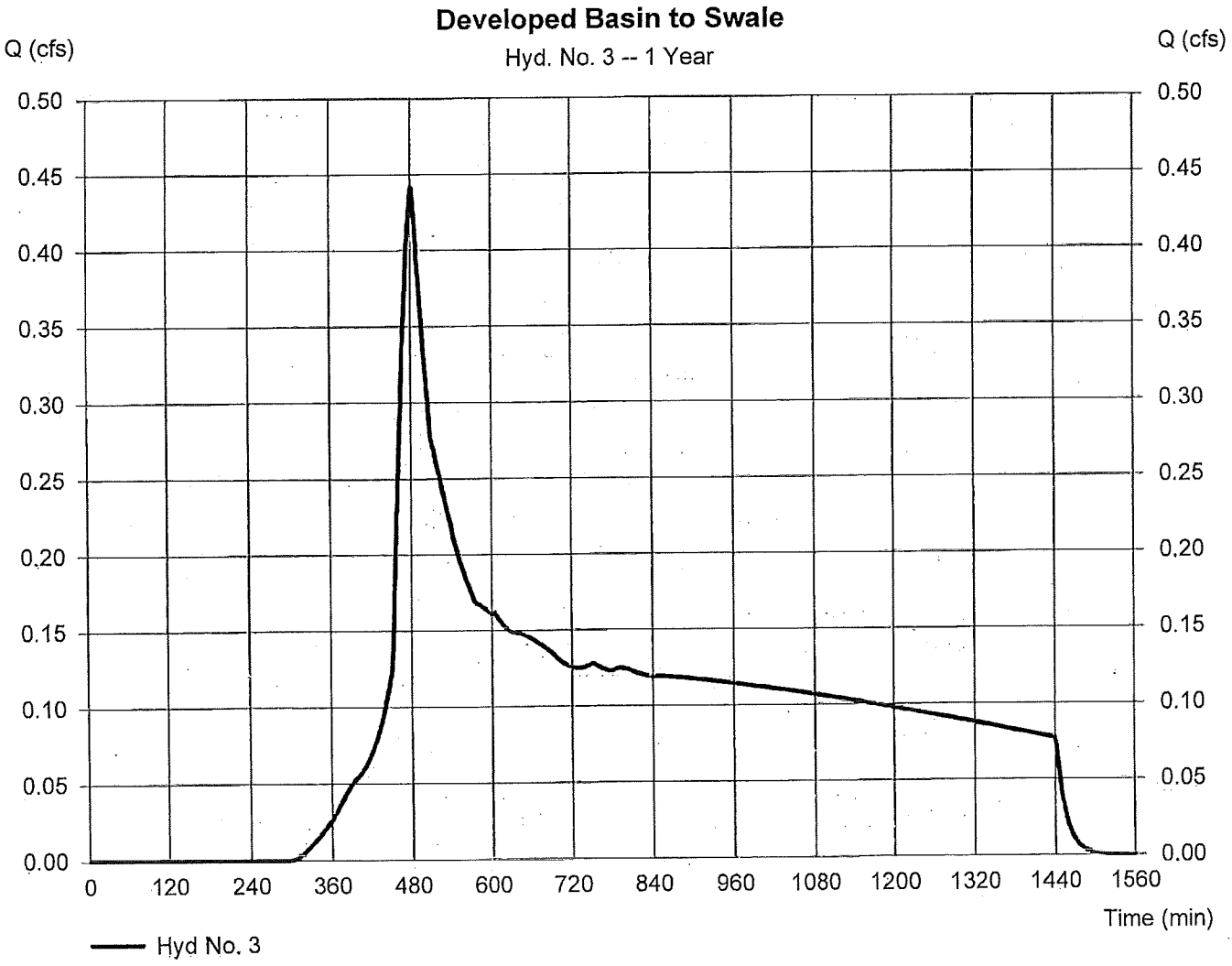
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 3

Developed Basin to Swale

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.442 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 8,281 cuft
Drainage area	= 6.200 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 0.83 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(5.000 x 98) + (1.200 x 77)] / 6.200



COASTAL FOREST PRODUCTS, LLC

Biofiltration Swale WQ Calculations

Man-Made Channels

CIVIL TOOLS PRO
English Units
01-06-2016 13:04:46

Results

Flow Depth	=	0.41 ft ←
Flowrate	=	0.44 cfs ←
Bottom Width	=	5.00 ft
Side Slope (H:V)	=	3.0000 H:V
Channel Slope (V:H)	=	0.0050 V:H
Manning's N	=	0.300
Wetted Area	=	2.57 sq ft
Wetted Perimeter	=	7.61 ft
Velocity	=	0.17 fps ←
Froude No.	=	0.05
Flow Regime	=	Sub-Critical

LENGTH = 100 LF

$$\text{RESIDENCE TIME} = \left(\frac{1\ \text{sec}}{0.17\ \text{ft}}\right)\left(100\ \text{LF}\right)\left(\frac{1\ \text{min}}{60\ \text{sec}}\right) = \underline{\underline{9.8\ \text{min}}}$$

COASTAL FOREST PRODUCTS, LLC

Biofiltration Swale Conveyance Calculations

Man-Made Channels

CIVIL TOOLS PRO
English Units
01-06-2016 13:14:18

Results

Flow Depth	=	1.48 ft
Flowrate	=	4.80 cfs
Bottom Width	=	5.00 ft
Side Slope (H:V)	=	3.0000 H:V
Channel Slope (V:H)	=	0.0050 V:H
Manning's N	=	0.300
Wetted Area	=	13.96 sq ft
Wetted Perimeter	=	14.35 ft
Velocity	=	0.34 fps
Froude No.	=	0.06
Flow Regime	=	Sub-Critical

Soil Conservation Service (SCS) method or other approved methods shall be used where appropriate.

For developed residential and commercial/industrial property, the maximum time of concentration from the most remote point in the development to the closest inlet shall be 10 minutes, unless calculations by an acceptable method show the time to be longer.

2. Detention Facilities

a. Where Required

Peak storm water runoff shall be controlled by detention facilities for all subdivisions, all commercial and industrial developments and all parking lots with a total developed acreage of 0.5 acres or more and all other developments where the county engineer determines control is needed to prevent flooding or damage downstream. This requirement may be waived if the applicant can show that it is not effective for the basin as a whole.

→ b. Allowable Runoff Rate (Outflow)

Peak runoff rate shall be limited to that which would occur in a 5-year frequency storm with predevelopment conditions (C=0.2). Pre-development is defined in Section II.

→ c. Required Storage Capacity

Detention facilities shall have storage capacities to detain the difference between a 5-year frequency storm with pre-development conditions and a 10-year frequency storm with development conditions.

d. Design

(1) The design shall be done in accordance with the Oregon Department of Transportation Publication 78-4, "Procedure Manual, Application of Detention Storage for Limiting Runoff", or other methods approved by the Director of Public Works.

(2) The orifice size and the hydraulic head shall be adjusted to produce the allowable outflow.

(3) To prevent excessive plugging, the minimum orifice diameter shall be 1-1/2 inches.

(4) Detention facilities shall be designed to protect public and private

property.

(a) Freeboard

At maximum storage, the water surface elevation shall be a minimum of 0.5 feet below the top of the structure (curb, bank, berm, etc.) designed to contain the water.

(b) Overflow System

The detention facility shall have an overflow system with the capacity to pass a 50-year frequency storm. The overflow shall discharge into a public storm drain facility or the natural drainage course for the drainage basin where the development is located.

(5) Simplified design for sites between 0.5 acres and 5 acres.

For developments in this size range, the detention facility may be designed in accordance with Standard Drawing No. 30. This method is based on the following conditions:

(a) The sites are small enough so that there is an insignificant difference between the times of concentration for the different site sizes. For calculating the allowable runoff rate, a uniform time of concentration of 10 minutes is applicable and, as a result, the allowable runoff rate is 0.2 cfs per acre.

(b) The sites, when developed, will have surfaces that are almost entirely impermeable (buildings, pavement, etc.). For a site not conforming to this condition, the required storage capacity can be reduced by doing a detailed analysis instead of following the standard drawing.

