STAFFORD
HILLS CLUB

June 21, 2016

City of Tualatin
Planning Department
18880 SW Martinazzi Ave
Tualatin, OR 97062-7092

Re: Stafford Hills Club Western Parking Expansion

Dear Planning Department:

Enclosed is our AR Application and supporting documents for the above referenced project. Receipt of the Service Provider letter from CWS is imminent. Aquila confirmed that we could submit this application, but that it would not be deemed "complete" until the SPL was received.

Please let us know if you need any further documentation to complete this application.

Most sincerely,

James D. Zupancic
Chairman and CEO

JDZ:jrf

City of Tualatin
www.tualatinoregon.gov

"NECESSARY PARTIES" MARKED BELOW

NOTICE OF APPLICATION SUBMITTAL

☐ ANNEXATION ☐ CONDITIONAL USE PERMIT ☐ PLAN TEXT AMENDMENT
☒ ARCHITECTURAL REVIEW ☐ PLAN MAP AMENDMENT ☐ OTHER:

CASE/FILE: AR16-0008 (Community Development Dept.: Planning Division)

PROPOSAL	
	To construct an additional 55 parking spaces to the existing parking area west of the main building and tennis courts.

PROPERTY					
☐ n/a	**Name of Application**	STAFFORD HILLS CLUB WESTSIDE PARKING EXPANSION			
	Street Address	5916 SW Nyberg Lane			
	Tax Map and Lot No(s).	21E 19C 00900			
	Planning District	Low Density Residential (RL)	**Overlays** ☐	**NRPO** ☒	**Flood Plain** ☒
	Previous Applications	AR-09-08; CUP-09-01	**Additional Applications:**	**CIO** EAST TUALATIN	

DATES				CONTACT	
Receipt of application	06/21/2016	**Deemed Complete**	07/13/2016		**Name:** Charles H. Benson III
Notice of application submittal			7/13/2016		**Title:** Associate Planner
Project Status / Development Review meeting			7/14/2016		**E-mail:** cbenson@ci.tualatin.or.us
Comments due for staff report			07/27/2016		**Phone:** 503-691-3029
Public meeting: ☐ **ARB** ☐ **TPC** ☒ **n/a**					**Notes:** You may view the application materials through this City web page: www.tualatinoregon.gov/projects
City Council (CC) ☒ **n/a**					

City Staff
- ☒ City Manager
- ☒ Building Official
- ☒ Chief of Police
- ☒ City Attorney
- ☒ City Engineer
- ☒ Community Dev. Director
- ☒ Community Services Director
- ☒ Economic Dev. liaison
- ☒ Engineering Associate*
- ☒ Finance Director
- ☒ GIS technician(s)
- ☒ IS Manager
- ☒ Operations Director*
- ☒ Parks and Recreation Coordinator
- ☒ Planning Manager
- ☒ Street/Sewer Supervisor
- ☒ Water Supervisor

Neighboring Cities
- ☐ Durham
- ☐ King City Planning Commission
- ☒ Lake Oswego
- ☒ Rivergrove PC
- ☐ Sherwood Planning Dept.
- ☐ Tigard Community Dev. Dept.
- ☐ Wilsonville Planning Div.

***Paper Copies**

Counties
- ☒ Clackamas County Dept. of Transportation and Dev.
- ☐ Washington County Dept. of Land Use and Transportation (AR's)
- ☐ Washington County LRP (Annexations)

Regional Government
- ☒ Metro

School Districts
- ☐ Lake Oswego School Dist. 7J
- ☐ Sherwood SD 88J
- ☒ Tigard-Tualatin SD 23J (TTSD)
- ☐ West Linn-Wilsonville SD 3J

State Agencies
- ☐ Oregon Dept. of Aviation
- ☐ Oregon Dept. of Land Conservation and Development (DLCD) (via proprietary notice)
- ☒ Oregon Dept. of State Lands: Wetlands Program
- ☒ Oregon Dept. of Transportation (ODOT) Region 1
- ☐ ODOT Maintenance Dist. 2A
- ☐ ODOT Rail Div.
- ☐ OR Dept. of Revenue

Utilities
- ☒ Republic Services
- ☒ Clean Water Services (CWS)
- ☒ Comcast [cable]*
- ☒ Frontier Communications [phone]
- ☒ Northwest Natural [gas]
- ☒ Portland General Electric (PGE)
- ☒ TriMet
- ☒ Tualatin Valley Fire & Rescue (TVF&R)
- ☐ United States Postal Service (USPS) (Washington; 18850 SW Teton Ave)
- ☒ USPS (Clackamas)
- ☐ Washington County Consolidated Communications Agency (WCCCA)

Additional Parties
- ☒ Tualatin Citizen Involvement Organization (CIO)
- ☐
- ☐

☐ *1.032: Burden of Proof*

☐ *31.071 Architectural Review Procedure*

☒ *31.074 Architectural Review Application Review Process*

☐ *31.077 Quasi-Judicial Evidentiary Hearing Procedures*

☐ *Metro Code 3.09.045 Annexation Review Criteria*

☐ *32.030 Criteria for Review of Conditional Uses*

☐ *33.020 Conditions for Granting a Variance that is not a Sign or a Wireless Communication Facility*

☐ *33.022 Criteria for Granting a Sign Variance*

☐ *33.024 Criteria for Granting a Minor Variance*

☐ *33.025 Criteria for Granting a Variance*

☐ *34.200 Tree Cutting on Private Property without Architectural Review, Subdivision or Partition Approval, or Tree Removal Permit Prohibited*

☒ *34.210 Application for Architectural Review, Subdivision or Partition Review, or Permit*

☐ *34.230 Criteria (tree removal)*

☐ *35.060 Conditions for Granting Reinstatement of Nonconforming Use*

☐ *36.160 Subdivision Plan Approval*

☐ *36.230 Review Process (partitioning)*

☐ *36.330 Review Process (property line adjustment)*

☐ *37.030 Criteria for Review (IMP)*

☒ *40.030 Conditional Uses Permitted (RL)*

☐ *40.060 Lot Size for Conditional Uses (RL)*

☒ *40.080 Setback Requirements for Conditional Uses (RL)*

☐ *41.030 Conditional Uses Permitted (RML)*

☐ *41.050 Lot Size for Conditional Uses (RML)*

☐ *41.070 Setback Requirements for Conditional Uses (RML)*

☐ *42.030 Conditional Uses Permitted (RMH)*

☐ *42.050 Lot Size for Conditional Uses (RMH)*

☐ *42.070 Setback Requirements for Conditional Uses (RMH)*

☐ *43.030 Conditional Uses Permitted (RH)*

☐ *43.060 Lot Size for Conditional Uses (RH)*

☐ *43.090 Setback Requirements for Conditional Uses (RH)*

☐ *44.030 Conditional Uses Permitted (RH-HR)*

☐ *44.050 Lot Size for Conditional Uses (RH-HR)*

☐ *44.070 Setback Requirements for Conditional Uses (RH-HR)*

☐ *49.030 Conditional Uses (IN)*

☐ *49.040 Lot Size for Permitted and Conditional Uses (IN)*

☐ *49.060 Setback Requirements for Conditional Uses (IN)*

☐ *50.020 Permitted Uses (CO)*

☐ *50.030 Central Urban Renewal Plan – Additional Permitted Uses and Conditional Uses (CO)*

☐ *50.040 Conditional Uses (CO)*

☐ *52.030 Conditional Uses (CR)*

☐ *53.050 Conditional Uses (CC)*

☐ *53.055 Central Urban Renewal Area – Conditional Uses (CC)*

☐ *54.030 Conditional Uses (CG)*

☐ *56.030 Conditional Uses (MC)*

☐ *56.045 Lot Size for Conditional Uses (MC)*

☐ *57.030 Conditional Uses (MUCOD)*

☐ *60.040 Conditional Uses (ML)*

☐ *60.041 Restrictions on Conditional Uses (ML)*

☐ *61.030 Conditional Uses (MG)*

☐ *61.031 Restrictions on Conditional Uses (MG)*

☐ *62.030 Conditional Uses (MP)*

☐ *62.031 Restrictions on Conditional Uses (MP)*

☐ *64.030 Conditional Uses (MBP)*

☐ *64.050 Lot Size for Permitted and Conditional Uses (MBP)*

☐ *64.065 Setback Requirements for Conditional Uses (MBP)*

☐ *68.030 Criteria for Designation of a Landmark*

☐ *68.060 Demolition Criteria*

☐ *68.070 Relocation Criteria*

☐ *68.100 Alteration and New Construction Criteria*

☐ *68.110 Alteration and New Construction Approval Process*

☒ *73.130 Standards*

☒ *73.160 Standards*

☐ *73.190 Standards – Single-Family and Multi-Family Uses*

☒ *73.220 Standards*

☐ *73.227 Standards*

☒ *73.230 Landscaping Standards*

☐ *73.300 Landscape Standards – Multi-Family Uses*

☒ *73.310 Landscape Standards – Commercial, Industrial, Public and Semi-Public Uses*

☒ *73.320 Off-Street Parking Lot Landscaping Standards*

☐ *73.470 Standards*

☐ *73.500 Standards*

City of Tualatin

www.tualatinoregon.gov

APPLICATION FOR ARCHITECTURAL REVIEW

Direct Communication to:			
Name: James D. Zupancic		Title: Chairman	
Company Name: Stafford Hills Club			
Current address: 4949 Meadows Road, Suite 600			
City: Lake Oswego	State: OR		ZIP Code: 97035
Phone: 503-941-9623	Fax:	Email: JIM@ZUPGROUP.COM	
Applicant			
Name: Stafford Hills Properties, LLC		Company Name:	
Address: 5916 Nyberg Lane			
City: Tualatin	State: OR		ZIP Code: 97062
Phone: 503 241-6400	Fax:	Email:	
Applicant's Signature: by: Jane D. Zupancic		Date: 6/16/16	
Property Owner			
Name: Stafford Hills Properties, LLC			
Address: 5916 Nyberg Lane			
City: Tualatin	State: OR		ZIP Code: 97062
Phone: 503-241-6400	Fax:	Email:	
Property Owner's Signature: by: Jane D. Zupancic		Date 6/16/16	
(Note: Letter of authorization is required if not signed by owner)			
Architect			
Name:			
Address:			
City:	State:		ZIP Code:
Phone:	Fax:	Email:	
Landscape Architect			
Name:			
Address:			
City:	State:		ZIP Code:
Phone:	Fax:	Email:	
Engineer			
Name: AKS Engineering & Forestry LLC			
Address: 12965 SW Herman Rd, Suite 100			
City: Tualatin	State: OR		ZIP Code: 97062
Phone: 503-563-6151	Fax: 503-563-6152	Email:	
Project			
Project Title: Stafford Hills Club Westside Parking Expansion			
Address: 5916 Nyberg Lane			
City: Tualatin	State: OR		ZIP Code: 97062
Brief Project Description: Adding paved area to existing parking on westside of developed area. Parking islands, landscaping, electrical and stormwater.			
Proposed Use: Parking lot expansion			

Value of Improvements:	$190,000

AS THE PERSON RESPONSIBLE FOR THIS APPLICATION, I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE INFORMATION ABOVE, ON THE FACT SHEET, AND THE SURROUNDING PERTY OWNER MAILING LIST IS CORRECT. I AGREE TO COMPLY WITH ALL APPLICABLE CITY AND COUNTY ORDINANCES AND STATE LAWS REGARDING BUILDING CONSTRUCTION AND LAND USE.

Applicant's Signature:	Date: 6/16/16

Office Use		
Case No:	Date Received:	Received by:
Fee: Complete Review :	Receipt No:	
Application Complete as of:	ARB hearing date (if applicable):	
Posting Verification:	6 copies of drawings (folded)	
1 reproducible 8 ½" X 11" vicinity map	1 reproducible 8 ½" X 11" site, grading, LS, Public Facilities plan	
Neighborhood/Developer meeting materials		

Revised: 6/12/14

GENERAL INFORMATION	
Site Address:	5916 Nyberg Lane, Tualatin
Assessor's Map and Tax Lot #:	
Planning District:	Residential Low Density – CUP
Parcel Size:	16 acres
Property Owner:	Stafford Hills Properties, LLC
Applicant:	
Proposed Use:	

ARCHITECTURAL REVIEW DETAILS	
☐ Residential ☐ Commercial ☐ Industrial	
Number of parking spaces:	
Square footage of building(s):	
Square footage of landscaping:	
Square footage of paving:	
Proposed density (for residential):	

For City Personnel to complete:

Staff contact person:

City of Tualatin

Narrative to Accompany Architectural Review

Application for Stafford Hills Club

Westside Parking Expansion

Submitted June 21, 2016

1. Pre-Application Meeting

A pre-application meeting was held with the City of Tualatin on May 9, 2016 at the City Planning Conference Room. During that meeting, City staff reviewed the administrative review process by which this application would be subject and discussed specific applicable sections of the Tualatin Development Code. It was agreed that this permit application would be handled with an administrative staff-level review without public hearings. Direction was provided by City staff relating to the application for Architectural Review and need to obtain the Service Provider Letter from Clean Water Services. The City staff agreed to accept the application prior to the applicant's receipt of the SPL from CWS, but that the application could not be deemed "complete" until the SPL is received and a copy is provided to the City.

2. Neighborhood/Developer Meeting

The Neighborhood/Developer meeting required by TDC 31.063 was held on June 17, 2016 commencing at 7:30 PM at Stafford Hills Club, Cascade Meeting Room, 2nd Floor of the Wellness Center, located at 5916 Nyberg Lane, Tualatin, OR 97062. Six members from the community attended the meeting, along with a representative from the City of Tualatin. Following a discussion concerning the proposed application, in addition to another unrelated issue of interest to attendees from Rivergrove, the meeting was adjourned at approximately 8:05 PM.

3. Mailing

Notice of the aforementioned Neighborhood/Developer Meeting was sent June 2, 2016 to the required landowners. The mailing list was obtained from the City of Tualatin for the mailing. The Certificate of Mailing and a copy of that Notice is attached under Tab 18 to this Application binder.

4. Sign Posting

Signs as required by were posted relating to the Neighborhood/Developer Meeting. A Certificate of Posting of those signs is attached hereto under Tab 15.

5. Copy Notice to City and CIO

A copy of the Notice was sent to the City and the CIO's. The addresses of the CIO's were provided to the applicant by the City of Tualatin.

6. Meeting Minutes and Attendance Roster

A copy of the Meeting Minutes is attached under Tab 17. A copy of the Attendance Roster is attached under Tab 16.

7. Clean Water Services SPL

The SPL has been approved by Clean Water Services and its receipt is expected very soon. The only item remaining is for CWS legal to sign off on the Water Quality Easement which has been provided to CWS as partial consideration for granting approval of the SPL.

8. Design Drawings

Design drawings prepared by AKS Engineering and Forestry are attached under Tabs 8 through 10. These drawings have been carefully vetted at the Pre-Application Meeting.

9. Code Compliance Criteria

The following sections of the Tualatin Development Code are applicable. An explanation on compliance with each of these code sections is provided below.

A. TDC 3.030 (Natural Resources) identifies sensitive resources including wetlands, wildlife, vegetation, and water quality. This project meets this criterion by improving wetland, wildlife, vegetation and water quality.

B. TDC 3.070(5) (Employment). Job creation within the City of Tualatin is key to creation of economic health. This project results in job preservation and creation in the City of Tualatin, and therefore meets this criterion.

C. TDC 3.080(j)(4) (Water-Drainage). Water drainage throughout the Tualatin Study Area is inadequate. This project will improve the storm drainage via an easement granted to CWS for future improvements.

D. TDC 40.030 (Condition Uses Permitted). (Conditional Uses Permitted). Stafford Hills Club was developed under a Conditional Use Permit granted under TDC 40.030. This parking expansion is consistent with that conditional use and therefore meets the criterion under this section.

E. TDC 40.080 (Setback Requirements for Conditional Uses). Offstreet parking shall be setback a minimum of ten feet from any public right-of-way or property line. The site design as submitted meets this criterion.

F. TDC 70.190 (Floodways). This section provides special restrictions for development within floodways. However, the subject property is located within a floodplain and not a floodway, making such restrictions inapplicable.

G. TDC 72.060 (Development Restrictions in Greenways and Natural Areas). This criterion restricts certain development activity in natural areas. The impacted area for this parking expansion touches a natural area. However, the result of this project will improve the degraded nature of the natural area by improvement to wetlands and vegetated corridors. Following completion of the project the natural areas will be enhanced as compared to existing conditions. Therefore, this criterion is met.

H. TDC 72.065 (Hardship Created). Variances are allowed, when warranted, following procedures outlined in Chapter 33. Excavation necessary to accomplish a balanced cut/fill site within the floodplain is required. Since the entire remainder of the underdeveloped site is within a natural area, the only method by which to satisfy the cut material is to excavate within the natural area. If necessary, the applicant requests a variance because satisfaction of one criterion (cut-fill balance) requires a variance from the other (NRPO). In total, the NRPO will be enhanced as a request of the project, thereby justifying the technical impact by net gain to the community because of environmental enhancements.

   No new impervious area encroaches on the NRPO. Only the excavation area that will be replaced with higher quality native vegetation will be impacted.

   A total 0.25 acres of excavation into degraded condition open space natural area is proposed to achieve floodplain cut balance for the project. A maximum of three feet of material (610 cubic yards) will be removed from the “degraded”-condition open space natural area to achieve the balance of the fill to create the additional parking area. After the excavation of the material, the area will be revegetated to

"good" condition by densely planting native trees and shrubs per CWS good condition standards. The final graded slopes will be mostly around 10H:1V, more conducive to buffer areas but not less than 4H:1V. Construction access for floodplain balance excavation will occur via an existing road located immediately off-site to the south on the adjacent hospital site and will not result in additional open space encroachment.

The west side of the site is the only place that is an upland area that the parking lot may expand into. Because this area is in the flood plain, any fill placed in the flood plain must be offset by an equal to or greater amount of material removed from the flood plain. Due to the site constrictions, there are no other locations on the site that material can be removed from. These constrictions include the extensive amounts of land encumbered by wetlands, vegetated corridor or the open space overlay. As such, there are no alternative locations for the proposed floodplain cut balance area. Floodplain balance is necessary to achieve project goals. Without the balance- the project is undevelopable.

The installation of native trees and shrubs will provide structural diversity to the open space natural area, improving many functional values over existing conditions. Therefore, the minor excavation proposed within open space natural area can be viewed as a temporary impact. Final conditions will not only protect but will improve the on-site functions and values of the adjacent wetland area. CWS has approved excavation and enhancement of this area (which is also vegetated corridor) in the Service Provider Letter process.

The applicant has granted an easement to CWS over the entire Sensitive Area and Vegetated Corridor for water quality preservation and storm and surface water drainage and detention. The easement will prevent the owner from conducting activities and uses inconsistent with the purpose of the easement; and will also provide CWS and The Wetland Conservancy the ability to enter the property to conduct additional discretionary resource enhancement activities over more than 9 acres of the site.

I. TDC 73.150 (Objectives). This criteria requires breaking up parking areas with landscaping (3), utilizing landscaping in parking areas to direct and control vehicular movement patterns (5) and provide safe pedestrian pathways (12). The site plan as submitted meets all these criteria and will enhance overall safety by helping to alleviate an existing overcrowded parking condition that has caused numerous vehicle accidents.

J. TDC 73.240 (Landscaping). This criterion requires compliance with CWS requirements for enhanced wetland mitigation plan. Such plan has been approved by CWS and this criterion is met.

K. TDC 73.250 (Tree Preservation). All trees are being preserved by this project therefore this criterion is met.

L. TDC 73.310 (5ft. landscaped buffer). Since the new parking area is bounded by the vegetated corridor, this requirement is waived.

M. TDC 73.320(1) (Off-Street Parking Landscaping). Shaded areas are required in parking lots, providing visual relief, emphasizing circulation patterns and reducing impervious area. This site design complies with this criterion by introducing additional trees, shrubs and groundcover and creating additional parking in an area that will largely invisible to the general public. This criterion is met.

N. TDC 73.370 (Off-street Parking and Loading). Minimum requirements for this facility were established by the Conditional Use Permit at 138 spaces. This expansion will address peak loads and therefore this criterion is met.

10. Early Water Quality Permit

The applicant requests issuance of an early water quality permit to commence construction during the dry season.

11. Early Grading Permit

The applicant requests issuance of an early grading permit to commence construction during the dry season.

12. Support for Parking Expansion

Under Tab 31 is a letter of support from the Tualatin Chamber of Commerce. Under Tab 32 is confirmation of support from 429 local residents who have voiced support for the parking expansion.

Clean Water Services
Our commitment is clear.

CWS File Number 08-002757

AMENDED #3 Service Provider Letter

08-002757

This form and the attached conditions will serve as your Service Provider Letter in accordance with Clean Water Services Design and Construction Standards (R&O 07-20).

Jurisdiction:	City of Tualatin	**Review Type:**	Tier 2
		SPL Original Date:	April 22, 2009
Site Address / Location:	5910 SW Nyberg RD Tualatin, OR 97062	**SPL Amendment Date:**	June 17, 2016
		SPL Expiration Date:	June 17, 2018

Applicant Information:		**Owner Information:**	
Name		Name	
Company	STAFFORD HILLS CLUB, LLC	Company	STAFFORD HILLS CLUB, LLC
Address	5335 MEADOWS RD SUITE 161 LAKE OSWEGO OR 97035	Address	5335 MEADOWS RD SUITE 161 LAKE OSWEGO OR 97035
Phone/Fax	(503) 968-8200	Phone/Fax	(503) 968-8200
E-mail:		E-mail:	

Tax lot ID	**Development Activity**
21E19C 00900	Additional Parking

Pre-Development Site Conditions:		**Post Development Site Conditions:**	
Sensitive Area Present:	[X] On-Site [X] Off-Site	Sensitive Area Present:	[X] On-Site [X] Off-Site
Vegetated Corridor Width:	Variable	Vegetated Corridor Width:	Variable
Vegetated Corridor Condition:	Degraded		

Enhancement of Remaining Vegetated Corridor Required: [X]

Square Footage to be enhanced: 28,314

Encroachments into Pre-Development Vegetated Corridor:

Type and location of Encroachment:	Square Footage:
Parking, Rip-Rap Pads, and Cut-Fill Grading	26,662
No Temporary Encroachment	0

Mitigation Requirements:

Type/Location	Sq. Ft./Ratio/Cost
On-site, adjacent to existing VC	3,485/ 1:1
On-site, wetland enhancement for VC mitigation, contiguous with existing VC	46,174/ 2:1
On-site, enhancement of impacted VC to meet Tier 2 public benefit	10,890

[X] Conditions Attached [X] Development Figures Attached (3) [X] Planting Plan Attached [ ] Geotech Report Required

This Service Provider Letter does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered on your property.

Tier 2 Alternative Analysis:

3.07.4.c.1 The proposed encroachment area is mitigated in accordance with Section 3.08.
The project requires mitigation for a total of 0.61 acres of permanent vegetated corridor impact. To mitigate for the impacts, the applicant is proposing 0.08 acres of on-site replacement vegetated corridor mitigation (at 1:1 replacement ratio), plus 1.06 acres of on-site wetland enhancement continuous and adjacent to remaining vegetated corridor (at 2:1 enhancement ratio). The 0.08 acres of replacement mitigation method is in accordance with Section 3.08, but the wetland enhancement method is not. However, there are no alternatives for the applicant to offset the remaining vegetated corridor impacts in accordance with Section 3.08. The remainder of the site is consumed by wetland, waters, existing vegetated corridor, and development. There were no available off-site vegetated corridor mitigation opportunities at the time of this application. Since the site design avoids wetland impacts, payment to provide mitigation was not applicable. The proposed wetland enhancement mitigation provides much needed functional lift to the existing low functioning wetland, which is dominated by non-native invasive vegetation species (reed canarygrass) and lacks native woody structure. According to the General Provisions listed under Section 3.01.1 of District code, the requirements set forth in Chapter 3 of the District's Design and Construction standards were intended to "protect the beneficial uses of waters within the Tualatin River Basin and within the District" and to "prevent or reduce the adverse impacts to the drainage system and waters resources of the Tualatin River Basin".

The wetland mitigation enhancement proposed to offset the vegetated corridor impacts will protect and enhance the functions and values associated with on-site water quality resources, as well as water quality within the Tualatin River itself. Therefore, while the proposed on-site wetland enhancement does not specifically meet the mitigation options listed under Section 3.08, it does meet the intentions of Chapter 3.

3.07.4.c.2 The replacement mitigation protects the functions and values of the Vegetated Corridor and Sensitive Area.
The proposed replacement vegetated corridor mitigation is continuous with the existing 50-foot vegetated corridor adjacent to wetland in the southern portion of the site. The replacement mitigation in this location would provide additional protection to the nearby wetlands. The 1.06 acres of on-site wetland mitigation enhancement is generally located adjacent and continuous with the remaining vegetated corridor on the site. As mentioned, the existing condition of the wetland enhancement areas are dominated by non-native invasive reed canarygrass, non-native hawthorn, and lack native woody vegetation. The installation of native trees and shrubs will provide structural diversity to the wetland, improving functions and values on the site. Please see below wetland enhancement plan that corresponds with SPL attachment 3, Figure 1.

Enhancement Area #1 (Wetland)

Planting specifications for the enhancement of **0.45 acre (19,602 SF)**

Scientific Name	Common Name	Size	Spacing/Seeding Rate	Quantity
Shrubs (total 980)				
Cornus sericea	red-osier dogwood	bareroot	4-5 feet on center	196
Crataegus douglasii	Douglas hawthorn	bareroot	4-5 feet on center	196
Rosa pisocarpa	clustered rose	bareroot	clustered	196
Salix scouleriana	Scouler willow	bareroot	4-5 feet on center	196
Spiraea douglasii	Douglas spirea	bareroot	4-5 feet on center	196
Seed mix				
Agrostis exerata	spike bentgrass	seed	1 lbs pls/acre	As needed for bare soil areas >25 square feet
Beckmania syzigachne	American sloughgrass	seed	2 lbs pls/acre	
Deschampsia cespitosa	tufted hairgrass	seed	2 lbs pls/acre	
Deschampsia elongate	slender hairgrass	seed	2 lbs pls/acre	
Hordeum brachyantherum	meadow barley	seed	2 lbs pls/acre	

Enhancement Area #2 (Wetland)

Planting specifications for the enhancement of **0.19 acre (8,276 SF)**

Scientific Name	Common Name	Size	Spacing/Seeding Rate	Quantity
Shrubs (total 415)				
Cornus sericea	red-osier dogwood	bareroot	4-5 feet on center	83
Lonicera involucrata	twinberry	bareroot	4-5 feet on center	83
Salix lucida	Pacific willow	live stake	4-5 feet on center	83
Salix sitchensis	Sitka willow	live stake	4-5 feet on center	83
Spiraea douglasii	Douglas spirea	bareroot	4-5 feet on center	83
Seed mix				
Agrostis exerata	spike bentgrass	seed	1 lbs pls/acre	As needed for bare soil areas >25 square feet
Beckmania syzigachne	American sloughgrass	seed	2 lbs pls/acre	
Deschampsia cespitosa	tufted hairgrass	seed	2 lbs pls/acre	
Deschampsia elongate	slender hairgrass	seed	2 lbs pls/acre	
Hordeum brachyantherum	meadow barley	seed	2 lbs pls/acre	

Enhancement Area #9 (Wetland)

Planting specifications for the enhancement of **0.38 acre (16,552 SF)**

Scientific Name	Common Name	Size	Spacing/Seeding Rate	Quantity
Shrubs (total 827)				
Cornus sericea	red-osier dogwood	bareroot	4-5 feet on center	165
Physocarpus capitatus	Pacific ninebark	bareroot	4-5 feet on center	165
Salix lucida	Pacific willow	live stake	4-5 feet on center	165
Salix sitchensis	Sitka willow	live stake	4-5 feet on center	165
Spiraea douglasii	Douglas spirea	bareroot	4-5 feet on center	165
Seed mix				
Agrostis exerata	spike bentgrass	seed	1 lbs pls/acre	As needed for bare soil areas >25 square feet
Beckmania syzigachne	American sloughgrass	seed	2 lbs pls/acre	
Deschampsia cespitosa	tufted hairgrass	seed	2 lbs pls/acre	
Deschampsia elongate	slender hairgrass	seed	2 lbs pls/acre	
Hordeum brachyantherum	meadow barley	seed	2 lbs pls/acre	

3.07.4.c.3 Enhancement of the replacement area, if not already in Good Corridor Condition, and either the remaining Vegetated Corridor on the site or the first 50 feet of width closest to the resource, whichever is less, to a Good Corridor Condition.

The site will have approximately 0.28 acres of remaining on-site vegetated corridor in the eastern portion of the site (planting plan below). With the wetland enhancement transitional area and the remaining VC area, a total of 1.34 acres is proposed to be planted by the applicant, maintained, and monitored for a minimum of 5 years after installation of the project. The City and CWS will coordinate on the inspection of this area.

TOTAL VEGETATED CORRIDOR PLANTING AREA (EASTERN EXTENT) 0.28 ACRES (12,197 SF)

Scientific Name	Common Name	Size	Spacing/Seeding Rate	Quantity
Trees (total 122)				
Acer circinatum	vine maple	bareroot	10 feet on center	40
Alnus rubra	red alder	bareroot	10 feet on center	42
Cornus nuttallii	Pacific dogwood	bareroot	10 feet on center	40
Shrubs (total 610)				
Lonicera involucrata	black twinberry	bareroot	4-5 feet on center	122
Mahonia nervosa	Cascade barberry	bareroot	4-5 feet on center	122
Oemleris cerasiformis	Indian plum	bareroot	4-5 feet on center	122
Sambucus racemosa	red elderberry	bareroot	4-5 feet on center	122
Symphoricarpus albus	snowberry	bareroot	clustered	122
Seed Mix				
Bromus carinatus	California brome	seed	2.5 lbs pls/acre	As needed for bare soil areas >25 square feet
Deschampsia elongata	slender hairgrass	seed	2 lbs pls/acre	
Elymus glaucus	blue wildrye	seed	2.5 lbs pls/acre	
Festuca rubra var. rubra	native red fescue	seed	2 lbs pls/acre	
Hordeum brachyantherum	meadow barley	seed	2 lbs pls/acre	

The site will have approximately 0.37 acres of remaining on-site vegetated corridor in the southern portion of the site. The remaining vegetated corridor and the 0.08 acres of replacement mitigation and 0.25 acres of public benefit mitigation will be enhanced to "good" condition, per CWS standards. The City and CWS will coordinate on inspection of the vegetated corridor.

TOTAL VEGETATED CORRIDOR PLANTING AREA (SOUTHERN EXTENT) 0.70 ACRES (30,492 SF)

Scientific Name	Common Name	Size	Spacing/Seeding Rate	Quantity
Fewer trees are recommended due to existing marginal condition area				
Acer macrophyllum	bigleaf maple	bareroot	10 feet on center	120
Alnus rubra	red alder	bareroot	10 feet on center	100
Pseudotsuga menziesii	Douglas fir	bareroot	10 feet on center	65
Shrubs (total 980)				
Holodiscus discolor	oceanspray	bareroot	4-5 feet on center	307
Mahonia aquifolium	tall Oregon grape	bareroot	clustered	307
Rhamnus purshiana	cascara	bareroot	4-5 feet on center	307
Sambucus racemosa	red elderberry	bareroot	4-5 feet on center	307
Symphoricarpus albus	snowberry	bareroot	clustered	307
Seed Mix				
Bromus carinatus	California brome	seed	2.5 lbs pls/acre	As needed for bare soil areas >25 square feet
Deschampsia elongata	slender hairgrass	seed	2 lbs pls/acre	
Elymus glaucus	blue wildrye	seed	2.5 lbs pls/acre	
Festuca rubra var. rubra	native red fescue	seed	2 lbs pls/acre	
Hordeum brachyantherum	meadow barley	seed	2 lbs pls/acre	

3.07.4.c.5 Location of the development and site planning minimizes incursion into the Vegetated Corridor.

The proposed layout provides the least amount of vegetated corridor impact possible while achieving a sufficient number of additional parking spaces. A preferred layout that would result in additional vegetated corridor encroachment, as well as wetland impact was not chosen. However, the alternative design provides 18 additional parking spaces over the current proposed layout and provides safer two-way circulation.

The following illustrates how the proposed design minimizes vegetated corridor encroachment:

- The design of the parking area is dictated by the required turning radius for emergency vehicles (fire department) and garbage trucks. The drive isles proposed for emergency vehicles are below standard. The applicant worked with Tualatin Valley Fire and Rescue (TVFR) to narrow the drive isles. TVFR prefers a full T-turnaround, which would have resulted in wetland impact.
- The proposed layout provides nearly the number of City allowed compact spaces (30% of entire parking on the site are compact spaces).
- The proposed layout provides triangular islands instead of standard curb islands to reduce the overall impervious footprint (City requires islands every 8 parking spaces).
- Lock and load retaining walls are incorporated into the design to minimize the extent of grading into vegetated corridor.
- The existing pedestrian path has been removed from the site plan to maximize the parking area.
- The site plan creates dead end parking spaces to avoid wetland impact. This provides access deficiencies and creates less than optimal parking efficiencies, which is not ideal but is necessary to avoid wetland impact. Current design has stalls that back into the elevated retaining wall.

Therefore, the applicant has proposed a layout that does not impact wetland, provides the minimum amount of vegetated corridor encroachment possible, while meeting City, TVFR, and waste management requirements, as well as the project goal. The applicant cannot reduce the impact any further. No additional parking spaces can be lost; otherwise, the applicant feels the parking inadequacy will not be resolved.

3.07.4.c.6 No practicable alternative to the location of the development exists that will not disturb the Sensitive Area or Vegetated Corridor.

The western portion of the site is the only practical location to create additional parking. There are no options that avoid impact to the vegetated corridor. Buildings, pool, tennis courts, and existing parking occupy the eastern portion of the site. An elevated parking structure cannot be built anywhere in the eastern portion of the site due to height requirements on the existing facility buildings and tennis court building. An elevated structure over the existing parking area would block solar exposure and create light glare on the neighborhood to the east.

The applicant researched ways to reconfigure the existing parking area in the eastern portion of the site. The parking in this area is already at maximum design capacity. No additional spaces can be gained. The applicant tried to negotiate a joint parking solution with Browns Ferry Park, which is located across from the facility. The City of Tualatin Parks and Recreation are not ready to expand their existing parking lot. There are no other off-site parking options.

Existing wetland, a wetland mitigation site, and Nyberg Creek occupy the undeveloped western portion of the site. The wetlands on the site have a direct surface water connection to the Tualatin River and provide significant functional opportunity to the local watershed. Therefore, encroachment into the wetland area was determined to not be a practical option. The only remaining option is encroachment into a portion of the vegetated corridor. The applicant's site design incorporates lock and load retaining walls to minimize vegetated corridor encroachment and avoid wetland impact. The applicant has minimized the parking isle turning radiuses as much as possible, while still meeting Tualatin Valley Fire and Rescue (TVFR) and waste management requirements. The less than ideal turning radius allows for some vegetated corridor to be present between the parking area and the wetland. As shown on attached Figure 5B, approximately 0.28 acres of vegetated corridor will remain adjacent to the new parking area.

3.07.4.c.7 The proposed encroachment provides public benefits.

The project will require 0.61 acres of permanent encroachment to degraded vegetated corridor. In addition to the substantial functional gain that will occur through this prescribed wetland mitigation enhancement plan, the following list outlines public benefit mitigation that will occur through the project:

- The applicant will plant the 0.25-acre vegetated corridor in the southern portion of the site with native woody vegetation at good condition planting densities. This area is considered permanent impact and has been accounted for in the mitigation requirements. The enhancement of 0.25 acres of vegetated corridor to good condition serves as additional water quality public benefit (i.e. public benefit).
- Public educational opportunity will be provided through the installation of the two educational signs (Enhancement Area 6).
- Pubic educational opportunity will be provided to the community through allowing TWC to conduct wildlife and wetland studies with local students on the site (Enhancement Area 7).
- The additional parking will alleviate overflow parking into the adjacent neighborhood, thus providing public benefit to the neighborhood.
- The applicant will grant an easement to CWS over the entire Sensitive Area and Vegetated Corridor for water quality preservation and storm and surface water drainage and detention. The easement will prevent the owner from conducting activities and uses inconsistent with the purpose of the easement; and will also provide CWS and The Wetland Conservancy the ability to enter the property to conduct additional discretionary resource enhancement activities over approximately 9.39 acres of the site.

In order to comply with Clean Water Services water quality protection requirements the project must comply with the following conditions:

1. No structures, development, construction activities, gardens, lawns, application of chemicals, uncontained areas of hazardous materials as defined by Oregon Department of Environmental Quality, pet wastes, dumping of materials of any kind, or other activities shall be permitted within the sensitive area or Vegetated Corridor which may negatively impact water quality, except those allowed in R&O 07-20, Chapter 3.
2. **Prior to any site clearing, grading or construction the Vegetated Corridor and water quality sensitive areas shall be surveyed, staked, and temporarily fenced per approved plan. During construction the Vegetated Corridor shall remain fenced and undisturbed except as allowed by R&O 07-20, Section 3.06.1 and per approved plans.**
3. **Prior to any activity within the sensitive area, the applicant shall gain authorization for the project from the Oregon Department of State Lands (DSL) and US Army Corps of Engineers (USACE). The applicant shall provide Clean Water Services or its designee (appropriate city) with copies of all DSL and USACE project authorization permits.**
4. An approved Oregon Department of Forestry Notification is required for one or more trees harvested for sale, trade, or barter, on any non-federal lands within the State of Oregon.
5. **Prior to ground disturbance an erosion control permit is required. Appropriate Best Management Practices (BMP's) for Erosion Control, in accordance with Clean Water Services' Erosion Prevention and Sediment Control Planning and Design Manual, shall be used prior to, during, and following earth disturbing activities.**
6. Prior to construction, a Stormwater Connection Permit from Clean Water Services or its designee is required pursuant to Ordinance 27, Section 4.B.
7. Activities located within the 100-year floodplain shall comply with R&O 07-20, Section 5.10.
8. Removal of native, woody vegetation shall be limited to the greatest extent practicable.
9. If applicable the water quality facility shall be planted with Clean Water Services approved native species, and designed to blend into the natural surroundings.
10. **Should final development plans differ significantly from those submitted for review by Clean Water Services, the applicant shall provide updated drawings, and if necessary, obtain a revised Service Provider Letter.**

11. **For Vegetated Corridors up to 50 feet wide, the applicant shall enhance the entire Vegetated Corridor to meet or exceed good corridor condition as defined in R&O 07-20, Section 3.14.2, Table 3-3.**
12. **Prior to any site clearing, grading or construction, the applicant shall provide a City with a Vegetated Corridor enhancement/restoration plan consistent with the plant quantity tables listed in the SPL. Enhancement/restoration of the Vegetated Corridor shall be provided in accordance with R&O 07-20, Appendix A.**
13. **Prior to installation of plant materials, all invasive vegetation within the Vegetated Corridor shall be removed per methods described in Clean Water Services' Integrated Pest Management Plan. During removal of invasive vegetation care shall be taken to minimize impacts to existing native tree and shrub species.**
14. Clean Water Services or the City shall be notified 72 hours prior to the start and completion of enhancement/restoration activities. Enhancement/restoration activities shall comply with the guidelines provided in Landscape Requirements (R&0 07-20, Appendix A).
15. **Maintenance and monitoring requirements shall comply with R&O 07-20, Section 2.11.2. If at any time during the warranty period the landscaping falls below the 80% survival level, the owner shall reinstall all deficient planting at the next appropriate planting opportunity and the maintenance period shall begin again from the date of replanting.**
16. Performance assurances for the Sensitive Area and Vegetated Corridor shall comply with R&O 07-20, Section 2.06.2.
17. **Clean Water Services will require an easement over the Sensitive Area and Vegetated Corridor conveying storm and surface water management to Clean Water Services that would prevent the owner of the Vegetated Corridor from activities and uses inconsistent with the purpose of the corridor and any easements therein.**

FINAL PLANS

18. **Final construction plans shall include landscape plans.** In the details section of the plans, a description of the methods for removal and control of exotic species, location, distribution, condition and size of plantings, existing plants and trees to be preserved, and installation methods for plant materials is required. Plantings shall be tagged for dormant season identification and shall remain on plant material after planting for monitoring purposes.
19. **A Maintenance Plan shall be included on final plans** including methods, responsible party contact information, and dates (minimum two times per year, by June 1 and September 30).
20. **Final construction plans shall clearly depict the location and dimensions of the sensitive area and the Vegetated Corridor** (indicating good, marginal, or degraded condition). Sensitive area boundaries shall be marked in the field.
21. Protection of the Vegetated Corridors and associated sensitive areas shall be provided by the installation of permanent signage between the development and the outer limits of the Vegetated Corridors. **Signage details to be included on final construction plans.**

This Service Provider Letter is not valid unless CWS-approved site plan is attached.

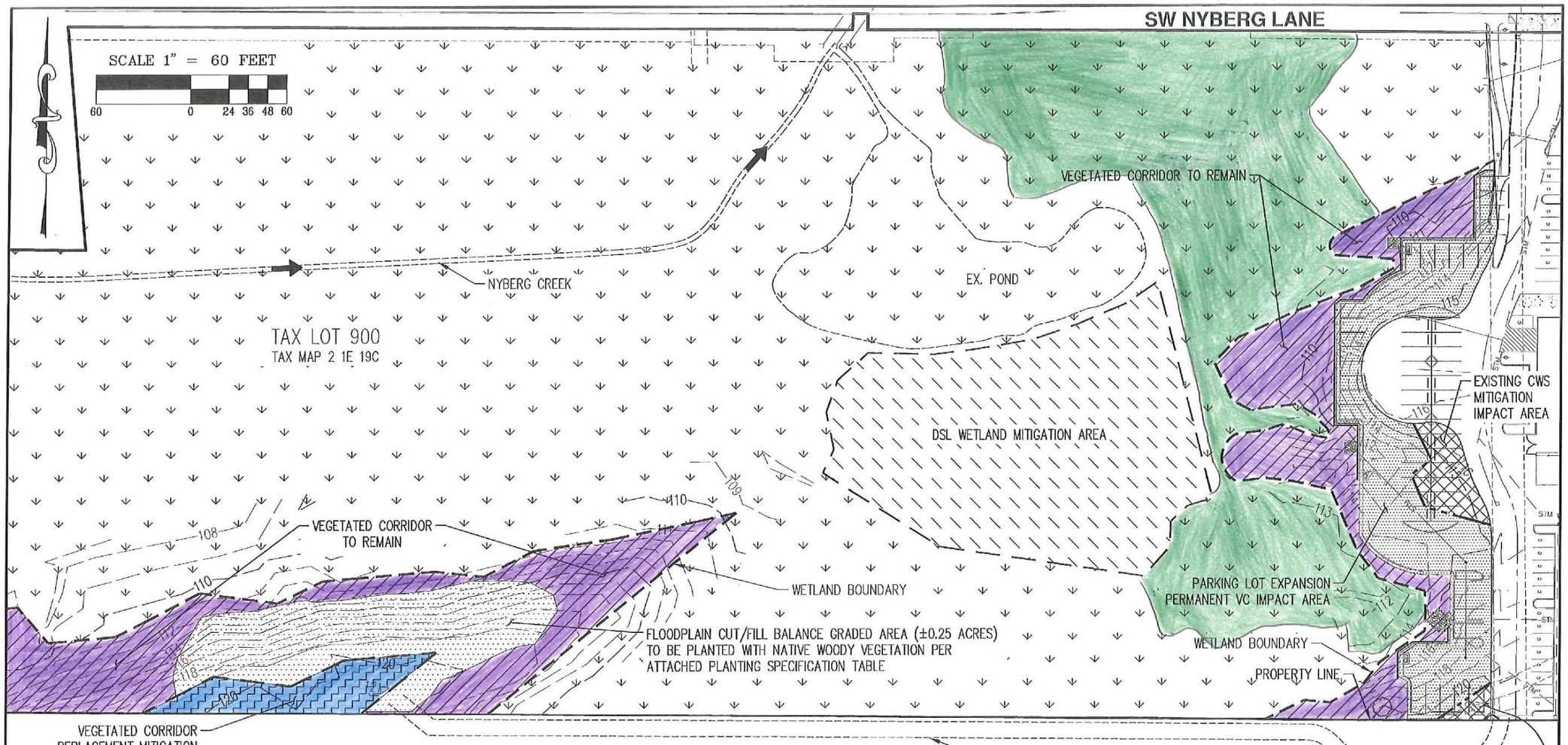
Please call (503) 681-3653 with any questions.

Amber Wierck
Environmental Plan Review

Attachments (3)

CleanWater Services
Our commitment is clear.

CWS File Number 08-002757



IMPACT AREA:

- PARKING LOT EXPANSION PERMANENT VEGETATED CORRIDOR IMPACT= ±0.31 ACRES
  FLOODPLAIN CUT/FILL BALANCE PERMANENT VEGETATED CORRIDOR IMPACT= ±0.25 ACRES
- EXISTING VEGETATED CORRIDOR MITIGATION IMPACT AREA PER CWS 08-002757 = ±0.05 ACRES

TOTAL PERMANENT VEGETATED CORRIDOR IMPACT= ±0.61 ACRES

TOTAL VEGETATED CORRIDOR TO REMAIN= ±0.65 ACRES

UNDISTURBED/MITIGATION AREA:

- WETLAND AREA= ±8.63 ACRES
- DSL WETLAND MITIGATION AREA = ±0.67 ACRES
- VEGETATED CORRIDOR TO REMAIN= ±0.65 ACRES
- VEGETATED CORRIDOR REPLACEMENT MITIGATION= ±0.08 ACRES
  –TO BE PLANTED TO GOOD CONDITION PER ATTACHED PLANTING SPECIFICATION TABLE
- WETLAND ENHANCEMENT FOR VC MITIGATION = ± 1.06 ACRES

CWS FILE NO. 08-002757
Approved
Clean Water Services
FOR ENVIRONMENTAL REVIEW
By AW Date 6/17/16
color copy
SPL ATTACHMENT 1 OF 3

FIGURE 5A: SITE PLAN — DATE: 05/23/2016

NATURAL RESOURCE ASSESSMENT	FIGURE
STAFFORD HILLS	5A
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: AW CHKD: CEG AKS JOB: 4490

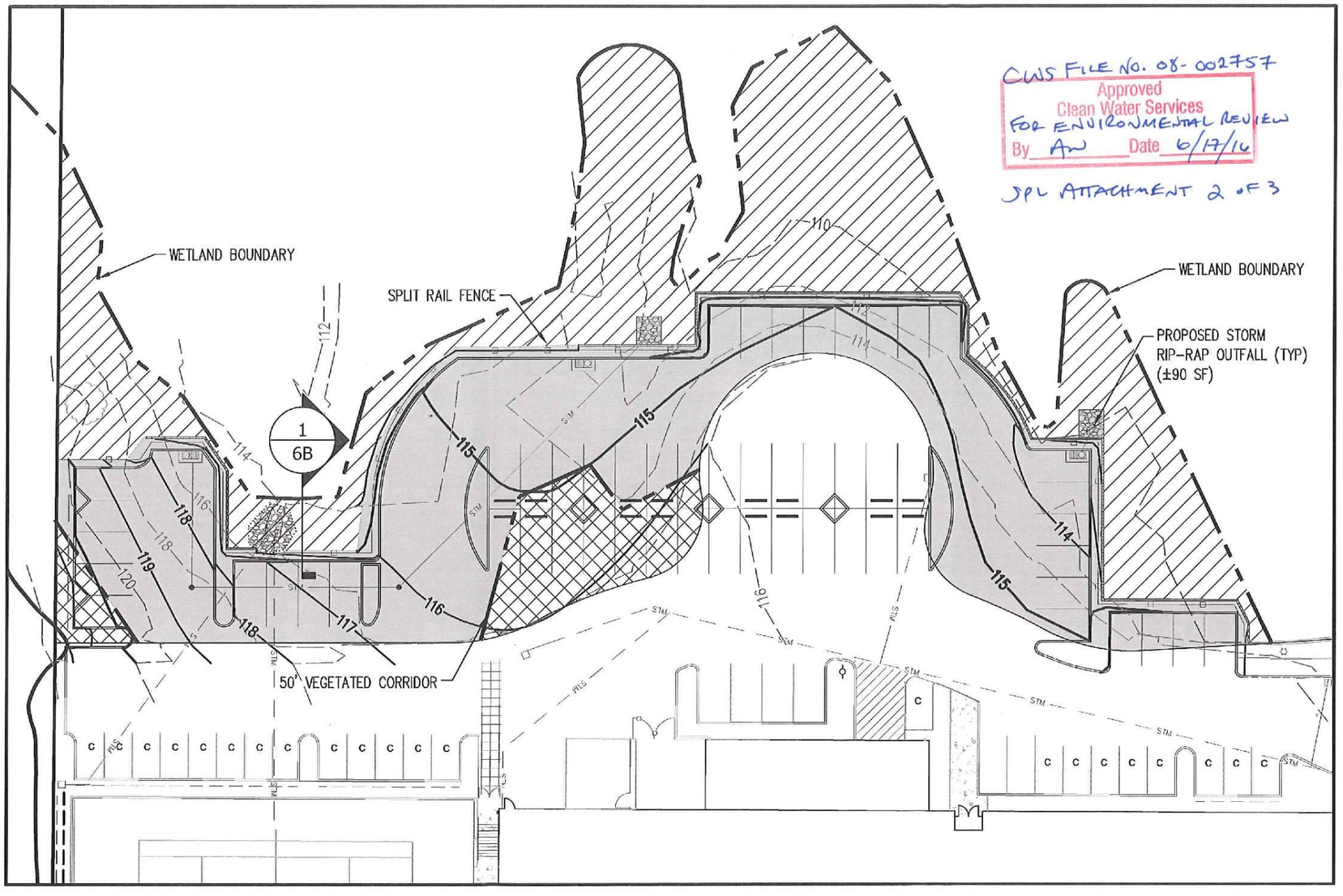
DWG: 4490 FIGURE 5A SITE PLAN 20160315 | SITE PLAN

CWS File Number

08-002757

CWS FILE NO. 08-002757
Approved
Clean Water Services
FOR ENVIRONMENTAL REVIEW
By AW Date 6/17/16

JPL ATTACHMENT 2 OF 3



EXISTING PARKING ON SITE:
ADA: 5 (4%)
STANDARD: 86
COMPACT: 46 (34%)
TOTAL: 137

PROPOSE NEW ADDITIONAL PARKING ON SITE:
STANDARD: 37
COMPACT: 18 (33%)
TOTAL: 55

PROPOSE FINAL PARKING ON SITE:
ADA: 5 (3%)
STANDARD: 123
COMPACT: 64 (33%)
TOTAL: 192

VEGETATED CORRIDOR TO REMAIN= ±0.28 ACRES – TO BE PLANTED TO GOOD CONDITION PER ATTACHED PLANTING SPECIFICATION TABLE

PERMANENT VEGETATED CORRIDOR IMPACT FOR PARKING AREA= ±0.32 ACRES

PERMANENT VEGETATED CORRIDOR MITIGATION IMPACT PER CWS 08-002757 = ±0.05 ACRES

TOTAL OF ADDITIONAL IMPERVIOUS AREA= PERMANENT VEGETATED CORRIDOR IMPACT + PERMANENT VEGETATED CORRIDOR MITIGATION IMPACT= ±0.37 ACRES

SCALE 1" = 30 FEET

30 0 12 18 24 30

FIGURE 5B: PARKING LAYOUT

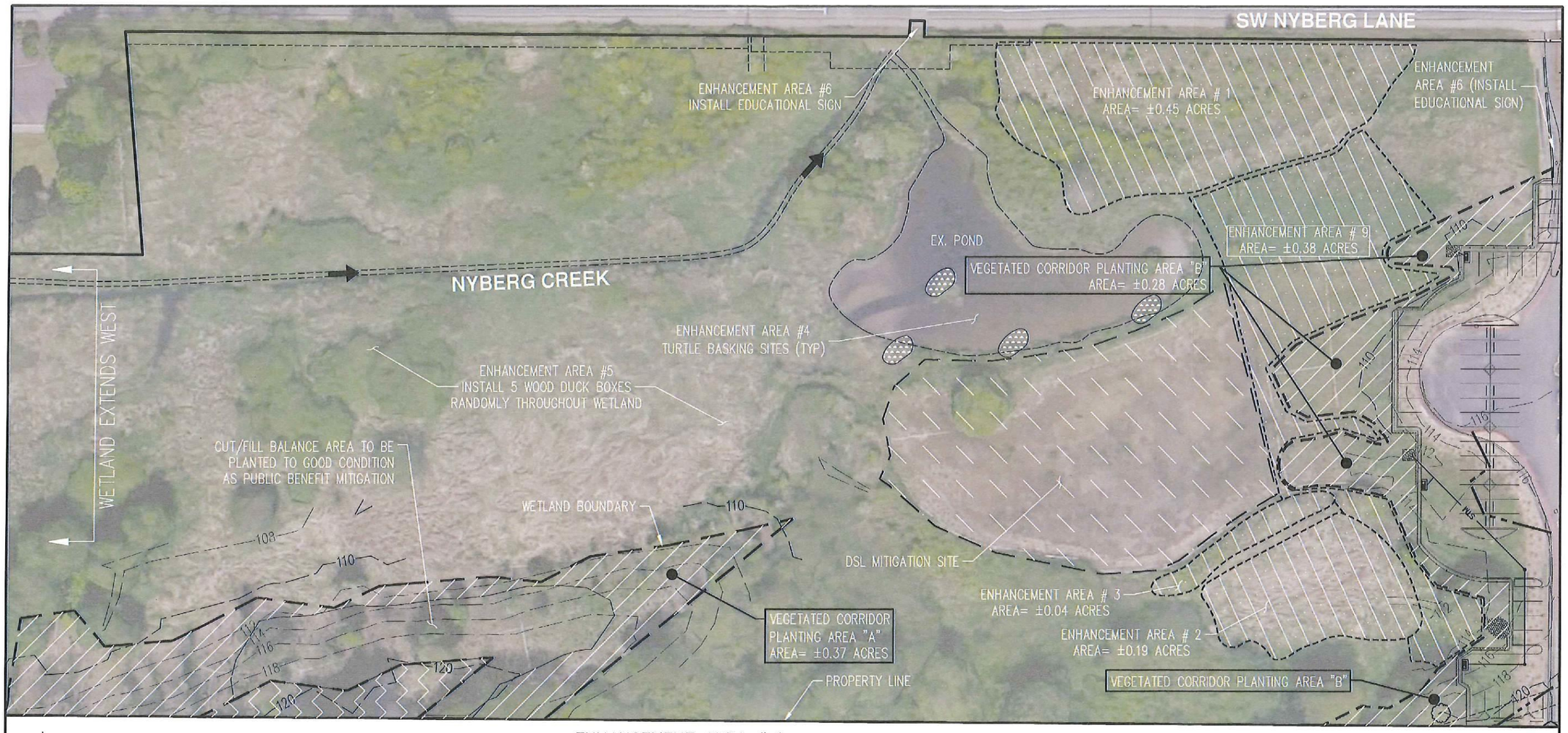
DATE: 05/23/2016

PARKING LAYOUT	FIGURE 5B
STAFFORD HILLS	
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: AW CHKD: CEG AKS JOB: 4490

DWG: 4490 FIGURE 5B PARKING LAYOUT | PARKING LAYOUT

CWS File Number

08-002757



WETLAND ENHANCEMENT AREA TO MITIGATE FOR VEGETATED CORRIDOR IMPACTS = ±1.06 ACRES

DSL WETLAND MITIGATION AREA = ±0.67 ACRES

VEGETATED CORRIDOR REPLACEMENT MITIGATION= ±0.08 ACRES
–TO BE PLANTED TO GOOD CONDITION PER ATTACHED PLANTING SPECIFICATION TABLE

VEGETATED CORRIDOR TO REMAIN= ±0.65 ACRES

FLOODPLAIN CUT/FILL BALANCE AREA = ±0.25 ACRES
–TO BE PLANTED TO GOOD CONDITION AS PUBLIC BENEFIT MITIGATION

SCALE 1" = 60 FEET

60 0 24 36 48 60

COLOR COPY

CWS FILE NO. 08-002757
Approved
Clean Water Services
FOR ENVIRONMENTAL REVIEW
By AW Date 4/17/16
SPL ATTACHMENT 3 OF 3

ENHANCEMENT AREA # 1: REMOVE NON–NATIVE HAWTHORN AND REPLANT WITH NATIVE SHRUBS PER ATTACHED PLANTING SPECIFICATION TABLE.

ENHANCEMENT AREA # 2: REMOVE NON–NATIVE INVASIVE REED CANARY GRASS AND REPLANT WITH NATIVE SHRUBS PER ATTACHED PLANTING SPECIFICATION TABLE

ENHANCEMENT AREA # 3: REMOVE NON–NATIVE INVASIVE HIMALAYAN BLACKBERRY AND INSTALL TURTLE NESTING MEDIUM. SEED WITH COMBINATION OF COLOR LUPINE (*Lupinus Bicolor*), FRAGRANT POPCORN FLOWER (*Plagiobothrys Figuratus*), TOADRUSH (*Juncus Bufonius*), SLENDER TARWEED (*Madia Gracilis*), NORTHWEST CINGUEFOIL (*Potentilla Gracilis*), AND/OR WESTERN BUTTERCUP (*Ranunculus Occidentallis*).

ENHANCEMENT AREA # 4: INSTALL FOUR BASKING LOGS.

ENHANCEMENT AREA # 5: INSTALL FIVE WOOD DUCK NEST BOXES.

ENHANCEMENT AREA # 6: INSTALL 2 EDUCATIONAL SIGNS

ENHANCEMENT AREA # 9: PLANT NATIVE SHRUBS PER ATTACHED PLANTING SPECIFICATION TABLE

FIGURE 1: WETLAND MITIGATION SITE PLAN DATE: 05/31/2016

NATURAL RESOURCE ASSESSMENT	FIGURE 1
STAFFORD HILLS	
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: AW CHKD: CEG AKS JOB: 4490

DWG: 4490 20160311 NAT RES ASSESS BY AW | MITIGATION

Stafford Hills Management Co. LLC
5916 SW Nyberg Lane
Tualatin, OR 97062
(503) 612-2400

Columbia Bank
Lake Oswego, OR 97034
(877) 272-3678
34-827/1251

5277
005277

Details on Back.
Security Features Included

PAY *ONE THOUSAND SIX HUNDRED FORTY-FIVE AND XX / 100

DATE	AMOUNT
6/20/2016	**********1,645.00*

TO THE ORDER OF
City of Tualatin
18880 SW Martinazzi Ave.
Tualatin, OR 97062

Architectural Review Application Fee

AUTHORIZED SIGNATURE

⑈005277⑈ ⑆125108272⑆70008054⑊⑊

Stafford Hills Management Co. LLC **5277**

DATE	INVOICE NO.	COMMENT	AMOUNT	DISCOUNT	NET AMOUNT
6/20/2016	CK00527701		1,645.00	0.00	1,645.00

Check: 005277 6/20/2016 City of Tualatin **TOTAL** 1,645.00

Stafford Hills Management Co. LLC **5277**

DATE	INVOICE NO.	COMMENT	AMOUNT	DISCOUNT	NET AMOUNT
6/20/2016	CK00527701		1,645.00	0.00	1,645.00

Check: 005277 6/20/2016 City of Tualatin **TOTAL** 1,645.00

LAP42 A/P CHECK

City of Tualatin
www.tualatinoregon.gov

Hydraulic Modeling Fee

Water supply modeling is necessary for larger projects to determine the impact of the project's water demand on the water supply system. Water supply modeling will be performed by a consulting engineer based on the most recent version of the Tualatin Water System Master Plan.

Due to possible impacts to the water supply system, the following projects in Tualatin require hydraulic modeling based on the size and type of the project and projected water use for the finished project. The outcome of modeling could require offsite improvements to the water supply system in order to ensure that adequate water supply is available to serve the project and reduce impacts to the overall system.

Hydraulic modeling of the water supply system is required for the following project type/sizes/demand:

Project Type	Criteria	Permit Fee
Commercial or Industrial Building	Building floor area greater than 48,300 square feet **or** Anticipated daily water demand greater than 870 gallons per acre per day	$ 300 per building
Residential development	More than 49 dwelling units	$ 1,000
Multi-family development	More than 49 dwelling units **or** a combined building floor area greater than 48,300 square feet	$ 300 per building

Please complete this form and submit the form and required fee (if applicable) with your land-use application (architectural review, subdivision, etc.).

☑ Commercial or Industrial Development

- Building floor area Ø square feet
- Anticipated water demand (if known) Ø gallons per day
- Described planned building use parking lot.

☐ Residential Development

- Number of dwelling units or single family home lots _____

☐ Multi-Family Residential Development

- Number of dwelling units_____
- Building floor area (sum of all building) _____
- Number of multi-family buildings_____

Permit fee required based on the information provided above $ Ø

- If no fee is required, enter $0.

