TYPE II APPLICATION (LAND USE) -- 2017

File #: DR2-17-007

TYPES – PLEASE CHECK ONE:

- [X] **Design review**
- [ ] **Tentative Plan for Partition**
- [ ] **Tentative Plan for Subdivision**
- [ ] **Type II Major Modification**
- [ ] **Variance** _____
- [ ] **Other: (Explain)** _____

APPLICANT INFORMATION:

APPLICANT: George Fox University
ADDRESS: 414 N. Meridian St., Newberg, Oregon 97132
EMAIL ADDRESS: dschutter@georgefox.edu
PHONE: 503-554-2014 MOBILE: 503-476-4256 FAX: 503-554-2009
OWNER (if different from above): _____ PHONE: _____
ADDRESS: _____
ENGINEER/SURVEYOR: AKS Engineering - Att; chuck Gregory PHONE: 503563-6151
ADDRESS: 12965 SW Herman Rd., Suite 100, Tualatin, OR 97062

GENERAL INFORMATION:

PROJECT NAME: Indoor Tennis Facility PROJECT LOCATION: 1015 E. Crestview Drive
PROJECT DESCRIPTION/USE: College / University athletic facility
MAP/TAX LOT NO. (i.e.3200AB-400): 3217 - 01905 ZONE: I SITE SIZE: 3.5 SQ. FT. ☐ ACRE ■
COMP PLAN DESIGNATION: I TOPOGRAPHY: Level Town Lot
CURRENT USE: undeveloped except for mass grading, and parking lot is graded gravel
SURROUNDING USES:
NORTH: R1 (church and school) SOUTH: R1 (church) and R2 (residential)
EAST: R1 (residential) WEST: R1 (residential)

SPECIFIC PROJECT CRITERIA AND REQUIREMENTS ARE ATTACHED

General Checklist: ☐ Fees ☐ Public Notice Information ☐ Current Title Report ☐ Written Criteria Response ☐ Owner Signature

For detailed checklists, applicable criteria for the written criteria response, and number of copies per application type, turn to:

Design Review ..... **p. 12**
Partition Tentative Plat ..... **p. 14**
Subdivision Tentative Plat ..... **p. 17**
Variance Checklist ..... **p. 20**

The above statements and information herein contained are in all respects true, complete, and correct to the best of my knowledge and belief. Tentative plans must substantially conform to all standards, regulations, and procedures officially adopted by the City of Newberg. All owners must sign the application or submit letters of consent. Incomplete or missing information may delay the approval process.

Applicant Signature 3/29/17 Date

Owner Signature 3/29/17 Date

Dan Schutter
Print Name

Clyde Thomas
Print Name

Attachments: General Information, Fee Schedule, Criteria, Checklists

First American

First American Title Company of Oregon
825 NE Evans Street
McMinnville, OR 97128
Phn - (503)376-7363
Fax - (866)800-7294

YAMHILL COUNTY TITLE UNIT
FAX (866)800-7294

Title Officer: **Clayton Carter**
(503)376-7363
ctcarter@firstam.com

LOT BOOK SERVICE

George Fox University
414 N Meridian St.
Newberg, OR 97132

Order No.: 1039-2837151
March 27, 2017

Attn: Dan Schutter
Phone No.: (503)554-2014 - Fax No.:
Email: dschutte@georgefox.com

Re:

Fee: $250.00

We have searched our Tract Indices as to the following described property:

The land referred to in this report is described in Exhibit A attached hereto.

and as of March 23, 2017 at 8:00 a.m.

We find that the last deed of record runs to

George Fox University, an Oregon Non-Profit Corporation

We find the following apparent encumbrances within ten (10) years prior to the effective date hereof:

NONE

1. Taxes, including the current fiscal year, not assessed because of ORS 307.145 Certain child care facilities, schools and student housing Exemption. If the exempt status is terminated an additional tax may be levied. Account No. 526588.

2. The rights of the public in and to that portion of the premises herein described lying within the limits of streets, roads and highways.

3. Ordinance No. 2007, including terms and provisions thereof.
   Recorded: January 07, 1981 as Film Volume 157, Page 1695, Deed and Mortgage Records

4. Improvement Non-Remonstrance Agreement - Minor Partition including the terms and provisions thereof:
   Recorded: October 25, 1982 as Film Volume 172, Page 1821, Deed and Mortgage Records

5. 10 foot public utility easement as shown on Partition Plat 2003-30.

6. Deed of Dedication, including terms and provisions thereof.
   Recorded: March 27, 2008 as Instrument No. 200805264, Deed and Mortgage Records

   And Re-Recorded: May 06, 2008

   Recording Information: Instrument No. 200807823, Deed and Mortgage Records

7. Easement, including terms and conditions contained therein:
   Granted to: Portland General Electric Company ("PGE"), an Oregon corporation
   For: Underground Utility Easement
   Recorded: March 27, 2008
   Recording Information: Instrument No. 200805265, Deed and Mortgage Records

8. Easement, including terms and conditions contained therein:
   Granted to: All Utility Companies ("UC") with an operating franchise agreement with the City of Newberg, an Oregon municipality
   For: Underground General Utility Easement
   Recorded: March 27, 2008
   Recording Information: Instrument No. 200805266, Deed and Mortgage Records

9. Easement, including terms and conditions contained therein:
   Granted to: Ccity of Newberg, a municipal corporation
   For: Reclaimed Waterline Utility Easement
   Recorded: May 29, 2008
   Recording Information: Instrument No. 200809244, Deed and Mortgage Records

10. Easement, including terms and conditions contained therein:
    Granted to: City of Newberg, a municipal corporation
    For: Public Waterline Easement
    Recorded: August 26, 2010
    Recording Information: Instrument No. 201011794, Deed and Mortgage Records

We have also searched our General Index for Judgments and State and Federal Liens against the Grantee(s) named above and find:

NONE

We find the following unpaid taxes and city liens:

NOTE: Taxes for the year 2016-2017 Not Yet Assess

Tax Amount:	Not Yet Assess
Map No.:	R3217-01905
Property ID:	526588
Tax Code No.:	29.0

THIS IS NOT a title report since no examination has been made of the title to the above described property. Our search for apparent encumbrances was limited to our Tract Indices, and therefore above listings do not include additional matters which might have been disclosed by an examination of the record title. We assume no liability in connection with this Lot Book Service and will not be responsible for errors or omissions therein. The charge for this service will not include supplemental reports, rechecks or other services.

Exhibit "A"

Real property in the County of Yamhill, State of Oregon, described as follows:

Parcel 1 of Yamhill County Partition Plat 2003-30 in Section 17, Township 3 South, Range 2 West, Yamhill County, Oregon.

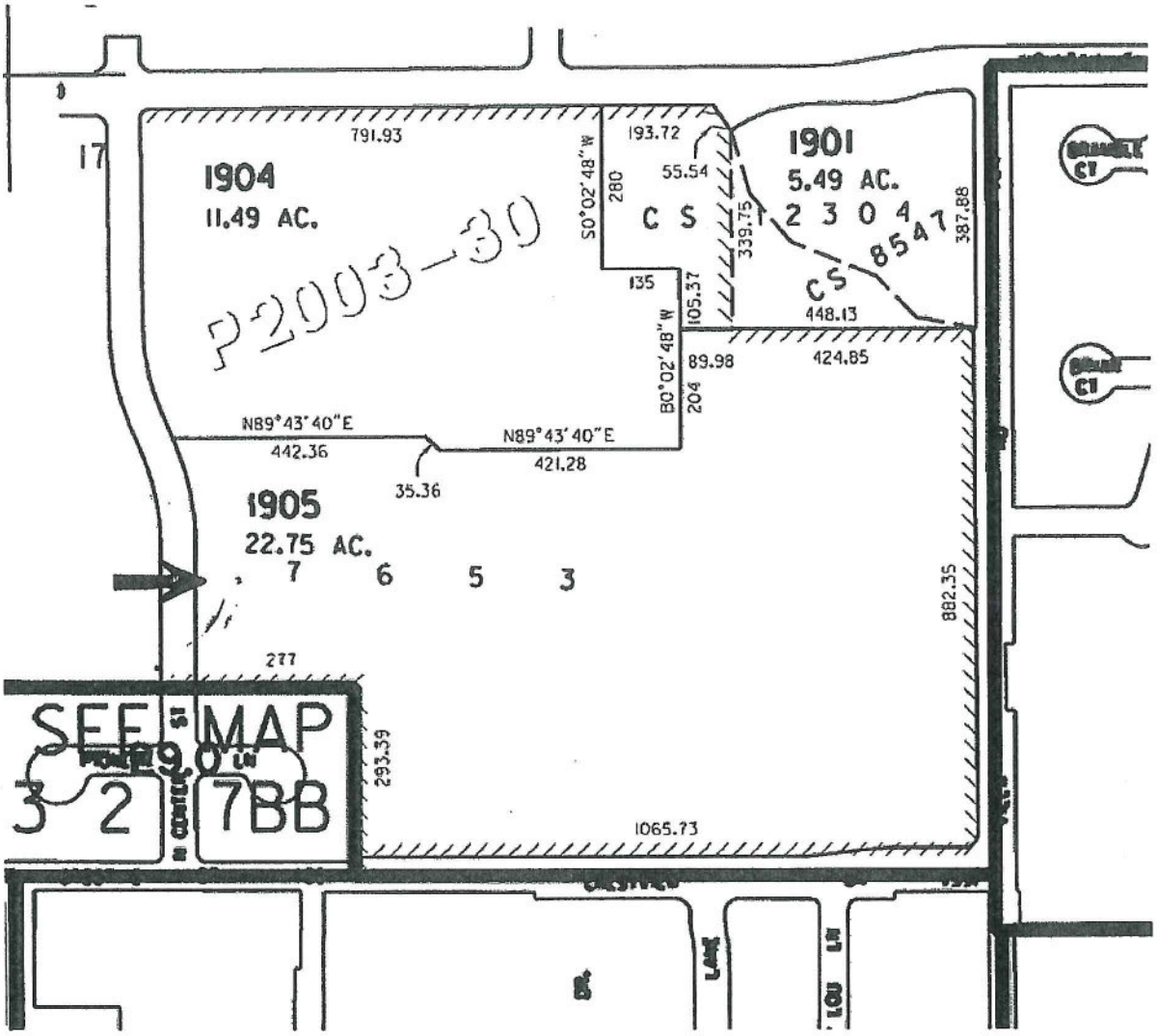
SAVE AND EXCEPTING therefrom the following described tract of land:

Beginning at the Southwest corner of that tract of land described in deed from NEWBERG CHRISTIAN CHURCH, FKA NEWBERG FIRST CHRISTIAN CHURCH to NEWBERG CHRISTIAN CHURCH and recorded in Film Volume 261, Page 1734, Yamhill County Deed and Mortgage Records; thence North 89°59'30" West 89.98 feet to the West line of said Parcel 1; thence North 00°02'48" East 105.38 feet along said West line; thence South 89°43'40" West 135.00 feet along said line; thence North 00°02'48" East 280.00 feet along said line to the most Northerly Northwest corner of said Parcel 1; thence North 89°43'40" East 193.70 feet along the South margin of Mountain View Drive to the most Northerly Northeast corner of said Parcel 1; thence South 34°14'07" East 55.54 feet along the East line of said Parcel 1; thence South 00°02'48" West 339.75 feet along said East line to the point of beginning.

FURTHER SAVE AND EXCEPTING THEREFROM that portion conveyed to the City of Newberg for public right of way, by Deed recorded March 27, 2008, as Instrument No. 200805264, and re-recorded May 6, 2008, as Instrument No. 200807823, Deed and Mortgage Records of Yamhill County, Oregon.

First American

This map is furnished for illustration and to assist in property location. The company assumes no liability for any variation in dimensions by location ascertainable by actual survey



DESIGN REVIEW CRITERIA RESPONSE

TYPE 2 – MINOR DESIGN REVIEW

ADDENDUM

For

TENNIS FACILITY

1015 Crestview Drive

Newberg, Oregon

Tax Lot: 3217-1905

~~March~~ May 12, 2017

GEORGE FOX UNIVERSITY

414 N. Meridian Street
Newberg, OR 97132-2697

Contact: Dan Schutter
Associate Director, Physical Plant
503.554.2014
dschutter@georgefox.edu

The following addendum is submitted to provide additional criteria response for the original Design Review Criteria Response dated March 29, 2017

Type II Design Review Criteria

(2) Parking and on-site circulation. *Parking areas shall meet the requirements of § 15.440.010. Parking studies may be required to determine if adequate parking and circulation are provided for uses not specifically identified in § 15.440.010. Provisions shall be made to provide efficient and adequate on-site circulation without using the public streets as part of the parking lot circulation pattern. Parking areas shall be designed so that vehicles can efficiently enter and exit the public streets with a minimum impact on the functioning of the public street.*

Response: the proposed development is in the Institutional Zone and the Land Use will be College / University. There will be no dormitories or student residents at this location so the Newberg Development Code §§ 15.440.030 School / College / commuter type is the most accurate description in the Development code for the proposed development. The requirement for this type development is 1 parking space per student. The proposed development will have 6 tennis courts and be home for the George Fox Bruins Men's and Women's Tennis teams, typically numbering about 20 students. According the Newberg Development code this use should require 20 parking spaces.

Also, the ITE Parking Generation Manual 3rd Edition includes a formula for parking for Land use code 550 "college" use in a suburban setting. This formula is based on campus population and is Parking Spaces = x 0.34 – 300 where x = Population. Population is described as students, faculty, and staff. The proposed development will include the tennis team (20 students), the coaches and trainers (6 people), and spectators (50 people), although it may be argued that the ITE definition of campus population does not include spectators we will be conservative and leave that number in this calculation. Therefore per the ITE formula (but only using the slope part of the slope intercept equation) the number of parking space should be 76 x 0.34 = 26.

The proposed development incudes a parking lot with 100 parking spaces and easily meets both of the above methods for determining the required parking.

Storm water Plan

Response: The proposed development site is 2,877 sq. ft. and includes detention and treatment facilities designed by AKS Engineering according to the Newberg Public Works Design and Construction Standards. Section 4 Storm Drainage: 4.1 Performance Standards IV.

GFU Austin Sports Complex
Newberg, Oregon

Stormwater Report

Date:	May 09, 2017
Client:	George Fox University 1101 North Villa Road Newberg, OR 97132
Engineering Contact:	Chuck Gregory, P.E. chuckg@aks-eng.com
Engineering Firm:	AKS Engineering & Forestry, LLC
AKS Job Number:	5809

AKS ENGINEERING & FORESTRY
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
P: (503) 563-6151
www.aks-eng.com

REGISTERED PROFESSIONAL ENGINEER
50644PE
PRELIMINARY
OREGON
SEPT. 14, 1999
CHARLES EDWARD GREGORY

RENEWS: JUNE 30, 20__

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APPENDIX B: CATCHMENT MAPS
APPENDIX C: PRE-DEVELOPMENT HYDROCAD CALCULATIONS
APPENDIX D: POST-DEVLOPMENT HYDROCAD CALCULATIONS
APPENDIX E: USDA NRCS SOIL REPORT FOR YAMHILL COUNTY
APPENDIX F: TECHINICAL RELEASE 55 RUNOFF CURVE NUMBERS
APPENDIX G: DOWNSTREAM ANALYSIS MAP
APPENDIX H: OPERATIONS AND MAINTENANCE OF FACILITIES

Exhibit

EXHIBIT A: BENEFITED PROPERTY LEGAL DESCRIPTION AND FACILITY AGREEMENT AREA
EXHIBIT B: SITE SPECIFIC MAINTENANCE PLAN AND CHECKLIST

Stormwater Report
GFU AUSTIN SPORTS COMPLEX
NEWBERG, OREGON

1.0 Purpose of Report
The purpose of this report is to analyze the effects of the proposed developments on the existing stormwater conveyance system and to document the criteria, methodology, and informational sources by which the proposed stormwater system has been designed.

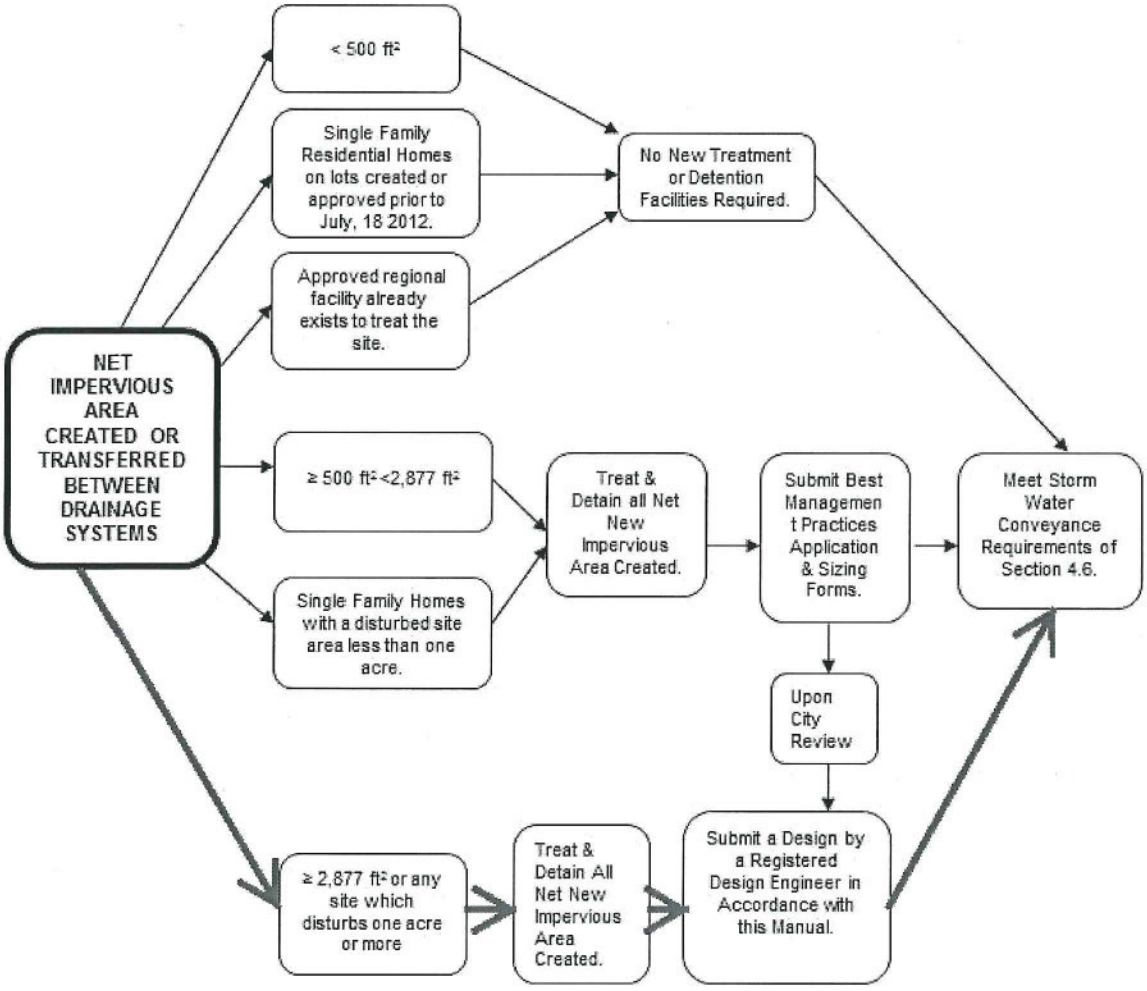
2.0 Project Location/Description
The proposed improvements are positioned in the southwest portion of Tax Lot 1905 (Yamhill County Tax Map 3S 2W 17), along Crestview Drive west of the intersection with Villa Road.

To the north of the project site, within the tax lot, there are existing athletic facilities with pedestrian paths. The eastern portion of the lot is undeveloped.

Proposed improvements include the construction of a domed fabric structure, a porous parking area, concrete sidewalks, and stormwater facilities; no demolition will be necessary. Surface water drainage will be provided with porous pavement and with the construction of a flat-bottomed swale/planter engineered to provide water quantity control and water quality treatment for post-development runoff.

3.0 Regulatory Design Criteria
Stormwater criteria was designed per the City of Newberg Public Works Design and Construction Standards (August 2015). Per the figure below, the stormwater facilities are engineered to treat and detain all new net impervious area created.

Figure 4.4 Storm water Quality & Quantity Design Flow Chart



3.1 STORMWATER QUANTITY

4.7.1.III Water Quantity Facility Design & Control Standards

Stormwater quantity on-site detention facilities shall be designed to capture runoff so the post-development runoff rates from the site do not exceed the predevelopment runoff rates from the site, based on 24-hour storm events ranging from the ½ of the 2-year return storm to the 25-year return storm. Specifically, the ½ of the 2, 2, 10, and 25-year post-development runoff rates will not exceed their respective ½ of the 2, 2, 10, and 25-year pre-development runoff rates….

3.2 STORMWATER QUALITY

4.8.5 Water Quality Storm

The storm defines both the volume and rate of runoff. The stormwater quality only facilities shall be designed for a dry weather storm event totaling 1.0 inches of precipitation falling in 24 hours…

4.0 Design Methodology

The Santa Barbara Urban Hydrograph (SBUH) Method was used to analyze stormwater runoff from the site. This method utilizes the SCS Type 1A 24-hour design storm. HydroCAD computer software version 10.00-18 aided in the analysis.

5.0 Design Parameters

5.1 DESIGN STORMS – CONVEYANCE SIZING

Stormwater mains, inlets, and laterals for the site are placed at locations that adequately collect and control the stormwater for the site. The stormwater pipes are sized using Manning's equation based on peak flows for the 25-year storm event.

5.2 PRE-DEVELOPED SITE CONDITIONS

5.2.1 Site Topography

The center of the existing site is graded with a crown with slopes ranging up to one (1) percent. Runoff sheet flows to a ditch to the south and through an existing culvert. Stormwater then flows to an existing ditch inlet, west of Villa Road.

There is an existing on-site gravel parking/staging area to the south and gravel paths flanking the east and west sides of the project site. The gravel path to the west is used as a fire apparatus access for the existing athletic facilities located on the lot. Runoff from these gravel areas sheet flows to the south and to the east where it collects in a ditch and is conveyed to the ditch inlet west of Villa Road.

A small portion of runoff from the westernmost area of the site sheet flows to an existing swale/rain garden along the pedestrian path connecting the site to N Center Street.

The time of concentration (Tc) is based on a combination of sheet flow and shallow concentrated flow. See Appendix C for input parameters.

5.2.2 Land Use

The current land use is zoned for institutional development.

5.3 SOIL TYPE

Per Section 4.5.4 Santa Barbara Urban Hydrograph (SBUH) of the City of Newberg Public Works Design and Construction Standards (August 2015):

> *II. Curve numbers shall be derived from the National Resources Conservation Service's (NRCS) runoff curve numbers contained in Technical Release 55 (TR-55)-Urban Hydrology for Small Watersheds.*
>
> *III. Soil types shall be derived from the NRCS Soil Survey for Yamhill County.*

The soils for the site are classified as Aloha Silt Loam (0 to 3% slopes) and Woodburn Silt Loam (3 to 12% slopes) per the USDA Soil Survey for Yamhill County. Information for these soils and selected curve numbers are contained within Appendix E and F, respectively, of this report.

5.4 POST-DEVELOPED SITE CONDITIONS

5.4.1 Site Topography

A domed fabric structure will be constructed on the crowned portion of the site. A swale will be constructed around three (3) sides. Runoff from the building will be treated as it infiltrates through the growing medium and then conveyed to an overflow which conveys stormwater to a flow spreader in the undeveloped eastern section of the property.

The gravel parking area along Crestview Drive will be dug out, scarified, and replaced with porous asphalt underlain with drain rock. Any excess rainfall that permeates through the porous pavement will flow along the sloped subgrade, be collected in a perforated pipe, and discharge to an existing culvert. This runoff will then flow as in pre-developed conditions.

The gravel fire access road to the west will remain, for the most part, as gravel. Approximately 70 feet will be removed and replaced with porous asphalt. Any excess rainfall from the northeast portion of the gravel road will sheet flow east onto the site where it will have the opportunity to infiltrate (see Post-Development Catchment Map). A small portion to the northwest will drain to an existing grassy swale which discharges to existing stormwater facilities. The majority of runoff from the gravel road will sheet flow to a french drain which will discharge to the swale.

Site topography will not change outside of the immediate improvement areas. Stormwater will either be collected and detained in the water quality swale or sheet flow as in pre-developed conditions. The discharge locations will mimic the existing runoff conditions.

5.4.2 Land Use

The site land-use will remain unchanged. The tax lot is developed with athletic facilities for the educational institution (George Fox University) or remains undeveloped.

5.4.3 Post-Developed Input Parameters

Per the City of Newberg *Public Works Design and Construction Standards (August 2015)*, curve numbers for input are to be taken from Technical Release 55 (TR-55)-Urban Hydrology for Small Watersheds. Per the NRCS Soil Survey for Yamhill County, the hydrological soil group for on-site soils is C.

The existing ground is most accurately described as "open space, fair condition." Grass cover is sparse in places but overall covers more than 50 percent. A curve number of 79 is used for on-site soils. See Appendix F for additional input parameters.

During the on-site geotechnical investigation, equipment limitations and site topography meant that infiltration testing could not be performed. Per the USDA NRCS Soil Survey for Yamhill County, Oregon, the capacity of the most limiting layer to transmit water (Ksat) for Aloha silt loam is 0.20 to 0.57 in/hr. Applying a factor of safety of 2.0 to the most conservative value of 0.20 in/hr, a design infiltration rate of 0.10 in/hr was chosen.

The minimum time of concentration (Tc) was conservatively assumed to be 5 minutes.

5.4.4 Description of Off-Site Contributing Basins

There are no off-site contributory basins. Runoff from the northern section of the property will sheet flow to the existing ditch inlet and will not be routed through the proposed stormwater infrastructure.

6.0 Stormwater Analyses

6.1 PROPOSED STORMWATER CONDUIT SIZING AND INLET SPACING

The stormwater pipes are adequately sized to capture and convey flows from the 25-year storm event.

6.2 PROPOSED STORMWATER QUALITY CONTROL FACILITY

Stormwater quantity control will be provided with the construction of LIDA facilities, a porous pavement parking lot and a flat-bottomed vegetated swale/planter which surrounds the north, south, and east sides of the structure. The two lengths of the swale drain to an overflow standpipe located on the east side of the structure. The elevation of the standpipe is designed to detain the released runoff to pre-developed rates.

The swale is underlain with 18 inches of growing medium and 12 inches of drain rock. A perforated pipe runs along the length of the swale, at the bottom of the drain rock layer. The two perforated pipes (running along the north and south end) meet and tie into the standpipe overflow. The orifice size from the perforated pipe is engineered to meet required release rates and is accounted for in the stormwater design.

6.3 PROPOSED STORMWATER QUALITY CONTROL FACILITY DESIGN

Stormwater quality control will be provided with the construction of a flat-bottomed swale/planter which surrounds the north, south, and east sides of the structure, as well as porous pavement for the parking area.

The swale is underlain with 18 inches of growing medium with a composition meeting the requirements of section A2.2.III.b of Appendix A of the City of Newberg Public Works Design and Construction Standards (August 2015). It is assumed that the growing medium has an infiltration rate of 2 in/hr.

The prescribed water quality storm completely infiltrates through the growing medium before being collected in the perforated pipe and released into the standpipe overflow.

6.4 STORMWATER SUMMARY

Table 6-4 Stormwater Summary

Storm Event	Rainfall Depth (inches)	Pre-Developed Flow (cfs)	Total Post-Developed Flow (cfs)	Flow Released (cfs)	Difference (cfs)	*Detention Volume Provided (cf)	Detention Volume Utilized (cf)
½ 2-Year	1.25	0.21	1.65	0.21	-0.00	17,384	1,190
2-Year	2.50	1.46	4.61	1.22	-0.24	17,384	3,754
10-Year	3.50	2.78	7.03	2.77	-0.01	17,384	5,389
25-Year	4.00	3.47	8.24	3.08	-0.39	17,384	6,300

*Note: Detention volume provided includes 12" of freeboard above the 25-year storm peak elevation.

It should also be noted that the flow released for the 100-year design storm is 3.34 cfs (see hydroCAD calculations). This value is less than the pre-developed release rate for the 25-year storm. In addition, the total utilized storage for the 100-year storm is less than half of the total capacity of the swale with the required 12" of freeboard (7,257 cf out of 17,384 cf). The planned improvements will lessen the demand on the public storm system during large storms.

6.5 DOWNSTREAM ANALYSIS

The proposed improvements include stormwater facilities to treat and detain all new net impervious area created. The stormwater impact from the development ends at the proposed flow spreader, where runoff rates and conditions mirror those in the pre-developed state. See Appendix G for the downstream analysis map.

The post-development discharge to the existing ditch inlet (and then to Hess Creek) will be less than or equal to pre-developed rates. Therefore, no impact to the downstream public storm system is anticipated.

DESIGN REVIEW CRITERIA RESPONSE

TYPE 2 – MINOR DESIGN REVIEW
For
TENNIS FACILITY
1015 Crestview Drive
Newberg, Oregon

Tax Lot: 3217-1905

March 29, 2017

GEORGE FOX
UNIVERSITY

414 N. Meridian Street
Newberg, OR 97132-2697

Contact: Dan Schutter
Associate Director, Physical Plant
503.554.2014
dschutter@georgefox.edu

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Attachments:

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A2 - Site Plan / Parking
A3 - Elevation (picture) of Similar Structure
A4 - Interior View of Similar Structure - Trusses
A5 - Cross Section Profile
A6 - Floor Plan
A6 - Interior Curtains Example
A7 - Grading Plan / Bio-Swale
A8 - Bio-Swale Detail
A9 - Landscape Area / Plant List
A10 - Parking Lot Lighting

Project Description

The proposed project is the construction of a new 6 court, fabric covered tennis structure for George fox University. The project is located within the Institutional (I) Zone. The site is situated on the south side of the George Fox University owned Austin Fields complex. The tennis structure (140' x 320') is located along Crestview Drive at approximately the 1015 - 1021 address. The north wall will be approximately 105 feet from the restroom building that serves the Austin Fields and 300 feet to the north property line. The east wall will be approximate 500 feet from Villa Road. The south wall will be approximately 135 feet from the curb of Crestview Drive. The west wall will be approximately 129 feet from the west property line. The west property line is the only line adjacent to residential properties. The structure will be located on a site that was originally graded for a football field (which was never built) about 6 years ago.

The structure itself is fabric covered, stretched over steel "hoop" trusses. It is 140' wide (running N/S) and 320' long (running E/W). It is 50' 7" high. The flame retardant PVC fabric is white. An 8' high navy blue band will circle the bottom of the structure. The main entrance will be via a 3' man-door on the SW corner. Two additional 3' man-doors will be provided, one in the NW and one in the NE corners. All three will be equipped with crash bar hardware. Two additional 14'x14' overhead doors will be located on both the E and W sides to provide ventilation in hot weather

The inside of the building will be configured to house 6 tennis courts (running N/S), each separated by 12'. A 5' walking path will run the length of the North wall separated from the courts with a curtain. Another curtain will be hung 15' inside the south wall to separate the south end of the courts from a 200' sprint track and a batting (net) cage. Portable seating for 150 will be located along the West (75 seats) and East (75 seats) walls in an 8' wide x 50' long space.