3. Pipes

a. Concrete pipe shall be used, except for temporary or unusual conditions, with a minimum diameter of 10 inches and a minimum cover of 12 inches. Based on the cover and anticipated loading, the required type ASTM C-76 (reinforced) or ASTM C-14(non-reinforced) and class of pipe shall be specified. Within county right-of-ways, under all public roadway areas, the pipe shall have rubber gasket joints. When the pipe has less that 12 inches of cover, Ductle Iron, Class 52 shall be installed. High-density polyethylene pipe with a corrugated exterior and a smooth interior (Advanced Design Systems, Inc., N-12 or equivalent), ASTM F-405 and F-667 or AASHTO M-252 and M-294, may be used for driveway culverts, provided a minimum cover of 18 inches can be placed and still

Hydrograph Report

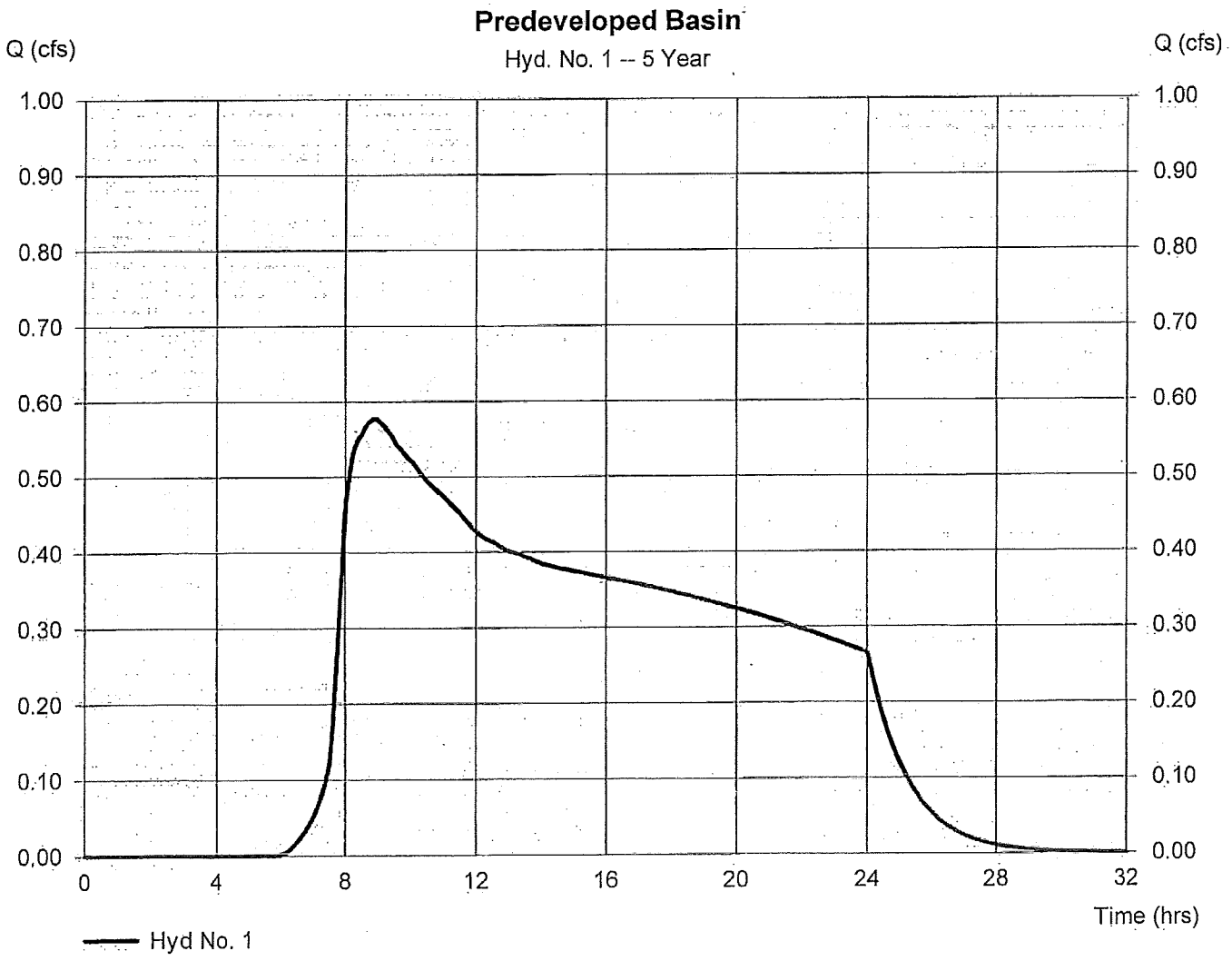
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 1

Predeveloped Basin

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.576 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.90 hrs
Time interval	= 2 min	Hyd. volume	= 24,105 cuft
Drainage area	= 6.200 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 75.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(6.200 x 77)] / 6.200



Hydrograph Report

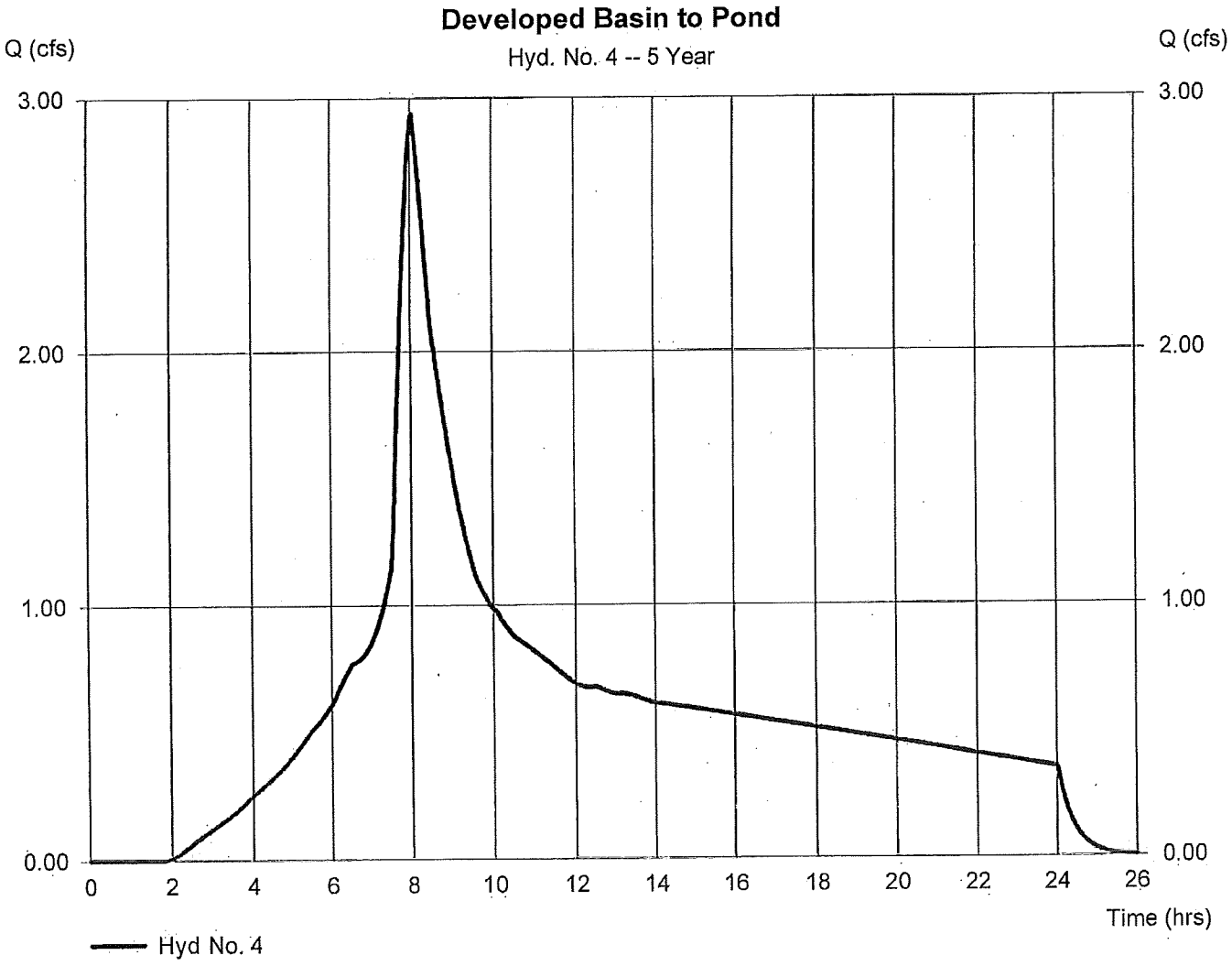
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 01 / 6 / 2016

Hyd. No. 4

Developed Basin to Pond

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.935 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.03 hrs
Time interval	= 2 min	Hyd. volume	= 52,891 cuft
Drainage area	= 6.200 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(5.000 x 98) + (1.200 x 77)] / 6.200