NOTE: Water Supply Modeling does not replace the requirement for fire hydrant flow testing. Flow testing of fire hydrants will still be required to verify adequate fire flow of finished system

CITY OF TUALATIN FACT SHEET

General

Proposed use:			
Site area:	acres	Building footprint:	sq. ft.
Development area:	acres	Paved area:	sq. ft.
	Sq. ft.	Development area coverage:	%

Parking

Spaces required (see TDC 73.400) *(example: warehouse @ 0.3/1000 GFA)* _____@_____/1000 GFA = _____ _____@_____/1000 GFA = _____ _____@_____/1000 GFA =_____Total parking required: spaces Handicapped accessible = Van pool = Compact = *(max. 35% allowed)* = Loading berths =	Spaces provided: Total parking provided: spaces Standard = Handicapped accessible = Van pool = Compact = Loading berths =

Bicycles

Covered spaces required:	Covered spaces provided:

Landscaping

Landscaping required:_____% of dvpt. area Square feet	Landscaping provided:_____% of dvpt. area Square feet
Landscaped parking island area required: %	Landscaped parking island area provided: %

Trash and recycling facility

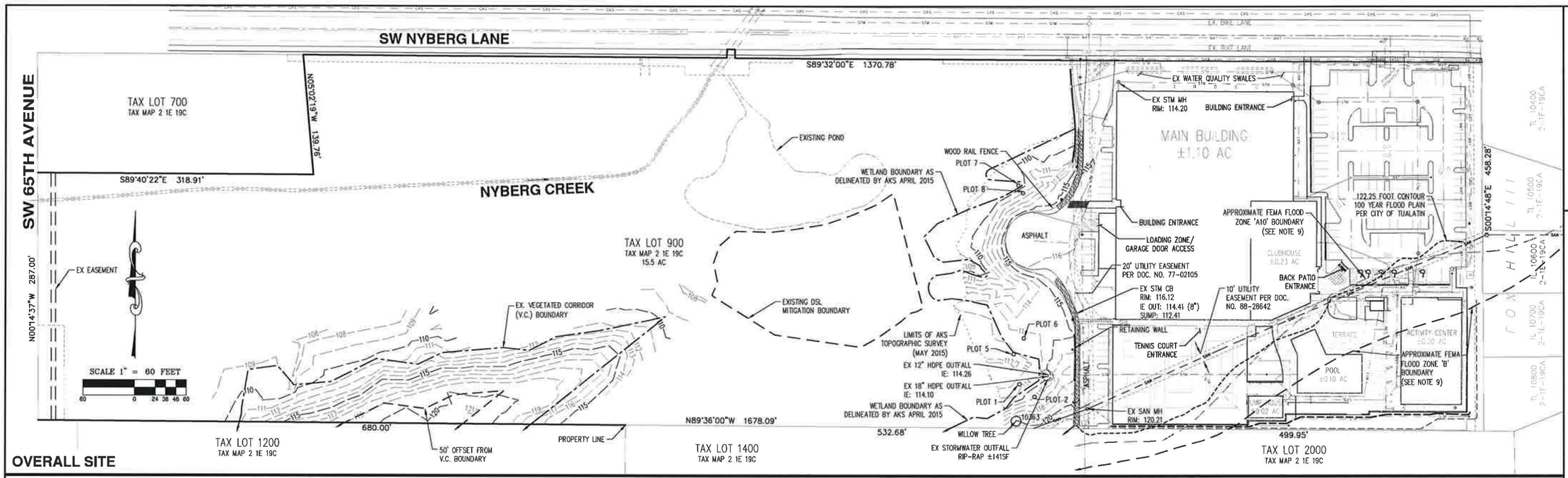
Minimum standard method: square feet
Other method:_____square feet

For commercial/industrial projects only

Total building area:	sq. ft.	2nd floor:	sq. ft.
Main floor:	sq. ft.	3rd floor:	sq. ft.
Mezzanine:	sq. ft.	4th floor:	sq. ft.

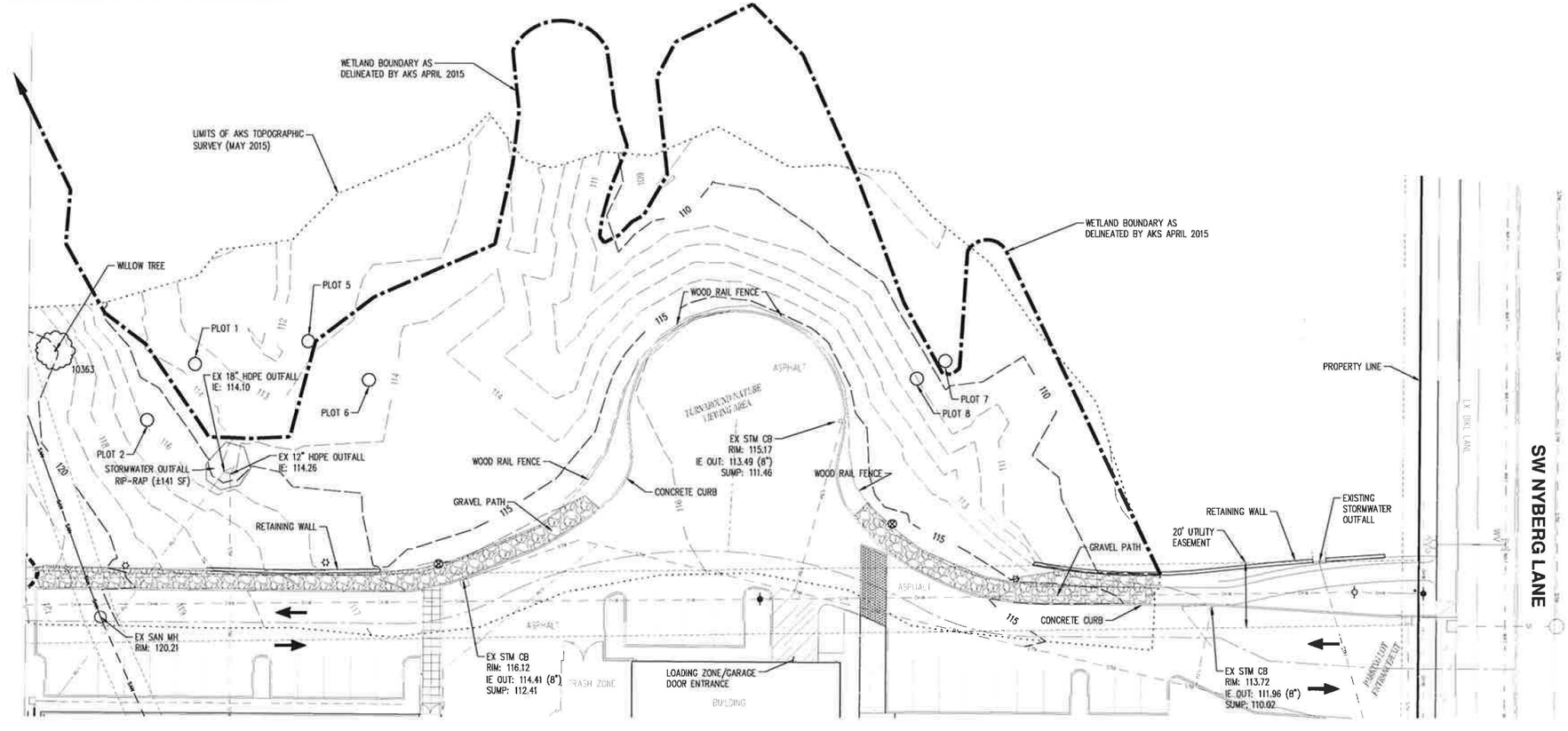
For residential projects only

Number of buildings:	Total sq. ft. of buildings: sq. ft.
Building stories:	



OVERALL SITE

ENLARGED WEST PARKING LOT



TREE TABLE		
NUMBER	SPECIE	DIAMETER (IN.)
10363	DECIDUOUS	20

NOTES:

1. THE BASE DRAWING THAT CONTAINS THE PROPERTY LINES, BUILDING LINES, AND UTILITY LINES ARE BASED ON DIGITAL INFORMATION PROVIDED BY OTHERS. AKS ENGINERING & FORESTRY, LLC. ONLY SURVEYED A SMALL PORTION OF THE SUBJECT PROPERTY, AS SHOWN. EVERYTHING OUTSIDE OF THE AKS TOPOGRAPHIC LIMITS IS CONSIDERED APPROXIMATE AND IS ONLY SHOWN FOR REFERENCE PURPOSES ONLY. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
2. AKS FIELD WORK WAS CONDUCTED APRIL 6 AND MAY 28, 2015.
3. VERTICAL DATUM: ELEVATIONS ARE BASED ON WASHINGTON COUNTY BENCHMARK NO. 469, A BRASS DISK AT THE SOUTHEAST CORNER OF THE FELLOW GUARD OF A BRIDGE ON NYBERG ROAD APPROXIMATELY 0.4 MILES EAST OF I-5. ELEVATION = 124.436 (NGVD 29).
4. THIS MAP DOES NOT CONSTITUTE A PROPERTY BOUNDARY SURVEY.
5. SURVEY IS ONLY VALID WITH SURVEYOR'S STAMP AND SIGNATURE.
6. BUILDING FOOTPRINTS ARE MEASURED TO SIDING UNLESS NOTED OTHERWISE.
7. CONTOUR INTERVAL IS 1 FOOT.
8. ONLY TREES HAVING A DIAMETER OF 6" AND GREATER, MEASURED AT BREAST HEIGHT, WERE SURVEYED AT THIS TIME.
9. FLOOD ZONE BOUNDARIES ARE BASED ON FEMA COMMUNITY MAP PANEL 410277 0002D, WITH AN EFFECTIVE DATE OF FEBRUARY 19, 1987, WHICH IS THE CURRENT MAP FOR THE AREA. FLOOD ZONE 'A10' IS THE AREA OF THE 100 YEAR FLOOD WITH BASE FLOOD ELEVATIONS DETERMINED (121 BASE FLOOD ELEVATION IS TO THE EAST OF THE SITE, AND 122 BASE FLOOD ELEVATION IS TO THE WEST OF THE SITE – NGVD 29 VERTICAL DATUM). FLOOD ZONE 'B' IS THE AREA BETWEEN THE 100 YEAR AND 500 YEAR FLOOD PLAIN. THESE BOUNDARY LINES ARE BASED ON GRAPHIC SCALING FROM AN IMAGE OVERLAY AND ARE CONSIDERED APPROXIMATE, AND COULD VARY HORIZONTALLY UP TO 20 FEET OR MORE.

SCALE 1" = 20 FEET
20 0 8 12 16 20

AKS DRAWING FILE: 4490 C002 EXCOND.DWG | LAYOUT: C002 EXCOND

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

EXISTING CONDITIONS PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 04/15/2016	

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON JANUARY 19, 2005 ROBERT D. RETTIG 60124LS
RENEWS: 12/31/16

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

SHEET C001

STAFFORD HILLS

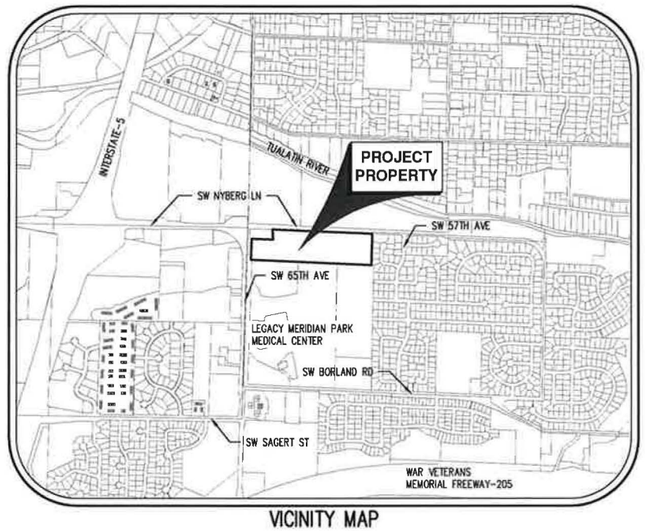
ARCHITECTURAL REVIEW

LEGEND

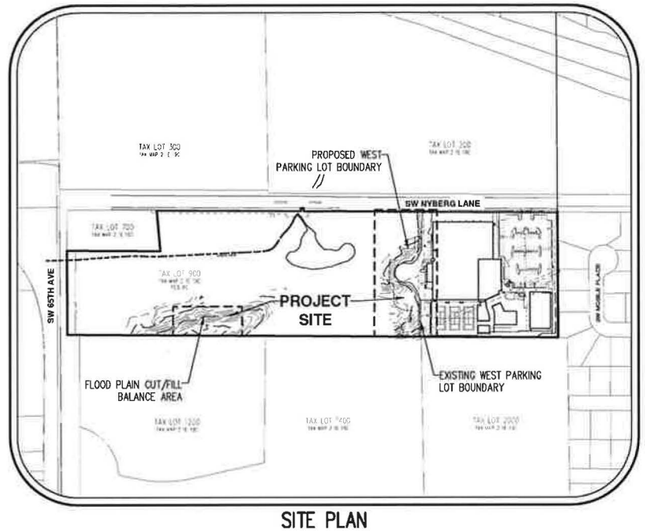
	EXISTING	PROPOSED
DECIDUOUS TREE		
CONIFEROUS TREE		
FIRE HYDRANT		
WATER BLOWOFF		
WATER METER		
WATER VALVE		
DOUBLE CHECK VALVE		
AIR RELEASE VALVE		
SANITARY SEWER CLEAN OUT		
SANITARY SEWER MANHOLE		
SIGN		
STREET LIGHT		
MAILBOX	MB	MB

	EXISTING	PROPOSED
STORM SEWER CLEAN OUT		
STORM SEWER CATCH BASIN		
STORM SEWER AREA DRAIN		
STORM SEWER MANHOLE		
GAS METER		
GAS VALVE		
GUY WIRE ANCHOR		
POWER POLE		
POWER VAULT	P	P
POWER JUNCTION BOX	P	P
POWER PEDESTAL		
COMMUNICATIONS VAULT	C	C
COMMUNICATIONS JUNCTION BOX		
COMMUNICATIONS RISER		

	EXISTING	PROPOSED
RIGHT-OF-WAY LINE		
BOUNDARY LINE		
PROPERTY LINE		
CENTERLINE		
DITCH		
CURB		
EDGE OF PAVEMENT		
EASEMENT		
FENCE LINE		
GRAVEL EDGE		
POWER LINE	PWR	PWR
OVERHEAD WIRE	OHW	OHW
COMMUNICATIONS LINE	COM	COM
FIBER OPTIC LINE	OFO	OFO
GAS LINE	GAS	GAS
STORM SEWER LINE	STM	STM
SANITARY SEWER LINE	SAN	SAN
WATER LINE	WAT	WAT



VICINITY MAP
SCALE: 1"=1,000'



SITE PLAN
NTS

SHEET INDEX:

APPLICANT/OWNER
CONTACT: JIM ZUPANCIC
5916 SW NYBERG LANE
TUALATIN, OR 97062
P: (503) 612-2407
E: jimz@staffordhills.com

CIVIL ENGINEERING, LANDSCAPE ARCHITECTURE, NATURAL RESOURCE, SURVEYING:
AKS ENGINEERING & FORESTRY, LLC
CONTACT: CHUCK GREGORY, PE
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OR 97062
P: (503) 563-6151
E: chuckg@aks-eng.com

PROPERTY DESCRIPTION
TAX LOT 900, CLACKAMAS COUNTY TAX MAP 2N 1E 19C, LOCATED IN THE NORTH OF SECTION 19C, TOWNSHIP 2 NORTH, RANGE 1 EAST, WILLAMETTE MERIDIAN, CITY OF PORTLAND, MULTNOMAH COUNTY, OREGON.

EXISTING LAND USE
LOW DENSITY RESIDENTIAL DISTRICT

PROJECT PURPOSE
NEW PARKING LOT.

VERTICAL DATUM
VERTICAL DATUM: ELEVATIONS ARE BASED ON WASHINGTON COUNTY BENCHMARK NO. 469, A BRASS DISK AT THE SOUTHEAST CORNER OF THE FELLOW GUARD OF A BRIDGE ON NYBERG ROAD APPROXIMATELY 0.4 MILES EAST OF I-5. ELEVATION = 124.436 (NGVD 29).

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

COVER SHEET

DESIGNED BY: CEG
DRAWN BY: AJW
CHECKED BY: CEG
SCALE: AS NOTED
DATE: 04/15/2016

REGISTERED PROFESSIONAL ENGINEER OREGON CHARLES E. GREGORY 79322PE RENEWS: JUNE 30, 2017
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C000

AKS DRAWING FILE: 4490 C000 COVER.DWG | LAYOUT: LAYOUT1

SITE PARKING DATA

EXISTING PARKING ON SITE			
ADA	STANDARD	COMPACT	TOTAL
5	86	46	137
% COMPACT =			34%
% ADA =			4%

PROPOSED PARKING ADDITION			
ADA	STANDARD	COMPACT	TOTAL
0	37	20	57
% COMPACT =			35%
% ADA =			0%

POST DEVELOPED PARKING ON SITE	
ADA =	5
STANDARD =	123
COMPACT =	66
TOTAL =	194
% COMPACT =	34%
% ADA =	3%

SITE AREA DATA

TOTAL PROPERTY AREA = ±15.50 ACRES

WETLAND/BUFFER = ±9.95 ACRES (≈64% OF PROPERTY AREA)

TOTAL BUILDING AREA = ±1.65 ACRES (≈33% OF POST DEVELOPED AREA)

EXISTING SITE AC PARKING LOT AREA = ±1.30 ACRES

PROPOSED PROJECT SITE AREA = ±0.50 ACRES

PROPOSED AC PARKING LOT EXPANSION AREA = ±0.36 ACRES (≈22% OF POST DEVELOPED AC AREA)

OVERALL SITE AREA PRE-DEVELOPMENT = ±4.64 ACRES

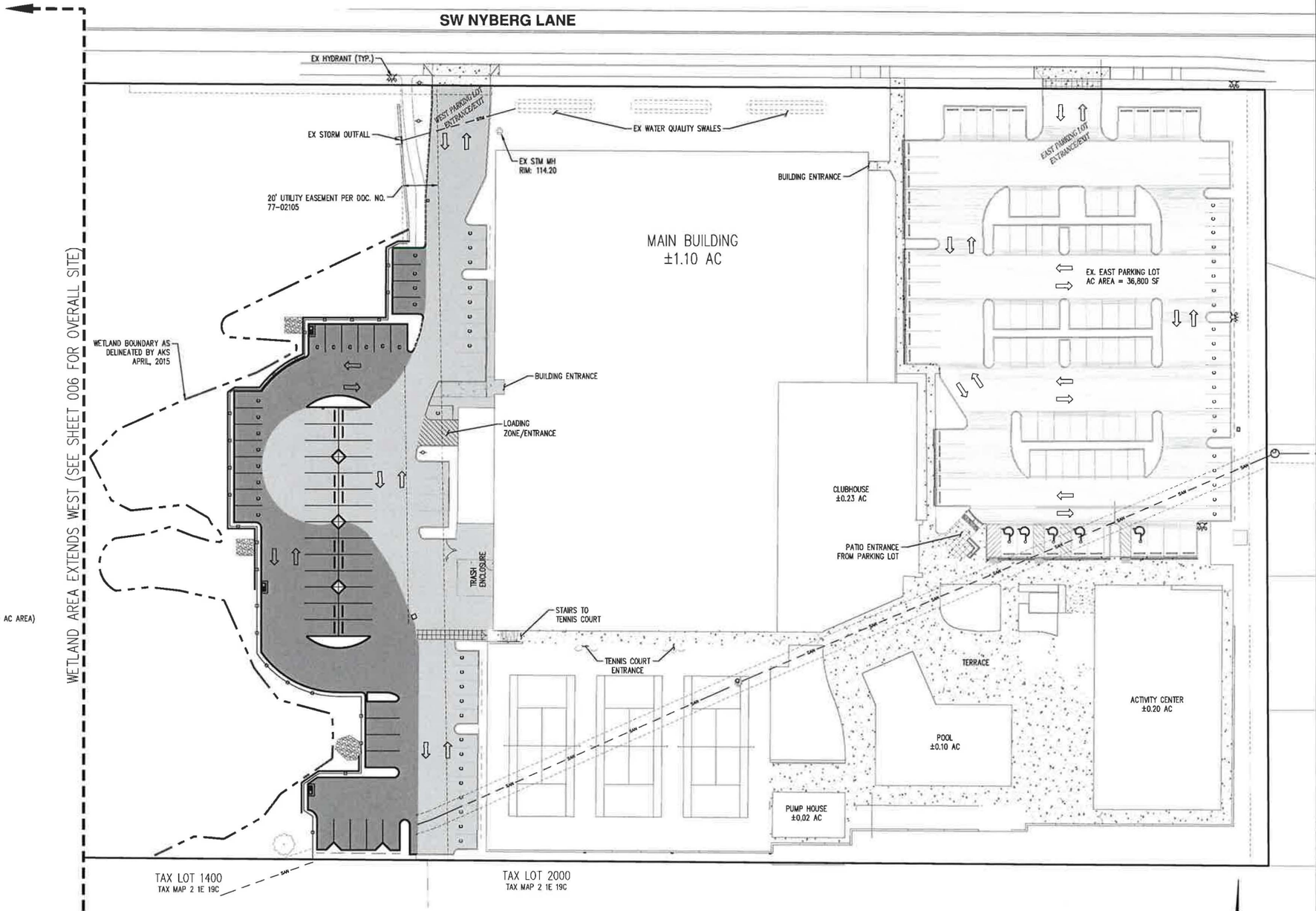
OVERALL SITE AREA POST-DEVELOPEMENT = ±5.00 ACRES

LANDSCAPED AREA (PROPOSED PARKING LOT ONLY SEE SHEET L100) = ±0.06 ACRES

TOTAL POST DEVELOPED PARKING LOT AC AREA (OVERALL SITE) = ±1.66 ACRES

EXISTING PARKING LOT AREA

PROPOSED PARKING LOT AREA



SCALE 1" = 30 FEET

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

PRELIMINARY DEVELOPED SITE PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 04/15/2016	

PRELIMINARY NOT FOR CONSTRUCTION
REVIEWS JUNE 30, 2017

REVISIONS

JOB NUMBER 4490

SHEET C004

AKS DRAWING FILE: 4490 C100 SITEPLAN.DWG | LAYOUT: C101 SITE PLAN OVERALL DEV

WETLAND ENHANCEMENT AREAS SEE NATURAL RESOURCE MITIGATION PLANS

WETLAND BOUNDARY AS DELINEATED BY AKS APRIL 2015

LIMITS OF PROPOSED DEVELOPED AREA

PROPOSED RETAINING WALL (TYP)

3.50'

1 C006

END OF RETAINING WALL

PERIMETER FENCE

END OF RETAINING WALL

9.00'

24.00'

R48.00'

16.50'

2.00'

9.00'

5.00'

24.00'

2.00'

18.50'

1.50' 6.00' 1.50'

2.00'

6.00'x8.00' (TYP.)

EX CATCH BASIN

PROPOSED STORM OUTFALL RIP-RAP (9'X10') (TYP.)

PERIMETER FENCE AT TOP OF RETAINING WALL

3.50'

24.00'

26.00'

20.00'

24.00'

EX RETAINING WALL

EX STORM OUTFALL

END OF RETAINING WALL

20.00' UTILITY EASMENT

EX CATCH BASIN

LIMITS OF PROPOSED DEVELOPED AREA IMPACT TO EXISTING SITE

30.00'

FIRE TRUCK TURN AROUND

EX CATCH BASIN

LOADING AREA

WEST PARKING LOT ENTRANCE/EXIT

10.00' UTILITY EASMENT

TENNIS COURTS

BUILDING AREA

SW NYBERG LANE

EXISTING PAVEMENT TO REMAIN ADJACENT TO DEVELOPMENT
A = 19,700 SF

PROPOSED PAVEMENT PARKING LOT
A = 15,500 SF

TOTAL PAVEMENT AREA IN WEST PARKING LOT
A = 35,200 SF

PROPOSED DEVELOPED AREA = 21,800 SF
(SEE ABOVE FOR LIMITS OF DEVELOPED AREA)

SCALE 1" = 15 FEET

15 0 6 9 12 15

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

AKS ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

PRELIMINARY ENLARGED SITE PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 04/15/2016	

REGISTERED PROFESSIONAL ENGINEER OREGON JULY 19, 2005 CHRISTOPHER E. GOODELL RENEWS: JUNE 30, 2017

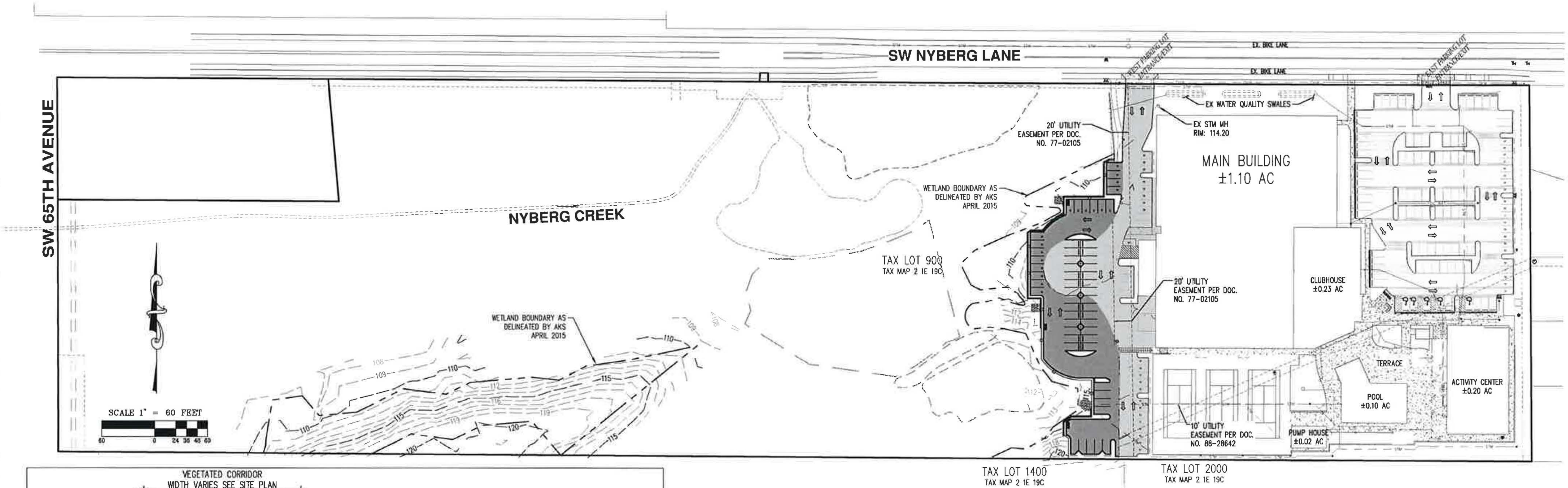
PRELIMINARY NOT FOR CONSTRUCTION

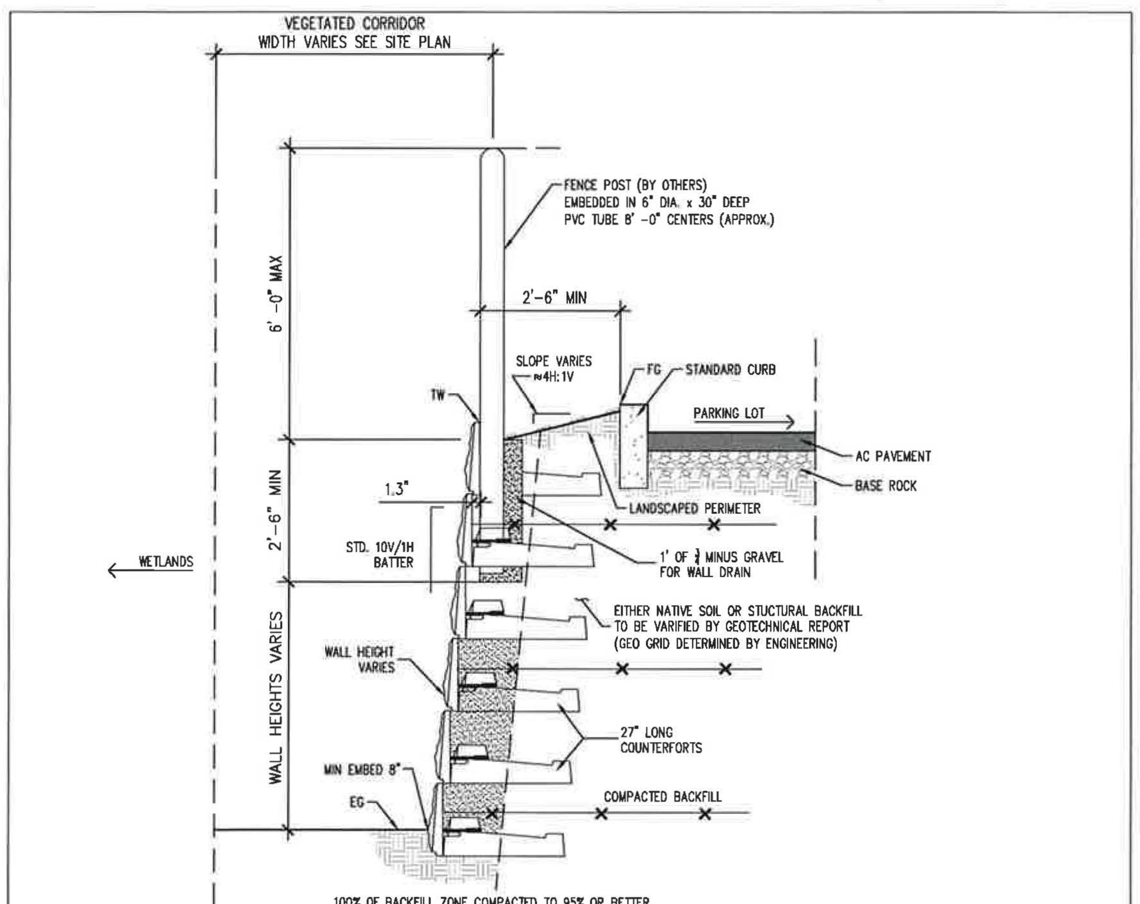
REVISIONS

JOB NUMBER 4490

SHEET C005

AKS DRAWING FILE: 4490 C100 SITEPLAN.DWG | LAYOUT: C100 SITE PLAN





RETAINAING WALL/FENCE DETAIL 1 / C006

SCALE: N.T.S.

AKS DRAWING FILE: 4490 C100 SITEPLAN.DWG | LAYOUT: C102 SITE PLAN OVERALL

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE

TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

PRELIMINARY OVERALL SITE PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 04/15/2016	

PRELIMINARY NOT FOR CONSTRUCTION

RENEWS: JUNE 30, 2017

REVISIONS

JOB NUMBER
4490

SHEET
C006

TAX LOT 1400
TAX MAP 2 1E 19C

SW NYBERG LANE

PROPOSED RET. WALL TO MATCH EXISTING RET. WALL AT TRANSITION POINT

EXISTING RETAINING WALL

MATCH EXISTING GRADE

MATCH EXISTING CURB

EX CB RIM El= 113.70

EX CB RIM El= 115.17

TRASH ENCLOSURE

PARKING AREA

FLOOD PLAIN CUT/FILL BALANCE AREA

SCALE 1" = 20 FEET

20 0 8 12 16 20

VOLUME SUMMARY:
FROM PARKING LOT DEVELOPMENT

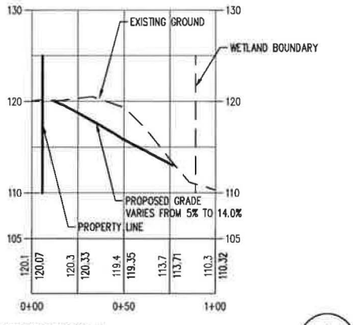
REQUIRED CUT	->	±50 CU.YD.
REQUIRED FILL	->	±660 CU.YD.
NET FILL	->	±610 CU.YD.

EXISTING PARKING LOT AREA

PROPOSED PARKING LOT AREA

ELEVATION KEY

TOP OF WALL	TW:100.00
TOP OF ASPHALT	AC:100.00
FINISH GRADE	FG:100.00
EXISTING GRADE	EG:100.00
EG ELEV. MATCHES FG ELEV.	EG=FG:100.00

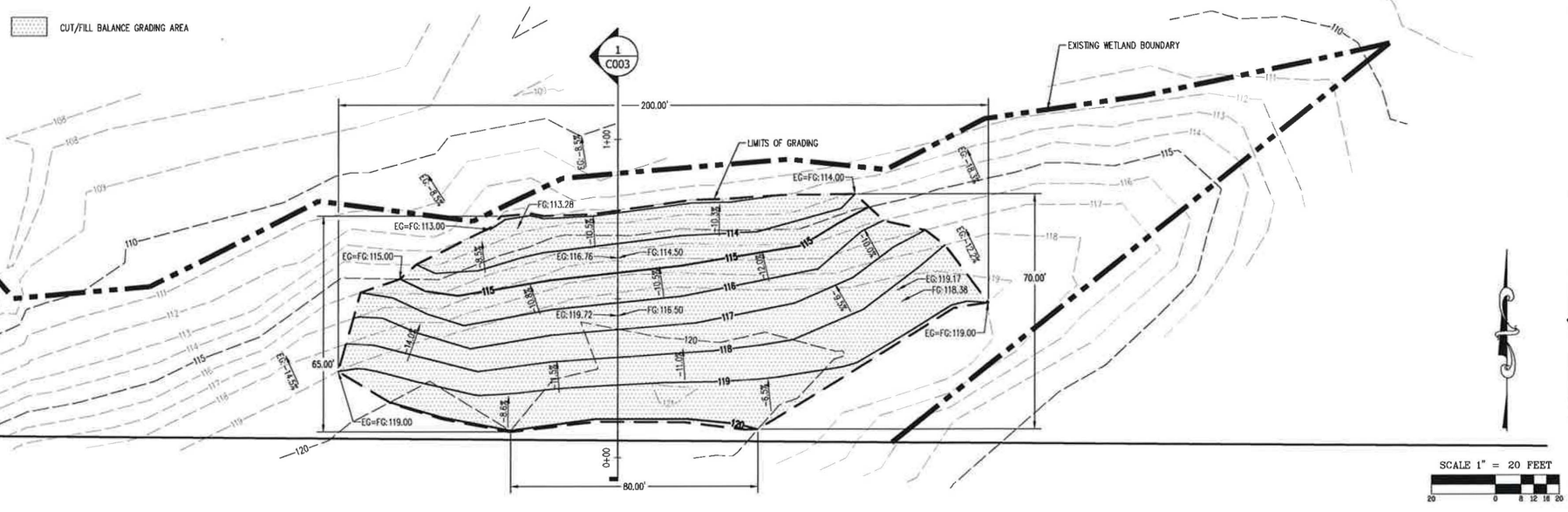


CUT SECTION 1
SCALE: HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=10'
1 C003

VOLUME SUMMARY:
FOR GRADING BALANCE SITE

REQUIRED CUT	->	±610 CU.YD.
REQUIRED FILL	->	0 CU.YD.
NET CUT	->	±610 CU.YD.

CUT/FILL BALANCE GRADING AREA



SCALE 1" = 20 FEET

20 0 8 12 16 20

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

PRELIMINARY GRADING PLAN

DESIGNED BY: CEG
DRAWN BY: AJW
CHECKED BY: CEG
SCALE: AS NOTED
DATE: 04/15/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 12, 2005
CHRISTOPHER E. GOODELL
RENEWS: JUNE 30, 2017

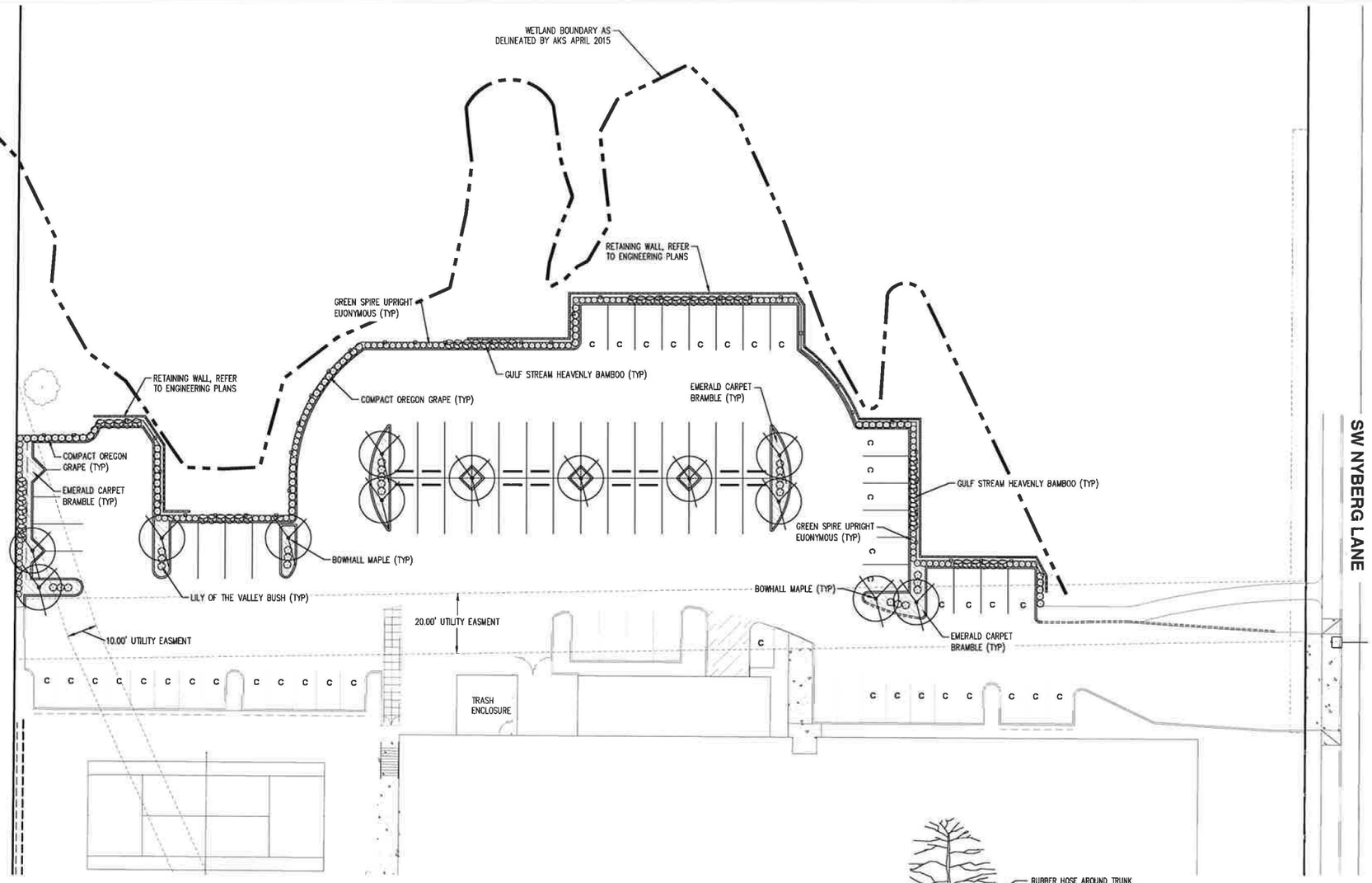
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C003

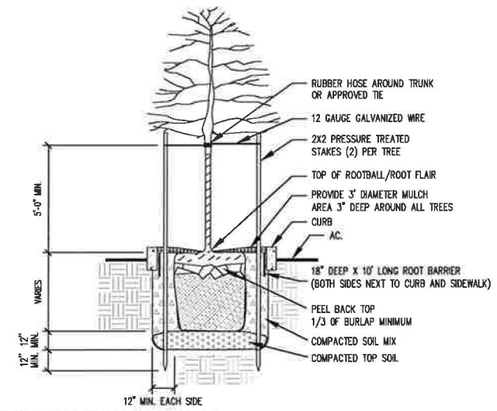
AKS DRAWING FILE: 4490 C070 GRADING.DWG | LAYOUT: C070 GRADING



SCALE 1" = 20 FEET

PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE/CONTAINER	SPACING
	13	ACER RUBRUM 'BOWHALL'	BOWHALL MAPLE	2" CAL. B&B	AS SHOWN
SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE/CONTAINER**	**SPACING**
○	99	EUONYMUS JAPONICUS 'GREENSPIRE'	GREENSPIRE UPRIGHT EUONYMUS	2 GAL. CONT.	24" o.c.
○	58	MAHONIA AQUIFOLIUM 'COMPACTA'	COMPACT OREGON GRAPE	2 GAL. CONT.	30" o.c.
⊗	54	NANDINA DOMESTICA 'GULF STREAM'	GULF STREAM HEAVENLY BAMBOO	2 GAL. CONT.	36" o.c.
⊙	25	PIERIS JAPONICA 'CAVATINE'	LILY OF THE VALLEY BUSH	2 GAL. CONT.	30" o.c.
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE/CONTAINER**	**SPACING**
	95	RUBUS CALYCINOIDES 'EMERALD CARPET'	EMERALD CARPET BRAMBLE	1 GAL. CONT.	36" o.c.



1 / L100 **TYPICAL TREE PLANTING DETAIL**

NTS

NOTES:
1. DRIVE STAKES OUTSIDE OF ROOTBALL.
2. SET TREE 2" ABOVE FINISH GRADE TO ALLOW FOR SETTLING OF SOIL.
3. SOIL MIX FOR TREE PLANTING TO BE 1/3 ORGANIC MATERIALS, 1/3 TOPSOIL, AND 1/3 SANDY LOAM.
4. REMOVE ALL WIRES, METAL BASKETS, TWINE, AND OTHER NON-COMPOSTABLE MATERIALS FROM TREE ROOTBALL PRIOR TO PLANTING.

GENERAL LANDSCAPING NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PLANT QUANTITIES. IF DISCREPANCIES OCCUR, DESIGN INTENT PREVAILS OVER QUANTITIES LISTED.
2. PLANTS AND PLANTING ACTIVITY SHALL CONFORM TO THE CITY OF TUALATIN DESIGN STANDARDS AND TO AMERICAN NURSERY STANDARDS ASN 1260.1. PLANT IN ACCORDANCE WITH 'BEST-PRACTICE' INDUSTRY STANDARDS ADOPTED BY THE OREGON LANDSCAPE CONTRACTORS BOARD (OLCB). PLANTS SHALL BE HEALTHY, EVENLY BRANCHED, AND TYPICAL FOR THEIR SPECIES ACCORDING TO AMERICAN STANDARD FOR NURSERY STOCK ANSI Z60.1 CURRENT EDITION. CONTAINERIZED STOCK SHALL BE FULLY ROOTED IN THE CONTAINER IN WHICH THEY ARE DELIVERED.
3. TREES TO BE PLANTED SHALL MEET THE REQUIREMENTS OF THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN) STANDARDS FOR NURSERY STOCK (ANSI Z60.2) FOR GRADE NO. 1 OR BETTER. DOUBLE STAKE ALL NEW TREES. TREES SHALL BE SYMMETRICAL, WELL-BRANCHED, VIGOROUS, AND TYPICAL FOR THEIR SPECIES. BALLED AND BURLAPPED TREES SHALL BE GROWN UNDER FAVORABLE GROWING CONDITIONS IN THE NURSERY, HAVING RECEIVED THE PROPER CULTURAL TREATMENT TO DEVELOP A WELL-BRANCED ROOT SYSTEM AND HARVESTED WITH THE BALL OF EARTH IN WHICH THEY ARE GROWING REMAINING INTACT. ROOT BALL SIZE SHALL BE OF A DEPTH AND DIAMETER TO ENCOMPASS ENOUGH OF THE ROOT SYSTEM AS NECESSARY FOR THE FULL RECOVERY OF THE PLANT, A MINIMUM OF 20"-24" DIAMETER (REFER TO ANSI Z60.1.6.1 AND TABLE 6).
4. PROVIDE (2) 18" DEEP X 10' LONG ROOT BARRIERS PER TREE, ADJACENT TO PAVED DRIVELANES. CENTER ROOT BARRIERS ON EACH TREE TRUNK. ROOT BARRIERS SHALL BE DEEP ROOT UP 18-2 OR OTHER SIMILAR RIGID STYLE ROOT BARRIER.
5. SUBSTITUTIONS TO PLANT SPECIES, SPACING, SIZES, ETC. MAY BE ACCEPTED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION DUE TO UNFORESEEN SITE CONDITIONS, PLANT AVAILABILITY, ETC. WHERE ALLOWED UNDER CITY OF TUALATIN STANDARDS.
6. HATCHED AREAS ARE MEANT TO CONVEY GENERAL PLANT LOCATION. PLANT COVERAGE, SPACING, AND LAYOUT SHALL BE CONSISTENT WITH THE SPACING LISTED IN THE PLANT LEGEND FOR FULL COVERAGE.
7. CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF OFF-SITE, ALL ORGANIC AND/OR UNSUITABLE MATERIALS, INCLUDING TREES, STUMPS, ROOTS, BRUSH AND LIMBS, CONCRETE, ASPHALT, GRAVELS, ETC. IN SUCH A MANNER TO MEET ALL APPLICABLE REGULATIONS.
8. SOIL PREPARATION: UNDER NO CIRCUMSTANCES SHOULD THE ROOT SYSTEMS OF EXISTING PLANTS TO REMAIN BE DISTURBED. IN EXISTING PLANTING AREAS CONTRACTOR SHALL AMEND SOIL BY SPREADING A 2" LAYER OF ORGANIC COMPOST, SUCH AS YARD DEBRIS OR OTHER NON-ANIMAL SOURCED COMPOST, AND TILL TO A DEPTH OF 6". FINISH GRADE IN THESE AREAS SHALL NOT EXCEED GRADE OF ADJACENT EXISTING PAVEMENT. REMOVE ALL ROCKS, CONCRETE CHUNKS, AND ALL OTHER NON-ORGANIC EXTRANEOUS MATERIAL FROM EXISTING PLANTING BEDS. PLANTS IN EXISTING BEDS SHALL BE POCKET PLANTED WITH AMENDED SOIL CONTAINING 1/3 TOPSOIL, 1/3 ORGANIC COMPOST, AND 1/3 SANDY SOIL. WHERE NEW PLANTING BEDS ARE CREATED IN PREVIOUSLY ASPHALTED OR OVERLY-COMPACTED SOIL, CONTRACTOR SHALL ENTIRELY REMOVE PAVING, GRAVEL/ROCK, HARDENED SUB SOIL AND OTHER SUBSTANCES HARMFUL TO PLANT GROWTH. PROVIDE AND SPREAD A MINIMUM OF 24" OF AMENDED SOIL MIX IN ALL NEW PLANTING AREAS OR AS NECESSARY TO MEET FINISH GRADE. AMENDED SOIL MIX SHALL CONSIST OF A BLEND OF 1/3 APPROVED TOPSOIL 1/3 ORGANIC MULCH, AND A 1/3 COARSE SAND. ORGANIC MULCH SHALL BE COARSE GRIND ROTTED BARK OR SAWDUST, PEAT MOSS, OR COMPOSTED YARD DEBRIS. TOPSOIL SHALL BE RICH DARK BROWN IN COLOR AND VOID OF ROOTS, PLANTS, SOD, STONES, CLAY LUMPS, ALKALI SALTS, DEBRIS, AND OTHER EXTRANEOUS MATERIALS HARMFUL TO PLANT GROWTH. FINISH GRADE OF NEW PLANTING AREAS SHALL SEAMLESSLY MEET FINISH GRADE OF SURROUNDING AREAS.
9. MULCH: APPLY 3" DEEP MEDIUM GRIND OR SHREDDED DARK HEMLOCK OR FIR BARK MULCH UNDER AND AROUND ALL NEW PLANTINGS. CARE SHALL BE TAKEN TO AVOID COVERING FOLIAGE OR ROOT CROWNS OF PLANTS. PLANTS SHALL BE PLANTED AT A DEPTH TO ACCOMMODATE BARK MULCH APPLICATION.
10. ALL LANDSCAPING SHALL BE CONTINUALLY MAINTAINED, INCLUDING NECESSARY WATERING, WEEDING, PRUNING, AND REPLACEMENT OF DEAD PLANT MATERIAL, IN A SUBSTANTIALLY SIMILAR MANNER AS THE LANDSCAPE PLANS APPROVED BY THE ARCHITECTURAL REVIEW PROCESS. ALL MAINTENANCE SHALL FOLLOW INDUSTRY 'BEST PRACTICE' STANDARDS.
11. CONTRACTOR SHALL PROVIDE A COMPLETE, WATER-EFFICIENT IRRIGATION SYSTEM FOR THE LANDSCAPE COMPONENTS INSTALLED UNDER THE SCOPE OF WORK. IRRIGATION TO RAISED INFILTRATION PLANTERS TO BE TEMPORARY AND REMOVED AFTER THE 2-YEAR MONITORING PERIOD IF APPROVED BY CWS. ALL OTHER IRRIGATION TO NEW PLANTINGS TO BE PERMANENT, UNDERGROUND DRIP IRRIGATION. REFER TO IRRIGATION PLAN.
12. CONTRACTOR SHALL WARRANT PLANT MATERIAL AND IRRIGATION SYSTEM FOR A PERIOD OF 1-YEAR AFTER FINAL ACCEPTANCE AGAINST FAILURE, DEFECTS, AND DEATH, AND SHALL REPLACE AT NO ADDITIONAL COST TO THE OWNER ANY PLANT OR IRRIGATION SYSTEM COMPONENT THAT FAILS DURING THAT PERIOD.

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

PRELIMINARY LANDSCAPE PLAN

DESIGNED BY: TEB/KAH
DRAWN BY: TEB
CHECKED BY: KAH
SCALE: AS NOTED
DATE: 04/15/2016

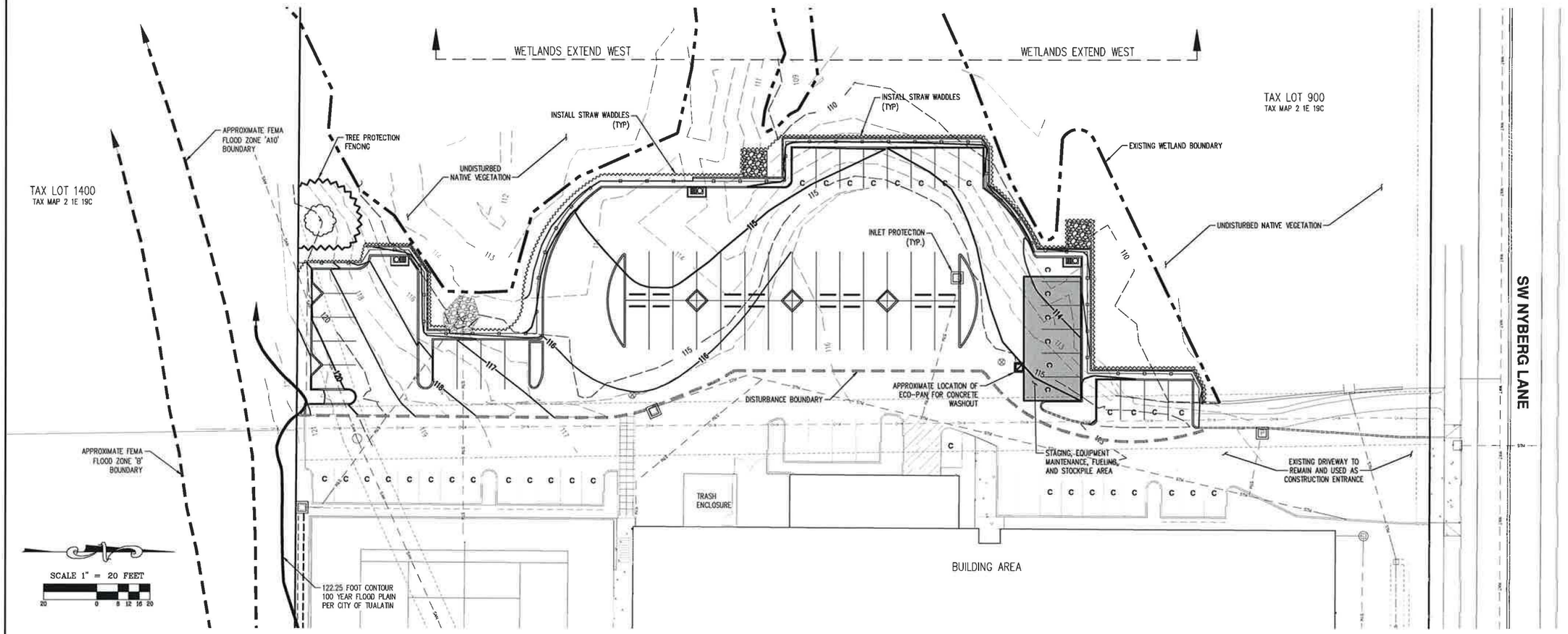
PRELIMINARY NOT FOR CONSTRUCTION
REGISTERED LANDSCAPE ARCHITECT
OREGON
JULY 08, 1983
KRISTOPHER A. HOSWALL

REVISIONS

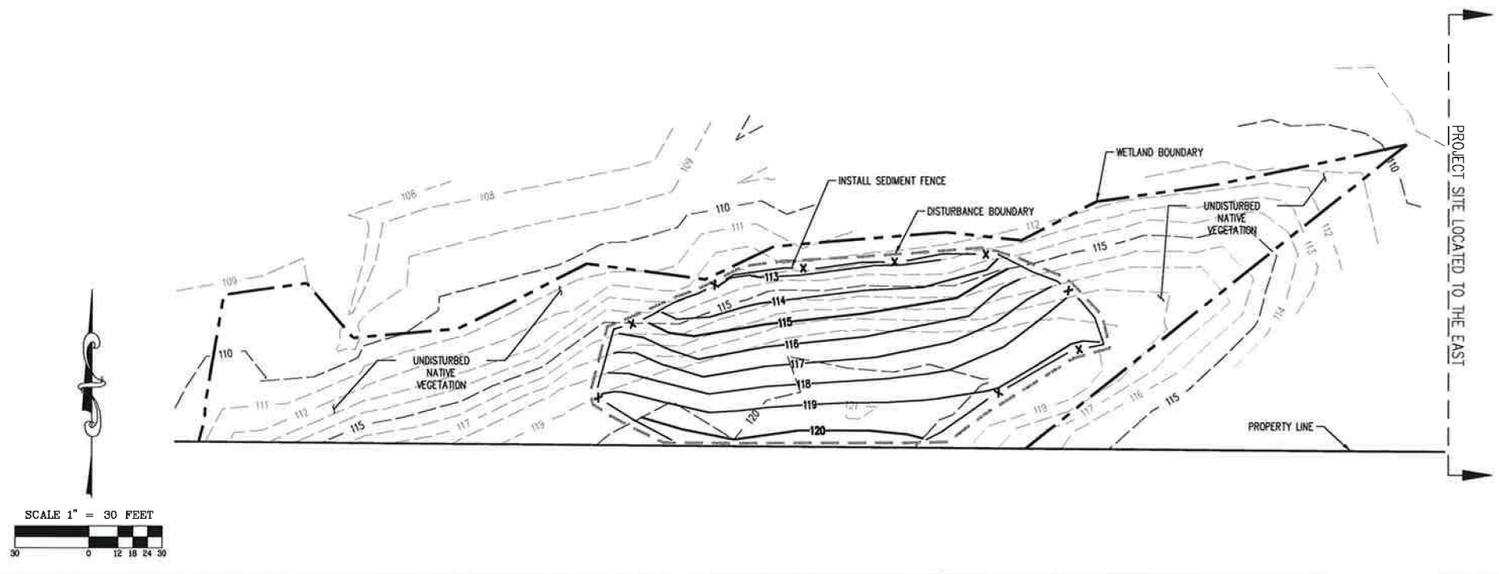
JOB NUMBER 4490

SHEET L100

AKS DRAWING FILE: 4490 L100 LANDSCAPE PLAN.DWG | LAYOUT: LANDSCAPE PLAN



FLOOD PLAIN CUT/FILL BALANCE AREA



LEGEND

EXISTING GROUND CONTOUR (1 FT)	134
EXISTING GROUND CONTOUR (5 FT)	140
DISTURBANCE BOUNDARY	
WETLAND BOUNDARY	
FINISHED GROUND CONTOUR (1 FT)	134
FINISHED GROUND CONTOUR (5 FT)	135
SEDIMENT FENCE	X
STRAW WADDLES	
CATCH BASIN PROTECTION	
CONTECH CATCH BASIN PROTECTION	
TREE PROTECTION FENCING	
ECO-PAN	

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

TREE PROTECTION, EROSION AND SEDIMENT CONTROL PLAN

DESIGNED BY: CEG
DRAWN BY: AJW
CHECKED BY: CEG
SCALE: AS NOTED
DATE: 04/15/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 19, 2005
CHRISTOPHER E. GOODELL
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

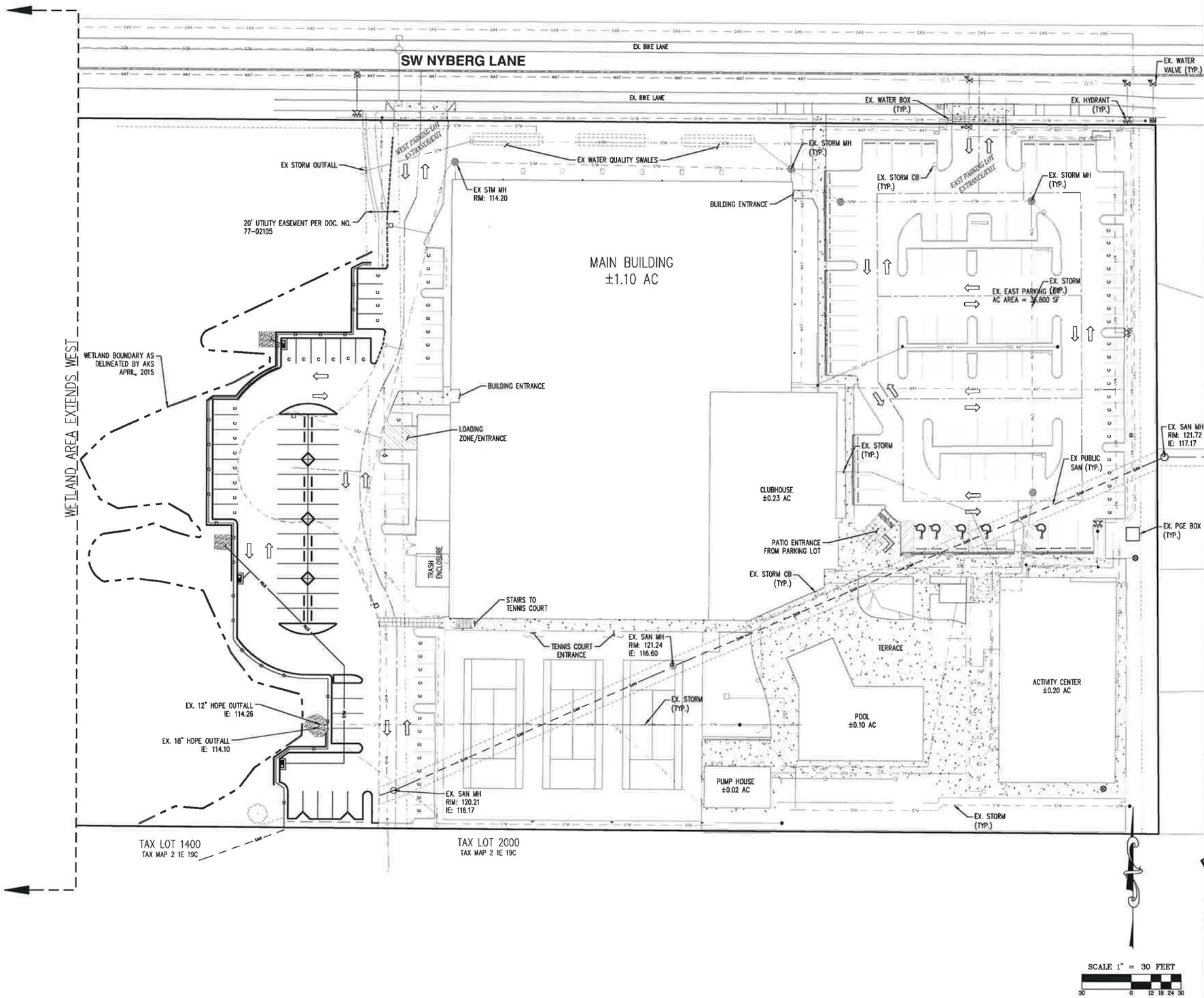
JOB NUMBER
4490

SHEET
C002

AKS DRAWING FILE: 4490 C050 ESC.DWG | LAYOUT: C002 ESC

NOTES:

1. THE BASE DRAWING THAT CONTAINS THE PROPERTY LINES, BUILDING LINES, AND UTILITY LINES ARE BASED ON DIGITAL INFORMATION PROVIDED BY OTHERS. AKS ENGINEERING & FORESTRY, LLC. ONLY SURVEYED A SMALL PORTION OF THE SUBJECT PROPERTY, AS SHOWN. EVERYTHING OUTSIDE OF THE AKS TOPOGRAPHIC LIMITS IS CONSIDERED APPROXIMATE AND IS ONLY SHOWN FOR REFERENCE PURPOSES ONLY. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.



SCALE 1" = 30 FEET

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS
5916 SW NYBERG LANE
TUALATIN
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

PUBLIC UTILITY FACILITY PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE:	04/15/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
CHRISTOPHER E. GOODELL
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

SHEET C007

AKS DRAWING FILE: 4490 C100 SITEPLANLONG | LAYOUT: PUB UTIL FACIL PLAN

CITY OF TUALATIN FACT SHEET

General

Proposed use: Westside parking expansion to add 55 parking spaces to Stafford Hills Club	
Site area: ≈ 16.0 acres	Building footprint: ± 1.65 acres sq. ft.
Development area: ± .5 acres acres	Paved area: Post - 1.66 acres sq. ft.
New impervious = .36 acre ~~Sq. ft.~~	Development area coverage: less than 33 %

Parking

Post construction

Spaces required (see TDC 73.400) *(example: warehouse @ 0.3/1000 GFA)* _____@_____/1000 GFA = _____ _____@_____/1000 GFA = _____ _____@_____/1000 GFA =_____Total parking required: spaces Handicapped accessible = Van pool = Compact = *(max. 35% allowed)* = Loading berths =	Spaces provided: Total parking provided: 193 spaces Standard = 122 Handicapped accessible = 5 Van pool = Compact = 66 Loading berths =

Bicycles

Covered spaces required:	Covered spaces provided: existing

Landscaping

Landscaping required:_____% of dvpt. area Square feet	Landscaping provided:_____% of dvpt. area Square feet
Landscaped parking island area required: %	Landscaped parking island area provided: %

Trash and recycling facility

Minimum standard method: square feet
Other method:_____square feet

For commercial/industrial projects only

Total building area:	sq. ft.	2nd floor:	sq. ft.
Main floor:	sq. ft.	3rd floor:	sq. ft.
Mezzanine:	sq. ft.	4th floor:	sq. ft.

For residential projects only

Number of buildings:	Total sq. ft. of buildings: sq. ft.
Building stories:	

NEIGHBORHOOD/DEVELOPER MEETING
AFFIDAVIT OF MAILING

STATE OF OREGON)
) SS
COUNTY OF WASHINGTON)

I, James D. Zupancic, being first duly sworn, depose and say:

That on the 2ND day of June, 2016, I served upon the persons shown on Exhibit "A," attached hereto and by this reference incorporated herein, a copy of the Notice of Neighborhood/Developer meeting marked Exhibit "B," attached hereto and by this reference incorporated herein, by mailing to them a true and correct copy of the original hereof. I further certify that the addresses shown on said Exhibit "A" are their regular addresses as determined from the books and records of the Washington County and/or Clackamas County Departments of Assessment and Taxation Tax Rolls, and that said envelopes were placed in the United States Mail with postage fully prepared thereon.