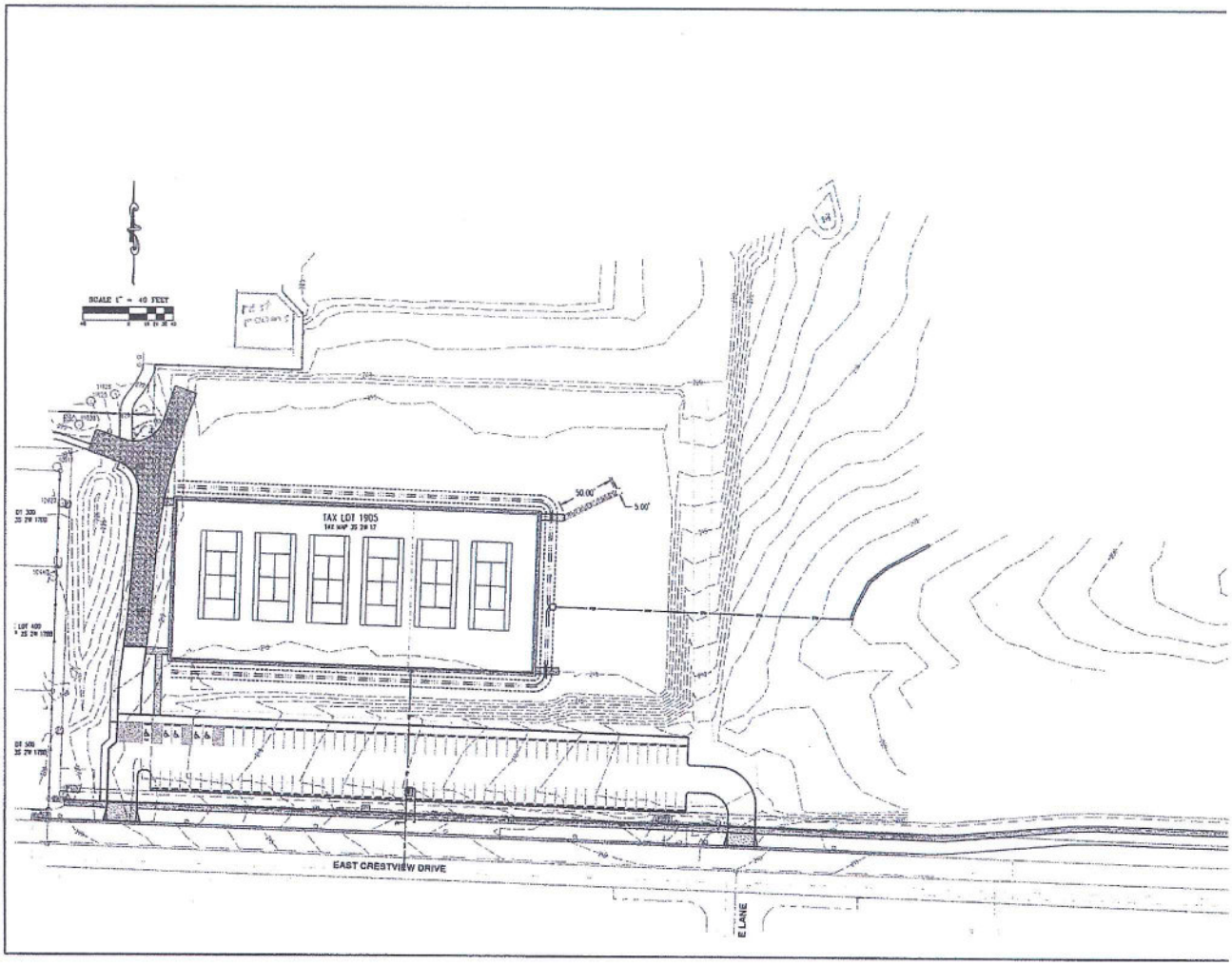
A full fire sprinkler (dry) system will be installed. It will connect to city water on the south side of Crestview Drive. A new fire hydrant and FDC will be located along the parking lot as noted in the site plan. The fire stack will be located just inside the south wall of the structure about 210' from the west entrance. The PVC fabric is flame retardant. The building will not be heated. Indirect LED lighting will be provided on the courts. Electric ceiling fans will be located to supplement ventilation. Electric service for the building will come from the existing Austin Fields service. It was built to accommodate additional buildings and is located by the restroom building.

The centrally located Austin Fields restrooms constructed in 2006 will service the tennis facility. They are located 240' (following a walkway) from the NW entry of the tennis structure. The restroom building has 5 men's and 9 women's toilets for a total of 14.

Storm water from the roof of the tennis structure will run directly into bio-swales on both the North and South sides and will join on the east side of the structure (800' total). Each swale is 18' wide x 320' long x 2' deep graded on a 1 to 3 and 1 to 4 slope. Overflow from the swales will run onto the adjacent 6 acre grass field to the east and spread out on that field. That field is owned by George Fox University.

A 100 car, pervious pavement parking lot will be constructed between the south side of the structure and Crestview Drive. The blacktop will be extended 7 feet beyond bumper stops of the

north side to create a walkway. ADA parking spaces will be provided on the west end of this lot. Six LED lights will be used to The walkway going to the tennis center and to the restroom facility will be ADA compatible. It will be lit with LED down-directed lights, designed so that no more than .5 foot candles reach the property line.



Type II Design Review Criteria

(1) Design compatibility. *The proposed design review request incorporates an architectural design which is compatible with and/or superior to existing or proposed uses and structures in the surrounding area. This shall include, but not be limited to, building architecture, materials, colors, roof design, landscape design, and signage.*

Response: The proposed Tennis building is a 44,800 square foot, unheated structure. It is a PVC fabric covered dome stretched over metal trusses. It has a height of 50'-7 1/16". It covers 6 tennis courts, a sprint track and batting cage. The fabric is white to allow maximum natural light on the courts with a navy blue band of 6-8' around the base perimeter. There will be 3 man-doors, 2 on the west, one on the east, and four 14'x14' roll up doors for ventilation, 2 on the east and 2 on the west.

The north, east and south sides of the structure are bordered with 18' wide bio-swales and will be planted appropriately with a minimum of 12 species including 2 kinds of fern, tall dogbane, red and yellow twig dogwood, Douglas Spirea, vine maple, bleeding heart, wild ginger, aster, yarrow, bulrush and sedge varieties. The sloped bank on the south between the proposed parking lot and the structure will be landscaped with a mix of low trees and shrubs (needles and leaves, deciduous, evergreen and conifer), the trees not exceeding 20' of height because maximum daylight is desired within the structure. Street trees, will be planted in the parking strip along Crestview to Villa Road every 30'. The 50' berm to the west separating the residential area from the fire lane will be designed with taller trees, grass and shrubs. All landscaping will be drip irrigated. Irrigation water will be supplied from the existing irrigation system on Austin Fields. It has ample capacity, having been designed for a much larger area than it is now serving.

(2) Parking and on-site circulation. *Parking areas shall meet the requirements of § 15.440.010. Parking studies may be required to determine if adequate parking and circulation are provided for uses not specifically identified in § 15.440.010. Provisions shall be made to provide efficient and adequate on-site circulation without using the public streets as part of the parking lot circulation pattern. Parking areas shall be designed so that vehicles can efficiently enter and exit the public streets with a minimum impact on the functioning of the public street.*

A 100 car pervious pavement parking lot will be constructed on Crestview Drive. New sidewalks will provide ADA access to Crestview Drive, the tennis structure entrance and to the restroom facilities. ADA parking will be at the west end of the new lot.

New LED type pathway and parking lot lighting will be installed as shown in Appendix B. These will be LED type lights selected for energy efficiency and good cutoff to reduce light pollution. They could potentially exceed .5 foot candles at the public sidewalk along Crestview but would dissipate before it crossed the 5 foot sidewalk and 10 foot strip of grass between the sidewalk and Crestview Drive.

The proposed development will include a bicycle parking areas located near the main entrance that has a capacity of about 12 bicycles, easily meeting the requirements for a 50,000 sq. ft. institutional building per section 15.440.100.

(3) Setbacks and general requirements. *The proposal shall comply with §§ 15.415.010 through 15.415.060 dealing with height restrictions and public access; and §§ 15.410.010 through 15.405.040 dealing with setbacks, coverage, vision clearance, and yard requirements.*

Response: The project is located in the Institutional (I) Zone. The site is situated on the south side of the George Fox University owned Austin Fields complex on a site that was originally graded flat for a football field about 6 years ago.

The tennis structure is140'wide (N/S) x 320' long (E/W). All setbacks are met. The North wall will be approximately 105 feet from the restroom building that serves the Austin Fields and 300 feet from the north property line. The east wall will be approximate 500 feet from Villa Road (the east property line). The south wall will be approximately 135 feet from the curb of Crestview Drive (the south property line. The west wall will be approximately 129' from the west property line. The west property line in the only line adjacent to residential properties. The height is 50 feet 7 1/16th inches. This is allowable in the overlay sub-district per 15.348.060.A. or 15.415.020.D. when the building is located more than 100' from a property line. The proposed building is located on tax lot 3217 01905.

The proposed parking lot improvements include landscaping strips that are 5 foot or greater in width per 15.420.010.B.3.b.

(4) Landscaping requirements. *The proposal shall comply with § 15.420.010 dealing with landscape requirements and landscape screening.*

The north, east and south sides of the structure are bordered with 18' wide bio-swales and will be planted appropriately with a minimum of 12 species including 2 kinds of fern, tall dogbane, red and yellow twig dogwood, Douglas Spirea, vine maple, bleeding heart, wild ginger, aster, yarrow, bulrush and sedge varieties. The sloped bank on the south between the proposed parking lot and the structure will be landscaped with a mix of low trees and shrubs (needles and leaves, deciduous, evergreen and conifer), the trees not exceeding 20' of height because maximum daylight is desired within the structure. Street trees, will be planted every 30' in the parking strip along Crestview Drive. The 50' wide berm to the west separating the residential area from the fire lane will be designed with taller trees, grass and shrubs. All landscaping will be drip irrigated being sourced from the existing irrigation system on Austin Fields. It has ample capacity, being designed for a much larger area than it is now serving.

Response: Roughly 14,000 square feet adjacent to all four sides of the proposed building will be landscaped in swales. An additional 50,000 square feet on the north and east will be turned into lawn. An additional 20,000 square feet on the west side will become trees and lawn. An additional 5,000 on the south will become shrub beds. Per Appendix D approximately 75% of the total area included in the proposed development will be landscaped, exceeding the 15 percent requirement in code section 15.420.010.B. The landscaping work, including automatic irrigation, will be completed in accordance with code section 15.420.010. See Appendix E for more detail about the landscaping areas and proposed types of plants.

The proposed parking lot improvement include a 5 foot or greater planter strip on all sides which exceeds the requirement of 25 square feet of landscaping per parking space per 15.420.010. The planting strip between Crestview Drive and the sidewalk will provide an additional 6,000 square feet of landscaping.

(5) Signs. *Signs shall comply with § 15.435.010 et seq. dealing with signs.*

Response: A standard "blue bar" sign with the building name and street address will be located in front (east side) of the proposed building. This sign is in accordance with the

University standard and complies with 15.348.060.F and 15.435.060 regarding Minor Freestanding Signs.

***(6) Manufactured home, mobile home and RV parks**. Manufactured home, mobile home, and recreational vehicle parks shall also comply with the standards listed in §§ 15.445.050 et seq., in addition to the other criteria listed in this section.*

Response: These elements are not present in this project.

***(7) Zoning district compliance.** The proposed use shall be listed as a permitted or conditionally permitted use in the zoning district in which it is located as found in §§ 15.304.010 through 15.328.040. Through this site review process, the Director may make a determination that a use is determined to be similar to those listed in the applicable zoning district, if it is not already specifically listed. In this case, the Director shall make a finding that the use shall not have any different or more detrimental effects upon the adjoining neighborhood area than those specifically listed.*

Response: The proposed use (6 court tennis building) per code section 15.303.332 land use code 331 is permitted in the Institutional zone per section 15.305.020 – Zoning Use Table and section 15.348 – Institutional Overlay Sub-district.

***(8) Sub-district compliance.** Properties located within sub-districts shall comply with the provisions of those sub-districts located in §§ 15.340.010 through 15.348.060.*

Response: The proposed development is located completely within the Institutional Overlay (IO) district and the building height, setback distances, and parking lot area of the proposed development meet the requirements in sections 15.348.

***(9) Alternative circulation, roadway frontage improvements and utility improvements.** Where applicable, new developments shall provide for access for vehicles and pedestrians to adjacent properties which are currently developed or will be developed in the future. This may be accomplished through the provision of local public streets or private access and utility easements. At the time of development of a parcel, provisions shall be made to develop the adjacent street frontage in accordance with city street standards and the standards contained in the transportation plan. At the discretion of the city, these improvements may be deferred through use of a deferred improvement agreement or other form of security.*

Response: The property on which the proposed development is located does not connect to or is it needed for access to any adjacent property not owned by George Fox University. The nearest frontage is Crestview Drive. This frontage was fully improved by the University in 2005. The addition of the sidewalk running along the frontage to Villa Road will complete the frontage improvements.

There are no overhead lines.

Regarding storm water plan for the proposed project, all new blacktop will be pervious pavement.

***(10) Traffic study improvements**. If a traffic study is required, improvements identified in the traffic study shall be implemented as required by the Director.*

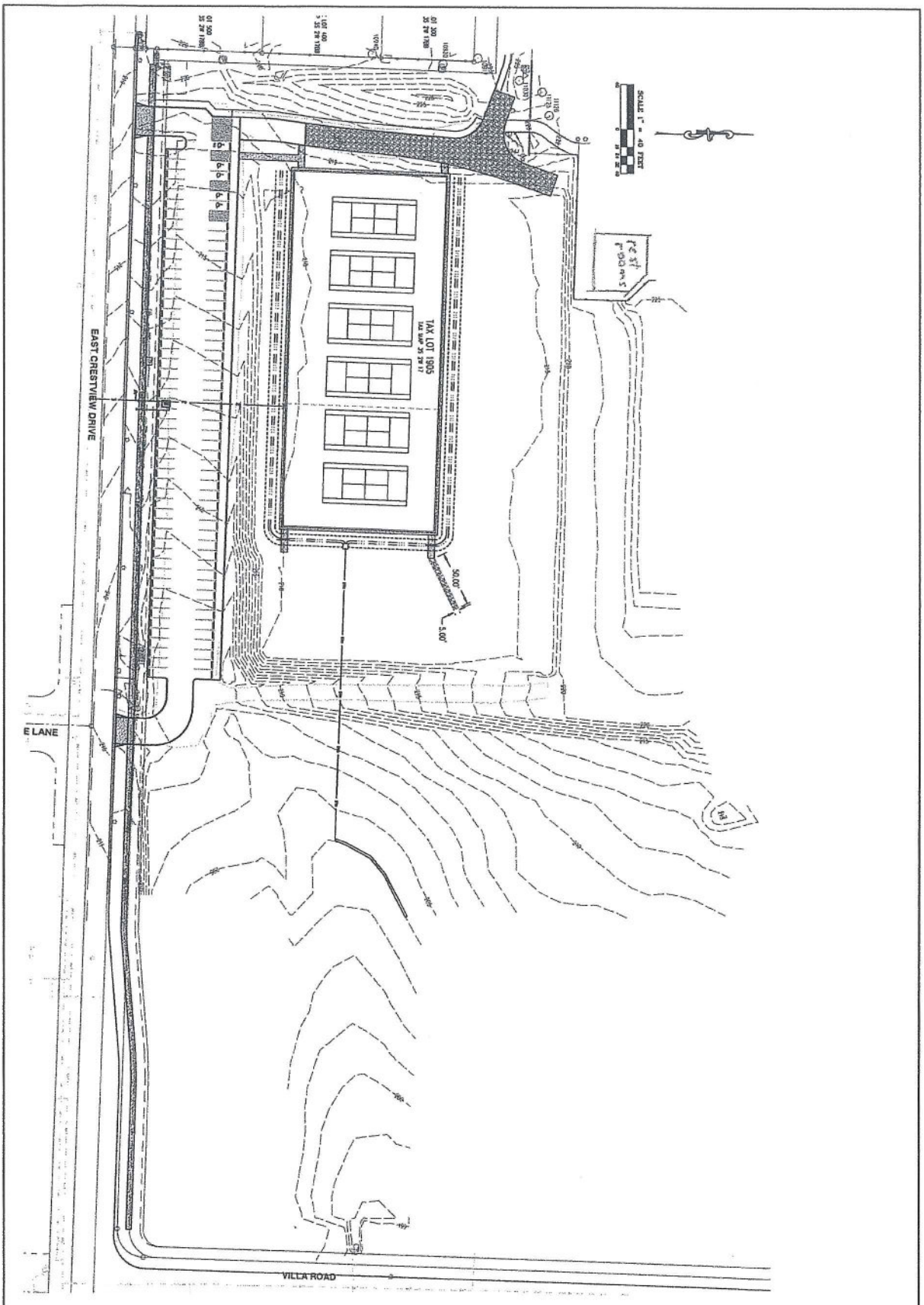
Response: "Tennis Courts 470", listed in the 8th edition ITE trip generation report seems to be the most appropriate designation. Using that designation 6 courts x 3.88 (PM peak rate) = 24 trips. This is less than 40 peak PM trips and therefore does not require a traffic study to be completed.

The tennis building will have an occupancy of under 50 student athletes and coaches on most days. When matches occur – about 6 times per year the occupancy might jump to 200. Temporary seating for 150 spectators will be provided in an 8' wide (including a 3' walkway) x 50' long strip on the east and west end of the building. Spectator area is restricted to 800 total sq. feet.

.


George Fox University -
Google Maps
https://www.google.com/maps/@45.3153038,-122.9672188,585m/data=!3m1!1e3?hl=en
Google Maps
Robert's Signs
E Mountainview Dr
E Mountainview Dr
E Mountainview Dr
E Mountainview Dr
N Center St
Joan Austin Elementary School
Newberg Christian Church
Villa Rd
Thorne St
George Fox University: Austin Sports Complex
N Center St
Villa Rd
Thorne St
Thorne St
Villa Rd
N Center St
Crestview Dr
Crestview Dr
Crestview Dr
Crestview Dr
Crestview Dr
Crestview Cir
Villa Rd
Hess Creek
N Meridian St
1101-1181 E Crestview Dr
Newberg, OR 97132
45.314249, -122.967455
Joyful Servant Lutheran Ch
Northside
Imagery ©2017 Google, Map data ©2017 Google
Terms
Send feedback
doc070162201703....pdf
M20895-Shipping ....pdf
storage building f....pdf
Cashiers check req....pdf
doc070159201703....pdf
1702 Feb 2017.pdf

AKS DRAWING FILE: 5809 SITE PLANNING | LAYOUT: C100



C100 SHEET	JOB NUMBER 5809	PRELIMINARY NOT-FOR-CONSTRUCTION	SITE PLAN	GFU AUSTIN SPORTS COMPLEX 1013 CRESTVIEW DRIVE NEWBERG OREGON TAX LOT 1905 YAMHILL COUNTY TAX MAP 3S2W17

DESIGNED BY: MJD
DRAWN BY: MJD
CHECKED BY: DJE
DATE: 01/07/2021
SCALE: AS NOTED

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD STE 100
TUALATIN, OR 97062
P: 503.563.6151
F: 503.563.6152
aks-eng.com

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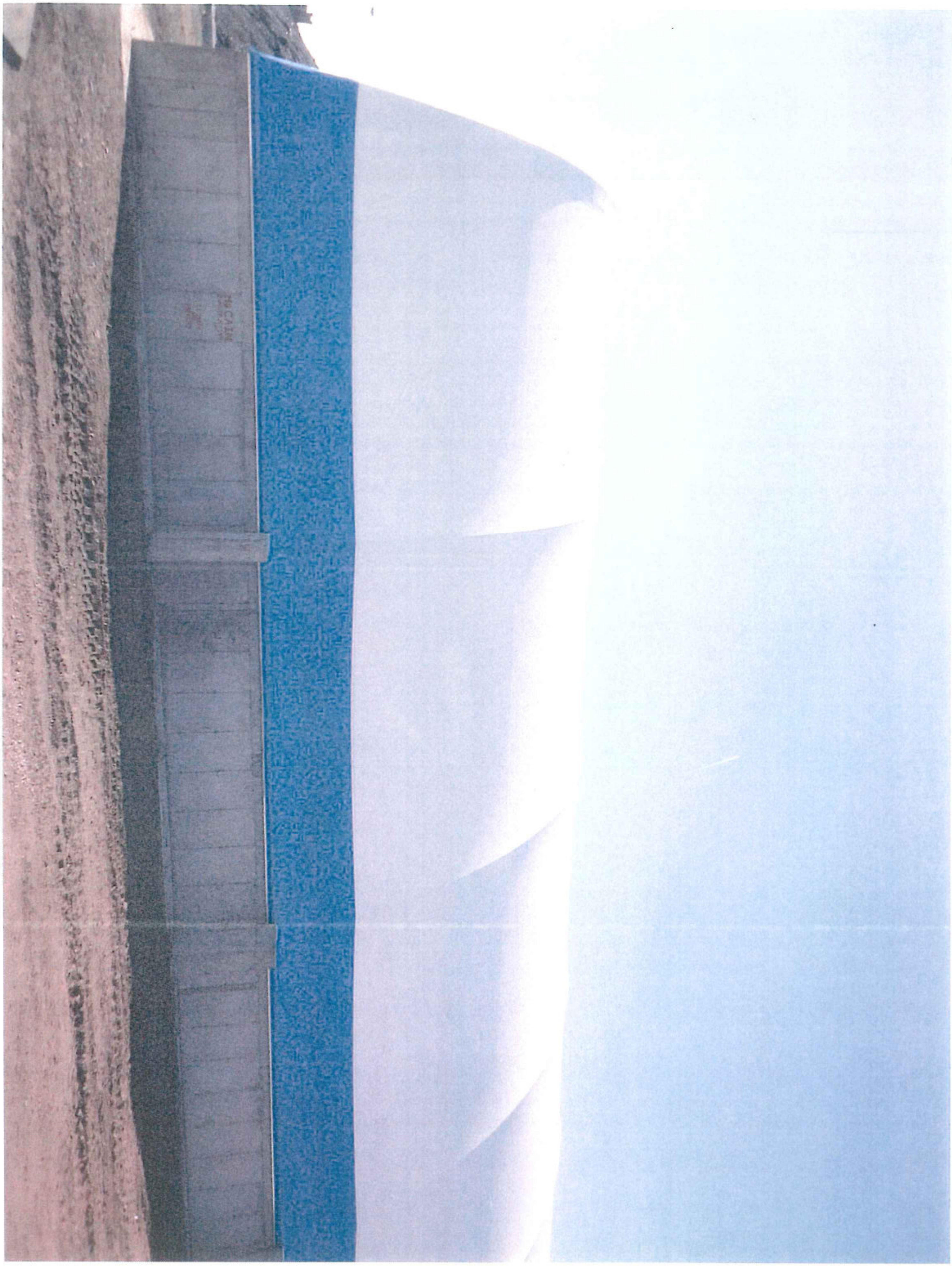
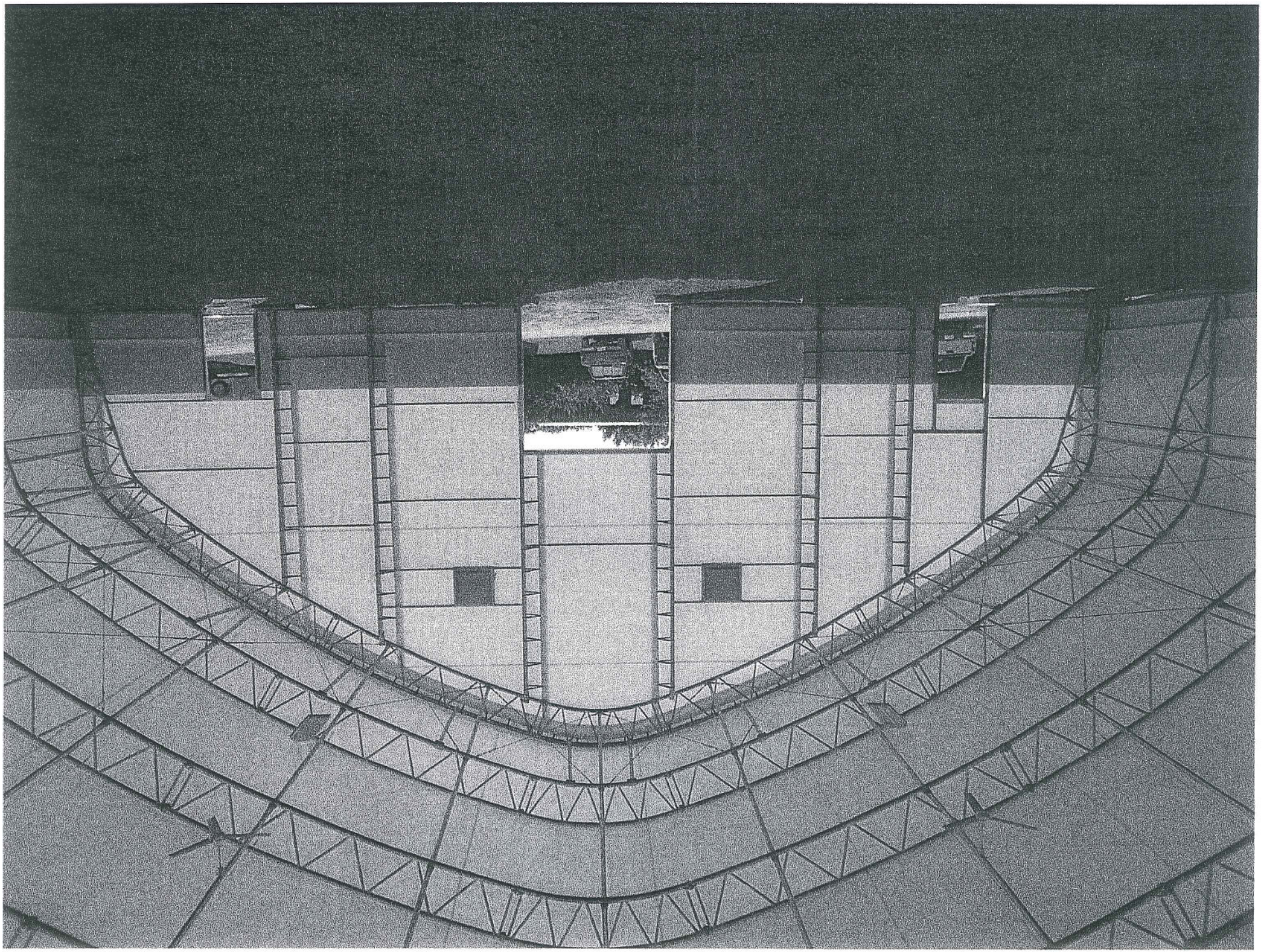
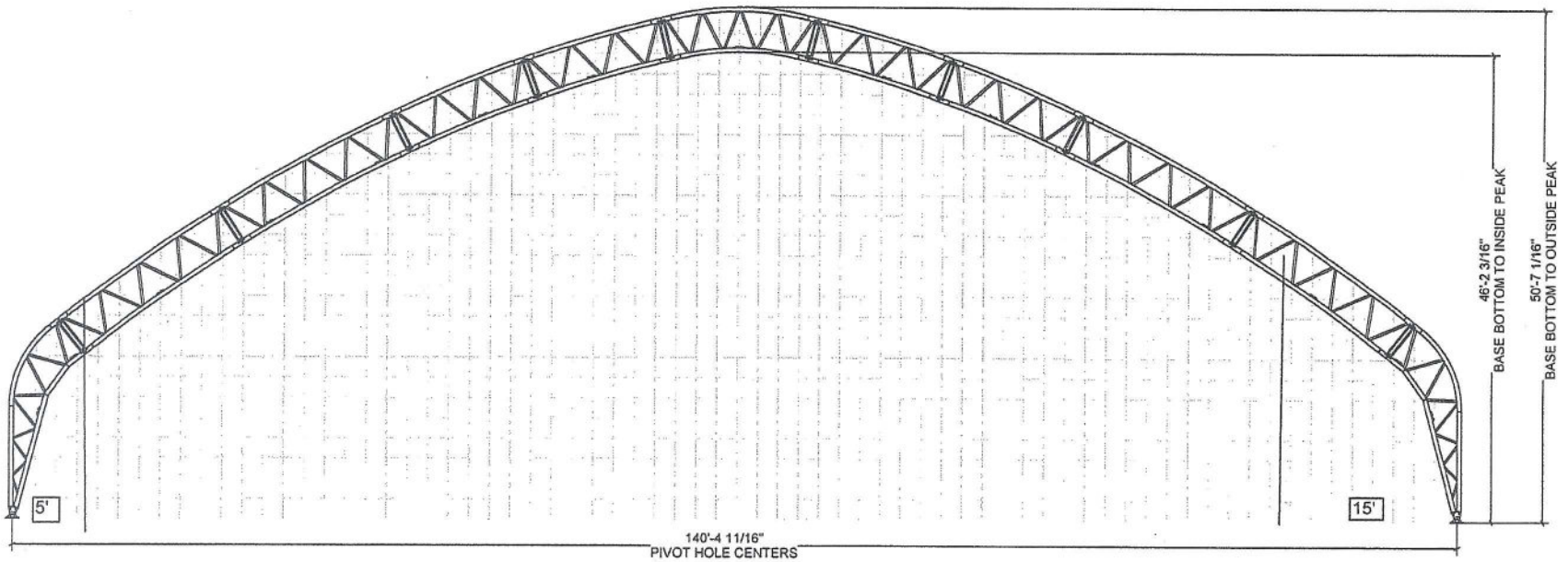
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE





T140HK
24" GRID



DEVELOPED BY
ClearSpan
ENGINEERING SERVICES & PRODUCTS CO.

ORDER #:

CUSTOMER #:

CUSTOMER INFORMATION:

STRUCTURE SKU #: T140HK

STRUCTURE SIZE:

STRUCTURE DESCRIPTION: 24" GRID

CONTACT PHONE:

CUSTOMER CONTACT:

SHEET TITLE:

DRAWING DETAILS	
DRAWN BY: CCC	CREATION DATE: 2/27/2017

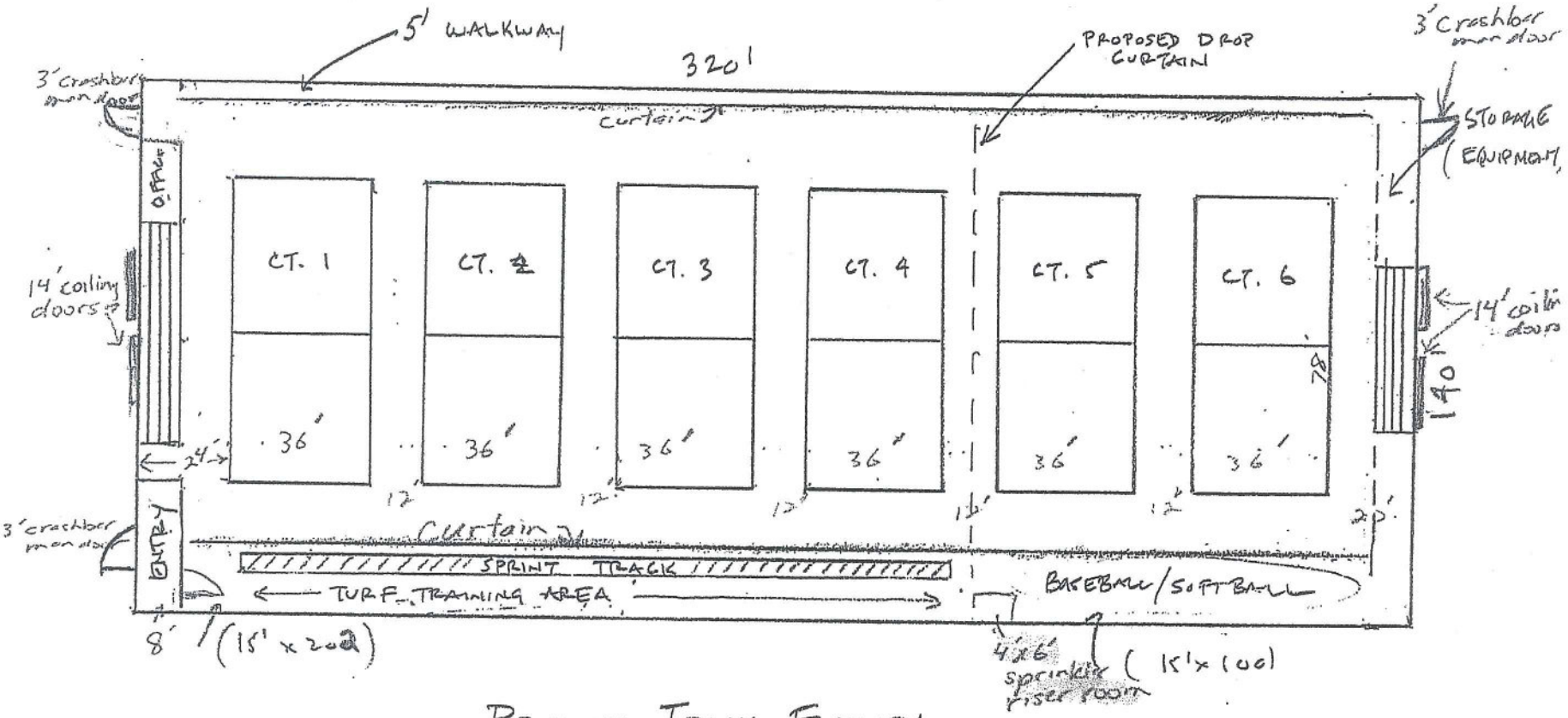
REVISIONS:

NO.	BY.	REVISION DATE:
1		
2		
3		
4		

NOT TO SCALE | SHEET SIZE: 11X17

SHEET:
A1-1.0

George Fox University Tennis



PROPOSED TENNIS FACILITY

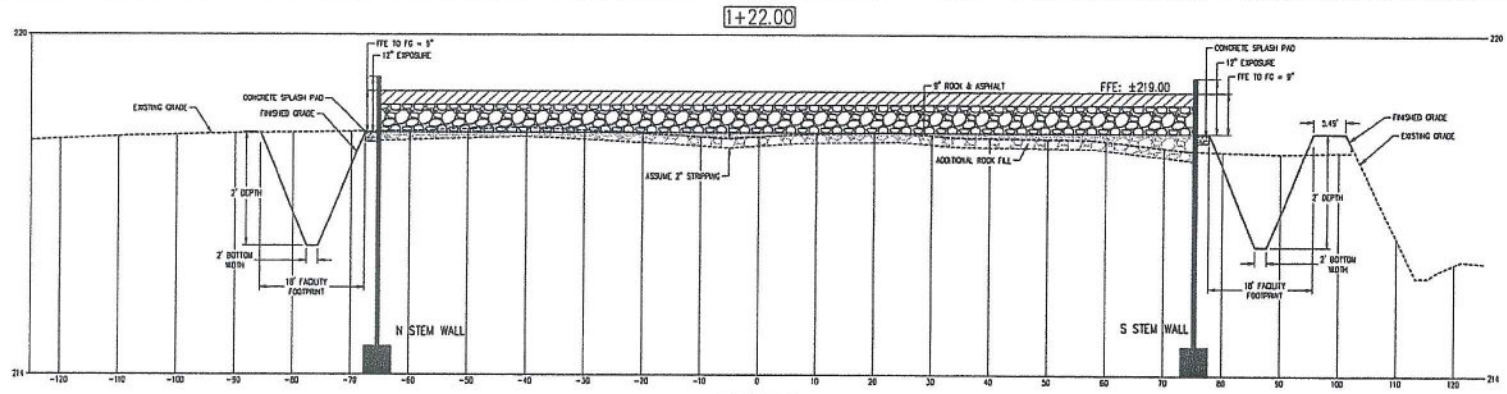
(140' x 320')

SCALE: 1/4" = 10 FT.