Hydrograph Report

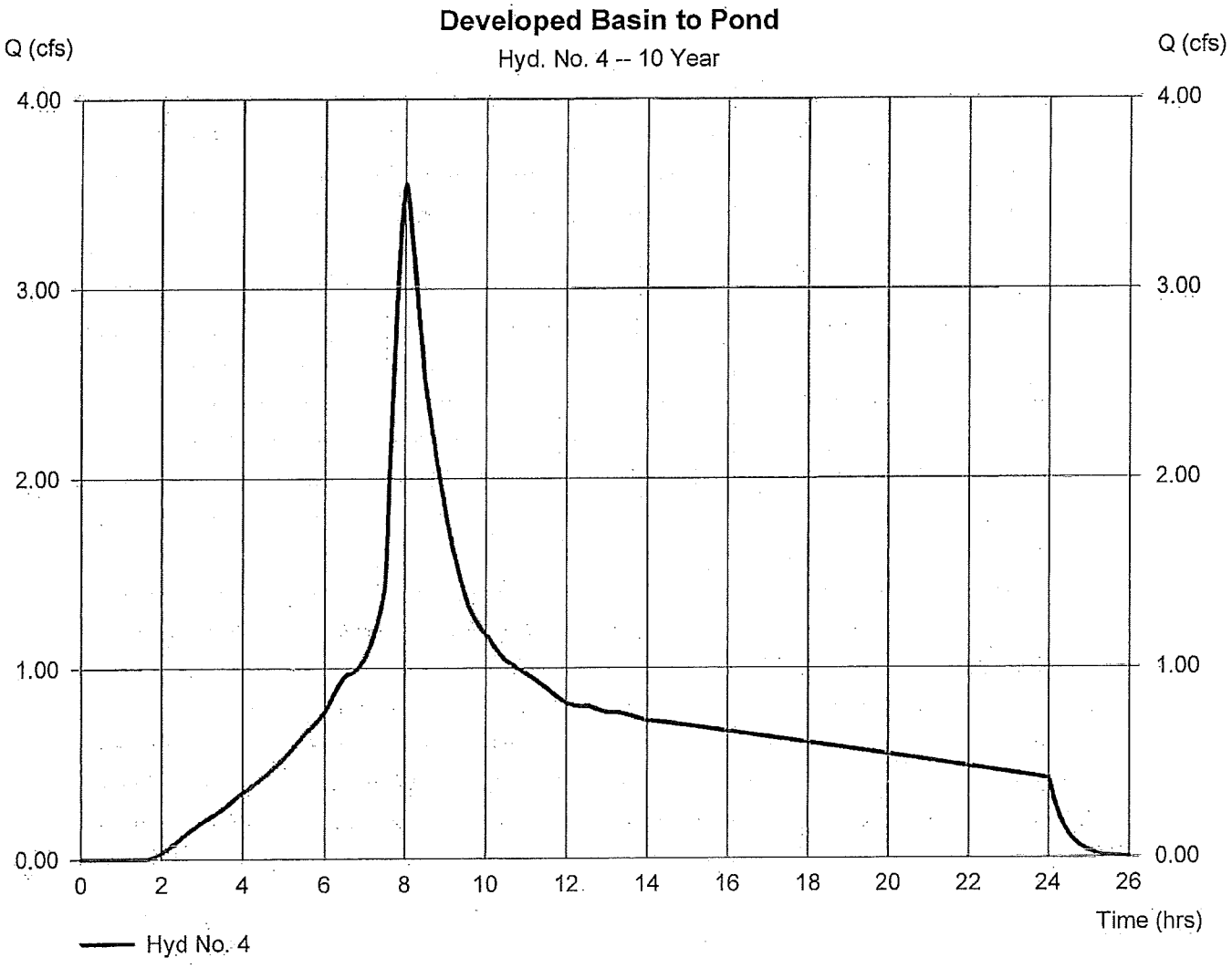
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 4

Developed Basin to Pond

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.549 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.03 hrs
Time interval	= 2 min	Hyd. volume	= 63,819 cuft
Drainage area	= 6.200 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.00 min
Total precip.	= 3.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(5.000 x 98) + (1.200 x 77)] / 6.200



Hydrograph Report

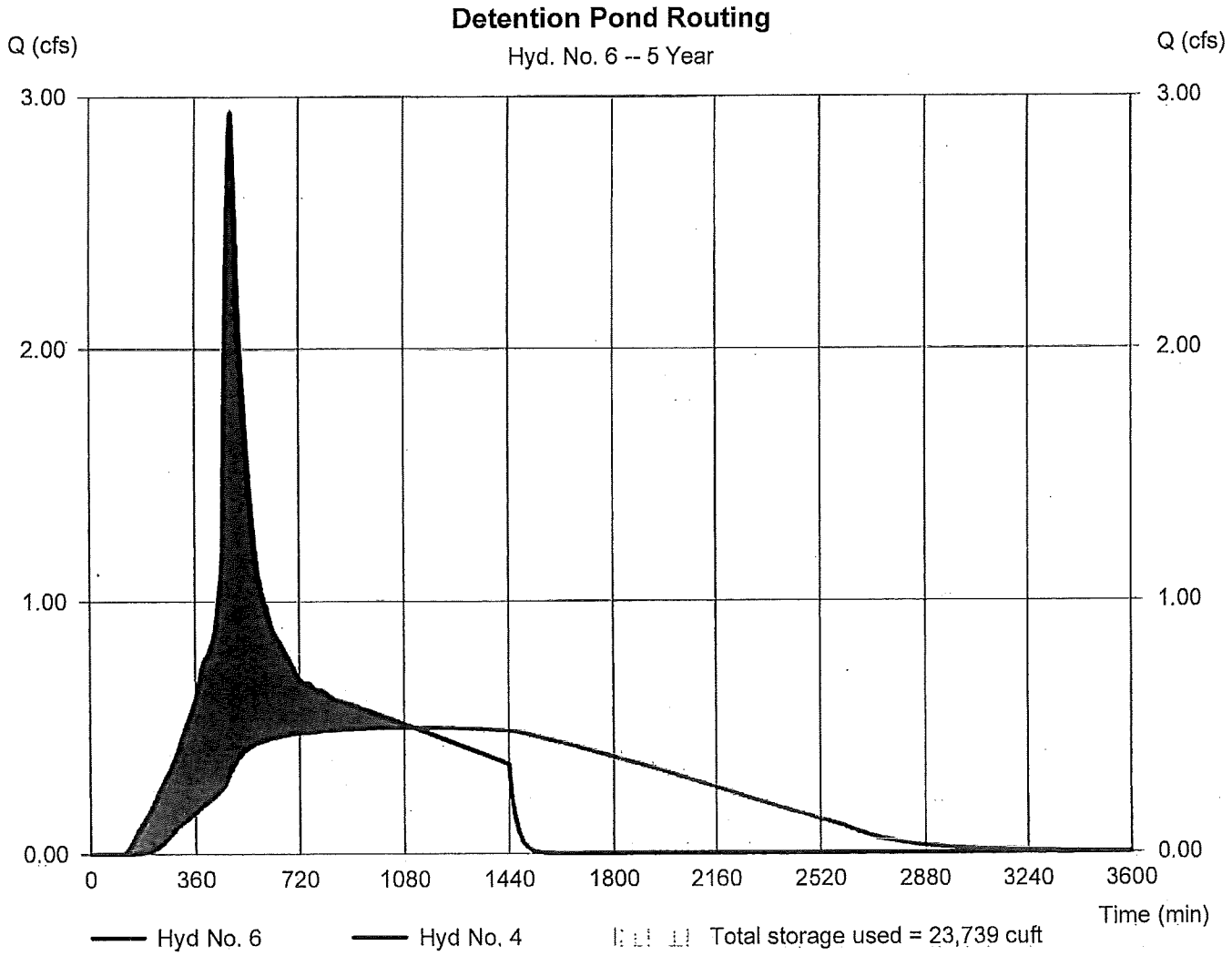
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 6

Detention Pond Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.498 cfs ←
Storm frequency	= 5 yrs	Time to peak	= 1112 min
Time interval	= 2 min	Hyd. volume	= 52,819 cuft
Inflow hyd. No.	= 4 - Developed Basin to Pond	Max. Elevation	= 4.04 ft ←
Reservoir name	= Detention Pond	Max. Storage	= 23,739 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Pond No. 1 - Detention Pond