James D. Zupancic
Signature

SUBSCRIBED AND SWORN to before me this 20th day of June, 2016

OFFICIAL STAMP
RACHEL ELENA CHAVEZ
NOTARY PUBLIC-OREGON
COMMISSION NO. 940473
MY COMMISSION EXPIRES JUNE 30, 2019

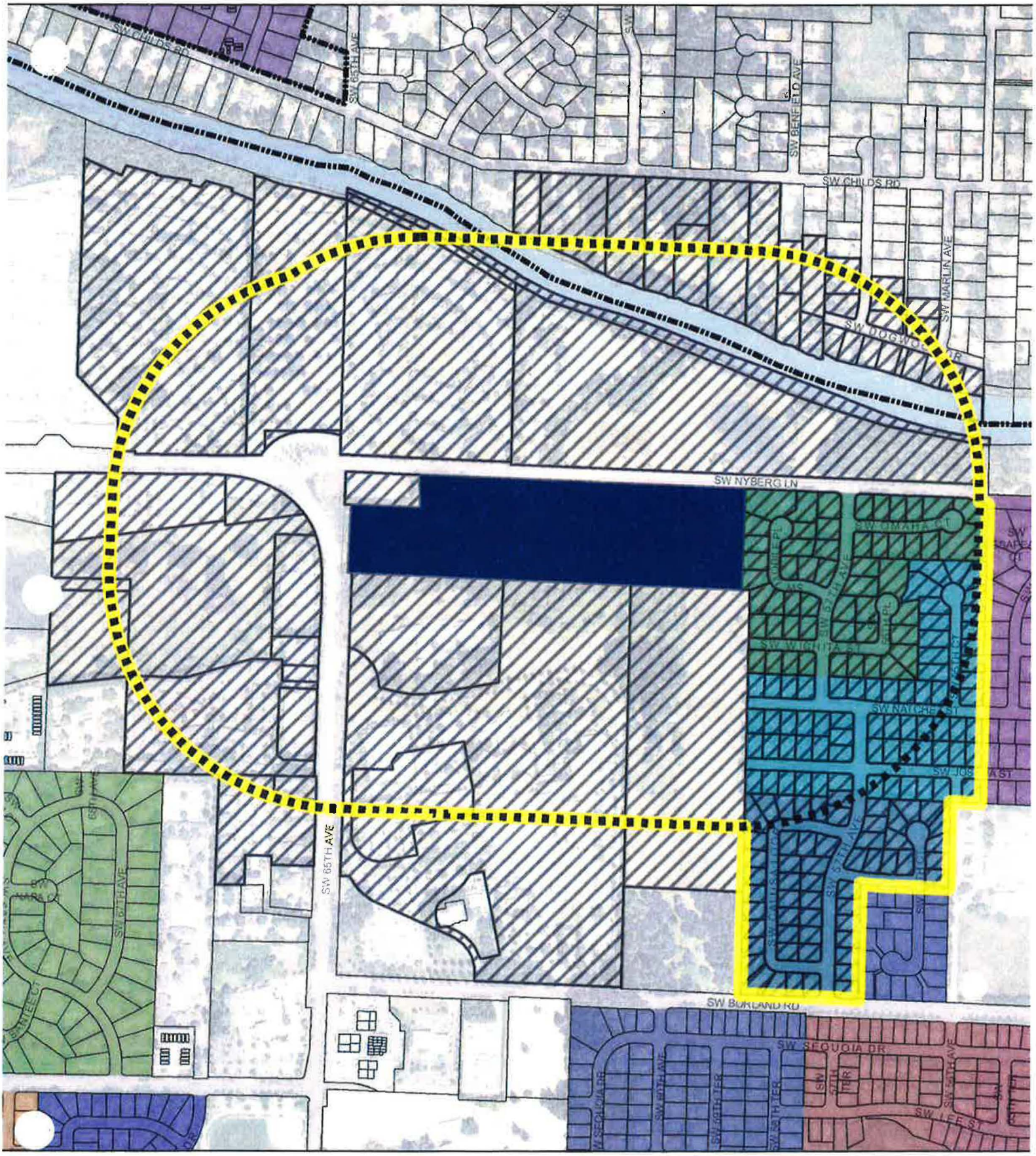
Rachel Chavez
Notary Public for Oregon
My commission expires: 6/30/19

RE: _____

EXHIBIT A

Mailing List - 21E19C00900

TUALGIS



1000' Buffer

1000' Buffer with Subdivisions

Selected Taxlots

N

W E

S

EXHIBIT B

STAFFORD
HILLS CLUB

June 1, 2016

Dear Neighbor:

Stafford Hills Club is proud to be a member of the Fox Hills Neighborhood and provide a place where members and guests gather and are *Achieving Wellness Together* ™. If you haven't yet visited us, we hope you stop by and see why people love it here.

In our continuing effort to be a good neighbor, we want you to know that we will be adding fifty-five parking spaces on the west side of our campus close to the border with Meridian Park Hospital. These new spaces will help reduce the parking stresses during peak demand times and should reduce traffic on the Fox Hills side of Stafford Hills. These new parking spaces will be located on the upland far away from Nyberg Lane and be invisible to Fox Hills' residences. Please see map on the reverse side of this letter.

Equally important, there will be no encroachment on any of the existing wetlands. In fact, we will be restoring some additional wetlands to the west, offering environmental education courses for students and adding even more habitat protections for indigenous wildlife.

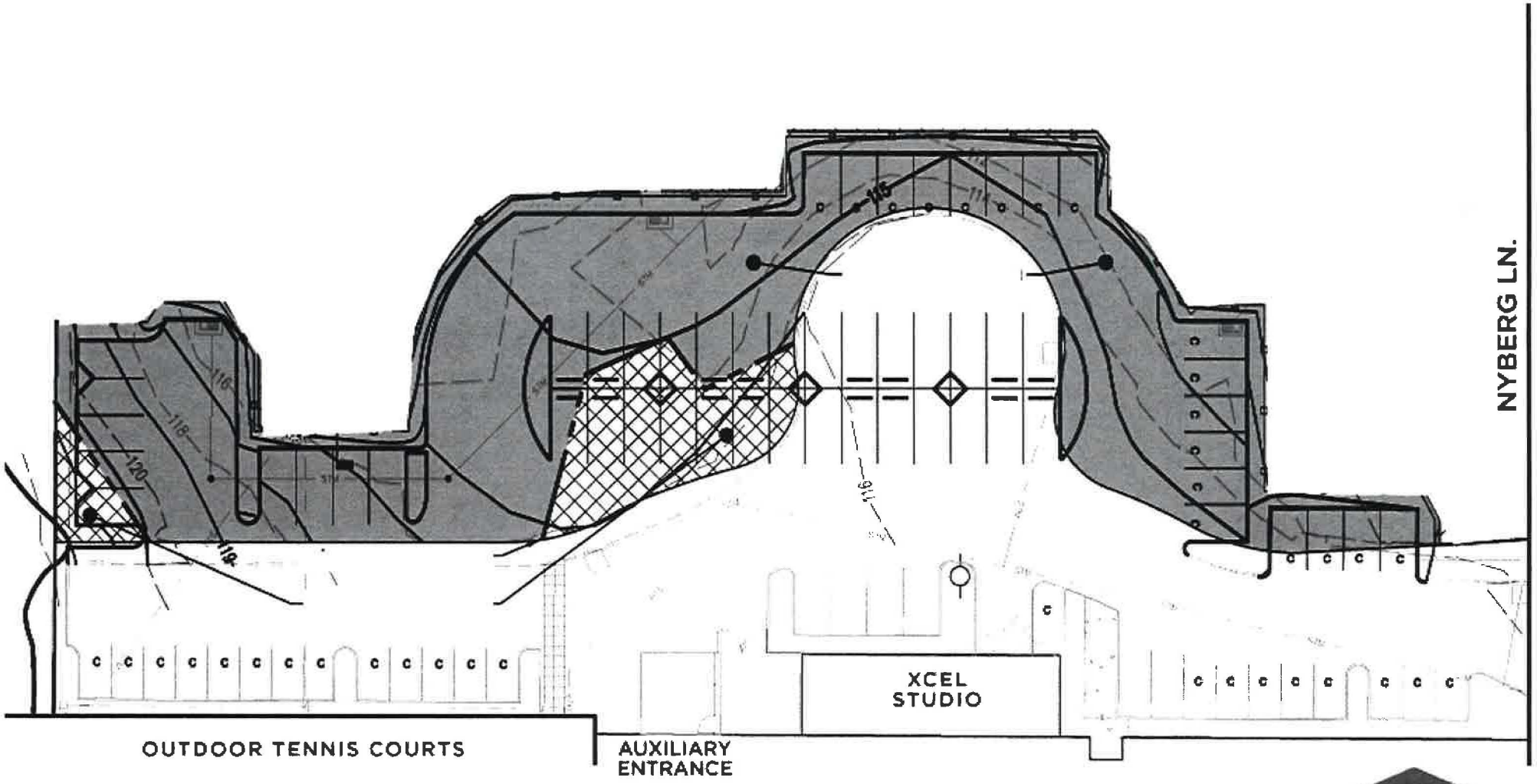
Construction is scheduled for later this summer. It should take less than 60 days to complete and there should be no adverse traffic impact on Nyberg Lane during construction.

You are invited to attend a meeting on Friday, June 17, 2016 at 7:30PM in the Cascade Room of Stafford Hills Club. This meeting shall be held to discuss the proposed project located at 5916 SW Nyberg Lane, Tualatin, OR 97062. As mentioned above, the proposal is to add fifty-five parking spaces on the west side of the main clubhouse building. The purpose of this meeting is to provide a means for the applicant, and surrounding property owners to meet and discuss this proposal and identify any issues regarding it.

We know that these new parking spaces will help in many ways and we thank you in advance for your support.

Yours in good health,

Evan T. Zupancic
General Manager



STAFFORD HILLS CLUB

PARKING LOT EXPANSION

ARCHITECTURAL REVIEW CERTIFICATION OF SIGN POSTING

The applicant shall provide and post a sign pursuant to Tualatin Development Code (TDC) 31.064(2). Additionally, the 18" x 24" sign must contain the application number, and the block around the word "NOTICE" must remain **primary yellow** composed of the **RGB color values Red 255, Green 255, and Blue 0.** Additionally, the potential applicant must provide a flier (or flyer) box on or near the sign and fill the box with brochures reiterating the meeting info and summarizing info about the potential project, including mention of anticipated land use application(s). Staff has a Microsoft PowerPoint 2007 template of this sign design available through the Planning Division homepage at < www.tualatinoregon.gov/planning/land-use-application-sign-templates>.

NOTE: For larger projects, the Community Development Department may require the posting of additional signs in conspicuous locations.

As the applicant for the _____

project, I hereby certify that on this day,_____sign(s) was/were posted on the subject property in accordance with the requirements of the Tualatin Development Code and the Community Development Department - Planning Division.

Applicant's Name: _____
(PLEASE PRINT)

Applicant's Signature: _____

Date: _____

	LABEL TEMPLATE / EXAMPLE	
	2S123BC02000 PROPERTY OWNER'S NAME ADDRESS CITY STATE ZIP	

Stafford Hills Club

Neighborhood/Developer Meeting Sign-in

Date: Friday, June 17, 2016

Time: 7:30 PM

PRINT NAME		PRINT NAME
1. Tom Conchuratt		26.
2. Jay Richards		27.
3. Glenn C. NYBERG		28.
4. Neil Gillenwater		29.
5. Charles Barson III		30.
6. David Pierce		31.
7. Julie VanEtten		32.
8.		33.
9.		34.
10.		35.
11.		36.
12.		37.
13.		38.
14.		39.
15.		40.
16.		41.
17.		42.
18.		43.
19.		44.
20.		45.
21.		46.
22.		47.
23.		48.
24.		49.
25.		50.

STAFFORD
HILLS CLUB

Neighborhood/Developer Meeting Minutes

Location: Stafford Hills Club – Cascade Room
Date: June 17, 2016
Time: 7:30 PM
Attendees: Jim Zupancic
Evan Zupancic
Kelsey Hofmeister
*See Sign-in Sheet for guests

Agenda Items:

- Opening statement by Jim Zupancic regarding overview of Stafford Hills Club.
  - Current number of parking spaces equals 138.
  - Additional parking spaces will not effect the wetlands but stays within buffer.
  - SHC will provide additional restoration to the wetlands.
  - Clean Water Services will have easement on wetlands.
  - Reason for needing additional spaces is to remove spillover parking into the Fox Hills neighborhood and Brown's Ferry Park during peak club usage times.
  - General public is using SHC parking without permission.
- Questions from guests:
  - Q: Will there be new entrances to the club?
    - A: No
  - Q: What lighting will be used on the new lot?
    - A: Same lighting will be used that is on the existing parking lots.
  - Q: What is being done to address the lights from the North facing windows on the tennis courts?
    - A: We are looking at options that will reduce the light from the outside without effecting the lighting on the courts. The lighting was designed to maximize the usage of the natural light coming in from those windows. Several options are being looked at and will be tested in the next year.
  - Q: Have shades been considered?
    - A: Yes, the height of the windows creates a challenge for testing our options and requires a more permanent solution as we won't be able to easily put up or down the shades.
  - Q: Do you see a need for more parking after this lot?
    - A: No, this should satisfy our parking needs.
  - Q: Why do you let the general public park in your lots? Why do you not require parking stickers?
    - A: We monitor and limit public usage of our parking lots as much as is feasible. As an example, we post signs for no Willowbrook Camp parking. We tried to have parking stickers when we first opened but found they were ineffective.
  - Q: Is the construction scheduled?

        - A: No, we are still in the application process but hope to have it scheduled as soon as possible.
    - Q: Are the wetlands owned by Stafford Hills?
        - A: Yes and we have partnered with the Wetlands Conversancy to allow them to post signage about the wetlands and to hold educational classes.
    - Q: When will construction start?
        - A: Hopefully this summer.
    - Q: Is there an ETA on covering the North windows?
        - A: The SHC Tennis Committee is focused on a solution and we hope to address this by the end of the year but we are still in the process of finding a viable solution.
        - SHC will work with Sheri Richards to get feedback from the neighbors across the river once we begin testing possible solutions for the windows.
- 8:05PM Meeting adjourned

STAFFORD
HILLS CLUB

June 1, 2016

Dear Neighbor:

Stafford Hills Club is proud to be a member of the Fox Hills Neighborhood and provide a place where members and guests gather and are *Achieving Wellness Together* ™. If you haven't yet visited us, we hope you stop by and see why people love it here.

In our continuing effort to be a good neighbor, we want you to know that we will be adding fifty-five parking spaces on the west side of our campus close to the border with Meridian Park Hospital. These new spaces will help reduce the parking stresses during peak demand times and should reduce traffic on the Fox Hills side of Stafford Hills. These new parking spaces will be located on the upland far away from Nyberg Lane and be invisible to Fox Hills' residences. Please see map on the reverse side of this letter.

Equally important, there will be no encroachment on any of the existing wetlands. In fact, we will be restoring some additional wetlands to the west, offering environmental education courses for students and adding even more habitat protections for indigenous wildlife.

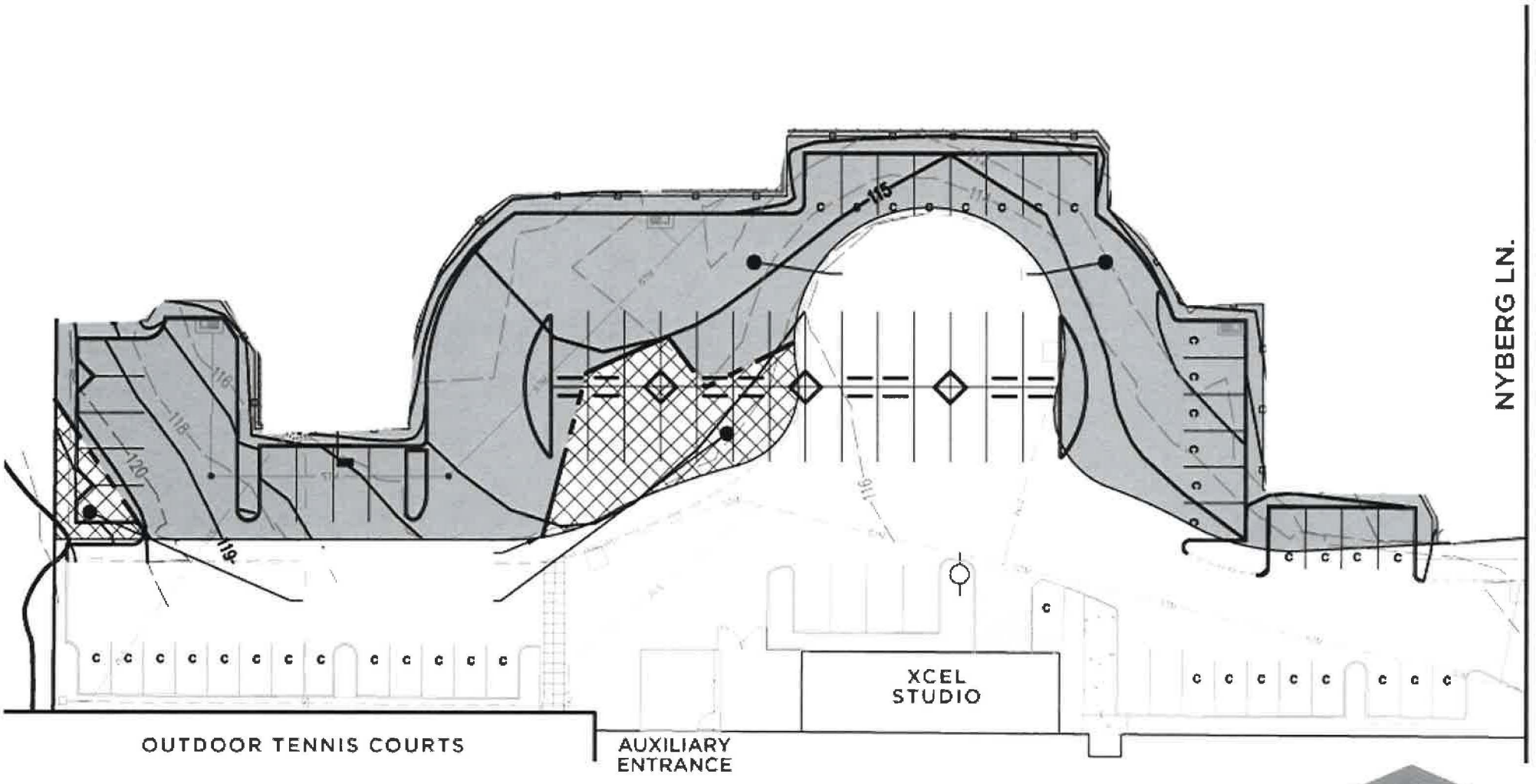
Construction is scheduled for later this summer. It should take less than 60 days to complete and there should be no adverse traffic impact on Nyberg Lane during construction.

You are invited to attend a meeting on Friday, June 17, 2016 at 7:30PM in the Cascade Room of Stafford Hills Club. This meeting shall be held to discuss the proposed project located at 5916 SW Nyberg Lane, Tualatin, OR 97062. As mentioned above, the proposal is to add fifty-five parking spaces on the west side of the main clubhouse building. The purpose of this meeting is to provide a means for the applicant, and surrounding property owners to meet and discuss this proposal and identify any issues regarding it.

We know that these new parking spaces will help in many ways and we thank you in advance for your support.

Yours in good health,

Evan T. Zupancic
General Manager



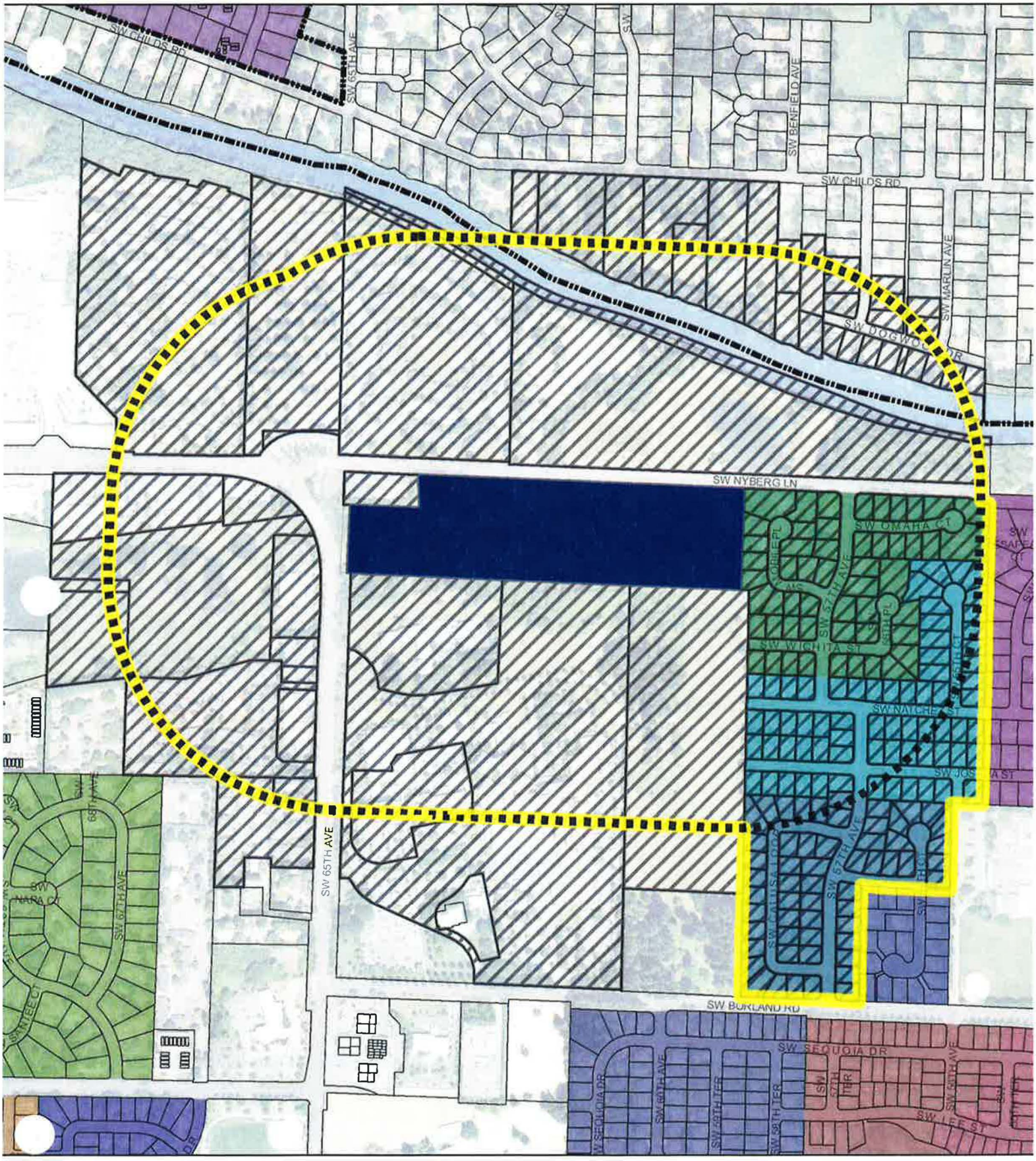
STAFFORD HILLS CLUB
PARKING LOT EXPANSION

AR16-0008

To lessen the bulk of the notice of application and to address privacy concerns, this sheet substitutes for the photocopy of the mailing labels. A copy is available upon request.

Mailing List - 21E19C00900

TUALGIS



1000' Buffer

1000' Buffer with Subdivisions

Selected Taxlots

N
W
E
S

NEIGHBORHOOD / DEVELOPER MEETING
CERTIFICATION OF SIGN POSTING

In addition to the requirements of TDC 31.064(2) quoted earlier in the packet, the 18" x 24" sign that the applicant provides must display the meeting date, time, and address and a contact phone number. The block around the word "NOTICE" must remain **orange** composed of the **RGB color values Red 254, Green 127, and Blue 0**. Additionally, the potential applicant must provide a flier (or flyer) box on or near the sign and fill the box with brochures reiterating the meeting info and summarizing info about the potential project, including mention of anticipated land use application(s). Staff has a Microsoft PowerPoint 2007 template of this sign design available through the Planning Division homepage at < www.tualatinoregon.gov/planning/land-use-application-sign-templates >.

As the applicant for the

Stafford Hills Club Westside Parking Expansion project, I

hereby certify that on this day, June 2, 2016 sign(s) was/were posted on the

subject property in accordance with the requirements of the Tualatin Development Code

and the Community Development Department - Planning Division.

Applicant's Name: James D. Zupancic / Stafford Hills Properties, LLC
(PLEASE PRINT)

Applicant's Signature: James D. Zupancic

Date: 6/2/16

City of Tualatin

COMMUNITY DEVELOPMENT PLANNING DIVISION

Pre-Application Meeting Request

The purpose of the Scoping and Pre-Application meetings is to offer early assistance in the land use and permitting process. This includes thoughtful feedback on preliminary design direction and visioning, outlining expectations, and to assist the applicant in attaining a complete application at first submittal.

PROJECT DESCRIPTION

Project name/title: Stafford Hills Club Parking Expansion

What is the primary purpose of this pre-application meeting (What would you like to accomplish)? (Attach additional sheets if needed.)

Receive staff input on applicable code sections and elements of narrative submittal for land use application.

PROPERTY INFORMATION

Property address/location(s): 5916 Nyberg Lane, Tualatin, OR 97062

Tax map and tax lot no.(s): 2N 1E 19C TL 900

Zoning: Residential low density

PROPERTY OWNER/HOLDER INFORMATION

Name(s): Stafford Hills Properties, LLC.

Address: 5916 Nyberg Lane Phone:

City/state: Tualatin, OR Zip: 97062

APPLICANT INFORMATION

Name: Stafford Hills Properties, LLC. c/o Jim Zupancic

Address: 4949 Meadows Rd. Suite 600 Phone: 503-941-9623

City/state: Lake Oswego, OR Zip: 97035

Contact person: Jim Zupancic

Phone: 503-277-9906 Email: Jim@zupgroup.com

Pre-application Conference Information

All of the information identified on this form is required and must be submitted to the Planning Division with this application. Conferences are scheduled subject to availability and a minimum of two weeks after receiving this application and all materials. Pre-application conferences are one (1) hour long and are typically held on Mondays between the hours of 3-4 p.m. or Wednesdays between 2-4 p.m.

REQUIRED SUBMITTAL ELEMENTS

*(Note: **Requests will not be accepted without the required submittal elements)***

☐ A complete application form and accompanying fee.

1 hard copy and an electronic set of the following:

☐ Preliminary site and building plans, drawn to scale, showing existing and proposed features. (Plans do not need to be professionaly prepared; just accurate and reliable.)

☐ A detailed narrative description of the proposal that clearly identifies the location, existing and proposed uses, and any proposed construction.

☐ A list of all questions or issues the applicant would like the City to address.

FOR STAFF USE ONLY

Case No.:

Related Case No.(s):

Application fee:

Application accepted:

By: Date:

Date of pre-app:

Time of pre-app:

Planner assigned to pre-app:

If more than four (4) people are expected to attend the pre-application conference in your group, please inform the City in advance so that alternate room arrangements can be made to accommodate the group.

What type of development are you proposing? (Check all that apply)

[ ] Industrial [x] Commercial [ ] Residential [ ] Institutional [ ] Mixed-use

Please provide a brief description of your project: (Attach additional sheets if needed.) Please include description of existing uses and structures in addition to what is proposed.

Stafford Hills Club operates a fitness, tennis and aquatics facility under a CUP. This application is to add 55 parking spaces on the west side of the main building, utilizing existing pavement and constructing parking about 1/3 acre of impervious area to facilitate this much needed expansion to mitigate parking spillover onto public streets.

Are you familiar with the development process in Washington or Clackamas County or Tualatin?

[x] Yes [ ] No

If yes, please identify an example project:

Stafford Hills Club and other multi-use developments.

Are you familiar with the sections of the Tualatin Development Code (TDC) that pertain to your proposed development?

[x] Yes [ ] No

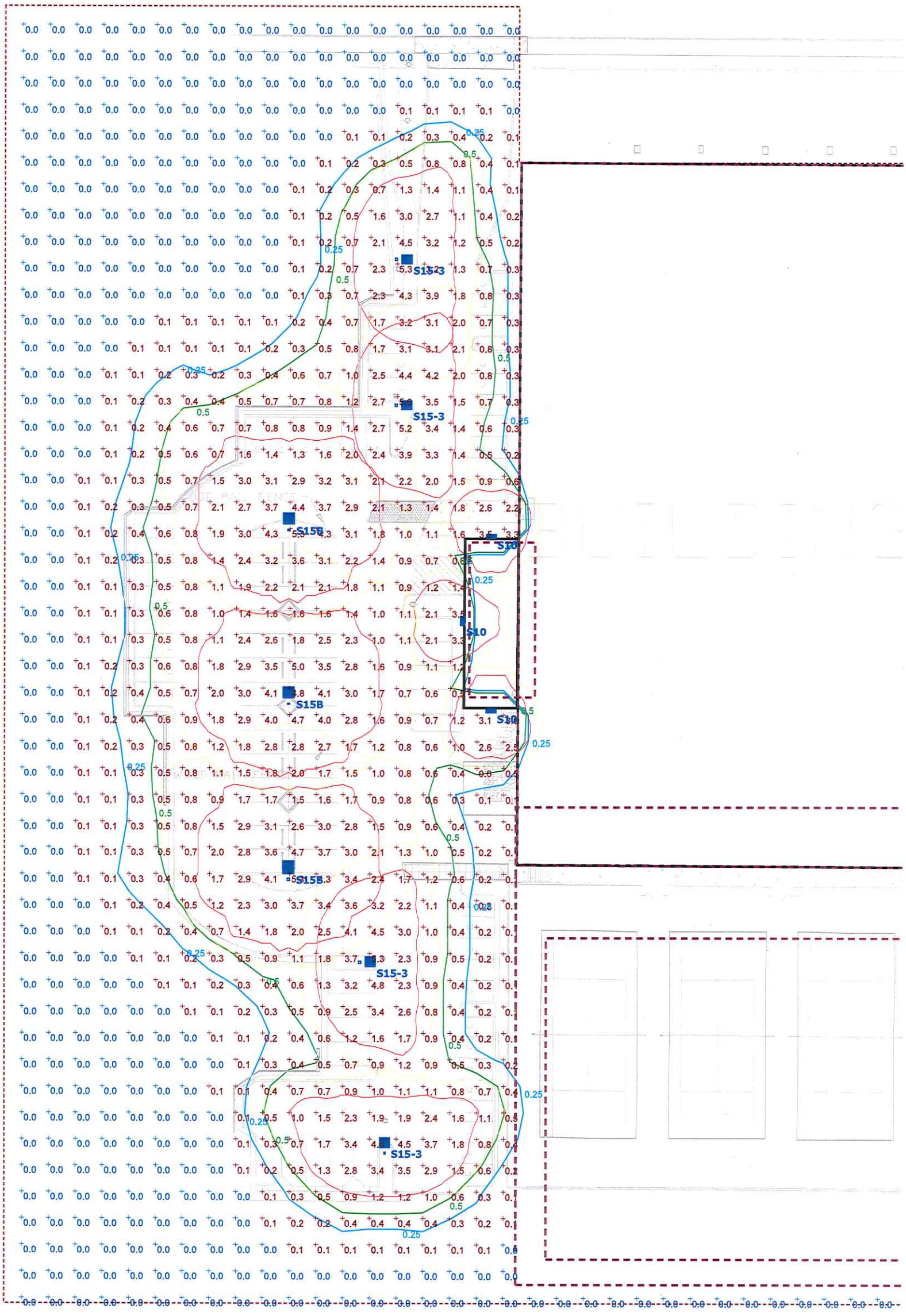
Is the property under enforcement action? If yes, please attached a notice of the violation.

No.

Please provide the names of City, TVF&R, CWS, and County staff with whom you have already discussed this proposal:

Aquilla Hurd-Ravich, Jeff Fuchs, Damon Reische, Elle Allan, Fire Marshal (Tualatin Valley Fire & Rescue).

We will appreciate assistance from the City to identify key code sections to be addressed in preparation of the narrative in support of the application.



Luminaire Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Lamp	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
	S15-4	0	PHILIPS GARDCO	EH14-FM-150PSMH	CLEAR HORIZONTAL 150PSMH RATED FOR 12500 LUMENS	1	12500	0.85	185
	S15B	3	PHILIPS GARDCO	EH19-4X-250PSMH	CLEAR HORIZONTAL 250PSMH RATED FOR 22000 LUMENS	1	22000	0.85	291
	S15-3	4	PHILIPS GARDCO	EH14-3-150PSMH	CLEAR HORIZONTAL 150PSMH RATED FOR 12500 LUMENS	1	12500	0.85	185

Stafford Hills Racquet and Fitness Club Parking Lot Expansion

Preliminary Stormwater Report

Date: April 18, 2016

Client: Stafford Hills Fitness Club
5916 SW Nyberg Lane
Tualatin, OR 97062

Engineering Contact: Chuck Gregory, PE

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

TABLE OF CONTENTS

APPENDIX

1.1 – EXHIBIT A ……. Vicinity Map

1.2 – EXHIBIT B ……. Pre-Developed Catchment Map

1.3 – EXHIBIT C …… Post-Developed Catchment Map

2.1 – Post-Developed 25-Year Storm Event (3.9”) HydroCAD Report

3.1 – CONTECH Stormfilter Catch Basin Calculations

3.2 – CONTECH Stormfilter Catch Basin Details and Specifications

4.0 – FIGURE 4-1: *CWS Rainfall Depths*

5.0 – Relevant Information from *TR-55: Urban Hydrology for Small Watersheds*

6.0 – Soils Information from *USDA SOIL SURVEY of Yamhill County, OR*

7.0 – Storm Report Prepared by *HARRIS-MCMONAGLE ASSOSIATES INC.*

PRELIMINARY STORMWATER REPORT
STAFFORD HILLS RACQUET AND FITNESS CLUB PARKING LOT EXPANSION

1.0 Purpose of Report

The purpose of this report is to analyze the effects that the proposed development will have on the existing stormwater conveyance system; identify the criteria, methodology, and informational sources used to design the proposed stormwater system; and document the results of the analysis. The contents of the report are intended to assist in the approval of the submittal sent to the City of Tualatin and Clean Water Services (CWS) for review. (Refer to Appendix 7.0 for the Storm Report previously prepared by Harris-McMonagle Assosiates Inc. for initial hydrologic analysis of the project site.)

2.0 Project Location/Description

The Stafford Hills Racquet and Fitness Club is located on the south side of SW Nyberg Lane approximately one-quarter mile east of the SW Nyberg Lane and SW 65th Avenue intersection in the City of Tualatin, Clackamas County, Oregon. The site is currently addressed as 5916 SW Nyberg Lane, Tualatin, Oregon 97062 and is shown as Tax Lot 900 on Clackamas County Tax Assessor's Map 2S 1E 19C. Due to the western portion of the site being wetlands and sensitive areas surrounding Nyberg Creek, the previously constructed building and parking lot are located on the easterly portion of the site. The overall property is approximately 15.5 acres and the overall proposed and existing developed site area within the property boundary is approximately 5.9 acres in size. The proposed project site area is approximately 1.5 acres; which includes the west parking lot and floodplain balance area. The existing development has two main tennis buildings, a clubhouse, three tennis courts, a pool area, an activity center, a larger parking lot east of the main tennis buildings, and a smaller parking lot west of the main tennis buildings.

The proposed improvements will be positioned west of the main fitness buildings as an extension of the existing west side parking lot. The proposed development includes an asphalt parking lot expansion with a fence installed around the west perimeter as well as a retaining wall along sections deemed necessary. Underground conveyance of stormwater into a filtration system that outlets into an energy dissipating rip-rap pad will be constructed to accommodate post-developed runoff conditions.

3.0 Regulatory Design Criteria

3.1 STORMWATER QUANTITY MANAGEMENT CRITERIA

CWS Design and Construction Standards (June 2007), Section 4.03 Water Quantity Control Requirements, states:

> *4.03.1 Mitigation Requirement for Quantity*
> *Each new development shall incorporate techniques for mitigating its impacts on the public stormwater system in accordance with Section 5.05 [conveyance design]. The District or City shall determine which of the following techniques may be used to satisfy this mitigation requirement.*
>
> *a. Construction of permanent on-site stormwater quantity detention facilities designed in accordance with this chapter; or.*
>
> *b. Enlargement or improvement of the downstream conveyance system in accordance with this chapter and Chapter 5; or*

c. *Payment of a Storm and Surface Water Management System Development Charge (SWM SDC), as provided in CWS Ordinance 28, which includes a water quantity component to meet these requirements.*

4.03.4 Other Requirements

d. *Construction of on-site detention shall not be allowed as an option if such a detention facility would have an adverse effect upon receiving waters in the basin or subbasin in the event of flooding, or would increase the likelihood or severity of flooding problems downstream of the site.*

e. *Low impact development approaches, designed in accordance with this Chapter, can be utilized to meet all or part of any detention requirements on a site.*

The site discharges storm water directly into the wetlands area adjacent to Nyberg Creek. Nyberg Creek then flows into the Tualatin River approximately 500 feet downstream from the project site. As such, in accordance with the storm report analysis previously approved for the original project site (see Appendix 7.0), no detention is required due to the potential adverse outcome of delaying the release of early storm flows into a larger upstream basin with a much longer time of concentration.

3.2 STORMWATER QUALITY MANAGEMENT CRITERIA

CWS Design and Construction Standards (June 2007), Section 4.05 Water Quality Treatment Requirements, states:

4.05.1 General

Owners of new development and other activities which create new impervious surfaces or increase the amount of stormwater runoff or pollution leaving the site are required to construct or fund permanent water quality facilities to reduce contaminants entering the storm and surface water system.

4.05.3 Required Treatment Design Efficiency

a. *Stormwater quality facilities shall be designed to remove 65 percent of the total phosphorous from the runoff from the impervious area that is tributary to the facility.*

4.05.4 Design Considerations

c. *Discharges to sensitive areas shall maintain the hydro period and flows of pre-development site conditions to the extent necessary to protect the characteristic functions of the sensitive area. Conversely, discharge of flows that may be critical to downstream water quality sensitive areas into other catchments will not be permitted unless addressed in the applicant's Service Provider Letter.*

d. *The stormwater quality facilities shall be designed for a dry weather storm event totaling 0.36 inches of precipitation falling in 4 hours with an average storm return period of 96 hours.*

4.05.7 Pretreatment

a. *Pretreatment Required:*

Unless approved by the District, sheet flow of impervious surfaces into water quality facilities shall not be allowed without pretreatment. Incoming flows to the water quality facility shall be pretreated using a water quality manhole in accordance with subsection 4.06.1 or other pretreatment method as approved by the District or City. Other methods of pretreatment may include proprietary devices, filter strip, trapped catch basin, or other methods as approved by the District or City.

b. Proprietary Pre-Treatment Devices

1. The use of proprietary pre-treatment devices shall be permitted on a case by case basis with approval by the District or City.

2. The devices will be sized in accordance with the manufacturer's recommendations; however, the minimum treatment flow must be the water quality flow.

3. Technical submittals from the manufacturer are required, including hydraulic design criteria, particulate removal efficiency, and maintenance requirements and schedule.

4.05.8 Proprietary Treatment Systems

a. Proprietary treatment systems shall meet the removal efficiency requirement defined in section 4.05.3(a) and be approved by the District for use in the situations identified in subsection (c) below.

c. Proprietary treatment systems shall be allowed in situations meeting one of the following criteria:

1. Treatment of runoff from a single parcel.

2. Treatment of runoff from an adjoining commercial, industrial, or multi-family, or condominium parcels which share a common parking lot.

3. Treatment of runoff from new and expanded collector and arterial roadways where no other opportunities exist for treatment without necessitating the removal of homes or businesses.

4. Treatment of runoff from new developments in transit-oriented or similar high-density zoning classifications where the development is primarily single-family residential and the average lot size is less than 2500 square feet.

5. *Treatment of runoff as part of a master planned regional facility approved by the District.*

In compliance with CWS standards, stormwater runoff from the proposed development will be treated using filtration catch basins. Post-developed stormwater runoff for the project site will be treated partially by the existing water quality swale and partially by the proposed filtration catch basins. The post-developed conditions will result in a net decrease to the amount of runoff flow being treated by the existing water quality swale by conveying the stormwater runoff to the proposed filtration catch basins.

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 8.50 aided in the analysis.

5.0 Design Parameters

5.1 DESIGN STORM – CONVEYANCE SIZING

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

5.2 PRE-DEVELOPED SITE CONDITIONS

5.2.1 Site Topography

The proposed 1.5 acre project site has existing on-site grades that range from 0% to 10% and generally slope from the south to the north. The westerly portion of the site, where the floodplain balance grading will take place, is an upland area with grass and scattered trees along the south property line. The project area focused at the parking lot expansion portion includes existing impervious area from the west asphalt parking lot, a gravel path separating the parking lot from the adjacent vegetated area to the west, and wetlands that cover the west portion of the property. Stormwater drainage from the vegetated terrain adjacent to the existing west parking lot flows into the wetland area at the western portion of the property. The wetlands allow natural drainage into Nyberg Creek which outlets to the north into the Tualatin River, approximately 500 feet downstream of the project site. The majority of the site lies beneath the 100-year flood plain.

5.2.2 Land Use

The site is currently zoned as Low Density Residential (RL). The existing site contains asphalt parking lots, large buildings, tennis courts, a pool, a gravel path, landscaping, and a wetland/natural buffer area.

5.3 SOIL TYPE

The soils for the site are classified as Cove silty clay loam (hydrologic group "D"), Quatama loam (hydrologic group "C"), and Wapato silty clay loam (hydrologic group "C/D"), according to the USDA Soil Survey for Clackamas County. Information on these soil types is included in Appendix 6.0 of this report. A curve number of 84 was used in the analysis to determine the estimated runoff from the natural grass surface. (Refer to Appendix 6.0 for NRCS Soil Report.)

5.4 POST-DEVELOPED SITE CONDITIONS

5.4.1 Site Topography

The proposed parking lot expansion will have a finish grade elevation that varies from 0 to 5 feet above existing ground elevation. Expansion of the parking lot will require excavation and fill supported by retaining walls. Grades outside the perimeter of the proposed parking lot will remain unchanged and the development will pose minimal disturbance to the surrounding area.

The developed site has been designed to have no net fill within the floodplain. Grades in the cut/fill balance area will vary from 5% to 14%, resulting in a minimal change to the existing conditions. All fill placed in the floodplain from the construction of the parking area will be offset by an equal amount removed from another portion of the site as shown on the drawings. By creating zero net fill, the floodplain conditions are anticipated to remain unchanged due to the proposed development. The proposed design drawings indicate the volume of fill as well as the corresponding cut (removal) from the proposed development.

5.4.2 Land Use

The site's land use will remain unchanged apart from mitigation efforts to improve the wetland area. Additional landscaping will also be provided.

5.4.3 Post-Developed Input Parameters

A curve number of 98 (see Table 2.3 in Appendix 5.0) was used in the analysis to determine the estimated runoff from the asphalt parking lot. Refer to Appendix 2.1 for the HydroCAD analysis.

5.5 DESCRIPTION OF OFF-SITE CONTRIBUTORY BASINS

Existing grades within the vicinity of the property generally slope from south to north and will not have any impact to the proposed development. The existing developed site within the property includes building areas, parking lot areas and landscaping. Stormwater from the existing developed site is collected and conveyed directly to the wetlands by existing storm drains which pass through an existing water quality swale before entering the wetland area.

All existing surface runoff from the property south of the site is either detained or redirected by existing site infrastructure. The storm drains and water quality swale of the previous development will not be impacted by this project or have any impact to the proposed project. As such, there are no off-site contributory drainage basins.

6.0 Calculation Methodology

6.1 PROPOSED STORMWATER CONDUIT SIZING AND INLET SPACING

The proposed stormwater conduit sizing and inlet spacing has been determined for the proposed development in accordance with CWS Design Construction Standards, Section 5.06.

The proposed conduit sizing was determined using analysis data obtained by engineering software HydroCAD for water modeling. The Santa Barbara Urban Hydrograph (SBUH) method with type 1A rainfall distribution, a 24-hour rainfall amount of 3.90 in/hr. for a 25-year event was used in the analysis. A Manning's coefficient value ("n") of 0.013 along with pipe slopes and diameters were was used to design the proposed storm drainage system. As required by CWS Design Construction Standards, Section 5.06, the proposed appurtenances (inlets, catch basins, storm drains, pipes, etc.) have been designed to accept and convey a 25-year storm event. Data in the HydroCAD report in Appendix 2.1 shows the 25-year storm peak flow rates and capacities for each node and reach of the storm sewer conveyance system.

6.2 PROPOSED STORMWATER QUANTITY CONTROL FACILITY DESIGN

Stormwater from the proposed parking lot will flow into filtration catch basins and then to a proposed conveyance system using 8-inch diameter PVC pipe routed to an adequate rip rap energy dissipater into the existing vegetated area. The proposed discharge has been designed to prevent downstream drainage issues by locating the discharge points relative to the existing terrain's flow path.

An analysis of the proposed stormwater conveyance system using HydroCAD water modeling computer software is shown in the HydroCAD report in Appendix 2.1. The analysis conducted used the Santa Barbara Urban Hydrograph (SBUH) Method with type 1A rainfall distribution and a 24-hour rainfall amount of 3.90 in/hr. for a 25-year event.

Based on the new storm design, the post-developed conditions will decrease runoff flow to the existing conveyance and treatment systems by diverting portions of existing surface area runoff to the proposed filtration catch basins. Not only does this diversion reduce demand on the existing swales, it allows for a more efficient distribution of stormwater flows across the broad wetland area.

As previously approved, detention is not recommended for this site due to adverse outcomes of delaying the release of early storm flows into a large upstream basin having a much longer required time of concentration.

6.3 PROPOSED STORMWATER QUALITY CONTROL FACILITY DESIGN

Water quality treatment for the post-developed site is designed to meet the requirements of the CWS Design Construction Standards, Section 4.06 Water Quality Facility Design Standards.

The proposed improvements will include constructing approximately 15,500 square feet of asphalt parking lot, landscaping, and retaining walls. The stormwater runoff from the proposed improvements will be conveyed to a stormwater treatment system that will meet CWS requirements by installing three, single cartridge Contech Stormfilter Catch Basins. (See Appendix 3 for Contech Stormfilter details and specifications.) The Contech Stormfilter catch basins are designed to accommodate flows generated by the post-developed area as well as partial areas of the existing impervious parking lot.

Calculations shown in Appendix 3.1 indicate the catchment areas for each catch basin and the treatment capacity of the Contech Stormfilter. Calculations and values used were conducted in compliance with CWS and manufacturers recommended water quality facility design standards.

6.4 DOWNSTREAM ANALYSIS

Nyberg Creek runs through the projects property and connects into the Tualatin River approximately 500 feet downstream from the project site. The proposed development will add a relatively small amount of impervious area runoff when compared to the large upstream drainage basins and the broad wetland area covering the western half of the property. The proposed design will limit stream erosion by using storm dissipater rip rap pads positioned strategically so the proposed stormwater flow is along the same drainage paths as the pre-developed conditions. As the previously approved storm drainage report mentions, the site is within the Tualatin River 100 year floodplain and stormwater detention at the lower portion of the basin is not required.

7.0 Stormwater Summary

Overall, the proposed development has been designed to treat new and existing storm runoff from the site before it enters the wetland area. The proposed conveyance system will allow dissipation at various outlet locations distributing storm water across the wetland area and into Nyberg Creek. To conclude, the proposed storm drainage system will adequately treat the prescribed storm water runoff and convey a 25-year storm event with no impact on the existing downstream drainage conditions. The project sites storm drainage system meets the City of Tualatin and CWS standards.

APPENDIX 1.1

EXHIBIT A
VICINITY MAP

VICINITY MAP

DATE: 03/25/2016

STAFFORD HILLS RACQUET AND ATHLETIC CLUB

EXHIBIT **A**

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: AJW
CHKD: CEG
AKS JOB: 4490

DWG: VICINITYNEW | VICINITY

APPENDIX 1.2

EXHIBIT B

PRE-DEV CATCHMENT MAP

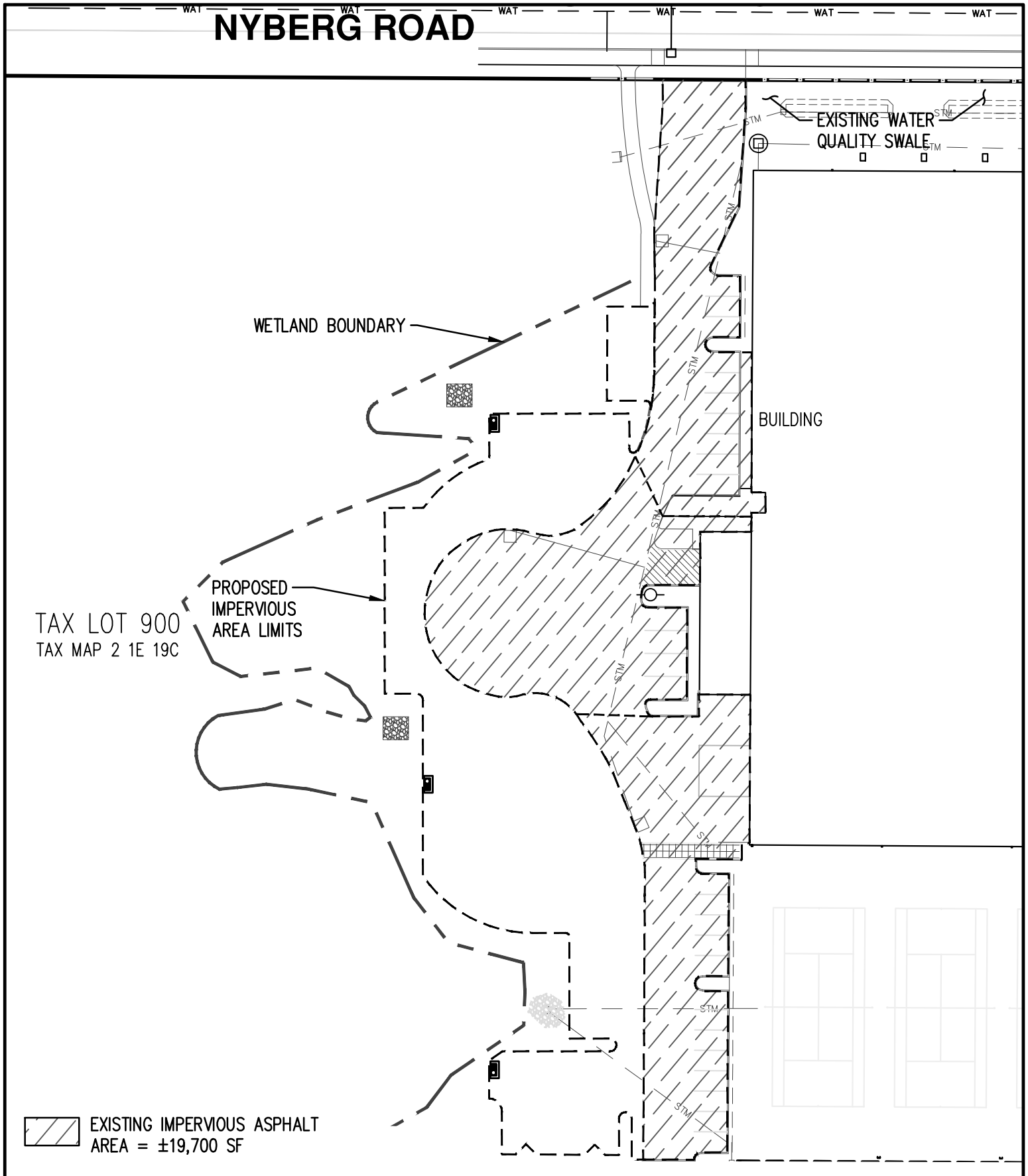


FIGURE: IMPERVIOUS AREA MAP PRE-DEV

DATE: 04/08/2016

STAFFORD HILLS ATHLETIC CLUB
PARKING LOT EXPANSION

EXHIBIT **B**

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: AW
CHKD: CEG
AKS JOB: 4490

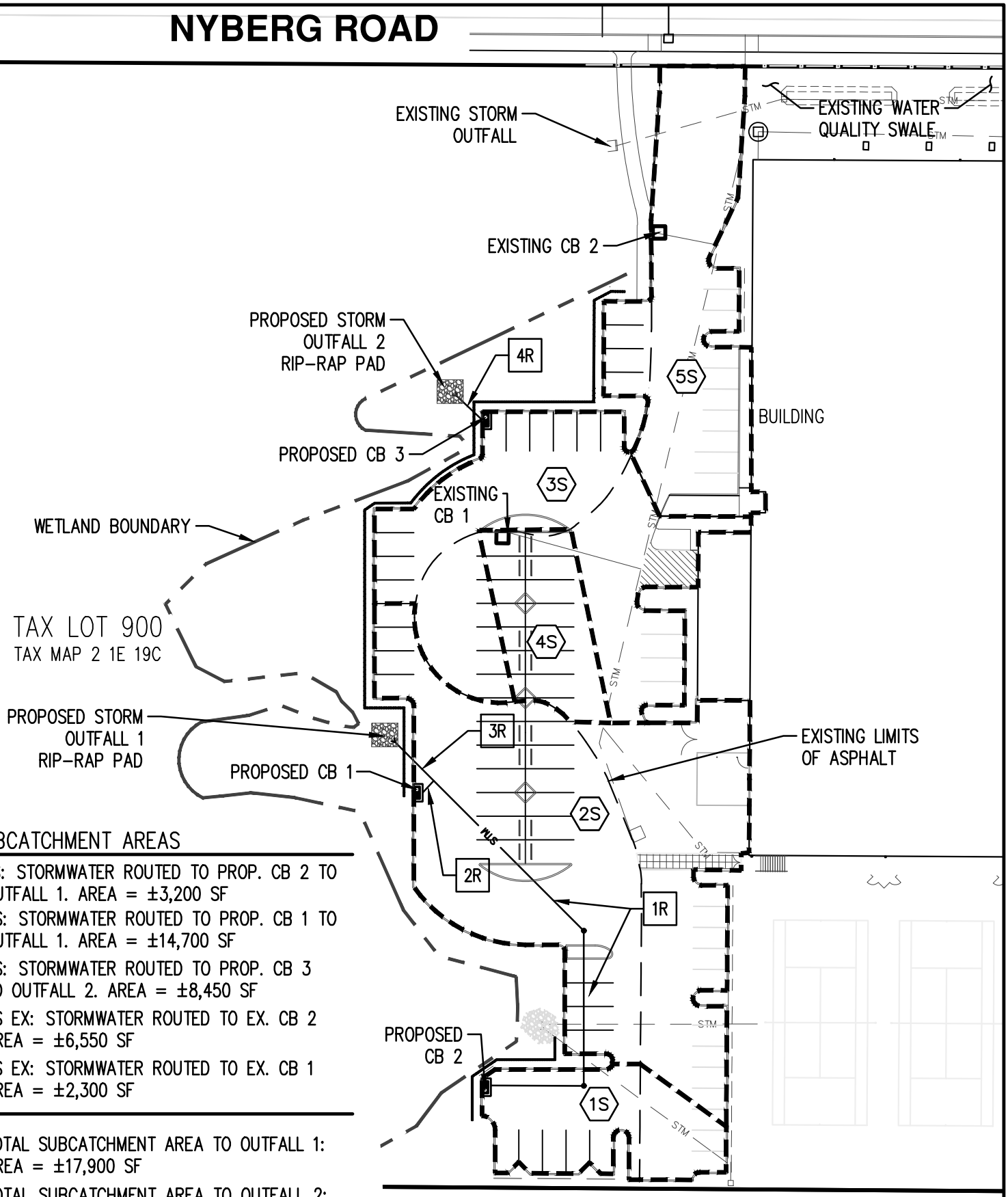
DWG: 4490 CATCHMENTMAP | IMPERVIOUS AREA

APPENDIX 1.3

EXHIBIT C

POST-DEV CATCHMENT MAP

NYBERG ROAD



SUBCATCHMENT AREAS

1S: STORMWATER ROUTED TO PROP. CB 2 TO OUTFALL 1. AREA = ±3,200 SF

2S: STORMWATER ROUTED TO PROP. CB 1 TO OUTFALL 1. AREA = ±14,700 SF

3S: STORMWATER ROUTED TO PROP. CB 3 TO OUTFALL 2. AREA = ±8,450 SF

5S EX: STORMWATER ROUTED TO EX. CB 2 AREA = ±6,550 SF

4S EX: STORMWATER ROUTED TO EX. CB 1 AREA = ±2,300 SF

TOTAL SUBCATCHMENT AREA TO OUTFALL 1: AREA = ±17,900 SF

TOTAL SUBCATCHMENT AREA TO OUTFALL 2: AREA = ±8,450 SF

TOTAL SUBCATCHMENT AREA TO EX. SYSTEM: AREA = ±8,850 SF

FIGURE: POST-DEV SUBCATCHMENT AREA MAP

DATE: 04/08/2016

STAFFORD HILLS ATHLETIC CLUB
PARKING LOT EXPANSION

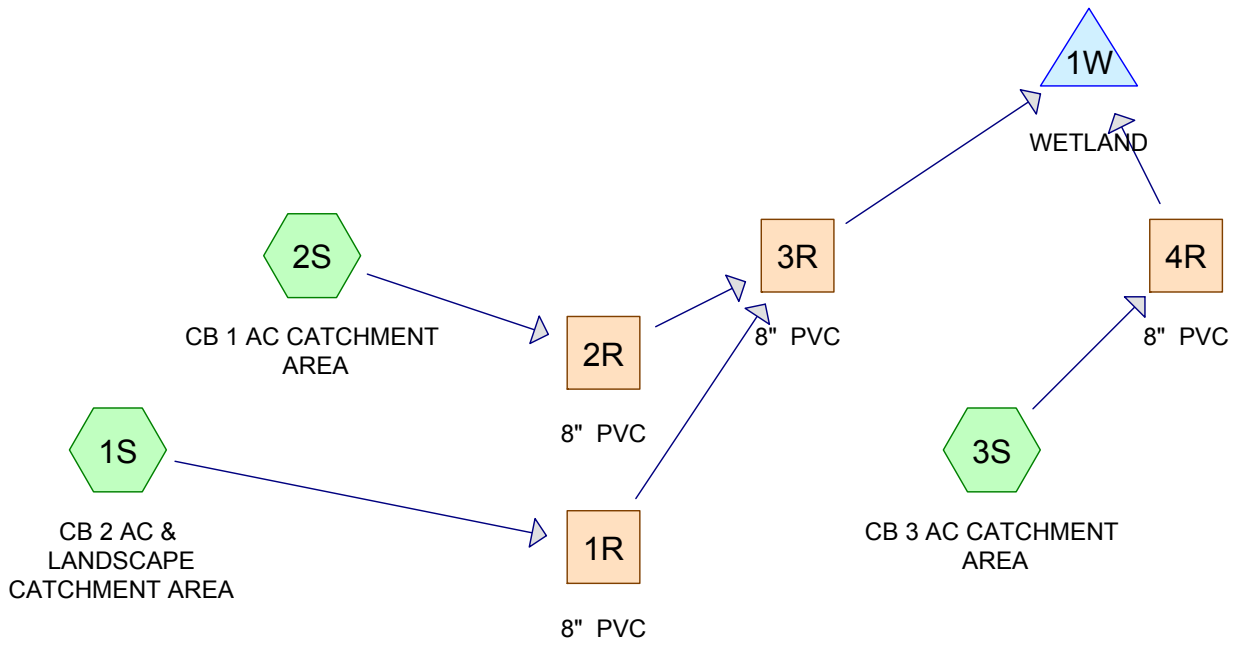
EXHIBIT **C**

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: AW
CHKD: CEG
AKS JOB: 4490

APPENDIX 2.1

POST-DEVELOPED 25-YEAR STORM EVENT (3.9”) HYDROCAD REPORT INFORMATION



Subcat Reach Pond Link

Drainage Diagram for 4490 POST-DEV-new only
Prepared by AKS Engineering, Printed 4/8/2016

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB 2 AC & LANDSCAPE Runoff Area=3,200 sf 96.88% Impervious Runoff Depth>3.60"
Tc=5.0 min CN=86/98 Runoff=0.07 cfs 960 cf

Subcatchment 2S: CB 1 AC CATCHMENT Runoff Area=14,700 sf 100.00% Impervious Runoff Depth>3.64"
Tc=5.0 min CN=0/98 Runoff=0.31 cfs 4,458 cf

Subcatchment 3S: CB 3 AC CATCHMENT Runoff Area=8,450 sf 100.00% Impervious Runoff Depth>3.64"
Tc=5.0 min CN=0/98 Runoff=0.18 cfs 2,563 cf

Reach 1R: 8" PVC Avg. Depth=0.09' Max Vel=2.32 fps Inflow=0.07 cfs 960 cf
D=8.0" n=0.013 L=175.3' S=0.0189 '/' Capacity=1.66 cfs Outflow=0.07 cfs 959 cf

Reach 2R: 8" PVC Avg. Depth=0.20' Max Vel=3.44 fps Inflow=0.31 cfs 4,458 cf
D=8.0" n=0.013 L=6.2' S=0.0161 '/' Capacity=1.53 cfs Outflow=0.31 cfs 4,458 cf

Reach 3R: 8" PVC Avg. Depth=0.31' Max Vel=2.34 fps Inflow=0.37 cfs 5,417 cf
D=8.0" n=0.013 L=20.7' S=0.0048 '/' Capacity=0.84 cfs Outflow=0.37 cfs 5,416 cf

Reach 4R: 8" PVC Avg. Depth=0.21' Max Vel=1.91 fps Inflow=0.18 cfs 2,563 cf
D=8.0" n=0.013 L=20.7' S=0.0048 '/' Capacity=0.84 cfs Outflow=0.18 cfs 2,562 cf