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS

36 x 6 = 216'
12 x 5 = 60'
20 x 2 = 40


SET
7
6
5
4
3
2
1
HOME



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GFU AUSTIN SPORTS COMPLEX
1013 CRESTVIEW DRIVE
NEWBERG, OREGON

TAX LOT 1905 — YAMHILL COUNTY TAX MAP 3216DA

CROSS SECTIONS

DESIGNED BY:	WJD
DRAWN BY:	WJD
CHECKED BY:	CCG
SCALE:	AS NOTED
DATE:	03/17/2017

REGISTERED PROFESSIONAL ENGINEER — OREGON — JULY 14, 1995 — CHARLES EDWARD GRIGSBY

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE 30 2017

REVISIONS

JOB NUMBER 5809

SHEET C101

AKS DRAWING FILE: 5809 SITE PLANNING [LAYOUT] CCG

AKS ENGINEERING & FORESTRY

☐ PHONE CONVERSATION ☐ MESSAGE ☐ MEETING ☐ OTHER _____

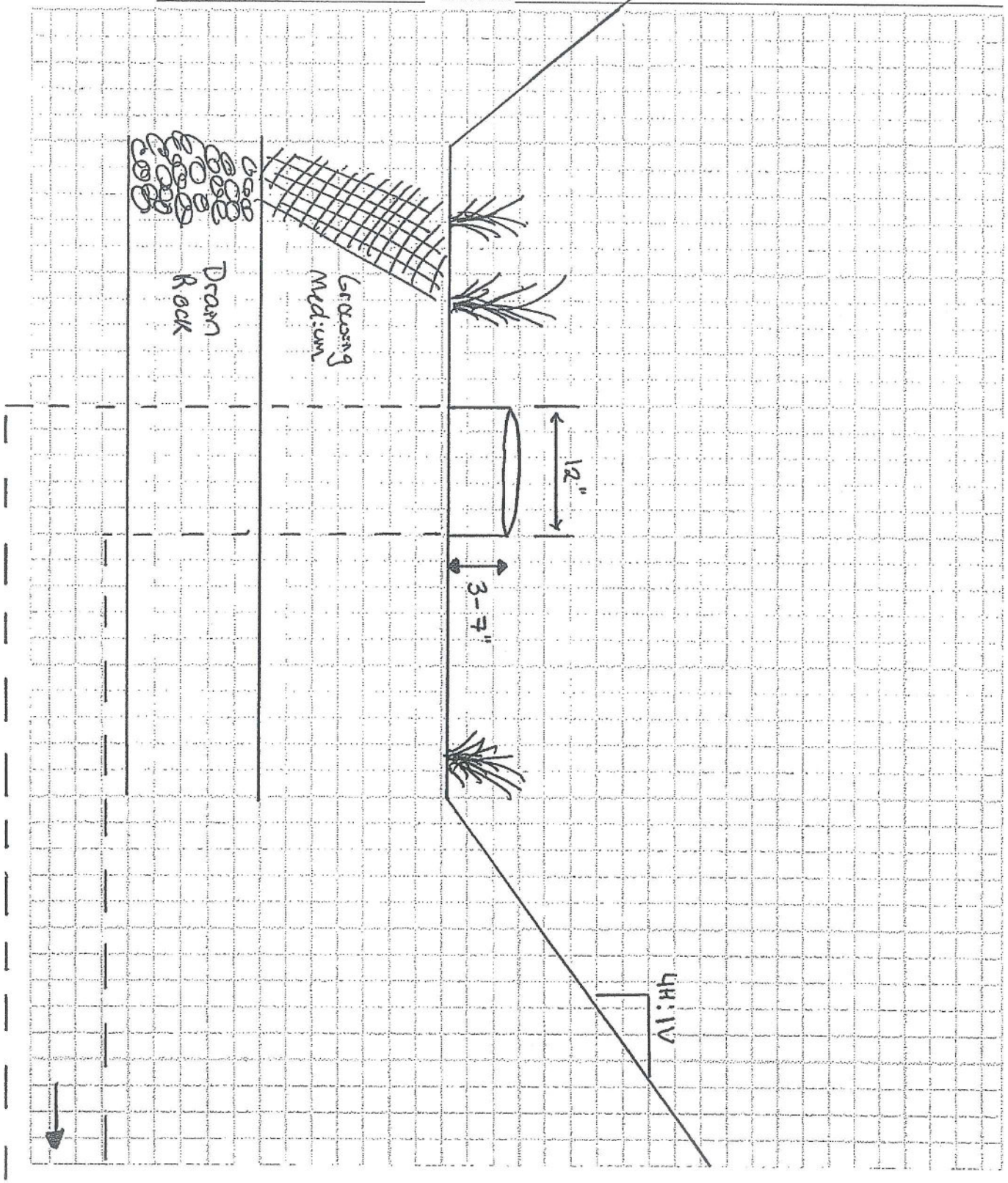
PROJECT NO. _____ PROJECT NAME _____ DATE/TIME _____

SUBJECT _____ INITIALS _____

www.aks-eng.com

PARTICIPANT(S) _____ OF/PHONE _____

_____ OF/PHONE _____



AKS ENGINEERING & FORESTRY

☐ PHONE CONVERSATION ☐ MESSAGE ☐ MEETING ☐ OTHER _____

PROJECT NO. _____ PROJECT NAME _____ DATE/TIME _____

SUBJECT _____ INITIALS _____

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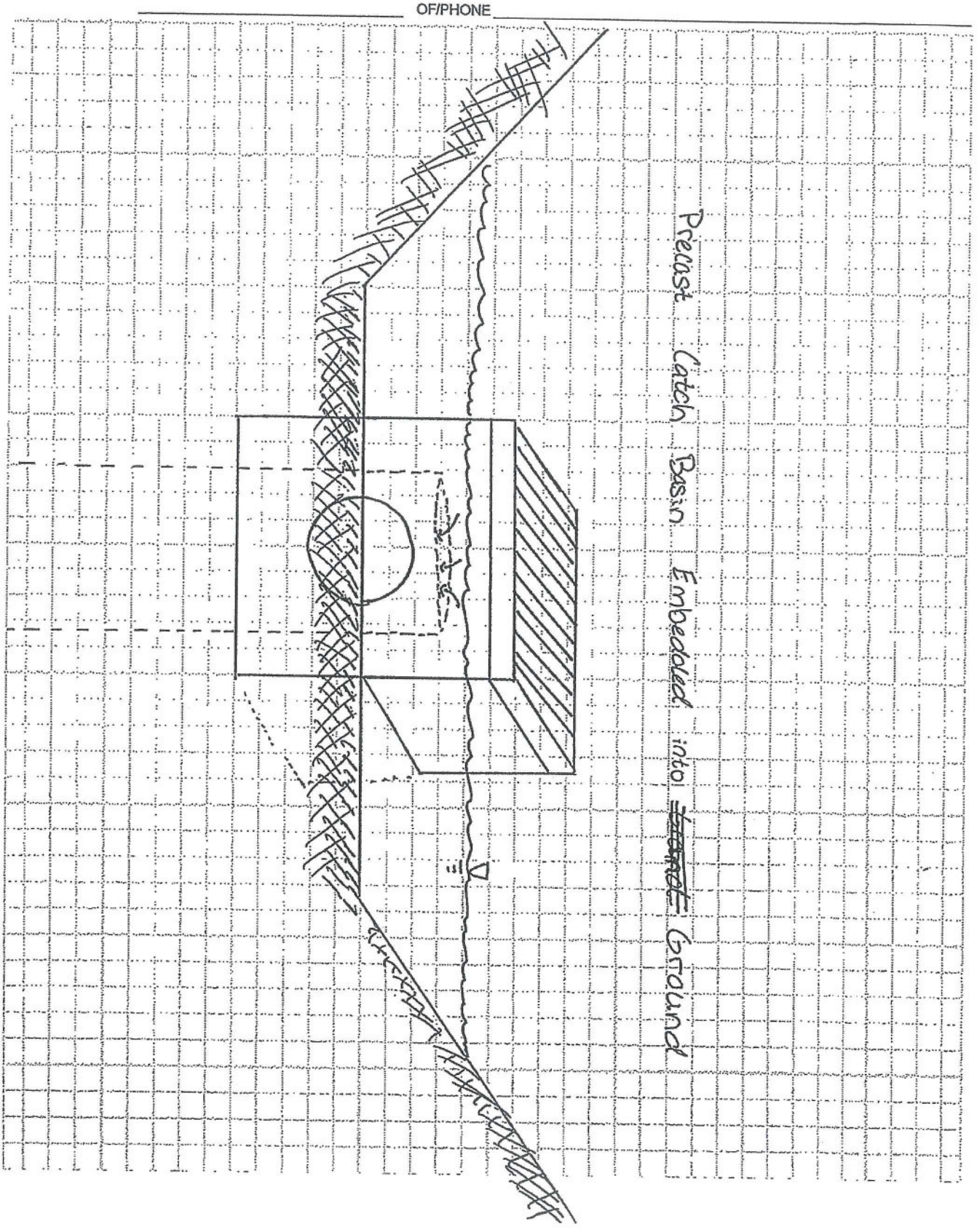
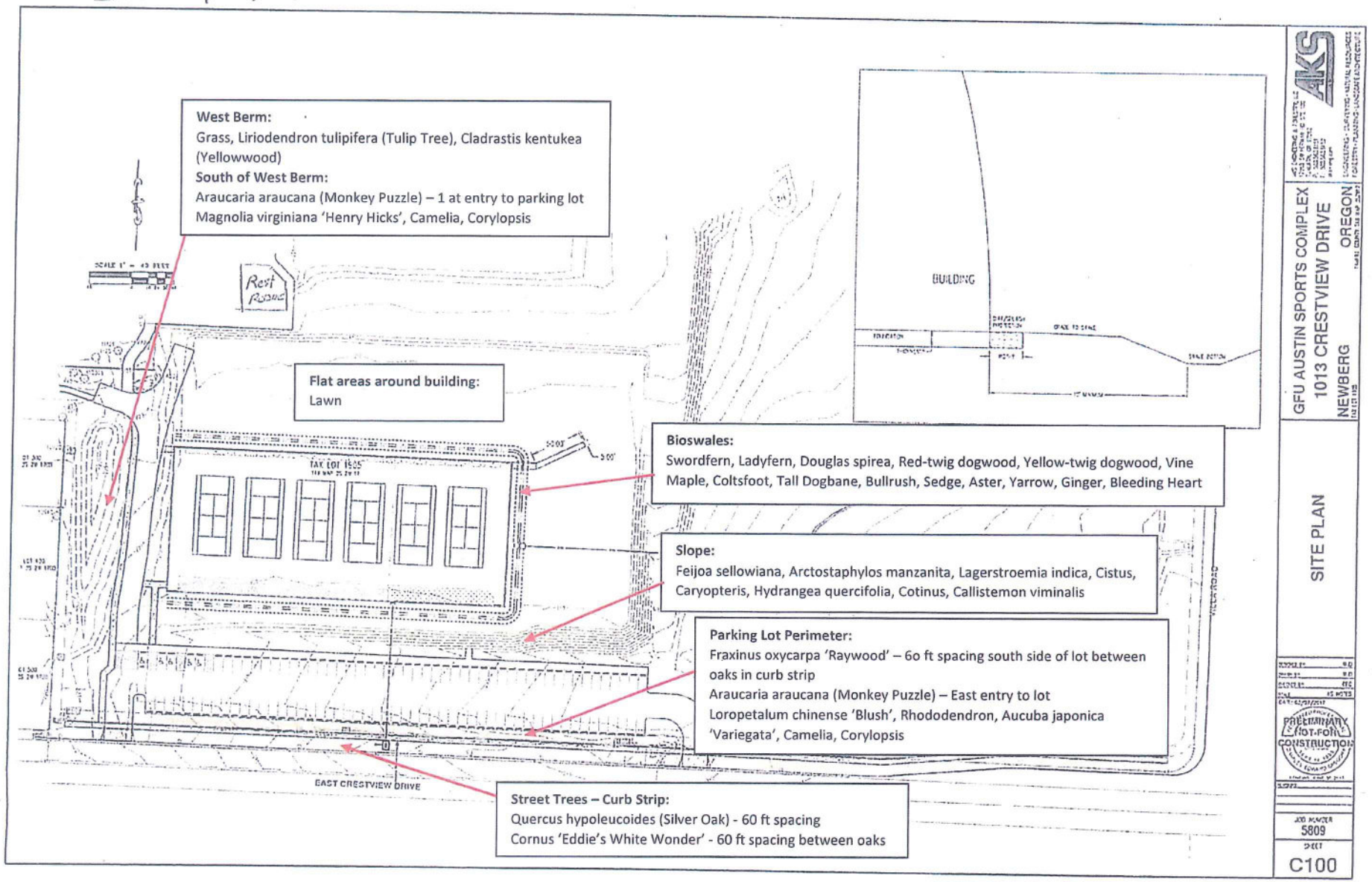
PARTICIPANT(S) _____ OF/PHONE _____

_____ OF/PHONE _____



Landscape Area



GFU AUSTIN SPORTS COMPLEX
1013 CRESTVIEW DRIVE
NEWBERG OREGON

SITE PLAN

PRELIMINARY NOT-FOR CONSTRUCTION

JOB NUMBER 5809

SHEET C100

e-conolight® OUTDOOR

Date : 24 Mar 2017

Title : Austin Parking.

Desc : Parking aprox. 450X60 (orange outline)

For : GFU

By : GFU

Luminaire

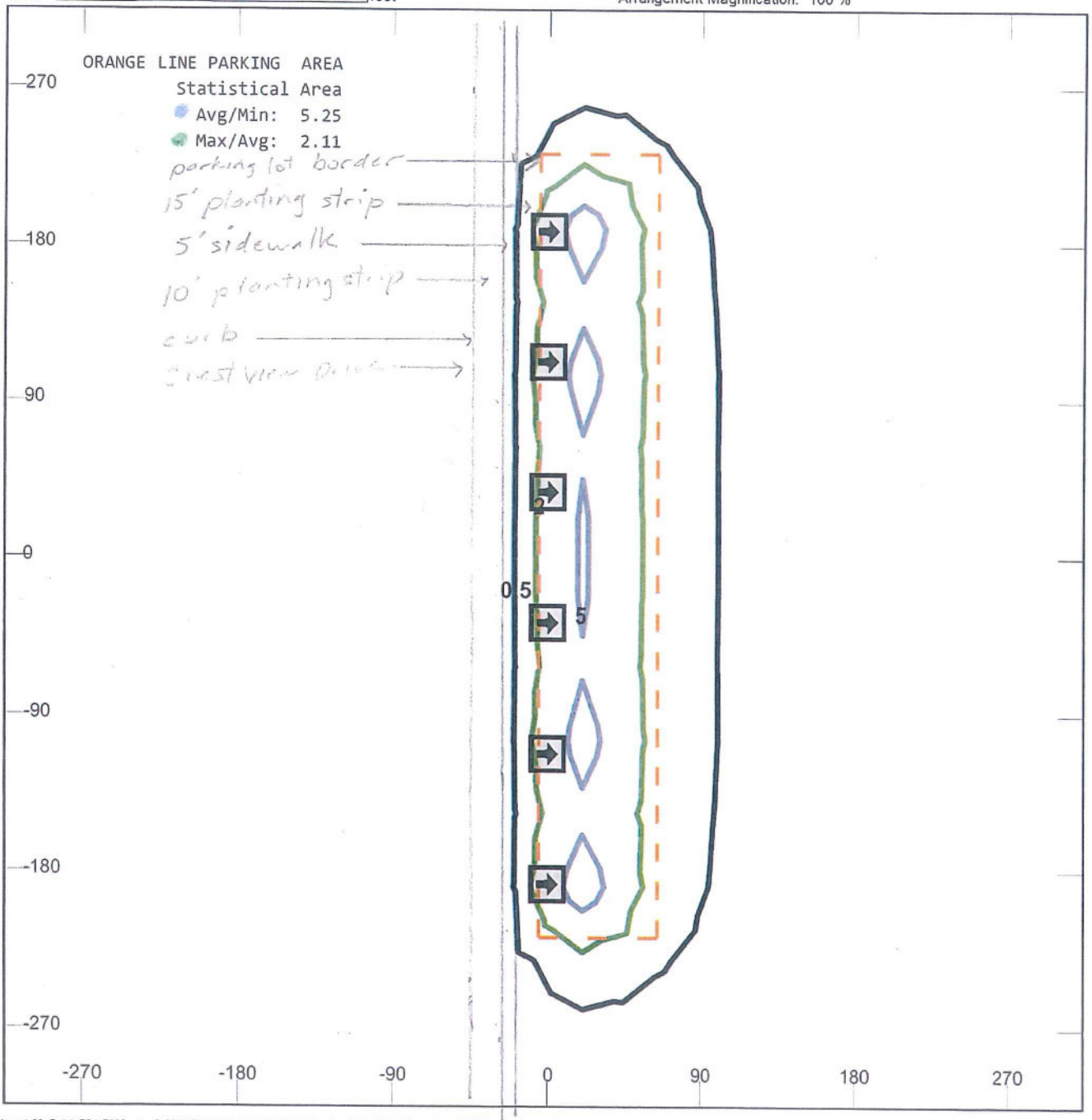
IES Filename : E-AL2L331CZ.IES

Description : E-AL2L331CZ
LED area light. Black metal housing, integrated heat sink.
Four LED arrays with
Four type CXA3050 LED arrays

Light Loss Factor :	1.00
Number of Lamps :	1
Lamp Lumens :	-1 lms
Luminaire Watts :	303 W

Scale: 0 90 18 feet

Arrangement Magnification: 100 %



GFU Austin Sports Complex
Newberg, Oregon

Stormwater Report

Date:	May 09, 2017
Client:	George Fox University 1101 North Villa Road Newberg, OR 97132
Engineering Contact:	Chuck Gregory, P.E. chuckg@aks-eng.com
Engineering Firm:	AKS Engineering & Forestry, LLC
AKS Job Number:	5809

AKS ENGINEERING & FORESTRY
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
P: (503) 563-6151
www.aks-eng.com

REGISTERED PROFESSIONAL ENGINEER
50644PE
PRELIMINARY
OREGON
SEPT. 14, 1999
CHARLES EDWARD GREGORY

RENEWS: JUNE 30, 20__

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APPENDIX C: PRE-DEVELOPMENT HYDROCAD CALCULATIONS
APPENDIX D: POST-DEVLOPMENT HYDROCAD CALCULATIONS
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APPENDIX F: TECHINICAL RELEASE 55 RUNOFF CURVE NUMBERS
APPENDIX G: DOWNSTREAM ANALYSIS MAP
APPENDIX H: OPERATIONS AND MAINTENANCE OF FACILITIES

Exhibit

EXHIBIT A: BENEFITED PROPERTY LEGAL DESCRIPTION AND FACILITY AGREEMENT AREA
EXHIBIT B: SITE SPECIFIC MAINTENANCE PLAN AND CHECKLIST

Stormwater Report
GFU AUSTIN SPORTS COMPLEX
NEWBERG, OREGON

1.0 Purpose of Report
The purpose of this report is to analyze the effects of the proposed developments on the existing stormwater conveyance system and to document the criteria, methodology, and informational sources by which the proposed stormwater system has been designed.

2.0 Project Location/Description
The proposed improvements are positioned in the southwest portion of Tax Lot 1905 (Yamhill County Tax Map 3S 2W 17), along Crestview Drive west of the intersection with Villa Road.

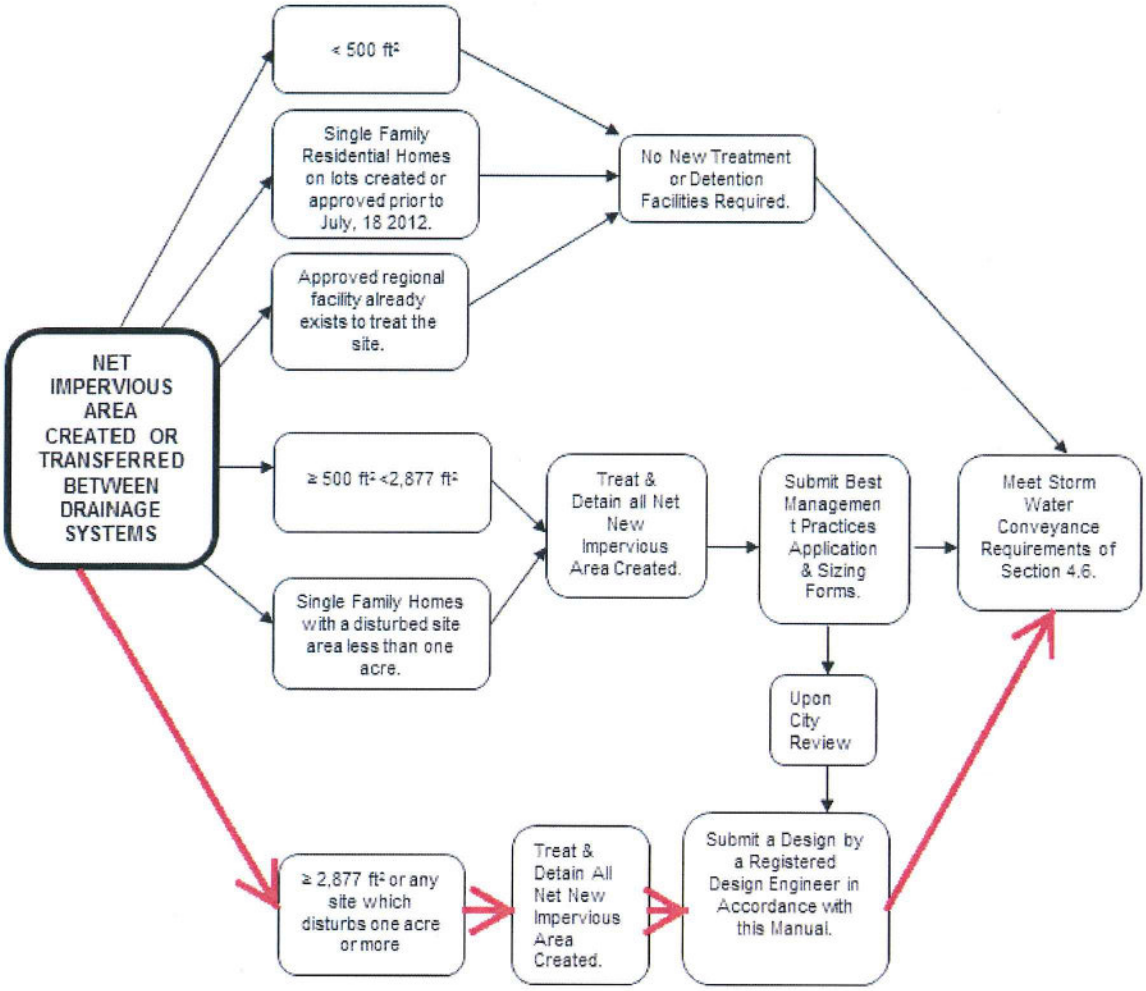
To the north of the project site, within the tax lot, there are existing athletic facilities with pedestrian paths. The eastern portion of the lot is undeveloped.

Proposed improvements include the construction of a domed fabric structure, a porous parking area, concrete sidewalks, and stormwater facilities; no demolition will be necessary. Surface water drainage will be provided with porous pavement and with the construction of a flat-bottomed swale/planter engineered to provide water quantity control and water quality treatment for post-development runoff.

3.0 Regulatory Design Criteria
Stormwater criteria was designed per the City of Newberg Public Works Design and Construction Standards (August 2015). Per the figure below, the stormwater facilities are engineered to treat and detain all new net impervious area created.

4.6 Water Quantity and Quality Facilities

Figure 4.4 Storm water Quality & Quantity Design Flow Chart



3.1 STORMWATER QUANTITY

4.7.1.III Water Quantity Facility Design & Control Standards

Stormwater quantity on-site detention facilities shall be designed to capture runoff so the post-development runoff rates from the site do not exceed the predevelopment runoff rates from the site, based on 24-hour storm events ranging from the ½ of the 2-year return storm to the 25-year return storm. Specifically, the ½ of the 2, 2, 10, and 25-year post-development runoff rates will not exceed their respective ½ of the 2, 2, 10, and 25-year pre-development runoff rates….

3.2 STORMWATER QUALITY

4.8.5 Water Quality Storm

The storm defines both the volume and rate of runoff. The stormwater quality only facilities shall be designed for a dry weather storm event totaling 1.0 inches of precipitation falling in 24 hours…

4.0 Design Methodology

The Santa Barbara Urban Hydrograph (SBUH) Method was used to analyze stormwater runoff from the site. This method utilizes the SCS Type 1A 24-hour design storm. HydroCAD computer software version 10.00-18 aided in the analysis.

5.0 Design Parameters

5.1 DESIGN STORMS – CONVEYANCE SIZING

Stormwater mains, inlets, and laterals for the site are placed at locations that adequately collect and control the stormwater for the site. The stormwater pipes are sized using Manning's equation based on peak flows for the 25-year storm event.

5.2 PRE-DEVELOPED SITE CONDITIONS

5.2.1 Site Topography

The center of the existing site is graded with a crown with slopes ranging up to one (1) percent. Runoff sheet flows to a ditch to the south and through an existing culvert. Stormwater then flows to an existing ditch inlet, west of Villa Road.

There is an existing on-site gravel parking/staging area to the south and gravel paths flanking the east and west sides of the project site. The gravel path to the west is used as a fire apparatus access for the existing athletic facilities located on the lot. Runoff from these gravel areas sheet flows to the south and to the east where it collects in a ditch and is conveyed to the ditch inlet west of Villa Road.

A small portion of runoff from the westernmost area of the site sheet flows to an existing swale/rain garden along the pedestrian path connecting the site to N Center Street.

The time of concentration (Tc) is based on a combination of sheet flow and shallow concentrated flow. See Appendix C for input parameters.

5.2.2 Land Use

The current land use is zoned for institutional development.

5.3 SOIL TYPE

Per Section 4.5.4 Santa Barbara Urban Hydrograph (SBUH) of the City of Newberg Public Works Design and Construction Standards (August 2015):

> *II. Curve numbers shall be derived from the National Resources Conservation Service's (NRCS) runoff curve numbers contained in Technical Release 55 (TR-55)-Urban Hydrology for Small Watersheds.*
>
> *III. Soil types shall be derived from the NRCS Soil Survey for Yamhill County.*

The soils for the site are classified as Aloha Silt Loam (0 to 3% slopes) and Woodburn Silt Loam (3 to 12% slopes) per the USDA Soil Survey for Yamhill County. Information for these soils and selected curve numbers are contained within Appendix E and F, respectively, of this report.

5.4 POST-DEVELOPED SITE CONDITIONS

5.4.1 Site Topography

A domed fabric structure will be constructed on the crowned portion of the site. A swale will be constructed around three (3) sides. Runoff from the building will be treated as it infiltrates through the growing medium and then conveyed to an overflow which conveys stormwater to a flow spreader in the undeveloped eastern section of the property.

The gravel parking area along Crestview Drive will be dug out, scarified, and replaced with porous asphalt underlain with drain rock. Any excess rainfall that permeates through the porous pavement will flow along the sloped subgrade, be collected in a perforated pipe, and discharge to an existing culvert. This runoff will then flow as in pre-developed conditions.

The gravel fire access road to the west will remain, for the most part, as gravel. Approximately 70 feet will be removed and replaced with porous asphalt. Any excess rainfall from the northeast portion of the gravel road will sheet flow east onto the site where it will have the opportunity to infiltrate (see Post-Development Catchment Map). A small portion to the northwest will drain to an existing grassy swale which discharges to existing stormwater facilities. The majority of runoff from the gravel road will sheet flow to a french drain which will discharge to the swale.

Site topography will not change outside of the immediate improvement areas. Stormwater will either be collected and detained in the water quality swale or sheet flow as in pre-developed conditions. The discharge locations will mimic the existing runoff conditions.

5.4.2 Land Use

The site land-use will remain unchanged. The tax lot is developed with athletic facilities for the educational institution (George Fox University) or remains undeveloped.

5.4.3 Post-Developed Input Parameters

Per the City of Newberg *Public Works Design and Construction Standards (August 2015)*, curve numbers for input are to be taken from Technical Release 55 (TR-55)-Urban Hydrology for Small Watersheds. Per the NRCS Soil Survey for Yamhill County, the hydrological soil group for on-site soils is C.

The existing ground is most accurately described as "open space, fair condition." Grass cover is sparse in places but overall covers more than 50 percent. A curve number of 79 is used for on-site soils. See Appendix F for additional input parameters.

During the on-site geotechnical investigation, equipment limitations and site topography meant that infiltration testing could not be performed. Per the USDA NRCS Soil Survey for Yamhill County, Oregon, the capacity of the most limiting layer to transmit water (Ksat) for Aloha silt loam is 0.20 to 0.57 in/hr. Applying a factor of safety of 2.0 to the most conservative value of 0.20 in/hr, a design infiltration rate of 0.10 in/hr was chosen.

The minimum time of concentration (Tc) was conservatively assumed to be 5 minutes.

5.4.4 Description of Off-Site Contributing Basins

There are no off-site contributory basins. Runoff from the northern section of the property will sheet flow to the existing ditch inlet and will not be routed through the proposed stormwater infrastructure.

6.0 Stormwater Analyses

6.1 PROPOSED STORMWATER CONDUIT SIZING AND INLET SPACING

The stormwater pipes are adequately sized to capture and convey flows from the 25-year storm event.

6.2 PROPOSED STORMWATER QUALITY CONTROL FACILITY

Stormwater quantity control will be provided with the construction of LIDA facilities, a porous pavement parking lot and a flat-bottomed vegetated swale/planter which surrounds the north, south, and east sides of the structure. The two lengths of the swale drain to an overflow standpipe located on the east side of the structure. The elevation of the standpipe is designed to detain the released runoff to pre-developed rates.

The swale is underlain with 18 inches of growing medium and 12 inches of drain rock. A perforated pipe runs along the length of the swale, at the bottom of the drain rock layer. The two perforated pipes (running along the north and south end) meet and tie into the standpipe overflow. The orifice size from the perforated pipe is engineered to meet required release rates and is accounted for in the stormwater design.

6.3 PROPOSED STORMWATER QUALITY CONTROL FACILITY DESIGN

Stormwater quality control will be provided with the construction of a flat-bottomed swale/planter which surrounds the north, south, and east sides of the structure, as well as porous pavement for the parking area.

The swale is underlain with 18 inches of growing medium with a composition meeting the requirements of section A2.2.III.b of Appendix A of the City of Newberg Public Works Design and Construction Standards (August 2015). It is assumed that the growing medium has an infiltration rate of 2 in/hr.

The prescribed water quality storm completely infiltrates through the growing medium before being collected in the perforated pipe and released into the standpipe overflow.

6.4 STORMWATER SUMMARY

Table 6-4 Stormwater Summary

Storm Event	Rainfall Depth (inches)	Pre-Developed Flow (cfs)	Total Post-Developed Flow (cfs)	Flow Released (cfs)	Difference (cfs)	*Detention Volume Provided (cf)	Detention Volume Utilized (cf)
½ 2-Year	1.25	0.21	1.65	0.21	-0.00	17,384	1,190
2-Year	2.50	1.46	4.61	1.22	-0.24	17,384	3,754
10-Year	3.50	2.78	7.03	2.77	-0.01	17,384	5,389
25-Year	4.00	3.47	8.24	3.08	-0.39	17,384	6,300

*Note: Detention volume provided includes 12" of freeboard above the 25-year storm peak elevation.