Pond Data

Trapezoid -Bottom L x W = 79.0 x 79.0 ft, Side slope = 3.00:1, Bottom elev. = 1.00 ft, Depth = 4.60 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1.00	6,241	0	0
0.46	1.46	6,685	2,972	2,972
0.92	1.92	7,144	3,180	6,152
1.38	2.38	7,618	3,395	9,547
1.84	2.84	8,107	3,616	13,163
2.30	3.30	8,612	3,845	17,008
2.76	3.76	9,132	4,080	21,088
3.22	4.22	9,667	4,323	25,411
3.68	4.68	10,217	4,573	29,984
4.14	5.14	10,783	4,829	34,813
4.60	5.60	11,364	5,093	39,906

Culvert / Orifice Structures

ORIFICE

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.40	0.00	0.00
Span (in)	= 12.00	3.40	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1.00	1.00	0.00	0.00
Length (ft)	= 0.00	1.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

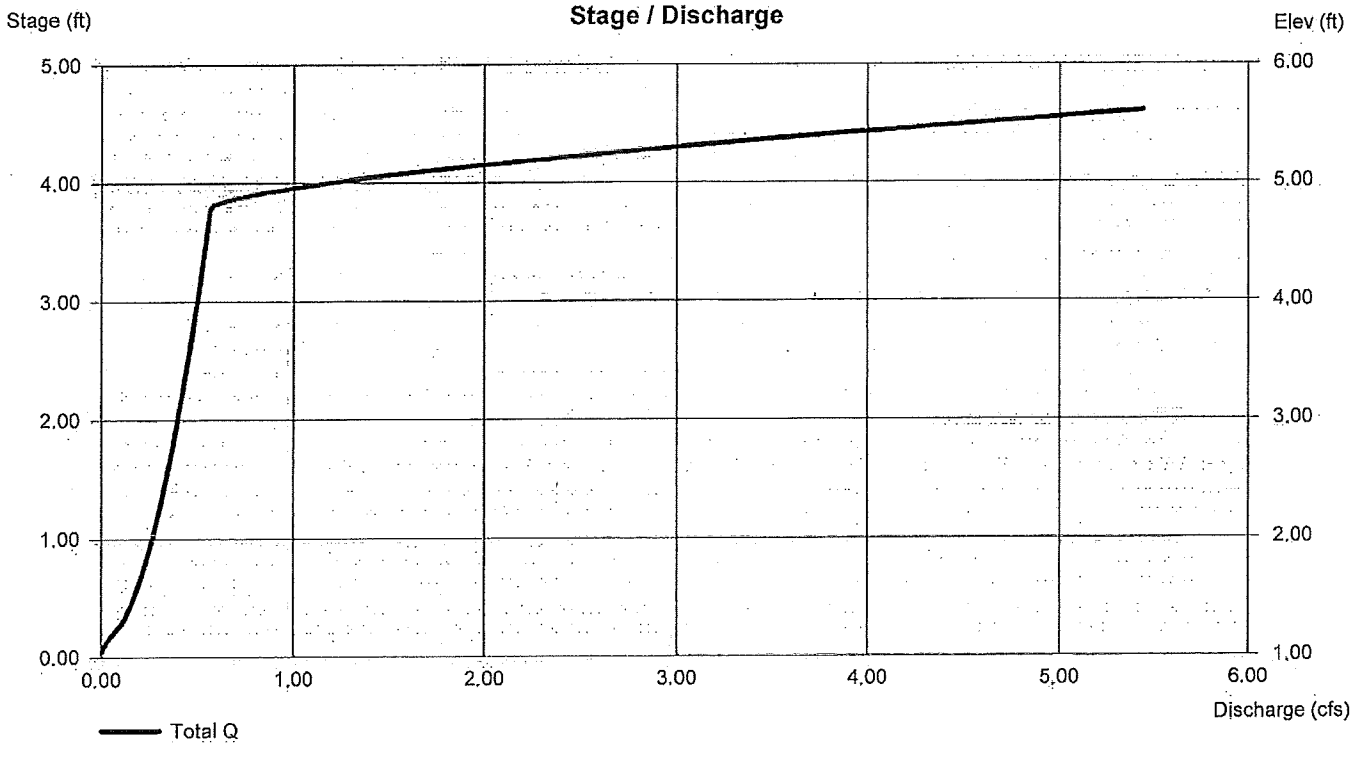
DITCH INLET OVERFLOW

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.69	0.00	0.00	0.00
Crest El. (ft)	= 4.80	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



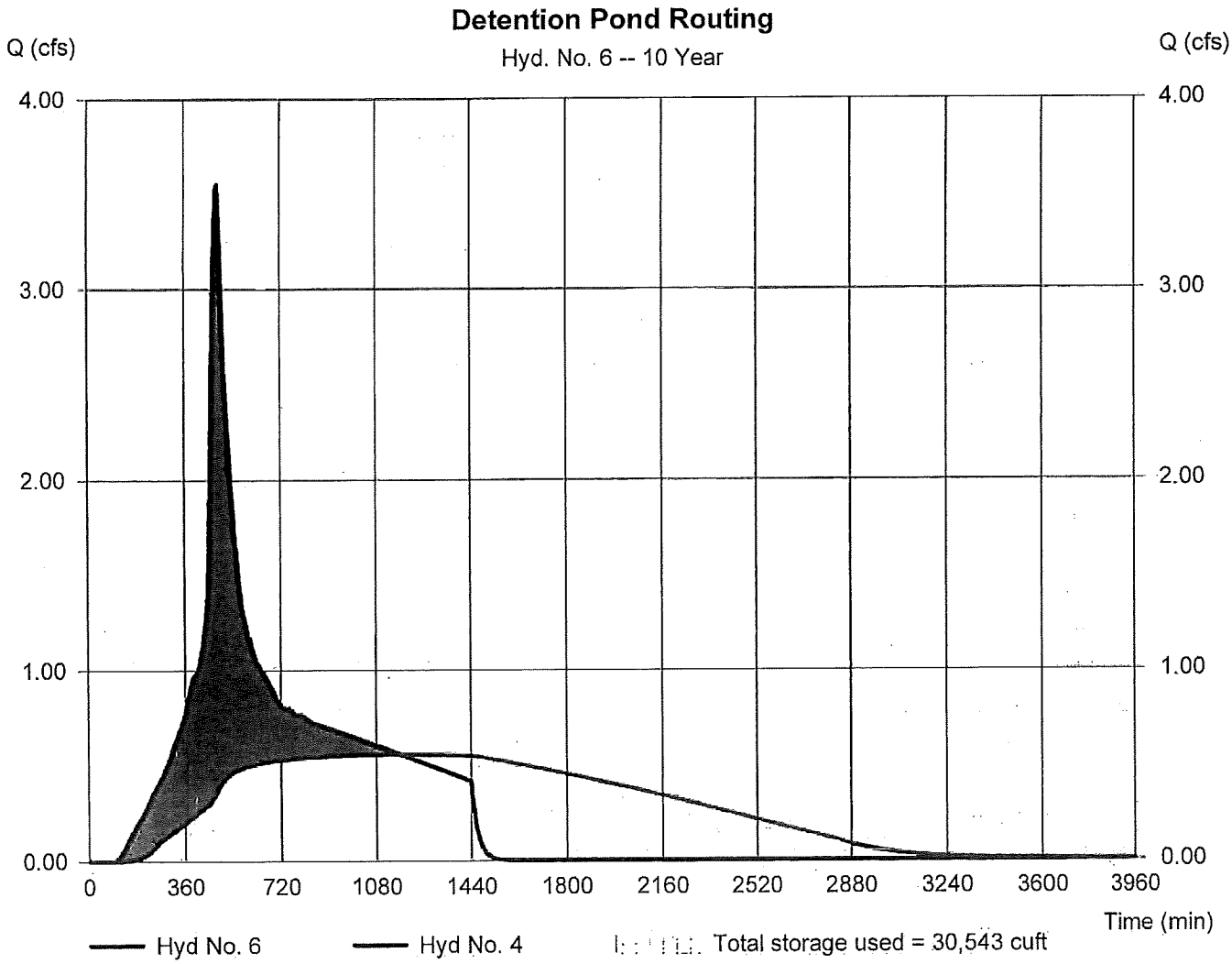
Hydrograph Report

Hyd. No. 6

Detention Pond Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.557 cfs
Storm frequency	= 10 yrs	Time to peak	= 1170 min
Time interval	= 2 min	Hyd. volume	= 63,747 cuft
Inflow hyd. No.	= 4 - Developed Basin to Pond	Max. Elevation	= 4.73 ft
Reservoir name	= Detention Pond	Max. Storage	= 30,543 cuft

Storage Indication method used.