Pond 1W: WETLAND Inflow=0.55 cfs 7,979 cf
Primary=0.55 cfs 7,979 cf

Summary for Subcatchment 1S: CB 2 AC & LANDSCAPE CATCHMENT AREA

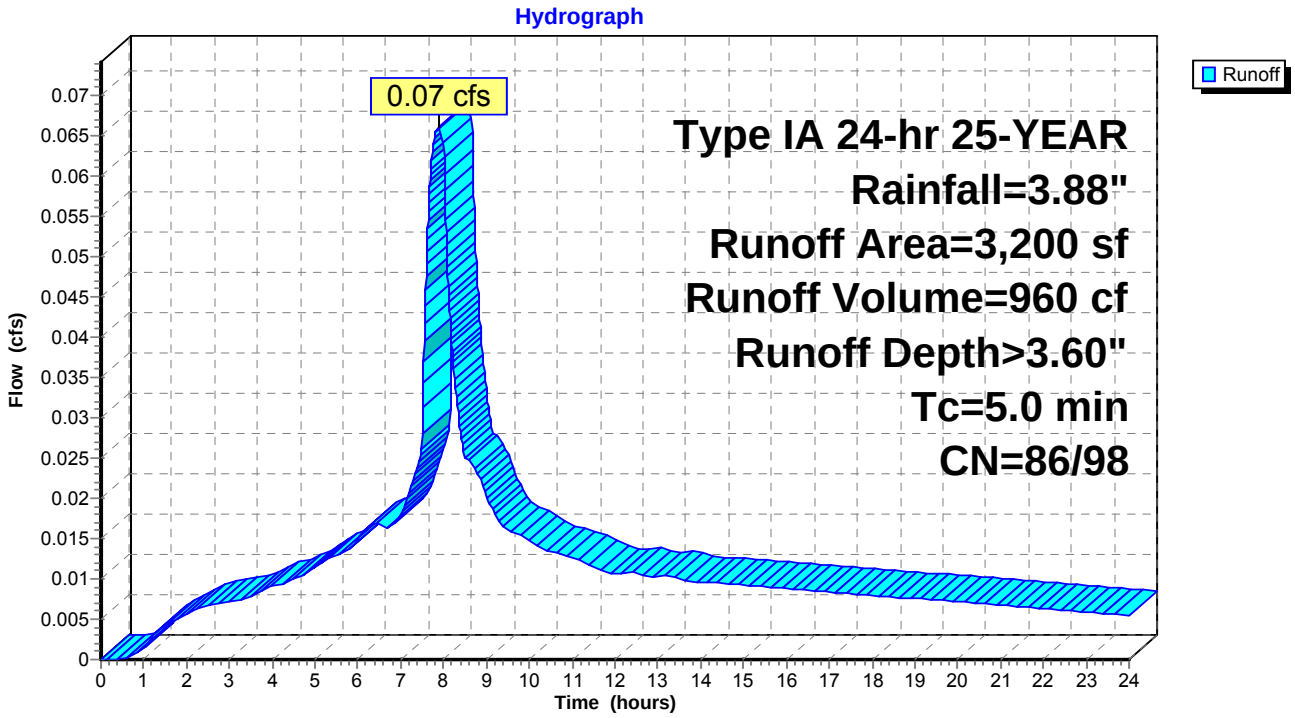
Runoff = 0.07 cfs @ 7.88 hrs, Volume= 960 cf, Depth> 3.60"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YEAR Rainfall=3.88"

	Area (sf)	CN	Description
	3,100	98	Paved parking & roofs
*	100	86	LANDSCAPING
	3,200	98	Weighted Average
	100	86	Pervious Area
	3,100	98	Impervious Area

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

Subcatchment 1S: CB 2 AC & LANDSCAPE CATCHMENT AREA



Summary for Subcatchment 2S: CB 1 AC CATCHMENT AREA

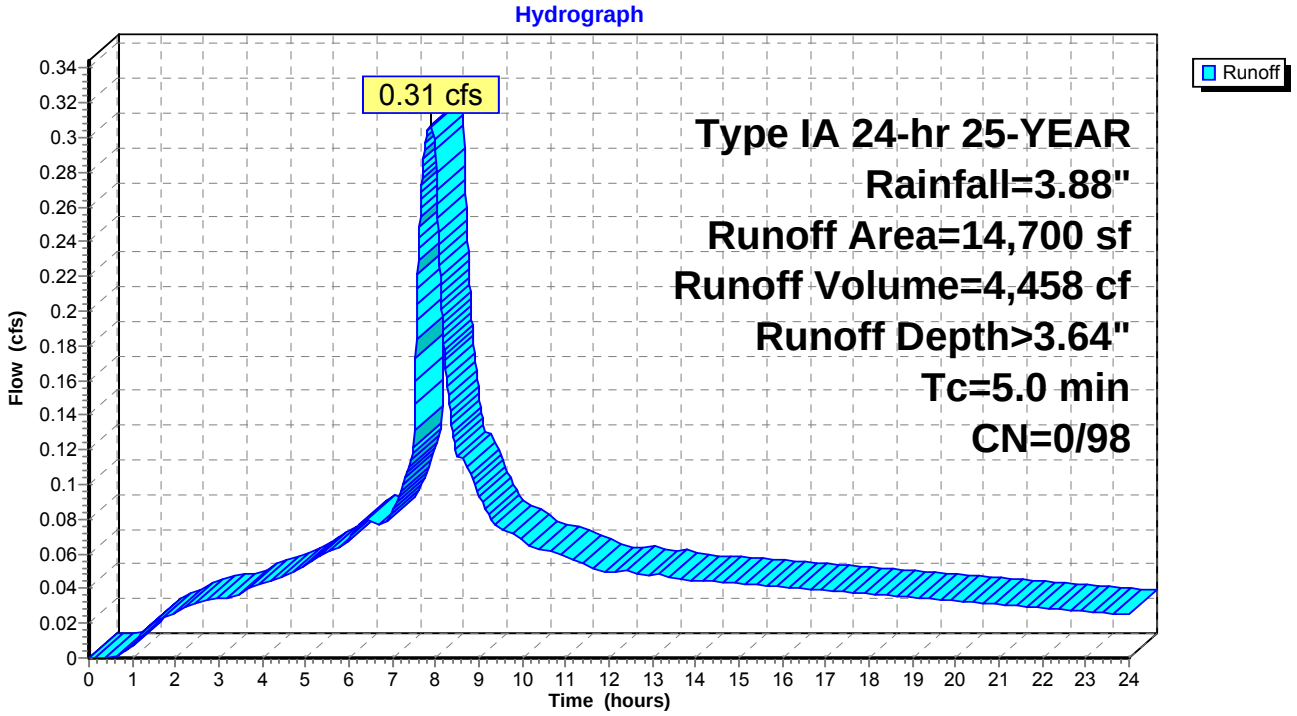
Runoff = 0.31 cfs @ 7.88 hrs, Volume= 4,458 cf, Depth> 3.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YEAR Rainfall=3.88"

	Area (sf)	CN	Description
*	14,700	98	AC PAVEMENT
	14,700	98	Impervious Area

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

Subcatchment 2S: CB 1 AC CATCHMENT AREA



Summary for Subcatchment 3S: CB 3 AC CATCHMENT AREA

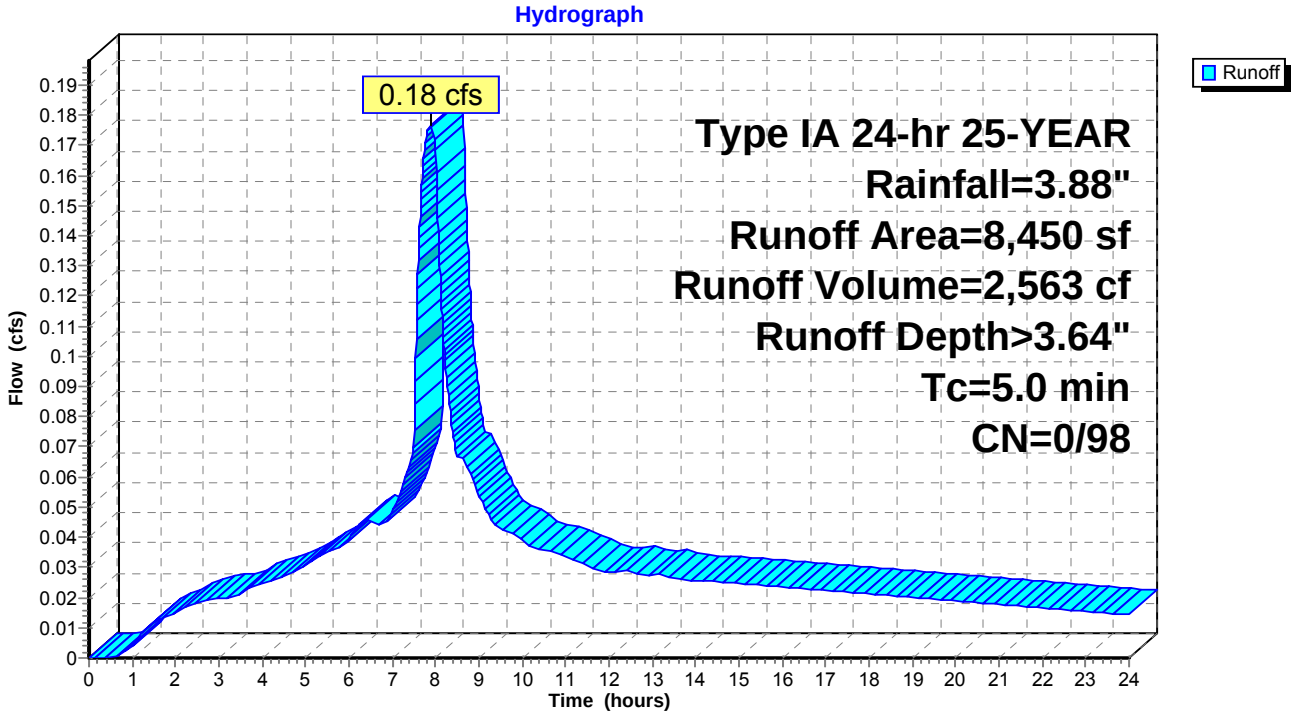
Runoff = 0.18 cfs @ 7.88 hrs, Volume= 2,563 cf, Depth> 3.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-YEAR Rainfall=3.88"

	Area (sf)	CN	Description
*	8,450	98	AC PAVEMENT
	8,450	98	Impervious Area

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

Subcatchment 3S: CB 3 AC CATCHMENT AREA



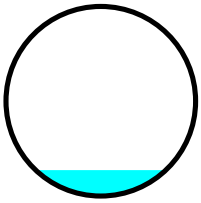
Summary for Reach 1R: 8" PVC

Inflow Area = 3,200 sf, 96.88% Impervious, Inflow Depth > 3.60" for 25-YEAR event
Inflow = 0.07 cfs @ 7.88 hrs, Volume= 960 cf
Outflow = 0.07 cfs @ 7.91 hrs, Volume= 959 cf, Atten= 0%, Lag= 2.2 min

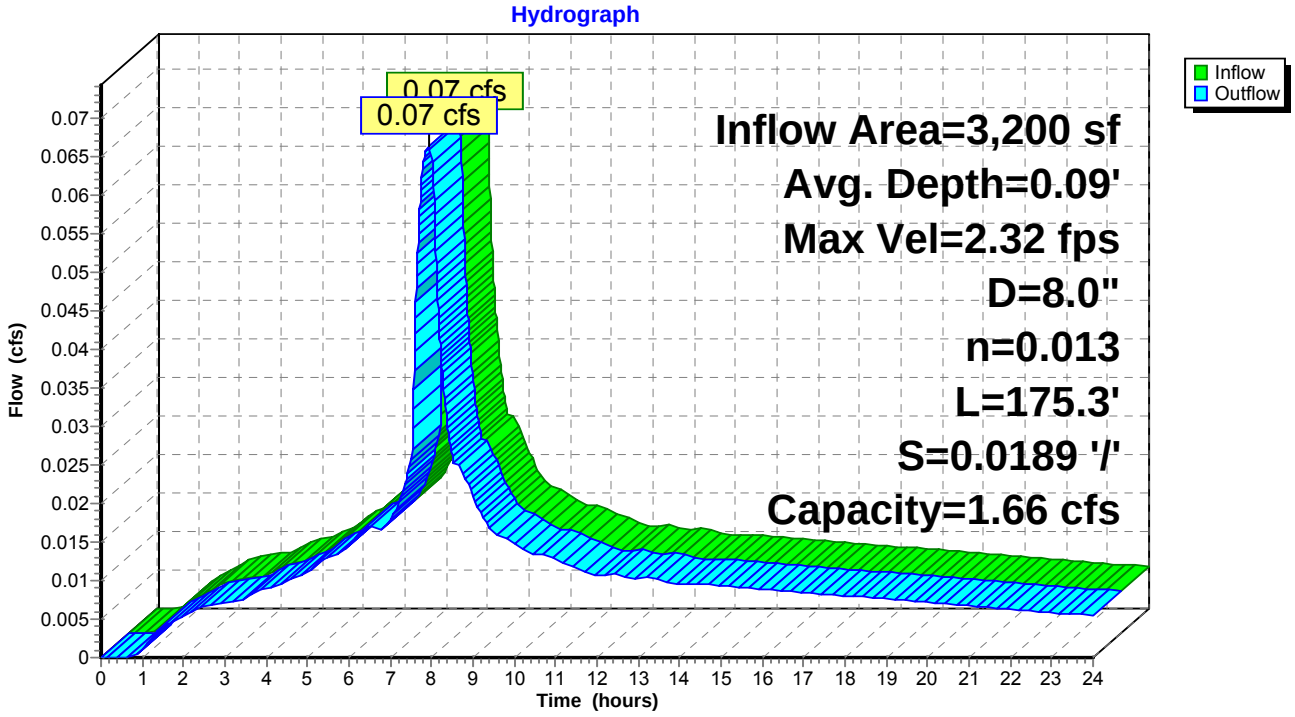
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.31 fps, Avg. Travel Time= 2.2 min

Peak Storage= 5 cf @ 7.89 hrs, Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.67', Capacity at Bank-Full= 1.66 cfs

8.0" Diameter Pipe, n= 0.013
Length= 175.3' Slope= 0.0189 '/'
Inlet Invert= 114.92', Outlet Invert= 111.60'



Reach 1R: 8" PVC



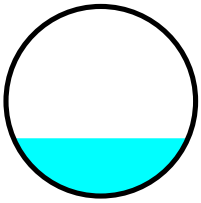
Summary for Reach 2R: 8" PVC

Inflow Area = 14,700 sf,100.00% Impervious, Inflow Depth > 3.64" for 25-YEAR event
Inflow = 0.31 cfs @ 7.88 hrs, Volume= 4,458 cf
Outflow = 0.31 cfs @ 7.88 hrs, Volume= 4,458 cf, Atten= 0%, Lag= 0.0 min

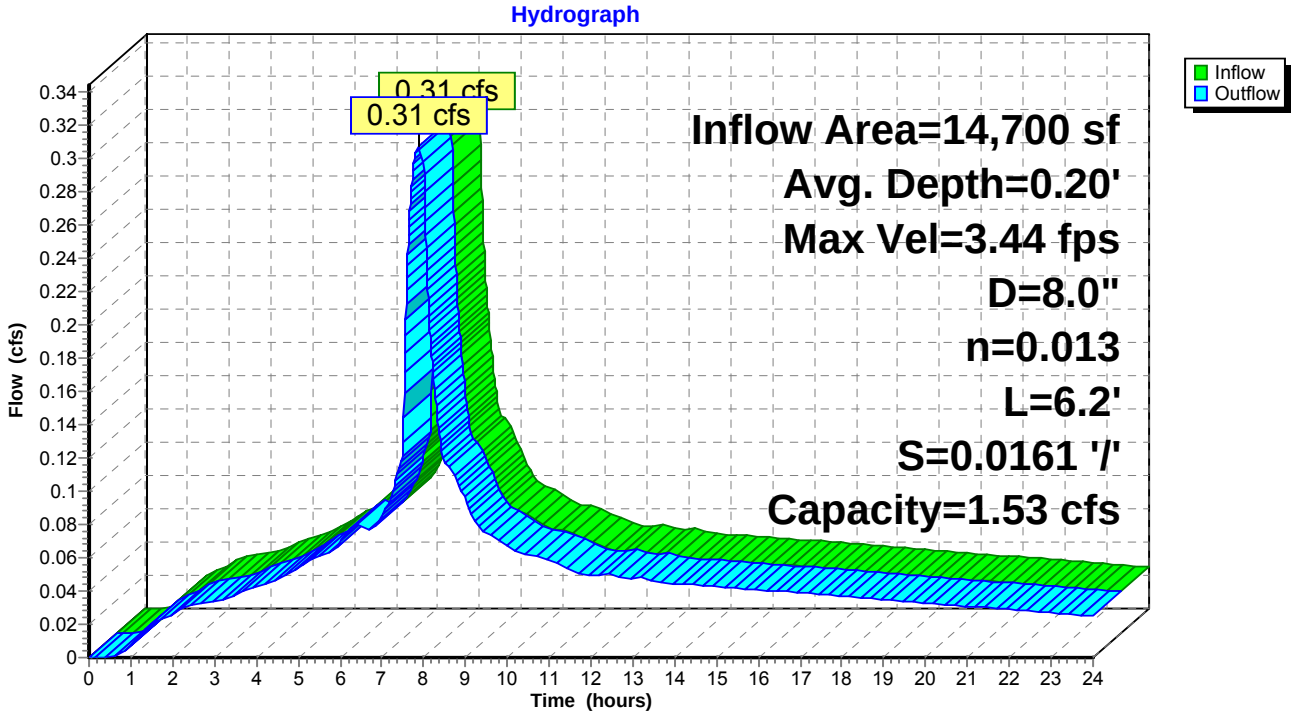
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.44 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.96 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 7.88 hrs, Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 0.67', Capacity at Bank-Full= 1.53 cfs

8.0" Diameter Pipe, n= 0.013
Length= 6.2' Slope= 0.0161 '/'
Inlet Invert= 111.70', Outlet Invert= 111.60'



Reach 2R: 8" PVC



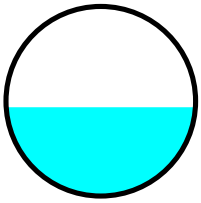
Summary for Reach 3R: 8" PVC

Inflow Area = 17,900 sf, 99.44% Impervious, Inflow Depth > 3.63" for 25-YEAR event
Inflow = 0.37 cfs @ 7.88 hrs, Volume= 5,417 cf
Outflow = 0.37 cfs @ 7.89 hrs, Volume= 5,416 cf, Atten= 0%, Lag= 0.3 min

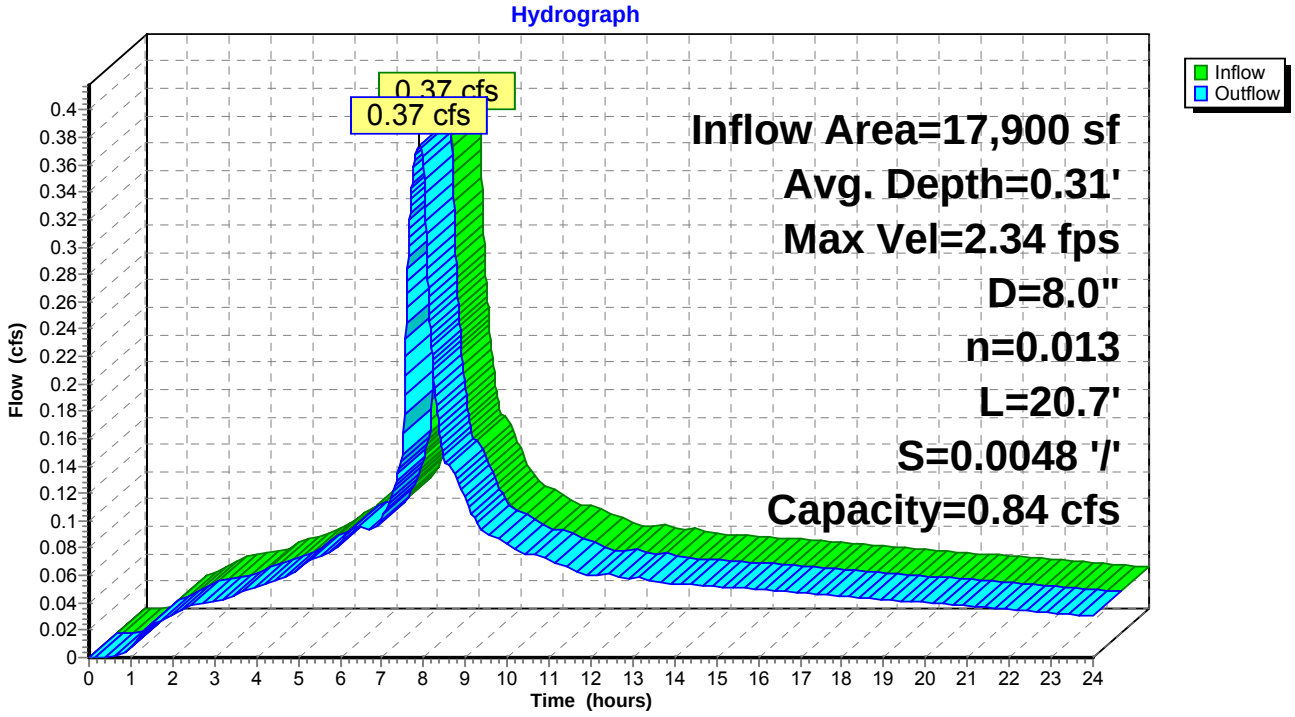
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.34 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 0.3 min

Peak Storage= 3 cf @ 7.89 hrs, Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 0.67', Capacity at Bank-Full= 0.84 cfs

8.0" Diameter Pipe, n= 0.013
Length= 20.7' Slope= 0.0048 '/'
Inlet Invert= 111.60', Outlet Invert= 111.50'



Reach 3R: 8" PVC



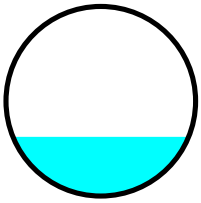
Summary for Reach 4R: 8" PVC

Inflow Area = 8,450 sf,100.00% Impervious, Inflow Depth > 3.64" for 25-YEAR event
Inflow = 0.18 cfs @ 7.88 hrs, Volume= 2,563 cf
Outflow = 0.18 cfs @ 7.88 hrs, Volume= 2,562 cf, Atten= 0%, Lag= 0.3 min

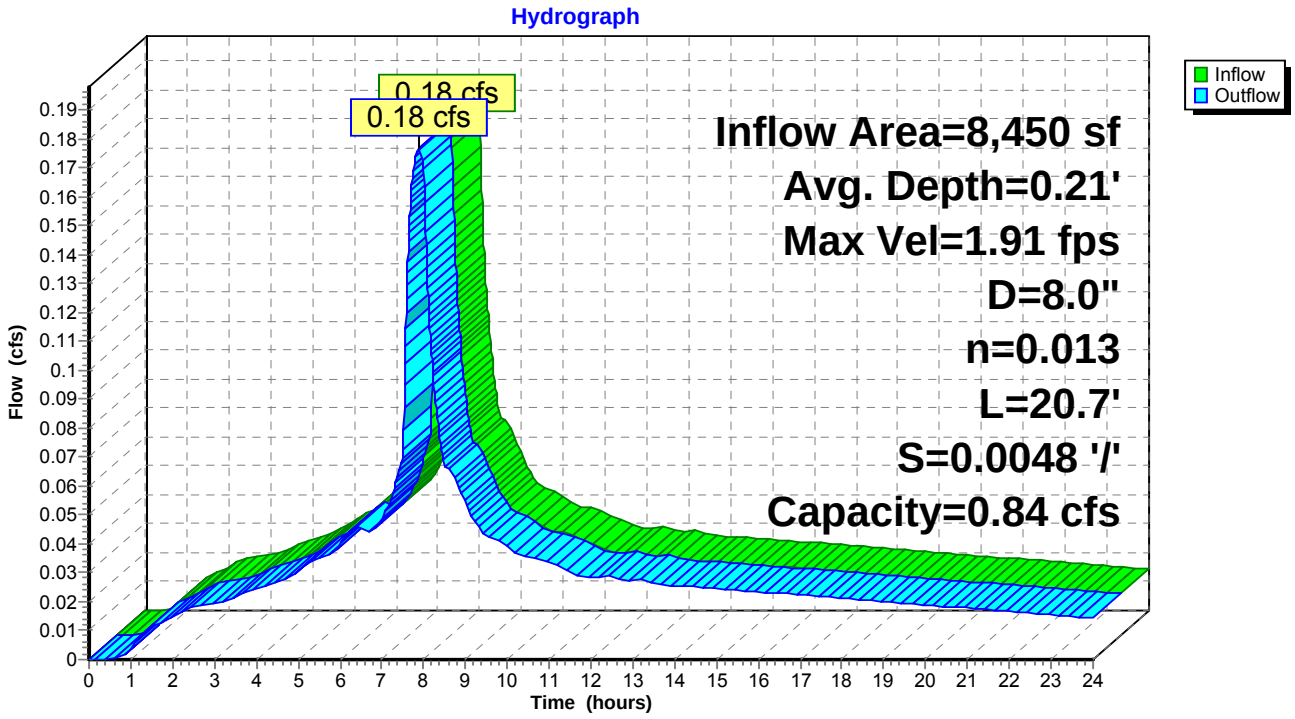
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.91 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2 cf @ 7.88 hrs, Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 0.67', Capacity at Bank-Full= 0.84 cfs

8.0" Diameter Pipe, n= 0.013
Length= 20.7' Slope= 0.0048 '/'
Inlet Invert= 111.60', Outlet Invert= 111.50'



Reach 4R: 8" PVC

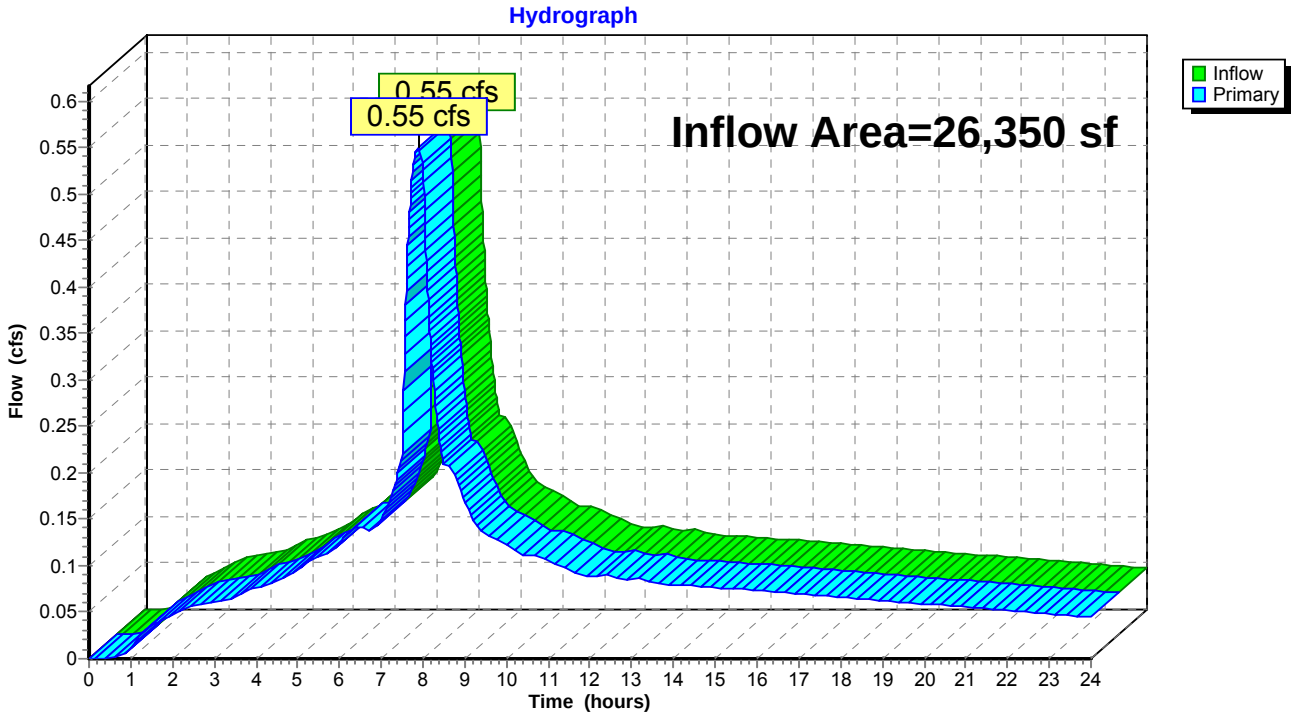


Summary for Pond 1W: WETLAND

Inflow Area = 26,350 sf, 99.62% Impervious, Inflow Depth > 3.63" for 25-YEAR event
Inflow = 0.55 cfs @ 7.89 hrs, Volume= 7,979 cf
Primary = 0.55 cfs @ 7.89 hrs, Volume= 7,979 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond 1W: WETLAND



APPENDIX 3.1

CONTECH STORMFILTER
CATCH BASIN CALCULATIONS

AKS ENGINEERING & FORESTRY, LLC.
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OR 97062
503-563-6151

Date: 3/31/2016
Designed by: AJW
Checked by: CEG

STAFFORD HILLS RACQUET AND FITNESS CLUB

Cartridge Sizing for StormFilter Catchbasin 1

STORMFILTER® DESIGN PARAMETERS

Number of Cartridges Required:

$N=Q_{treat}\,(449_{gpm/cfs} / Q_{cart\ gpm/cart})$

Q_{treat} = Water Quality Volume (WQV)
$Q_{cart\ gpm/cart}$ = Treatment per Cartridge = 15.0 $_{gpm/cart}$

StormFilter Sizing for Catchbasin 1

Area Requiring Treatment 14,700 sq.ft

$$\boldsymbol{WQV}\ (cu.ft) = \frac{0.36(in.) \times Area\ (sq.ft)}{12(in./ft)} \rightarrow 441\ FT^3$$

$$\boldsymbol{WQF}\ (cfs) = \frac{WQV\ (cu.ft)}{14{,}400\ sec} \rightarrow 0.031\ CFS$$

Cartridge Required $N=Q_{treat}\,(449_{gpm/cfs} / Q_{cart\ gpm/cart})$ $N=Q_{treat}\,(449_{gpm/cfs} / 15.0\ _{cart\ gpm/cart})$

N = 0.92 cartridges → 1 SINGLE CARTRIDGE STORMFILTER

AKS ENGINEERING & FORESTRY, LLC.
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OR 97062
503-563-6151

Date: 3/31/2016
Designed by: AJW
Checked by: CEG

STAFFORD HILLS RACQUET AND FITNESS CLUB

Cartridge Sizing for StormFilter Catchbasin 2

STORMFILTER® DESIGN PARAMETERS

Number of Cartridges Required:

$N=Q_{treat}\,(449_{gpm/cfs} / Q_{cart\ gpm/cart})$

Q_{treat} = Water Quality Volume (WQV)
$Q_{cart\ gpm/cart}$ = Treatment per Cartridge = 15.0 $_{gpm/cart}$

StormFilter Sizing for Catchbasin 2

Area Requiring Treatment 3,200 sq.ft

$$\boldsymbol{WQV}\ (cu.ft) = \frac{0.36(in.) \times Area\ (sq.ft)}{12(in./ft)} \rightarrow 96\ FT^3$$

$$\boldsymbol{WQF}\ (cfs) = \frac{WQV\ (cu.ft)}{14{,}400\ sec} \rightarrow 0.007\ CFS$$

Cartridge Required $N=Q_{treat}\,(449_{gpm/cfs} / Q_{cart\ gpm/cart})$ $N=Q_{treat}\,(449_{gpm/cfs} / 15.0_{cart\ gpm/cart})$

N = 0.20 cartridges → 1 SINGLE CARTRIDGE STORMFILTER

AKS ENGINEERING & FORESTRY, LLC.
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OR 97062
503-563-6151

Date: 3/31/2016
Designed by: AJW
Checked by: CEG

STAFFORD HILLS RACQUET AND FITNESS CLUB

Cartridge Sizing for StormFilter Catchbasin 3

STORMFILTER® DESIGN PARAMETERS

Number of Cartridges Required:

$N=Q_{treat}\,(449_{gpm/cfs} / Q_{cart\ gpm/cart})$

Q_{treat} = Water Quality Volume (WQV)
$Q_{cart\ gpm/cart}$ = Treatment per Cartridge = 15.0 $_{gpm/cart}$

StormFilter Sizing for Catchbasin 3

Area Requiring Treatment 8,450 sq.ft

$$\boldsymbol{WQV}\ (cu.ft) = \frac{0.36(in.) \times Area\ (sq.ft)}{12(in./ft)} \rightarrow 254\ FT^3$$

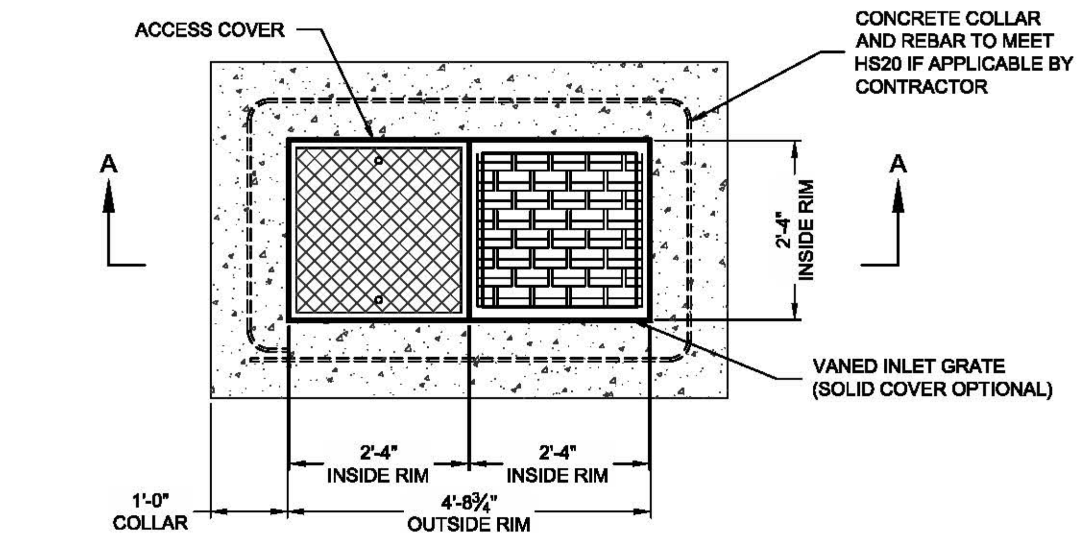
$$\boldsymbol{WQF}\ (cfs) = \frac{WQV\ (cu.ft)}{14{,}400\ sec} \rightarrow 0.018\ CFS$$

Cartridge Required $N=Q_{treat}\,(449_{gpm/cfs} / Q_{cart\ gpm/cart})$ $N=Q_{treat}\,(449_{gpm/cfs} / 15.0_{cart\ gpm/cart})$

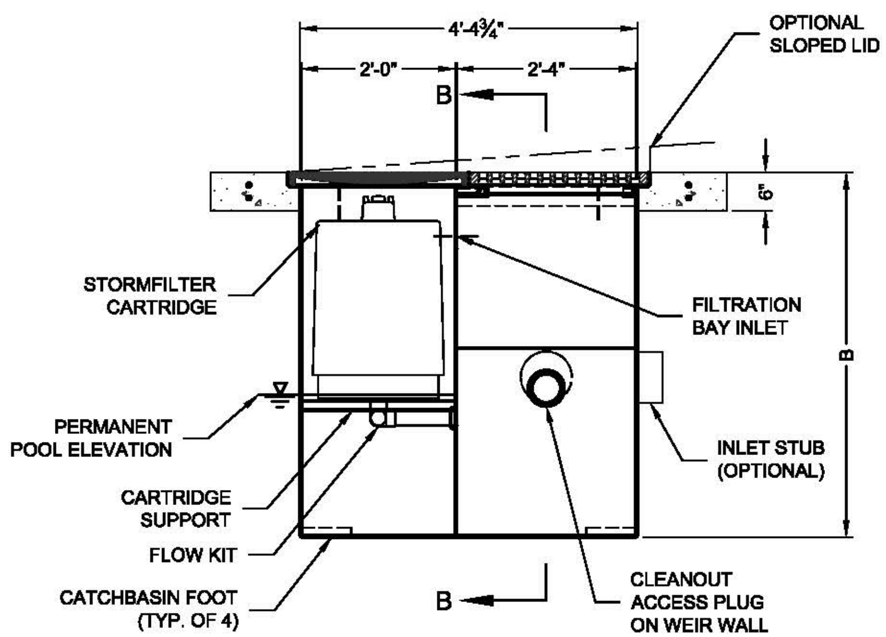
N = 0.53 cartridges → 1 SINGLE CARTRIDGE STORMFILTER

APPENDIX 3.2

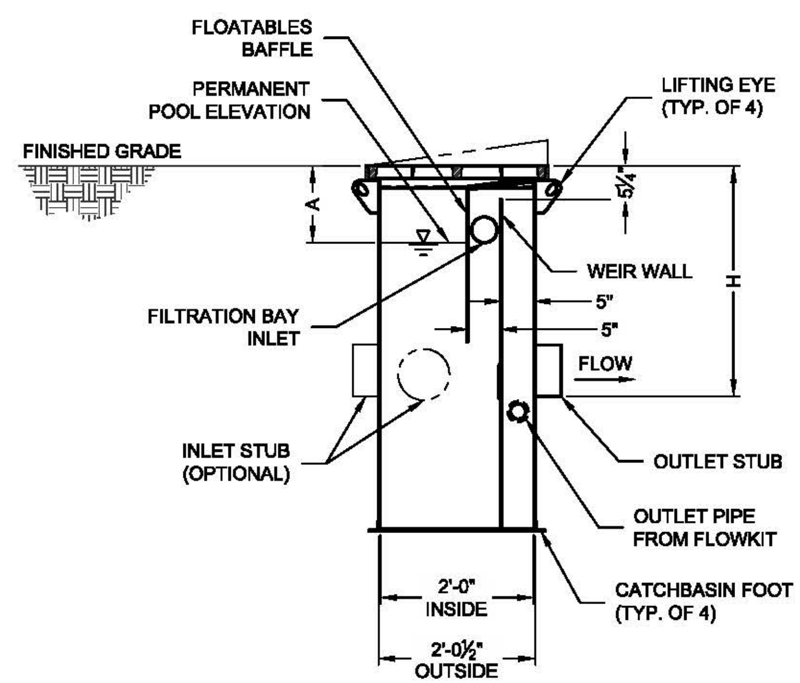
CONTECH STORMFILTER CATCH BASIN DETAILS AND SPECIFICATIONS



PLAN VIEW



SECTION A-A



SECTION B-B

STORMFILTER CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 1 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF ONE CARTRIDGE. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL.
PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"		18"		18" DEEP	
MINIMUM HYDRAULIC DROP (H)	3.05'		2.3'		3.3'	
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	15	7.5
PEAK HYDRAULIC CAPACITY	1.0		1.0		1.8	
INLET PERMANENT POOL LEVEL (A)	1'-0"		1'-0"		2'-0"	
OVERALL STRUCTURE HEIGHT (B)	4'-9"		3'-9"		4'-9"	

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
4. INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
5. STORMFILTER CATCHBASIN EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING. STANDARD OUTLET STUB IS 8 INCHES IN DIAMETER. MAXIMUM OUTLET STUB IS 15 INCHES IN DIAMETER. CONNECTION TO COLLECTION PIPING CAN BE MADE USING FLEXIBLE COUPLING BY CONTRACTOR.
6. STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO M306 LOAD RATING. TO MEET HS20 LOAD RATING ON STRUCTURE, A CONCRETE COLLAR IS REQUIRED. WHEN REQUIRED, CONCRETE COLLAR WITH QUANTITY (2) #4 REINFORCING BARS TO BE PROVIDED BY CONTRACTOR.
7. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 37 SECONDS.
8. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

1-CARTRIDGE CATCHBASIN STORMFILTER DATA

STRUCTURE ID		XXX
WATER QUALITY FLOW RATE (cfs)		X.XX
PEAK FLOW RATE (<1 cfs)		X.XX
RETURN PERIOD OF PEAK FLOW (yrs)		XXX
CARTRIDGE FLOW RATE (gpm)		XX
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)		XXXXX
RIM ELEVATION		XXX.XX'
PIPE DATA:	I.E.	DIAMETER
INLET STUB	XXX.XX'	XX"
OUTLET STUB	XXX.XX'	XX"
CONFIGURATION: OUTLET / INLET / INLET — OUTLET / INLET / INLET		
SLOPED LID		YES\NO
SOLID COVER		YES\NO
NOTES/SPECIAL REQUIREMENTS:		

The Stormwater Management StormFilter®
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: ... RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

1 CARTRIDGE CATCHBASIN STORMFILTER STANDARD DETAIL

I:\STORMWATER\COMMON\PS110 STORMFILTER\40 STANDARD DRAWINGS\CATCH BASIN SF\SFCB-SI\DWG\SFCB1-DTL.DWG 10/21/2014 8:39 AM

The Contech Engineered Solutions LLC StormFilter® Specification
STEEL CATCH BASIN CONFIGURATION
February, 2015

PART 1 GENERAL

1.1 Description

The Contractor shall furnish and install the Contech Engineered Solutions, LLC, StormFilter stormwater treatment system, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

The Stormwater Filtration System shall consist of an underground steel catch basin structure that houses passive, radial flow, siphon-actuated, and rechargeable media filled filtration cartridge(s). The rechargeable media-filled filter cartridges shall incorporate a siphon-actuated surface self-cleaning mechanism to increase the effective life of the filter media and to reduce the accumulation of material on the cartridge/media interface. Each radial-flow filter cartridge shall operate at a predetermined flow rate through the use of an integrated flow control orifice located within each filter cartridge outlet manifold.

1.4. Manufacturer

The Stormwater Filtration System shall be of a type that has been installed and in use for a minimum of five (5) consecutive years preceding the date of installation of the system. The manufacturer shall have been, during the same consecutive five (5) year period, engaged in the engineering design and production of systems deployed for the treatment of storm water runoff and which have a history of successful production, acceptable to the Engineer of Record and/or the approving Jurisdiction. The StormFilter stormwater treatment system shall be supplied by Contech Engineered Solutions, LLC, 1-800-338-1122, without exception.

1.3 Related Sections

A. Section [ ]:

1.4 Submittals

A. Contech Engineered Solutions LLC, or authorized supplier, to submit shop drawings for StormFilter stormwater treatment system with the catch basin, filter cartridges and accessory equipment. Drawings shall include principal dimensions, filter placement, location of piping and unit foundation.

B. Manufacturer or supplier shall submit Installation Instructions to the contractor.

C. Contech Engineered Solutions LLC, or authorized supplier, shall submit an Operation and Maintenance Manual.

PART 2 PRODUCTS

2.1 Internal Components

All internal components including ABS and PVC manifold piping, filter cartridge(s), filter media (as specified on the plans in the StormFilter data block or by the Engineer of Record), shall be provided by Contech Engineered Solutions LLC.

A. ABS manifold pipe shall meet ASTM specification F628. PVC manifold pipe shall meet ASTM specification D1785 and PVC fittings shall meet ASTM specification D2466.

B. Filter cartridge bottom pan, inner ring, and hood shall be constructed from linear low-density polyethylene (LLDPE) or ABS. Filter cartridge screen shall consist of 1" x ½" welded wire fabric (16 gauge minimum) with a bonded PVC coating. Internal parts shall consist of ABS or PVC material. Siphon-priming float shall be constructed from high-density polyethylene (HDPE). All miscellaneous nuts, bolts, screws, and other fasteners shall be stainless steel or aluminum.

An orifice plate shall be supplied with each cartridge to restrict flow rate to a maximum of 22.5 gpm at system design head or as specified on drawings.

C. Filter Media: Filter media shall be provided by same manufacturer as Vertical Media Filtration System. Filter media shall consist of one or more of the following, as specified by the Engineer:

1. Perlite Media: Perlite media shall be made of natural siliceous volcanic rock free of any debris or foreign matter. The perlite media shall have a bulk density ranging from 6.5 to 8.5 lb/ft^3 and particle sizes ranging from that passing through a 0.50 inch screen and retained on a U.S. Standard #8 sieve.

2. CSF Media: CSF media shall be made exclusively of composted fallen deciduous leaves. Filter media shall be granular. Media shall be dry at the time of installation. The CSF leaf media shall have a bulk density ranging from 40 to 50 lb/ft^3 and particle sizes ranging from that passing through a 0.50 inch screen to that retained on a U.S. Standard #8 sieve.

3. Metal Rx Media: Metal Rx media shall be made exclusively of composted fallen deciduous leaves. Filter media shall be granular. Media shall be dry at the time of installation. The Metal Rx media shall have a bulk density ranging from 40 to 50 lb/ft^3 and particle sizes ranging from that passing through a U.S. Standard #8 sieve to that retained on a U.S. Standard #14 sieve.

4. Zeolite Media: Zeolite media shall be made of naturally occurring clinoptilolite, which has a geological structure of potassium-calcium-sodium aluminosilicate. The zeolite media shall have a bulk density ranging from 44 to 48 lb/ft^3, particle sizes ranging from that passing through a U.S. Standard #4 sieve to that retained on a U.S. Standard #6 sieve, and a cation exchange capacity ranging from 1.0 to 2.2 meq/g.

5. Granular Activated Carbon: Granular activated carbon (GAC) shall be made of lignite coal that has been steam activated. The GAC media shall have a bulk density ranging from 28 to 31 lb/ft^3 and particle sizes ranging from that passing through a U.S. Standard #4 sieve to that retained on a U.S. Standard #8 sieve.

6. Zeolite-Perlite-Granular Activated Carbon (ZPG): ZPG is a mixed media that shall be composed of a 1.3 ft^3 outer layer of 100% Perlite (see above) and a 1.3 ft^3 inner layer consisting of a mixture of 90% Zeolite (see above) and 10% Granular Activated Carbon (see above).

7. Zeolite-Perlite (Zeo/Perl): Zeo/Perl is a mixed media that shall be composed of a 1.3 ft^3 outer layer of 100% Perlite (see above) and a 1.3 ft^3 inner layer consisting of 100% Zeolite.

8. CSF – Granular Activated Carbon (CSF/GAC): CSF/GAC is a mixed media that shall be composed of a 1.3 ft^3 outer layer of 100% CSF media (see above) and a 1.3 ft^3 inner layer consisting of 100% Granular Activated Carbon (see above).

9. Perlite – Metal Rx : Perlite/Metal Rx is a mixed media that shall be composed of a 1.3 ft^3 outer layer of 100% Perlite (see above) and a 1.3 ft^3 inner layer consisting of 100% Metal Rx (see above).

10. PhosphoSorb: PhosphoSorb media shall be made from Perlite pellets with activated alumina bound to the surface. The PhosphoSorb media pellets shall be granular and have a bulk density from 18 to 25 lb/ft^3. The pellet size should range from that passing through a U.S. Standard ¼ inch sieve and retained on a #8 sieve.

2.2 STEEL CATCH BASIN COMPONENTS

A. Steel Catch Basin: Catch basin shall be all welded steel construction, fabricated from ASTM A36 ¼-inch steel and shall be designed to withstand AASHTO H-20 wheel loads.

B. Catch Basin Grate: Grating shall be ductile iron construction and shall meet AASHTO H-20 loading requirements, and shall be provided according to ASTM A48.

C. Catch Basin Solid Lid: Solid lid shall be gray cast iron, treated with non slip surfacing, and shall meet AASHTO H-20 loading requirements, and shall be provided according to ASTM A48.

2.3 CONTRACTOR-PROVIDED COMPONENTS

All contractor-provided components shall meet the requirements of this section, the plans specifications and contract documents. In the case of conflict, the more stringent specification shall apply.

A. Crushed rock base material shall be six-inch minimum layer of ¾-inch minus rock. Compact undisturbed sub-grade materials to 95% of maximum density at +/-2% of optimum moisture content. Any over-excavation, removal, and replacement of unsuitable material/soils below sub-grade shall be performed at the guidance of the geotechnical engineer or per the engineer of record.

B. Concrete: Shall be 3000 psi, 28 day strength, ¾-inch round rock, 4-inch slump maximum, placed within 90 minutes of initial mixing, or as otherwise specified in the general technical specifications.

C. Rebar: Shall meet ASTM A-615M Grade 420 (60 ksi) or as otherwise specified in the general technical specifications.

D. Sub-Base: Shall be 6-inch minimum of ¾-inch minus rock or as otherwise specified in the general technical specifications.

E. Backfill: Shall be ¾-inch minus rock or as otherwise specified in the general technical specifications.

PART 3 EXECUTION

3.1 STEEL CATCH BASIN

A. Catch basin floor shall slope 1/4 inch maximum across the width and slope downstream 1 inch per 12 foot of length. Catch basin top finish grade shall be even with surrounding finish grade surface unless otherwise noted on plans.

B. Contractor shall prevent sediment and debris from entering the filter unit during construction.

C. Contractor shall compact sub-base to 95% of maximum density or as otherwise specified by engineer. Unsuitable material below sub-grade shall be replaced as directed by engineer.

D. If necessary, the inlet chamber may be filled with clean water to assist in preventing flotation during construction until the structure is backfilled and the concrete collar is poured.

E. Contractor shall compact backfill to 95% of maximum density or as otherwise specified by engineer.

F. Catch basin outlet shall be connected to downstream (and upstream, if applicable) piping using a flexible-type coupling.

G. Concrete perimeter slab shall be constructed 1 foot wide and 6 inches thick. Slab shall include two #4 rebar hoops with minimum 6-inch overlap at closure. Allow 2-inch vertical spacing between hoops and minimum 2-inch clearance from concrete surfaces, or as directed by the engineer.

3.2 FILTER CARTRIDGE

Catch Basin StormFilter shall be provided complete with cartridge(s) and cartridge media installed, unless otherwise agreed upon with the manufacturer.

3.3 CLEANUP

A. The project site shall be clean and free of dirt and debris before runoff is allowed to enter the filter. Site work shall be in a complete condition as approved by the engineer. The project site includes any surface that contributes storm drainage to the system.

B. The inlet/outlet chamber and filter chamber(s) shall be free of construction debris and sediment before the system is placed in operation.

C. Contractor shall remove the temporary filter fabric around the inlet grate to place the system in operation.

D. The 4-inch cleanout plug in the overflow weir wall shall remain in place for proper operation of the system.

3.4 Filter Cartridges

A. Filter cartridges shall be delivered installed in the manhole, unless otherwise agreed upon with the manufacturer. Contractor shall take appropriate action to protect the cartridges from sediment and other debris during construction. Methods for protecting the cartridges include but are not limited to:

1. Remove cartridges from the manhole and store appropriately. Cartridges shall be reinstalled to operate according to 3.4 B (see below).

2. If catch basin is equipped with underdrain bypass piping, Contractor may leave cartridges in the manhole and allow stormwater entering collection system to bypass filter bay through underdrain bypass piping.

3. Leave cartridges in the catch basin and plug inlet and outlet pipe to prevent stormwater from entering the manhole, and provide means for stormwater to bypass the stormwater filtration system.

The method ultimately selected shall be at Contractor's discretion and Contractor's risk.

B. Filter cartridges shall not be placed in operation until the catch basin is clean and the project site is clean and stabilized (construction erosion control measures no longer required). The project site includes any surface that contributes storm drainage to the StormFilter. All impermeable surfaces shall be clean and free of dirt and debris. All catch basins, manhole and pipes shall be free of dirt and sediments. Contact Contech Engineered Solutions, LLC, to assist with system activation and/or inspect the system for proper installation once site is clean and stabilized.

C. Contractor to install filter cartridges.

1. *Filter Cartridges with ¼-Turn Connector Fittings:* Tape shall be cleanly and completely removed from manifold fitting openings. ¼-turn connects shall be glued and inserted into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be turned onto the connector until they reach the hard stop on the connector – approximately ¼ revolution, with care to not "over turn" the cartridge, or turn with such force to damage the hard stop mechanism. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

2. *Filter Cartridges with Threaded Connector Fittings:* Tape shall be cleanly and completely removed from manifold fitting openings. Threaded connectors shall be glued and inserted into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be threaded onto the connectors until they contact the vault floor, or have reached the limit of the threads within the filter cartridge, with care not to "over turn" the cartridge and damage the threads. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

3. *Filter Cartridges with CSF with Slip Connector Fittings*: Tape shall be cleanly and completely removed from manifold fitting openings. Spool pieces (slip fittings) shall be inserted without glue into all manifold fittings to be equipped with a filter cartridge. Filter cartridges shall be placed over the spool pieces to contact the vault floor. Plugs shall be inserted without glue in all manifold fittings not equipped with a filter cartridge.

PART 4 PERFORMANCE

4.1 Cartridge Operation

A. Each stormwater filtration system shall contain one or more siphon actuated media filter cartridges that maintain a uniform pressure profile across the face of the filter during operation. At the design flow rate the maximum filter hydraulic loading rate is not to exceed 2.1 gallons per minute per square foot of filter surface area. Stormwater shall enter the filter cartridges through sides and shall flow through the filter media radially

from the outer perimeter to the inner cartridge lumen and shall have an average contact time no less than 35 seconds.

4.2 Documentation of Sediment Removal

A. The Filtration system shall have the State of Washington Department of Ecology, General Use Level Designation (GULD) Certification and current approval status from the New Jersey Department of Environmental Protection. (NJDEP).

4.3 Cartridge Sediment Loading

A. Filter cartridges shall be of a design that has demonstrated a minimum sediment retention capacity of 22 pounds of silty loam per cartridge in laboratory tests without a reduction in hydraulic capacity. Laboratory data shall be corroborated with field observations/data demonstrating equivalent or improved longevity without impacting normal hydraulic performance of the stormwater filtration system. All laboratory and field tests submitted in support of this specification must have undergone peer review by outside entity other than the manufacturer of the stormwater filtration system.

4.4 Overflow

A. Each stormwater filtration system shall include an internal, offline overflow bypass. Water enters through the grate into the inlet bay that is separate from the cartridge bay and separate from the outlet bay. Low flows travel from the inlet bay, through a transfer opening and into the cartridge bay. High flows enter the outlet bay by topping the baffled weir separating the inlet and outlet bay. Flow rates beyond the design flow (overflow) will not enter the cartridge bay. Minimum of 0.5 cfs overflow capacity.

4.5 Maintenance

A. Maintenance and Inspection shall be in performed in accordance with the manufacturer's recommendations for maintenance and inspection.
B. Maintenance and inspection intervals shall be per the manufacturer's recommendations, or per the approving/local jurisdiction/agency requirements; whichever is more frequent.
C. Surface access for personnel and equipment for inspection and maintenance activities shall be provided.

END OF SECTION

APPENDIX 4.0

FIGURE 4-1 – CWS RAINFALL DEPTHS

24-HOUR RAINFALL DEPTHS

RECURRENCE INTERVAL (YEARS)	TOTAL PRECIPITATION DEPTH (INCHES)
2	2.50
5	3.10
10	3.45
25	3.90
50	4.20
100	4.50

24-HOUR RAINFALL DEPTHS

DRAWING NO. 1280

REVISED 12–06

Clean Water Services
Our commitment is clear.

APPENDIX 5.0

RELEVANT INFORMATION FROM *TR-55 – URBAN HYDROLOGY FOR SMALL WATERSHEDS*

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

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: 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.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

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

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

APPENDIX 6.0

SOILS INFORMATION FROM THE *USDA SOIL SURVEY OF YAMHILL COUNTY, OREGON*

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 Clackamas County Area, Oregon, and Washington County, Oregon

March 24, 2016

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 (http://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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

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: 1:2,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 40 80 160 240

Feet
0 100 200 400 600

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 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 10, Sep 18, 2015

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 13, Sep 18, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Aug 3, 2014—Aug 23, 2014

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

Clackamas County Area, Oregon (OR610)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
25	Cove silty clay loam	7.6	38.5%
71B	Quatama loam, 3 to 8 percent slopes	1.3	6.5%
71C	Quatama loam, 8 to 15 percent slopes	2.3	11.9%
84	Wapato silty clay loam	8.0	40.8%
Subtotals for Soil Survey Area		**19.3**	**97.7%**
Totals for Area of Interest		**19.7**	**100.0%**

Washington County, Oregon (OR067)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
37C	Quatama loam, 7 to 12 percent slopes	0.1	0.5%
43	Wapato silty clay loam	0.4	1.8%
Subtotals for Soil Survey Area		**0.5**	**2.3%**
Totals for Area of Interest		**19.7**	**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.

Clackamas County Area, Oregon

25—Cove silty clay loam

Map Unit Setting

National map unit symbol: 223y
Elevation: 100 to 1,500 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cove and similar soils: 85 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cove

Setting

Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

H1 - 0 to 7 inches: silty clay loam
H2 - 7 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D

Minor Components

Wapato

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)

Conser

Percent of map unit: 4 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)

Concord

Percent of map unit: 2 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)

Dayton

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)

71B—Quatama loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 226q
Elevation: 100 to 1,400 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Quatama and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quatama

Setting

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

Typical profile

H1 - 0 to 18 inches: loam

H2 - 18 to 38 inches: clay loam
H3 - 38 to 60 inches: loam

Properties and qualities

Slope: 3 to 8 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 (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)

Minor Components

Delena

Percent of map unit: 5 percent
Landform: Terraces, hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)

71C—Quatama loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 226r
Elevation: 100 to 400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Quatama and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quatama

Setting

Landform: Terraces
Landform position (three-dimensional): Riser

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified glaciolacustrine deposits

Typical profile

H1 - 0 to 18 inches: loam
H2 - 18 to 38 inches: clay loam
H3 - 38 to 60 inches: loam

Properties and qualities

Slope: 8 to 15 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 (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)

84—Wapato silty clay loam

Map Unit Setting

National map unit symbol: 227j
Elevation: 100 to 1,500 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Wapato and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapato

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 18 inches: silty clay loam
H2 - 18 to 45 inches: silty clay loam
H3 - 45 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: 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 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Other vegetative classification: Poorly Drained (G002XY006OR)

Minor Components

Cove

Percent of map unit: 6 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

Humaquepts

Percent of map unit: 4 percent
Landform: Flood plains

Washington County, Oregon

37C—Quatama loam, 7 to 12 percent slopes

Map Unit Setting

National map unit symbol: 21zn
Elevation: 140 to 250 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Quatama and similar soils: 85 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quatama

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 15 inches: loam
H2 - 15 to 30 inches: clay loam
H3 - 30 to 62 inches: loam

Properties and qualities

Slope: 7 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 (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)

Minor Components

Huberly

Percent of map unit: 4 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)

43—Wapato silty clay loam

Map Unit Setting

National map unit symbol: 2203
Elevation: 100 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Wapato and similar soils: 85 percent
Labish and similar soils: 3 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapato

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Recent alluvium

Typical profile

H1 - 0 to 14 inches: silty clay loam
H2 - 14 to 42 inches: silty clay loam
H3 - 42 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: 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 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Other vegetative classification: Poorly Drained (G002XY006OR)

Description of Labish

Setting

Landform: Flood plains, lakebeds (relict)
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and lacustrine deposits over organic material

Typical profile

H1 - 0 to 13 inches: mucky clay
H2 - 13 to 36 inches: clay
H3 - 36 to 60 inches: mucky peat

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 18.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Other vegetative classification: Poorly Drained (G002XY006OR)

Minor Components

Cove, silty clay loam surface

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

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.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX 7.0

STORM REPORT PREVIOUSLY CONDUCTED BY *HARRIS-MCMONAGLE ASSOSIATES INC.* *FOR STAFFORD HILLS SITE AREA*

Stafford Hills Racquet and Fitness Club

STORM DRAINAGE REPORT

CITY OF TUALATIN PLANNING DEPARTMENT
CASEFILE NUMBER AR 09-08

OWNER

Stafford Hills Club, LLC.
5335 Meadows Road
Lake Oswego, Oregon 97035

ENGINEER/SURVEYOR

Harris-McMonagle Associates Inc.
8740 SW Scoffins Street
Tigard, Oregon 97223
503-639-3453

April 6, 2010
Revised November 16, 2010

STAFFORD HILLS RACQUET AND FITNESS CLUB

STORM DRAINAGE REPORT

TABLE OF CONTENTS

STAFFORD HILLS RACQUET AND FITNESS CLUB

STORM DRAINAGE REPORT

PURPOSE

The purpose of this report is to provide design information to accompany the Stafford Hills Racquet and Fitness Club construction plans that are being submitted to the City of Tualatin and Cleanwater Services (CWS) for approval.

LOCATION

The Stafford Hills Racquet and Fitness Club project site is on the south side of SW Nyberg Lane approximately one-quarter mile east of its intersection with SW 65th Avenue, City of Tualatin, Clackamas County, Oregon. The site is currently addressed as 5916 SW Nyberg Lane. The project site is shown as Tax Lot 900 on Assessor's Map 2S 1E 19. A vicinity map is shown on page 4.

EXISTING CONDITIONS

Topography

The 15.5 acre site has approximately 1350 feet of frontage along SW Nyberg Lane and approximately 287 feet of frontage along SW 65th Avenue. Nyberg Creek crosses the property from west to east before turning north approximately halfway across the site property. Due to the wetlands and other sensitive areas around the creek, the planned development for the site is limited to the easterly portion of the site. The site generally slopes from the south to the north, with slopes between one to ten percent. The site topography is shown on the Subcatchment Map, page 34.

The site is currently vacant. A single-family home was recently removed from the site. The ground cover on the majority of the site is grass with scattered trees along the south and east property lines.

Drainage

The existing drainage from the project site flows into the wetlands areas adjacent to Nyberg Creek. Nyberg Creek then flows into the Tualatin River approximately 500 feet downstream from the project site. The majority of the site lies beneath the 100-year flood plain which lies at elevation 122.25 using the site vertical datum, which is based on Washington County NGVD29.

PROPOSED DEVELOPMENT

The proposal is to construct a fitness club which includes both indoor and outdoor tennis courts, swimming pool and terrace, and necessary parking areas, totaling approximately 5.9 acres in size. The future improvements will include construction of buildings, pavement, storm sewer, sanitary sewer, landscaping, electrical utilities and such appurtenant facilities as required for a commercial development. Please refer to the construction plans that are bound separately.

The site has been designed to comply with the Army Corps of Engineer standards with no net fill within the floodplain. It should be noted that per data available from CWS, the 10-year storm event is at elevation 116.15, which is above the inverts of the majority of the proposed storm system and is approximately four feet above SW Nyberg Lane in front of the project site. However, due to the significant difference in the time of concentration for the project site and for that of the Nyberg Creek

and Tualatin River basins, the pipes will most likely be empty of the local storm event by the time they are inundated by the flood event.

HYDROLOGIC ANALYSIS

Due to the flat terrain on the lower portion of the site, and grading constraints required to maintain flood plain balance, a minimum slope of 0.5% was used on the proposed private storm drainage system. As this is less than the 1/8" per foot shown in the Uniform Plumbing Code Table 11-2, the pipes were sized using engineering software. HydroCAD, computer software for stormwater modeling, was used to compute the drainage hydrographs and peak flow rate of the onsite subcatchments for the 10-year storm event. This was done using the Santa Barbara Urban Hydrograph (SBUH) method with Type 1A rainfall distribution and a 24-hour rainfall amount for the 25-year event of 3.90 In./Hr. A subcatchment map is shown on page 34.

As the building downspout and outdoor tennis court drain locations have not been finalized, wyes have been provided for their connection. These have been sized according to the Uniform Plumbing Code Table 11-2, so that drains installed at 1/8" or 1/4" per foot will accommodate the future drain areas. The drainage areas are shown on the subcatchment map, page 34. A copy of the Uniform Plumbing Code Table 11-2 is shown on page 35.

Soils - The NRCS Soil Survey of Washington County indicates that the soil type on site is mostly Cove and Wapato silty clay loams, which are in hydrologic group "D". Approximately 10% of the site is Quatama loam, which is in hydrologic group "C". The runoff curve numbers of the predominant soil group in each subcatchment was used in calculating runoff. A soils hydrological group analysis is shown on pages 5-8.