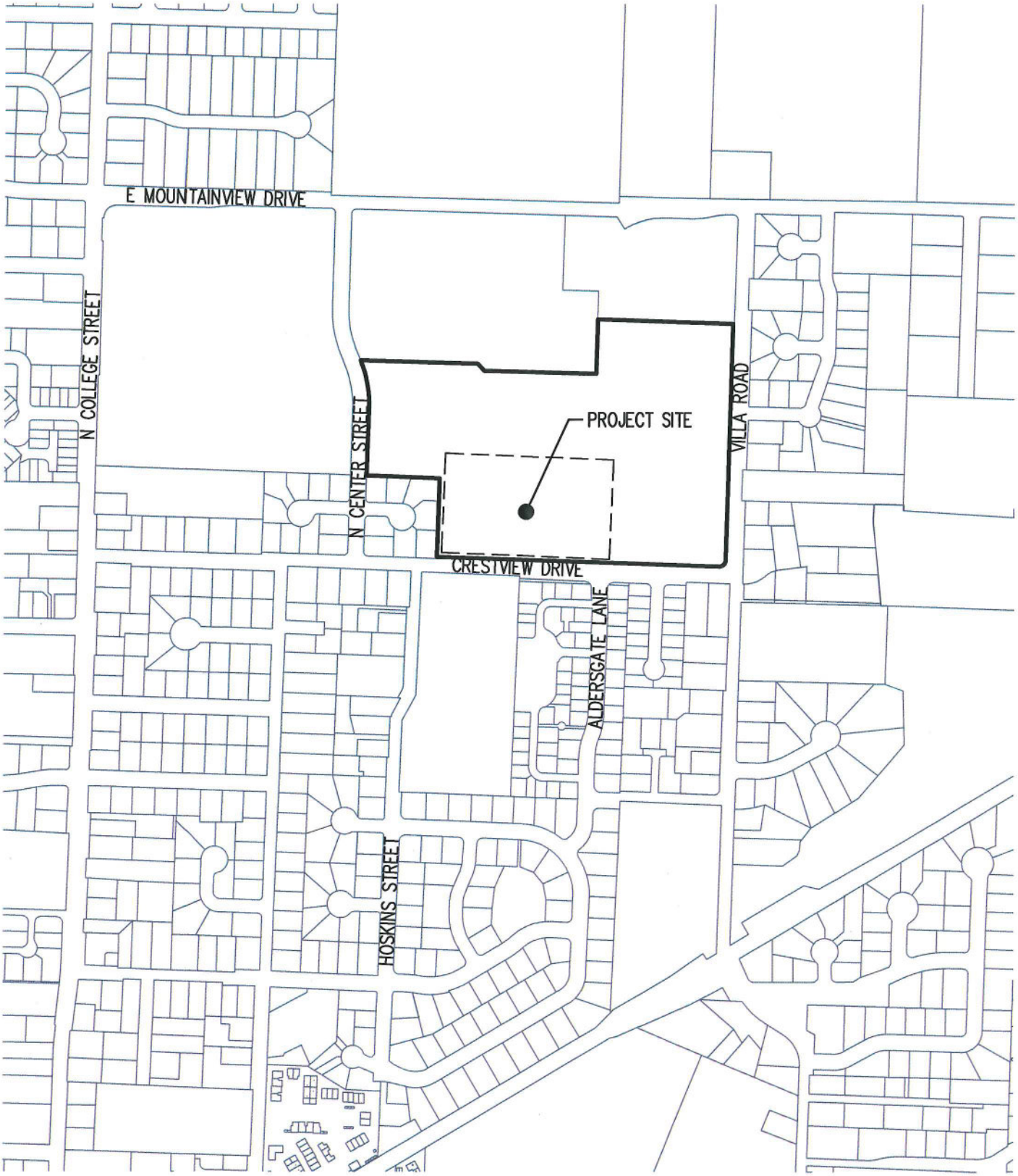
It should also be noted that the flow released for the 100-year design storm is 3.34 cfs (see hydroCAD calculations). This value is less than the pre-developed release rate for the 25-year storm. In addition, the total utilized storage for the 100-year storm is less than half of the total capacity of the swale with the required 12" of freeboard (7,257 cf out of 17,384 cf). The planned improvements will lessen the demand on the public storm system during large storms.

6.5 DOWNSTREAM ANALYSIS

The proposed improvements include stormwater facilities to treat and detain all new net impervious area created. The stormwater impact from the development ends at the proposed flow spreader, where runoff rates and conditions mirror those in the pre-developed state. See Appendix G for the downstream analysis map.

The post-development discharge to the existing ditch inlet (and then to Hess Creek) will be less than or equal to pre-developed rates. Therefore, no impact to the downstream public storm system is anticipated.

Appendix A: Vicinity Map



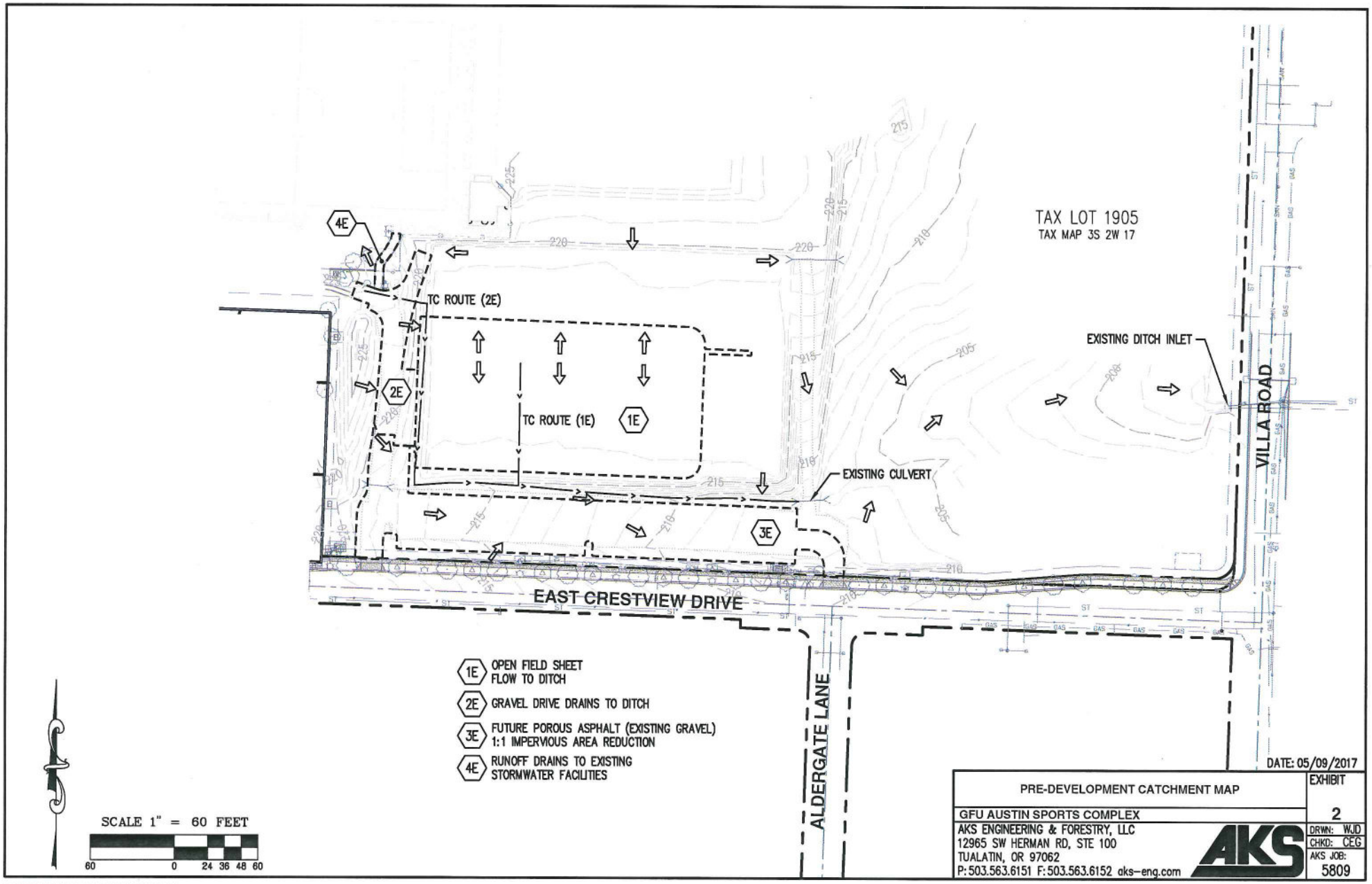
NTS

DATE: 05/09/2017

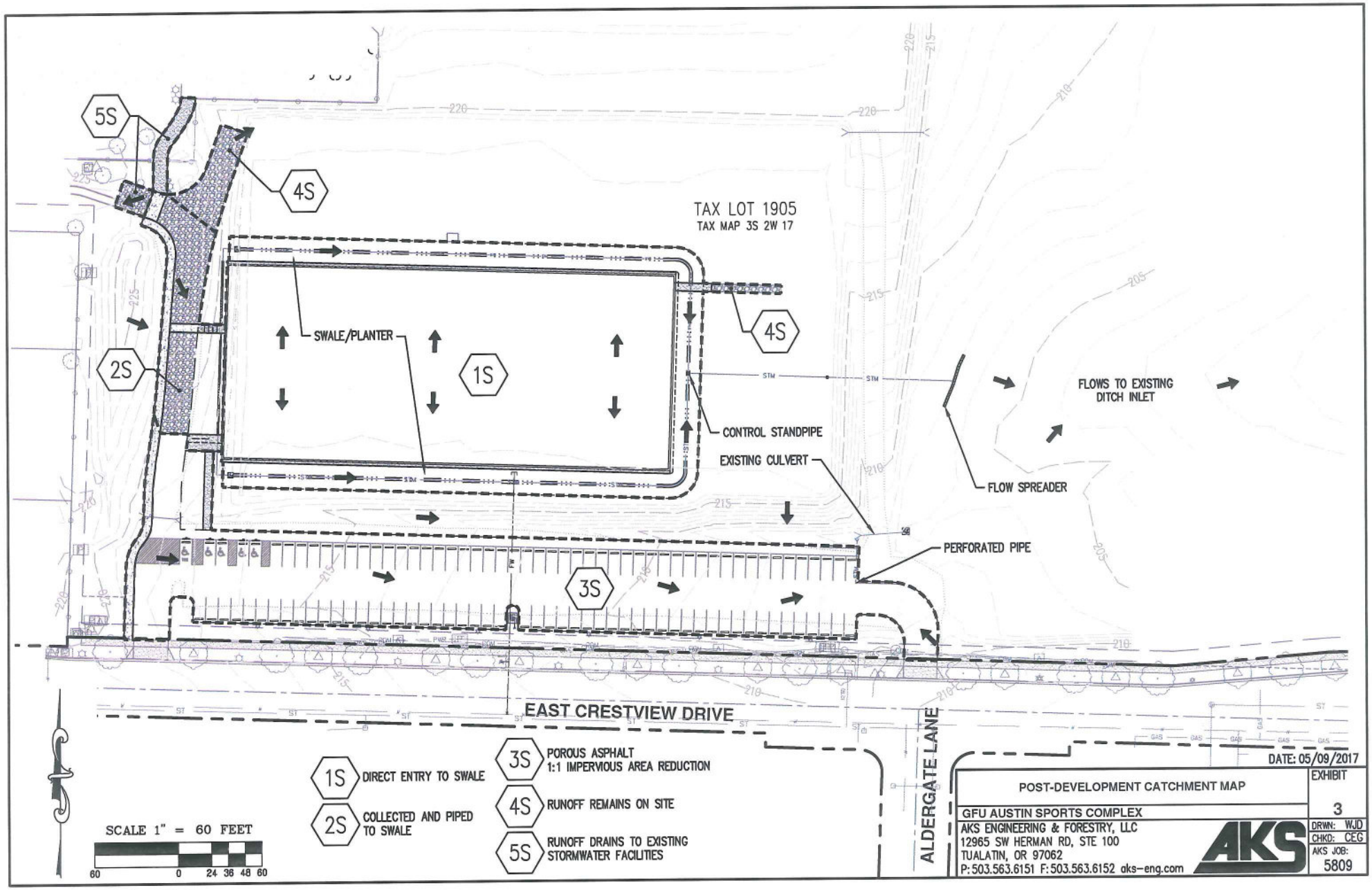
VICINITY MAP	EXHIBIT 1
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD, STE 100 TUALATIN, OR 97062 P: 503.563.6151 F: 503.563.6152 aks-eng.com	DRWN: WJD CHKD: CEG AKS JOB: 5809

DWG: 5809 COVER | VICINITY MAP

Appendix B: Catchment Maps



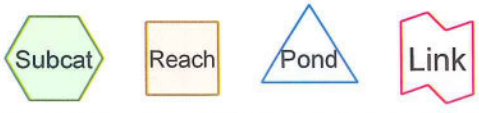
DWG: 5809 STORMWATER EXHIBITS-PRE | PRE-DEVELOPED


TAX LOT 1905
TAX MAP 3S 2W 17
5S
4S
2S
1S
3S
SWALE/PLANTER
CONTROL STANDPIPE
EXISTING CULVERT
PERFORATED PIPE
FLOWS TO EXISTING DITCH INLET
FLOW SPREADER
EAST CRESTVIEW DRIVE
ALDERGATE LANE
SCALE 1" = 60 FEET
60 0 24 36 48 60
1S DIRECT ENTRY TO SWALE
2S COLLECTED AND PIPED TO SWALE
3S POROUS ASPHALT 1:1 IMPERVIOUS AREA REDUCTION
4S RUNOFF REMAINS ON SITE
5S RUNOFF DRAINS TO EXISTING STORMWATER FACILITIES
DATE: 05/09/2017
POST-DEVELOPMENT CATCHMENT MAP
EXHIBIT 3
GFU AUSTIN SPORTS COMPLEX
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com
DRWN: WJD
CHKD: CEG
AKS JOB: 5809
DWG: 5809 STORMWATER EXHIBITS-POST | POST-DEVELOPED

Appendix C: Pre-Developed HydroCAD Calculations

OPEN FIELD SHEET FLOW TO DITCH

GRAVEL DRIVE DRAINS TO DITCH



Routing Diagram for PRE DEVELOPED
Prepared by AKS Engineering & Forestry, Printed 5/2/2017

Summary for Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH

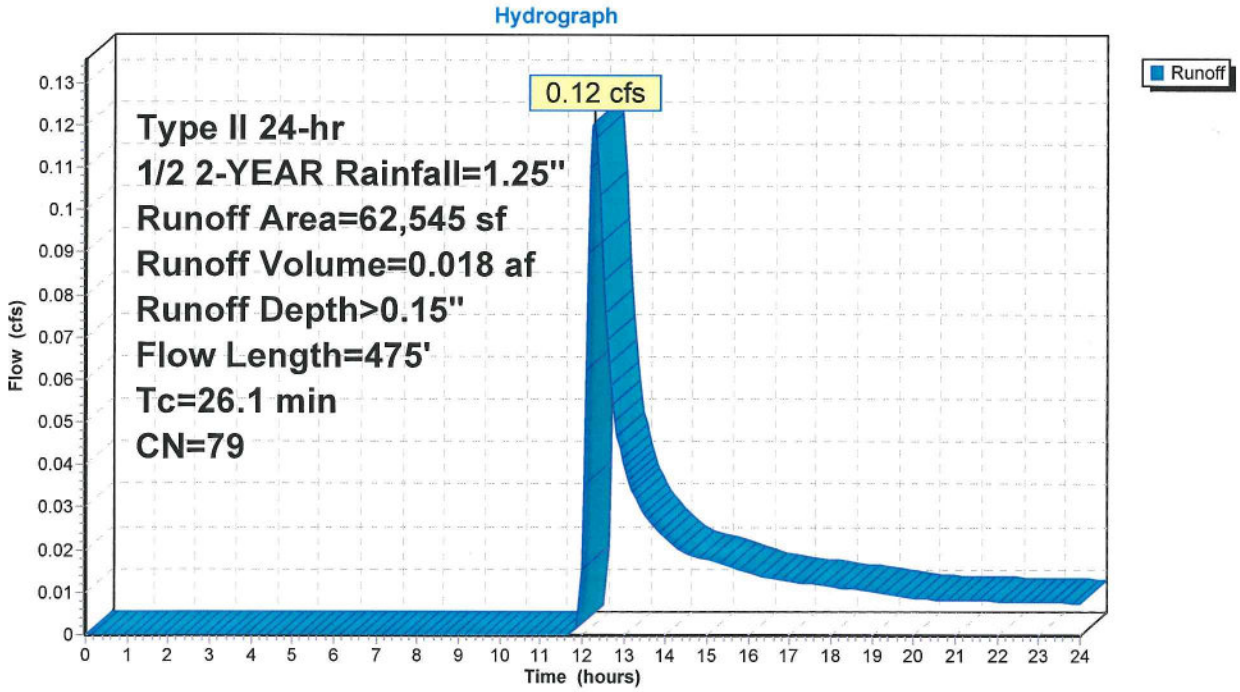
Runoff = 0.12 cfs @ 12.28 hrs, Volume= 0.018 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1/2 2-YEAR Rainfall=1.25"

	Area (sf)	CN	Description
*	62,545	79	OPEN SPACE, POOR CONDITION
	62,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	140	0.0060	0.10		**Sheet Flow, SHEET FLOW TO DITCH** Grass: Short n= 0.150 P2= 2.50"
2.6	335	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW** Grassed Waterway Kv= 15.0 fps
26.1	475	Total			

Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH



Summary for Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH

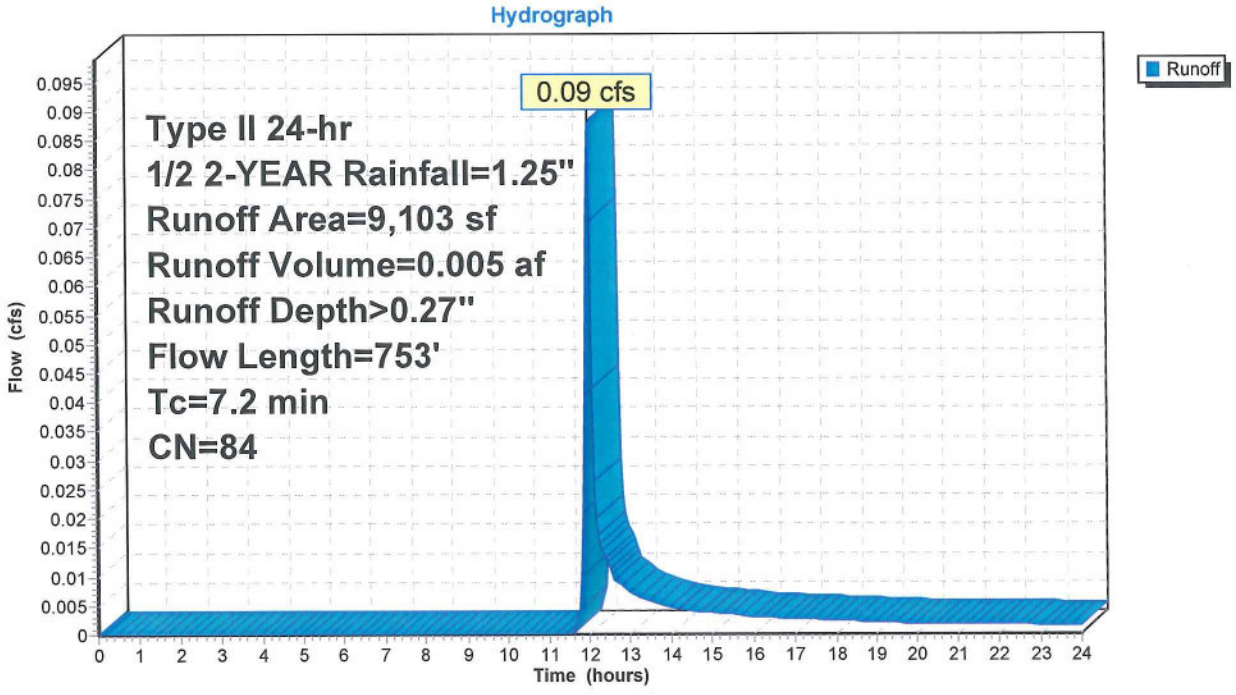
Runoff = 0.09 cfs @ 12.00 hrs, Volume= 0.005 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1/2 2-YEAR Rainfall=1.25"

	Area (sf)	CN	Description
*	4,931	89	EXISTING GRAVEL
*	4,172	79	OPEN SPACE, FAIR CONDITION
	9,103	84	Weighted Average
	9,103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	75	0.0930	2.12		**Sheet Flow, SHEET FLOW OVER GRAVEL TO DITCH** Smooth surfaces n= 0.011 P2= 2.50"
3.1	218	0.0060	1.16		**Shallow Concentrated Flow, DITCH FLOW #`1** Grassed Waterway Kv= 15.0 fps
3.5	460	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW #2** Grassed Waterway Kv= 15.0 fps
7.2	753	Total			

Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH



Summary for Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH

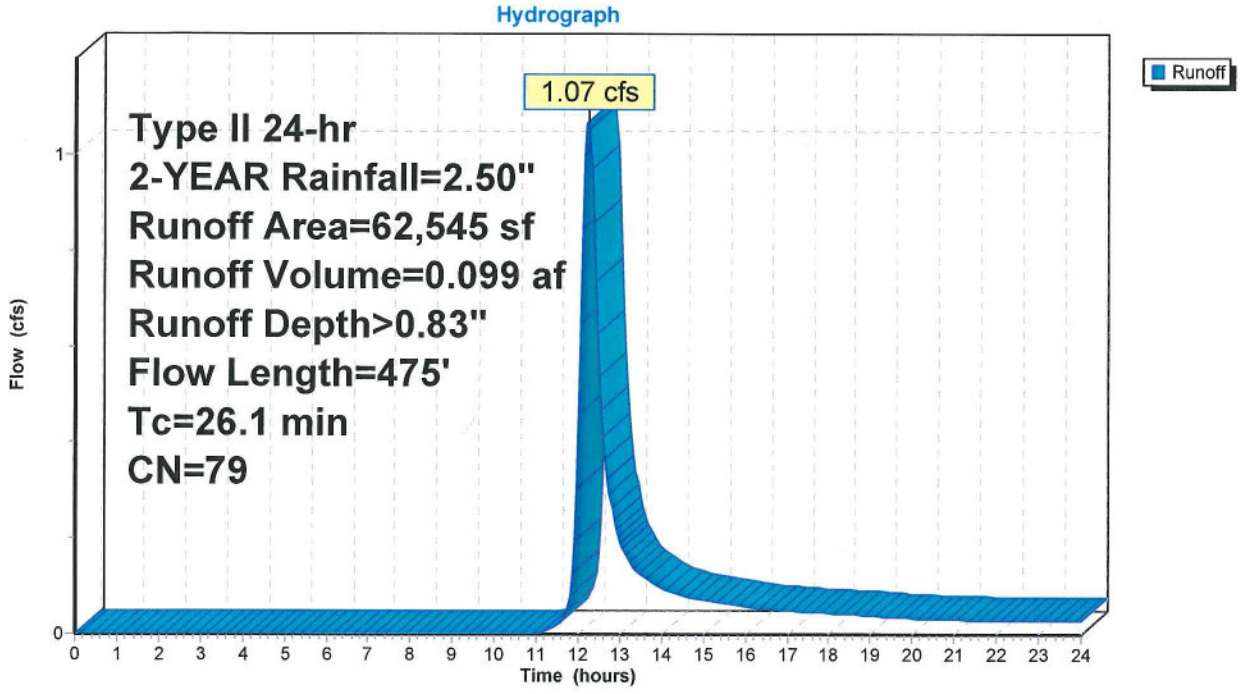
Runoff = 1.07 cfs @ 12.22 hrs, Volume= 0.099 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YEAR Rainfall=2.50"

	Area (sf)	CN	Description
*	62,545	79	OPEN SPACE, POOR CONDITION
	62,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	140	0.0060	0.10		**Sheet Flow, SHEET FLOW TO DITCH** Grass: Short n= 0.150 P2= 2.50"
2.6	335	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW** Grassed Waterway Kv= 15.0 fps
26.1	475	Total			

Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH



Summary for Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH

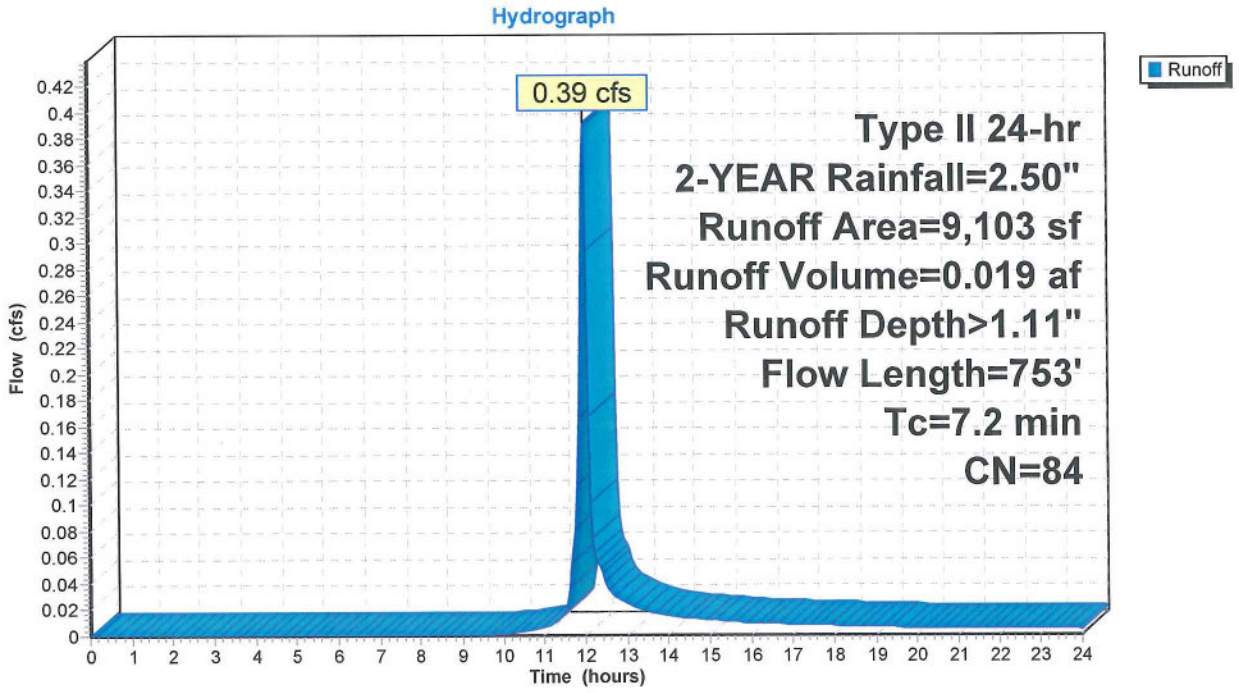
Runoff = 0.39 cfs @ 11.99 hrs, Volume= 0.019 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YEAR Rainfall=2.50"

	Area (sf)	CN	Description
*	4,931	89	EXISTING GRAVEL
*	4,172	79	OPEN SPACE, FAIR CONDITION
	9,103	84	Weighted Average
	9,103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	75	0.0930	2.12		**Sheet Flow, SHEET FLOW OVER GRAVEL TO DITCH** Smooth surfaces n= 0.011 P2= 2.50"
3.1	218	0.0060	1.16		**Shallow Concentrated Flow, DITCH FLOW #`1** Grassed Waterway Kv= 15.0 fps
3.5	460	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW #2** Grassed Waterway Kv= 15.0 fps
7.2	753	Total			

Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH



Summary for Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH

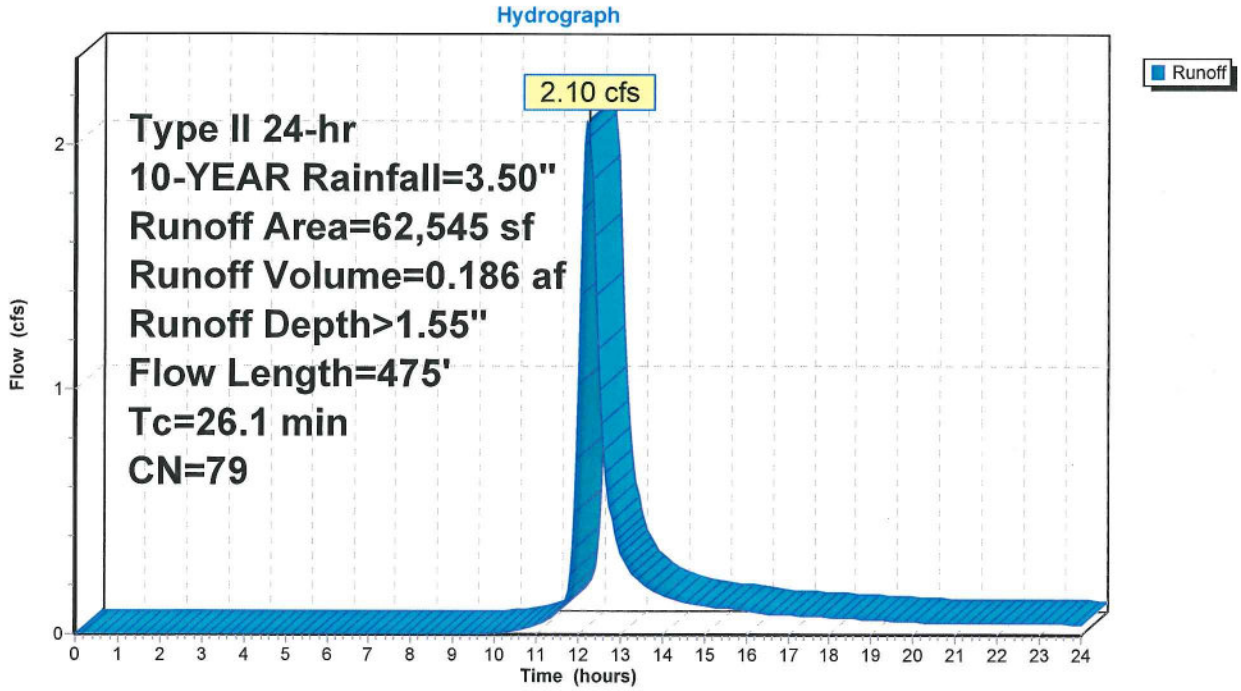
Runoff = 2.10 cfs @ 12.21 hrs, Volume= 0.186 af, Depth> 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YEAR Rainfall=3.50"

	Area (sf)	CN	Description
*	62,545	79	OPEN SPACE, POOR CONDITION
	62,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	140	0.0060	0.10		**Sheet Flow, SHEET FLOW TO DITCH** Grass: Short n= 0.150 P2= 2.50"
2.6	335	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW** Grassed Waterway Kv= 15.0 fps
26.1	475	Total			

Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH



Summary for Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH

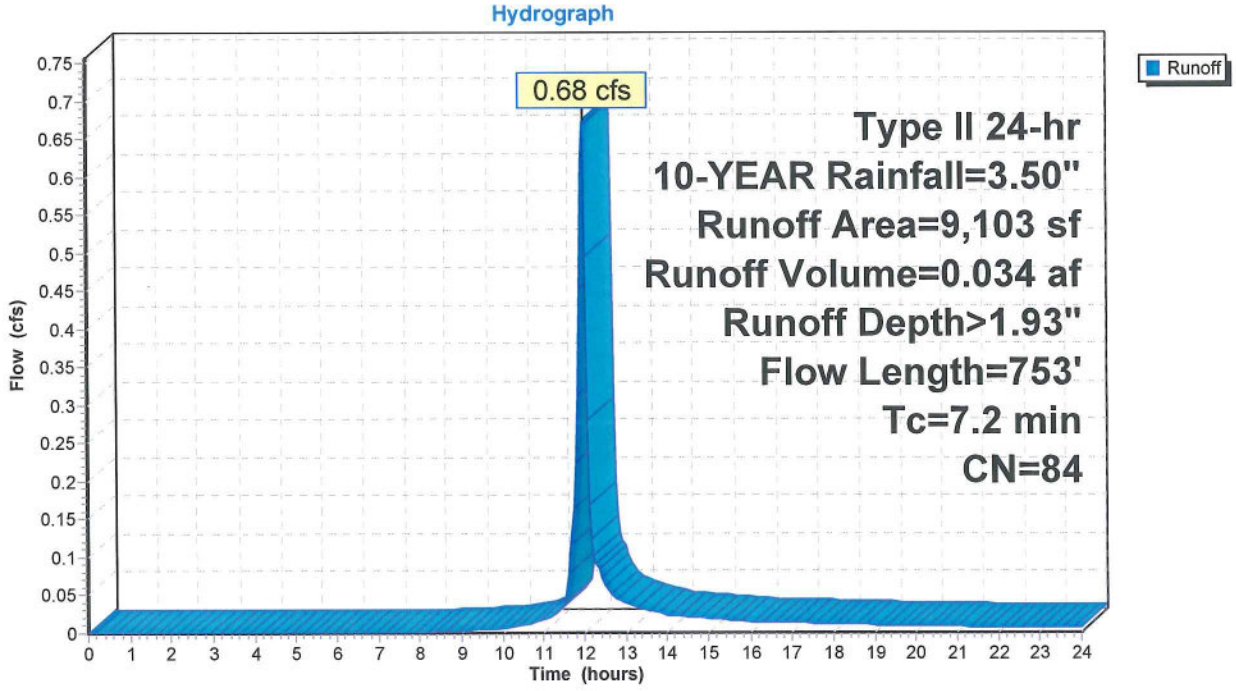
Runoff = 0.68 cfs @ 11.99 hrs, Volume= 0.034 af, Depth> 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YEAR Rainfall=3.50"