3. Maximum Water Design Depth: 0.5 feet
4. Minimum Freeboard: 1.0 foot (for facilities not protected from high flows)
5. Manning "n" Value: 0.24
6. Maximum Velocity: 2.0 fps based on 25-year flow

b. Design Criteria

1. Provide an energy dissipater at the entrance to swale, with a minimum length of 4 feet. It will be designed to reduce velocities and spread the flow across the treatment cross section.
2. The use of intermediate flow spreaders may be required.
3. Minimum Length: 100 feet
4. Minimum Slope: 0.5%
5. Minimum Bottom Width: 2 feet
6. Maximum Treatment Depth (measured from top of gravel): 0.5 feet
7. Side Slope:
   A) In Treatment Area: 4H:1V or flatter
   B) Above Treatment Area: 2.5H:1V or flatter
8. The treatment area shall have 2"-¾" river run rock placed 2.5 to 3 inches deep on high density jute or coconut matting over 12 inches of topsoil or base stabilization method as approved by the District or City. Extend river rock, topsoil, and high density jute or coconut matting to top of treatment area (or WQV level). Extend topsoil and low density jute matting to the edge of water quality tract or easement area.
9. Provide an approved outlet structure for all flows.
10. Where swales wrap 180-degrees forming parallel channels, freeboard shall be provided between each of the parallel channels. A 1-foot (above ground surface) wall may be used above the treatment area to provide freeboard while enabling a narrower system. As an alternative, a soil-based berm may be used. The berm shall have a minimum top width of 1 foot and 2.5H:1V or flatter side slopes.
11. Where swales are designed with ditch inlets and outlet structures and design of maintenance access to such structures may be difficult due to swale location, swales may be designed as flow-through facilities with unsumped structures. Maintenance access to one end of the facility will still be required.

→ 4.06.3 Extended Dry Basin

a. Hydraulic Design Criteria:

1. Permanent Pool Depth: 0.4 feet
2. Permanent pool is to cover the entire bottom of the basin.

3. Minimum Water Quality Detention Volume: 1.0 x Water Quality Volume (WQV)
4. Water Quality Drawdown Time: 48 hours
5. Orifice Size:
USE: $D = 24 * [(Q/ (C[2gH]^{0.5}) / \pi]^{0.5}$
Where:
D (in) = diameter of orifice
Q(cfs) = WQV(cf) /(48*60*60) Q RELEASE MAX
C = 0.62
H(ft) = 2/3 x temporary detention height to centerline of orifice.
6. Maximum Depth of Water Quality Pool (not including Permanent Pool): 4-feet or as limited by issuing jurisdiction.

b. Design Criteria:

1. Minimum of 2 cells, with the first cell (forebay) at least 10% of surface area. The forebay shall also constitute 20-percent of the treatment volume. Where space limits multi-cell design, use one cell with a forebay at the inlet to settle sediments and distribute flow across the wet pond.
2. Inlet and outlet structures shall be designed to avoid direct flow between structures without receiving treatment (i.e. short circuiting of flow).
3. Minimum Bottom Width: 4 feet
4. Side Slopes in Basin Treatment Area: 3H:1V
5. Minimum Freeboard: 1-foot from 25-year design water surface elevation.
6. The treatment area shall have high density jute or coconut matting over 12 inches of topsoil or base stabilization method as approved by the District or City. If required by the District or City, 2"-¾" river run rock shall be placed 2.5 to 3 inches deep in areas where sustained flow is anticipated to occur. Extend river rock (if required), topsoil, and high density jute or coconut matting to top of treatment area (or WQV level). Extend topsoil and low density jute matting to the edge of water quality tract or easement area.
7. Provide an approved outlet structure for all flows.
8. The Engineer shall certify that the pond storm sewer design is in compliance with Chapter 5 of this Resolution and Order and that at normal design water surface that the upstream storm sewer will not be in a surcharged condition for longer than 24 hours

4.06.4 Constructed Water Quality Wetland

a. Hydraulic Design Criteria:

1. Permanent Pool Volume: 0.55 x Water Quality Volume (WQV)

Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Pond No. 2 - CWS Extended Dry Basin

Pond Data

Trapezoid -Bottom L x W = 79.0 x 79.0 ft, Side slope = 3.00:1, Bottom elev. = 1.00 ft, Depth = 4.60 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1.00	6,241	0	0
0.46	1.46	6,685	2,972	2,972
0.92	1.92	7,144	3,180	6,152
1.38	2.38	7,618	3,395	9,547
1.84	2.84	8,107	3,616	13,163
2.30	3.30	8,612	3,845	17,008
2.76	3.76	9,132	4,080	21,088
3.22	4.22	9,667	4,323	25,411
3.68	4.68	10,217	4,573	29,984
4.14	5.14	10,783	4,829	34,813
4.60	5.60	11,364	5,093	39,906

W/ ORIFICE FLOW CONTROL ORIFICE

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.80	3.30	0.00
Span (in)	= 12.00	1.80	3.30	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1.00	1.00	2.85	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

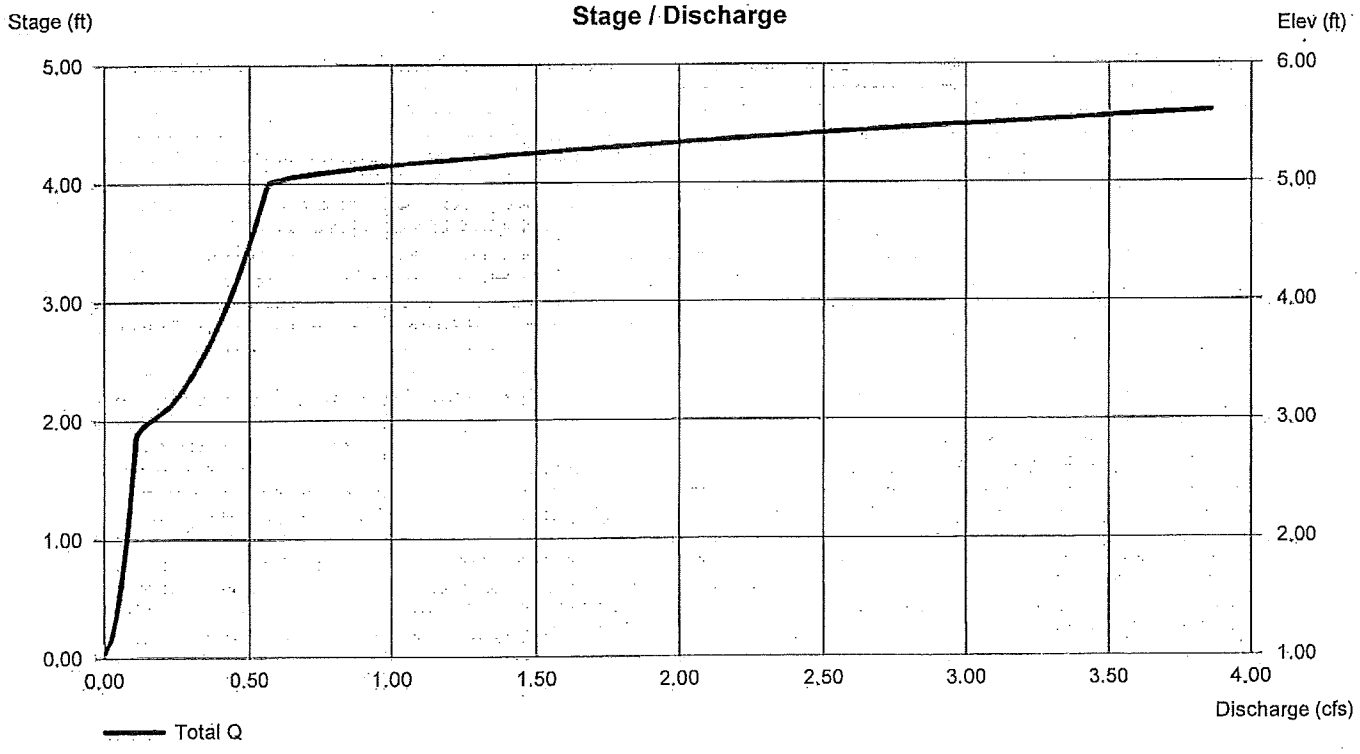
WITH INLET OVERFLOW

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.69	0.00	0.00	0.00
Crest El. (ft)	= 5.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