Runoff Curve Numbers - Runoff curve numbers are from Table 2.3 of Stormwater Management Manual for Western Washington: Volume III prepared by Washington State Department of Ecology. A copy of this table is shown on page 9.

Curve number calculations are shown on the subcatchment summary and hydrograph sheets.

Time of Concentration – Due to the small size of the subcatchments involved, a minimum time of concentration of five minutes was assumed. The times of concentration for each subcatchment are shown on the hydrograph summary sheets, pages 11 through 24.

DEVELOPED BASIN STORM FLOWS

Storm Routing – As shown on the Subcatchment Map, page 34, the storm runoff from the developed site will be routed through a private drainage system which will flow through a system of water quality swales then across a flow dissipater prior to discharge into the existing wetlands area.

Hydrographs – The subcatchments contributing to each reach of the proposed storm sewer system are shown on the Subcatchment Map, page 34.

The subcatchment 25-year storm hydrographs for the developed site are shown on pages 11 through 24.

Collection System – The 25-year storm peak flow rates and capacities for each node and reach of the proposed storm sewer system are shown on pages 25-31. Manning's formula was used to calculate the capacities of the pipes and channels.

As shown on the summaries, the proposed systems have capacity to accommodate a 25-year storm event.

WATER QUALITY

As shown on the construction plans, storm flows from the eastern portion of the roadway will be routed through a water quality swale prior to discharge.

The water quality facilities design calculations per CWS standards are shown on page 32. All impervious areas for the proposed facilities were included. The flow depth and velocity in the swale for the water quality event and the 25-year storm event and the required sump dimensions were calculated, and are shown on page 33.

PUBLIC FACILITIES

No new public storm drainage facilities are proposed to be constructed by this development. An existing curb inlet located along SW Nyberg Lane will be removed and replaced ten feet west to allow for a service road access to be constructed. This inlet is located at a low-point, and no drainage will be altered as a result of its relocation.

DETENTION

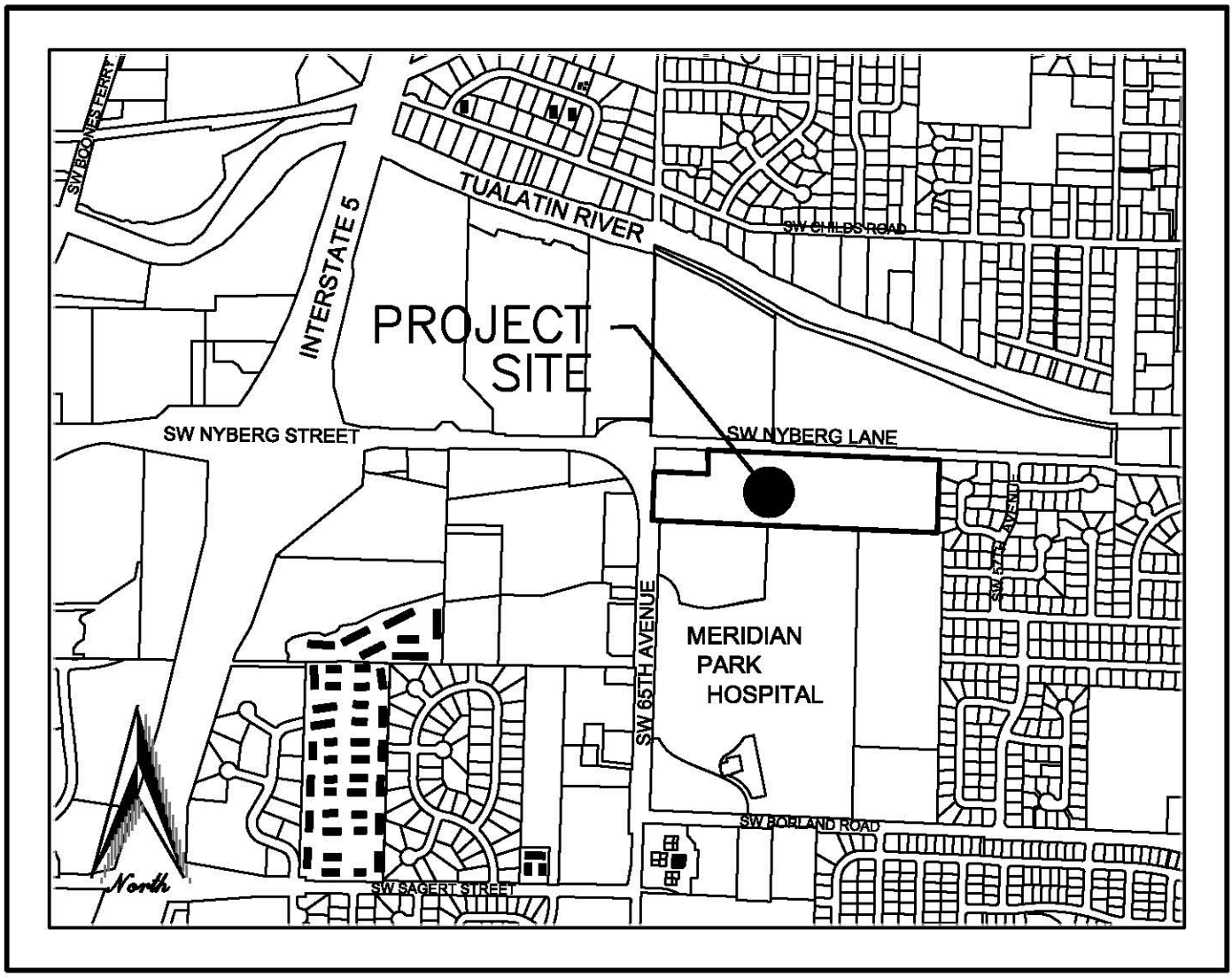
This site is located approximately a quarter of a mile upstream of the Tualatin River. Detention is not recommended for this site due to the adverse outcome of delaying the release of early storm flows into a large stream with a basin which has a much longer required time of concentration. Stream erosion will be limited by the construction of a fifty foot wide storm dissipater and the resulting distribution of storm flows across a broad wetlands area. Refer to the storm drainage plans for details of the storm dissipater design.

CONCLUSION

The storm drainage alterations proposed for construction of the Stafford Hills Racquet and Fitness Club improvements will adequately convey the 25-year storm runoff in conformity with the Uniform Plumbing Code.

The proposed facility for stormwater quality is in conformity with CWS standards.

Storm flows from the developed site will have no significant impact on the existing drainage downstream of the project site.



VICINITY MAP

1"=1000'

Hydrologic Soil Group—Clackamas County Area, Oregon, and Washington County, Oregon
(Stafford Hills Racquet and Fitness Club)

MAP LEGEND

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

Soils
- Soil Map Units

Soil Ratings
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:2,820 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

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

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 6, Feb 9, 2010

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 8, Feb 8, 2010

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 8/3/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Clackamas County Area, Oregon				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
25	Cove silty clay loam	D	6.8	44.0%
71B	Quatama loam, 3 to 8 percent slopes	C	0.6	3.8%
71C	Quatama loam, 8 to 15 percent slopes	C	0.9	5.7%
84	Wapato silty clay loam	D	7.1	45.5%
Subtotals for Soil Survey Area			**15.4**	**99.1%**
Totals for Area of Interest			**15.6**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — Washington County, Oregon				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
43	Wapato silty clay loam	D	0.1	0.9%
Subtotals for Soil Survey Area			**0.1**	**0.9%**
Totals for Area of Interest			**15.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Table 2.3
Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Areas

(Sources: TR 55, 1986, and Stormwater Management Manual, 1992. See Section 2.1.1 for explanation)

Cover type and hydrologic condition.	CNs for hydrologic soil group A	B	C	D
Curve Numbers for Pre-Development Conditions				
Pasture, grassland, or range-continuous forage for grazing:				
Fair condition (ground cover 50% to 75% and not heavily grazed).	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
Woods:				
Fair (Woods are grazed but not burned, and some forest litter covers the soil).	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil).	30	55	70	77
Curve Numbers for Post-Development Conditions				
Open space (lawns, parks, golf courses, cemeteries, landscaping, etc.)[1]				
Fair condition (grass cover on 50% - 75% of the area).	77	85	90	92
Good condition (grass cover on >75% of the area)	68	80	86	90
Impervious areas:				
Open water bodies: lakes, wetlands, ponds etc.	100	100	100	100
Paved parking lots, roofs[2], driveways, etc. (excluding right-of-way)	98	98	98	98
Porous Pavers and Permeable Interlocking Concrete (assumed as 85% impervious and 15% lawn)				
Fair lawn condition (weighted average CNs).	95	96	97	97
Good lawn condition (weighted average CNs).	94	95	96	97
Paved	98	98	98	98
Gravel (including right-of-way)	76	85	89	91
Dirt (including right-of-way)	72	82	87	89
Pasture, grassland, or range-continuous forage for grazing:				
Poor condition (ground cover <50% or heavily grazed with no mulch).	68	79	86	89
Fair condition (ground cover 50% to 75% and not heavily grazed).	49	69	79	84
Good condition (ground cover >75% and lightly or only occasionally grazed)	39	61	74	80
Woods:				
Poor (Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning).	45	66	77	83
Fair (Woods are grazed but not burned, and some forest litter covers the soil).	36	60	73	79
Good (Woods are protected from grazing, and litter and brush adequately cover the soil).	30	55	70	77

Single family residential[3]: Dwelling Unit/Gross Acre	Should only be used for subdivisions > 50 acres	Average Percent impervious area[3,4]	
1.0 DU/GA		15	Separate curve number
1.5 DU/GA		20	shall be selected for
2.0 DU/GA		25	pervious & impervious
2.5 DU/GA		30	portions of the site or
3.0 DU/GA		34	basin
3.5 DU/GA		38	
4.0 DU/GA		42	
4.5 DU/GA		46	
5.0 DU/GA		48	
5.5 DU/GA		50	
6.0 DU/GA		52	
6.5 DU/GA		54	
7.0 DU/GA		56	
7.5 DU/GA		58	

PUD's, condos, apartments, commercial businesses, industrial areas & & subdivisions < 50 acres	%impervious must be computed	Separate curve numbers shall be selected for pervious and impervious portions of the site

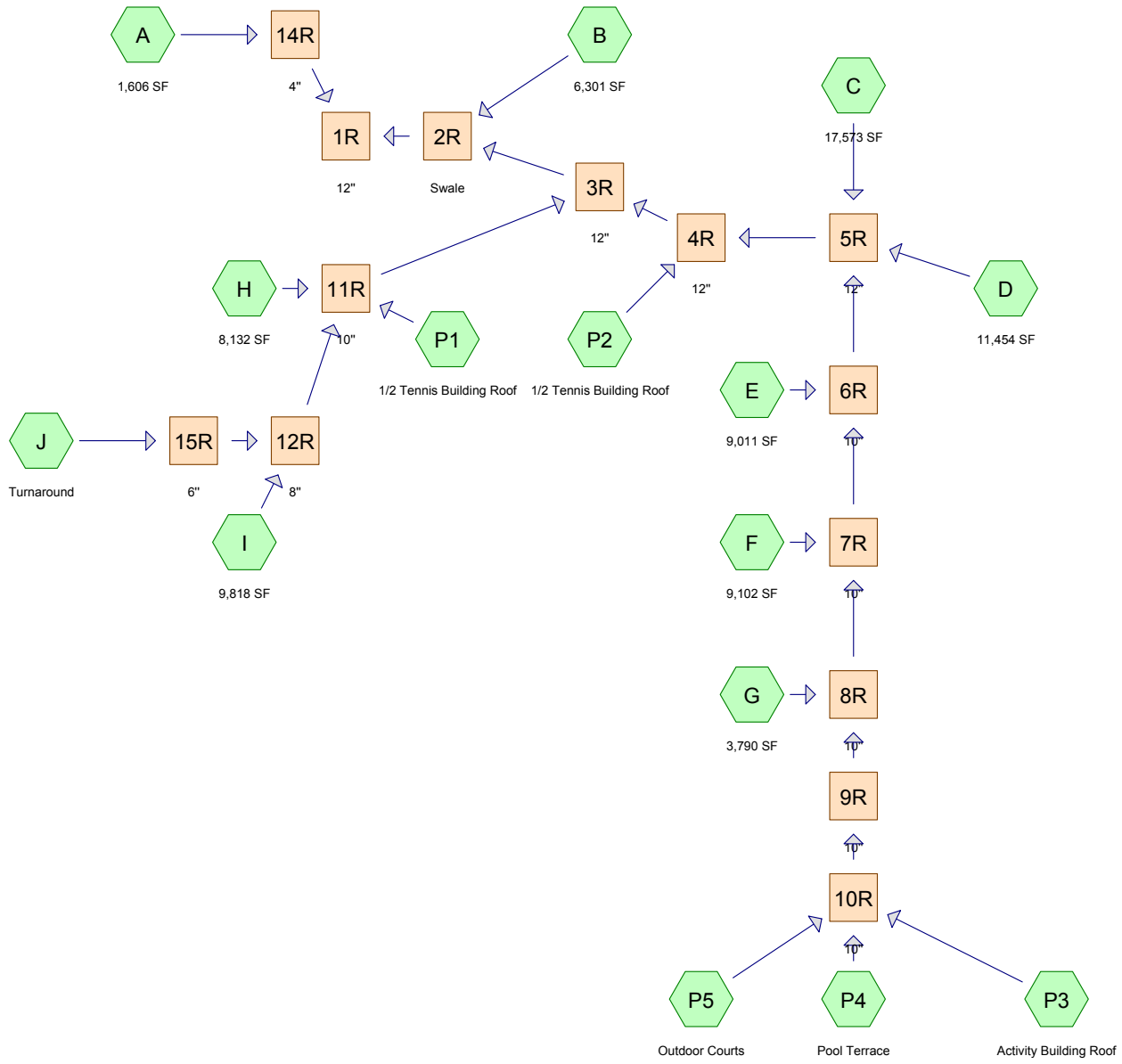
For a more detailed and complete description of land use curve numbers refer to chapter two (2) of the Soil Conservation Service's Technical Release No. 55 , (210-VI-TR-55, Second Ed., June 1986).

[1] Composite CN's may be computed for other combinations of open space cover type.

[2] Where roof runoff and driveway runoff are infiltrated or dispersed according to the requirements in Chapter 2, the average percent impervious area may be adjusted in accordance with the procedure described under "Flow Credit for Roof Downspout Infiltration" and "Flow Credit for Roof Downspout Dispersion" in Chapter 2.

[3] Assumes roof and driveway runoff is directed into street/storm system.

[4] All the remaining pervious area (lawn) are considered to be in good condition for these curve numbers.



Subcat Reach Pond Link

Drainage Diagram for SH DESIGN

Prepared by {enter your company name here}, Printed 11/16/2010

Summary for Subcatchment A: 1,606 SF

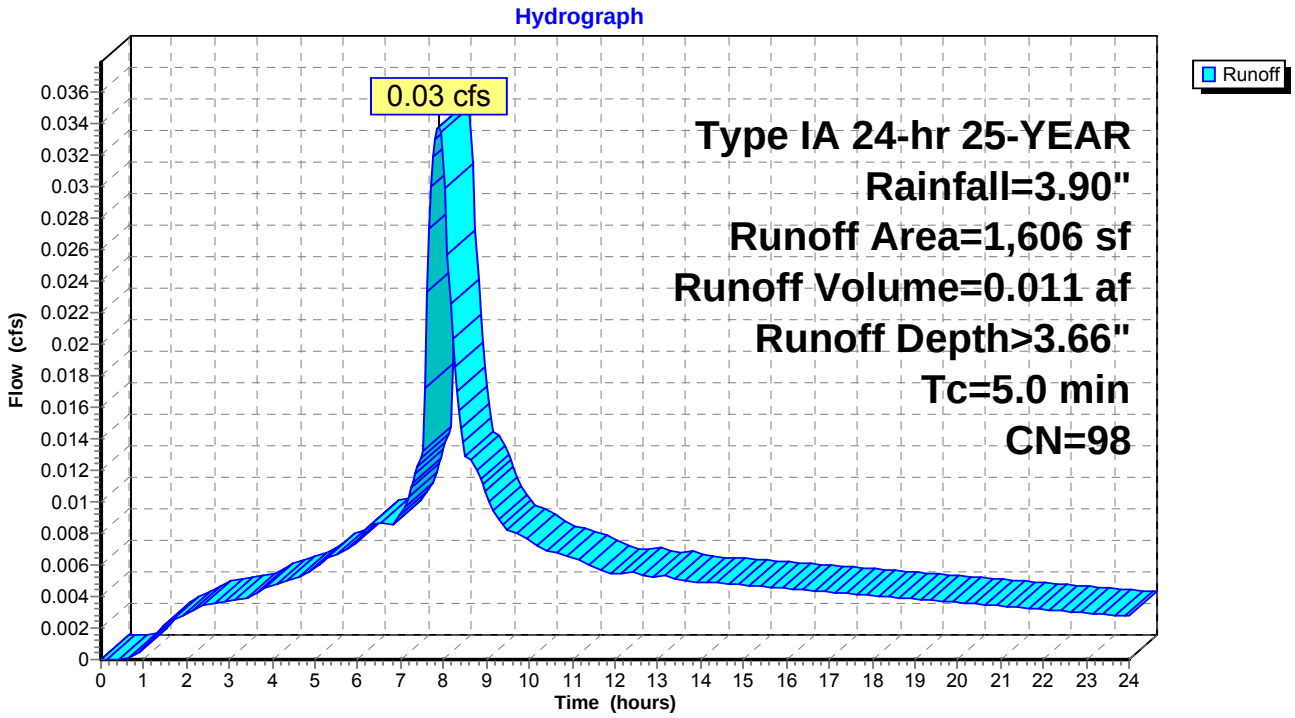
Runoff = 0.03 cfs @ 7.90 hrs, Volume= 0.011 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	1,586	98	Impervious
*	20	90	Landscaping
	1,606	98	Weighted Average
	20		1.25% Pervious Area
	1,586		98.75% Impervious Area

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

Subcatchment A: 1,606 SF



Summary for Subcatchment B: 6,301 SF

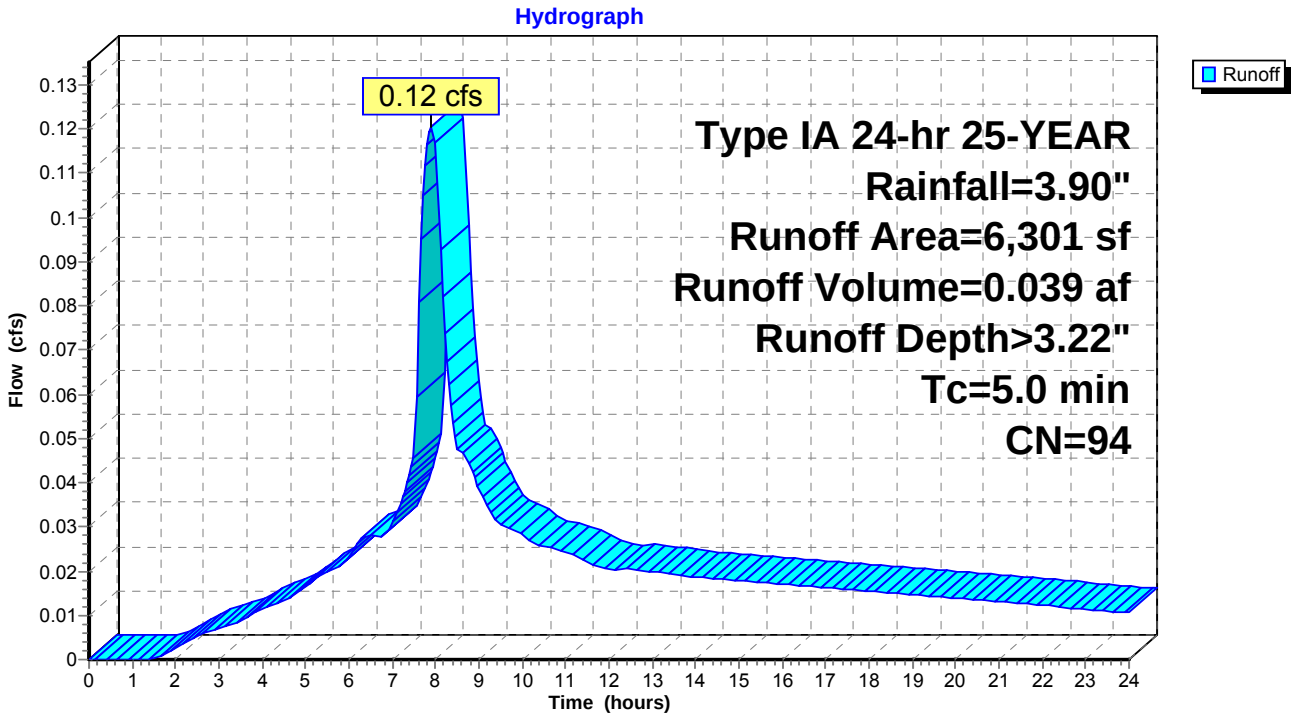
Runoff = 0.12 cfs @ 7.91 hrs, Volume= 0.039 af, Depth> 3.22"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	3,000	98	Impervious
*	3,301	90	Landscaping
	6,301	94	Weighted Average
	3,301		52.39% Pervious Area
	3,000		47.61% Impervious Area

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

Subcatchment B: 6,301 SF



Summary for Subcatchment C: 17,573 SF

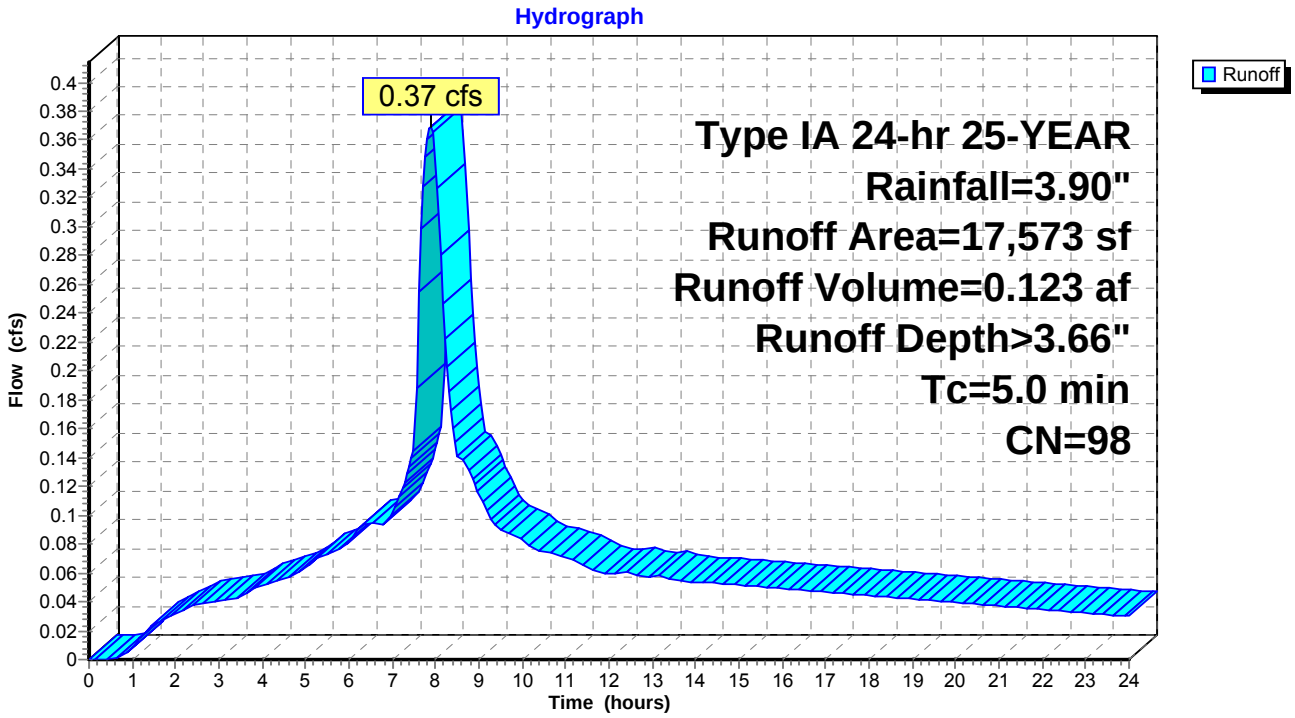
Runoff = 0.37 cfs @ 7.90 hrs, Volume= 0.123 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	16,527	98	Impervious
*	1,046	90	Landscaping
	17,573	98	Weighted Average
	1,046		5.95% Pervious Area
	16,527		94.05% Impervious Area

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

Subcatchment C: 17,573 SF



Summary for Subcatchment D: 11,454 SF

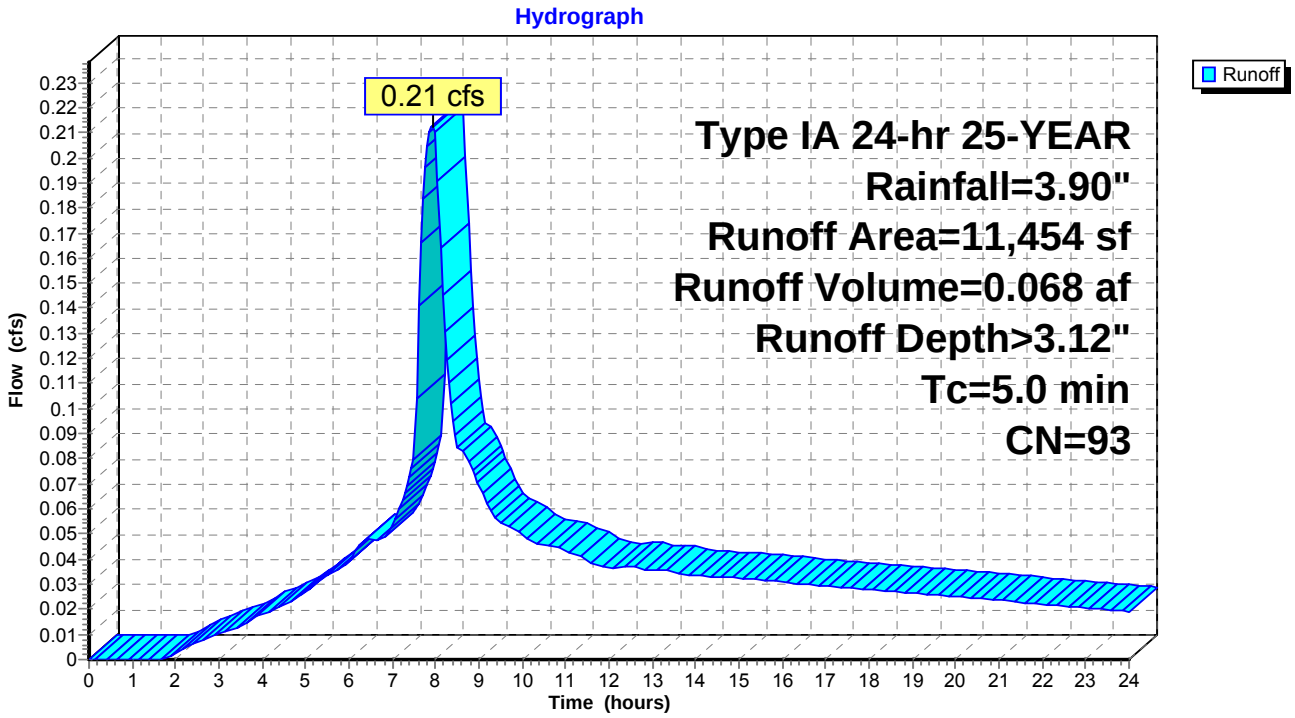
Runoff = 0.21 cfs @ 7.92 hrs, Volume= 0.068 af, Depth> 3.12"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	4,926	98	Impervious
*	6,528	90	Landscaping
	11,454	93	Weighted Average
	6,528		56.99% Pervious Area
	4,926		43.01% Impervious Area

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

Subcatchment D: 11,454 SF



Summary for Subcatchment E: 9,011 SF

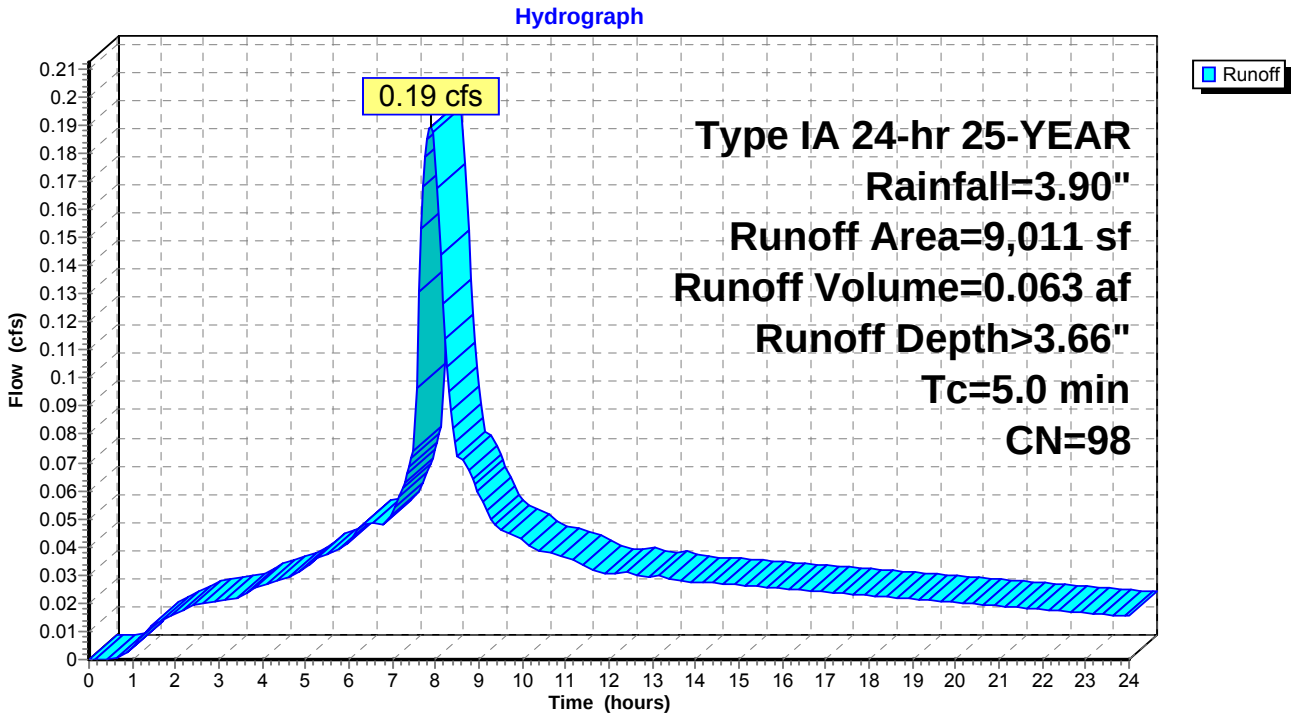
Runoff = 0.19 cfs @ 7.90 hrs, Volume= 0.063 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	8,911	98	Impervious
*	100	90	Landscaping
	9,011	98	Weighted Average
	100		1.11% Pervious Area
	8,911		98.89% Impervious Area

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

Subcatchment E: 9,011 SF



Summary for Subcatchment F: 9,102 SF

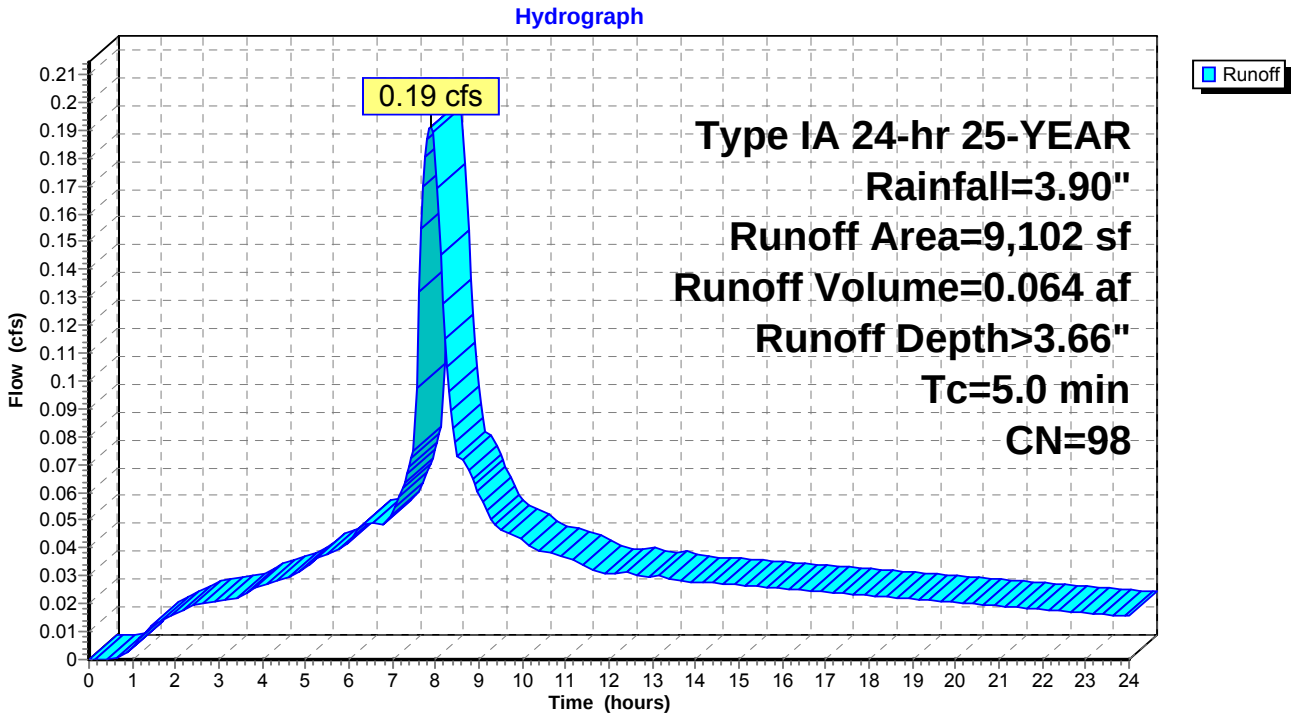
Runoff = 0.19 cfs @ 7.90 hrs, Volume= 0.064 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	9,002	98	Impervious
*	100	90	Landscaping
	9,102	98	Weighted Average
	100		1.10% Pervious Area
	9,002		98.90% Impervious Area

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

Subcatchment F: 9,102 SF



Summary for Subcatchment G: 3,790 SF

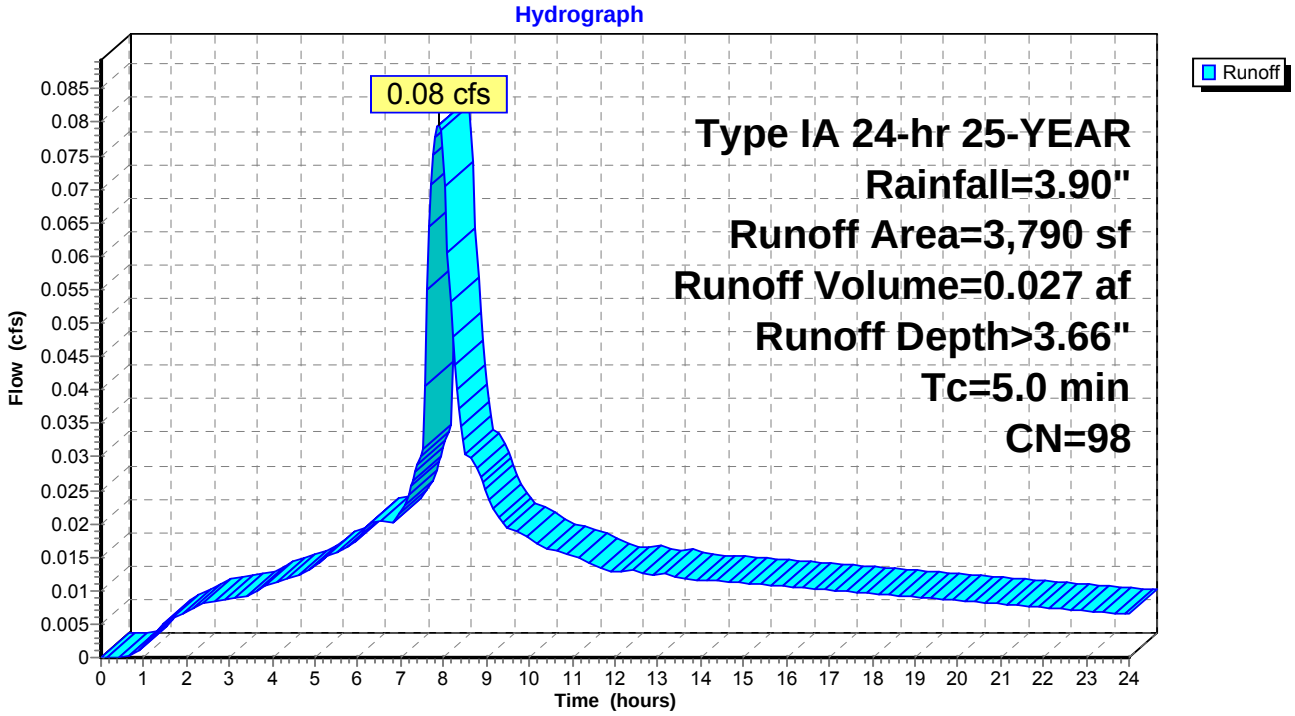
Runoff = 0.08 cfs @ 7.90 hrs, Volume= 0.027 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	3,770	98	Impervious
*	20	90	Landscaping
	3,790	98	Weighted Average
	20		0.53% Pervious Area
	3,770		99.47% Impervious Area

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

Subcatchment G: 3,790 SF



Summary for Subcatchment H: 8,132 SF

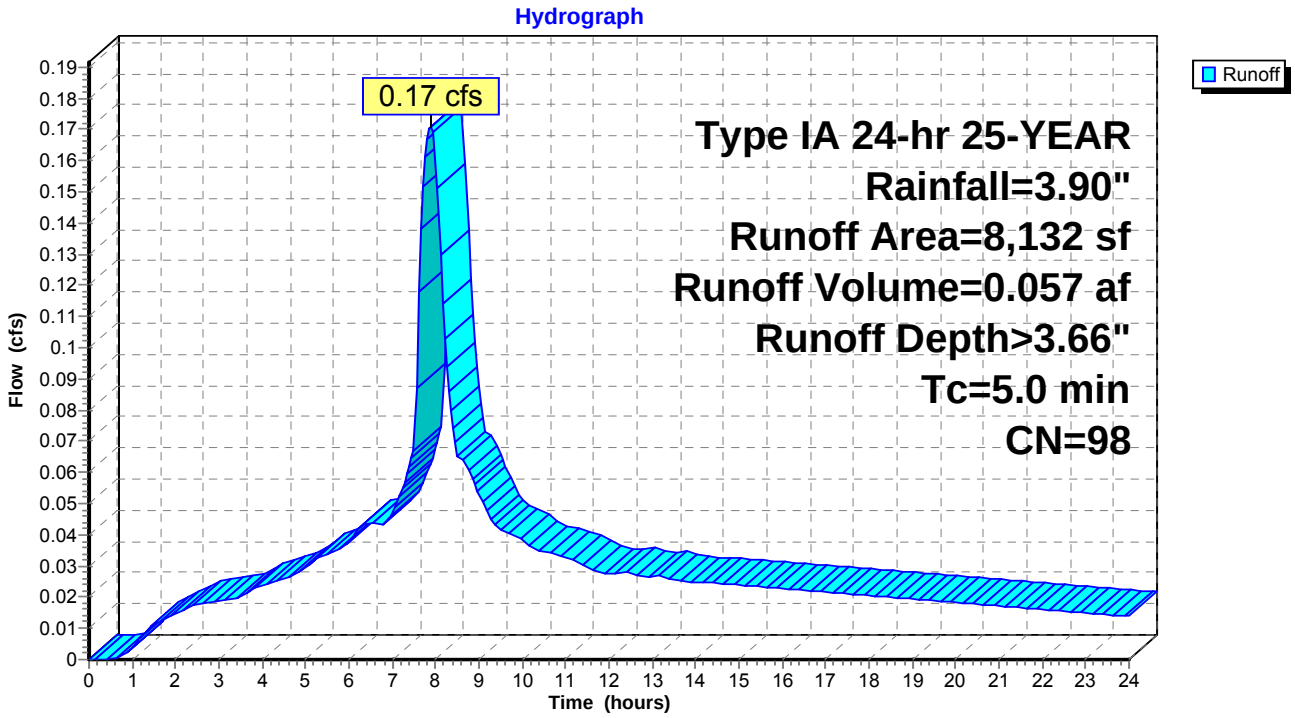
Runoff = 0.17 cfs @ 7.90 hrs, Volume= 0.057 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	8,100	98	Impervious
*	32	90	Landscaping
	8,132	98	Weighted Average
	32		0.39% Pervious Area
	8,100		99.61% Impervious Area

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

Subcatchment H: 8,132 SF



Summary for Subcatchment I: 9,818 SF

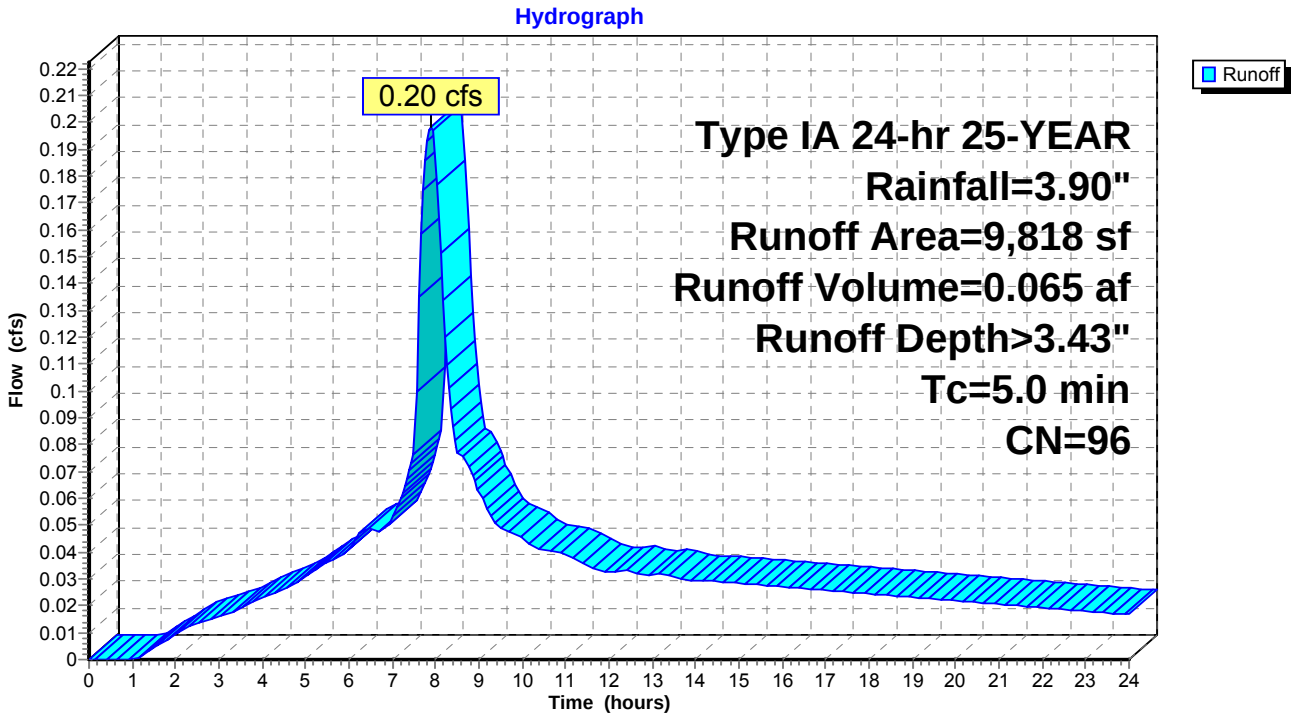
Runoff = 0.20 cfs @ 7.90 hrs, Volume= 0.065 af, Depth> 3.43"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	7,241	98	Impervious
*	2,577	90	Landscaping
	9,818	96	Weighted Average
	2,577		26.25% Pervious Area
	7,241		73.75% Impervious Area

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

Subcatchment I: 9,818 SF



Summary for Subcatchment J: Turnaround

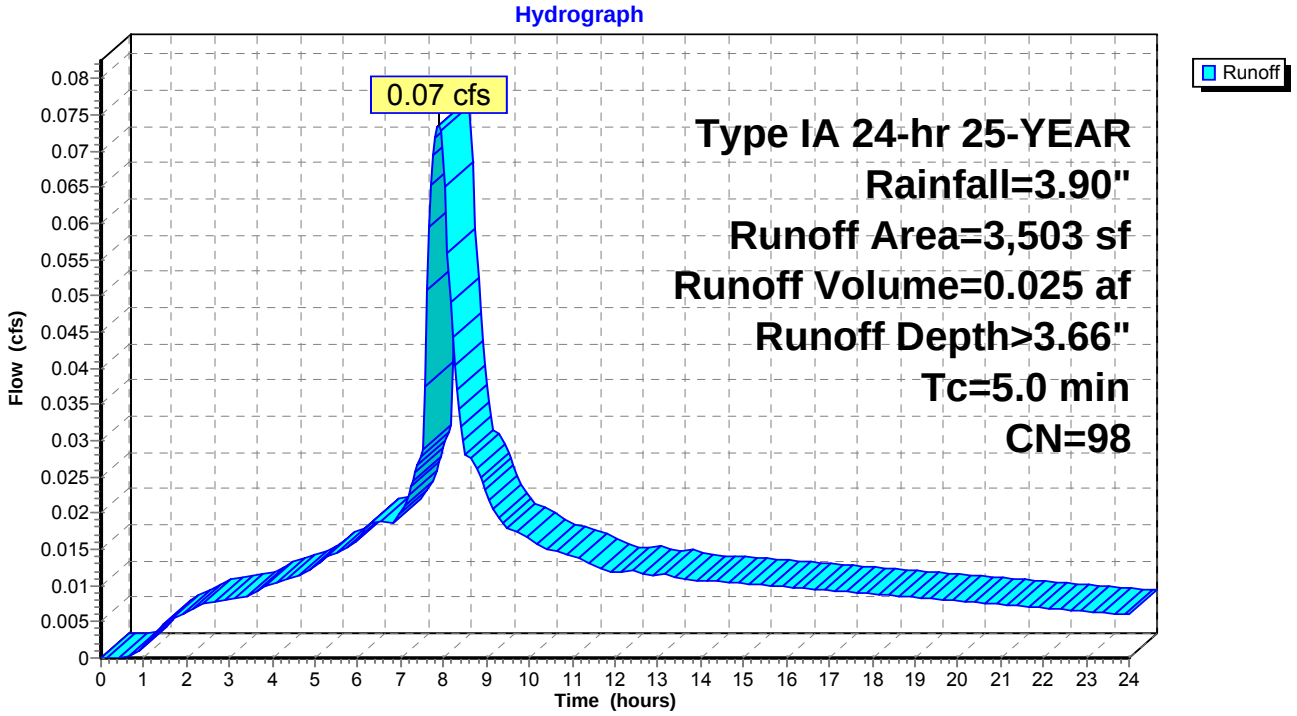
Runoff = 0.07 cfs @ 7.90 hrs, Volume= 0.025 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	3,503	98	Pavers
	3,503		100.00% Impervious Area

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

Subcatchment J: Turnaround



Summary for Subcatchment P1: 1/2 Tennis Building Roof

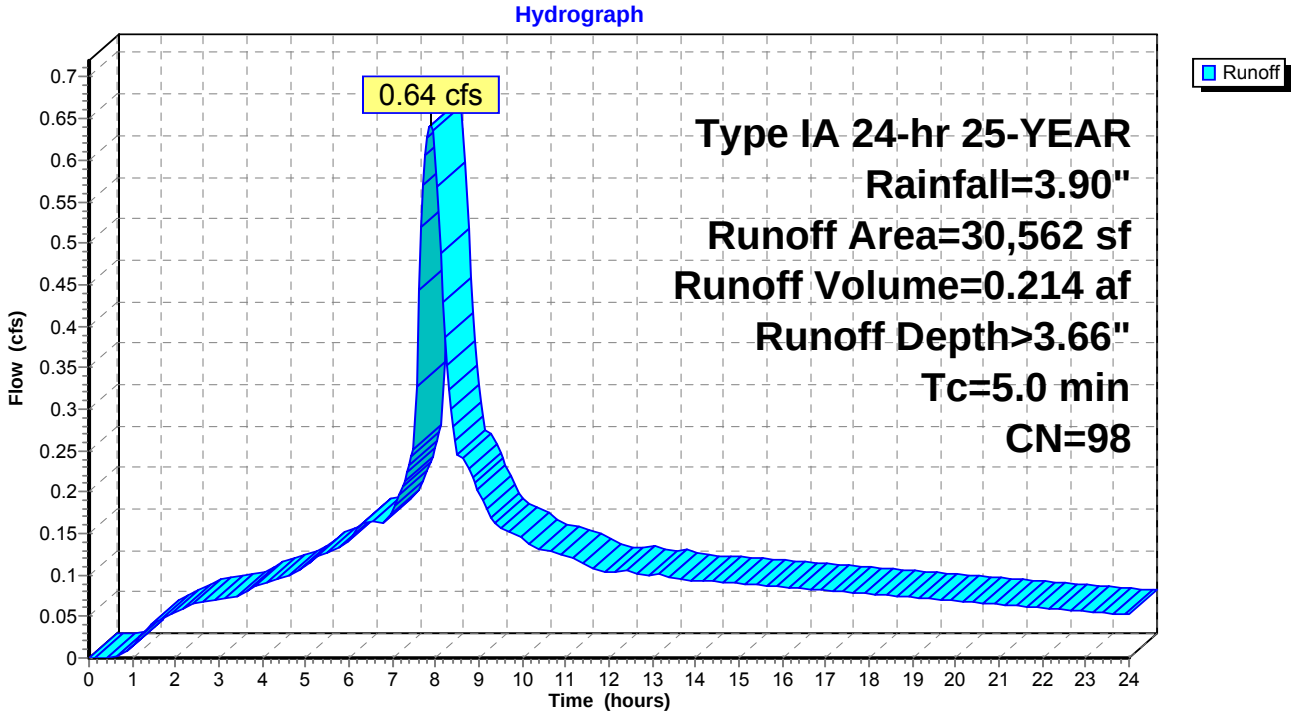
Runoff = 0.64 cfs @ 7.90 hrs, Volume= 0.214 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	30,562	98	Roofs
	30,562		100.00% Impervious Area

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

Subcatchment P1: 1/2 Tennis Building Roof



Summary for Subcatchment P2: 1/2 Tennis Building Roof

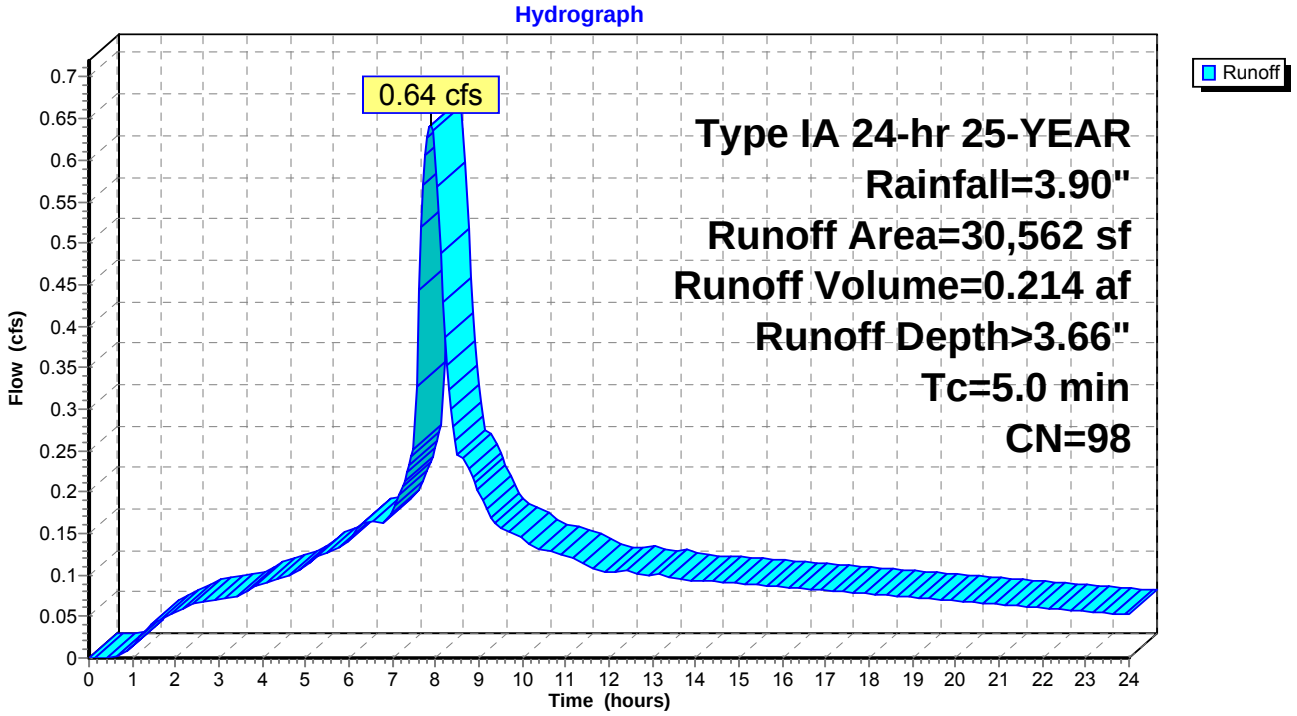
Runoff = 0.64 cfs @ 7.90 hrs, Volume= 0.214 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	30,562	98	Roofs
	30,562		100.00% Impervious Area

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

Subcatchment P2: 1/2 Tennis Building Roof



Summary for Subcatchment P3: Activity Building Roof

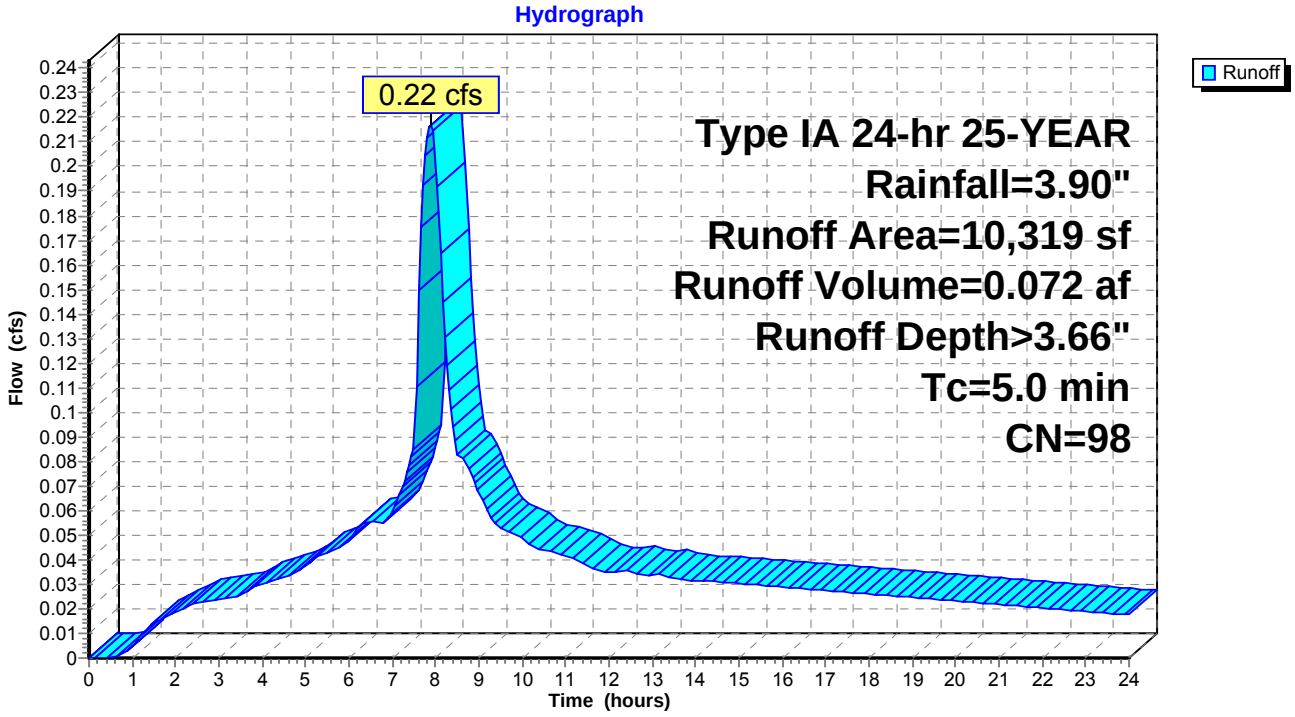
Runoff = 0.22 cfs @ 7.90 hrs, Volume= 0.072 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	8,600	98	Roofs
*	1,719	98	Canopies
	10,319	98	Weighted Average
	10,319		100.00% Impervious Area

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

Subcatchment P3: Activity Building Roof



Summary for Subcatchment P4: Pool Terrace

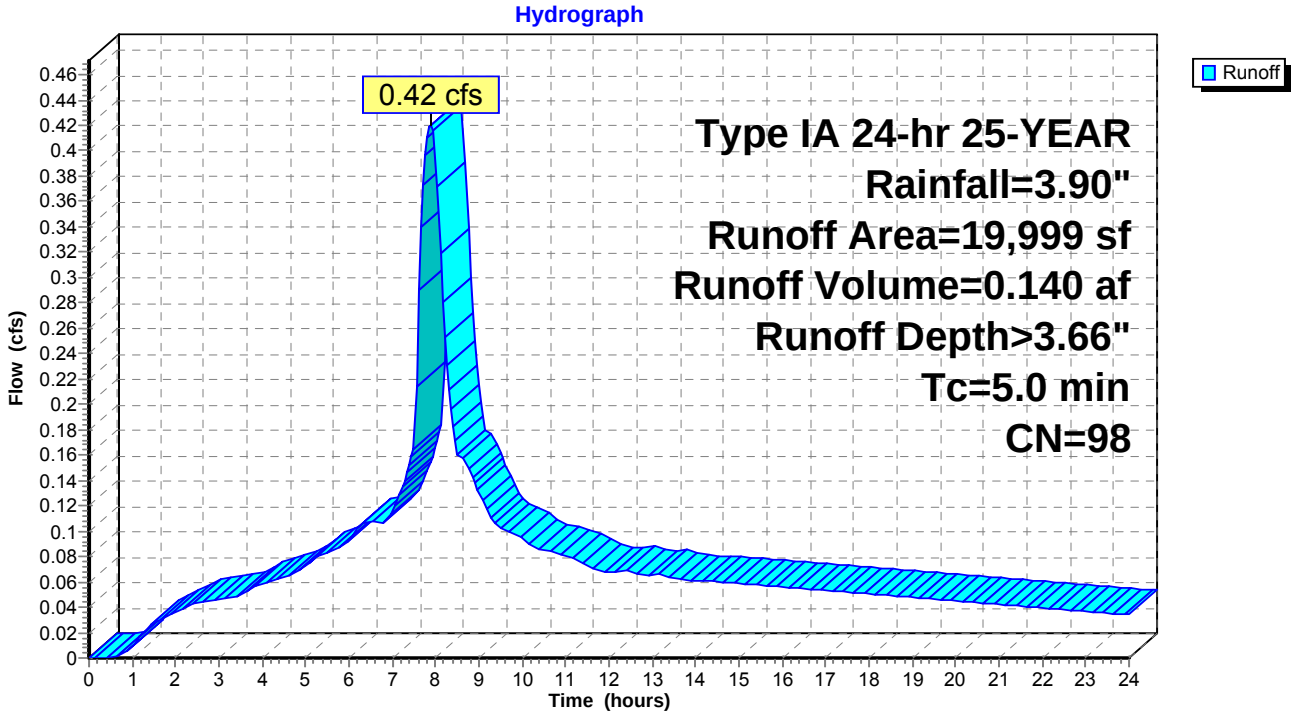
Runoff = 0.42 cfs @ 7.90 hrs, Volume= 0.140 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	19,999	98	Terrace
	19,999		100.00% Impervious Area

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

Subcatchment P4: Pool Terrace



Summary for Subcatchment P5: Outdoor Courts

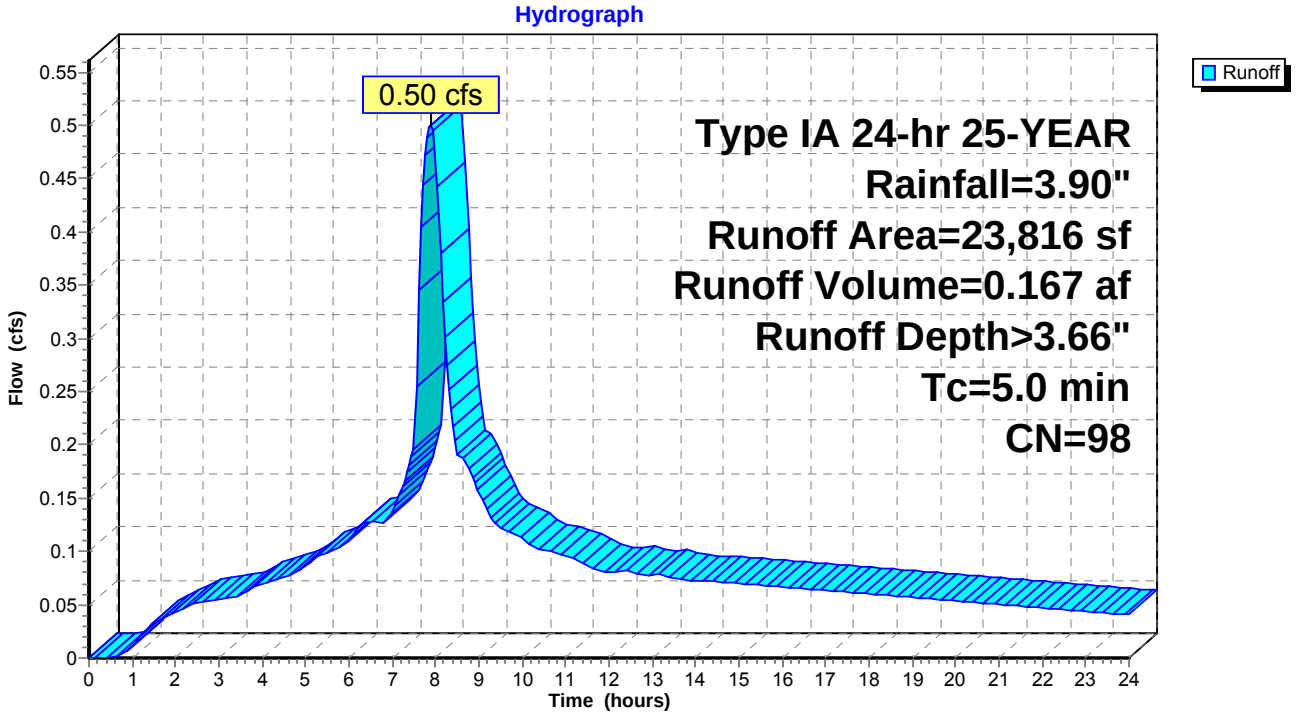
Runoff = 0.50 cfs @ 7.90 hrs, Volume= 0.167 af, Depth> 3.66"