	Area (sf)	CN	Description
*	4,931	89	EXISTING GRAVEL
*	4,172	79	OPEN SPACE, FAIR CONDITION
	9,103	84	Weighted Average
	9,103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	75	0.0930	2.12		**Sheet Flow, SHEET FLOW OVER GRAVEL TO DITCH** Smooth surfaces n= 0.011 P2= 2.50"
3.1	218	0.0060	1.16		**Shallow Concentrated Flow, DITCH FLOW #`1** Grassed Waterway Kv= 15.0 fps
3.5	460	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW #2** Grassed Waterway Kv= 15.0 fps
7.2	753	Total			

Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH



Summary for Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH

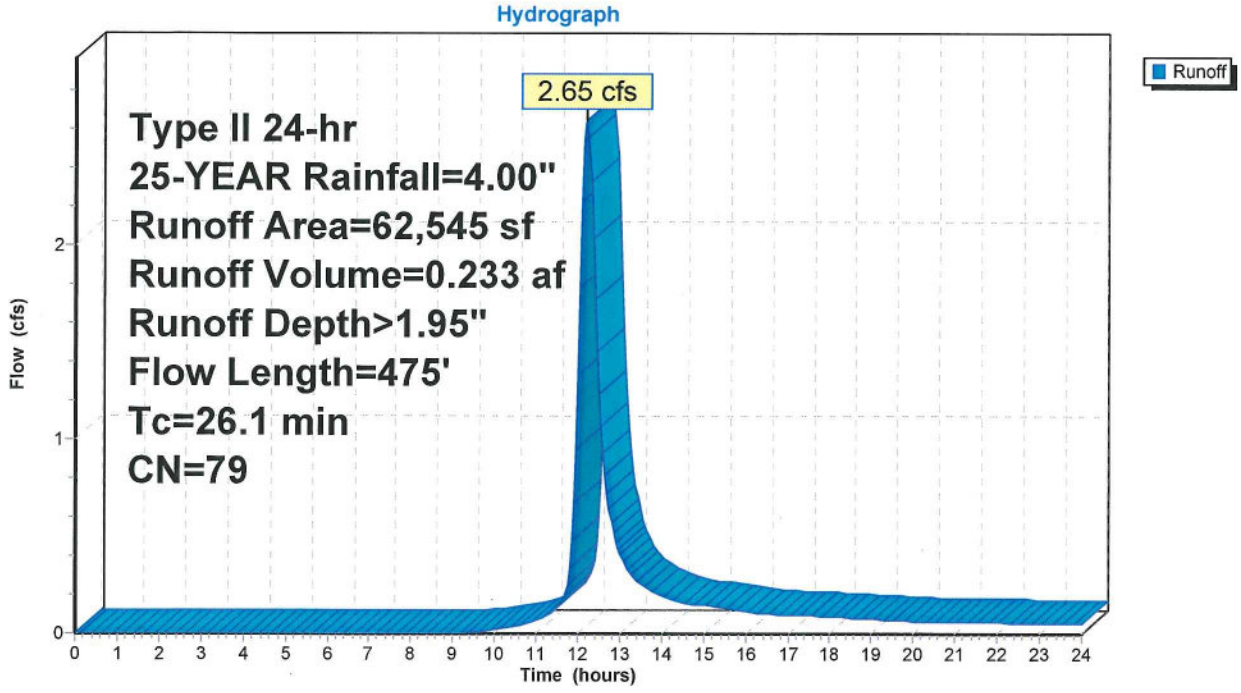
Runoff = 2.65 cfs @ 12.20 hrs, Volume= 0.233 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-YEAR Rainfall=4.00"

	Area (sf)	CN	Description
*	62,545	79	OPEN SPACE, POOR CONDITION
	62,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.5	140	0.0060	0.10		**Sheet Flow, SHEET FLOW TO DITCH** Grass: Short n= 0.150 P2= 2.50"
2.6	335	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW** Grassed Waterway Kv= 15.0 fps
26.1	475	Total			

Subcatchment 1E: OPEN FIELD SHEET FLOW TO DITCH



Summary for Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH

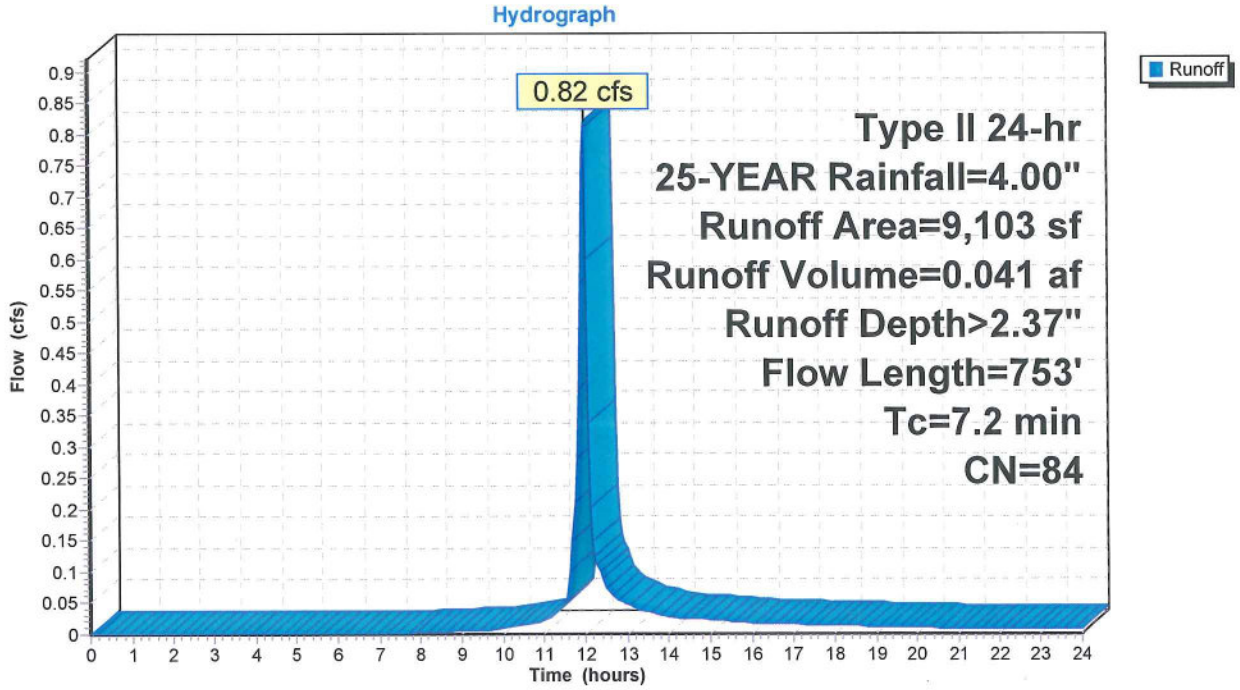
Runoff = 0.82 cfs @ 11.98 hrs, Volume= 0.041 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-YEAR Rainfall=4.00"

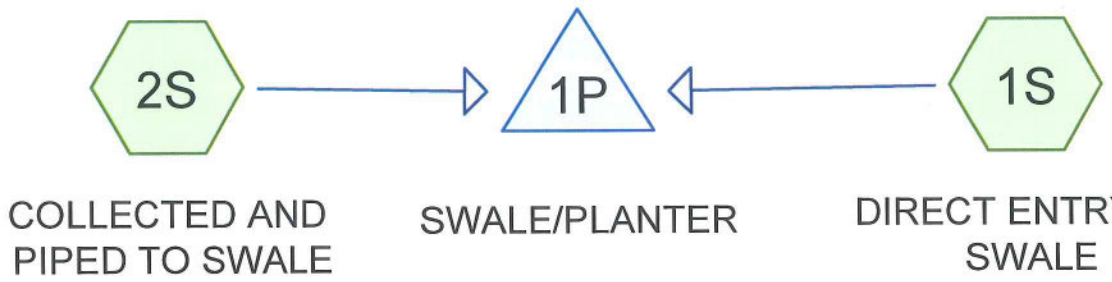
	Area (sf)	CN	Description
*	4,931	89	EXISTING GRAVEL
*	4,172	79	OPEN SPACE, FAIR CONDITION
	9,103	84	Weighted Average
	9,103		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	75	0.0930	2.12		**Sheet Flow, SHEET FLOW OVER GRAVEL TO DITCH** Smooth surfaces n= 0.011 P2= 2.50"
3.1	218	0.0060	1.16		**Shallow Concentrated Flow, DITCH FLOW #`1** Grassed Waterway Kv= 15.0 fps
3.5	460	0.0210	2.17		**Shallow Concentrated Flow, DITCH FLOW #2** Grassed Waterway Kv= 15.0 fps
7.2	753	Total			

Subcatchment 2E: GRAVEL DRIVE DRAINS TO DITCH



Appendix D: Post-Developed HydroCAD Calculations



Subcat Reach Pond Link

Routing Diagram for POST DEVELOPED
Prepared by AKS Engineering & Forestry, Printed 5/5/2017

Summary for Subcatchment 1S: DIRECT ENTRY TO SWALE

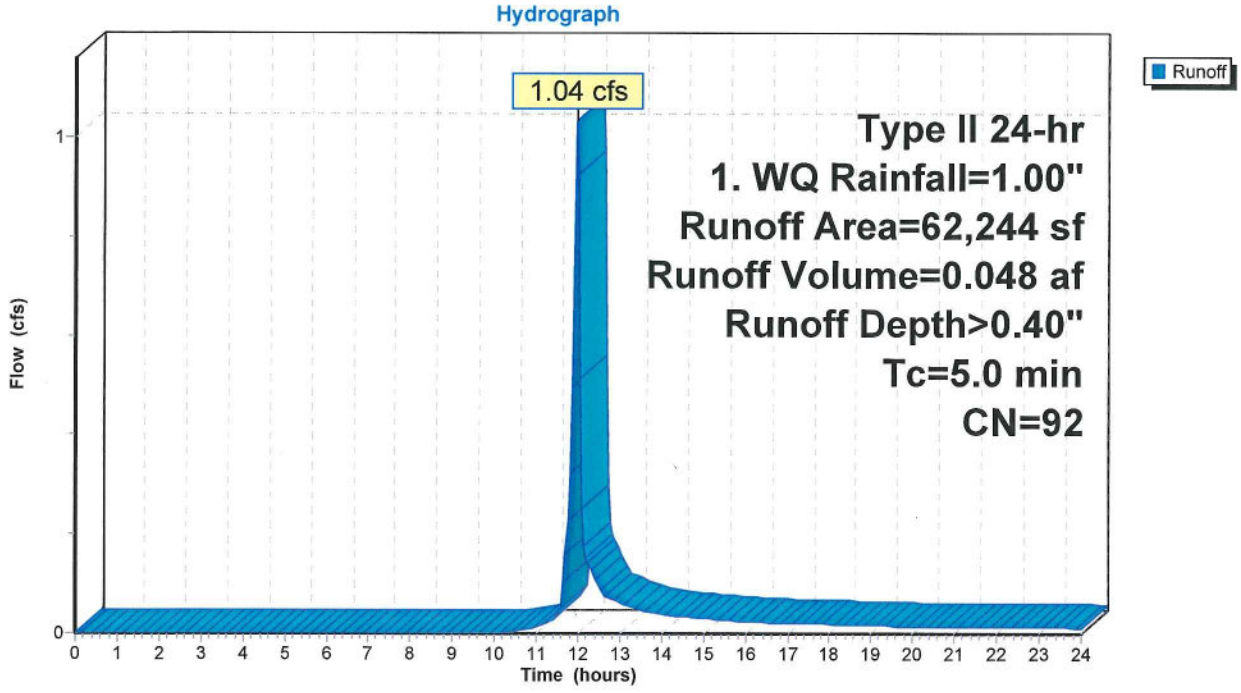
Runoff = 1.04 cfs @ 11.96 hrs, Volume= 0.048 af, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1. WQ Rainfall=1.00"

	Area (sf)	CN	Description
*	45,882	98	DOMED FABRIC STRUCTURE
*	1,445	98	CONCRETE
*	14,746	74	SWALE FOOTPRINT
*	171	79	OPEN SPACE, FAIR CONDITION
	62,244	92	Weighted Average
	14,917		23.97% Pervious Area
	47,327		76.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: DIRECT ENTRY TO SWALE



Summary for Subcatchment 2S: COLLECTED AND PIPED TO SWALE

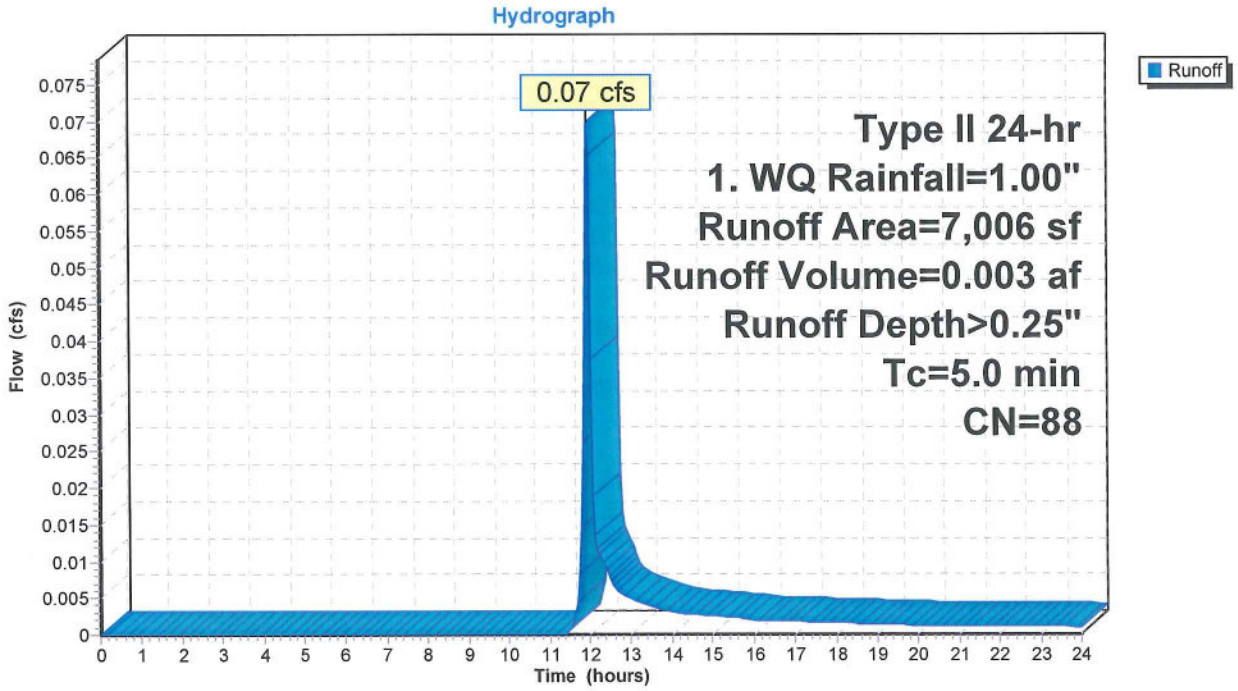
Runoff = 0.07 cfs @ 11.97 hrs, Volume= 0.003 af, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1. WQ Rainfall=1.00"

	Area (sf)	CN	Description
*	1,389	98	CONCRETE
*	3,632	89	GRAVEL
*	1,985	79	OPEN SPACE, FAIR CONDITION
	7,006	88	Weighted Average
	5,617		80.17% Pervious Area
	1,389		19.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: COLLECTED AND PIPED TO SWALE



Summary for Pond 1P: SWALE/PLANTER

Inflow Area = 1.590 ac, 70.35% Impervious, Inflow Depth > 0.39" for 1. WQ event
Inflow = 1.11 cfs @ 11.96 hrs, Volume= 0.051 af
Outflow = 0.20 cfs @ 12.15 hrs, Volume= 0.051 af, Atten= 82%, Lag= 11.5 min
Discarded = 0.02 cfs @ 12.15 hrs, Volume= 0.003 af
Primary = 0.18 cfs @ 12.15 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 215.52' @ 12.15 hrs Surf.Area= 8,353 sf Storage= 737 cf

Plug-Flow detention time= 53.0 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 51.8 min (897.2 - 845.4)

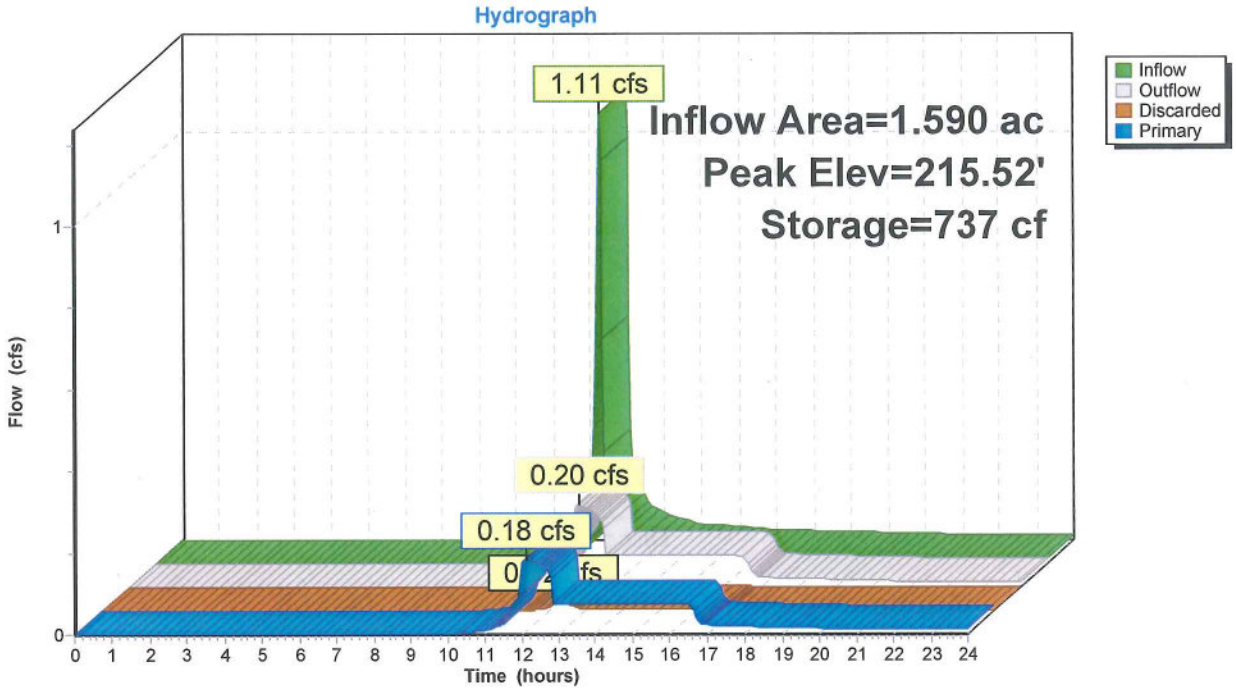
Volume	Invert	Avail.Storage	Storage Description
#1	216.23'	16,325 cf	**2.00'W x 398.00'L x 2.00'H PONDING DEPTH Z=4.0**x 2
#2	214.73'	487 cf	**2.00'W x 398.00'L x 1.50'H 1.5' GROWING MEDIUM Z=4.0**x 2 9,732 cf Overall x 5.0% Voids
#3	213.73'	502 cf	**2.00'W x 398.00'L x 1.00'H 1' DRAIN ROCK**x 2 1,592 cf Overall - 69 cf Embedded = 1,523 cf x 33.0% Voids
#4	213.73'	69 cf	**4.0" Round PERFORATED PIPE** x 2 Inside #3 L= 398.0'
		17,384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	211.95'	**12.0" Round CULVERT TO STM DRAIN** L= 100.0' Ke= 0.600 Inlet / Outlet Invert= 211.95' / 209.42' S= 0.0253 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	213.37'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 2	213.73'	**2.000 in/hr Exfiltration over Surface area**
#4	Device 1	216.72'	**12.0" Horiz. RISER** C= 0.600 Limited to weir flow at low heads
#5	Discarded	213.73'	**0.100 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.15 hrs HW=215.52' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.18 cfs @ 12.15 hrs HW=215.52' (Free Discharge)
└**1=CULVERT TO STM DRAIN** (Passes 0.18 cfs of 6.22 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.18 cfs @ 6.91 fps)
  │ └**3=Exfiltration** (Passes 0.18 cfs of 0.39 cfs potential flow)
  └**4=RISER** (Controls 0.00 cfs)

Pond 1P: SWALE/PLANTER



Summary for Subcatchment 1S: DIRECT ENTRY TO SWALE

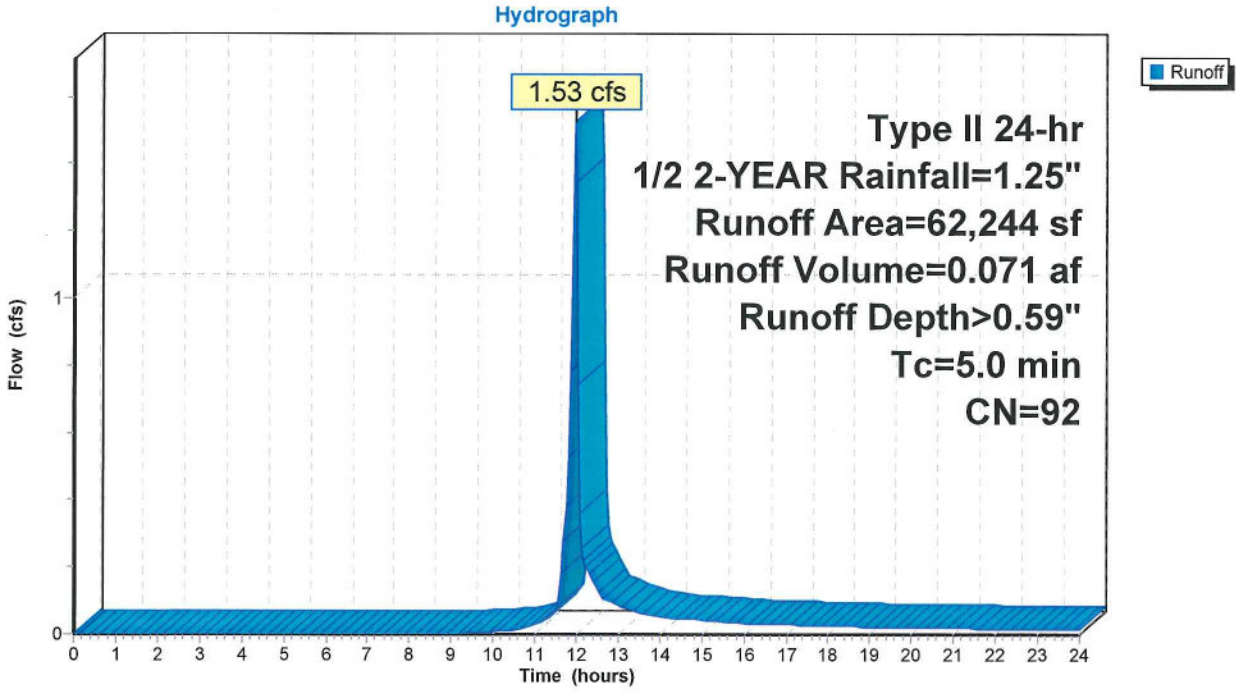
Runoff = 1.53 cfs @ 11.96 hrs, Volume= 0.071 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1/2 2-YEAR Rainfall=1.25"

	Area (sf)	CN	Description
*	45,882	98	DOMED FABRIC STRUCTURE
*	1,445	98	CONCRETE
*	14,746	74	SWALE FOOTPRINT
*	171	79	OPEN SPACE, FAIR CONDITION
	62,244	92	Weighted Average
	14,917		23.97% Pervious Area
	47,327		76.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: DIRECT ENTRY TO SWALE



Summary for Subcatchment 2S: COLLECTED AND PIPED TO SWALE

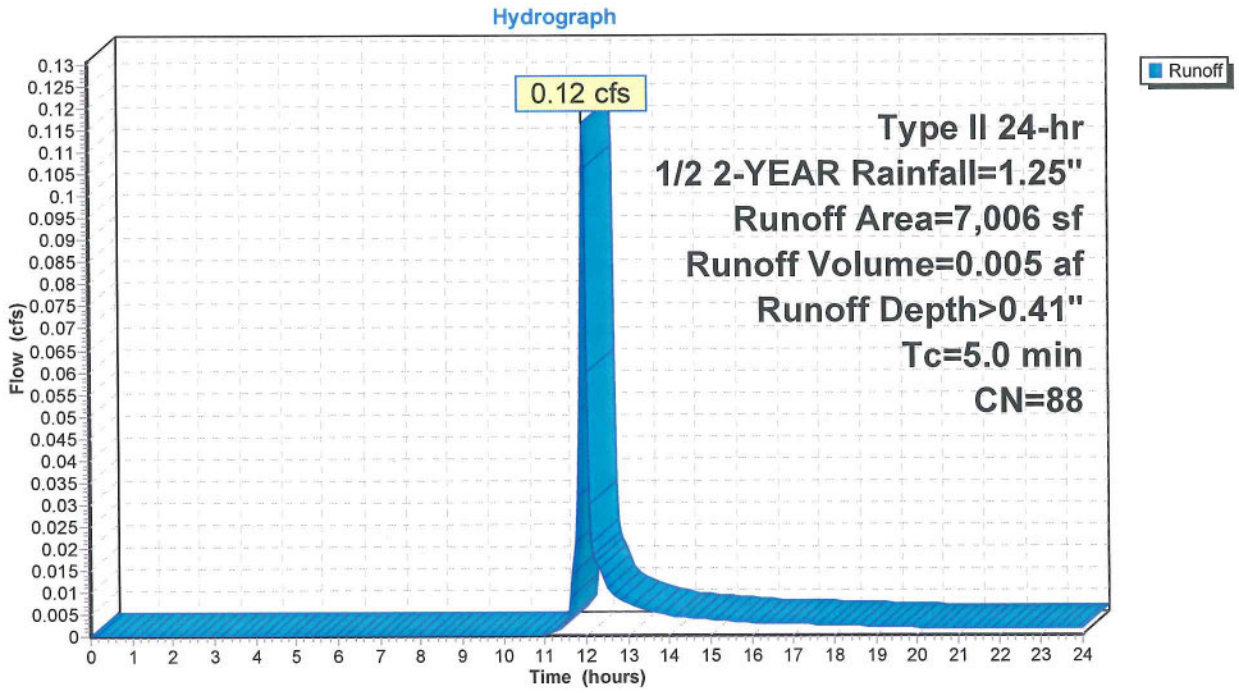
Runoff = 0.12 cfs @ 11.96 hrs, Volume= 0.005 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1/2 2-YEAR Rainfall=1.25"

	Area (sf)	CN	Description
*	1,389	98	CONCRETE
*	3,632	89	GRAVEL
*	1,985	79	OPEN SPACE, FAIR CONDITION
	7,006	88	Weighted Average
	5,617		80.17% Pervious Area
	1,389		19.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: COLLECTED AND PIPED TO SWALE



Summary for Pond 1P: SWALE/PLANTER

Inflow Area = 1.590 ac, 70.35% Impervious, Inflow Depth > 0.58" for 1/2 2-YEAR event
Inflow = 1.65 cfs @ 11.96 hrs, Volume= 0.076 af
Outflow = 0.25 cfs @ 12.19 hrs, Volume= 0.076 af, Atten= 85%, Lag= 13.7 min
Discarded = 0.04 cfs @ 12.19 hrs, Volume= 0.006 af
Primary = 0.21 cfs @ 12.19 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 216.30' @ 12.19 hrs Surf.Area= 15,127 sf Storage= 1,190 cf

Plug-Flow detention time= 57.4 min calculated for 0.076 af (100% of inflow)
Center-of-Mass det. time= 56.1 min (890.0 - 833.9)

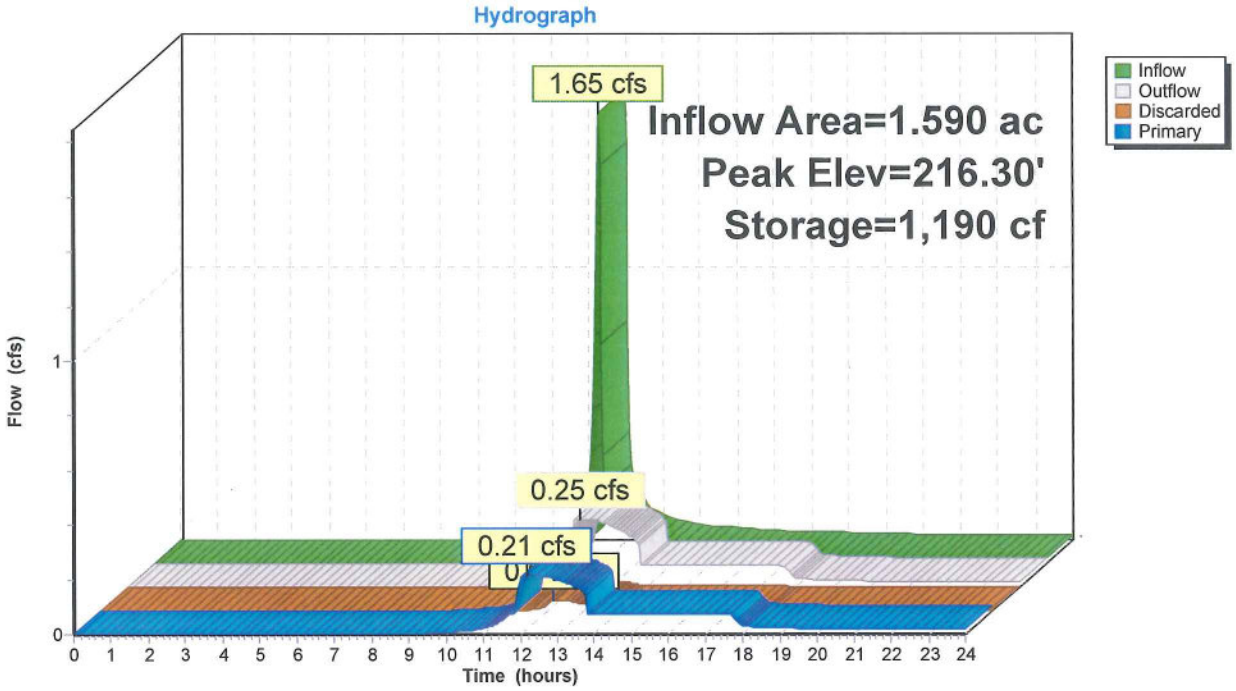
Volume	Invert	Avail.Storage	Storage Description
#1	216.23'	16,325 cf	**2.00'W x 398.00'L x 2.00'H PONDING DEPTH Z=4.0**x 2
#2	214.73'	487 cf	**2.00'W x 398.00'L x 1.50'H 1.5' GROWING MEDIUM Z=4.0**x 2 9,732 cf Overall x 5.0% Voids
#3	213.73'	502 cf	**2.00'W x 398.00'L x 1.00'H 1' DRAIN ROCK**x 2 1,592 cf Overall - 69 cf Embedded = 1,523 cf x 33.0% Voids
#4	213.73'	69 cf	**4.0" Round PERFORATED PIPE** x 2 Inside #3 L= 398.0'
		17,384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	211.95'	**12.0" Round CULVERT TO STM DRAIN** L= 100.0' Ke= 0.600 Inlet / Outlet Invert= 211.95' / 209.42' S= 0.0253 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	213.37'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 2	213.73'	**2.000 in/hr Exfiltration over Surface area**
#4	Device 1	216.72'	**12.0" Horiz. RISER** C= 0.600 Limited to weir flow at low heads
#5	Discarded	213.73'	**0.100 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.19 hrs HW=216.30' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.21 cfs @ 12.19 hrs HW=216.30' (Free Discharge)
└**1=CULVERT TO STM DRAIN** (Passes 0.21 cfs of 6.96 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.21 cfs @ 8.11 fps)
  │ └**3=Exfiltration** (Passes 0.21 cfs of 0.70 cfs potential flow)
  └**4=RISER** (Controls 0.00 cfs)