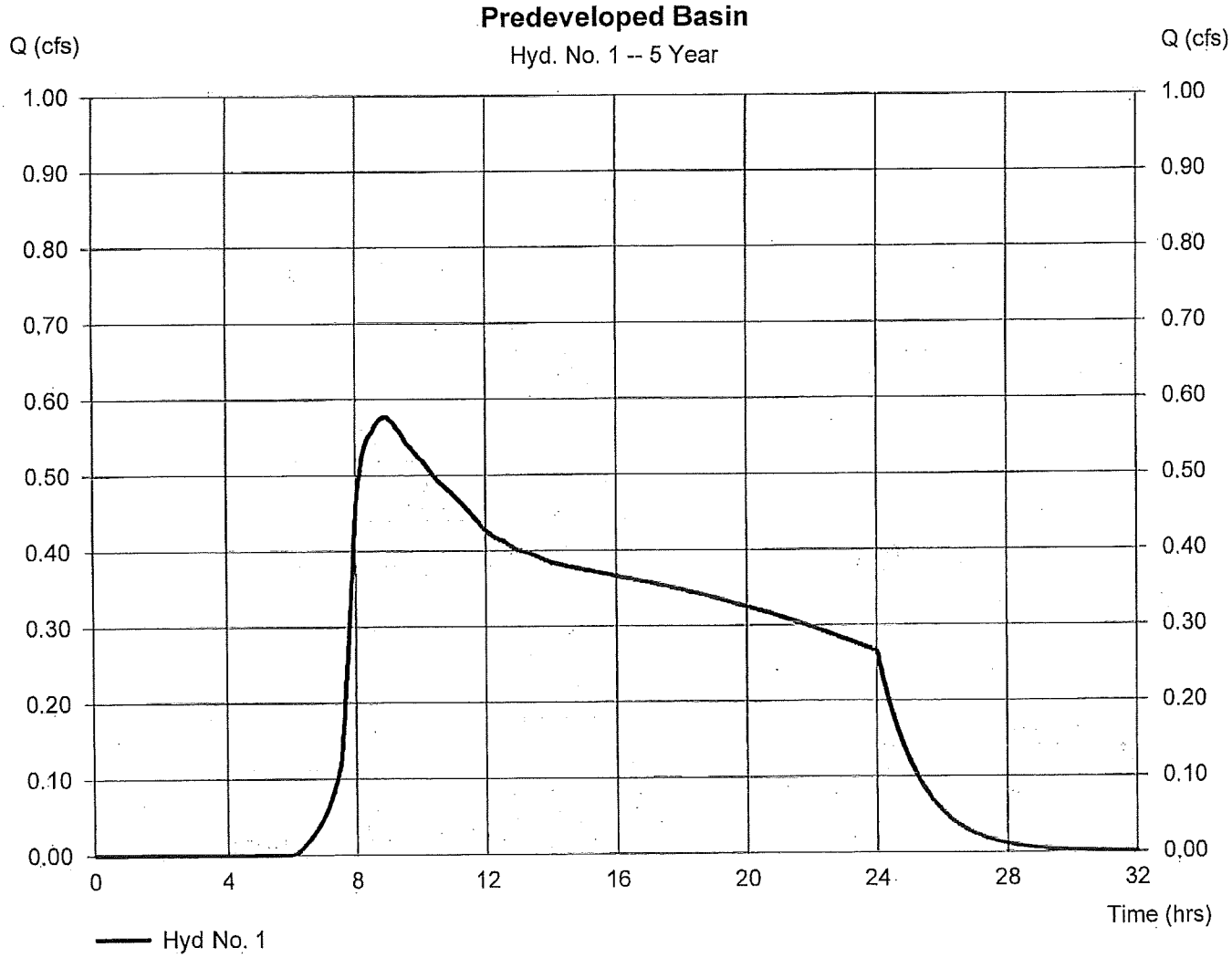
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 1

Predeveloped Basin

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.576 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.90 hrs
Time interval	= 2 min	Hyd. volume	= 24,105 cuft
Drainage area	= 6.200 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 75.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(6.200 x 77)] / 6.200



Hydrograph Report

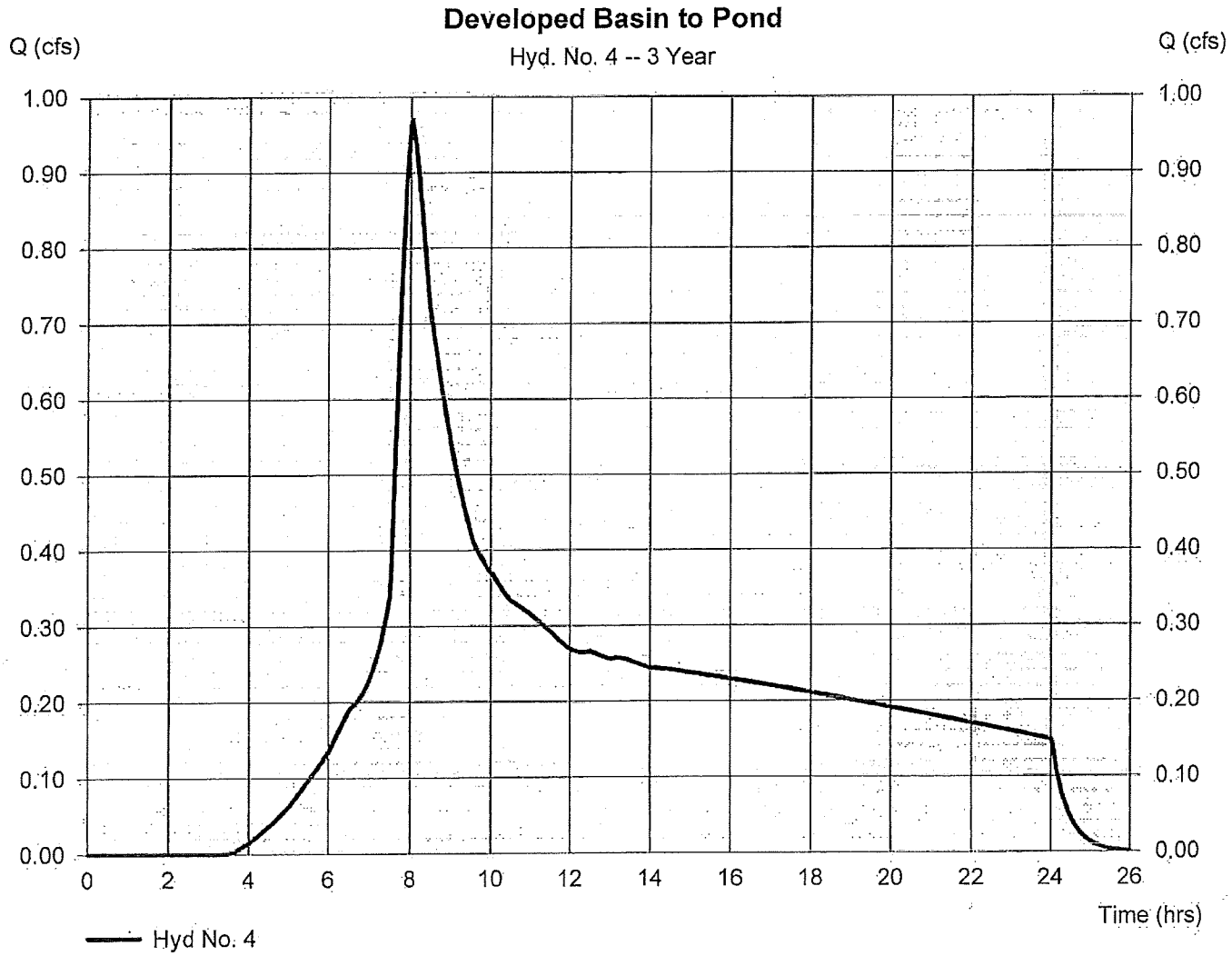
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 Wednesday, 01 / 6 / 2016

Hyd. No. 4

Developed Basin to Pond

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.969 cfs
Storm frequency	= 3 yrs	Time to peak	= 8.03 hrs
Time interval	= 2 min	Hyd. volume	= 18,670 cuft
Drainage area	= 6.200 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.00 min
Total precip.	= 1.38 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(5.000 x 98) + (1.200 x 77)] / 6.200