Runoff by SBUH method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YEAR Rainfall=3.90"

	Area (sf)	CN	Description
*	23,816	98	Tennis Courts
	23,816		100.00% Impervious Area

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

Subcatchment P5: Outdoor Courts



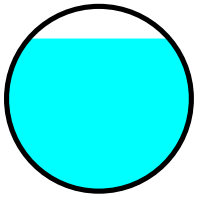
Summary for Reach 1R: 12"

Inflow Area = 4.489 ac, 92.98% Impervious, Inflow Depth > 3.57" for 25-YEAR event
Inflow = 3.94 cfs @ 8.12 hrs, Volume= 1.336 af
Outflow = 3.93 cfs @ 8.12 hrs, Volume= 1.336 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.68 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.56 fps, Avg. Travel Time= 0.3 min

Peak Storage= 47 cf @ 8.12 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.91 cfs

12.0" Round Pipe
n= 0.013
Length= 68.0' Slope= 0.0121 '/'
Inlet Invert= 109.22', Outlet Invert= 108.40'



Summary for Reach 2R: Swale

Inflow Area = 4.452 ac, 92.93% Impervious, Inflow Depth > 3.60" for 25-YEAR event
Inflow = 4.00 cfs @ 7.93 hrs, Volume= 1.335 af
Outflow = 3.91 cfs @ 8.12 hrs, Volume= 1.325 af, Atten= 2%, Lag= 11.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.40 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 0.22 fps, Avg. Travel Time= 12.3 min

Peak Storage= 1,601 cf @ 8.01 hrs
Average Depth at Peak Storage= 1.34'
Bank-Full Depth= 2.50', Capacity at Bank-Full= 13.59 cfs

Custom cross-section, Length= 164.3' Slope= 0.0049 '/'
Constant n= 0.240
Inlet Invert= 110.58', Outlet Invert= 109.78'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	102.50	0.00
0.01	101.50	1.00
2.00	100.50	2.00
4.00	100.00	2.50
7.00	100.00	2.50
9.00	100.50	2.00
10.99	101.50	1.00
11.00	102.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	3.0	0	0.00
0.50	2.5	7.1	411	0.54
1.50	11.5	11.6	1,888	4.94
2.50	22.5	13.6	3,693	13.59

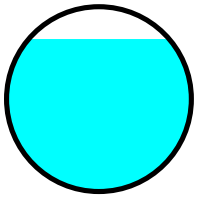
Summary for Reach 3R: 12"

Inflow Area = 4.308 ac, 94.46% Impervious, Inflow Depth > 3.61" for 25-YEAR event
Inflow = 3.89 cfs @ 7.93 hrs, Volume= 1.296 af
Outflow = 3.88 cfs @ 7.93 hrs, Volume= 1.296 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 5.61 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.51 fps, Avg. Travel Time= 0.1 min

Peak Storage= 13 cf @ 7.93 hrs
Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Round Pipe
n= 0.013
Length= 18.7' Slope= 0.0118 '/'
Inlet Invert= 110.85', Outlet Invert= 110.63'



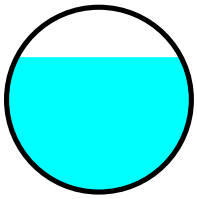
Summary for Reach 4R: 12"

Inflow Area = 3.114 ac, 94.25% Impervious, Inflow Depth > 3.61" for 25-YEAR event
Inflow = 2.81 cfs @ 7.92 hrs, Volume= 0.937 af
Outflow = 2.81 cfs @ 7.93 hrs, Volume= 0.937 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 4.58 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.79 fps, Avg. Travel Time= 0.3 min

Peak Storage= 27 cf @ 7.92 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.18 cfs

12.0" Round Pipe
n= 0.013
Length= 43.8' Slope= 0.0080 '/'
Inlet Invert= 111.20', Outlet Invert= 110.85'



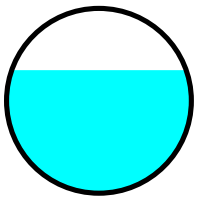
Summary for Reach 5R: 12"

Inflow Area = 2.412 ac, 92.58% Impervious, Inflow Depth > 3.60" for 25-YEAR event
Inflow = 2.17 cfs @ 7.91 hrs, Volume= 0.723 af
Outflow = 2.17 cfs @ 7.93 hrs, Volume= 0.723 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 3.91 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.35 fps, Avg. Travel Time= 0.8 min

Peak Storage= 64 cf @ 7.92 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.78 cfs

12.0" Round Pipe
n= 0.013
Length= 115.1' Slope= 0.0061 '/'
Inlet Invert= 112.00', Outlet Invert= 111.30'



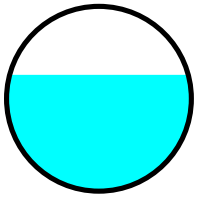
Summary for Reach 6R: 10"

Inflow Area = 1.746 ac, 99.71% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 1.59 cfs @ 7.91 hrs, Volume= 0.532 af
Outflow = 1.59 cfs @ 7.91 hrs, Volume= 0.532 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 4.41 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.64 fps, Avg. Travel Time= 0.2 min

Peak Storage= 11 cf @ 7.91 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 0.83', Capacity at Bank-Full= 2.21 cfs

10.0" Round Pipe
n= 0.013
Length= 29.5' Slope= 0.0102 '/'
Inlet Invert= 112.40', Outlet Invert= 112.10'



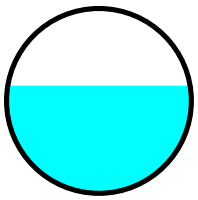
Summary for Reach 7R: 10"

Inflow Area = 1.539 ac, 99.82% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 1.41 cfs @ 7.90 hrs, Volume= 0.469 af
Outflow = 1.40 cfs @ 7.91 hrs, Volume= 0.469 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 4.26 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.53 fps, Avg. Travel Time= 0.4 min

Peak Storage= 20 cf @ 7.91 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 0.83', Capacity at Bank-Full= 2.19 cfs

10.0" Round Pipe
n= 0.013
Length= 62.0' Slope= 0.0100 '/'
Inlet Invert= 113.02', Outlet Invert= 112.40'



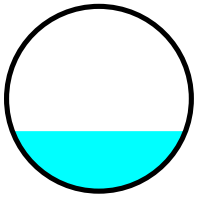
Summary for Reach 8R: 10"

Inflow Area = 1.330 ac, 99.97% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 1.22 cfs @ 7.90 hrs, Volume= 0.405 af
Outflow = 1.21 cfs @ 7.91 hrs, Volume= 0.405 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 7.96 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.56 fps, Avg. Travel Time= 0.2 min

Peak Storage= 9 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 0.83', Capacity at Bank-Full= 5.37 cfs

10.0" Round Pipe
n= 0.013
Length= 62.0' Slope= 0.0600 '/'
Inlet Invert= 116.74', Outlet Invert= 113.02'



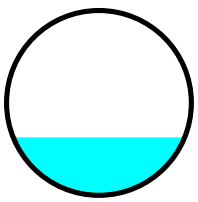
Summary for Reach 9R: 10"

Inflow Area = 1.243 ac,100.00% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 1.14 cfs @ 7.90 hrs, Volume= 0.379 af
Outflow = 1.14 cfs @ 7.90 hrs, Volume= 0.379 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 7.81 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 4.47 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.83', Capacity at Bank-Full= 5.37 cfs

10.0" Round Pipe
n= 0.013
Length= 22.5' Slope= 0.0600 '/'
Inlet Invert= 118.09', Outlet Invert= 116.74'



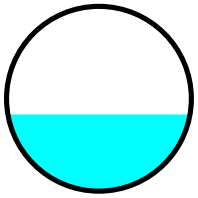
Summary for Reach 10R: 10"

Inflow Area = 1.243 ac,100.00% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 1.14 cfs @ 7.90 hrs, Volume= 0.379 af
Outflow = 1.14 cfs @ 7.90 hrs, Volume= 0.379 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 5.35 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.09 fps, Avg. Travel Time= 0.2 min

Peak Storage= 10 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 0.83', Capacity at Bank-Full= 3.18 cfs

10.0" Round Pipe
n= 0.013
Length= 46.0' Slope= 0.0211 '/'
Inlet Invert= 119.16', Outlet Invert= 118.19'



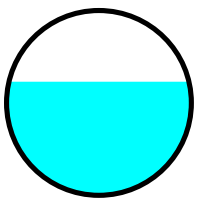
Summary for Reach 11R: 10"

Inflow Area = 1.194 ac, 94.98% Impervious, Inflow Depth > 3.61" for 25-YEAR event
Inflow = 1.08 cfs @ 7.91 hrs, Volume= 0.360 af
Outflow = 1.08 cfs @ 7.95 hrs, Volume= 0.359 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 3.08 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.83 fps, Avg. Travel Time= 1.8 min

Peak Storage= 69 cf @ 7.93 hrs
Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 0.83', Capacity at Bank-Full= 1.55 cfs

10.0" Round Pipe
n= 0.013
Length= 197.0' Slope= 0.0050 '/'
Inlet Invert= 111.84', Outlet Invert= 110.85'



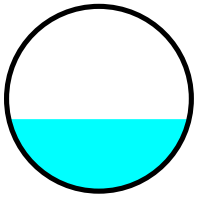
Summary for Reach 12R: 8"

Inflow Area = 0.306 ac, 80.65% Impervious, Inflow Depth > 3.49" for 25-YEAR event
Inflow = 0.27 cfs @ 7.91 hrs, Volume= 0.089 af
Outflow = 0.27 cfs @ 7.96 hrs, Volume= 0.089 af, Atten= 0%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 2.16 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.23 fps, Avg. Travel Time= 3.3 min

Peak Storage= 31 cf @ 7.93 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.67', Capacity at Bank-Full= 0.85 cfs

8.0" Round Pipe
n= 0.013
Length= 245.0' Slope= 0.0049 '/'
Inlet Invert= 113.15', Outlet Invert= 111.94'



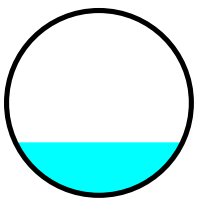
Summary for Reach 14R: 4"

Inflow Area = 0.037 ac, 98.75% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 0.03 cfs @ 7.90 hrs, Volume= 0.011 af
Outflow = 0.03 cfs @ 7.92 hrs, Volume= 0.011 af, Atten= 0%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.65 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 1.6 min

Peak Storage= 2 cf @ 7.91 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.33', Capacity at Bank-Full= 0.19 cfs

4.0" Round Pipe
n= 0.013
Length= 90.0' Slope= 0.0100 '/'
Inlet Invert= 110.33', Outlet Invert= 109.43'



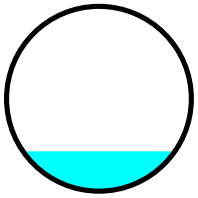
Summary for Reach 15R: 6"

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 0.07 cfs @ 7.90 hrs, Volume= 0.025 af
Outflow = 0.07 cfs @ 7.91 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 2.38 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 0.9 min

Peak Storage= 2 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 0.73 cfs

6.0" Round Pipe
n= 0.013
Length= 70.8' Slope= 0.0168 '/'
Inlet Invert= 114.13', Outlet Invert= 112.94'



Vegetated Swale

tcm

CRITERIA:

Clean Water Services' Design & Construction Standards - Appendix B - Water Quality & Quantity Design

a. Storm event: Precipitation of 0.36 inches falling in 4 hours with an average return period of 96 hours.
b. Minimum hydraulic residence time in swale: 9 minutes
c. Maximum design depth: 0.5 feet
d. Manning "n" value: 0.24
e. Maximum velocity: 2.0-fps based on 25-year flow
f. Minimum length: 100 feet
g. Minimum slope: 0.5 percent
h. Minimum bottom width: 2.0 feet - Minimum side slopes in treatment area: 4H:1V
i. Impervious area for each single family lot: 2,640 square feet.

PROPOSED IMPERVIOUS AREA -(FOR WATER QUALITY VOLUME CALCULATION)

New Buildings	67,336	sq. ft.	
Parking Lots and Service Road	55,998	sq. ft.	
Outside Courts, Pool Area and Walkways	45,316	sq. ft.	
Total proposed impervious area	**168,650**	**sq. ft.**	**3.87 acres**

WATER QUALITY VOLUME - (WQV)

WQV = (0.36 inches) x (total impervious area) = **5,060 cubic feet**

WATER QUALITY FLOW - (WQF)

WQF = (volume)/(14,400 seconds *(4 hrs)*) = 0.35 cfs

SWALE SIZING

Slope (ft/ft)	Bottom Width (ft)	Mannings "n"	Side Slopes h:v	Flow Depth (ft)
0.005	**3.00**	**0.24**	**4.00**	**0.40**

SWALE HYDRAULICS

Q_d (cfs)	Velocity (fps)	Flow Area (sq. ft.)	Wp (ft)	R (ft)
0.35	0.19	1.84	6.30	0.29

MINIMUM SWALE LENGTH

Length of swale for 9 minute residence time = **104 l.f.**

USE

Swale dimensions:

Bottom Width (feet)	Design Length (feet)	Slope (ft/ft)
3.00	**116.3**	**0.005**

VEGATED SWALE - 25-YEAR STORM ANALYSIS

Q_{25} = 3.89 cfs - (From SBUH 25-year storm hydrograph)

Velocity (fps)	Q (cfs)	Flow Depth (ft.)	Flow Area (sq. ft.)	Wp (ft)	R (ft)	Froude No. F
0.37	3.89	1.29	10.55	13.65	0.77	0.07

Velocity < 2.0 fps -- OK

WATER QUALITY MANHOLE

CRITERIA:

1. Manhole shall conform to CWS Dwg. No. 515 or equivalent.
2. Minimum manhole diameter: 60-inch
3. Maximum size of incoming pipe: 18-inch
4. Sump depth: No deeper than 5 feet from invert out to bottom of sump
5. Volume of sump: 20 cubic feet / 1.0-cfs of flow into the water quality manhole, up to the 25-year flow. Flow calculations shall include the effect of an upstream flow splitter.
6. Maintain a 3-foot clear access zone between the inside structure wall and the interioir outlet structure.
7. Orient access to structure in a clear zone.
8. Minimum sump depth: 3.00 feet.

Q_{25} = 3.89 cfs - (From SBUH 25-year storm hydrograph)

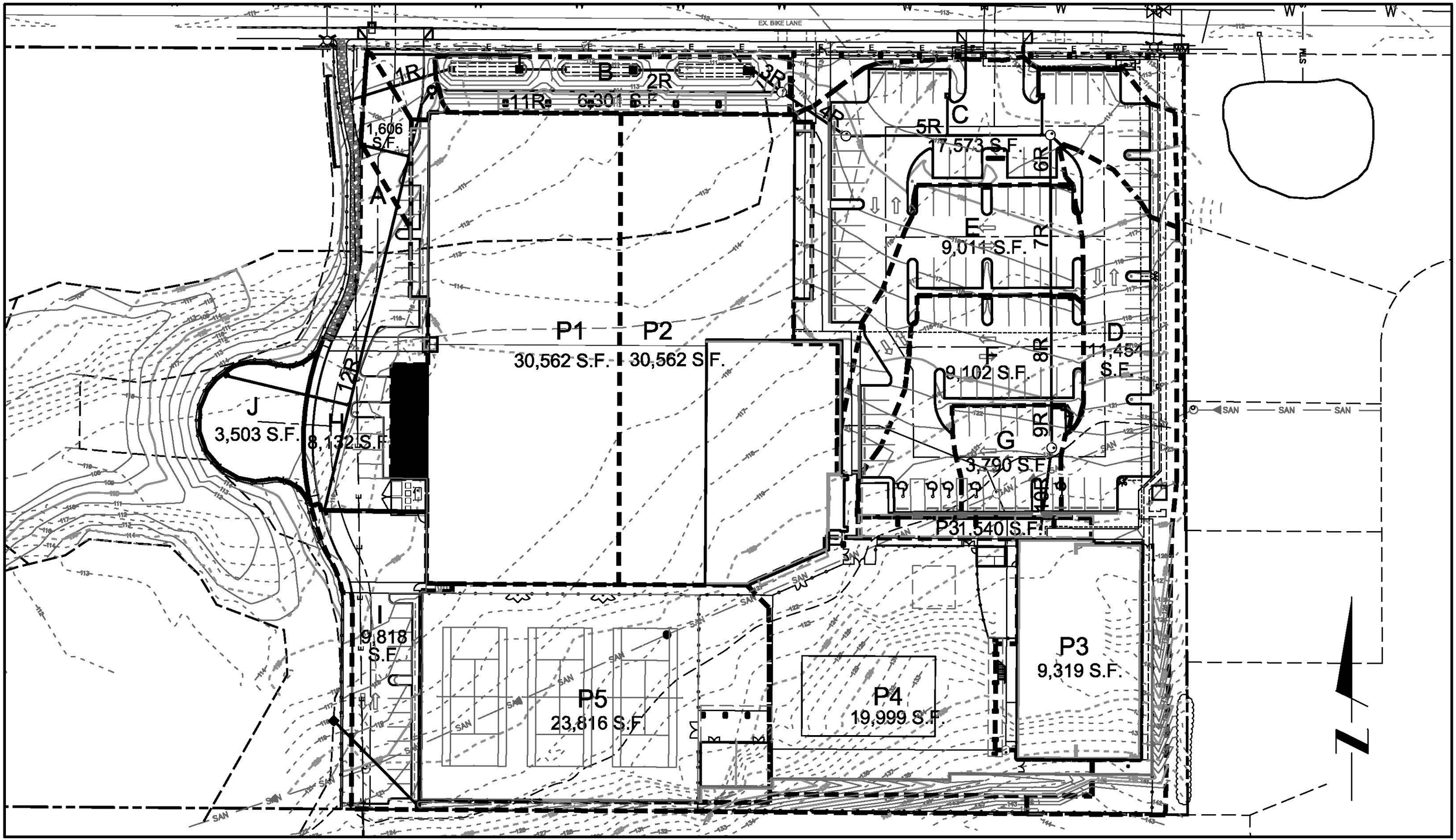
Required Sump Volume ($feet^3$) = 20 x Q_{25} = 77.80 C.F.

Proposed Manhole Diameter (inches)…… 60

Minium calculated sump depth (feet) …… 3.96

Proposed sump depth …… 4.00

Total proposed depth …… 4 feet =4.00 OK



STAFFORD HILLS RACQUET AND FITNESS CLUB
SUBCATCHMENT MAP

DATE: NOVEMBER 16, 2010 SCALE: 1"=50'

0 50 100

SCALE: 1"=50'

TABLE 11-2
Size of Horizontal Rainwater Piping

Size of Pipe in Inches **1/8"Slope**	Maximum Rainfall In Inches per Hour 2	3	4	5	6
3	1644	1096	822	657	548
4	3760	2506	1880	1504	1253
5	6680	4453	3340	2672	2227
6	10,700	7133	5350	4280	3566
8	23,000	15,330	11,500	9200	7600
10	41,400	27,600	20,700	16,580	13,800
12	66,600	44,400	33,300	26,650	22,200

Size of Pipe in Inches **1/4"Slope**	Maximum Rainfall In Inches per Hour 2	3	4	5	6
3	2320	1546	1160	928	773
4	5300	3533	2650	2120	1766
5	9440	6293	4720	3776	3146
6	15,100	10,066	7550	6040	5033
8	32,600	21,733	16,300	13,040	10,866
10	58,400	38,950	29,200	23,350	19,450
12	94,000	62,600	47,000	37,600	31,350

Size of Pipe in Inche **1/2"Slope**	Maximum Rainfall In Inches per Hour 2	3	4	5	6
3	3288	2295	1644	1310	1096
4	7520	5010	3760	3010	2500
5	13,360	8900	6680	5320	4450
6	21,400	13,700	10,700	8580	7140
8	46,000	30,650	23,000	18,400	15,320
10	82,800	55,200	41,400	33,150	27,600
12	133,200	88,800	66,600	53,200	44,400
15	238,000	158,800	119,000	95,300	79,250

REPORT

STAFFORD HILLS CLUB
WETLAND MITIGATION PLAN

DATE: May 27, 2016

PREPARED FOR: Clean Water Services
Environmental Plan Review

PREPARED BY: AKS Engineering & Forestry, LLC
Stacey Reed, PWS, Senior Wetland Scientist

CWS FILE NUMBER: 08-002757

AKS ENGINEERING & FORESTRY
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

Contents

Tables

Attachments

WETLAND MITIGATION ENHANCEMENT PLAN OVERVIEW

The Stafford Hills Club parking lot addition will result in a total of 0.61 acres of permanent vegetated corridor impact. The project includes 0.08 acres of on-site vegetated corridor replacement mitigation, leaving approximately 0.53 acres of vegetated corridor impact requiring mitigation. Since there is no traditional vegetated corridor mitigation opportunity available on the site, and the applicant (Stafford Hills Club) was unable to secure traditional off-site vegetated corridor mitigation, the applicant is proposing on-site wetland functional lift to offset the loss of the remaining 0.53 acres of vegetated corridor impact. The wetland enhancement mitigation area is located in the existing undeveloped western half of the site (locations shown on attached Figure 1). A minimum of 1.06 acres of wetland enhancement (located in Enhancement Areas #1, #2, #3 and #9), consisting of non-native and invasive vegetation removal and replanting with native woody vegetation, is proposed. In addition, wildlife (amphibian and bird) habitat enhancement and environmental public outreach are proposed to provide an overwhelming ecological gain and public benefit.

The proposed enhancement mitigation and public benefit mitigation will consist of a combination of the following efforts:

1. Remove non-native invasive species (reed canarygrass and Himalayan blackberry)
2. Substantially remove non-native English hawthorn
3. Plant four areas (total of 1.06 acres) with a diverse palette of native woody vegetation and/or native low growing grasses and forbs
4. Install wood duck nesting boxes
5. Create turtle nesting and basking sites
6. Install educational wetland signage
7. Allow The Wetlands Conservancy (TWC) to conduct educational classes on the site
8. Provide Clean Water Services (CWS) with an easement to access the undeveloped western portion of the site for future wetland enhancement efforts

These combined on-site direct enhancement efforts and indirect public outreach efforts will provide the local watershed and the public with overwhelming ecological and community benefits and offset the loss of vegetated corridor.

AKS Engineering & Forestry, LLC (AKS) Senior Wetland Biologist Stacey Reed walked the site with Megan Garvey of The Wetlands Conservancy (TWC) in December 2015 to discuss potential wetland enhancement opportunities. Megan identified the need for Northern red-legged frog (*Rana aurora*) and western pond turtle (*Actinemys marmorata*) (both State Priority Conservation Species) habitat in the Nyberg Creek area. There are documented occurrences of both species immediately downstream and upstream of the project site and TWC is already working with the CWS watershed enhancement group on habitat enhancement efforts for these species. The proposed wetland mitigation plan was developed as a joint effort between AKS and TWC to optimize benefits to the local watershed with these species in mind. AKS and the applicant met with TWC many times to identify which mitigation enhancement opportunities would best serve the local watershed.

An Oregon Department of State Lands (DSL) approved wetland restoration mitigation site already exists on the site (location shown on attached Figure 1). The DSL wetland mitigation site is currently successful and in its fifth and final year of mitigation monitoring. The mitigation enhancement proposed under this plan would complement the existing high-functioning qualities of the DSL mitigation area.

The proposed mitigation will be successful and sustainable, thereby maintaining and improving the overall on-site habitat. The sections below describe how the proposed mitigation will provide overwhelming net ecological and public benefits, which will offset the loss of vegetated corridor functions on the site.

The enhancement activities prescribed in this report may require a removal-fill permit from DSL and/or the Portland District Army Corps of Engineers (Corps). The applicant will secure all necessary State and/or federal permits prior to conducting the enhancement efforts (specifically the turtle nesting and basking areas, which require placement of substrate and large woody debris in wetland).

Ecological Goals, Objectives, and Concepts

The overall goal of the mitigation plan is to provide on-site function and value gain to offset the functional loss of the vegetated corridor. The mitigation plan objectives and associated strategic concepts regarding how each objective is to be accomplished are listed in Table 1 below:

Table 1. Mitigation Functional Objectives and Strategies

Functional Objective	Strategy
Increase waterbird nesting habitat	Install 5 wood duck nesting boxes
Increase songbird habitat	Create diverse native scrub-shrub communities
Increase thermoregulation	– Replace non-native invasive emergent community with native woody community to reduce water temperature – Provide an easement to CWS to install native woody plants adjacent to on-site portions of Nyberg Creek
Improve amphibian and reptile habitat	– Create native turtle nesting and basking sites – Improve Northern red-legged frog habitat by densely planting native scrub-shrub communities
Increase native plant communities and species diversity	Remove non-native and invasive plant communities and replant with diverse native woody and herbaceous plants
Increase pollinator habitat	– Install native woody flowering plants – Minimize herbicide treatment
Increase public use and recognition values	– Install educational signs – Allow TWC to conduct educational classes on the site

Existing Site Conditions of Enhancement Areas

Below is a summary of the existing conditions of the proposed mitigation areas. The locations of the numbered enhancement areas are shown on attached Figure 1.

Enhancement Area #1 (Non-native hawthorn community; 0.45 acres in size): This area is dominated by a non-native emergent vegetation community consisting mostly of meadow foxtail (*Alopecurus pratensis*). The shrub community is dominated by non-native English hawthorn, with scattered clustered rose (*Rosa piscoarpa*).

Enhancement Area #2 (Reed canarygrass community; 0.19 acres in size): This area is mostly dominated by non-native invasive reed canarygrass (*Phalaris arundinacea*) and lacks native woody vegetation. A drainage channel, which conveys flow from piped hillside seeps, flows through the reed canarygrass area into scrub-shrub wetland to the south of the enhancement area.

Enhancement Area #3 (Turtle nesting site; 0.04 acres in size): This area consists of a slightly elevated berm located between the DSL wetland mitigation site and Enhancement Area 2. The berm is covered in Himalayan blackberry and appears to have been inadvertently created during construction of the DSL-approved wetland construction. This area was determined to be suitable nesting turtle habitat due to its higher elevation, gentle slope, and location immediately adjacent to wetland that receives seasonal inundation. The berm is south facing, providing the necessary solar exposure for incubating turtle eggs.

Enhancement Area #4 (Turtle basking sites): The turtle basking sites were selected due to their proximity to the existing pond. According to the Guidance for Conserving Oregon's Native Turtles, Including Best Management Practices (Oregon Conservation Strategy, 2015), Oregon native turtles prefer smaller waterbodies with a range of water depths and temperatures. The existing pond offers a muddy substrate with partially submerged vegetation. The edges of the pond provide good sun exposure, which is necessary for proper turtle digestion and to maintain shell health. Due to the overall lack of mature woody vegetation in the site's wetlands, the site lacks suitable basking structures.

Enhancement Area #5 (Wood duck boxes): The DSL mitigation site and existing pond provide slow moving and shallow waters, which are good wood duck rearing habitat. The site currently lacks woody debris (logs, stumps, dead standing trees, etc.), which ducks use for nesting.

Enhancement Areas #6 and #7 (Educational signage and public outreach): The site is used by the members of the fitness club and is located across the street from City of Tualatin Browns Ferry Park. The park is utilized by the neighborhood, as well as by youth during summer camp programs occurring at Browns Ferry Park (i.e. Willowbrook). Therefore, the site has a lot of public exposure, providing a great opportunity to educate the public on wetland enhancement and restoration efforts. The signs will include information and facts regarding native wetland plants and animals and the importance of protecting and restoring these features in the watershed. In addition to the signage, the applicant will allow TWC to conduct educational programs on the site.

Enhancement Area #8 (Easement for westernmost portion of site): Nyberg Creek flows easterly through the center of the western portion of the site. On site, Nyberg Creek is ditched, with incised channel banks. The riparian community adjacent to the on-site portions of the creek is dominated by reed canarygrass and lacks native woody structure. CWS and TWC have indicated a desire to conduct a shade enhancement project on this portion of the site. As part of the proposed mitigation, the applicant will grant CWS an easement to conduct future enhancement work on this portion of the site.

Enhancement Area #9 (Woody enhancement; 0.38 acres in size): This area is dominated by non-native grasses, primarily meadow foxtail (*Alopecurus pratensis*) and lacks native woody vegetation. Small patches of native slough sedge (*Carex obnupta*) and soft rush (*Juncus effuses*) are present within the meadow foxtail community. Small isolated patches of invasive reed canarygrass is also present in the northern portion of this enhancement area. This area experiences prolonged ponding during the winter and early spring months. A stormwater outfall is present just outside of the enhancement area, which contributes to the wetland's hydrology source.

FUNCTIONS AND VALUES ASSESSMENT

Vegetated Corridor Function Assessment

Approximately 0.65 acres of remaining vegetated corridor (i.e. wetland buffer) will be present following project construction. The existing condition of the 0.61 acres of vegetated corridor impact area was determined to be in *degraded* and *marginal* condition by CWS standards (the impact area was dominated by non-native and invasive plant species, lacked diversity, and lacked tree canopy). Below is a table summarizing important wetland buffer functions and an assessment of the existing functional and anticipated post-construction functional opportunities. The functional opportunities were rated by best professional judgment as providing high, moderate, or low functional capacity. The assessment for potential buffer function was only conducted on the vegetated corridor area in the vicinity of the parking area. The table was derived from protocol developed by Cooke Scientific, Washington State Department of Ecology (Cooke Scientific, 2002), and DSL's Buffer Mitigation Credit Table from Chapter 8 of DSL's Guide to the Removal-Fill Permit Process (DSL, 2013).

Table 2. Assessment of Existing and Post-Construction Vegetated Corridor (Buffer) Functions

Buffer adjacent to parking			
	Existing	Predicted	Change
Slows stormwater runoff and enhances infiltration	Moderate	Low	Loss in function
Filters suspended solids, nutrients, or harmful toxins	Moderate	Low	Loss in function
Protects soil and/or wetland plant resources	Moderate	Low	Loss in function
Reduces flood water levels and erosion; reduces bank erosion	Moderate	Low	Loss in function
Protects natural areas; separates human activities; enhances visual interest	Moderate	Low	Loss in function
Provides habitat for wetland-associated species for use in feeding, roosting, breeding, and rearing of young, and cover for safety and mobility	Low-Moderate	Low	Loss in function
Thermoregulation protection	Low	Low	No Loss

Currently, there is a 50-foot wide vegetated corridor adjacent to wetland in the vicinity of the existing parking area, which generally provides moderate functional capacity. However, the quality of the condition of the vegetated corridor can be described as *degraded* as it lacks a diverse native canopy and is dominated by non-native vegetation species.

The proposed Site Plan would reduce buffer widths in some areas, reducing the vegetated corridor width to 5 feet in spots adjacent to site development. The loss in vegetated corridor will result in significant loss of buffer function. However, the remaining portions of the vegetated corridor will be densely planted with native trees and shrubs and monitored for 5 years to ensure 80% plant survival and lack of cover by non-native invasive plants. On-site wetland enhancement is proposed to offset the loss of the vegetated corridor functions on the site. On-site wetland enhancement will generally occur continuous with remaining vegetated corridor, providing a continuous wide native woody communiy.

Wetland Functions and Values Assessment

The majority of the wetland is supported hydrologically by a seasonally high ground water table; therefore, the wetland belongs to the Slope/Flats Hydrogeomorphic (HGM) classification. Existing and post-construction wetland enhancement conditions were assessed using the Oregon Rapid Wetland

Assessment Protocol (ORWAP) version 2.0.2 (May 2012). Since the enhancement will occur in only a portion of the wetland area, the assessment area (AA) evaluated was defined by the mitigation enhancement area, not the entire off-site wetland complex. The post-construction functions assessment scores do not include the future enhancement work that will occur in the western portion of the site through the granting of the easement. This work will be conducted by CWS or others and, therefore, specific efforts are unknown and cannot be quantified at this time.

Table 3 below provides a summary of the existing and predicted post-mitigation scores and whether there will be a net increase. As shown in the table below, the post-construction mitigation functions will provide a significant net benefit over the existing wetland site functions and values. The ORWAP data sheets are included in Attachment A.

Table 3. Existing and Post-Treatment Wetland Functions

Wetland Services		Wetland Enhancement Area		
		Existing	Predicted	Net Change
Water Storage and Delay	**Function score**	3.74	3.74	0
	Value score	7.57	7.57	0
Sediment Retention and Stabilization	**Function score**	6.07	6.07	0
	Value score	3.98	3.98	0
Phosphorus Retention	**Function score**	4.76	4.76	0
	Value score	5.33	5.33	0
Nitrate Removal and Retention	**Function score**	5.54	5.54	0
	Value score	4.24	4.24	0
Thermoregulation	**Function score**	3.20	3.89	**+0.69**
	Value score	5.00	5.00	0
Carbon Sequestration	**Function score**	2.94	2.85	**+0.09**
	Value score	N/A	N/A	N/A
Organic Matter Export	**Function score**	6.30	6.50	**+0.02**
	Value score	N/A	N/A	N/A
Aquatic Invertebrate Habitat	**Function score**	4.49	4.61	**+0.12**
	Value score	6.65	6.65	0
Non-Anadromous Fish Habitat	**Function score**	1.80	3.67	**+1.87**
	Value score	2.20	2.64	**+0.44**
Amphibian and Reptile Habitat	**Function score**	2.05	1.95	-0.10
	Value score	7.33	7.33	0
Waterbird Feeding Habitat	**Function score**	4.40	5.29	**+0.89**
	Value score	4.00	4.00	0
Waterbird Nesting Habitat	**Function score**	0.00	0.00	0
	Value score	3.00	3.00	0
	Function score	3.88	4.09	**+0.21**

Wetland Services		Wetland Enhancement Area		
		Existing	Predicted	Net Change
Songbird, Raptor, and Mammal Habitat	**Value score**	4.00	4.00	0
Pollinator Habitat	**Function score**	2.41	3.49	**+1.08**
	Value score	5.00	5.00	0
Native Plant Diversity	**Function score**	2.10	3.34	**+1.24**
	Value score	6.00	6.00	0

The mitigation is not expected to have a significant effect on the duration and depth of seasonal inundation; therefore, as expected, the hydrologic support function scores did not change. The removal of non-native hawthorn and invasive reed canarygrass and replanting with a diverse palette of woody vegetation will contribute to the significant increases in the scores to the native plant diversity, songbird habitat, reptile habitat, thermoregulation, and pollinator habitat functions and values. The installation of native woody plants will also cool the water and provide food and forage to non-anadromous fish.

The waterbird nesting habitat function score did not increase with ORWAP. However, the installation of wood duck boxes will provide nesting habitat for these waterbirds, improving this function on the site.

The amphibian and reptile habitat function score slightly decreased from the existing conditions score. This is due to the increase in woody plants that will be installed as part of the mitigation. However, the installation of turtle basking sites and nesting habitat will provide an increase in the amphibian and reptile habitat functions on the site; therefore, the ORWAP score is not reflective of the mitigation efforts and the increase in the site's functional opportunity to provide amphibian and reptile habitat.

The ORWAP scores also do not accurately reflect the public use and recognition values. The site will include visitations by TWC for educational purposes, providing an increase to the recreation and educational function and value scores.

Summary of Site Functional Gain

Based on the assessments above, there will be a loss of vegetated corridor functions on the site (generally reduced from moderate to low value functional opportunity). However, as described in Table 3 above, the proposed wetland mitigation will result in a significant wetland functional lift, thus offsetting the loss of buffer functions and providing an increased overall ecological benefit to the site.

The Site Plan will result in a total of 0.61 acres of vegetated corridor impact; however, post construction, the site will have 0.98 acres of enhanced vegetated corridor (0.65 acres of undisturbed remaining vegetated corridor, plus 0.25 acres of enhanced floodplain cut/fill area, plus 0.08 acres of replacement mitigation area) and 1.06 acres of wetland enhancement (consisting of removing non-native and invasive plant species and replanting with native woody vegetation, Enhancement Areas #1, #2, #3,and #9). This will result in a total of 2.04 acres of on-site enhanced area, which does not include the addition of the turtle basking sites or wood duck boxes, which also provide meaningful functional uplift to the local watershed.

ENHANCEMENT SPECIFICATIONS

Recommended efforts to achieve desired conditions are described below. These are only recommendations and may be revised slightly, as necessary, based on the contractor selected. However, all non-native enhancement removal must be completed in compliance with CWS' Integrated Vegetation and Animal Maintenance Guidance (March 2003) and CWS Design and Construction Standards, Appendix E.

Enhancement Area #1 (Non-native hawthorn area)

The removal of all non-native hawthorn from this area is required before enhancement plantings can be installed. We recommend a minimum of three site preparation treatments (chemical and mechanical) prior to planting. Non-native hawthorn will be treated using the cut/spray method with an aquatic-safe herbicide (i.e. Element 3a). After the initial cut/spray treatment and observed die-back, the hawthorn will be cut to ground-level using chainsaws. Cut stumps and debris left as a result of site preparation efforts will be removed from the area and disposed of off site. Other non-native invasive weeds observed in the area will also be treated during these site preparation maintenance efforts, including Himalayan blackberry, non-native thistles, and reed canarygrass. After site preparation is complete and the hawthorn has been removed, the area will be densely planted with native scrub-shrub plantings, as described on the attached Planting Specifications Table for Enhancement Area #1 (Attachment B).

Timing:

- Late spring – cut/spray
- Early summer – cut/spray
- Late summer – cut/spray
- Early fall – remove stumps, sow native seed
- Late winter – install woody enhancement plantings

Enhancement Area #2 (Reed canarygrass area)

The first step in the mitigation plan for this area will include removing the reed canarygrass. In order to control the reed canarygrass and prepare the site for planting, we recommend treating the area a minimum of three times. Reed canarygrass will be backpack sprayed using aquatic-safe glyphosate (i.e. RoundUp Custom) during the growing season. The area will be mowed at least twice prior to seeding and planting, in between herbicide applications. After a minimum of three site preparation treatments, the area will be densely planted with native trees and shrubs, as prescribed on the attached Planting Specifications Table for Enhancement Area #2 (Attachment B). We recommend planting woody plants in rows to allow for mowing during the first couple years of establishment.

Timing:

- Late spring – spray
- Early summer – mow and spray
- Late summer – mow and spray
- Early fall- sow native seed
- Late winter – install woody enhancement plantings

Enhancement Area #3 (Turtle nesting site)
The goal of the turtle nesting site is to provide an area with abundant sun exposure and little or no shrub or overhead tree canopy. The nesting site requires sparse, low-growing, patchy grasses and forbs. The proposed location for the turtle nesting site is shown on attached Figure 1. The area is currently dominated by Himalayan blackberry. The first step of this mitigation enhancement will require removal of the Himalayan blackberry. Himalayan blackberry will be removed in accordance with CWS guidelines. The blackberry removal will be a two-step process involving an herbicide application in the summer followed by the mechanical removal of remaining plant material in the late summer. Removing the blackberry will create bare ground in some areas, and other areas of the berm that have existing vegetation will be disturbed through scarification (scraping with light equipment or hand tools) to create areas of bare ground. The area will then be covered with a shallow layer (imported clean, weed-free materials) of mixed substrates suitable for nesting areas. The volume of imported substrates will roughly consist of 25% fine clay, 25% loam, 25%-50% sand, and 25% small aggregate. A silt fence will be installed around the perimeter of Enhancement Area #3 to ensure that no sediment enters the adjacent wetland area. Construction access will come from the adjacent upland vegetated corridor. The area will be seeded with low growing herbaceous plant species. Herbaceous cover will not exceed more than 40% of the enhancement area.

Timing:

- Early summer – spray blackberry
- Late summer – mechanically remove blackberry, scarification, placement of substrate
- Early fall – seed lightly with combination of two-color lupine (*Lupinus bicolor*), fragrant popcorn flower (*Plagiobothrys figuratus*), toadrush (*Juncus bufonius*), slender tarweed (*Madia gracilis*), Northwest cinquefoil (*Potentilla gracilis*), and/or Western buttercup (*Ranunculus occidentallis*)

Enhancement Area #4 (Turtle basking sites)
A total of four basking sites will be installed along the southern perimeter of the existing pond, and one additional basking site will float on the pond. Basking sites will be placed in locations that receive full to partial sun exposure. The approximate locations of the basking sites are shown on attached Figure 1. We recommend the use of natural wood for basking sites. Basking structures will be placed approximately 20 feet from one another. The natural wood installed in the pond will be approximately 8 to 20 inches in diameter and a minimum of 6 feet in length. A variety of natural wood sizes are recommended. The placement of the wood will be at different angles and water depths. The floating log will be anchored to maintain its position in the pond. Although not preferred, artificial basking structures can be used. However, the basking structures must follow the design specifications presented in Attachment C of the Guidance for Conserving Oregon's Turtles (design guidance for artificial basking structures included in Attachment C of this report).

Timing:

- Install LWD during summer months

Enhancement Area #5 (Wood duck boxes)
A total of five nest boxes will be installed. Nest boxes can be installed on land or in water. The wood duck boxes will be installed on non-treated poles, with the entrance hole about 6 feet from the ground.

Poles will be placed a minimum of 50 feet from one another. A 4-inch layer of cedar (or wood) shavings will be placed inside each box for nest bedding.

Timing:

- Install during fall

Enhancement Area #6 (Educational signs)
The applicant will create and install two signs along the perimeter of the site to educate the public on the wetland enhancement efforts. The content of the signs will be coordinated with a qualified biologist and/or TWC. The signs will be located on site along SW Nyberg Lane and just north of the new parking area, adjacent to the Stafford facility.

Enhancement Area #7 (Public outreach education program)
The applicant agrees to participate in a minimum of two public outreach educational programs per year for a minimum of two years with The Wetlands Conservancy (TWC). In the past, TWC has conducted high school wetland restoration educational programs within the wetlands on the subject site. The past programs have been focused on presenting students with career options and giving students real-life experience with natural area restoration. TWC plans to provide three major programs at the Stafford Hills Club site, including a youth day camp that will offer a 3- to 5-day program conducted within the club and adjacent natural area where young people will participate in educational and recreational activities. The applicant also will organize its members to participate in an educational service project that will focus on removing invasive species from the wetland areas. The applicant will further allow TWC access to the site's natural area to conduct educational programs for students (similar to the TWC high school student wetland restoration program of 2015), as well as conduct research on local wetland species.

Enhancement Area #8 (Temporary easement dedication to CWS)
The applicant agrees to grant CWS an easement over the site to conduct future wetland enhancement work. The recommended draft easement is included as Attachment D.

Timing:

- The easement will be in place prior to CWS engineering approval

Enhancement Area #9
All non-native invasive vegetation species present within this area will be removed by hand prior to installing enhancement plantings. The area will be densely planted with native scrub-shrub plantings, as described on the attached Planting Specifications Table for Enhancement Area #9 (Attachment B).

Timing:

- Late winter – install woody enhancement plantings

WETLAND MITIGATION PERFORMANCE STANDARDS

Performance standards for the wetland enhancement areas are listed in the table below. The performance standards for vegetation are based on DSL routine performance standards; however, due to the relatively small size of the wetland mitigation site, a lower plant diversity standard is

recommended. Monitoring plots will be established in Enhancement Areas #1, #2, and #9 during the first year of monitoring.

Table 4. Mitigation Performance Standards

Enhancement Area	Performance Standards
Enhancement Area #1	– The cover of native vegetation species is at least 60% – The cover of non-native invasive species is no more than 20% – Bare substrate represents no more than 10% cover – By Year 3 and thereafter, there will be at least 4 different native woody species, each species totaling 10% of the area
Enhancement Area #2	– The cover of native vegetation species is at least 60% – The cover of non-native invasive species is no more than 20% – Bare substrate represents no more than 10% cover – By Year 3 and thereafter, there will be at least 4 different native woody species; each species totaling 10% of the area
Enhancement Area #7 Public Outreach	Applicant will receive written confirmation from TWC confirming public outreach programs have occurred.
Enhancement Area #9	– The cover of native vegetation species is at least 60% – The cover of non-native invasive species is no more than 20% – Bare substrate represents no more than 10% cover – By Year 3 and thereafter, there will be at least 4 different native woody species, each species totaling 10% of the area

MITIGATION MONITORING SCHEDULE

The mitigation areas will be monitored for a minimum of 5 years after installation of the project. Permanent plots will be established in Enhancement Areas #1, #2, and #9 during the first year of monitoring. An annual monitoring report will be submitted to CWS by December 15th of each year, documenting the success of that year's mitigation. The first annual report will be completed following one full growing season after all of the plantings have occurred.

If the mitigation performance standards are not being met during the monitoring and maintenance period, contingency measures will be implemented to correct the deficiencies. Any mitigation project deficiencies will be assessed during annual monitoring in order to determine the appropriate response(s) to the problem. Contingency tasks may include, but are not limited to, installation of supplemental plantings and/or seed, mowing, and control of invasive plant species using selective herbicide applications. It is possible that some replanting will be necessary during the first few years, and revisions to the species to be replanted may be required based on hydrology of the mitigation

areas, seed availability, or other factors. Revisions to the planting specifications will be approved by a wetland biologist. Recommendations for achieving mitigation success will be included in the annual wetland monitoring reports, and these recommendations will be implemented as needed throughout the monitoring period to ensure that the success criteria are met at the end of the monitoring period.

MAINTENANCE PLAN

The following maintenance activities are recommended for the duration of the 5-year monitoring period:

Enhancement Areas #1, #2, and #9 (Hawthorn, reed canarygrass, and woody enhancement areas): These mitigation areas will be inspected a minimum of three times during the growing season and one time prior to onset of the growing season, annually. Invasive species control will be conducted as needed based on the site inspections. Mechanical and chemical treatments will likely be necessary to ensure that non-native invasive plant cover does not exceed 20% of the area.

Enhancement Area #3 (Turtle nesting): Maintenance activities will not occur during nesting periods, which is generally from April 1 through May 15. Regular maintenance outside of the nesting periods will occur to keep the area free of non-native and invasive plant species and prevent herbaceous cover from consuming more than 40% of the enhancement area. Periodic raking, spraying, hand-pulling, or mowing will be used to maintain the area with approximately 60% bare ground. The use of irrigation will not be allowed within the turtle nesting enhancement area.

Enhancement Area #4 (Turtle basking): Annual inspection will be necessary to ensure the basking sites are in the proper locations and that damage has not occurred.

Enhancement Area #5 (Wood duck boxes): Boxes will be cleaned out annually, during late winter. Cedar or wood shaving bedding will be replaced after each cleaning.

LONG-TERM PROTECTION AND SECURITY INSTRUMENT

Long-term maintenance of the enhancement areas will be provided by the applicant. The applicant will provide financial assurance in the form of a performance bond or a letter of credit issued by a local Oregon bank. An estimate from Green Banks LLC to complete the mitigation and conduct 5 years of maintenance and monitoring is included in Attachment E.

PUBLIC BENEFIT MITIGATION

The project will require 0.61 acres of permanent encroachment to *degraded* vegetated corridor. In addition to the substantial functional gain that will occur through this prescribed wetland mitigation enhancement plan, the following list outlines public benefit mitigation that will occur through the project:

- The applicant will plant the 0.25-acre vegetated corridor in the southern portion of the site with native woody vegetation at *good* condition planting densities. This area is considered permanent impact and has been accounted for in the mitigation requirements. The enhancement of 0.25 acres of vegetated corridor to *good* condition serves as additional water quality public benefit (i.e. public benefit).
- Public educational opportunity will be provided through the installation of the two educational signs (Enhancement Area 6).

- Pubic educational opportunity will be provided to the community through allowing TWC to conduct wildlife and wetland studies with local students on the site (Enhancement Area 7).
- The additional parking will alleviate overflow parking into the adjacent neighborhood, thus providing public benefit to the neighborhood.
- CWS will be provided with a 20-year easement to conduct wetland enhancement activities adjacent to Nyberg Creek. TWC and the CWS watershed enhancement group have expressed interest in providing shade to Nyberg Creek on the project site and adjacent properties to the west. The applicant is willing to allow CWS and TWC to enter the property and provide enhancement and maintenance activities for an extended period over approximately 8 acres of the site.

REFERENCES

Adamus, P., J. Morlan, and K. Verble. 2010. *Manual for the Oregon Rapid Wetland Assessment Protocol (ORWAP). Version 2.0.2*. Salem (OR): Oregon Dept. of State Lands.

Fielder, Paul C. 2000. *Guidelines for Managing Wood Duck Nest Boxes in Washington State*. Olympia (WA): Washington Department of Fish and Wildlife. Available at: http://wdfw.wa.gov/publications/00406/wdfw00406.pdf. [Accessed March 2016].

Oregon Department of Fish and Wildlife. 2015. *Guidance for Conserving Oregon's Native Turtles including Best Management Practices*. Salem (OR): Oregon Department of Fish and Wildlife. Available at: http://www.sccp.ca/sites/default/files/species-habitat/documents/ODFW_Turtle_BMPs_March_2015_0.pdf. [Accessed March 2016].

Oregon Department of State Lands. 2013. *A Guide to the Removal-Fill Permit Process*. Salem (OR). May 2013.

Cooke Scientific Services. 2002. *Wetland and Buffer Functions Semi-Quantitative Assessment Methodology (SAM)*. February 2002.

TUALATIN · VANCOUVER · SALEM
12965 SW HERMAN RD., SUITE 100 · TUALATIN, OR 97062
AKS ENGINEERING & FORESTRY
WWW.AKS-ENG.COM
P: (503) 563-6151 F: (503) 563-6152

Tier 2 Alternatives Analysis Criteria

To: Amber Wierck

From: Stacey Reed, Senior Wetland Scientist

Date: 5/30/2016

Re: Stafford Hills Club, LLC – Additional Parking Area - CWS File No. 08-002757

TIER 2 ALTERNATIVES ANALYSIS CRITERIA

3.07.4.b.1 Description of why the encroachment is needed including rejected alternatives that would result in less encroachment.

Project Purpose and Need

The purpose of the project is to create additional parking to meet the current membership demand. The facility is experiencing an acute shortage of available parking, especially during peak hours (mornings, after work hours, Saturdays, and during poplar fitness classes). Facility patrons are parking in the adjacent neighborhood that is in violation of the Conditional Use Permit issued by the City in connection with this use. The City of Tualatin and adjacent neighbors have expressively complained to law enforcement about the parking problem and the overflow onto neighborhood streets. One of the express conditions of local land use approval was that visitors to the club not use the neighborhood streets for parking. The City of Tualatin Chief of Police has been to the club on multiple occasions to ask the facility to direct their members to not park on the streets, and has indicated that future violations could result in a revocation of the Conditional Use Permit requiring the club to close. Another City official has made similar threats. Many of the members have been cited by police for parking infractions. However, there is also a shortage of parking at Browns Ferry Park, immediately across the street from the Stafford Hills Club. Park patrons are utilizing the Stafford Hills Club for parking, further contributing to the shortage of parking for the facility. City staff have urged the applicant find a solution to the parking issues as soon as possible.

The site currently has 139 parking spaces, which is approximately 1.5 spaces per 1,000 square feet of building space. Capacity at the facility fluctuates seasonally (higher rates of utilization during the summer months for those who want to use the saltwater pool) and with the time of day (peak times include weekdays before and after work hours, weekdays between 8:30 AM and noon, Saturday mornings, immediately after school drop off, etc). Currently, the facility does not have the parking to service existing membership and programs during these peak times, which is causing spillover onto the neighborhood streets. In addition, the current programs have limits due to the unavailability of parking. For example, tennis memberships are substantially full and the fitness and aquatics membership cannot maintain sustainable levels because parking cannot handle peak demands.

During the initial planning stages, a small handful of vociferous opponents organized opposition to the club, demanded increased protections for the neighbors to the east and appealed the land use decision to the City Council. Initially, the Stafford Hills Club requested at least 190 parking spaces. However, the final City approved site plan only allowed for 2/3 of that number. The City required site design to substantially increase the landscaped buffer widths along the eastern boundary of the site to offset the potential impact on the adjacent neighbors. The increased buffer widths resulted in the loss of approximately 60 parking spaces. The applicant originally felt they needed those additional 60 parking spaces to handle the peak time demand for parking; however, the City was not flexible on the size of the landscape buffer strips. The applicant reduced building dimensions and other facets of the facility to maximize parking on the site, but still was not able to account for the substantial loss of parking from the required buffer strips. Since the Stafford Hills Club was a new business concept (wellness, fitness, tennis, and aquatics) and a new independent startup club, no one was precisely certain what the peak parking loads would be. There is no other club exactly like the Stafford Hills Club in the Portland suburbs. No one could forecast with any certainty what the membership mix would be, the age demographics for membership, and other factors that would impact parking needs. Therefore, the applicant reluctantly settled on what they felt would be sufficient parking area for the startup phase. The City was aware of the potential for the applicant to come back in two to three years to request additional parking area necessary to support the use at stabilization. City staff have acknowledged this history and have expressed their support of this proposal to mitigate the parking issues during a scoping meeting held at the City on August 18, 2015.

Rejected Alternatives

The applicant has tried various alternative solutions to providing additional on-site parking, including:

- Rearranging group fitness classes to spread the parking impact out as much as possible.
- Spread out programming to non-peak hours as much as possible.
- Spent thousands of dollars renting parking spaces at a previously vacant pre-school located immediately northwest of the site. This property has now sold and the new pre-school owners have stated they need all of the parking for their operation.
- Spent thousands of dollars using a contract car valet service to double park cars during peak times. The need has outgrown that service and there is no place to further double park cars.
- Thoroughly examined the site for other areas in which parking could be added within the existing developed area. Elevated parking structures would not be allowed by the City due to the impact on the adjacent neighborhood. This was confirmed at the August 18, 2015 scoping meeting. An elevated parking structure over the existing parking area in the east would block solar exposure and create unacceptable light glare from the parking lot to the neighbors to the east of the site.
- Examined ways to reconfigure existing parking to achieve more spaces. The current parking area in the eastern portion of the site is already at maximum design capacity within City code.
- Commissioned staff to monitor the parking lot and try to keep public patrons of Browns Ferry Park and Willowbrook from using the Stafford parking lot, including posting signage.
- Requested that the City allow the applicants users to utilize any available spaces in the Brown's Ferry Park lot across the street. That request was denied by the City.

As described in more detail in Section 3.07.4.c.5 below, there are no on-site alternatives that would avoid encroachment to vegetated corridor or would result in less encroachment to the vegetated corridor while meeting the project goal of obtaining an absolute minimum of 58 additional parking spaces. Another main goal of the project is to avoid wetland impact. The applicant respects and has

admiration for the natural resources on the site. The applicant has incorporated educational wetland and wildlife topics into summer programs for junior club members. The applicant views the natural resources on the site as a true amenity that complements the club's fitness and wellness vision, as well as its LEED Silver Certification and commitment to sustainable maintenance practices. Observers have note a marked increase in waterfowl visiting the site since the wetlands restoration was accomplished preconstruction of the club.

3.07.4.c.1 The proposed encroachment area is mitigated in accordance with Section 3.08.

The project requires mitigation for a total of 0.61 acres of permanent vegetated corridor impact. To mitigate for the impacts, the applicant is proposing 0.08 acres of on-site replacement vegetated corridor mitigation (at 1:1 replacement ratio), plus 1.06 acres of on-site wetland enhancement continuous and adjacent to remaining vegetated corridor (at 2:1 enhancement ratio). The 0.08 acres of replacement mitigation method is in accordance with Section 3.08, but the wetland enhancement method is not. However, there are no alternatives for the applicant to offset the remaining vegetated corridor impacts in accordance with Section 3.08. The remainder of the site is consumed by wetland, waters, existing vegetated corridor, and development. There were no available off-site vegetated corridor mitigation opportunities at the time of this application. Since the site design avoids wetland impacts, payment to provide mitigation was not applicable. The proposed wetland enhancement mitigation provides much needed functional lift to the existing low functioning wetland, which is dominated by non-native invasive vegetation species (reed canarygrass) and lacks native woody structure.

According to the General Provisions listed under Section 3.01.1 of District code, the requirements set forth in Chapter 3 of the District's Design and Construction standards were intended to "protect the beneficial uses of waters within the Tualatin River Basin and within the District" and to "prevent or reduce the adverse impacts to the drainage system and waters resources of the Tualatin River Basin". The wetland mitigation enhancement proposed to offset the vegetated corridor impacts will protect and enhance the functions and values associated with on-site water quality resources, as well as water quality within the Tualatin River itself, as documented in the April 2016 *Stafford Hills Wetland Mitigation Plan* prepared by AKS. Therefore, while the proposed on-site wetland enhancement does not specifically meet the mitigation options listed under Section 3.08, it does meet the intentions of Chapter 3.

3.07.4.c.2 The replacement mitigation protects the functions and values of the Vegetated Corridor and Sensitive Area.

The proposed replacement vegetated corridor mitigation is continuous with the existing 50-foot vegetated corridor adjacent to wetland in the southern portion of the site. The replacement mitigation in this location would provide additional protection to the nearby wetlands.

The 1.06 acres of on-site wetland mitigation enhancement is generally located adjacent and continuous with the remaining vegetated corridor on the site. As mentioned, the existing condition of the wetland enhancement areas are dominated by non-native invasive reed canarygrass, non-native hawthorn, and lack native woody vegetation. The installation of native trees and shrubs will provide structural diversity to the wetland, improving functions and values on the site.

3.07.4.c.3 Enhancement of the replacement area, if not already in Good Corridor Condition, and either the remaining Vegetated Corridor on the site or the first 50 feet of width closest to the resource, whichever is less, to a Good Corridor Condition.

The site will have approximately 0.65 acres of remaining on-site vegetated corridor. The remaining vegetated corridor and the 0.08 acres of replacement mitigation area will be enhanced to "good" condition, per CWS standards. The attached Stafford Hills Club Planting Specification Table lists the recommended plant species and quantities (Attachment E).

3.07.4.c.5 Location of the development and site planning minimizes incursion into the Vegetated Corridor.

The proposed layout provides the least amount of vegetated corridor impact possible while achieving a sufficient number of additional parking spaces. Attached Figure 8 Alternative Site Plan illustrates a preferred layout that would result in additional vegetated corridor encroachment, as well as wetland impact. However, the alternative design provides 18 additional parking spaces over the current proposed layout and provides safer two-way circulation.

The following illustrates how the proposed design minimizes vegetated corridor encroachment:

- The design of the parking area is dictated by the required turning radius for emergency vehicles (fire department) and garbage trucks. The drive isles proposed for emergency vehicles are below standard. The applicant worked with Tualatin Valley Fire and Rescue (TVFR) to narrow the drive isles. TVFR prefers a full T-turnaround, which would have resulted in wetland impact.
- The proposed layout provides nearly the number of City allowed compact spaces (30% of entire parking on the site are compact spaces).
- The proposed layout provides triangular islands instead of standard curb islands to reduce the overall impervious footprint (City requires islands every 8 parking spaces).
- Lock and load retaining walls are incorporated into the design to minimize the extent of grading into vegetated corridor.
- The existing pedestrian path has been removed from the site plan to maximize the parking area.
- The site plan creates dead end parking spaces to avoid wetland impact. This provides access deficiencies and creates less than optimal parking efficiencies, which is not ideal but is necessary to avoid wetland impact. Current design has stalls that back into the elevated retaining wall.

Therefore, the applicant has proposed a layout that provides the minimum amount of vegetated corridor encroachment possible, while meeting City, TVFR, and waste management requirements, as well as the project goal. The applicant cannot reduce the impact any further. No additional parking spaces can be lost; otherwise, the applicant feels the parking inadequacy will not be resolved.

3.07.4.c.6 No practicable alternative to the location of the development exists that will not disturb the Sensitive Area or Vegetated Corridor.

The western portion of the site is the only practical location to create additional parking. There are no options that avoid impact to the vegetated corridor. Buildings, pool, tennis courts, and existing parking occupy the eastern portion of the site. An elevated parking structure cannot be built anywhere in the eastern portion of the site due to height requirements on the existing facility buildings and tennis court building. An elevated structure over the existing parking area would block solar exposure and create light glare on the neighborhood to the east, resulting in neighborhood objections, prolonged appeals

and the likelihood of disapproval by an appellate body as inconsistent with the City of Tualatin's Comprehensive Plan. An elevated structure of any height would therefore not be approved by the City. The City clearly stated objection to an elevated structure in the eastern portion of the site during the August 18, 2015 scoping meeting. Its clear preference is for the additional parking to be accommodated on the western side of the existing facility, away from the neighborhood.

The applicant researched ways to reconfigure the existing parking area in the eastern portion of the site. The parking in this area is already at maximum design capacity. No additional spaces can be gained.

The applicant tried to negotiate a joint parking solution with Browns Ferry Park, which is located across from the facility. The City of Tualatin Parks and Recreation are not ready to expand their existing parking lot. There are no other off-site parking options.

Existing wetland, a wetland mitigation site, and Nyberg Creek occupy the undeveloped western portion of the site. The wetlands on the site have a direct surface water connection to the Tualatin River and provide significant functional opportunity to the local watershed. Therefore, encroachment into the wetland area was determined to not be a practical option.

The only remaining option is encroachment into a portion of the vegetated corridor. The applicant's site design incorporates lock and load retaining walls to minimize vegetated corridor encroachment and avoid wetland impact. The applicant has minimized the parking isle turning radiuses as much as possible, while still meeting Tualatin Valley Fire and Rescue (TVFR) and waste management requirements. The less than ideal turning radius allows for some vegetated corridor to be present between the parking area and the wetland. As shown on attached Figure 5B, approximately 0.28 acres of vegetated corridor will remain adjacent to the new parking area (total remaining on-site vegetated corridor is 0.65 acres).

3.07.4.c.7 The proposed encroachment provides public benefits.