Pond 1P: SWALE/PLANTER



Summary for Subcatchment 1S: DIRECT ENTRY TO SWALE

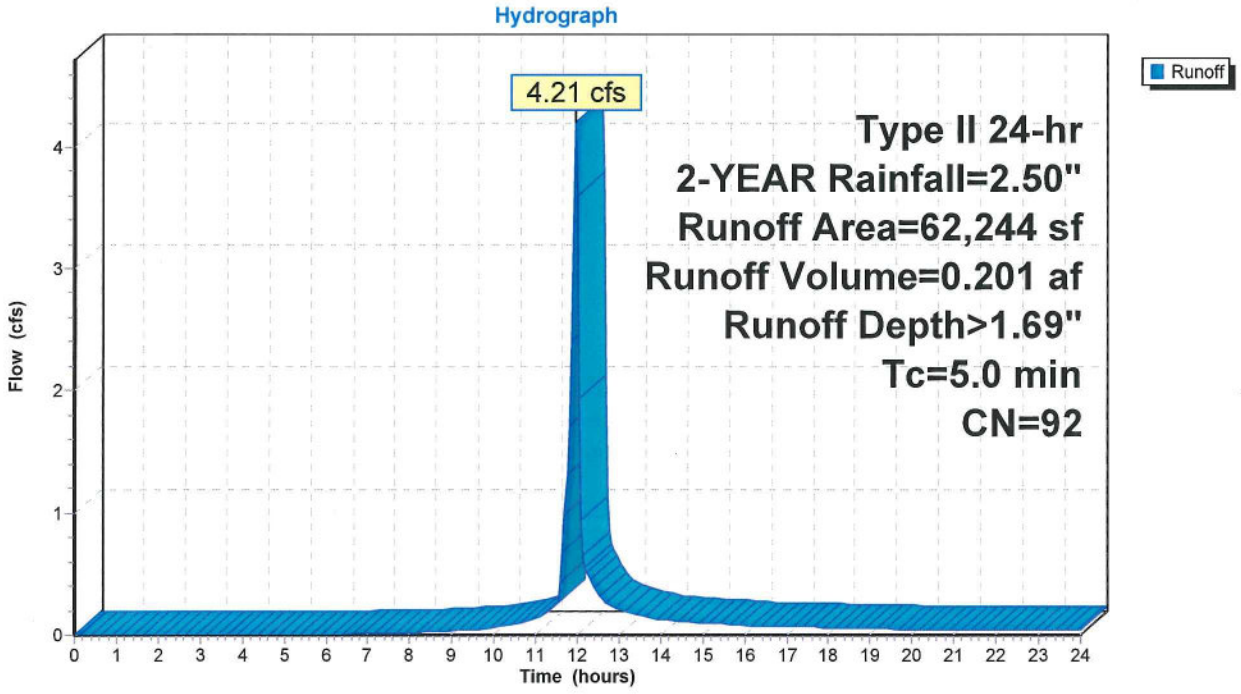
Runoff = 4.21 cfs @ 11.95 hrs, Volume= 0.201 af, Depth> 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YEAR Rainfall=2.50"

	Area (sf)	CN	Description
*	45,882	98	DOMED FABRIC STRUCTURE
*	1,445	98	CONCRETE
*	14,746	74	SWALE FOOTPRINT
*	171	79	OPEN SPACE, FAIR CONDITION
	62,244	92	Weighted Average
	14,917		23.97% Pervious Area
	47,327		76.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: DIRECT ENTRY TO SWALE



Summary for Subcatchment 2S: COLLECTED AND PIPED TO SWALE

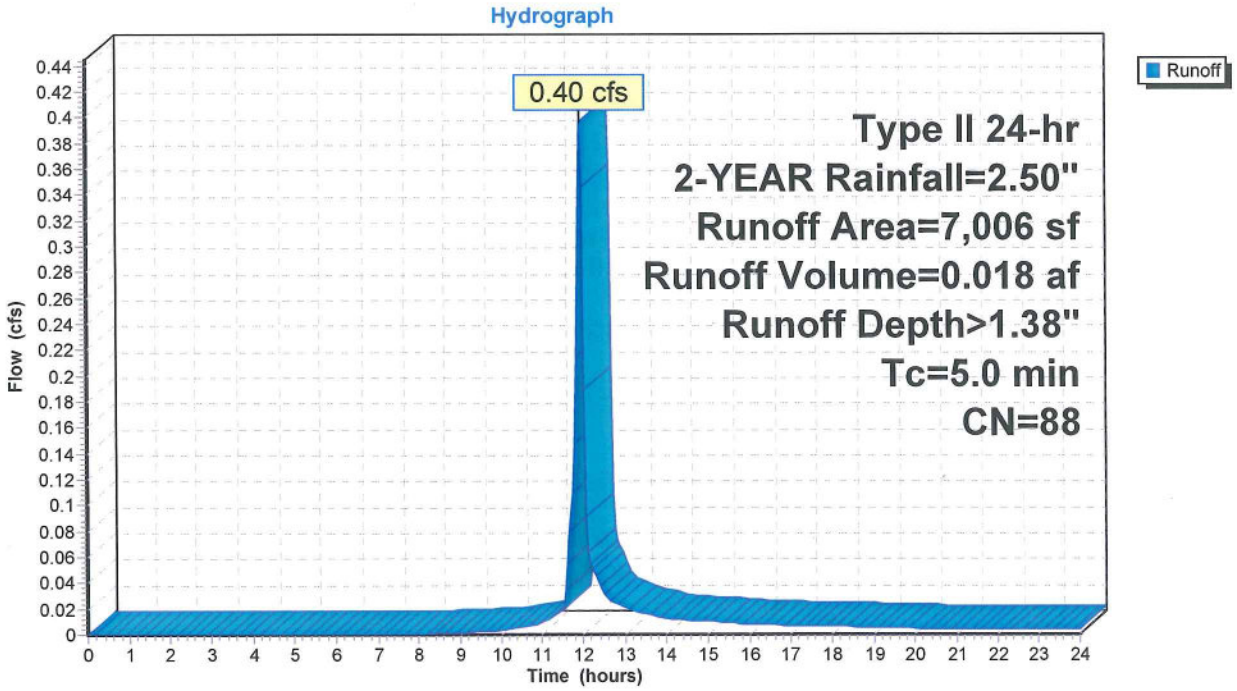
Runoff = 0.40 cfs @ 11.96 hrs, Volume= 0.018 af, Depth> 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YEAR Rainfall=2.50"

	Area (sf)	CN	Description
*	1,389	98	CONCRETE
*	3,632	89	GRAVEL
*	1,985	79	OPEN SPACE, FAIR CONDITION
	7,006	88	Weighted Average
	5,617		80.17% Pervious Area
	1,389		19.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: COLLECTED AND PIPED TO SWALE



Summary for Pond 1P: SWALE/PLANTER

Inflow Area = 1.590 ac, 70.35% Impervious, Inflow Depth > 1.66" for 2-YEAR event
Inflow = 4.61 cfs @ 11.95 hrs, Volume= 0.220 af
Outflow = 1.27 cfs @ 12.10 hrs, Volume= 0.220 af, Atten= 72%, Lag= 8.7 min
Discarded = 0.04 cfs @ 12.10 hrs, Volume= 0.020 af
Primary = 1.22 cfs @ 12.10 hrs, Volume= 0.200 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 216.93' @ 12.10 hrs Surf.Area= 19,205 sf Storage= 3,754 cf

Plug-Flow detention time= 86.1 min calculated for 0.219 af (100% of inflow)
Center-of-Mass det. time= 85.0 min (889.0 - 804.0)

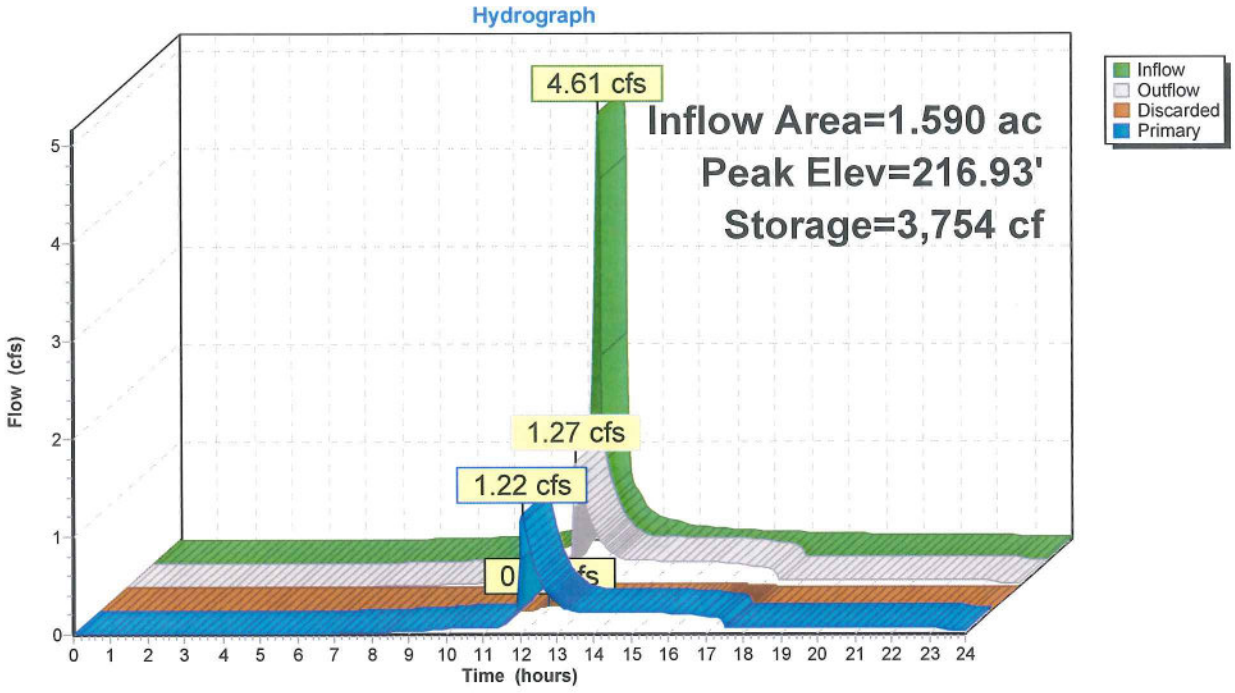
Volume	Invert	Avail.Storage	Storage Description
#1	216.23'	16,325 cf	**2.00'W x 398.00'L x 2.00'H PONDING DEPTH Z=4.0** x 2
#2	214.73'	487 cf	**2.00'W x 398.00'L x 1.50'H 1.5' GROWING MEDIUM Z=4.0** x 2 9,732 cf Overall x 5.0% Voids
#3	213.73'	502 cf	**2.00'W x 398.00'L x 1.00'H 1' DRAIN ROCK** x 2 1,592 cf Overall - 69 cf Embedded = 1,523 cf x 33.0% Voids
#4	213.73'	69 cf	**4.0" Round PERFORATED PIPE** x 2 Inside #3 L= 398.0'
		17,384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	211.95'	**12.0" Round CULVERT TO STM DRAIN** L= 100.0' Ke= 0.600 Inlet / Outlet Invert= 211.95' / 209.42' S= 0.0253 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	213.37'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 2	213.73'	**2.000 in/hr Exfiltration over Surface area**
#4	Device 1	216.72'	**12.0" Horiz. RISER** C= 0.600 Limited to weir flow at low heads
#5	Discarded	213.73'	**0.100 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.10 hrs HW=216.93' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.22 cfs @ 12.10 hrs HW=216.93' (Free Discharge)
└**1=CULVERT TO STM DRAIN** (Passes 1.22 cfs of 7.39 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 8.97 fps)
  │ └**3=Exfiltration** (Passes 0.24 cfs of 0.89 cfs potential flow)
  └**4=RISER** (Weir Controls 0.99 cfs @ 1.50 fps)

Pond 1P: SWALE/PLANTER



Summary for Subcatchment 1S: DIRECT ENTRY TO SWALE

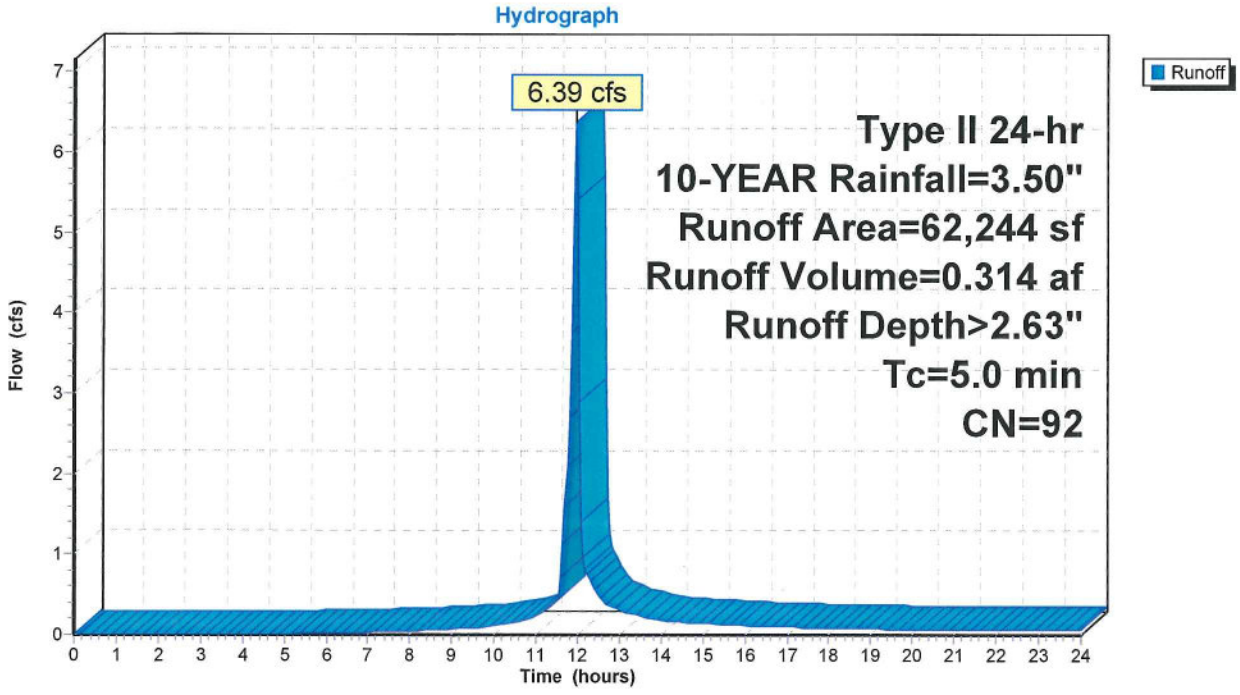
Runoff = 6.39 cfs @ 11.95 hrs, Volume= 0.314 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YEAR Rainfall=3.50"

	Area (sf)	CN	Description
*	45,882	98	DOMED FABRIC STRUCTURE
*	1,445	98	CONCRETE
*	14,746	74	SWALE FOOTPRINT
*	171	79	OPEN SPACE, FAIR CONDITION
	62,244	92	Weighted Average
	14,917		23.97% Pervious Area
	47,327		76.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: DIRECT ENTRY TO SWALE



Summary for Subcatchment 2S: COLLECTED AND PIPED TO SWALE

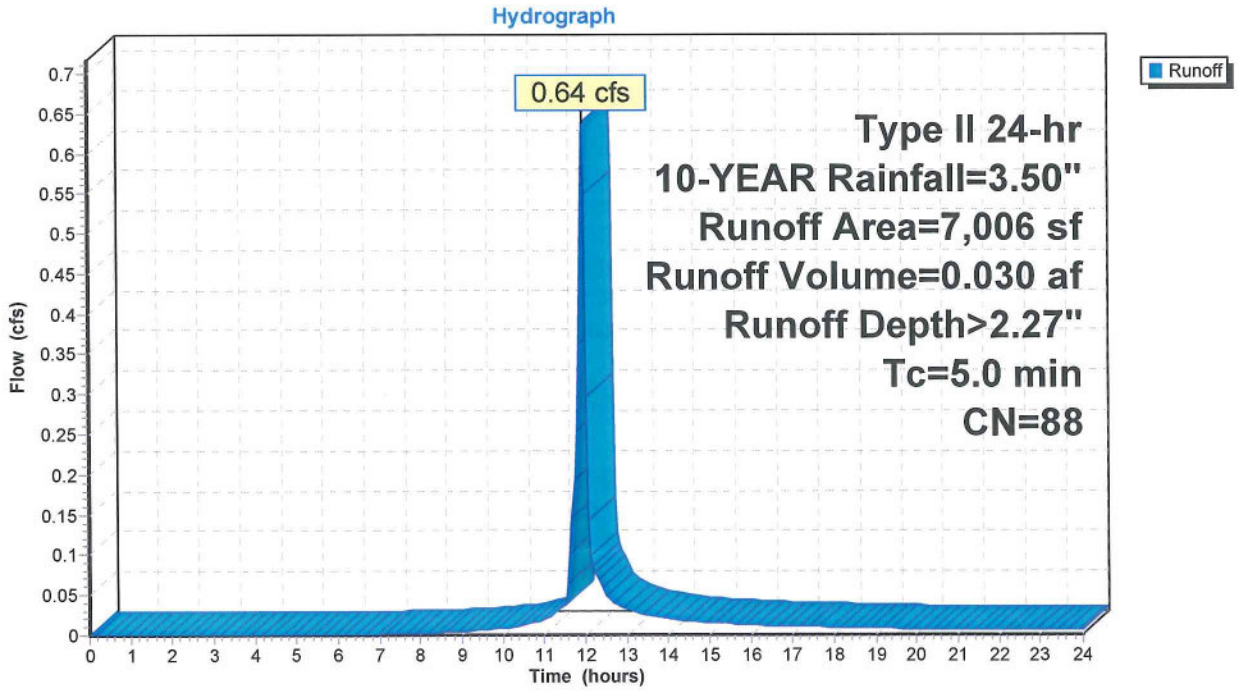
Runoff = 0.64 cfs @ 11.95 hrs, Volume= 0.030 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YEAR Rainfall=3.50"

	Area (sf)	CN	Description
*	1,389	98	CONCRETE
*	3,632	89	GRAVEL
*	1,985	79	OPEN SPACE, FAIR CONDITION
	7,006	88	Weighted Average
	5,617		80.17% Pervious Area
	1,389		19.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: COLLECTED AND PIPED TO SWALE



Summary for Pond 1P: SWALE/PLANTER

Inflow Area = 1.590 ac, 70.35% Impervious, Inflow Depth > 2.60" for 10-YEAR event
Inflow = 7.03 cfs @ 11.95 hrs, Volume= 0.344 af
Outflow = 2.82 cfs @ 12.07 hrs, Volume= 0.336 af, Atten= 60%, Lag= 6.8 min
Discarded = 0.05 cfs @ 12.07 hrs, Volume= 0.025 af
Primary = 2.77 cfs @ 12.07 hrs, Volume= 0.310 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 217.17' @ 12.07 hrs Surf.Area= 20,768 sf Storage= 5,389 cf

Plug-Flow detention time= 76.2 min calculated for 0.336 af (98% of inflow)
Center-of-Mass det. time= 61.1 min (852.6 - 791.5)

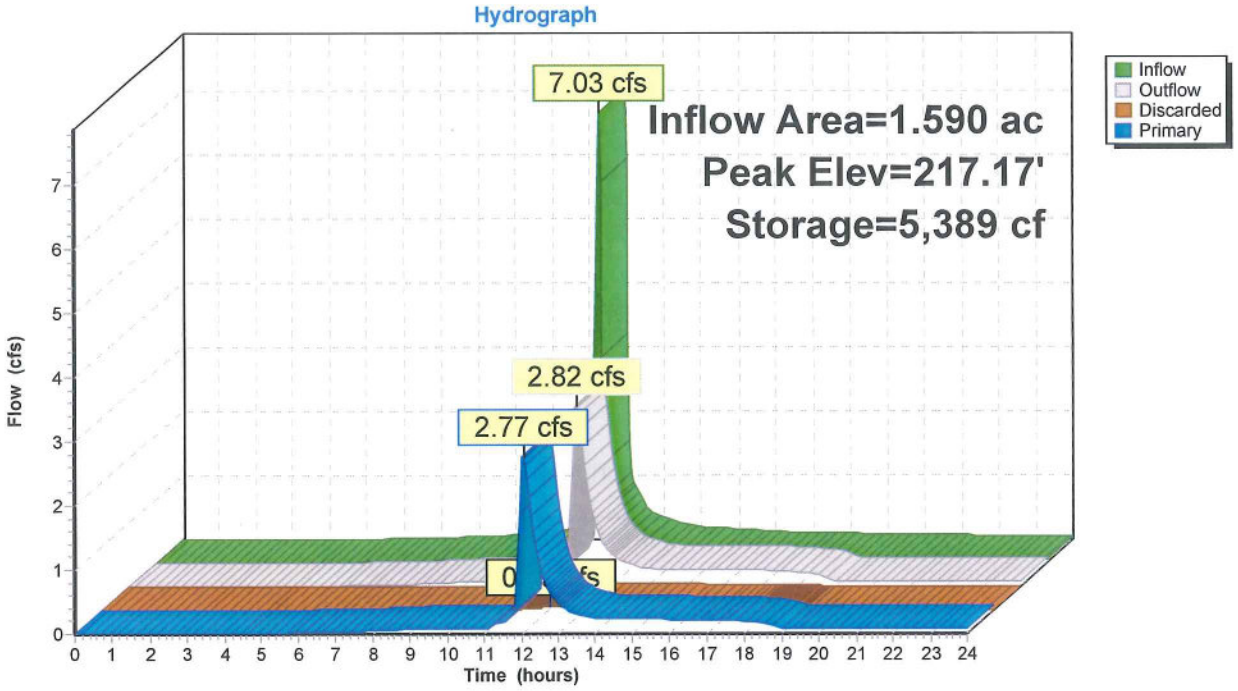
Volume	Invert	Avail.Storage	Storage Description
#1	216.23'	16,325 cf	**2.00'W x 398.00'L x 2.00'H PONDING DEPTH Z=4.0** x 2
#2	214.73'	487 cf	**2.00'W x 398.00'L x 1.50'H 1.5' GROWING MEDIUM Z=4.0** x 2 9,732 cf Overall x 5.0% Voids
#3	213.73'	502 cf	**2.00'W x 398.00'L x 1.00'H 1' DRAIN ROCK** x 2 1,592 cf Overall - 69 cf Embedded = 1,523 cf x 33.0% Voids
#4	213.73'	69 cf	**4.0" Round PERFORATED PIPE** x 2 Inside #3 L= 398.0'
		17,384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	211.95'	**12.0" Round CULVERT TO STM DRAIN** L= 100.0' Ke= 0.600 Inlet / Outlet Invert= 211.95' / 209.42' S= 0.0253 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	213.37'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 2	213.73'	**2.000 in/hr Exfiltration over Surface area**
#4	Device 1	216.72'	**12.0" Horiz. RISER** C= 0.600 Limited to weir flow at low heads
#5	Discarded	213.73'	**0.100 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 12.07 hrs HW=217.16' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=2.75 cfs @ 12.07 hrs HW=217.16' (Free Discharge)
└**1=CULVERT TO STM DRAIN** (Passes 2.75 cfs of 7.52 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 9.26 fps)
  │ └**3=Exfiltration** (Passes 0.24 cfs of 0.96 cfs potential flow)
  └**4=RISER** (Orifice Controls 2.51 cfs @ 3.20 fps)

Pond 1P: SWALE/PLANTER



Summary for Subcatchment 1S: DIRECT ENTRY TO SWALE

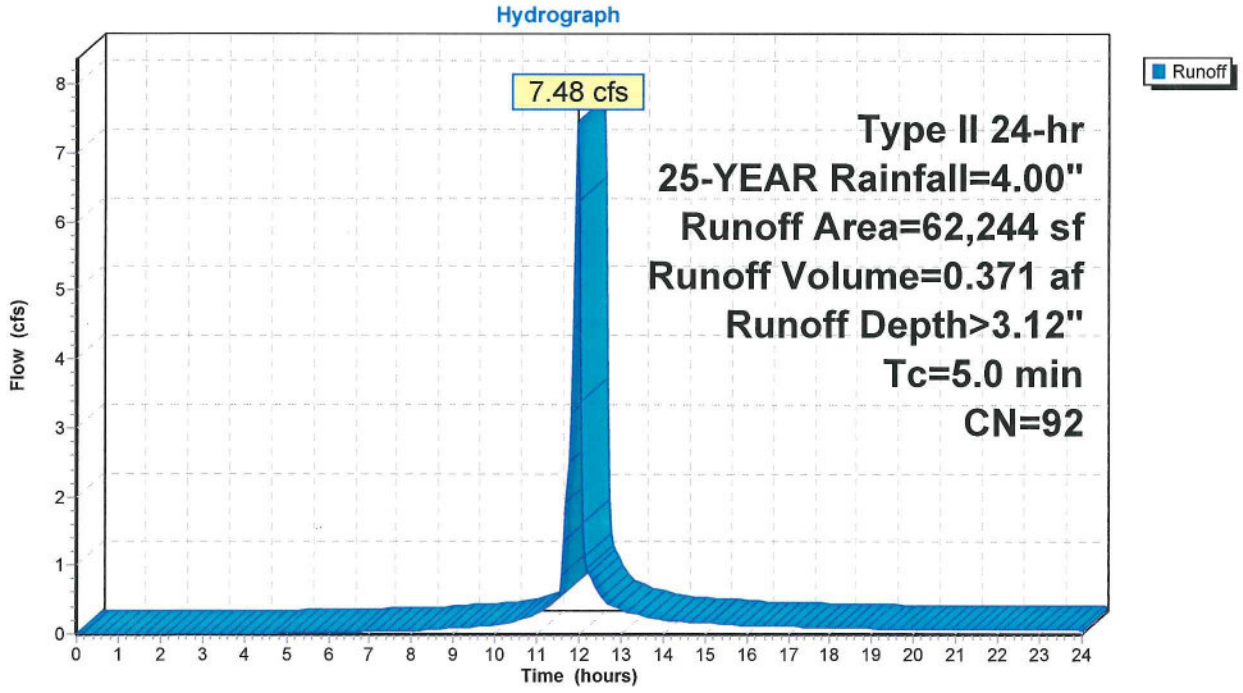
Runoff = 7.48 cfs @ 11.95 hrs, Volume= 0.371 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-YEAR Rainfall=4.00"

	Area (sf)	CN	Description
*	45,882	98	DOMED FABRIC STRUCTURE
*	1,445	98	CONCRETE
*	14,746	74	SWALE FOOTPRINT
*	171	79	OPEN SPACE, FAIR CONDITION
	62,244	92	Weighted Average
	14,917		23.97% Pervious Area
	47,327		76.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: DIRECT ENTRY TO SWALE



Summary for Subcatchment 2S: COLLECTED AND PIPED TO SWALE

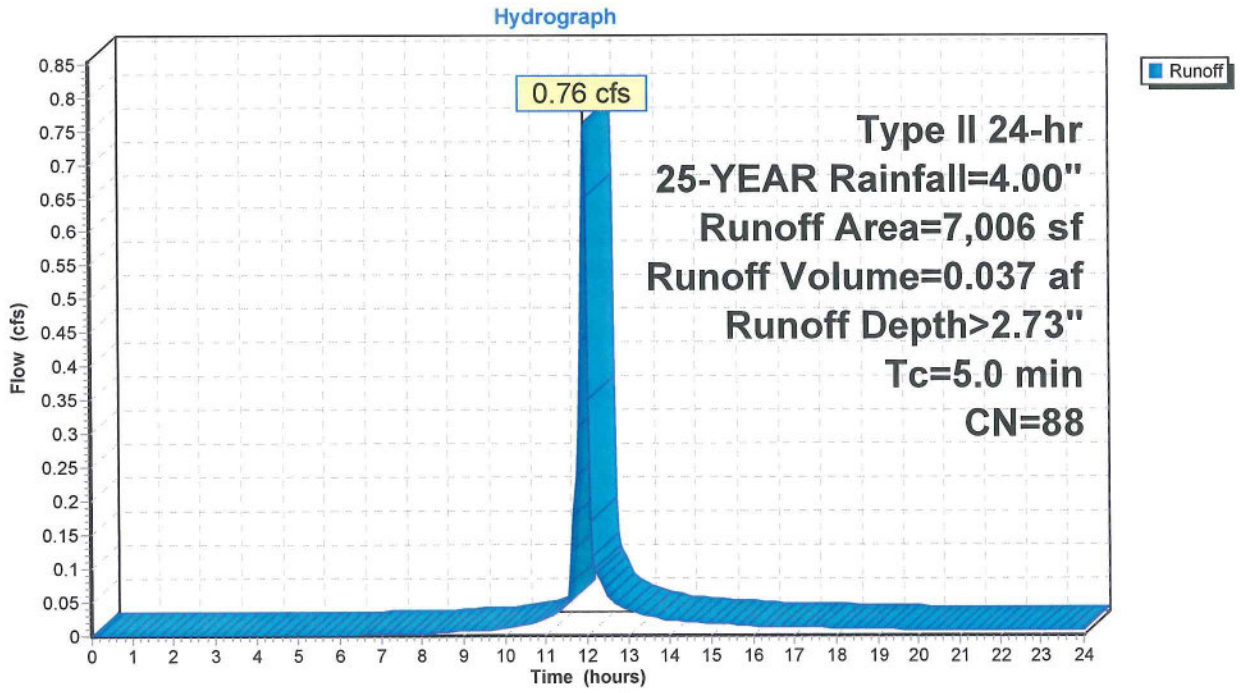
Runoff = 0.76 cfs @ 11.95 hrs, Volume= 0.037 af, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-YEAR Rainfall=4.00"

	Area (sf)	CN	Description
*	1,389	98	CONCRETE
*	3,632	89	GRAVEL
*	1,985	79	OPEN SPACE, FAIR CONDITION
	7,006	88	Weighted Average
	5,617		80.17% Pervious Area
	1,389		19.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: COLLECTED AND PIPED TO SWALE



Summary for Pond 1P: SWALE/PLANTER

Inflow Area = 1.590 ac, 70.35% Impervious, Inflow Depth > 3.08" for 25-YEAR event
Inflow = 8.24 cfs @ 11.95 hrs, Volume= 0.408 af
Outflow = 3.13 cfs @ 12.07 hrs, Volume= 0.396 af, Atten= 62%, Lag= 7.0 min
Discarded = 0.05 cfs @ 12.07 hrs, Volume= 0.028 af
Primary = 3.08 cfs @ 12.07 hrs, Volume= 0.367 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 217.28' @ 12.07 hrs Surf.Area= 21,519 sf Storage= 6,300 cf

Plug-Flow detention time= 72.6 min calculated for 0.396 af (97% of inflow)
Center-of-Mass det. time= 54.9 min (841.7 - 786.8)