Hydrograph Report

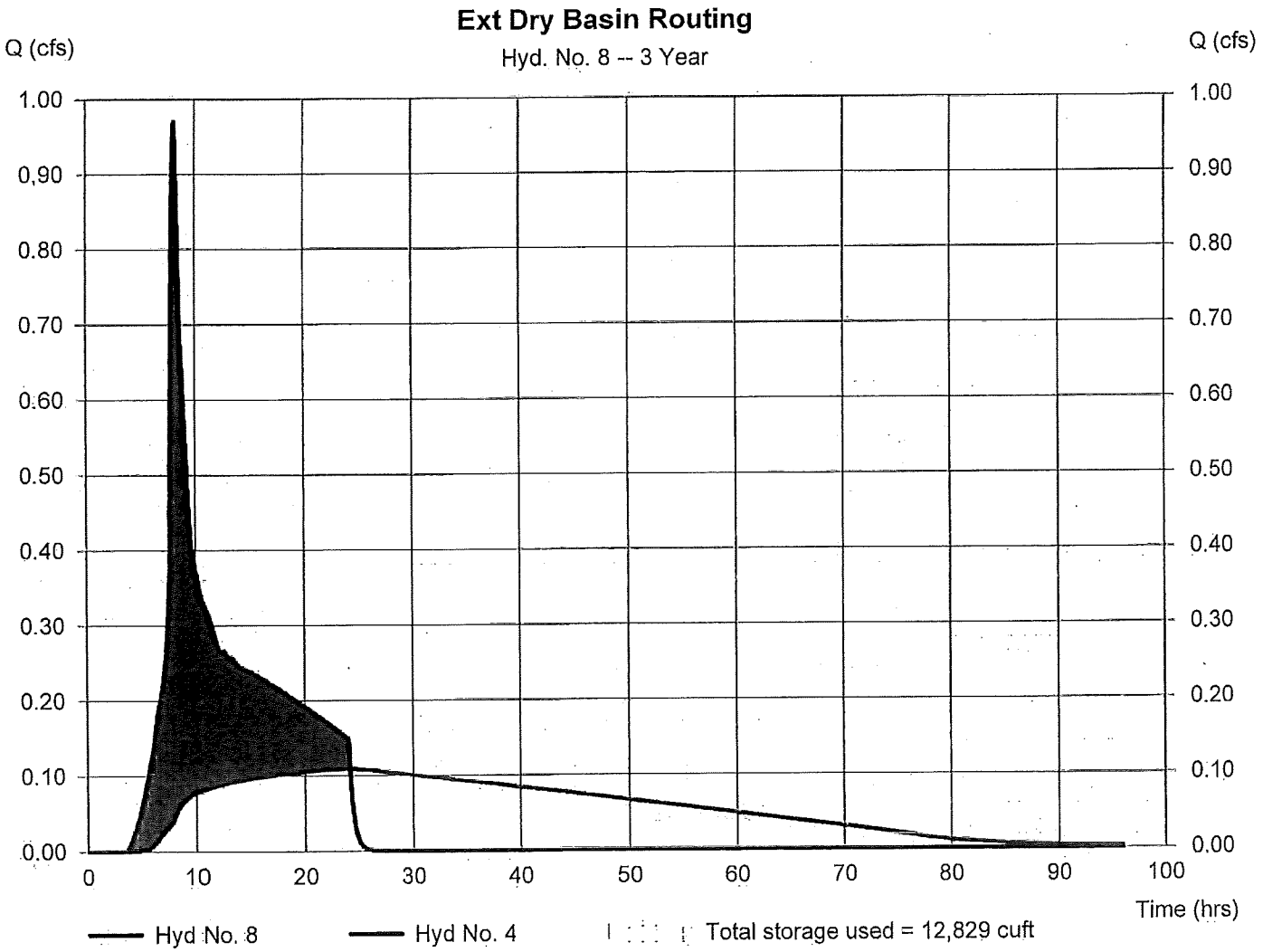
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 8

Ext Dry Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.109 cfs
Storm frequency	= 3 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 18,408 cuft
Inflow hyd. No.	= 4 - Developed Basin to Pond	Max. Elevation	= 2.80 ft
Reservoir name	= CWS Extended Dry Basin	Max. Storage	= 12,829 cuft

Storage Indication method used.



Hydrograph Report

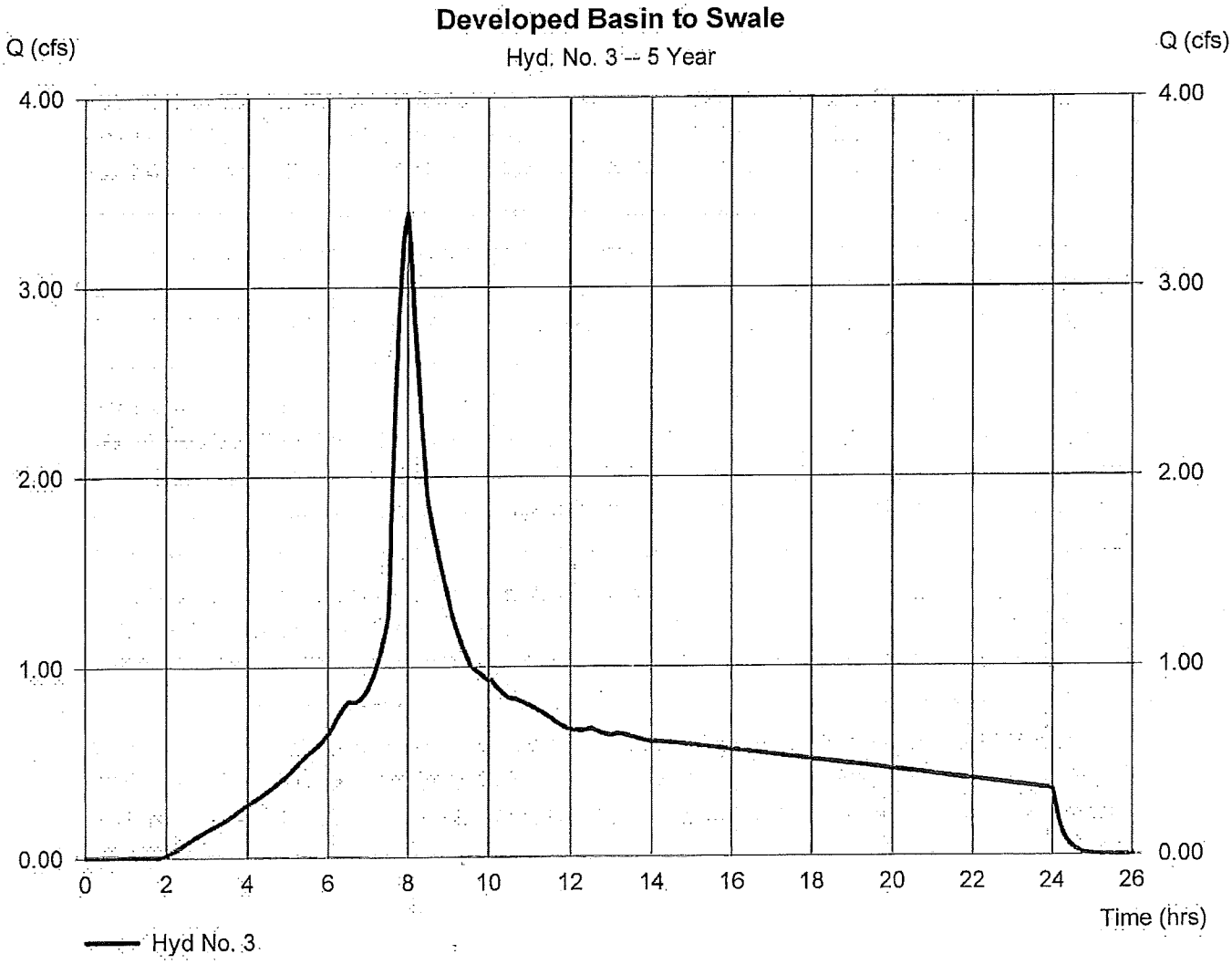
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 3

Developed Basin to Swale

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.393 cfs
Storm frequency	= 5 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 52,891 cuft
Drainage area	= 6.200 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(5.000 x 98) + (1.200 x 77)] / 6.200