The project will require 0.61 acres of permanent encroachment to *degraded* vegetated corridor. In addition to the substantial functional gain that will occur through this prescribed wetland mitigation enhancement plan, the following list outlines public benefit mitigation that will occur through the project:

- The applicant will plant the 0.25-acre vegetated corridor in the southern portion of the site with native woody vegetation at *good* condition planting densities. This area is considered permanent impact and has been accounted for in the mitigation requirements. The enhancement of 0.25 acres of vegetated corridor to *good* condition serves as additional water quality public benefit (i.e. public benefit).
- Public educational opportunity will be provided through the installation of the two educational signs (Enhancement Area 6).
- Pubic educational opportunity will be provided to the community through allowing TWC to conduct wildlife and wetland studies with local students on the site (Enhancement Area 7).
- The additional parking will alleviate overflow parking into the adjacent neighborhood, thus providing public benefit to the neighborhood.
- CWS will be provided with a 20-year easement to conduct wetland enhancement activities adjacent to Nyberg Creek. TWC and the CWS watershed enhancement group have expressed interest in providing shade to Nyberg Creek on the project site and adjacent properties to the west. The

applicant is willing to allow CWS and TWC to enter the property and provide enhancement and maintenance activities for an extended period over approximately 8 acres of the site.

Tier 2 Functional Assessment

Vegetated Corridor Function Assessment

Approximately 0.61 acres of remaining vegetated corridor (i.e. wetland buffer) will be present following project construction. The existing condition of the 0.61 acres of vegetated corridor impact area was determined to be in *degraded* condition by CWS standards (the impact area was dominated by non-native and invasive plant species, lacked diversity, and lacked tree canopy). Below is a table summarizing important wetland buffer functions and an assessment of the existing functional and anticipated post-construction functional opportunities. The functional opportunities were rated by best professional judgment as providing high, moderate, or low functional capacity. The assessment for potential buffer function was only conducted on the vegetated corridor area in the vicinity of the parking area. The table was derived from protocol developed by Cooke Scientific, Washington State Department of Ecology (Cooke Scientific, 2002), and DSL's Buffer Mitigation Credit Table from Chapter 8 of DSL's Guide to the Removal-Fill Permit Process (DSL, 2013).

Table 1. Assessment of Existing and Post-Construction Vegetated Corridor (Buffer) Functions

Buffer adjacent to parking			
Existing		Predicted	Change
Slows stormwater runoff and enhances infiltration	Moderate	Low	Loss in function
Filters suspended solids, nutrients, or harmful toxins	Moderate	Low	Loss in function
Protects soil and/or wetland plant resources	Moderate	Low	Loss in function
Reduces flood water levels and erosion; reduces bank erosion	Moderate	Low	Loss in function
Protects natural areas; separates human activities; enhances visual interest	Moderate	Low	Loss in function
Provides habitat for wetland-associated species for use in feeding, roosting, breeding, and rearing of young, and cover for safety and mobility	Low-Moderate	Low	Loss in function
Thermoregulation protection	Low	Low	No Loss

Currently, there is a 50-foot wide vegetated corridor adjacent to wetland in the vicinity of the existing parking area, which generally provides moderate functional capacity. However, the quality of the condition of the vegetated corridor can be described as *degraded* as it lacks a diverse native canopy and is dominated by non-native vegetation species.

The proposed Site Plan would reduce buffer widths in some areas, reducing the vegetated corridor width to 5 feet in spots adjacent to site development. The loss in vegetated corridor will result in significant loss of buffer function. However, the remaining portions of the vegetated corridor will be densely planted with native trees and shrubs and monitored for 5 years to ensure 80% plant survival and lack of cover by non-native invasive plants. On-site wetland enhancement is proposed to offset the loss of the vegetated corridor functions on the site.

Wetland Functions and Values Assessment

The majority of the wetland is supported hydrologically by a seasonally high ground water table; therefore, the wetland belongs to the Slope/Flats Hydrogeomorphic (HGM) classification. Existing and post-construction wetland enhancement conditions were assessed using the Oregon Rapid Wetland Assessment Protocol (ORWAP) version 2.0.2 (May 2012). Since the enhancement will occur in only a portion of the wetland area, the assessment area (AA) evaluated was defined by the mitigation enhancement area, not the entire off-site wetland complex. The post-construction functions assessment scores do not include the future enhancement work that will occur in the western portion of the site through the granting of the easement. This work will be conducted by CWS or others and, therefore, specific efforts are unknown and cannot be quantified at this time.

Table 3 below provides a summary of the existing and predicted post-mitigation scores and whether there will be a net increase. As shown in the table below, the post-construction mitigation functions will provide a significant net benefit over the existing wetland site functions and values. The ORWAP data sheets are included in Attachment A.

Table 2. Existing and Post-Treatment Wetland Functions

Wetland Services		Wetland Enhancement Area		
		Existing	Predicted	Net Change
Water Storage and Delay	Function score	3.74	3.74	0
	Value score	7.57	7.57	0
Sediment Retention and Stabilization	Function score	6.07	6.07	0
	Value score	3.98	3.98	0
Phosphorus Retention	Function score	4.76	4.76	0
	Value score	5.33	5.33	0
	Function score	5.54	5.54	0

Wetland Services		Wetland Enhancement Area		
		Existing	Predicted	Net Change
Nitrate Removal and Retention	Value score	4.24	4.24	0
Thermoregulation	Function score	3.20	3.89	**+0.69**
	Value score	5.00	5.00	0
Carbon Sequestration	Function score	2.94	2.85	**+0.09**
	Value score	N/A	N/A	N/A
Organic Matter Export	Function score	6.30	6.50	**+0.02**
	Value score	N/A	N/A	N/A
Aquatic Invertebrate Habitat	Function score	4.49	4.61	**+0.12**
	Value score	6.65	6.65	0
Non-Anadromous Fish Habitat	Function score	1.80	3.67	**+1.87**
	Value score	2.20	2.64	**+0.44**
Amphibian and Reptile Habitat	Function score	2.05	1.95	-0.10
	Value score	7.33	7.33	0
Waterbird Feeding Habitat	Function score	4.40	5.29	**+0.89**
	Value score	4.00	4.00	0
Waterbird Nesting Habitat	Function score	0.00	0.00	0
	Value score	3.00	3.00	0
Songbird, Raptor, and Mammal Habitat	Function score	3.88	4.09	**+0.21**
	Value score	4.00	4.00	0
Pollinator Habitat	Function score	2.41	3.49	**+1.08**
	Value score	5.00	5.00	0
Native Plant Diversity	Function score	2.10	3.34	**+1.24**
	Value score	6.00	6.00	0

The mitigation is not expected to have a significant effect on the duration and depth of seasonal inundation; therefore, as expected, the hydrologic support function scores did not change. The removal of non-native hawthorn and invasive reed canarygrass and replanting with a diverse palette of woody vegetation will contribute to the significant increases in the scores to the native plant diversity, songbird habitat, reptile habitat, thermoregulation, and pollinator habitat functions and values. The installation of native woody plants will also cool the water and provide food and forage to non-anadromous fish.

The waterbird nesting habitat function score did not increase with ORWAP. However, the installation of wood duck boxes will provide nesting habitat for these waterbirds, improving this function on the site.

The amphibian and reptile habitat function score slightly decreased from the existing conditions score. This is due to the increase in woody plants that will be installed as part of the mitigation. However, the installation of turtle basking sites and nesting habitat will provide an increase in the amphibian and reptile habitat functions on the site; therefore, the ORWAP score is not reflective of the mitigation efforts and the increase in the site's functional opportunity to provide amphibian and reptile habitat.

The ORWAP scores also do not accurately reflect the public use and recognition values. The site will include visitations by TWC for educational purposes, providing an increase to the recreation and educational function and value scores.

Summary of Site Functional Gain

Based on the assessments above, there will be a loss of vegetated corridor functions on the site (generally reduced from moderate to low value functional opportunity). However, as described in Table 3 above, the proposed wetland mitigation will result in a significant wetland functional lift, thus offsetting the loss of buffer functions and providing an increased overall ecological benefit to the site and therefore replace the functions and values lost through vegetated corridor encroachment.

The Site Plan will result in a total of 0.61 acres of vegetated corridor impact; however, post construction, the site will have 0.98 acres of enhanced vegetated corridor (0.65 acres of undisturbed remaining vegetated corridor, plus 0.08 acres of replacement mitigation area), 0.25 acres of additional enhanced public benefit mitigation vegetated corridor, and a total of 1.06 acres of wetland enhancement (consisting of removing non-native and invasive plant species and replanting with native woody vegetation, Enhancement Areas #1, #2, #3, and #9). This will result in a total of 2.04 acres of on-site enhanced area, which does not include the addition of the turtle basking sites or wood duck boxes. The installation of basking sites will create turtle habitat that will be lost through the removal of vegetated corridor (upland buffer habitat). The installation of the wood duck boxes provides waterbird nesting habitat, improving the habitat function on the site, which helps replace the habitat function lost, as described in Table 2 above.

RETURN TO: Clean Water Services
Mail Stop 10
2550 SW Hillsboro Highway
Hillsboro, OR 97123

Project: Stafford Hills Racquet Club
Tax Lot No.: 21E19C 00900
Acres: 9.39

EASEMENT FOR WATER QUALITY PRESERVATION AND STORM AND SURFACE WATER DRAINAGE

GRANTOR'S NAME: Stafford Hills Properties, LLC

ADDRESS: 5916 Nyberg Lane, Tualatin, OR 97062

GRANTOR, owner of the property described herein, has the authority and does hereby grant, convey and warrant unto Clean Water Services, GRANTEE, a non-exclusive perpetual easement in gross to use the real property described in Exhibit A attached hereto and by this reference incorporated herein (Easement Area) for water quality preservation and storm and surface water drainage. This easement includes the right to construct and perpetually maintain storm and surface water drainage and water quality facilities (including vegetation) through, under, and along the Easement Area. This easement includes the right to access the above described easement over and across the land of the GRANTOR for the purpose of maintenance of the easement and facilities therein. This easement shall run with the land and shall be binding upon and shall inure to the benefit of the parties hereto, their heirs, successors and assigns. GRANTEE shall not have any responsibility for pre-existing environmental contamination or for environmental contamination caused by GRANTOR or any third party of the Easement Area.

Any temporary easement granted hereby is automatically extinguished upon acceptance of the completed public facilities in the adjacent permanent easement.

The consideration for this grant is nonmonetary.

Additional terms and conditions set forth below are hereby agreed to and binding upon the parties to this easement:

1. No structure shall be erected on the Easement Area without the written consent of the GRANTEE.

2. One purpose of this easement shall be to preserve water quality by maintaining native vegetation and habitat conditions within the Easement Area. GRANTOR agrees that any vegetation planted by GRANTEE within the Easement Area shall not be removed, destroyed, mowed, altered or sprayed with biocides. GRANTOR may make additional plantings of Oregon native species within the Easement Area and may prune planted vegetation with approval of GRANTEE.

3. GRANTOR agrees that there shall be no filling, excavating or dredging; no removal of topsoil, sand, gravel, rock, minerals or other materials, nor any dumping of ashes, trash, garbage, or of any other material, and no changing of the grade or topography of the Easement Area in any manner unless authorized by GRANTEE.

4. GRANTOR agrees that there shall be no damming, dredging or other activities that may be detrimental to water quality within the Easement Area. The scope of this easement includes GRANTEE'S right to remove any barrier to natural creek flow within the Easement Area that may cause flooding of structures subject to the terms of necessary federal, state and local permits. GRANTOR agrees that any activities within the Easement Area which are, in the opinion of the GRANTEE, inconsistent with preserving the natural condition of the Easement Area are prohibited and may be subject to enforcement action.

5. GRANTEE shall take action to enforce the terms of this easement. Enforcement shall include abatement of any prohibited condition or activity within the Easement Area by all means provided under Clean Water Services' Ordinances and Resolution and Orders, and federal and state laws.

6. GRANTEE and its contractors shall confine construction operations to within the Easement Area or make special arrangements with GRANTOR if additional area or access is required.

7. During the time that work is in progress, GRANTEE and GRANTEE'S contractor shall make every effort to maintain the site in a neat and orderly condition. All refuse, excess fill material, etc., shall be removed as soon as practicable. Should the site not be maintained in satisfactory condition, GRANTEE may cause the work to stop until the cleanup portion of the work has been done to the satisfaction of GRANTOR and GRANTEE.

STAFFORD HILLS PROPERTIES, LLC

By: Stafford Hills Club, LLC
Its: Manager

By: _____
James D. Zupancic, Manager

Date: 6-17-16

ACCEPTED

By: _____
General Manager or Designee
Clean Water Services

APPROVED AS TO FORM

_____
District Counsel

NOTARIZE DOCUMENT BELOW

[Use this notary block if GRANTOR is an entity.]

STATE OF OREGON)
)
County of Clackamas)

This instrument was acknowledged before me on June 17, 2016 (date) by James. D. Zupancic as Manager of Stafford Hills Club, LLC, the Manager of Stafford Hills Properties, LLC.

OFFICIAL SEAL
AMY E JONES
NOTARY PUBLIC - OREGON
COMMISSION NO. 476324
MY COMMISSION EXPIRES MARCH 06, 2017

Amy E Jones
Notary Public

AKS ENGINEERING & FORESTRY, LLC
12965 SW Herman Road, Suite 100, Tualatin, OR 97062
P: (503) 563-6151 F: (503) 563-6152
OFFICES IN: TUALATIN, OR - VANCOUVER, WA - SALEM-KEIZER, OR

AKS Job #4490

EXHIBIT A

A tract of land located in the Southwest One-Quarter of Section 19, Township 2 South, Range 1 East, Willamette Meridian, City of Tualatin, Clackamas County, Oregon and being more particularly described as follows:

Commencing at the northwesterly corner of Lot 154 of the plat "Fox Hill III", also being a point on the southerly right-of-way line of SW Nyberg Lane (30.00 feet from centerline); thence along said right-of-way line North 89°40'22" West 491.74 feet to the Point of Beginning; thence continuing along said right-of-way line North 89°40'22" West 879.08 feet to the northeast corner of Document Number 2014-064714; thence leaving said southerly right-of-way line and along the easterly line of said deed South 05°02'19" East 139.76 feet to the southeasterly corner thereof; thence along the southerly line of said deed North 89°40'22" West 289.91 feet to the easterly right-of-way line of SW Meridian Avenue (variable width from centerline); thence along said right-of-way line South 00°14'37" East 287.04 feet to the southwest corner of Document Number 2010-072065; thence along the southerly line of said deed South 89°36'00" East 1119.65 feet; thence leaving said southerly line North 00°06'13" West 22.30 feet; thence North 56°50'21" West 5.92 feet; thence North 00°00'00" East 16.91 feet; thence North 55°36'17" East 11.55 feet; thence South 90°00'00" East 21.97 feet; thence North 00°00'00" East 39.50 feet; thence North 90°00'00" West 10.99 feet; thence along a curve to the right with a Radius of 56.00 feet, a Delta of 56°08'08", a Length of 54.87 feet and a Chord of North 61°55'56" West 52.70 feet; thence North 00°00'00" East 69.17 feet; thence North 90°00'00" West 15.00 feet; thence North 00°00'00" East 75.72 feet; thence North 55°05'25" East 4.85 feet; thence North 89°51'13" East 13.77 feet; thence along a non-tangent curve to the right with a Radius of 54.40 feet, a Delta of 32°04'20", a Length of 30.45 feet and a Chord of North 52°35'56" East 30.06 feet; thence North 00°00'00" East 20.26 feet; thence South 89°59'38" East 45.63 feet; thence North 00°19'35" East 38.62 feet; thence North 03°36'48" West 89.48 feet to the Point of Beginning.

Excepting therefrom that tract of land as described in Document Number 2011-064047.

The above described tract of land contains 9.39 acres, more or less.

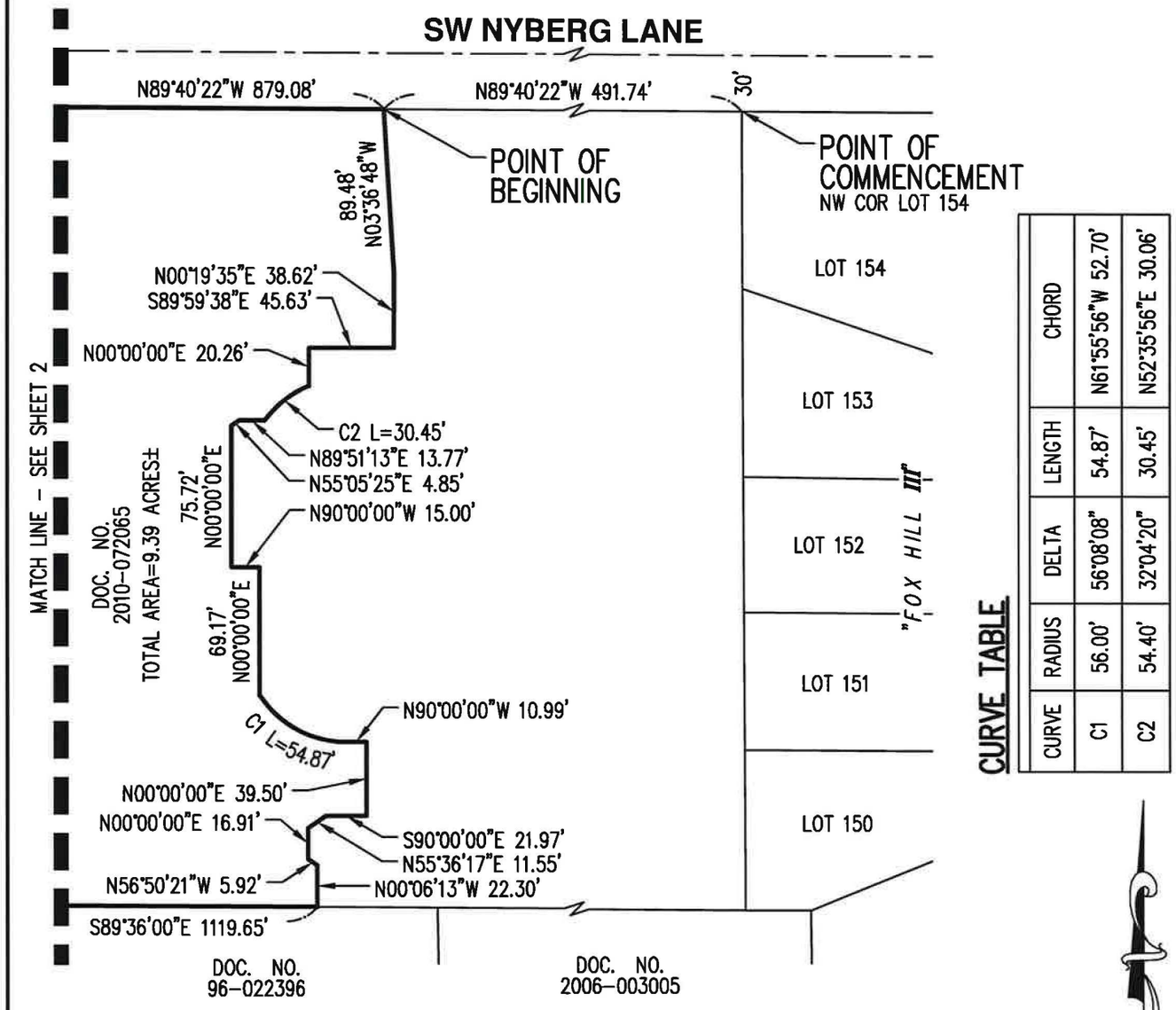
06-17-16

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
JANUARY 11, 2005
ROBERT D. RETTIG
60124LS
RENEWS: 12/31/16

EXHIBIT A

A TRACT OF LAND LOCATED IN THE SOUTHWEST 1/4 OF SECTION 19, TOWNSHIP 2 SOUTH, RANGE 1 EAST, WILLAMETTE MERIDIAN, CITY OF TUALATIN, CLACKAMAS COUNTY, OREGON



CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C1	56.00'	56°08'08"	54.87'	N61°55'56"W 52.70'
C2	54.40'	32°04'20"	30.45'	N52°35'56"E 30.06'

06-17-16

REGISTERED PROFESSIONAL LAND SURVEYOR

OREGON
JANUARY 11, 2005
ROBERT D. RETTIG
60124LS

RENEWS: 12/31/16

PREPARED FOR

ZUPANCIC RATHBONE LAW GROUP, PC
4949 MEADOWS ROAD, SUITE 600
LAKE OSWEGO, OR 97035

SCALE 1" = 80 FEET

80 0 32 48 64 80

STAFFORD HILLS CLUB

EXHIBIT A

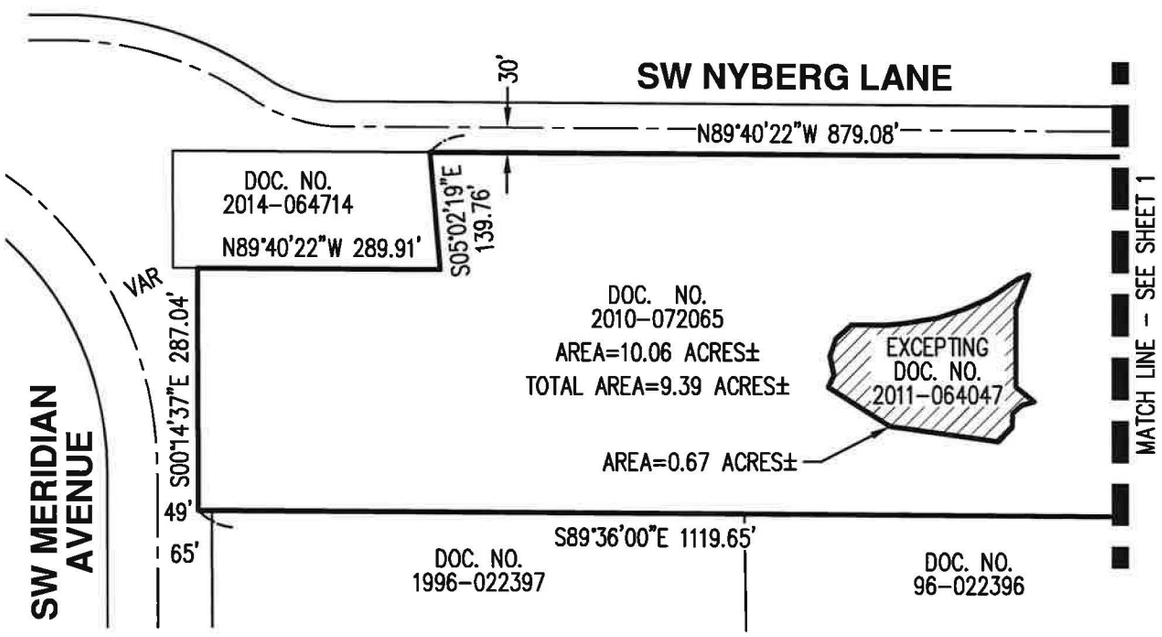
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com

DRWN: WCB
CHKD: RDR
AKS JOB: 4490

DWG: 4490 20160617 EXB | EXB1

EXHIBIT A

A TRACT OF LAND LOCATED IN THE SOUTHWEST 1/4 OF SECTION 19, TOWNSHIP 2 SOUTH, RANGE 1 EAST, WILLAMETTE MERIDIAN, CITY OF TUALATIN, CLACKAMAS COUNTY, OREGON



06-17-16

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
JANUARY 11, 2005
ROBERT D. RETTIG
60124LS

RENEWS: 12/31/16

PREPARED FOR

ZUPANCIC RATHBONE LAW GROUP, PC
4949 MEADOWS ROAD, SUITE 600
LAKE OSWEGO, OR 97035

SCALE 1" = 200 FEET

200 0 80 120 160 200

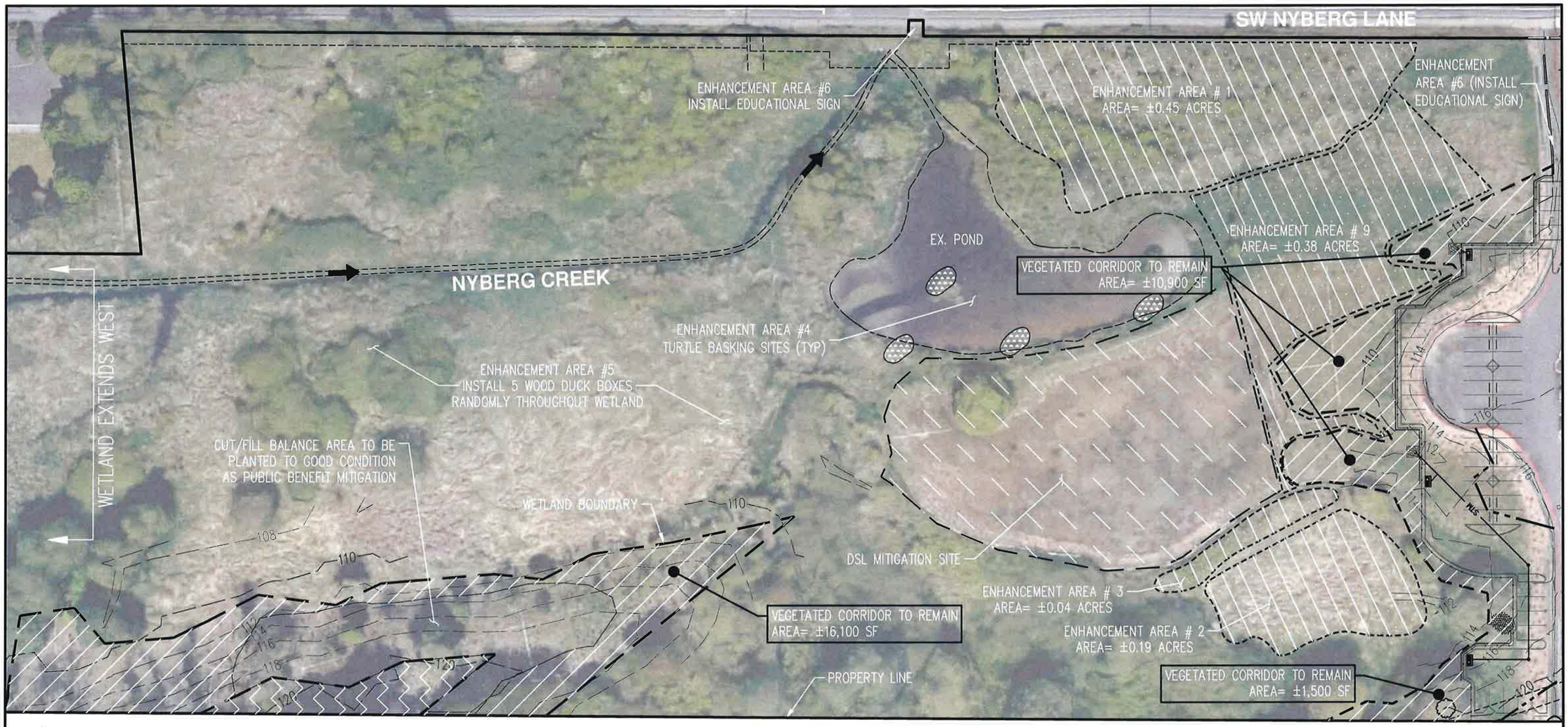
STAFFORD HILLS CLUB

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

EXHIBIT A

DRWN: WCB
CHKD: RDR
AKS JOB: 4490

DWG: 4490 20160617 EXB | EXB2



WETLAND ENHANCEMENT AREA TO MITIGATE FOR VEGETATED CORRIDOR IMPACTS = ±1.06 ACRES

DSL WETLAND MITIGATION AREA = ±0.67 ACRES

VEGETATED CORRIDOR REPLACEMENT MITIGATION= ±0.08 ACRES
–TO BE PLANTED TO GOOD CONDITION PER ATTACHED PLANTING SPECIFICATION TABLE

VEGETATED CORRIDOR TO REMAIN= ±0.65 ACRES

FLOODPLAIN CUT/FILL BALANCE AREA = ±0.25 ACRES
–TO BE PLANTED TO GOOD CONDITION AS PUBLIC BENEFIT MITIGATION

SCALE 1" = 60 FEET

60 0 24 36 48 60

ENHANCEMENT AREA # 1: REMOVE NON-NATIVE HAWTHORN AND REPLANT WITH NATIVE SHRUBS PER ATTACHED PLANTING SPECIFICATION TABLE.

ENHANCEMENT AREA # 2: REMOVE NON-NATIVE INVASIVE REED CANARY GRASS AND REPLANT WITH NATIVE SHRUBS PER ATTACHED PLANTING SPECIFICATION TABLE

ENHANCEMENT AREA # 3: REMOVE NON-NATIVE INVASIVE HIMALAYAN BLACKBERRY AND INSTALL TURTLE NESTING MEDIUM. SEED WITH COMBINATION OF COLOR LUPINE (*Lupinus Bicolor*), FRAGRANT POPCORN FLOWER (*Plagiobothrys Figuratus*), TOADRUSH (*Juncus Bufonius*), SLENDER TARWEED (*Madia Gracilis*), NORTHWEST CINGUEFOIL (*Potentilla Gracilis*), AND/OR WESTERN BUTTERCUP (*Ranunculus Occidentallis*).

ENHANCEMENT AREA # 4: INSTALL FOUR BASKING LOGS.

ENHANCEMENT AREA # 5: INSTALL FIVE WOOD DUCK NEST BOXES.

ENHANCEMENT AREA # 6: INSTALL 2 EDUCATIONAL SIGNS

ENHANCEMENT AREA # 9: PLANT NATIVE SHRUBS PER ATTACHED PLANTING SPECIFICATION TABLE

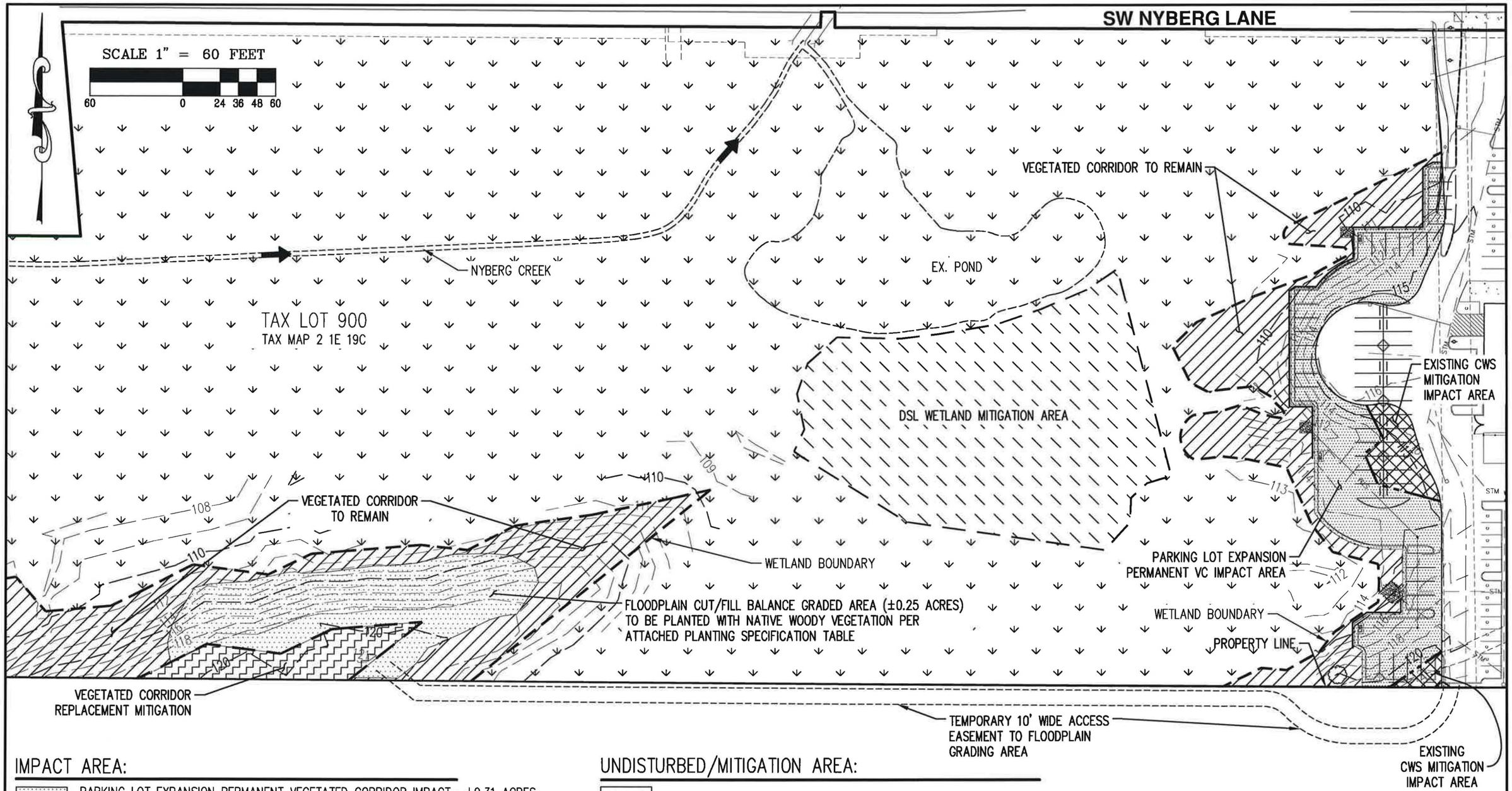
FIGURE 1: WETLAND MITIGATION SITE PLAN DATE: 05/27/2016

NATURAL RESOURCE ASSESSMENT	FIGURE
STAFFORD HILLS	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: AW
CHKD: CEG
AKS JOB: 4490

DWG: 4490 20160311 NAT RES ASSESS BY AW | MITIGATION



IMPACT AREA:

PARKING LOT EXPANSION PERMANENT VEGETATED CORRIDOR IMPACT= ±0.31 ACRES
FLOODPLAIN CUT/FILL BALANCE PERMANENT VEGETATED CORRIDOR IMPACT= ±0.25 ACRES

EXISTING VEGETATED CORRIDOR MITIGATION IMPACT AREA PER CWS 08-002757 = ±0.05 ACRES

TOTAL PERMANENT VEGETATED CORRIDOR IMPACT= ±0.61 ACRES

TOTAL VEGETATED CORRIDOR TO REMAIN= ±0.65 ACRES

UNDISTURBED/MITIGATION AREA:

WETLAND AREA= ±8.63 ACRES

DSL WETLAND MITIGATION AREA = ±0.67 ACRES

VEGETATED CORRIDOR TO REMAIN= ±0.65 ACRES

VEGETATED CORRIDOR REPLACEMENT MITIGATION= ±0.08 ACRES –TO BE PLANTED TO GOOD CONDITION PER ATTACHED PLANTING SPECIFICATION TABLE

FIGURE 5A: SITE PLAN — DATE: 05/23/2016

NATURAL RESOURCE ASSESSMENT

STAFFORD HILLS

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

FIGURE 5A

DRWN: AW
CHKD: CEG
AKS JOB: 4490

DWG: 4490 FIGURE 5A SITE PLAN 20160315 | SITE PLAN

TUALATIN
CHAMBER of COMMERCE

Evan Zupancik, GM
Stafford Hills Club
5916 SW Nyberg Lane
Tualatin, OR. 97062

June 17, 2016

Dear Evan,

The Tualatin Chamber of Commerce is pleased to write this letter of support for the Stafford Hills Club parking lot expansion. Stafford Hills Club is considered to be a major asset to the Tualatin Area Community. Your campus of sustainable LEED® certified buildings and professionally designed landscape, grounds and gardens set a very high standard of development that respects the environment, neighborhood and community at large.

In addition, Stafford Hills Club is good for business. The Club's high quality programs and services bring members and visitors from outside of our community. Those members and visitors stay to shop at our stores, eat at our restaurants and stay in our hotels.

Finally, as a resident of the Fox Hill neighborhood I feel the additional parking will ensure that Club members and employees do not need to use precious parking spaces from within the Fox Hill neighborhood or at the Brown's Ferry Park parking lot….a much needed improvement.

Moving forward, the Stafford Hills Club parking lot expansion will provide a much needed amenity and we are happy to provide our endorsement for the project.

Sincerely,

Linda Moholt

Linda Moholt, CEO, IOM

linda@tualatinchamber.com

PO Box 701
8101 SW Nyberg St., Suite 102
Tualatin, OR. 97062

Phone: 503-692-0780
Chamber@tualatinchamber.com
www.TualatinChamber.com

Parking Lot Expansion

	Date	First Name	Last Name	SHC Member
1	06/19/16	Susanne	Sparling	YES
2	06/18/16	Michael	Moore	YES
3	06/17/16	Maria	Gregson	YES
4	06/17/16	David	Butts	YES
5	06/17/16	Lee	McKenna	YES
6	06/17/16	Tamra	Dereiko	YES
7	06/17/16	Rob	Lee	YES
8	06/17/16	ashley	mcferron	YES
9	06/17/16	Chris	Eddy	YES
10	06/17/16	Kathryn	Eddy	YES
11	06/17/16	Matt	Wilson	YES
12	06/17/16	Karin	Butts	YES
13	06/16/16	Matt	Trank	YES
14	06/16/16	Anne	Moore	YES
15	06/16/16	Erin	Weis	YES
16	06/16/16	Brian	Kriesel	YES
17	06/16/16	Tiffany	Kriesel	YES
18	06/16/16	Jim	Diesing	YES
19	06/16/16	Marty	Fraser	YES
20	06/16/16	carmen	mccallum	YES
21	06/16/16	Kathleen	Laughlin	YES
22	06/16/16	Nick	Albertini	YES
23	06/16/16	Jennifer	Albertini	YES
24	06/16/16	Jeffrey	Weitz	YES
25	06/16/16	Marla	Zupancic	YES
26	06/16/16	Kimberly	Christensen	YES
27	06/16/16	Keith	Okerstrom	YES
28	06/16/16	Gary	Tinker	YES
29	06/16/16	Lucio	Ramirez Camacho	YES
30	06/16/16	Eric	Carlson	YES
31	06/16/16	Bonny	Carlson	YES
32	06/16/16	Jude	Garcia	NO
33	06/16/16	Yolanda	Ishida	NO
34	06/16/16	Annette	Zack	NO
35	06/16/16	Steven	Zack	NO
36	06/16/16	Christine	Garcia	NO
37	06/16/16	Jeffrey	Garcia	YES
38	06/16/16	Janice	Kalina	YES
39	06/16/16	Rob	Atkin	YES
40	06/16/16	Jeff	Higgins	YES
41	06/16/16	Fran	Carter	YES
42	06/15/16	James	Buxman	YES
43	06/13/16	Shari	Marshall	YES
44	06/13/16	jim	shaub	YES
45	06/13/16	stacy	shaub	YES
46	06/11/16	Marcie	Adelman	YES
47	06/11/16	Bernadette	Widolff	YES
48	06/11/16	Bernie	Widolff	YES

	Date	First Name	Last Name	SHC Member
49	06/11/16	jaymi	sladen	YES
50	06/10/16	Sarah	Mariscal	YES
51	06/10/16	Jenell	Henson	YES
52	06/10/16	Jay	Schrader	YES
53	06/10/16	Leslie	O'Brien	YES
54	06/10/16	Brad	Neuhoff	YES
55	06/10/16	lori	bedell	YES
56	06/10/16	Jalen	Riley	YES
57	06/10/16	Donald	Spencer	YES
58	06/10/16	Victoria	Hammond (VanderZanden)	YES
59	06/10/16	Peter	Fisher	YES
60	06/09/16	Betsie	Stark	YES
61	06/09/16	Vickie	Maletteri	YES
62	06/09/16	Traci	Herrick	YES
63	06/09/16	Michael	Manglitz	YES
64	06/09/16	Peter	Klouda	YES
65	06/09/16	Samantha	Bonham	YES
66	06/09/16	Kathleen	Laughlin	YES
67	06/09/16	Kathleen	Laughlin	YES
68	06/09/16	Michelle	Jordan	YES
69	06/09/16	Melissa	Adams	YES
70	06/09/16	Melissa	Adams	YES
71	06/09/16	Shonda	Waxman	YES
72	06/09/16	Desiree	Whitehall	YES
73	06/09/16	Glen	Mitzel	YES
74	06/09/16	Derek	Mitzel	YES
75	06/09/16	Adam	Mitzel	YES
76	06/09/16	Julie	Mitzel	YES
77	06/09/16	Cricket	Forsey	YES
78	06/09/16	Tucker	Trefzger	YES
79	06/09/16	Kathi	Hermanski	YES
80	06/09/16	Erika	Vincent	YES
81	06/09/16	Katie	Fagen	YES
82	06/09/16	Cole	Peck	YES
83	06/09/16	Daniel	Peck	YES
84	06/09/16	Brittney	Peck	YES
85	06/09/16	Scott and Susan	Surface	YES
86	06/09/16	Alice	Neely	YES
87	06/09/16	Phillip	Neely	YES
88	06/09/16	Glade	French	YES
89	06/09/16	Dawn	French	YES
90	06/08/16	Nicholas	Williams	YES
91	06/08/16	Meredith	Williams	YES
92	06/08/16	Alexander	Williams	YES
93	06/08/16	Richard	Williams	YES
94	06/08/16	Sarah	Williams	YES
95	06/07/16	Leslie	Finch	YES
96	06/06/16	Dirk	Frailey	YES
97	06/06/16	Serena	Frailey	YES
98	06/06/16	Christine	Stuart	YES

	Date	First Name	Last Name	SHC Member
99	06/06/16	Tony	Szymczak	YES
100	06/06/16	Jim	Pearson	YES
101	06/05/16	John	Judge	YES
102	06/05/16	Linda	Zuckerman	YES
103	06/05/16	Peter	Miller	YES
104	06/05/16	Sheri	Miller	YES
105	06/05/16	Sheree	Armtson	YES
106	06/05/16	Jim	George	YES
107	06/04/16	Sarah	Hamilton	YES
108	06/04/16	Kara	DeVan	YES
109	06/04/16	Morgan	Thompson	YES
110	06/04/16	Jeff	Mengis	YES
111	06/04/16	Brooke	Thompson	YES
112	06/04/16	Diane	Prokop	YES
113	06/04/16	Karen	Oyler	YES
114	06/04/16	Bob	Anderson	YES
115	06/04/16	Thomas	Solheim	YES
116	06/04/16	Lindsay	Obra	YES
117	06/04/16	Elexus	Graves	YES
118	06/04/16	Shane	Graves	YES
119	06/04/16	Nicole	Graves	YES
120	06/04/16	Susan	Harsany	YES
121	06/04/16	Sarah	Hawkins	YES
122	06/04/16	Darrell	Hawkins	YES
123	06/04/16	Dee	Deatherage	YES
124	06/04/16	Alan	Lofurno	YES
125	06/04/16	Judith	Lofurno	YES
126	06/04/16	Brian	Grant	YES
127	06/03/16	Jalen	Riley	YES
128	06/03/16	Marty	Fraser	YES
129	06/03/16	Christine	Wilson	YES
130	06/03/16	Trang	Swanson	YES
131	06/03/16	Cathy	Rotunno	YES
132	06/03/16	Julie	Bevan	NO
133	06/03/16	David	Manfield	YES
134	06/03/16	Emily	Oishi	YES
135	06/03/16	Kirin	Nelson	YES
136	06/03/16	Nancy	Tongue	YES
137	06/03/16	Kim	ODonnell	YES
138	06/03/16	Jennifer	Meagher	YES
139	06/03/16	Jolene	Itami	YES
140	06/03/16	Kathy	Bellairs	YES
141	06/03/16	Teresa	Meyer	YES
142	06/03/16	Nanette	Thaut	YES
143	06/03/16	Nanette	Thaut	YES
144	06/03/16	Eileen	Willis	YES
145	06/03/16	Norman	Willis	YES
146	06/03/16	Sally	Ward	YES
147	06/03/16	Gretchen	McCallun	YES
148	06/03/16	Michael	McCallum	YES

	Date	First Name	Last Name	SHC Member
149	06/03/16	Laurie	Balke	YES
150	06/03/16	Jessica	Young	YES
151	06/03/16	Phil	Hudson	NO
152	06/03/16	Jan	Hudson	NO
153	06/03/16	Kevin	Edwards	NO
154	06/03/16	Tara	Edwards	YES
155	06/03/16	Tamara	Beecroft	YES
156	06/03/16	Jim	Stark	YES
157	06/03/16	Jeremy	Barber	YES
158	06/03/16	Patricia	Haglund	YES
159	06/03/16	Jamie	Barber	YES
160	06/03/16	Bert	Berends	YES
161	06/03/16	Pat	Betwnds	YES
162	06/03/16	Jackie	Anderson	YES
163	06/03/16	Todd	Crouse	YES
164	06/03/16	Angie	Crouse	YES
165	06/03/16	Robert	Samuels	YES
166	06/03/16	Caitlin	Bowman	YES
167	06/03/16	John	Weber	YES
168	06/03/16	Casey	Cobb	YES
169	06/03/16	Ramey	Wells	YES
170	06/03/16	Melanie	Himmelright	YES
171	06/03/16	Carol	Schaaf	YES
172	06/03/16	Lorraine	Brazier	YES
173	06/03/16	Kelsey	Hofmeister	YES
174	06/03/16	Jan	Engler	YES
175	06/03/16	Jan	Engler	YES
176	06/03/16	Ryan	Griffiths	YES
177	06/03/16	Joanne	Griffiths	YES
178	06/03/16	Will	Stirling	YES
179	06/03/16	Drew	Stirling	YES
180	06/03/16	Sara	Stirling	YES
181	06/03/16	Pete	Stirling	YES
182	06/03/16	Scott	Atkin	YES
183	06/03/16	Kimberly	Atkin	YES
184	06/03/16	Cathie	Ericson	YES
185	06/03/16	Scott	Stanislowski	YES
186	06/03/16	Brent	Schafer	YES
187	06/03/16	Linnette	Jackson	YES
188	06/03/16	John	Williamson	YES
189	06/03/16	Julie	Szambelan	YES
190	06/03/16	Perry	Thompson	YES
191	06/03/16	Abbey	Lippert	YES
192	06/03/16	Kimberly	Dorros	YES
193	06/03/16	Sarah	Wright	YES
194	06/03/16	Anna	Oliveira	YES
195	06/03/16	Fran	Carter	YES
196	06/03/16	Annie	Pledger	YES
197	06/03/16	Linda	Clayton	YES
198	06/03/16	Sydney	Higgins	YES

	Date	First Name	Last Name	SHC Member
199	06/03/16	Anastasia	Boudoures	YES
200	06/03/16	Marisa	Michael	YES
201	06/03/16	Anna	Low	YES
202	06/03/16	Dustin	James	YES
203	06/03/16	Bill	Christensen	YES
204	06/03/16	Jeff	Higgins	YES
205	06/03/16	Sarah	Kusyk	YES
206	06/03/16	Tasca	Gulick	YES
207	06/03/16	Brady	Fisher	YES
208	06/03/16	Maddox	Fisher	YES
209	06/03/16	Bryan	Fisher	YES
210	06/03/16	Elizabeth	Cowell	YES
211	06/03/16	Tiffany	Fisher	YES
212	06/03/16	Cari	DeFlorio	YES
213	06/03/16	Amanda	Ciporen	YES
214	06/03/16	David	Aoyagi	YES
215	06/02/16	Owen	Lee	YES
216	06/02/16	Eva	Lee	YES
217	06/02/16	Christopher	Lee	YES
218	06/02/16	Elizabeth	Farry	YES
219	06/01/16	Jane	Wolley	YES
220	05/31/16	Lisa	Freeman	YES
221	05/31/16	John	Yannello	YES
222	05/31/16	Donna	Crisell	YES
223	05/31/16	Holly	Crisell	YES
224	05/30/16	Bennett	Heiner	YES
225	05/30/16	Isla	Heiner	YES
226	05/30/16	Lisa	Gottfried	YES
227	05/30/16	Mitch	Heiner	YES
228	05/30/16	Lisa	Gray	YES
229	05/30/16	Rebecca	Gelinas	YES
230	05/29/16	Linda	Graham	YES
231	05/28/16	Heather	Frisbee	YES
232	05/28/16	Marlise	Scotti	YES
233	05/27/16	James	Mathews	YES
234	05/27/16	Karen	Mathews	YES
235	05/27/16	Stephanie	Cartwright	YES
236	05/27/16	Natalie	Cartwright	YES
237	05/27/16	Scott	Cartwright	YES
238	05/27/16	victoria	cartwright	YES
239	05/27/16	Emmett	Moore	YES
240	05/27/16	Olivia	Moore	YES
241	05/27/16	Justine	Moore	YES
242	05/27/16	Michael	Moore	YES
243	05/27/16	Darcy	Moore	YES
244	05/27/16	Bonnie	Ford	YES
245	05/27/16	Sharon	Patricelli	YES
246	05/27/16	Jennifer	Bond	YES
247	05/27/16	Dennis	Frisbee	YES
248	05/27/16	Michael	Gold	YES

	Date	First Name	Last Name	SHC Member
249	05/27/16	Linda	Lee	YES
250	05/27/16	John	McCroskey	YES
251	05/27/16	David	Steinberg	YES
252	05/27/16	Judy	North	YES
253	05/27/16	Russ	Parks	YES
254	05/27/16	Bradley	Carter	YES
255	05/27/16	Owen	Young	YES
256	05/27/16	John	Young	YES
257	05/27/16	Alishia	Young	YES
258	05/27/16	Marlene	Stauffer	NO
259	05/27/16	Meg	Goddard	YES
260	05/27/16	Sara	Betty	YES
261	05/27/16	Cary	Strauch	YES
262	05/27/16	Bill	Spencer	YES
263	05/27/16	David	Swanson	YES
264	05/27/16	Kevin	Fitzpatrick	YES
265	05/27/16	Marie	Picard	YES
266	05/27/16	Jackie	Anderson	YES
267	05/27/16	Katie	Randels	YES
268	05/27/16	Aaron	Randels	YES
269	05/26/16	Terri	Ward	YES
270	05/26/16	Jim	Patricelli	YES
271	05/26/16	Anna	Oliveira	YES
272	05/26/16	Katie	Keim	YES
273	05/26/16	Lisa	Hanna	YES
274	05/26/16	Jeff	Metke	YES
275	05/26/16	Teresa	Metke	YES
276	05/26/16	Webb	Jaques	YES
277	05/26/16	Tyler	Jaques	YES
278	05/26/16	Nicole	Jaques	YES
279	05/26/16	Paul	Blankenmeister	YES
280	05/26/16	Eden	Armstrong	YES
281	05/26/16	Mary	Bloom	YES
282	05/26/16	Diane	LaMear-Tucker	YES
283	05/26/16	Kim	Sparrius	YES
284	05/26/16	Jan	Spencer	YES
285	05/26/16	Ted	Werner	YES
286	05/26/16	Shannah	Werner	YES
287	05/26/16	Ken	Daugherty	YES
288	05/26/16	Drew	Daugherty	YES
289	05/26/16	Brooke	Daugherty	YES
290	05/26/16	Shamera	Dsugherty	YES
291	05/26/16	Tim	Dozois	YES
292	05/26/16	Sonja	Dozois	YES
293	05/26/16	Diane	Macdonalf	YES
294	05/26/16	Judy	Ma	YES
295	05/26/16	Cate	Minor	YES
296	05/26/16	Walter	Bentley	YES
297	05/26/16	Kristen	Bentley	YES
298	05/26/16	Amy	Carlton	YES

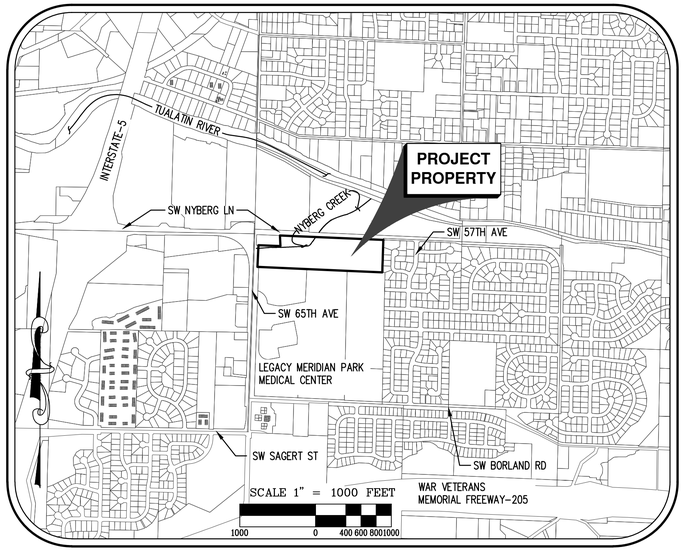
	Date	First Name	Last Name	SHC Member
299	05/26/16	Kim	Kress	YES
300	05/26/16	Tami	Socolofsky	YES
301	05/26/16	Brenns	Dramov	YES
302	05/26/16	Tricia	Tydeman	YES
303	05/26/16	Stefanie	Lamb	YES
304	05/26/16	Jeremy	Breunig	YES
305	05/26/16	Marla	Gaarenstroom	YES
306	05/26/16	Mandy	Gasperson	YES
307	05/26/16	Matthew	York	YES
308	05/26/16	Andrea	Lennon	YES
309	05/26/16	Tori	Plummer	YES
310	05/26/16	Lisa	Ashley	YES
311	05/26/16	Lisa	Ashley	YES
312	05/26/16	Elisabeth	Stewart	YES
313	05/26/16	Wendy	Dillree	YES
314	05/26/16	Andrew	Dillrer	YES
315	05/26/16	Deborah	George	NO
316	05/26/16	Neil	Olsen	YES
317	05/26/16	Marie	Olsen	YES
318	05/26/16	Liz	Stickel	YES
319	05/26/16	Marla	ELLIS	YES
320	05/26/16	Jane	Loverin	YES
321	05/26/16	Juliana	Jiang	YES
322	05/26/16	Katherine	Phillips	YES
323	05/26/16	Adam	Philips	YES
324	05/26/16	Juliana	Jiang	YES
325	05/26/16	Abby	Miller	YES
326	05/26/16	Keri	Winscott	YES
327	05/26/16	Katie	Simpson	YES
328	05/26/16	Michael	Feinstein	YES
329	05/26/16	Diana	Lavery	YES
330	05/26/16	Melba	Davidson	YES
331	05/26/16	Lori	Livesay	YES
332	05/26/16	Perry	Thompson	YES
333	05/26/16	Morgan	Thompson	YES
334	05/26/16	Brooke	Thompson	YES
335	05/26/16	Ken	Dwinell	YES
336	05/26/16	Amy	Gremmel	YES
337	05/26/16	Melanie	Grant	YES
338	05/26/16	Wendy	Mackin	YES
339	05/26/16	Jaap	Sparrius	YES
340	05/26/16	Erik	Bucher	YES
341	05/26/16	Shannon	DeVall	YES
342	05/26/16	Amy	Bucher	YES
343	05/26/16	Jody	Odaniell	YES
344	05/26/16	Lori	Carroll	YES
345	05/26/16	Jim	Barton	YES
346	05/26/16	Jeremiah	Bay	YES
347	05/26/16	Anne	McCroskey	YES
348	05/26/16	Brian	Feeney	YES

	Date	First Name	Last Name	SHC Member
349	05/26/16	Russ	DeMoss	YES
350	05/26/16	Lynn	Sanchez	YES
351	05/26/16	Theresa	Gonzales	YES
352	05/26/16	Forrest	Hall	YES
353	05/26/16	Joe	Begin	YES
354	05/26/16	Kia	Kamali	YES
355	05/26/16	Kristy	Kamali	YES
356	05/26/16	Mike	Reiss	YES
357	05/26/16	Jacob	Bering	YES
358	05/26/16	Beth	Bering	YES
359	05/26/16	Gary	Bering	YES
360	05/26/16	Monte	Vaughn	YES
361	05/26/16	Scott	Florsheim	YES
362	05/26/16	Jon	Rockwood	YES
363	05/26/16	Scott	Florsheim	YES
364	05/26/16	Marisa	Rockwood	YES
365	05/26/16	Kori	Montpas	YES
366	05/26/16	Willy	Joseph	YES
367	05/26/16	Brandon	Blondheim	YES
368	05/26/16	Amy	Blondheim	YES
369	05/26/16	Pamela	Johnson	YES
370	05/26/16	Elizabeth	Cowell	YES
371	05/26/16	Maggie	Creos	YES
372	05/26/16	Robert	Harvey	YES
373	05/26/16	Linda	Blankenmeister	YES
374	05/26/16	Kathy	Arnold	YES
375	05/26/16	Erika	Augustyn	YES
376	05/26/16	Madonna	Sujever	YES
377	05/26/16	Shavonda	Buganan	NO
378	05/26/16	Hope	Jackson	NO
379	05/26/16	Anna	OliveirA	YES
380	05/26/16	Chandra	Blanchard	NO
381	05/26/16	Melissa	Brown	YES
382	05/26/16	Sarah	Brown	YES
383	05/26/16	Kim	Studebaker	YES
384	05/25/16	Michael	Callahan	YES
385	05/25/16	Coni	Rathbone	YES
386	05/25/16	Julia	Statham	YES
387	05/25/16	Michael	Bates	YES
388	05/25/16	Gareth	Tabor	YES
389	05/25/16	Jennifer	Podeschi	YES
390	05/25/16	Rebecca	Neuhoff	YES
391	05/25/16	Sherry	Churchill	YES
392	05/25/16	Marie	Olsen	YES
393	05/25/16	Kelli	Koch	YES
394	05/25/16	Sarah	Carter	YES
395	05/25/16	Karen	Betz	YES
396	05/24/16	Dolores	Rincon	YES
397	05/24/16	Kaanchan	Gangal	YES
398	05/24/16	Sean	McElderry	YES

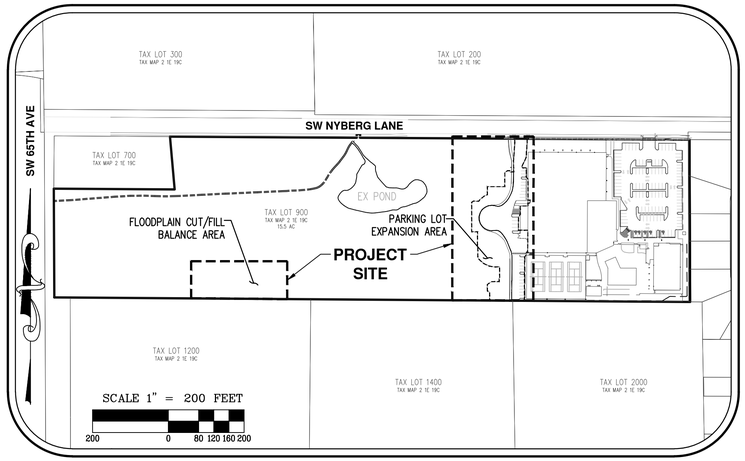
	Date	First Name	Last Name	SHC Member
399	05/24/16	Olya	Kovnatska	YES
400	05/24/16	Lindsey	Fry	YES
401	05/24/16	Robert	Strait	YES
402	05/24/16	Satoko	Katayama-Corey	YES
403	05/24/16	Tamara	Jenness	YES
404	05/24/16	Cindy	Weaver	YES
405	05/24/16	Tamra	Dereiko	YES
406	05/24/16	Rob	Lee	YES
407	05/24/16	Doug	Boyer	YES
408	05/24/16	Heather	Boyer	YES
409	05/24/16	Jim	Zupancic	YES
410	05/24/16	Greg	Young	YES
411	05/24/16	Matthew	Wagner	YES
412	05/24/16	Barbara	Wagner	YES
413	05/24/16	Andrew	Graves	YES
414	05/24/16	Kristin	Graves	YES
415	05/24/16	Bruce	Magnuson	YES
416	05/24/16	Cody	Schuman	YES
417	05/24/16	Denise	Visse	YES
418	05/24/16	David	Visse	YES
419	05/24/16	Patricia Ann	Harkleroad	YES
420	05/24/16	Eric	Thompson	YES
421	05/24/16	Dan	Heck (Neighbor and Member)	YES
422	05/24/16	John	Wells	YES
423	05/24/16	Shava	Feinstein	YES
424	05/24/16	John	Closi	YES
425	05/24/16	Briam	Mai	YES
426	05/24/16	Lina	Kone	YES
427	05/24/16	Christopher	Hermanski	YES
428	05/24/16	Linn	Beswick	YES
429	05/24/16	Mike	Baker	YES

STAFFORD HILLS CLUB

CONSTRUCTION PLANS



VICINITY MAP
SCALE: 1"=1,000'



SITE PLAN
SCALE: 1"=200'

CIVIL ENGINEERING/ LANDSCAPE ARCHITECTURE/ SURVEYING FIRM

AKS ENGINEERING & FORESTRY, LLC
CONTACT: CHUCK GREGORY, PE
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OR 97062
P: (503) 563-6151
E: chuckg@aks-eng.com

DEVELOPER/OWNER

CONTACT: STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN, OR 97062
P: (503) 612-2407
E: jimz@staffordhills.com

EXISTING LAND USE

LOW DENSITY RESIDENTIAL DISTRICT

PROJECT PURPOSE

PARKING LOT EXPANSION

LEGEND

	EXISTING	PROPOSED		EXISTING	PROPOSED
DECIDUOUS TREE			STORM SEWER CLEAN OUT		
CONIFEROUS TREE			STORM SEWER CATCH BASIN		
			STORM SEWER AREA DRAIN		
FIRE HYDRANT			STORM SEWER MANHOLE		
WATER BLOWOFF			GAS METER		
WATER METER			GAS VALVE		
WATER VALVE			GUY WIRE ANCHOR		
DOUBLE CHECK VALVE			POWER POLE		
AIR RELEASE VALVE			POWER VAULT	P	P
SANITARY SEWER CLEAN OUT			POWER JUNCTION BOX		
SANITARY SEWER MANHOLE			POWER PEDESTAL		
SIGN			COMMUNICATIONS VAULT	C	C
STREET LIGHT			COMMUNICATIONS JUNCTION BOX		
MAILBOX			COMMUNICATIONS RISER		

	EXISTING	PROPOSED
RIGHT-OF-WAY LINE		
BOUNDARY LINE		
PROPERTY LINE		
CENTERLINE		
DITCH		
CURB		
EDGE OF PAVEMENT		
EASEMENT		
FENCE LINE		
GRAVEL EDGE		
POWER LINE	PWR	PWR
OVERHEAD WIRE	OHW	OHW
COMMUNICATIONS LINE	COM	COM
FIBER OPTIC LINE	CFO	CFO
GAS LINE	GAS	GAS
STORM SEWER LINE	STM	STM
SANITARY SEWER LINE	SAN	SAN
WATER LINE	WAT	WAT

PROPERTY DESCRIPTION:

TAX LOT 900, CLACKAMAS COUNTY TAX MAP 2N 1E 19C, LOCATED IN THE NORTH OF SECTION 19C, TOWNSHIP 2 NORTH, RANGE 1 EAST, WILLAMETTE MERIDIAN, CITY OF PORTLAND, MULTNOMAH COUNTY, OREGON.

PROPERTY SIZE: ±15.50 ACRES

NEW DEVELOPED AREA: ±0.50 ACRES

VERTICAL DATUM

VERTICAL DATUM: ELEVATIONS ARE BASED ON WASHINGTON COUNTY BENCHMARK NO. 469, A BRASS DISK AT THE SOUTHEAST CORNER OF THE FELLOW GUARD OF A BRIDGE ON NYBERG ROAD APPROXIMATELY 0.4 MILES EAST OF I-5. ELEVATION = 124.436 (NGVD 29).