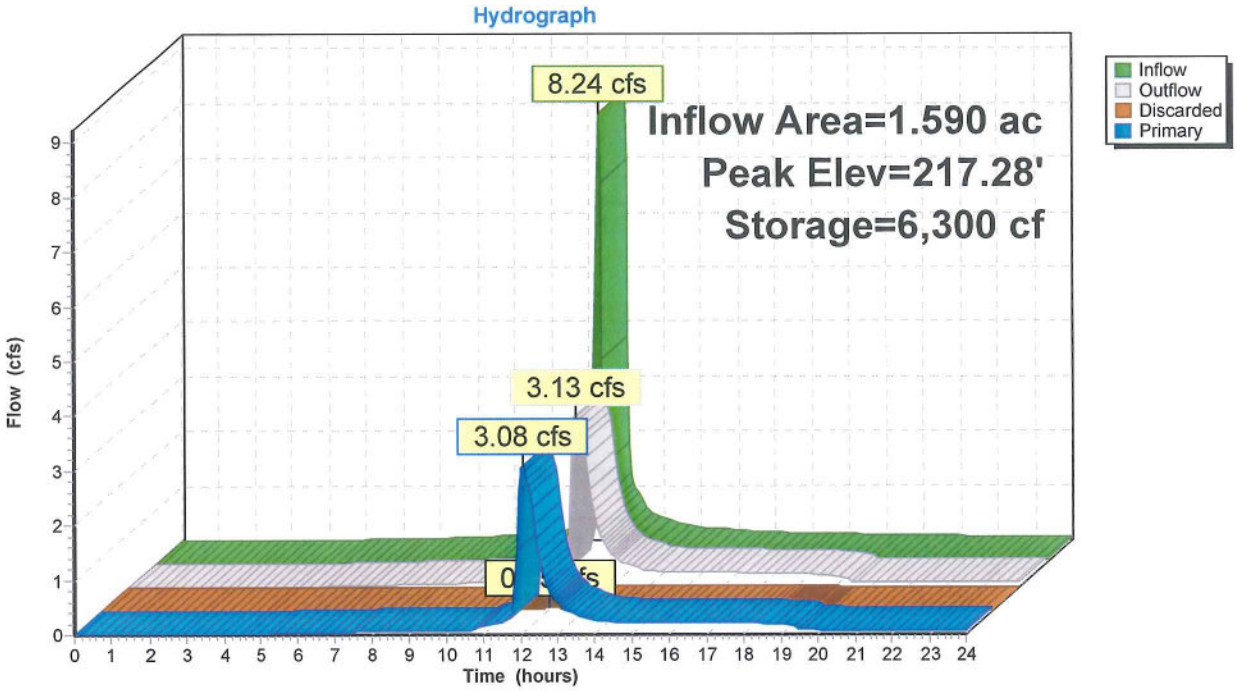
Volume	Invert	Avail.Storage	Storage Description
#1	216.23'	16,325 cf	**2.00'W x 398.00'L x 2.00'H PONDING DEPTH Z=4.0** x 2
#2	214.73'	487 cf	**2.00'W x 398.00'L x 1.50'H 1.5' GROWING MEDIUM Z=4.0** x 2 9,732 cf Overall x 5.0% Voids
#3	213.73'	502 cf	**2.00'W x 398.00'L x 1.00'H 1' DRAIN ROCK** x 2 1,592 cf Overall - 69 cf Embedded = 1,523 cf x 33.0% Voids
#4	213.73'	69 cf	**4.0" Round PERFORATED PIPE** x 2 Inside #3 L= 398.0'
		17,384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	211.95'	**12.0" Round CULVERT TO STM DRAIN** L= 100.0' Ke= 0.600 Inlet / Outlet Invert= 211.95' / 209.42' S= 0.0253 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	213.37'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 2	213.73'	**2.000 in/hr Exfiltration over Surface area**
#4	Device 1	216.72'	**12.0" Horiz. RISER** C= 0.600 Limited to weir flow at low heads
#5	Discarded	213.73'	**0.100 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 12.07 hrs HW=217.27' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=3.06 cfs @ 12.07 hrs HW=217.27' (Free Discharge)
└**1=CULVERT TO STM DRAIN** (Passes 3.06 cfs of 7.58 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 9.40 fps)
  │ └**3=Exfiltration** (Passes 0.25 cfs of 0.99 cfs potential flow)
  └**4=RISER** (Orifice Controls 2.81 cfs @ 3.58 fps)

Pond 1P: SWALE/PLANTER



Summary for Subcatchment 1S: DIRECT ENTRY TO SWALE

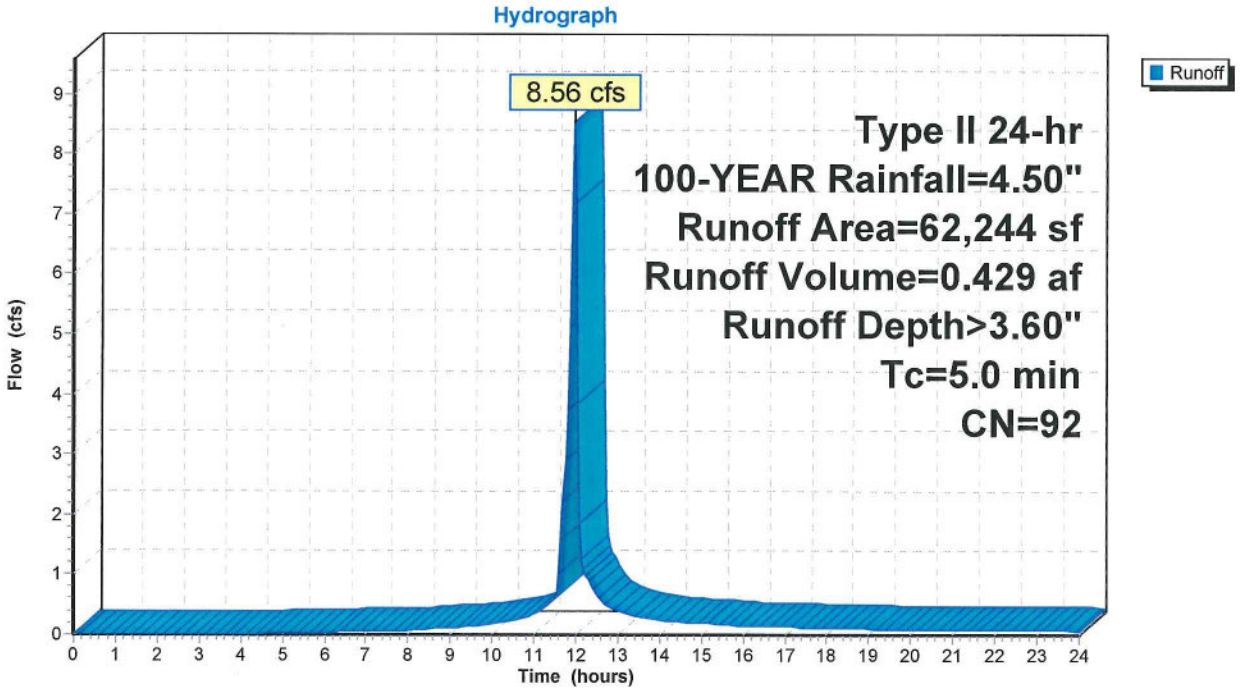
Runoff = 8.56 cfs @ 11.95 hrs, Volume= 0.429 af, Depth> 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YEAR Rainfall=4.50"

	Area (sf)	CN	Description
*	45,882	98	DOMED FABRIC STRUCTURE
*	1,445	98	CONCRETE
*	14,746	74	SWALE FOOTPRINT
*	171	79	OPEN SPACE, FAIR CONDITION
	62,244	92	Weighted Average
	14,917		23.97% Pervious Area
	47,327		76.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: DIRECT ENTRY TO SWALE



Summary for Subcatchment 2S: COLLECTED AND PIPED TO SWALE

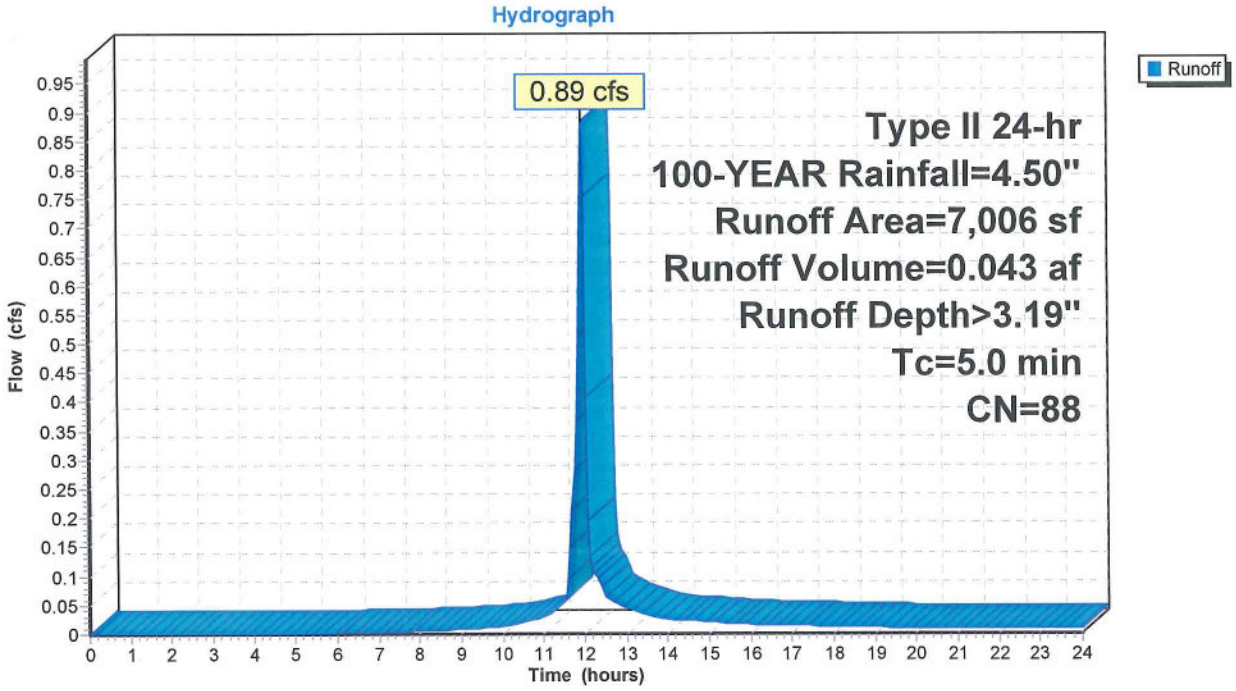
Runoff = 0.89 cfs @ 11.95 hrs, Volume= 0.043 af, Depth> 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YEAR Rainfall=4.50"

	Area (sf)	CN	Description
*	1,389	98	CONCRETE
*	3,632	89	GRAVEL
*	1,985	79	OPEN SPACE, FAIR CONDITION
	7,006	88	Weighted Average
	5,617		80.17% Pervious Area
	1,389		19.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: COLLECTED AND PIPED TO SWALE



Summary for Pond 1P: SWALE/PLANTER

Inflow Area = 1.590 ac, 70.35% Impervious, Inflow Depth > 3.56" for 100-YEAR event
Inflow = 9.44 cfs @ 11.95 hrs, Volume= 0.471 af
Outflow = 3.39 cfs @ 12.07 hrs, Volume= 0.458 af, Atten= 64%, Lag= 7.2 min
Discarded = 0.05 cfs @ 12.07 hrs, Volume= 0.031 af
Primary = 3.34 cfs @ 12.07 hrs, Volume= 0.427 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 217.39' @ 12.07 hrs Surf.Area= 22,245 sf Storage= 7,257 cf

Plug-Flow detention time= 69.8 min calculated for 0.457 af (97% of inflow)
Center-of-Mass det. time= 52.9 min (835.7 - 782.8)

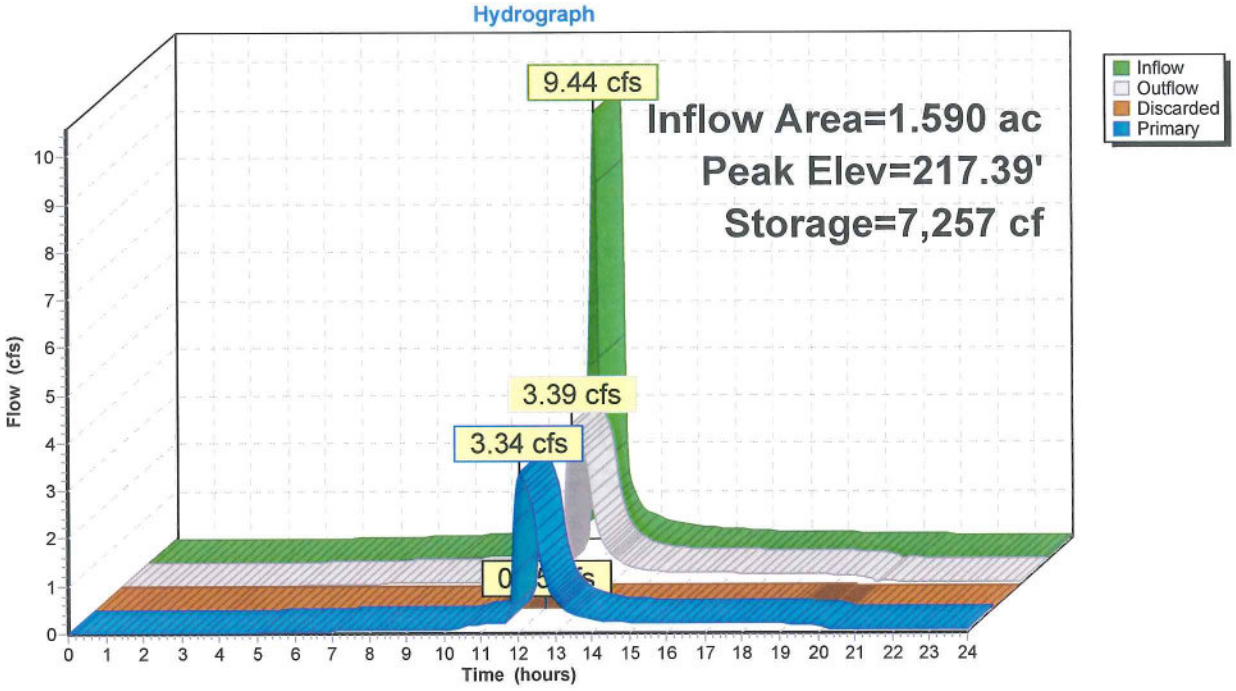
Volume	Invert	Avail.Storage	Storage Description
#1	216.23'	16,325 cf	**2.00'W x 398.00'L x 2.00'H PONDING DEPTH Z=4.0** x 2
#2	214.73'	487 cf	**2.00'W x 398.00'L x 1.50'H 1.5' GROWING MEDIUM Z=4.0** x 2 9,732 cf Overall x 5.0% Voids
#3	213.73'	502 cf	**2.00'W x 398.00'L x 1.00'H 1' DRAIN ROCK** x 2 1,592 cf Overall - 69 cf Embedded = 1,523 cf x 33.0% Voids
#4	213.73'	69 cf	**4.0" Round PERFORATED PIPE** x 2 Inside #3 L= 398.0'
		17,384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	211.95'	**12.0" Round CULVERT TO STM DRAIN** L= 100.0' Ke= 0.600 Inlet / Outlet Invert= 211.95' / 209.42' S= 0.0253 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	213.37'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 2	213.73'	**2.000 in/hr Exfiltration over Surface area**
#4	Device 1	216.72'	**12.0" Horiz. RISER** C= 0.600 Limited to weir flow at low heads
#5	Discarded	213.73'	**0.100 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 12.07 hrs HW=217.38' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=3.32 cfs @ 12.07 hrs HW=217.38' (Free Discharge)
└**1=CULVERT TO STM DRAIN** (Passes 3.32 cfs of 7.64 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 9.53 fps)
    └**3=Exfiltration** (Passes 0.25 cfs of 1.03 cfs potential flow)
  └**4=RISER** (Orifice Controls 3.07 cfs @ 3.91 fps)

Pond 1P: SWALE/PLANTER



Appendix E: USDA NRCS Soil Report

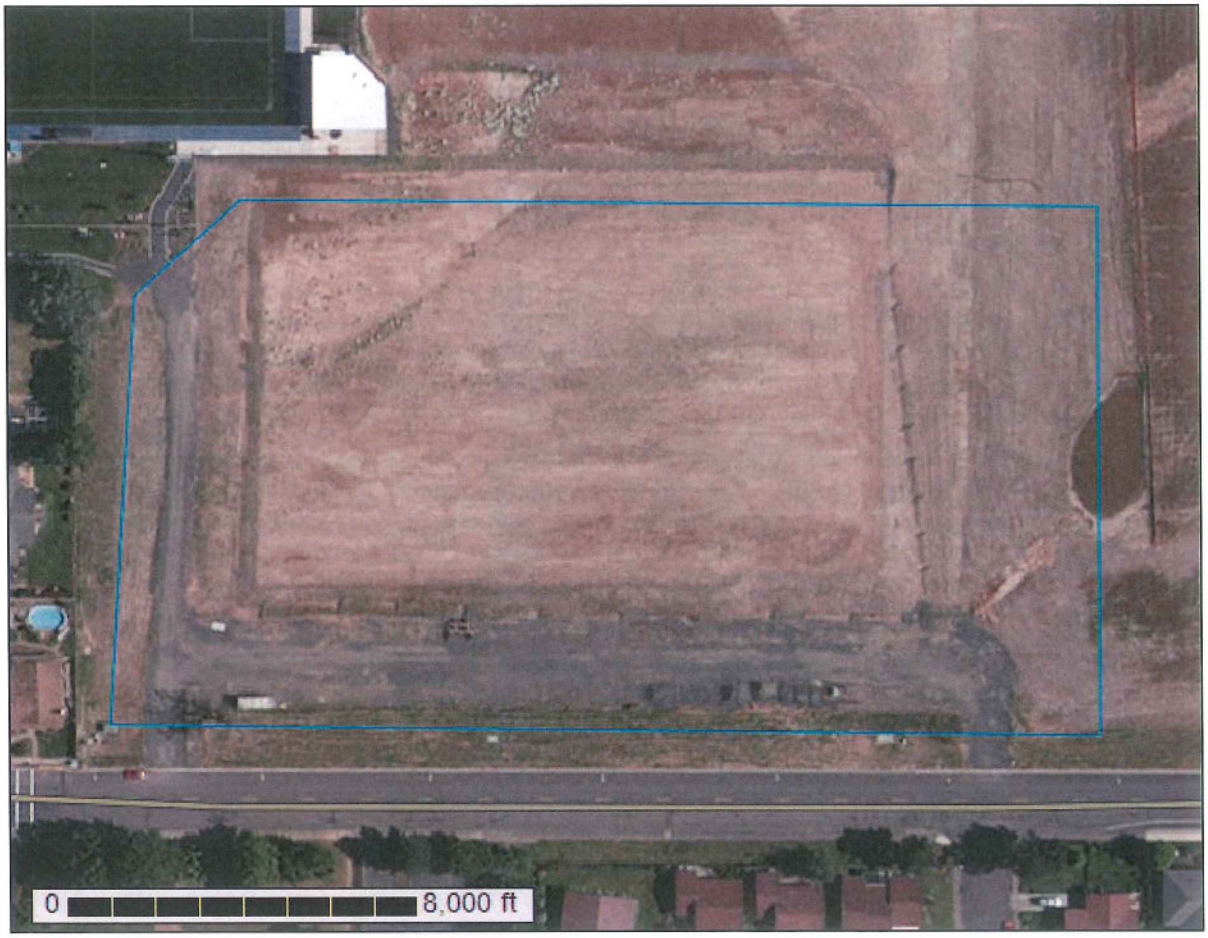
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Yamhill County, Oregon



April 5, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,110 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Yamhill County, Oregon
Survey Area Data: Version 4, Sep 16, 2016

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

Date(s) aerial images were photographed: Jul 8, 2010—Sep 4, 2011

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

Yamhill County, Oregon (OR071)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2300A	Aloha silt loam, 0 to 3 percent slopes	4.9	94.3%
2310C	Woodburn silt loam, 3 to 12 percent slopes	0.3	5.7%
Totals for Area of Interest		**5.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Yamhill County, Oregon

2300A—Aloha silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1j8b0
Elevation: 100 to 350 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Aloha and similar soils: 96 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aloha

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy glaciolacustrine deposits

Typical profile

Ap - 0 to 8 inches: silt loam
BA - 8 to 15 inches: silt loam
Bt - 15 to 22 inches: silt loam
Bw1 - 22 to 31 inches: silt loam
Bw2 - 31 to 46 inches: silt loam
Bw3 - 46 to 60 inches: silt loam
C - 60 to 65 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 8 to 15 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Other vegetative classification: Somewhat Poorly Drained (G002XY005OR)
Hydric soil rating: No

Minor Components

Dayton

Percent of map unit: 3 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

2310C—Woodburn silt loam, 3 to 12 percent slopes

Map Unit Setting

National map unit symbol: 1j8b5
Elevation: 100 to 350 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Woodburn and similar soils: 93 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Silty glaciolacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
A - 9 to 17 inches: silt loam
2Bt1 - 17 to 25 inches: silty clay loam
2Bt2 - 25 to 32 inches: silty clay loam
2BCt1 - 32 to 39 inches: silt loam
2BCt2 - 39 to 54 inches: silt loam
2C1 - 54 to 68 inches: silt loam
2C2 - 68 to 80 inches: stratified fine sandy loam to silt loam
3C3 - 80 to 92 inches: stratified fine sandy loam to silt loam

Properties and qualities

Slope: 3 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 25 to 32 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Dayton

Percent of map unit: 2 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

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.

Percentage of 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. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

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. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

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. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

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.

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). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Yamhill County, Oregon														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
2300A—Aloha silt loam, 0 to 3 percent slopes														
Aloha	96	C/D	0-8	Silt loam	ML, CL-ML, CL	A-6, A-4	0- 0- 0	0- 0- 0	100-100-100	95-100-100	95-97-100	85-85-95	25-35-40	5-9 -15
			8-15	Loam, silt loam	ML, CL-ML, CL	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	95-100-100	95-97-100	75-85-95	25-35-40	5-9 -15
			15-22	Silt loam, loam	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-97-100	75-85-95	30-36-40	10-13-15
			22-31	Silt loam, loam	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	75-82-95	30-36-40	10-13-15
			31-46	Silt loam, loam	CL	A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-98-100	65-82-95	30-36-40	10-13-15
			46-60	Silt loam, loam	CL, CL-ML	A-6, A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-98-100	65-80-95	25-30-40	5-10-15
			60-65	Silt loam, loam, very fine sandy loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-97-100	60-64-95	25-28-40	5-8 -15

Engineering Properties–Yamhill County, Oregon														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
2310C—Woodburn silt loam, 3 to 12 percent slopes														
Woodburn	93	C	0-9	Silt loam	ML, CL	A-4, A-6	0- 0- 0	0- 0- 0	95-99-100	95-98-100	95-97-100	85-94-100	30-36-40	5-11-15
			9-17	Silt loam	ML, CL	A-4, A-6	0- 0- 0	0- 0- 0	95-99-100	95-98-100	95-97-100	85-94-100	30-36-40	5-11-15
			17-25	Silty clay loam, silt loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-99-100	90-97-100	30-38-45	10-15-20
			25-32	Silty clay loam, silt loam	CL	A-6, A-7	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-99-100	90-97-100	30-38-45	10-15-20
			32-39	Silt loam, silty clay loam	CL	A-7, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-99-100	90-97-100	30-36-45	10-14-20
			39-54	Silt loam, silty clay loam	CL	A-7, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-99-100	90-97-100	30-36-45	10-14-20
			54-68	Silty clay loam, silt loam	CL-ML, CL	A-6, A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	80-90-100	25-35-40	5-11-15
			68-80	Stratified fine sandy loam to silt loam	ML, SM	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	70-92-100	40-60-90	20-28-35	NP-5-10
			80-92	Stratified fine sandy loam to silt loam	ML, SM	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	70-92-100	40-51-90	20-28-35	NP-5-10

Appendix F: Technical Release 55 Runoff Curve Numbers

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
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, etc. (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
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Appendix G: Downstream Analysis Map


DOWNSTREAM ANALYSIS MAP
EXISTING DITCH INLET
DISCHARGE TO HESS CREEK
PROJECT SITE
LOCATION OF FLOW SPREADER

Appendix H: Operations and Maintenance of Facilities

AFTER RECORDING RETURN TO:
City of Newberg – Engineering Department
PO Box 970 - 414 E. First Street
Newberg, OR 97132

CITY OF NEWBERG

AGREEMENT TO MAINTAIN PRIVATE STORMWATER FACILITIES

THIS AGREEMENT is entered into this ___ day of _____, 20__ by and between the City of Newberg, a municipal corporation of the State of Oregon, hereinafter called CITY, and

_____
(Owner name)

_____
(Address)

_____ _____ _____
(City, State, Zip) (Phone) (Email Address)

hereinafter called OWNER.

RECITALS

1. OWNER has developed the following facilities located at: _____ (Site Address)
Tax Map _____, Tax Lot _____.

(select one, or both if applicable):

☐ Private Stormwater Detention or Retention Facilities

☐ Private Water Quality Treatment Facilities

2. Stormwater Facilities (FACILITIES) enable development of property while mitigating the impacts of additional surface water and pollutants associated with stormwater runoff prior to discharge from the property to the public stormwater system. The consideration for this agreement is connection to the public stormwater system.

3. The property benefited by the FACILITIES and subject to the obligation of this Agreement is described in Exhibit A (PROPERTY). The site specific maintenance plan and checklist for the FACILITIES is to assist with the successful completion of the operation and maintenance is described in Exhibit B. Exhibits A and B are attached hereto and incorporated by reference.

4. The FACILITIES are a required condition of permit approval for the property and are designed by a registered professional engineer in accordance with the City of Newberg Standard Design Manual; and are binding on all current and future owners of the property as described in Section VII below. The owner is required to operate and maintain the FACILITIES in accordance with the attached O&M plans.

5. CITY and OWNER agree that effective maintenance of the FACILITIES will best be facilitated by regular inspections, not less than twice a year, those times being generally described as once in the early spring and again in the fall prior to the onset of fall rains.

6. Failure to inspect and maintain the FACILITIES will constitute a violation of Section 13.25 of the Newberg Municipal Code (NMC) and can result in a notice of violation and penalties, as stated in Section V below:

NOW, THEREFORE, it is agreed by and between the parties as follows:

I. OWNER INSPECTIONS

OWNER shall provide inspections of the Facilities in conformance with the requirements set forth in Exhibits B. OWNER shall maintain a log of inspection activities. The log shall be available to the CITY upon request, and submitted yearly to the City as outlined in Section 13.25.300, Maintenance of the NMC.

II. DEFICIENCIES

All aspects in which the FACILITIES fail to satisfy the Operations and Maintenance Plan shall be noted as "Deficiencies" **in the inspection logs.**

III. OWNER CORRECTIONS

All Deficiencies shall be corrected at OWNER'S expense within thirty (30) days after completion of the inspection. If more than 30 days is reasonably needed to correct a Deficiency, OWNER shall have a reasonable period to correct the Deficiency so long as the correction is commenced within the 30-day period and is diligently prosecuted to completion.

IV. CITY INSPECTIONS

OWNER hereby grants CITY the right to access and inspect the FACILITIES. CITY will endeavor to give prior notice (as courtesy to OWNER), except that no notice shall be required in case of an emergency. CITY shall determine whether Deficiencies need to be corrected. OWNER (at the last known address provided to the City) will be notified in writing via first class mail of the Deficiencies and shall make corrections in accordance with the City inspection report and within the timeframe specified in the report.

V. CITY CORRECTIONS

If correction of all CITY identified Deficiencies is not completed within the timeframe specified in the notice of violation, the CITY shall have the right to correct the noted Deficiencies. CITY (i) shall hereby have full access to the Facilities for the purpose of correcting such Deficiencies and (ii) shall bill OWNER in accordance with the summary abatement procedures of NMC 13.25.370.

VI. EMERGENCY MEASURES

If at any time the CITY reasonably determines that the FACILITIES create an immediate threat to public health and safety; potential for damage to public or private property adjacent to or downstream of the FACILITIES; or the potential for damage or negative impacts to water quality, riparian habitat, or channel morphology of the receiving watercourse; the CITY may immediately and without prior notice to OWNER take measures reasonably designed to remedy the threat. CITY shall provide notice of the threat and the measures taken to OWNER as soon as reasonably practicable, and charge OWNER for the cost of these corrective measures as outlined in V above.

VII. FORCE AND EFFECT

This Agreement has the same force and effect as any deed covenant running with the land and shall benefit and bind all OWNERS of the PROPERTY present and future, and their heirs, successors and assigns.

VIII. AMENDMENTS

The terms of this Agreement may be amended only by mutual agreement of the parties and shall not alter the intended purpose, intent, or functionality (NMC 13.25.300) of the FACILITIES. Any amendments shall be in writing, shall refer specifically to this Agreement, and shall be valid only when executed by the owners of the PROPERTY and CITY and recorded in the Official Records of Yamhill County.

IX. PREVAILING PARTY

In any action brought by either party to enforce the terms of this Agreement, the prevailing party shall be entitled to recover all costs, including reasonable attorney's fees as may be determined by the court having jurisdiction, including any appeal.

X. SEVERABILITY

The invalidity of any section, clause, sentence, or provision of this Agreement shall not affect the validity of any other part of this Agreement, which can be given effect without such invalid part or parts.

IN WITNESS WHEREOF, OWNER and CITY have signed this Agreement.

OWNER(S):

_____	_____
Signature	*Signature*
_____	_____
Name (Print or Type)	*Name (Print or Type)*
_____	_____
Title (Corporate)	*Title (Corporate)*
_____	_____
Name of Entity (Corporate)	*Name of Entity (Corporate)*

STATE OF _____)
) s.s.
County of _____)

This instrument was acknowledged before me this ____ day of _____, 20__, by

_____.

_____
Notary Public for Oregon
My Commission expires:_____

City Approval:

_____
Sue Ryan
City Recorder

Department Approval:

_____
Kaaren Hofmann
City Engineer

Approved as to Form and Content:

_____
Truman A. Stone
City Attorney

EXHIBIT A

Benefited Property Legal Description and Facility
Agreement Area Meets and Bounds Legal Description with Sketch
(To be Provided by Owner)

Parcel 1 of Partition Plat 2003-30 (see attached)

EXHIBIT B

Site Specific Maintenance Plan and Checklist

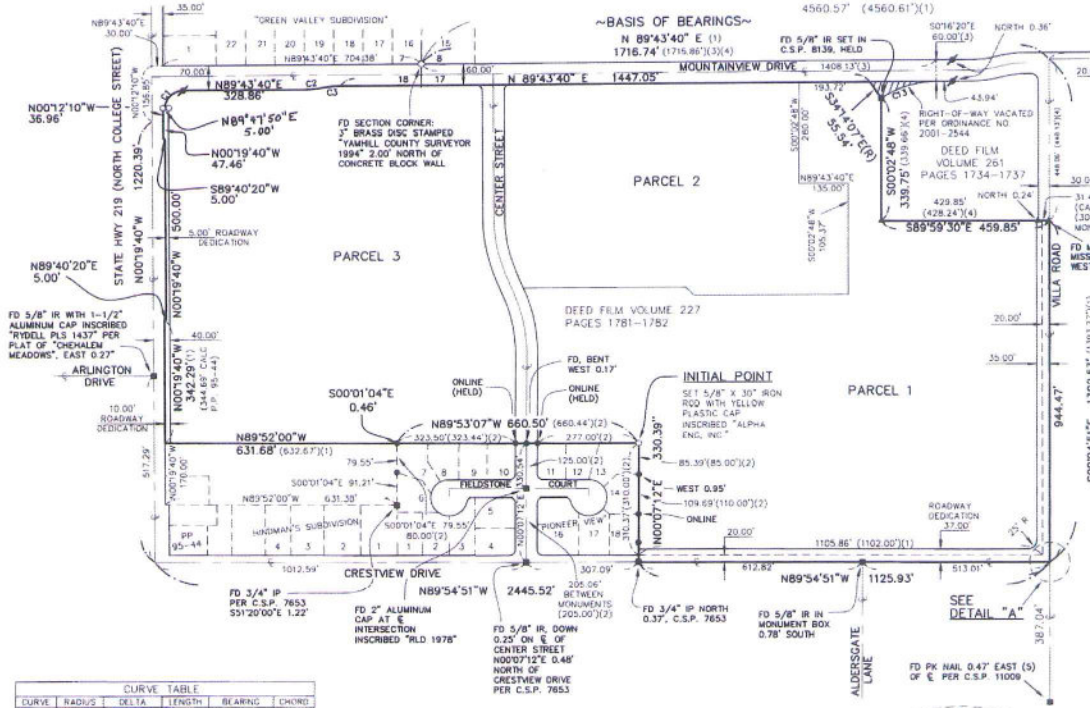
PARTITION PLAT 2003-30

LOCATED IN THE NORTHWEST ONE-QUARTER OF SECTION 17,
AND THE NORTHEAST ONE-QUARTER OF SECTION 18,
TOWNSHIP 3 SOUTH, RANGE 2 WEST, WILLAMETTE MERIDIAN,
CITY OF NEWBERG, YAMHILL COUNTY, OREGON

SURVEYED: NOVEMBER 10, 2003
FOR: KENNETH AND JOAN AUSTIN

ALPHA ENGINEERING, INC.
9600 S.W. OAK, PLAZA WEST, SUITE 230
PORTLAND, OREGON 97223
(503) 452-8003

PARTITION 2003-30



LEGEND

- ○ SET 5/8" x 30" IRON ROD WITH YELLOW PLASTIC CAP INSCRIBED "ALPHA ENG. INC."
- ⊛ SET 5/8" x 30" IRON WITH 1-1/2" ALUMINUM CAP INSCRIBED "ALPHA ENG. INC."
- ◇ FOUND SECTION CORNER OR D.L.C. CORNER AS NOTED
- ● FOUND 5/8" IRON ROD PER PLAT OF "PIONEER VIEW"
- ✗ FOUND 5/8" IRON ROD WITH YELLOW PLASTIC CAP INSCRIBED "RAINERI PLS 2054" PER C.S. 11573
- ▲ FOUND 5/8" IRON ROD WITH YELLOW PLASTIC CAP INSCRIBED "D. CUDLEY PLS 1806" OR AS NOTED PER C.S.P. 8547
- ■ FOUND MONUMENT AS NOTED
- (1) RECORD DATA PER C.S.P. 7653
- (2) RECORD DATA PER PLAT OF "PIONEER VIEW"
- (3) RECORD DATA PER C.S.P. 8139
- (4) RECORD DATA PER DEED FILE VOLUME 261 PAGES 1734-1737
- (5) RECORD DATA PER C.S.P. 11009
- FD FOUND
- IR IRON ROD
- IP IRON PIPE
- ℄ CENTERLINE
- P.U.E. PUBLIC UTILITY EASEMENT
- (R) RADIAL

REFERENCE SURVEYS:

C.S.P. 6634, C.S.P. 7653, C.S.P. 8139, C.S.P. 8547, C.S.P. 11009, C.S. 11573

PLATS OF: "GREEN VALLEY", "PIONEER VIEW", "CHEHALEM MEADOWS"

NARRATIVE

1. THE PURPOSE OF THIS SURVEY IS TO PARTITION INTO 3 PARCELS THE PROPERTY DESCRIBED AS PARCELS II AND III IN DEED FILM VOLUME 227 PAGES 1781-1782 EXCEPTING THEREFROM THOSE PORTIONS OF SAID PARCELS DESCRIBED IN DEEDS OF DEDICATION PER DEED FILM VOLUME 172 PAGE 1947, INSTRUMENT NO. 200121322, INSTRUMENT NO. 200106702 AND INSTRUMENT NO. 200113400, AND INCLUDING THAT PORTION OF MOUNTAINVIEW DRIVE WHICH INURED TO SAID PARCELS AS A RESULT OF VACATION ORDINANCE NO. 2001-2544 RECORDED AS DOCUMENT NO. 200107486.
2. THE BASIS OF BEARINGS IS THE NORTH LINE OF SECTION 17 TAKEN AS N89°43'40"E PER C.S.P. 7653.
3. THE EAST RIGHT-OF-WAY LINE OF NORTH COLLEGE (STATE HIGHWAY 219) AND THAT PORTION OF THE SOUTH LINE FOLLOWING THE CENTERLINE OF CRESTVIEW DRIVE WERE ESTABLISHED PER SAID SURVEY NO. C.S.P. 7653.
4. THE RIGHT-OF-WAY OF MOUNTAINVIEW DRIVE WAS ESTABLISHED PER C.S.P. 8139. A PORTION OF SAID RIGHT-OF-WAY WAS VACATED PER SAID ORDINANCE NO. 2001-2544. HELD MONUMENT SET IN C.S.P. 8139 AT THE NORTHWEST CORNER OF PROPERTY DESCRIBED IN FILM VOLUME 261 PAGES 1734-1737 ESTABLISHED THAT PORTION OF THE VACATED RIGHT-OF-WAY OF MOUNTAINVIEW DRIVE WHICH INURED TO SAID PROPERTY ON A RADIAL BEARING FROM SAID NORTHWEST CORNER WITH THE CURVE OF THE VACATED RIGHT-OF-WAY. HELD MONUMENTS AT THE SOUTHWEST CORNER AND ON THE SOUTH LINE OF SAID PROPERTY SET IN C.S.P. 8547 TO DETERMINE THE REMAINING LINES OF SAID PROPERTY. THE SOUTHERLY NORTHEAST CORNER OF THE SUBJECT PROPERTY BEING THE INTERSECTION OF SAID SOUTH LINE WITH THE CENTERLINE OF VILLA ROAD ESTABLISHED FROM MONUMENTS FOUND IN C.S.P. 11009.
5. HELD MONUMENTS SET IN PLAT OF "PIONEER VIEW" AS SHOWN TO ESTABLISH THE BOUNDARIES OF SAID SUBDIVISION.
6. HELD MONUMENT SET IN C.S. 11573 AT THE NORTHWEST CORNER MARKING THE RIGHT-OF-WAY DEDICATION PER INSTRUMENT NO. 200121322.