Hydrograph Report

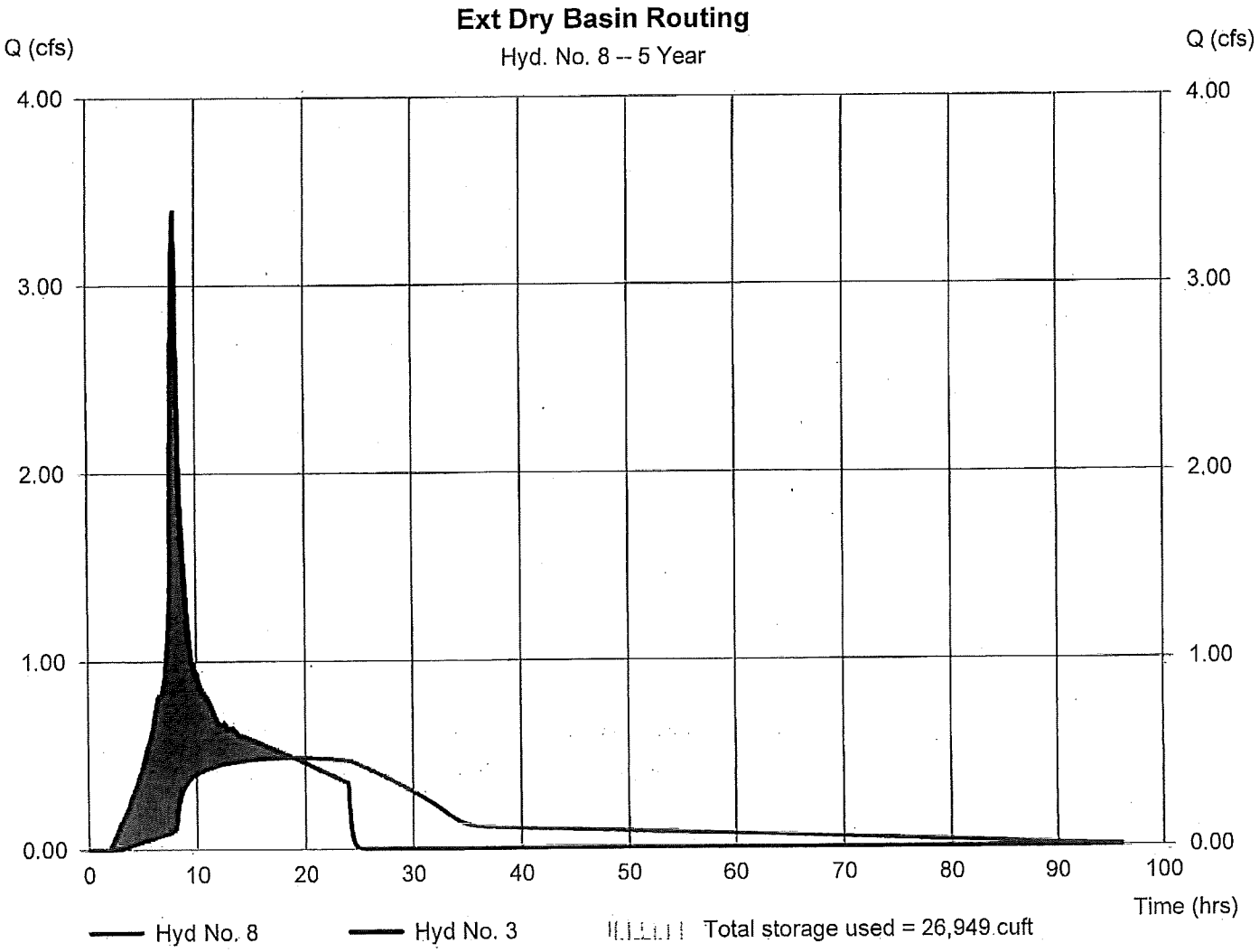
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4 — Wednesday, 01 / 6 / 2016

Hyd. No. 8

Ext Dry Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.485 cfs
Storm frequency	= 5 yrs	Time to peak	= 18.87 hrs
Time interval	= 2 min	Hyd. volume	= 52,407 cuft
Inflow hyd. No.	= 3 - Developed Basin to Swale	Max. Elevation	= 4.37 ft
Reservoir name	= CWS Extended Dry Basin	Max. Storage	= 26,949 cuft

Storage Indication method used.



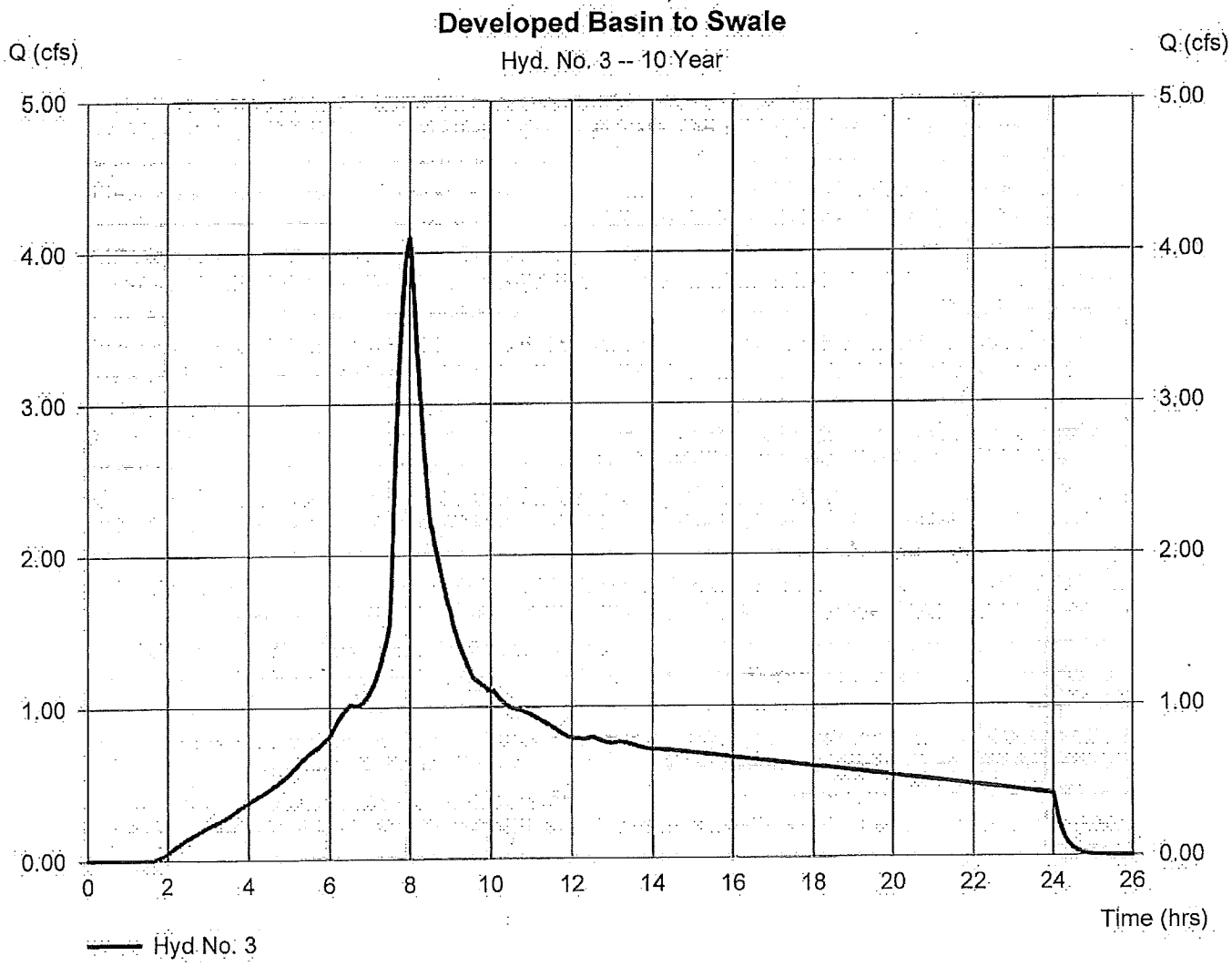
Hydrograph Report

Hyd. No. 3

Developed Basin to Swale

Hydrograph type	= SBUH Runoff	Peak discharge	= 4.097 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 63,819 cuft
Drainage area	= 6.200 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 3.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(5.000 x 98) + (1.200 x 77)] / 6.200



Hydrograph Report

Hyd. No. 8

Ext Dry Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.564 cfs
Storm frequency	= 10 yrs	Time to peak	= 19.13 hrs
Time interval	= 2 min	Hyd. volume	= 63,219 cuft
Inflow hyd. No.	= 3 - Developed Basin to Swale	Max. Elevation	= 4.97 ft
Reservoir name	= CWS Extended Dry Basin	Max. Storage	= 32,992 cuft

Storage Indication method used.