CURVE TABLE					
CURVE	RADIUS	DELTA	LENGTH	BEARING	CHORD
C1	50.00'	89°55'31"	78.47'	N44°45'55"E	70.66'
C2	251.90'	11°26'08"	50.28'	N84°00'36"E	50.19'
C3	251.90'	11°26'08"	50.28'	N84°00'36"E	50.19'
C13	270.00'	33°57'47"	160.05'	N72°44'47"E	157.74'

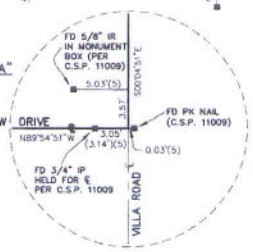
SHEET INDEX

SHEET 1 OF 4 — PLAT BOUNDARY, NARRATIVE, SHEET INDEX
SHEET 2 OF 4 — LOT 1, AND CENTER STREET.
SHEET 3 OF 4 — LOTS 2-4, CENTER STREET, AND RIGHT-OF-WAY DEDICATIONS
SHEET 4 OF 4 — DECLARATION, ACKNOWLEDGMENT, SURVEYOR'S CERTIFICATE, YAMHILL COUNTY APPROVALS, CITY OF NEWBERG APPROVALS, PLAT RESTRICTIONS & NOTES

NOTE

THIS PLAT IS SUBJECT TO THE CONDITIONS IMPOSED BY THE CITY OF NEWBERG IN PLANNING FILE S-33-03.

BOUNDARY CONTROL DIAGRAM 1" = 200'



REGISTERED PROFESSIONAL LAND SURVEYOR
Michael Cates
OREGON JULY 25, 1990 MICHAEL R. CATES 2449
VALID UNTIL 6-30-05

I HEREBY CERTIFY THAT THIS TRACING IS A TRUE AND EXACT COPY OF PARTITION PLAT 2003-30

Michael Cates
MICHAEL R. CATES P.L.S. 2449

THIS PLAT WAS PREPARED USING HP PRODUCT NO. 51645A INK, ON CONTINENTAL NO. JPC4M2 POLYESTER FILM.

Received 12-03-03
County Surveyor

SHEET 1 OF 4

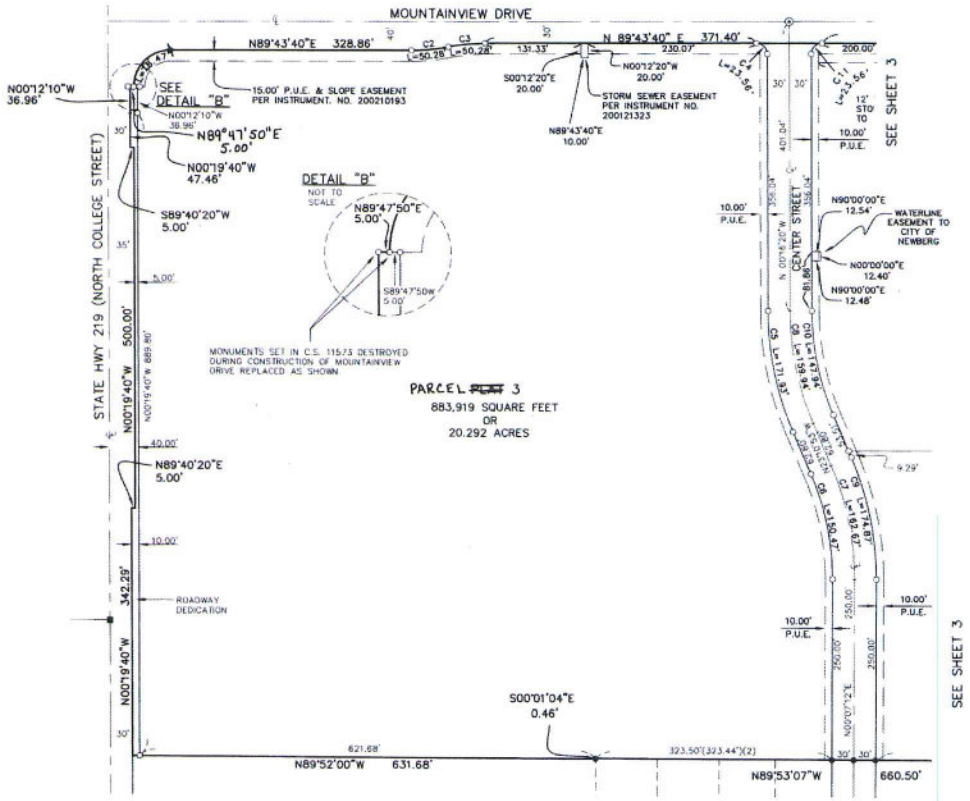
693-001

PARTITION PLAT 2003-30

LOCATED IN THE NORTHWEST ONE-QUARTER OF SECTION 17,
AND THE NORTHEAST ONE-QUARTER OF SECTION 18,
TOWNSHIP 3 SOUTH, RANGE 2 WEST, WILLAMETTE MERIDIAN,
CITY OF NEWBERG, YAMHILL COUNTY, OREGON

SURVEYED: NOVEMBER 10, 2003
FOR: KENNETH AND JOAN AUSTIN

ALPHA ENGINEERING, INC.
9600 S.W. OAK, PLAZA WEST, SUITE 230
PORTLAND, OREGON 97223
(503) 452-8003



SCALE 1" = 100'

NOTE

THIS SUBDIVISION IS SUBJECT TO THE CONDITIONS IMPOSED BY THE CITY OF NEWBERG IN PLANNING FILE S-33-03.

LEGEND

- ○ SET 5/8" x 30" IRON ROD WITH YELLOW PLASTIC CAP INSCRIBED "ALPHA ENG. INC."
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- ℄ CENTERLINE
- P.U.E. PUBLIC UTILITY EASEMENT
- (R) RADIAL

CURVE TABLE

CURVE	RADIUS	DELTA	LENGTH	BEARING	CHORD
C1	50.00'	89°55'31"	78.47'	N44°45'55"E	70.68'
C2	251.90'	11°26'08"	50.28'	N84°00'36"E	50.19'
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C4	15.00'	89°59'59"	23.56'	S45°16'20"E	21.21'
C5	430.00'	22°54'33"	171.93'	S11°43'36"E	170.79'
C6	370.00'	23°18'05"	150.47'	S11°31'50"E	149.44'
C7	400.00'	23°18'05"	162.67'	N11°31'50"W	161.56'
C8	400.00'	22°54'33"	159.94'	S11°43'36"E	158.87'
C9	430.00'	23°18'05"	174.87'	N11°31'50"W	173.67'
C10	370.00'	22°54'33"	147.94'	S11°43'36"E	146.96'
C11	15.00'	90°00'00"	23.56'	S44°43'40"W	21.21'

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 25, 1989
MICHAEL R. GATES
2449
VALID UNTIL 6-30-05

I HEREBY CERTIFY THAT THIS TRACING IS A TRUE AND EXACT COPY OF PARTITION PLAT 2003-30 "COPYHOLD"

MICHAEL R. GATES P.L.S. 2449

THIS PLAT DRAWING WAS PREPARED USING HP PRODUCT NO. 51645A INK, ON CONTINENTAL NO. JPC-4M2 POLYESTER FILM.

Received 12-03-03
County Surveyor

PARTITION 2003-30

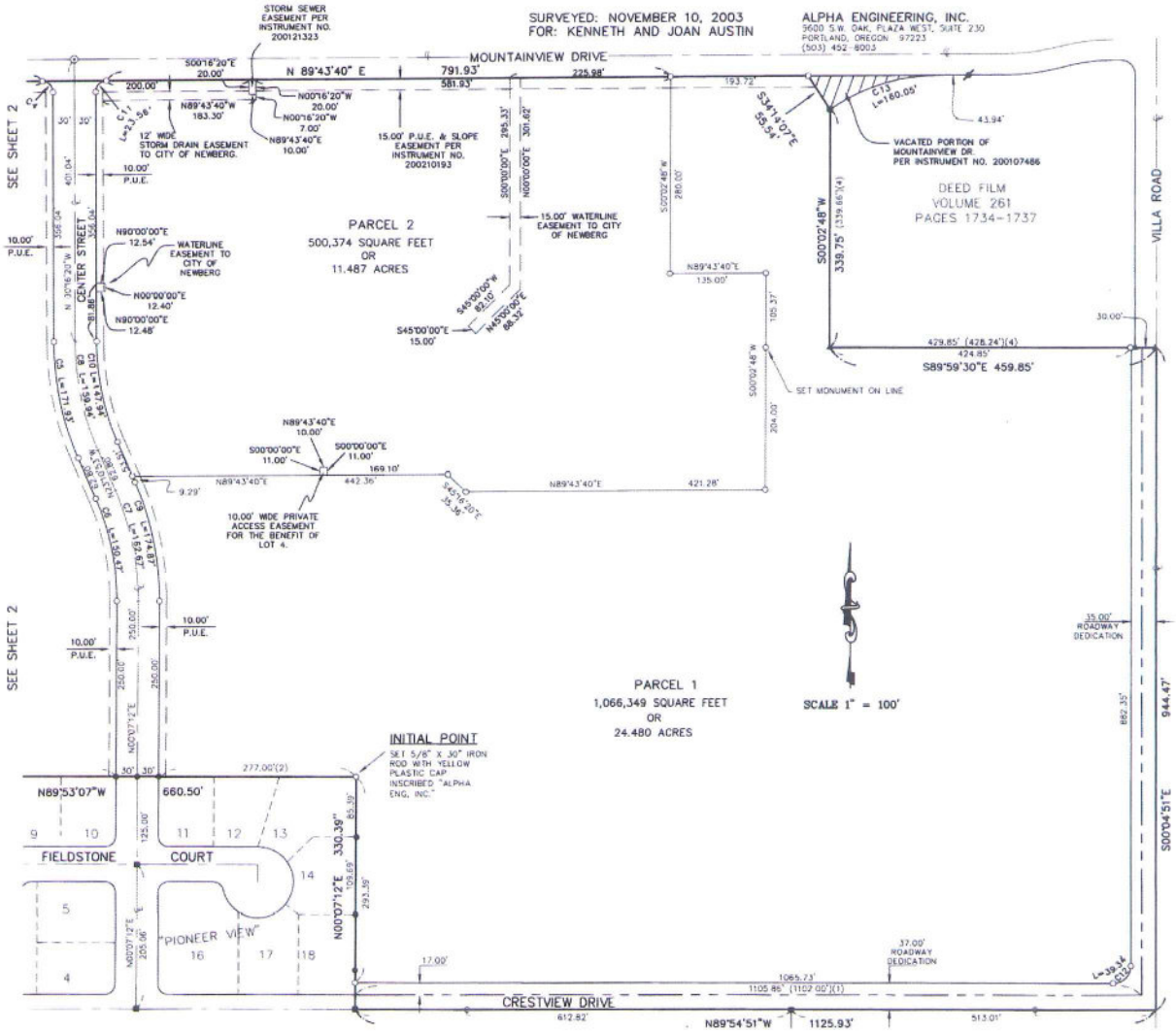
PARTITION PLAT 2003-30

LOCATED IN THE NORTHWEST ONE-QUARTER OF SECTION 17,
AND THE NORTHEAST ONE-QUARTER OF SECTION 18,
TOWNSHIP 3 SOUTH, RANGE 2 WEST, WILLAMETTE MERIDIAN,
CITY OF NEWBERG, YAMHILL COUNTY, OREGON

SURVEYED: NOVEMBER 10, 2003
FOR: KENNETH AND JOAN AUSTIN

ALPHA ENGINEERING, INC.
5600 S.W. OAK, PLAZA WEST, SUITE 230
PORTLAND, OREGON 97223
(503) 452-6003

PARTITION 2003-30



NOTE

THIS PLAT IS SUBJECT TO THE CONDITIONS IMPOSED BY THE CITY OF NEWBERG IN PLANNING FILE S-33-03.

LEGEND

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- (R) RADIAL

CURVE TABLE

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C4	15.00'	90°00'00"	23.56'	N45°16'20"W	21.21'
C5	430.00'	22°54'33"	171.93'	S11°43'36"E	170.79'
C6	370.00'	23°18'05"	150.47'	N11°31'50"W	149.44'
C7	400.00'	23°18'05"	162.67'	N11°31'50"W	161.56'
C8	400.00'	22°54'33"	159.94'	S11°43'36"E	158.87'
C9	430.00'	23°18'05"	174.87'	N11°31'50"W	173.67'
C10	370.00'	22°54'33"	147.94'	S11°43'36"E	146.96'
C11	15.00'	89°59'59"	23.56'	S44°43'40"W	21.21'
C12	25.00'	90°10'01"	39.34'	S45°00'09"W	35.41'
C13	270.00'	33°57'47"	160.05'	N72°44'47"E	157.74'

REGISTERED PROFESSIONAL LAND SURVEYOR
Michael Gates
OREGON
JULY 25, 1980
MICHAEL R. GATES
2449

VALID UNTIL 6-30-05

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Michael Gates
MICHAEL R. GATES P.L.S. 2449

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693-001

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SURVEYED: NOVEMBER 10, 2003
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ALPHA ENGINEERING, INC.
9600 S.W. OAK, PLAZA WEST, SUITE 230
PORTLAND, OREGON 97223
(503) 452-8003

PARTITION 2003-30

DECLARATION

KNOW ALL PEOPLE BY THESE PRESENTS: THAT GEORGE KENNETH AUSTIN, JR. AND JOAN D. AUSTIN, AS INDIVIDUALS, ARE THE OWNERS OF THE PROPERTY AND DO HEREBY MAKE, ESTABLISH, AND DECLARE THE ANNEXED PARTITION PLAT, AS DESCRIBED IN THE ACCOMPANYING SURVEYOR'S CERTIFICATE, TO BE A TRUE AND CORRECT PLAT THEREOF, ALL PARCEL LINES BEING OF THE DIMENSIONS SHOWN AND ALL STREETS AND EASEMENTS OF THE WIDTHS THEREIN SET FORTH AND DO HEREBY DEDICATE TO THE PUBLIC AS PUBLICWAYS FOREVER ALL STREETS AND HEREBY GRANT ALL EASEMENTS AS SHOWN OR NOTED HEREON.

George Kenneth Austin
GEORGE KENNETH AUSTIN, JR.

Joan D. Austin
JOAN D. AUSTIN

ACKNOWLEDGMENT

STATE OF OREGON }
YAMHILL COUNTY } SS

THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON 18 NOV. 2003
BY GEORGE KENNETH AUSTIN, AND JOAN D. AUSTIN.

Glenda L. Wade
NOTARY SIGNATURE
Glenda L. Wade
NOTARY PUBLIC - OREGON
COMMISSION NO. 33212
MY COMMISSION EXPIRES 6-28-04

OFFICIAL SEAL
GLENDA L. WADE
NOTARY PUBLIC-OREGON
COMMISSION NO. 33212
MY COMMISSION EXPIRES JUN 28, 2004

NOTE

THIS PLAT IS SUBJECT TO THE CONDITIONS IMPOSED BY THE CITY OF NEWBERG IN PLANNING FILE S-33-03.

SURVEYOR'S CERTIFICATE

I, MICHAEL R. GATES, HEREBY CERTIFY THAT I HAVE CORRECTLY SURVEYED AND MARKED WITH PROPER MONUMENTS THE LANDS REPRESENTED ON THE ANNEXED PARTITION PLAT; LOCATED IN THE NORTHWEST ONE-QUARTER OF SECTION 17, AND THE NORTHEAST ONE-QUARTER OF SECTION 18, TOWNSHIP 3 SOUTH, RANGE 2 WEST, OF THE WILLAMETTE MERIDIAN, CITY OF NEWBERG, YAMHILL COUNTY, OREGON; THAT AS THE INITIAL POINT OF SAID SURVEY I SET A 5/8" IRON ROD WITH A YELLOW PLASTIC CAP INSCRIBED "ALPHA ENG. INC." MARKING THE NORTHEAST CORNER OF LOT 13, "PIONEER VIEW"; THENCE ALONG THE NORTH LINE OF SAID SUBDIVISION NORTH 89°53'07" WEST 660.50 FEET TO THE NORTHWEST CORNER OF LOT 7; THENCE SOUTH 00°01'04" EAST 0.46 FEET ALONG THE WEST LINE OF SAID LOT 7; THENCE LEAVING SAID LINE NORTH 89°52'00" WEST 631.68 FEET TO THE EAST RIGHT-OF-WAY LINE OF STATE HIGHWAY 219 (NORTH COLLEGE STREET); THENCE ALONG SAID LINE NORTH 00°19'40" WEST 342.29 FEET; THENCE NORTH 89°40'20" EAST 5.00 FEET; THENCE NORTH 00°19'40" WEST 500.00 FEET; THENCE SOUTH 89°40'20" WEST 5.00 FEET; THENCE NORTH 00°19'40" WEST 47.46 FEET; THENCE NORTH 00°12'10" WEST 36.96 FEET; THENCE NORTH 89°47'50" EAST 5.00 FEET; THENCE ON A CURVE CONCAVE TO THE SOUTHEAST, HAVING A RADIUS OF 50.00 FEET, THROUGH A CENTRAL ANGLE OF 89°55'31", AN ARC LENGTH OF 78.47 FEET (CHORD BEARS NORTH 44°45'55" EAST 70.66 FEET) TO A POINT ON THE SOUTH RIGHT-OF-WAY LINE OF MOUNTAINVIEW DRIVE; THENCE ALONG SAID LINE NORTH 89°43'40" EAST 328.86 FEET; THENCE ON A CURVE TO THE LEFT, HAVING A RADIUS OF 251.90 FEET, THROUGH A CENTRAL ANGLE OF 11°26'08", AN ARC LENGTH OF 50.28 FEET (CHORD BEARS NORTH 84°00'36" EAST 50.19 FEET) TO A POINT OF REVERSE CURVATURE; THENCE ON A CURVE CONCAVE TO THE SOUTH HAVING A RADIUS OF 251.90 FEET, THROUGH A CENTRAL ANGLE OF 11°26'08", AN ARC LENGTH OF 50.28 FEET (CHORD BEARS NORTH 84°00'36" EAST 50.19 FEET); THENCE NORTH 89°43'40" EAST 1447.05 FEET TO THE NORTHWEST CORNER OF THAT PORTION OF THE VACATED RIGHT-OF-WAY OF MOUNTAINVIEW DRIVE WHICH INURED TO THE PROPERTY DESCRIBED IN DEED FILM VOLUME 261 PAGES 1734-1737 AS A RESULT OF VACATION ORDINANCE NO. 2001-2544; THENCE ALONG THE WEST LINE OF SAID VACATED RIGHT-OF-WAY SOUTH 34°14'07" EAST 55.64 FEET TO THE NORTHWEST CORNER OF SAID PROPERTY; THENCE ALONG THE WEST LINE OF SAID PROPERTY SOUTH 00°02'48" WEST 339.75 FEET TO THE SOUTHWEST CORNER; THENCE ALONG THE SOUTH LINE AND ITS EASTERLY EXTENSION SOUTH 89°59'30" EAST 459.85 FEET TO A POINT ON THE CENTERLINE OF VILLA ROAD; THENCE SOUTH 00°04'51" EAST 944.47 TO THE INTERSECTION WITH THE CENTERLINE OF CRESTVIEW DRIVE; THENCE ALONG THE CENTERLINE OF CRESTVIEW DRIVE NORTH 89°54'51" WEST 1125.93 FEET TO A POINT ON THE SOUTHERLY EXTENSION OF THE EAST LINE OF SAID "PIONEER VIEW"; THENCE ALONG THE EAST LINE OF SAID SUBDIVISION AND ITS SOUTHERLY EXTENSION NORTH 00°01'12" EAST 330.39 FEET TO THE INITIAL POINT.

CONTAINING 59.492 ACRES.

REGISTERED
PROFESSIONAL
LAND SURVEYOR
Michael R. Gates
OREGON
JULY 23, 1990
MICHAEL R. GATES
2449

VALID UNTIL 6-30-05

I HEREBY CERTIFY THAT THIS TRACING IS A TRUE AND EXACT COPY OF PARTITION PLAT 2003-30

Michael R. Gates
MICHAEL R. GATES P.L.S. 2449

THIS PLAT DRAWING WAS PREPARED USING HP PRODUCT NO. 51645A INK, ON CONTINENTAL NO. JPC-4M2 POLYESTER FILM.

YAMHILL COUNTY APPROVALS

APPROVED THIS 26th DAY OF November, 2003.

David C. Hunter
YAMHILL COUNTY SURVEYOR — 11/26/2003 DATE

ALL TAXES, FEES, ASSESSMENTS OR OTHER CHARGES AS PROVIDED BY O.R.S 92.095 HAVE BEEN PAID. 6-30-04

David Thurston
YAMHILL COUNTY TAX COLLECTOR — 12/2/03 DATE

CITY OF NEWBERG APPROVALS

NEWBERG COMMUNITY DEVELOPMENT DIRECTOR — 11-29-03 DATE

J. H. Bennett
CITY OF NEWBERG RECORDER — 11/25/03 DATE

OFFICIAL YAMHILL COUNTY RECORDS
CHARLES STERN, COUNTY CLERK
200330511 11:13:24 AM 12/03/2003
PR-PARPR Cnt=1 Stn=1 KAREN
$45.00 $10.00 $11.00
$66.00

Received 12-03-03
County Surveyor

SHEET 4 OF 4

593-001

3.1.1.2. Pervious Pavement

Note: If this is a proprietary system, the O&M requirements for the system supersede this plan.

Structural components, including surface materials, must evenly infiltrate stormwater.	
MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
Clogged surface	Vacuum or dry sweep at least once a year.
Unraveling or settled pavement	Repair as per manufacturer specification. Do not apply sealants to pervious pavement.
Vegetation must be managed to reduce impacts to pervious pavement.	
MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
Leaf debris	Sweep leaf litter and sediment to prevent surface clogging and ponding.
Vegetation encroachment	Prevent large root systems from damaging subsurface structural components.
Weeds	Manually remove, mow, or torch weeds.
Filter medium must be maintained to preserve infiltration capacity.	
MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
Aggregate loss	Replace paver pore space with aggregate per original design.

Annual Maintenance Schedule

Summer	Make structural repairs.
Fall	Vacuum sweep.
Winter	Monitor infiltration rates.
Spring	Vacuum sweep.
All seasons	Weed as necessary.

Maintenance Records: All facility operators are required to keep an inspection and maintenance log. Record date, description, and contractor (if applicable) for all repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Access: Maintain ingress/egress per design standards.

Infiltration/Flow Control: All facilities must drain within 48 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites must implement Best Management Practices to prevent the introduction of pollutants into stormwater. Record the time/date, weather, and site conditions when site activities contaminate stormwater. Record the time/date and description of corrective action taken.

Vectors (Mosquitoes and Rats): Stormwater facilities must not harbor mosquito larvae or rodents that pose a threat to public health or that undermine the facility structure. Record the time/date, weather, and site conditions when vector activity observed. Record when vector abatement started and ended.

Operations and Maintenance Log

Date	Work Performed By	Type of Work Performed	Notes	Initials

3.1.1.6. Swales

Structural components must be operated and maintained in accordance with the design specifications.	
MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
Clogged inlets or outlets	Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes; maintain at least 50% conveyance at all times.
Broken inlets or outlets	Repair or replace broken downspouts, curb cuts, standpipes, and screens as needed.
Cracked or exposed drain pipes	Repair or seal cracks. Replace when repair is insufficient. Cover with 6 inches of growing medium to prevent freeze/thaw and UV damage.
Check dams missing or with gaps	Maintain or replace check dams as per design specifications.
Perforated liner	Repair or replace as necessary.
Vegetation must cover at least 90% of the facility at maturity.	
MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
Dead or stressed vegetation	Replant per planting plan or substitute from the plant list in Section 2.4.1.
Dry grass or other plants	Irrigate and mulch. Maintain grass height at 6"-9".
Tall grass and vegetation	Prune to allow sight lines and foot traffic. Prune to ensure inlets and outlets freely convey stormwater into and/or out of facility.
Weeds	Manually remove weeds.
Growing medium must sustain healthy plant cover and infiltrate within 48 hours.	
MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
Erosion and sediment accumulation	Fill in and lightly compact areas of erosion with City-approved soil mix (see Section 2.3.6); replant according to planting plan or substitute from the plant list in Section 2.4.1. Erosion deeper than 2 inches must be addressed. Sediment more than 4 inches deep must be removed.
Scouring at the inlet(s)	Ensure splash blocks or inlet gravel/rock are adequate.
Slope slippage	Stabilize 3:1 slopes/banks with plantings from the original planting plan or from the plant list in Section 2.4.1.
Ponding	Rake, till, or amend soil surface with City-approved soil mix to restore infiltration rate.

Annual Maintenance Schedule

Summer	Make structural repairs; clean gutters and downspouts; remove any build-up of weeds or organic debris.
Fall	Replant exposed soil and replace dead plants. Remove sediment and plant debris.
Winter	Clear gutters and downspouts.
Spring	Remove sediment and plant debris. Replant exposed soil and replace dead plants.
All seasons	Weed as necessary.

Maintenance Records: All facility operators are required to keep an inspection and maintenance log. Record date, description, and contractor (if applicable) for all repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Fertilizers/Pesticides/Herbicides. Their use is strongly discouraged because of the potential for damage to downstream systems. If pesticides or herbicides are required, use the services of a licensed applicator and products approved for aquatic use.

Access: Maintain ingress/egress per design standards.

Infiltration/Flow Control: All facilities must drain within 48 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites must implement Best Management Practices to prevent contamination of stormwater. Call 503-823-7180 to report spills. Never wash spills into a stormwater facility. If contamination occurs, document the circumstances and the corrective action taken; include the time/date, weather, and site conditions.

Vectors (Mosquitoes and Rats): Stormwater facilities must not harbor mosquito larvae or rodents that pose a threat to public health or that undermine the facility structure. Record the time/date, weather, and site conditions when vector activity observed. Record when vector abatement started and ended.

Operations and Maintenance Log

Date	Work Performed By	Type of Work Performed					Notes	Initials
		Clean inlets and Outlets	Sediment and Trash Removal	Plant Replacement type, location	Structural Repairs – type, location	Other		

3.1.1.8. Planters

Structural components must be operated and maintained in accordance with the design specifications.		
	MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
	Clogged inlets or outlets	Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes; maintain at least 50% conveyance at all times.
	Broken inlets or outlets	Repair/replace broken downspouts, curb cuts, standpipes, and screens.
	Damaged liners and walls	Extend and secure liner to planter walls above the high water mark. The facility must be water tight to protect abutting foundations from moisture damage.
	Cracked or exposed drain pipes	Repair or seal cracks. Replace when repair is insufficient. Cover with 6 inches of growing medium to prevent freeze/thaw and UV damage
Vegetation must cover at least 90% of the facility at maturity.		
	MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
	Dead or stressed vegetation	Replant per original planting plan, or substitute from the plant list in Section 2.4.1. Irrigate and mulch as needed; prune tall, dry grasses and remove clippings.
	Tall grass and vegetation	Maintain grass height at 6"-9". Trim to allow sight lines and foot traffic, also to ensure inlets and outlets freely convey stormwater into and/or out of facility.
	Weeds	Manually remove weeds.
Growing medium must sustain healthy plant cover and infiltrate within 48 hours.		
	MAINTENANCE INDICATOR	**CORRECTIVE ACTION**
	Gullies, erosion, exposed soils, sediment accumulations	Fill in and lightly compact areas of erosion with City-approved soil mix (see Section 2.3.6) and replant according to planting plan or substitute from the plant list in Section 2.4.1. Sediment more than 4 inches deep must be removed.
	Scouring at the inlet(s)	Ensure splash blocks or inlet gravel/rock are adequate.
	Ponding	Rake, till, or amend soil surface with City-approved soil mix to restore infiltration rate. Remove and replace sediment at entrances.

Annual Maintenance Schedule

Summer	Make structural repairs; clean gutters and downspouts; remove any build-up of weeds or organic debris.
Fall	Replant exposed soil and replace dead plants. Remove sediment and plant debris.
Winter	Clear gutters and downspouts.
Spring	Remove sediment and plant debris. Replant exposed soil and replace dead plants.
All seasons	Weed as necessary.

Maintenance Records: All facility operators are required to keep an inspection and maintenance log. Record date, description, and contractor (if applicable) for all repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Fertilizers/Pesticides/Herbicides: Their use is strongly discouraged because of the potential for damage to downstream systems. If pesticides or herbicides are required, use the services of a licensed applicator and products approved for aquatic use.

Access: Maintain ingress/egress per design standards.

Infiltration/Flow Control: All facilities must drain within 48 hours. Record time/date, weather, and conditions when ponding occurs.

Pollution Prevention: All sites must implement Best Management Practices to prevent contamination of stormwater. Call 503-823-7180 to report spills. Never wash spills into a stormwater facility. If contamination occurs, document the circumstances and the corrective action taken; include the time/date, weather, and site conditions.

Vectors (Mosquitoes and Rats): Stormwater facilities must not harbor mosquito larvae or rodents that pose a threat to public health or that undermine facility structures. Record the time/date, weather, and site conditions when vector activity observed. Record when vector abatement started and ended.

Operations and Maintenance Log

Date	Work Performed By	Type of Work Performed					Notes	Initials
		Clean inlets and Outlets	Sediment and Trash Removal	Plant Replacement type, location	Structural Repairs – type, location	Other		