PROJECT RECORD DRAWING

CONTRACTOR SHALL PROVIDE THE OWNER'S REPRESENTATIVE WITH A REDLINED COPY OF THESE CONSTRUCTION PLANS SHOWING AS-BUILT ELEVATIONS, LOCATIONS, AND PLAN DEVIATIONS. REDLINED AS-BUILT DRAWINGS SHALL BE SUBMITTED TO THE OWNER'S REPRESENTATIVE ONE WEEK PRIOR TO REQUESTING WALK-THROUGH AND/OR ACCEPTANCE OF SUBSTANTIAL COMPLETION.

I, THE UNDERSIGNED, STATE I HAVE CHECKED AND VERIFIED THAT THESE REDLINED AS-BUILT DRAWINGS ARE ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

SIGNATURE (CONTRACTOR) _____ DATE _____

ATTENTION EXCAVATORS:

OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503-232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO BUSINESS DAYS BUT NOT MORE THAN TEN BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. CALL 503-246-6699.

SHEET INDEX:

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

ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

COVER SHEET WITH VICINITY, SITE MAP, AND LEGEND

DESIGNED BY: CEG
DRAWN BY: AJW
CHECKED BY: CEG
SCALE: AS NOTED
DATE: 05/10/2016

REGISTERED PROFESSIONAL ENGINEER OREGON JULY 13, 2004 CHUCK GREGORY
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

SHEET C000

AKS DRAWING FILE: 4490 C000 COVERSHEET.DWG | LAYOUT: LAYOUT1

GENERAL CONSTRUCTION NOTES

1. ALL WORK AND MATERIAL SHALL CONFORM TO THESE PLANS, THE APPLICABLE PROVISIONS OF THE INTERNATIONAL BUILDING CODE, UNIFORM PLUMBING CODE, THE CITY OF TUALATIN, CLEAN WATER SERVICES, AND ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.

2. THE LOCATIONS, DEPTH AND DESCRIPTION OF EXISTING UTILITIES SHOWN ARE COMPILED FROM AVAILABLE RECORDS AND/OR FIELD SURVEYS. THE ENGINEER OR UTILITY COMPANIES DO NOT GUARANTEE THE ACCURACY OR THE COMPLETENESS OF SUCH RECORDS. ADDITIONAL UTILITIES MAY EXIST WITHIN THE WORK AREA.

3. THE LOCATION OF EXISTING UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE AND SHOWN FOR INFORMATION PURPOSES ONLY. THE CONTRACTOR SHALL HAVE ALL UTILITIES LOCATED PRIOR TO COMMENCING CONSTRUCTION. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

4. THE CONTRACTOR MUST VERIFY ALL EXISTING UTILITIES FOR BOTH VERTICAL ELEVATION AND HORIZONTAL LOCATION PRIOR TO START OF WORK (POTHOLE BEFORE DIGGING). IF DUE TO THE CONTRACTOR'S LACK OF PROPER POTHOLING SHOULD CONFLICTS ARISE AND REDESIGN OR RELOCATION FACILITIES PREVIOUSLY INSTALLED BE NECESSARY, IT SHALL BE DONE AT THE CONTRACTOR'S EXPENSE. CHANGES MUST BE APPROVED BY THE PROJECT ENGINEER AND CITY OF TUALATIN IN ADVANCE OF WORK. THE CONTRACTOR SHALL COORDINATE THE WORK WITH UTILITY AGENCIES.

5. SUBSEQUENT SETTLEMENT OR CRACKING OF FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A FAILURE OF THE SUBGRADE AND SHALL BE REPAIRED.

6. THE CONTRACTOR SHALL CONTROL TRAFFIC IN CONFORMANCE WITH THE LATEST EDITION OF "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", "OREGON SUPPLEMENTS", AND CITY OF TUALATIN REQUIREMENTS. THE CONTRACTOR SHALL AT ALL TIMES MAINTAIN LOCAL ACCESS ALONG THE PROJECT SITE. THE CONTRACTOR SHALL PROVIDE A PROJECT SPECIFIC TRAFFIC CONTROL PLAN, APPROVED BY THE OWNER, AND AVAILABLE ON THE PROJECT SITE.

7. THE CONTRACTOR SHALL HAVE A MINIMUM OF ONE SET OF APPROVED CONSTRUCTION PLANS ON THE JOB SITE AT ALL TIMES DURING THE CONSTRUCTION PHASES.

8. THE CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL EARTHWORK, TRENCH BACKFILL, ROAD CONSTRUCTION COMPACTION TESTS, AND GEOTECHNICAL REVIEWS WITH THE PROJECT'S GEOTECHNICAL ENGINEER AND THE CITY OF TUALATIN.

9. THE CONTRACTOR SHALL MAINTAIN BENCHMARKS, PROPERTY CORNERS, MONUMENTS, AND OTHER REFERENCE POINTS. IF SUCH POINTS ARE DISTURBED OR DESTROYED BY CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND PAY FOR THEIR REPLACEMENT BY EMPLOYING A PROFESSIONAL LAND SURVEYOR TO RESET PROPERTY CORNERS AND OTHER SUCH MONUMENTS.

10. PRIOR TO BEGINNING WORK, THE CONTRACTOR SHALL PRESENT AT THE PRE-CONSTRUCTION MEETING A LIST OF SUBCONTRACTORS, A PROJECT SCHEDULE, A TRAFFIC CONTROL PLAN, AND AN EMERGENCY CONTACT NAME AND PHONE NUMBER.

11. PRIOR TO FINAL ACCEPTANCE AND PAYMENT, THE CONTRACTOR SHALL CLEAN THE WORK SITE AND ADJACENT AREAS OF ANY DEBRIS, DISCARDED ASPHALTIC CONCRETE MATERIAL, OR OTHER ITEMS DEPOSITED BY THE CONTRACTOR'S PERSONNEL DURING THE PERFORMANCE OF THIS CONTRACT.

12. THE PUBLIC ROADWAY SHALL NOT BE CLOSED TO TRAFFIC, AT ANY TIME, WITHOUT HAVING FIRST OBTAINED WRITTEN APPROVAL FROM THE CITY. THE CONTRACTOR IS RESPONSIBLE FOR PROVISION OF TIMELY NOTIFICATION OF TRAFFIC FLOW DISRUPTIONS TO AREA WIDE EMERGENCY SERVICES.

13. TRAFFIC CONTROL DEVICES, FLAG PERSONS, ETC., SHALL BE IN PLACE PRIOR TO INITIATION OF CONSTRUCTION WORK AND SHALL BE EFFECTIVELY MAINTAINED.

14. A COPY OF THE PERMIT WITH ALL ATTACHMENTS, A COPY OF THE APPROVED CONSTRUCTION PLANS, AND ALL AMENDMENTS SHALL BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. ALL WORK SHALL CONFORM TO THE PERMIT TERMS, CONDITIONS/PROVISIONS, THE CITY APPROVED CONSTRUCTION PLANS, APPROVED PLAN AMENDMENTS, AND TO THESE GENERAL CONDITIONS. CHANGES TO ANY OF THE AFORESAID MUST BE APPROVED BY THE PROJECT ENGINEER AND THE CITY, IN ADVANCE OF WORK PERFORMANCE.

15. MAINTENANCE OF THE WORK AREA AND APPROACH ROADS IS THE RESPONSIBILITY OF THE CONTRACTOR. THE WORK AREA AND APPROACH ROADS SHALL BE MAINTAINED IN A CLEAN AND SANITARY CONDITION, FREE FROM OBSTRUCTIONS, HAZARDS, DEBRIS, AND TRASH AT ALL TIMES. A COPY OF THE CONTRACTOR CERTIFICATE OF INSURANCE SHALL BE AVAILABLE AT THE WORK AREA.

16. THE SPREADING OF MUD OR DEBRIS OR STORAGE OF MATERIAL OR EQUIPMENT OF ANY KIND UPON ANY PUBLIC ROADWAY IS STRICTLY PROHIBITED AND VIOLATION SHALL BE CAUSE FOR IMMEDIATE SUSPENSION OF THE PERMIT. THE PROJECT ENGINEER AND/OR THE CITY MAY AT ANY TIME ORDER IMMEDIATE CLEAN UP AND STOPPAGE OF WORK TO ACCOMPLISH CLEAN UP.

17. EFFECTIVE EROSION CONTROL IS REQUIRED. EROSION CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED.

18. EFFECTIVE DRAINAGE CONTROL IS REQUIRED. DRAINAGE SHALL BE CONTROLLED WITHIN THE SITE AND SHALL BE ROUTED SO THAT ADJACENT PRIVATE PROPERTY, PUBLIC PROPERTY, AND THE RECEIVING SYSTEM ARE NOT ADVERSELY IMPACTED. THE PROJECT ENGINEER AND/OR THE CITY MAY AT ANY TIME ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE DRAINAGE CONTROL.

19. A TEMPORARY HARD-SURFACE PATCH (COLD MIX AC OR HOT MIX BASE PAVING) SHALL BE PLACED ON TRENCHES WITHIN EXISTING ROADWAYS AT THE END OF EACH DAY'S WORK. NO TRENCH, ON SITE OR OFF-SITE, SHALL BE LEFT AT ANY TIME IN AN UNSAFE CONDITION. THE CONTRACTOR IS RESPONSIBLE FOR AND IS LIABLE FOR HAZARDS OR DAMAGE RESULTING FROM THE PROSECUTION OF THE WORK.

20. THE CONTRACTOR SHALL PROTECT AND MAINTAIN OPERATION OF ALL EXISTING UTILITIES WITHIN THE CONSTRUCTION AREA THROUGHOUT THE CONSTRUCTION PROCESS AND SHALL BE RESPONSIBLE FOR REPLACEMENT OR REPAIR OF ALL EXISTING UTILITIES WHICH ARE DISTURBED. THE CONTRACTOR SHALL COORDINATE ALL WORK ON UTILITIES WITH THE VARIOUS OWNERS.

21. DOWNTIME FOR UTILITIES SHALL BE HELD TO A MINIMUM AND COORDINATED WITH THE OWNER PRIOR TO DISRUPTION. INTERRUPTION SHALL BE IN ACCORDANCE WITH A SCHEDULE OF SHUTDOWNS TO BE PROVIDED BY THE CONTRACTOR AND APPROVED BY THE OWNER.

22. UPON COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT "REDLINE DRAWINGS" TO THE PROJECT ENGINEER AND OWNER. "REDLINE DRAWINGS" DOCUMENT ALL DEVIATIONS AND REVISIONS TO THE APPROVED PLANS; THEY ALSO RECORD A DESCRIPTION OF CONSTRUCTION MATERIALS ACTUALLY USED (PIPE MATERIALS, ETC.).

23. THE CONTRACTOR SHALL PROCURE AND CONFORM TO ALL CONSTRUCTION PERMITS REQUIRED BY THE CITY OR OTHER APPLICABLE AGENCIES.

24. ANY INSPECTION BY THE CITY, COUNTY, STATE, OR FEDERAL AGENCIES OR THE PROJECT ENGINEER SHALL NOT, IN ANY WAY, RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PERFORM THE WORK IN COMPLIANCE WITH THE APPLICABLE CODES, REGULATION, CITY STANDARDS, AND PROJECT CONTRACT DOCUMENTS.

25. THE PROJECT ENGINEER MUST BE NOTIFIED OF ALL CONSTRUCTION MODIFICATIONS. PRIOR APPROVAL MUST BE PROVIDED BY THE PROJECT ENGINEER BEFORE MODIFICATIONS TO THE APPROVED DESIGN ARE INITIATED.

26. SITE CONSTRUCTION PRACTICES SHALL BE IN ACCORDANCE WITH OSHA REGULATIONS. THE CONTRACTOR SHALL MAINTAIN ON-SITE LEGIBLE MATERIAL SAFETY SHEETS FOR ALL HAZARDOUS MATERIALS USED ON-SITE.

27. THE CONTRACTOR SHALL GIVE THE APPROPRIATE INSPECTION AGENCY TWO WORKING DAYS ADVANCE NOTICE WHEN REQUESTING INSPECTIONS.

28. THE CONTRACTOR SHALL TAKE NO ADVANTAGE OF ANY ERRORS, OMISSIONS, OR DISCREPANCIES IN THE PLANS. WHEN ERRORS, OMISSIONS, OR DISCREPANCIES ARE FOUND, THE ENGINEER SHALL BE NOTIFIED. WORK PERFORMED BY THE CONTRACTOR AS A RESULT OF AN ERROR, OMISSION, OR DISCREPANCY IN THE PLANS SHALL BE AT THE CONTRACTOR'S RISK AND EXPENSE WHEN SUCH ERROR, OMISSION, OR DISCREPANCY HAS NOT BEEN BROUGHT TO THE ATTENTION OF THE ENGINEER.

29. IMMEDIATE COLD PATCH REQUIRED FOR ALL TRENCH CUTS IN EXISTING ROADS. MAINTAIN UNTIL PERMANENT PATCHING IS COMPLETE.

30. THE CONTRACTOR SHALL MAINTAIN AN ADEQUATE FIRE LANE DURING CONSTRUCTION.

31. THE CONTRACTOR SHALL RESTRIPE AC PAVEMENT AND CONCRETE PAVEMENT WHERE REQUIRED DUE TO NEW CONSTRUCTION.

32. THE CONTRACTOR SHALL MAINTAIN ACCESS TO EXISTING ROADWAYS AND FACILITIES AS DETERMINED NECESSARY BY OWNER.

33. THE CONTRACTOR SHALL REPLACE, IN KIND, ALL AC PAVEMENT, CONCRETE, LANDSCAPING, AND IRRIGATION WHICH IS REMOVED OR DISTURBED DURING INSTALLATION OF PIPELINE AND PLACEMENT OF MANHOLES.

34. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION TO PREVENT ELEVATION CONFLICTS.

35. THE RESPONSIBILITY FOR CONSTRUCTION OF SITE UTILITIES SHALL BEGIN AT FIVE FEET OUTSIDE THE BUILDING SLAB.

36. UTILITIES SHOWN ARE DRAWN SCHEMATICALLY. UTILITY PLANS MAY NOT REFLECT THE ACTUAL SPACING AND HORIZONTAL/VERTICAL LOCATION OF NEW OR EXISTING UTILITIES. PLANS DO NOT SHOW ALL BENDS, REDUCERS, "WYES", GASKETS, CLEANOUTS, FITTINGS, AND STRUCTURES. CONTRACTOR IS RESPONSIBLE FOR MATERIALS AND LABOR NECESSARY TO CONSTRUCT UTILITIES SHOWN AS INTENDED IN ACCORDANCE WITH APPLICABLE MANUFACTURER, LOCAL, STATE, AND FEDERAL REQUIREMENTS.

GENERAL CONSTRUCTION NOTES

37. PIPE LENGTHS SHOWN ARE APPROXIMATE.

38. PROPERTY AND RIGHT-OF-WAY LINES SHOWN ARE APPROXIMATE. THESE PLANS ARE NOT MEANT TO SERVE BOUNDARY SURVEY PURPOSES.

39. THE FOLLOWING STANDARD SPECIFICATIONS ARE INCORPORATED BY REFERENCE. ALL MATERIALS AND WORK SHALL CONFORM TO APPLICABLE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE (IBC), UNIFORM PLUMBING CODE (UPC), CITY OF TUALATIN STANDARD CONSTRUCTION SPECIFICATIONS, CLEAN WATER SERVICES AND THE AMERICAN PUBLIC WORKS ASSOCIATION.

40. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY TO COMPLETE THIS PROJECT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS INCLUDING SUCH INCIDENTALS AS MAY BE NECESSARY TO MEET THE INTENT OF THE PROJECT CONTRACT DOCUMENTS, APPLICABLE AGENCY REQUIREMENTS, AND OTHER WORK AS NECESSARY TO PROVIDE A COMPLETE PROJECT.

41. THE PROJECT ENGINEER RESERVES THE RIGHT TO ADJUST GRADES OR ALIGNMENT TO ACCOMMODATE OTHER UTILITIES AS REQUIRED; SUCH ADJUSTMENTS OR REVISIONS SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO COMMENCEMENT OF WORK.

42. THESE PLANS ASSUME THAT CONSTRUCTION STAKING WILL BE NECESSARY TO CONSTRUCT THE IMPROVEMENTS SHOWN AND THAT CONSTRUCTION STAKING ACTIVITIES WILL BE PERFORMED BY AKS ENGINEERING & FORESTRY LLC. AKS ENGINEERING & FORESTRY LLC. DOES NOT ACCEPT ANY RESPONSIBILITY FOR ITEMS CONSTRUCTED INCORRECTLY BASED ON MISINTERPRETATIONS OF ITEMS SHOWN ON THESE PLANS.

43. THE CONTRACTOR SHALL REPAIR ALL EXISTING IMPROVEMENTS DAMAGED BY CONSTRUCTION TO AS GOOD AS OR BETTER CONDITION.

STORM DRAINAGE GENERAL CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL VIDEO INSPECT AND MANDREL ALL CONVEYANCE LINES WHERE REQUIRED BY PLUMBING CODE AND AT THE DIRECTION OF THE ENGINEER. PROVIDE VIDEOS AND REPORTS TO THE ENGINEER MINIMUM OF 10 DAYS PRIOR TO PLACEMENT OF TOP LIFT OF PAVEMENT.

2. ALL REQUESTS FOR ALTERNATIVE MATERIALS SHALL BE SUBMITTED TO THE ENGINEER AND THE CITY OF TUALATIN IN WRITING. THE ENGINEER MAY REQUIRE A MINIMUM OF 5 WORKING DAYS TO REVIEW AND COMMENT ON ALL SUCH REQUESTS.

3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION AND SHALL NOTIFY ENGINEER IMMEDIATELY OF ANY CONFLICTS WITH THESE PLANS IMMEDIATELY UPON DISCOVERY.

4. THE CONTRACTOR SHALL ALSO BE HELD RESPONSIBLE FOR INSTALLING AND MAINTAINING ALL EROSION CONTROL MEASURES TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE. ALL ADJACENT DOWNSTREAM STORM DRAIN INLETS SHALL BE PROTECTED FROM SILTATION BY INSTALLING AND MAINTAINING SILT SACKS IN EACH INLET. FAILURE TO COMPLY WITH ALL APPLICABLE EROSION CONTROL LAWS AND REQUIREMENTS MAY SUBJECT THE CONTRACTOR TO ANY ASSOCIATED FINES, OR DAMAGES, INCLUDING THOSE THAT MAY BE LEVIED THROUGH THE OWNER/DEVELOPER.

5. THE CONTRACTOR SHALL NOT ALLOW ANY WASHWATER OR DEBRIS TO ENTER NEW PIPES OR CHANNELS DURING CONSTRUCTION.

6. ALL PIPE BEDDING AND BACKFILL WITHIN THE PUBLIC RIGHTS OF WAY SHALL CONFORM TO THE REQUIREMENTS OF THE CITY OF TUALATIN AND BE IN COMPLIANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER.

7. ALL MANHOLE AND CLEANOUT RIMS ARE APPROXIMATE, AND SHALL BE INSTALLED TO THE FINAL PAVEMENT GRADE. ALL ATTEMPTS SHALL BE MADE TO PREVENT PONDING OF WATER ON THE PAVEMENT. THE CONTRACTOR SHALL WASH THE ENTIRE PAVING AREAS AND REPAIR ANY POINTS OF PONDING PRIOR TO THE TOP LIFT OF PAVEMENT. CONTACT THE DESIGN ENGINEER IF A SOLUTION IS NOT APPARENT FOR PONDING IN THE PAVEMENT.

8. ALL CONNECTIONS NOT MADE AT MANHOLES OR CATCH BASINS SHALL USE A "WYE" FITTING.

9. NO DRAINAGE PIPING OR PART THEREOF, WHICH IS CONSTRUCTED OF MATERIALS OTHER THAN THOSE APPROVED FOR USE UNDER OR WITHIN A BUILDING, SHALL BE INSTALLED UNDER OR WITHIN FIVE FEET OF ANY BUILDING OR STRUCTURE, OR PART THEREOF, NO LESS THAN ONE FOOT BELOW THE SURFACE OF THE GROUND. THIS INCLUDES STRUCTURES SUCH AS PORCHES AND STEPS, WHETHER COVERED OR UNCOVERED, BREEZEWAYS, ROOFED PORTE-COCHERES, ROOFED PATIOS, CARPORTS, COVERED WALKS AND DRIVEWAYS, AND SIMILAR STRUCTURES OR APPURTENANCES.

10. UNLESS OTHERWISE NOTED, ALL PVC PIPE SHALL BE ASTM D3034 SDR 26 OR SCHEDULE 40. ALL CORRUGATED POLYETHYLENE PIPE (CPE) PIPE SHALL BE HANCOR, ADS N-12, OR APPROVED EQUAL MEETING AASHTO M252 OR M294 TYPE S SMOOTH INTERIOR, BELL AND SPIGOT STYLE. DUCTILE IRON PIPE SHALL BE CLASS 52. ANY REINFORCED CONCRETE PIPE BEND CONNECTIONS SHALL USE FACTORY ELBOWS. ALL MATERIALS FOR USE IN THE RIGHT OF WAY SHALL BE FROM THE QUALIFIED PRODUCTS LIST OR AS PRE-APPROVED BY THE CITY OF TUALATIN.

11. INSTALL CONTINUOUS INSULATED COPPER TRACER WIRE OR MAGNETIC TAPE AS REQUIRED BY THE U.P.C.

12. THE CONTRACTOR SHALL AT ALL TIMES PROVIDE AND MAINTAIN AMPLE MEANS AND DEVICES TO REMOVE AND DISPOSE OF ALL WATER ENTERING THE TRENCH EXCAVATION DURING THE PROCESS OF LAYING THE PIPE. WATER AND DEBRIS SHALL NOT ENTER INTO THE CITY'S SEWER SYSTEM. WATER AND DEBRIS SHALL BE DISPOSED OF IN AN APPROVED MANNER.

13. IF DURING THE COURSE OF INSTALLING UNDERGROUND UTILITIES DRAIN TILES ARE ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER TO DETERMINE HOW THE TILES WILL BE ROUTED.

14. ALL STORM SEWER PIPE CONNECTIONS TO CATCH BASINS, MANHOLES, AND OTHER RELATED STRUCTURES SHALL BE WATER TIGHT AS PER CITY OF TUALATIN OR U.P.C. REQUIREMENTS,. THE CONNECTIONS SHALL BE FINISHED WITH PORTLAND CEMENT GROUT.

15. UNLESS OTHERWISE SPECIFIED ON THE PLANS OR DIRECTED BY THE PROJECT ENGINEER, EACH SERVICE CONNECTION SHALL BE LAID IN A SEPARATE TRENCH ON A STRAIGHT LINE AND GRADIENT FROM THE WYE TO THE END OF THE SERVICE CONNECTION. THE SERVICE CONNECTION SHALL BE INSTALLED WITH THE SAME ACCURACY AS THE MAIN SEWER.

GRADING GENERAL NOTES

1. ALL GRADING SHALL BE DONE UNDER THE SUPERVISION OF A REGISTERED SOILS ENGINEER, WHO SHALL CERTIFY THAT ALL FILL HAS BEEN PROPERLY PLACED, AND WHO SHALL SUBMIT A FINAL COMPACTION REPORT FOR ALL FILLS OVER ONE FOOT DEEP.

2. ALL GROUND EXPOSED DURING GRADING SHALL BE PLANTED WITH GRASS OR GROUND COVER TO PROTECT THE SLOPE FROM EROSION AND INSTABILITY PRIOR TO THE APPROVAL OF FINAL INSPECTION.

3. NO FILL SHALL BE PLACED ON EXISTING GROUND UNTIL THE GROUND HAS BEEN CLEARED OF WEEDS, DEBRIS, TOPSOIL, AND OTHER DELETERIOUS MATERIAL.

4. IF STEEP SLOPING TERRAIN OCCURS UPON WHICH FILL IS TO BE PLACED, IT MUST BE CLEARED, KEYED, AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. PREPARATION SHALL BE APPROVED BY A REGISTERED SOILS ENGINEER PRIOR TO PLACEMENT OF FILL MATERIAL.

5. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHALL BE PROVIDED TO PREVENT PONDING WATER, CONTROL RUNOFF CONTAMINATION, AND DAMAGE TO ADJACENT PROPERTY.

6. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.

7. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE MUST CONTINUE TO FUNCTION ESPECIALLY DURING STORM CONDITIONS. PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.

8. ALL MATERIAL IMPORTED OR EXCAVATED ON THE PROJECT SITE TO BE UTILIZED IN THE FILL, SHALL BE ASSESSED TO BE SUITABLE BY A REGISTERED SOILS ENGINEER.

9. MATERIAL USED IN THE COMPACTING PROCESS SHOULD BE EVENLY SPREAD, WATERED OR DRIED, PROCESSED AND COMPACTED IN THIN LIFTS NOT TO EXCEED SIX INCHES IN THICKNESS TO OBTAIN A UNIFORM DENSE LAYER. THE FILL SHOULD BE PLACED AND COMPACTED ON A HORIZONTAL PLANE, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

GENERAL NOTES

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED

DATE: 05/10/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2004
EDWARD GREGG

RENEWS: JUNE 30, 2017

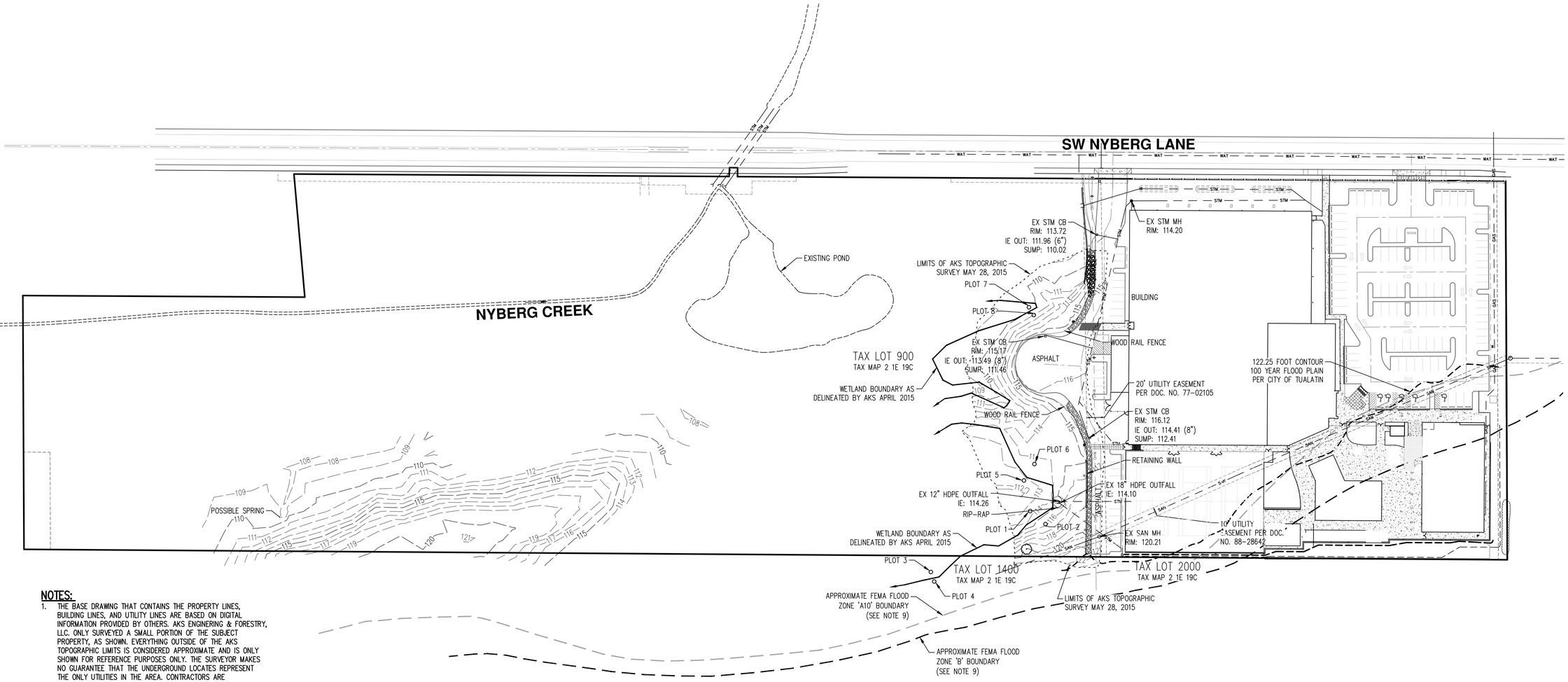
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C001

AKS DRAWING FILE: 4490 C001 NOTES.DWG | LAYOUT: C001 NOTES



NOTES:

1. THE BASE DRAWING THAT CONTAINS THE PROPERTY LINES, BUILDING LINES, AND UTILITY LINES ARE BASED ON DIGITAL INFORMATION PROVIDED BY OTHERS. AKS ENGINERING & FORESTRY, LLC. ONLY SURVEYED A SMALL PORTION OF THE SUBJECT PROPERTY, AS SHOWN. EVERYTHING OUTSIDE OF THE AKS TOPOGRAPHIC LIMITS IS CONSIDERED APPROXIMATE AND IS ONLY SHOWN FOR REFERENCE PURPOSES ONLY. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
2. AKS FIELD WORK WAS CONDUCTED APRIL 6 AND MAY 28, 2015.
3. VERTICAL DATUM: ELEVATIONS ARE BASED ON WASHINGTON COUNTY BENCHMARK NO. 469, A BRASS DISK AT THE SOUTHEAST CORNER OF THE FELLOW GUARD OF A BRIDGE ON NYBERG ROAD APPROXIMATELY 0.4 MILES EAST OF I-5. ELEVATION = 124.436 (NGVD 29).
4. THIS MAP DOES NOT CONSTITUTE A PROPERTY BOUNDARY SURVEY.
5. SURVEY IS ONLY VALID WITH SURVEYOR'S STAMP AND SIGNATURE.
6. BUILDING FOOTPRINTS ARE MEASURED TO SIDING UNLESS NOTED OTHERWISE.
7. CONTOUR INTERVAL IS 1 FOOT.
8. ONLY TREES HAVING A DIAMETER OF 6" AND GREATER, MEASURED AT BREAST HEIGHT, WERE SURVEYED AT THIS TIME.
9. FLOOD ZONE BOUNDARIES ARE BASED ON FEMA COMMUNITY MAP PANEL 410277 0002D, WITH AN EFFECTIVE DATE OF FEBRUARY 19, 1987, WHICH IS THE CURRENT MAP FOR THE AREA. FLOOD ZONE 'A10' IS THE AREA OF THE 100 YEAR FLOOD WITH BASE FLOOD ELEVATIONS DETERMINED (121 BASE FLOOD ELEVATION IS TO THE EAST OF THE SITE, AND 122 BASE FLOOD ELEVATION IS TO THE WEST OF THE SITE – NGVD 29 VERTICAL DATUM). FLOOD ZONE 'B' IS THE AREA BETWEEN THE 100 YEAR AND 500 YEAR FLOOD PLAIN. THESE BOUNDARY LINES ARE BASED ON GRAPHIC SCALING FROM AN IMAGE OVERLAY AND ARE CONSIDERED APPROXIMATE, AND COULD VARY HORIZONTALLY UP TO 20 FEET OR MORE.

TREE TABLE

NUMBER	SPECIE	DIAMETER (IN.)
10363	DECIDUOUS	20

SCALE 1" = 60 FEET

60 0 24 36 48 60

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN
TAX LOTS 900
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C

EXISTING CONDITIONS PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 05/10/2016	

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JANUARY 11, 2005
ROBERT D. RETTIG
60124LS
RENEWS: 12/31/16

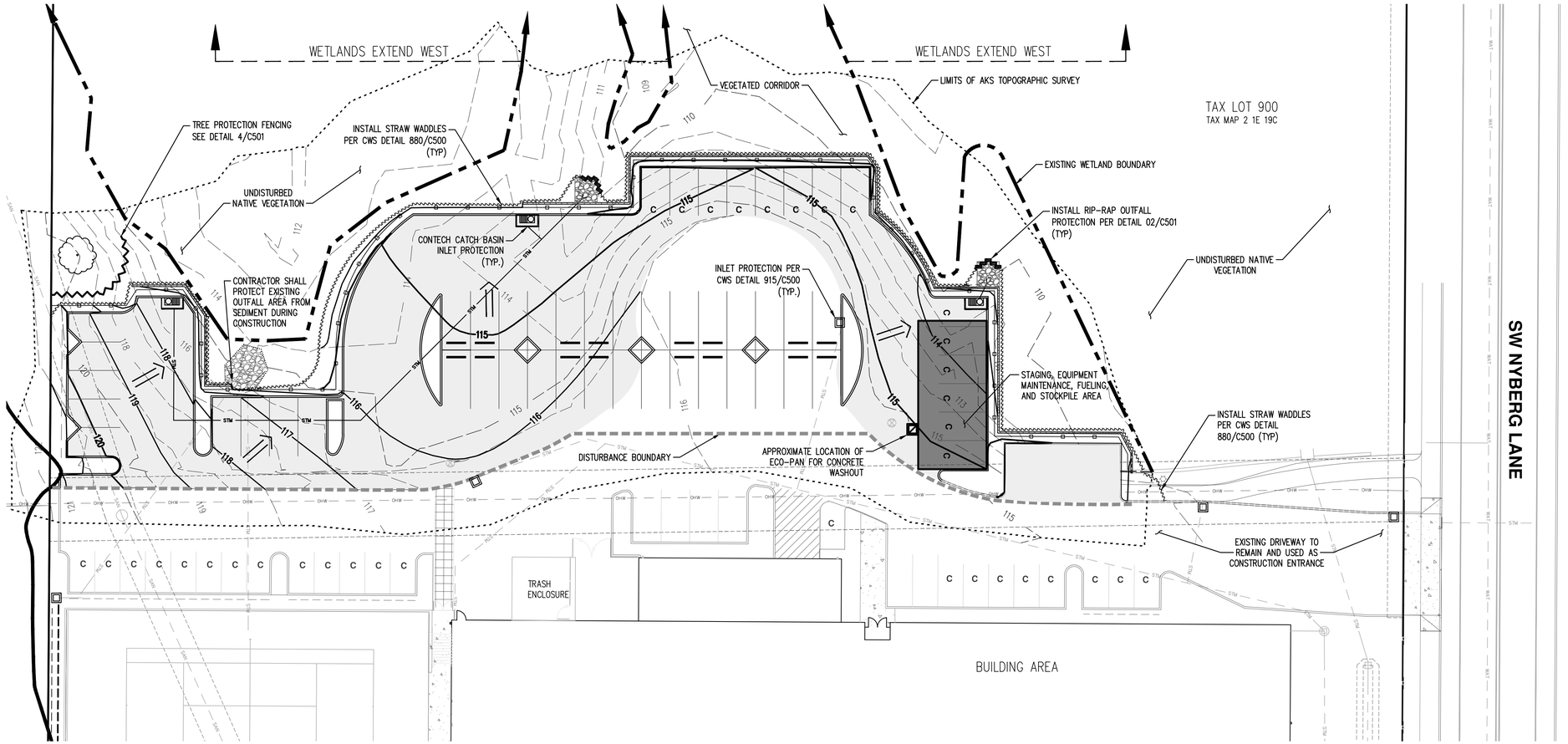
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C002

AKS DRAWING FILE: 4490 C002 EXCOND.DWG | LAYOUT: C002 EXCOND



SCALE 1" = 20 FEET

20 0 8 12 16 20

NOTE:
CONTRACTOR SHALL COMPLY WITH CWS EROSION PREVENTION AND SEDIMENT CONTROL STANDARDS AND AT ALL TIMES USE EROSION PREVENTION BMP'S PER CWS DESIGN AND CONSTRUCTION STANDARDS

LEGEND

EXISTING GROUND CONTOUR (1 FT)	109
EXISTING GROUND CONTOUR (5 FT)	110
FINISHED GROUND CONTOUR (1 FT)	114
FINISHED GROUND CONTOUR (5 FT)	115
DISTURBANCE BOUNDARY	
WETLAND BOUNDARY	
SEDIMENT FENCE	
STRAW WADDLES	
TREE PROTECTION FENCING	
PROPOSED STORM PIPE	STM
INLET PROTECTION (BIO BAG/SILT SACK)	
CONTECH STYLE CATCH BASIN PROTECTION	
ECO-PAN FOR CONCRETE WASHOUT	
PROPOSED STORM CLEANOUT	
DIRECTION OF POST-DEVELOPED RUNOFF	
PROPOSED STORM OUTFALL AREA	
STAGING AREA	
NEW PARKING LOT ASPHALT	

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

EROSION & SEDIMENT CONTROL AND TREE PROTECTION PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED

DATE: 05/10/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
CRAIG E. GEORGE
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

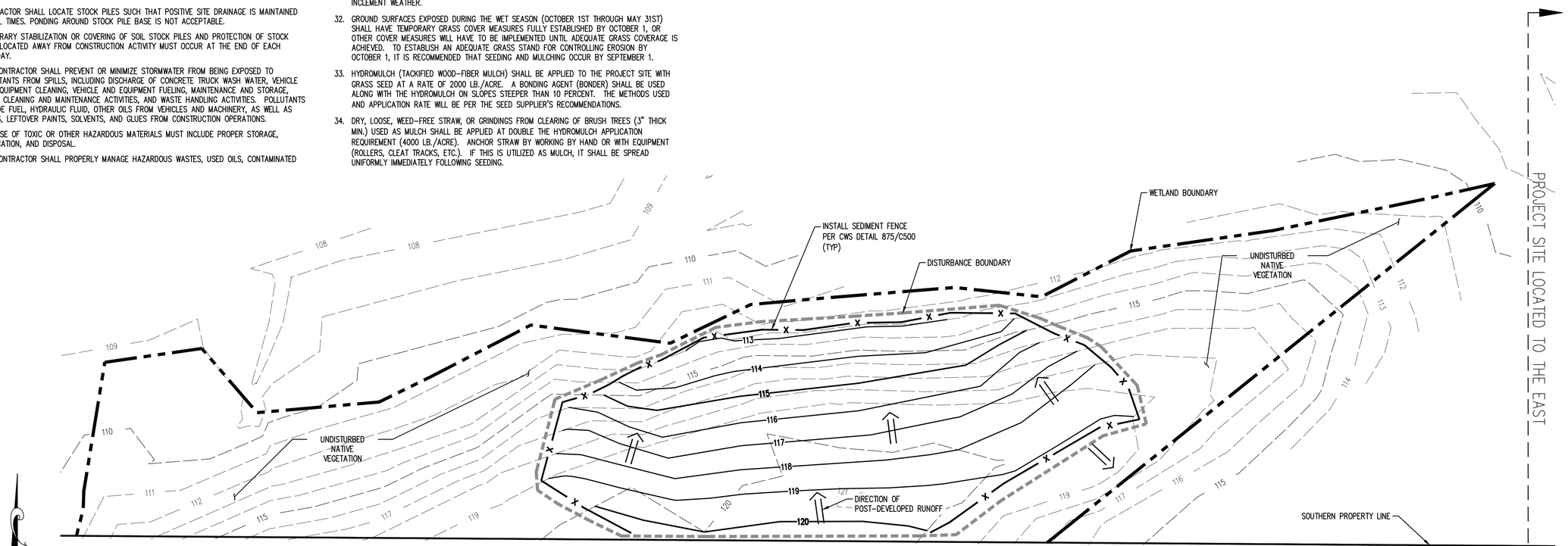
JOB NUMBER
4490

SHEET
C030

AKS DRAWING FILE: 4490 C030 ESC.DWG | LAYOUT: C030 ESC

EROSION & SEDIMENT CONTROL NOTES FOR SITE LESS THAN 1 ACRE:

1. THE IMPLEMENTATION OF THE EROSION AND SEDIMENT CONTROL PLAN INCLUDING CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THE EROSION AND SEDIMENT CONTROL MEASURES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED BY THE LOCAL JURISDICTION AND VEGETATION/LANDSCAPING IS ESTABLISHED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES, IN ACCORDANCE WITH LOCAL, STATE, OR FEDERAL REGULATIONS.
3. EROSION AND SEDIMENT CONTROL MEASURES MUST BE IN PLACE BEFORE VEGETATION IS DISTURBED AND MUST REMAIN IN PLACE AND BE MAINTAINED, REPAIRED, AND PROMPTLY IMPLEMENTED FOLLOWING PROCEDURES ESTABLISHED FOR THE DURATION OF CONSTRUCTION, INCLUDING PROTECTION FOR ACTIVE STORM DRAIN INLETS, CATCH BASINS, AND APPROPRIATE NON-STORMWATER POLLUTION CONTROLS.
4. BEGIN LAND CLEARING, EXCAVATION, TRENCHING, CUTTING OR GRADING AFTER INSTALLING APPLICABLE SEDIMENT, EROSION PREVENTION AND RUNOFF CONTROL MEASURES NOT IN THE DIRECT PATH OF WORK.
5. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES.
6. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND CREATION OF BARE GROUND ON SLOPES GREATER THAN FIVE (5) PERCENT.
7. CONTRACTOR SHALL USE BIONET SC150BN EROSION CONTROL BLANKETS, OR APPROVED EQUAL, ON SLOPES GREATER THAN 3H:1V. EROSION CONTROL BLANKET AND INSTALLATION METHOD SHALL BE IN ACCORDANCE WITH APPLICABLE JURISDICTIONS AND MANUFACTURER'S RECOMMENDATIONS.
8. WET WEATHER EROSION CONTROL: TEMPORARY STABILIZATION OF THE SITE MUST BE INSTALLED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND OR AT THE END OF EACH WORKDAY.
9. PROVIDE PERMANENT EROSION PREVENTION MEASURES ON ALL EXPOSED AREAS TO PREVENT FROM BECOMING A SOURCE OF EROSION AND REMOVE ALL TEMPORARY CONTROL MEASURES, UNLESS LOCAL ORDINANCES REQUIRE OTHERWISE, AS AREAS ARE STABILIZED.
10. ALL TEMPORARY SEDIMENT CONTROLS MUST REMAIN IN PLACE UNTIL PERMANENT VEGETATION OR OTHER PERMANENT COVERING OF EXPOSED SOIL IS ESTABLISHED.
11. SEDIMENT CONTROLS MUST BE INSTALLED AND MAINTAINED ALONG THE SITE PERIMETER ON ALL DOWN GRADIENT SIDES OF THE CONSTRUCTION SITE, AND AT ALL ACTIVE AND OPERATIONAL INTERNAL STORM DRAIN INLETS AT ALL TIMES DURING CONSTRUCTION.
12. PRIOR TO ANY LAND DISTURBING ACTIVITIES EACH SITE MUST HAVE GRAVELED, PAVED, OR CONSTRUCTED ENTRANCES, EXITS AND PARKING AREAS TO REDUCE THE TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS.
13. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER WATERTIGHT TRUCKS MUST BE USED OR LOADS MUST BE DRAINED ON-SITE UNTIL DRIPPING HAS BEEN REDUCED TO MINIMIZE SPILLAGE ON ROADS.
14. CONTRACTOR SHALL LOCATE STOCK PILES SUCH THAT POSITIVE SITE DRAINAGE IS MAINTAINED AT ALL TIMES. PONDING AROUND STOCK PILE BASE IS NOT ACCEPTABLE.
15. TEMPORARY STABILIZATION OR COVERING OF SOIL STOCK PILES AND PROTECTION OF STOCK PILES LOCATED AWAY FROM CONSTRUCTION ACTIVITY MUST OCCUR AT THE END OF EACH WORKDAY.
16. THE CONTRACTOR SHALL PREVENT OR MINIMIZE STORMWATER FROM BEING EXPOSED TO POLLUTANTS FROM SPILLS, INCLUDING DISCHARGE OF CONCRETE TRUCK WASH WATER, VEHICLE AND EQUIPMENT CLEANING, VEHICLE AND EQUIPMENT FUELING, MAINTENANCE AND STORAGE, OTHER CLEANING AND MAINTENANCE ACTIVITIES, AND WASTE HANDLING ACTIVITIES. POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, LEFTOVER PAINTS, SOLVENTS, AND GLUES FROM CONSTRUCTION OPERATIONS.
17. ANY USE OF TOXIC OR OTHER HAZARDOUS MATERIALS MUST INCLUDE PROPER STORAGE, APPLICATION, AND DISPOSAL.
18. THE CONTRACTOR SHALL PROPERLY MANAGE HAZARDOUS WASTES, USED OILS, CONTAMINATED SOILS, CONCRETE WASTE, SANITARY WASTE, LIQUID WASTE, OR OTHER TOXIC SUBSTANCES DISCOVERED OR GENERATED DURING CONSTRUCTION AND MEET ALL STATE AND FEDERAL REGULATIONS AND APPROVALS.
19. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THIS PLAN ARE MINIMUM REQUIREMENTS FOR ANTICIPATED DRY WEATHER SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE MEASURES MUST BE UPGRADED AS NEEDED TO COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL EROSION AND SEDIMENT CONTROL REGULATIONS.
20. SIGNIFICANT AMOUNTS OF SEDIMENT, WHICH LEAVES THE SITE, MUST BE CLEANED UP WITHIN 24 HOURS, PLACED BACK ON THE SITE, AND STABILIZED OR PROPERLY DISPOSED. THE CAUSE OF THE SEDIMENT RELEASE MUST BE FOUND AND PREVENTED FROM CAUSING A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS.
21. VACUUMING OR DRY SWEEPING MUST BE USED TO CLEAN-UP RELEASED SEDIMENT AND MUST NOT BE INTENTIONALLY WASHED INTO STORM SEWERS, DRAINAGE WAYS, OR WATER BODIES.
22. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS.
23. SEDIMENT MUST BE REMOVED FROM BEHIND A SEDIMENT FENCE WHEN IT HAS REACHED A HEIGHT OF 1/3 THE HEIGHT OF THE FENCE ABOVEGROUND AND BEFORE FENCE REMOVAL.
24. SEDIMENT MUST BE REMOVED FROM BEHIND BIO BAGS WHEN IT HAS REACHED A HEIGHT OF TWO (2) INCHES AND BEFORE BMP REMOVAL.
25. REMOVAL OF TRAPPED SEDIMENT IN A SEDIMENT BASIN, SEDIMENT TRAP, OR CATCH BASIN MUST OCCUR WHEN THE SEDIMENT RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT (50%), AND AT COMPLETION OF PROJECT.
26. SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR THIRTY DAYS OR MORE, THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD.
27. SHOULD CONSTRUCTION ACTIVITIES CEASE FOR FIFTEEN (15) DAYS OR MORE ON ANY SIGNIFICANT PORTION OF A CONSTRUCTION SITE TEMPORARY STABILIZATION IS REQUIRED FOR THAT PORTION OF THE SITE WITH STRAW, COMPOST, OR OTHER TACKIFIED COVERING THAT PREVENTS SOIL OR WIND EROSION UNTIL WORK RESUMES ON THAT PORTION OF THE SITE.
28. THE CONTRACTOR SHALL PERFORM DAILY INSPECTIONS OF THE EROSION AND SEDIMENT CONTROL MEASURES AND DISCHARGE OUTFALLS.
29. EROSION AND SEDIMENT CONTROL MEASURES AND DISCHARGE OUTFALLS MUST BE INSPECTED BEFORE, DURING, AND AFTER SIGNIFICANT STORM EVENTS.
30. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSPECTED VISUALLY TO ENSURE THAT EROSION AND SEDIMENT CONTROL MEASURES ARE IN PROPER WORKING ORDER PRIOR TO THE SITE BECOMING INACTIVE OR IN ANTICIPATION OF SITE INACCESSIBILITY. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSPECTED VISUALLY ONCE EVERY TWO (2) WEEKS DURING INACTIVE PERIODS GREATER THAN FOURTEEN (14) CONSECUTIVE CALENDAR DAYS.
31. IF PRACTICAL, INSPECTIONS MUST OCCUR DAILY AT A RELEVANT AND ACCESSIBLE DISCHARGE POINT OR DOWNSTREAM LOCATION DURING PERIODS WHICH THE SITE IS INACCESSIBLE DUE TO INCLEMENT WEATHER.
32. GROUND SURFACES EXPOSED DURING THE WET SEASON (OCTOBER 1ST THROUGH MAY 31ST) SHALL HAVE TEMPORARY GRASS COVER MEASURES FULLY ESTABLISHED BY OCTOBER 1, OR OTHER COVER MEASURES WILL HAVE TO BE IMPLEMENTED UNTIL ADEQUATE GRASS COVERAGE IS ACHIEVED. TO ESTABLISH AN ADEQUATE GRASS STAND FOR CONTROLLING EROSION BY OCTOBER 1, IT IS RECOMMENDED THAT SEEDING AND MULCHING OCCUR BY SEPTEMBER 1.
33. HYDROMULCH (TACKIFIED WOOD-FIBER MULCH) SHALL BE APPLIED TO THE PROJECT SITE WITH GRASS SEED AT A RATE OF 2000 LB./ACRE. A BONDING AGENT (BONDER) SHALL BE USED ALONG WITH THE HYDROMULCH ON SLOPES STEEPER THAN 10 PERCENT. THE METHODS USED AND APPLICATION RATE WILL BE PER THE SEED SUPPLIER'S RECOMMENDATIONS.
34. DRY, LOOSE, WEED-FREE STRAW, OR GRINDINGS FROM CLEARING OF BRUSH TREES (3" THICK MIN.) USED AS MULCH SHALL BE APPLIED AT DOUBLE THE HYDROMULCH APPLICATION REQUIREMENT (4000 LB./ACRE). ANCHOR STRAW BY WORKING BY HAND OR WITH EQUIPMENT (ROLLERS, CLEAT TRACKS, ETC.). IF THIS IS UTILIZED AS MULCH, IT SHALL BE SPREAD UNIFORMLY IMMEDIATELY FOLLOWING SEEDING.
35. SEED USED FOR TEMPORARY OR PERMANENT SEEDING SHALL BE COMPOSED OF ONE OF THE FOLLOWING MIXTURES, UNLESS OTHERWISE AUTHORIZED:
    - 35.1. DWARF GRASS MIX (MIN. 2.5 LB/1000 SF)
      - DWARF PERENNIAL RYEGRASS (80% BY WEIGHT)
      - CREEPING RED FESCUE (20% BY WEIGHT)
    - 35.2. STANDARD HEIGHT GRASS MIX (MIN. 2.5 LB/1000 SF)
      - ANNUAL RYEGRASS (40% BY WEIGHT)
      - TURF-TYPE FESCUE (60% BY WEIGHT)
36. SLOPE TO RECEIVE TEMPORARY OR PERMANENT SEEDING SHALL HAVE THE SURFACE ROUGHENED BY MEANS OF TRACK-WALKING OR THE USE OF OTHER APPROVED IMPLEMENTS. SURFACE ROUGHENING IMPROVES SEED BEDDING AND REDUCES RUN-OFF VELOCITY.
37. IN ACCORDANCE WITH SUPPLIER'S RECOMMENDATIONS, CONTRACTOR SHALL ONLY USE NON-PHOSPHOROUS FERTILIZER.
38. SEEDING SHALL BE SUPPLIED WITH ADEQUATE MOISTURE TO ESTABLISH GRASS. SUPPLY WATER AS NEEDED, ESPECIALLY IN UNUSUALLY HOT OR DRY WEATHER CONDITIONS OR ON ADVERSE SITES. WATER APPLICATION RATES SHOULD BE CONTROLLED TO PROVIDE ADEQUATE MOISTURE WITHOUT CAUSING RUNOFF.
39. AREAS WHICH FAIL TO ESTABLISH GRASS COVER ADEQUATE TO PREVENT EROSION SHALL BE RESEEDED AS SOON AS SUCH AREAS ARE IDENTIFIED, AND ALL APPROPRIATE MEASURES SHALL BE TAKEN TO ESTABLISH ADEQUATE COVER.
40. SEED MIX SHALL BE INSTALLED ON EXPOSED SOIL AREAS ONCE GRADING ACTIVITY HAS BEEN COMPLETED ON EACH PORTION OF THE SITE PRIOR TO PROCEEDING TO ANOTHER AREA OF THE SITE.
41. CONTRACTOR MAY BE REQUIRED TO RESEED SOME AREAS DUE TO FURTHER DISTURBANCE AFTER PLANT MATERIAL HAS BEEN INSTALLED ON EXPOSED SOIL AREAS. CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING A FULL STAND OF GRASS PRIOR TO FINAL APPROVAL.
42. CONTRACTOR SHALL WATER OR USE A SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL.
43. CONTRACTOR SHALL ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK.



FLOOD PLAIN CUT/FILL BALANCE AREA

NOTE:
CONTRACTOR SHALL COMPLY WITH CWS EROSION PREVENTION AND SEDIMENT CONTROL STANDARDS AND AT ALL TIMES USE EROSION PREVENTION BMP'S PER CWS DESIGN AND CONSTRUCTION STANDARDS

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

ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

EROSION & SEDIMENT CONTROL AND TREE PROTECTION PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 05/10/2016	

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2004
CHRISTOPHER E. GOODELL
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

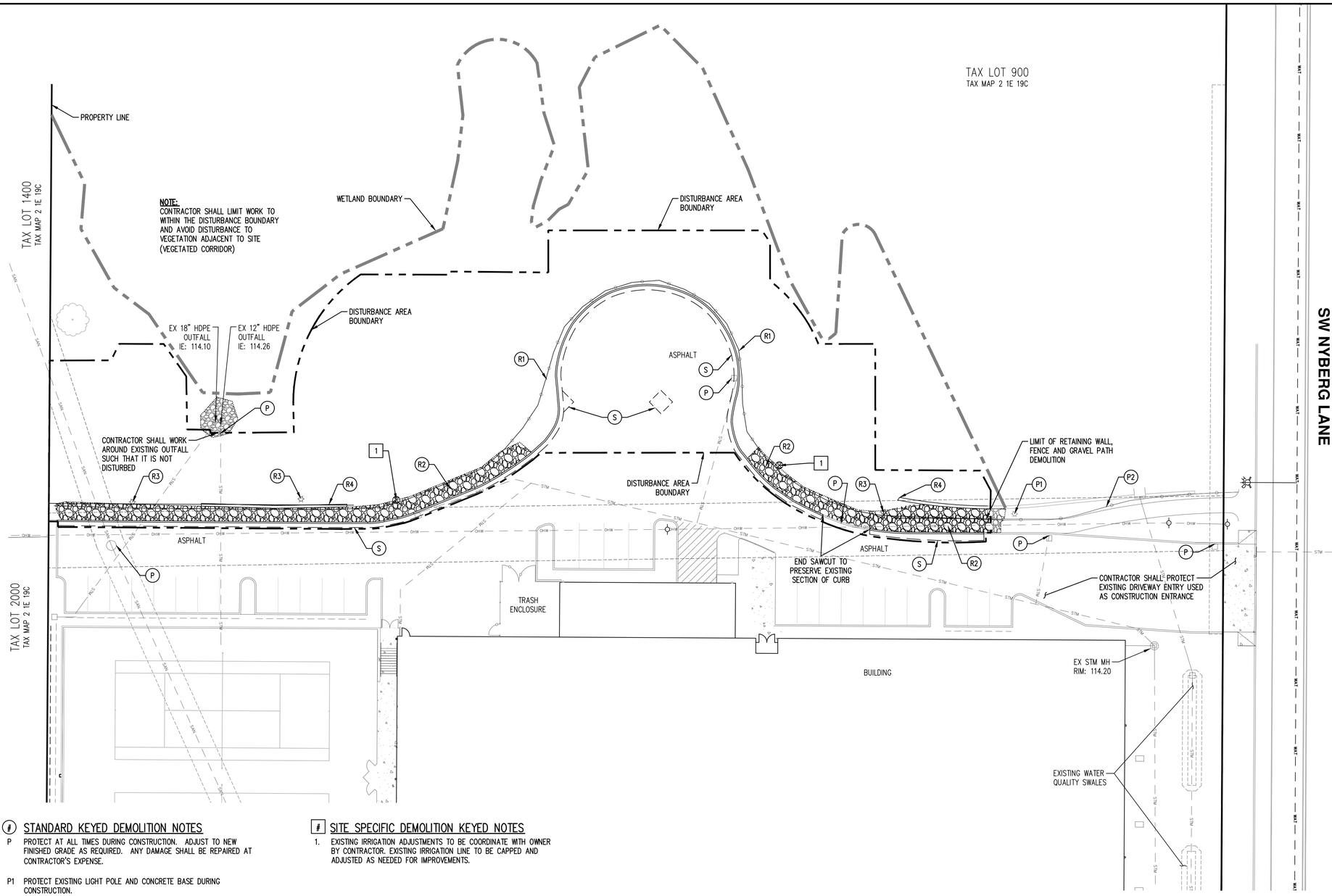
JOB NUMBER 4490

SHEET C031

AKS DRAWING FILE: 4490 C030 ESC.DWG | LAYOUT: C031 ESC

DEMOLITION NOTES

1. PRIOR TO STARTING DEMOLITION OPERATIONS THE CONTRACTOR SHALL APPLY FOR AND OBTAIN ALL NECESSARY PERMITS REQUIRED BY FEDERAL, STATE, AND LOCAL LAWS, CODES, AND REGULATIONS.
2. THE CONTRACTOR SHALL PROVIDE ALL THE "MEANS AND METHODS" NECESSARY TO PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF EXISTING STRUCTURES AND/OR IMPROVEMENTS TO REMAIN ON OR OFF SITE. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING STRUCTURES AND/OR IMPROVEMENTS TO REMAIN, AND SHALL RESTORE ANY DAMAGE TO THE PRE-DEMOLITION CONDITION OR BETTER USING NEW MATERIALS. ANY REPAIRS REQUIRED SHALL BE PERFORMED AT THE CONTRACTOR'S SOLE COST AND EXPENSE.
3. CONTRACTOR SHALL BE REQUIRED TO SECURE ALL NECESSARY PERMITS AND APPROVALS FOR ALL OFF SITE MATERIAL SOURCES AND DISPOSAL FACILITIES. CONTRACTOR SHALL SUPPLY A COPY OF APPROVALS TO OWNER'S REPRESENTATIVE PRIOR TO INITIATING WORK.
4. CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES IN CONFORMANCE WITH THE EROSION CONTROL PLAN, NOTES AND DETAILS PRIOR TO STARTING DEMOLITION OPERATIONS.
5. THE LOCATION OF ALL UTILITIES SHALL BE MARKED IN THE FIELD PRIOR TO DEMOLITION. CONTRACTOR SHALL PROTECT AND MAINTAIN IN A SAFE AND OPERABLE CONDITION ALL UTILITIES INDICATED TO REMAIN, AND PREVENT INTERRUPTION OF EXISTING UTILITY SERVICES EXCEPT WHEN AUTHORIZED IN WRITING BY THE AUTHORITIES HAVING JURISDICTION. CONTRACTOR SHALL PROVIDE TEMPORARY SERVICES, ACCEPTABLE TO GOVERNING AUTHORITIES AND OWNER'S REPRESENTATIVE, FOR BUILDING(S) TO REMAIN AS REQUIRED DURING INTERRUPTIONS TO EXISTING UTILITY SERVICES.
6. DEMOLITION ACTIVITIES AND EQUIPMENT SHALL NOT USE AREAS OUTSIDE THE PROJECT LIMITS WITHOUT WRITTEN PERMISSION FROM THE OWNER'S REPRESENTATIVE AND /OR GOVERNMENTAL AGENCIES HAVING JURISDICTION IF APPLICABLE.
7. THE CONTRACTOR SHALL KEEP ALL STREETS AND PUBLIC RIGHT-OF-WAYS CLEAN OF MUD, DIRT, AND DEMOLITION DEBRIS. THE CONTRACTOR SHALL MONITOR THE HAULING OF DEBRIS TO INSURE THAT ANY SPILLAGE FROM TRUCKS IS PROMPTLY AND COMPLETELY REMOVED AND CLEANED UP. IF REQUIRED AND/OR NECESSARY THE CONTRACTOR SHALL COVER ALL HAUL VEHICLES.
8. CONTRACTOR SHALL CONDUCT DEMOLITION ACTIVITIES IN SUCH A MANNER TO ENSURE MINIMUM INTERFERENCE WITH ROADS, STREETS, SIDEWALKS, WALKWAYS, AND OTHER ADJACENT FACILITIES. STREET CLOSURE PERMITS MUST BE RECEIVED FROM THE APPROPRIATE GOVERNMENTAL AUTHORITY PRIOR TO THE COMMENCEMENT OF ANY ROAD OPENING OR DEMOLITION ACTIVITIES IN OR ADJACENT TO THE RIGHT-OF-WAY.
9. CONTRACTOR SHALL CLEAN ADJACENT STRUCTURES AND IMPROVEMENTS OF DUST, DIRT, AND DEBRIS CAUSED BY DEMOLITION OPERATIONS. RETURN ADJACENT AREAS TO CONDITIONS EXISTING PRIOR TO THE START OF THE WORK.
10. DEBRIS SHALL NOT BE BURIED OR STOCKPILED ON THE PROPERTY. ALL DEMOLITION DEBRIS AND MATERIALS SHALL BE DISPOSED OF AT OFFSITE LOCATIONS IN ACCORDANCE WITH ALL MUNICIPAL, COUNTY, STATE, AND FEDERAL LAWS, CODES, AND REGULATIONS. THE CONTRACTOR SHALL MAINTAIN RECORDS TO DEMONSTRATE PROPER DISPOSAL ACTIVITIES AND SHALL PROVIDE A COPY TO THE OWNER OR OWNER'S REPRESENTATIVE UPON REQUEST. CONTRACTOR TO COORDINATE AND PAY ALL COSTS INCLUDING DISPOSAL CHARGES.
11. PAVEMENT SHALL BE SAW CUT IN STRAIGHT LINES, AND EXCEPT FOR EDGE OF BUTT JOINTS, SHALL EXTEND TO THE FULL DEPTH OF THE EXISTING PAVEMENT. THE SAWCUT LINES SHOWN ON THE DRAWINGS ARE SCHEMATIC AND NOT INTENDED TO SHOW THE EXACT ALIGNMENT OF SUCH CUTS.
12. CONTRACTOR SHALL CONFORM TO APPLICABLE REGULATORY PROCEDURES IF HAZARDOUS OR CONTAMINATED MATERIALS ARE DISCOVERED.
13. CONTRACTOR IS RESPONSIBLE FOR JOB SAFETY AND SHALL PROVIDE, ERECT, AND MAINTAIN TEMPORARY BARRIERS, WARNING SIGNS, TRAFFIC CONES, AND PROTECTION AS NECESSARY DURING DEMOLITION ACTIVITIES.
14. CONTRACTOR SHALL REMOVE ALL EXISTING STRUCTURES, FACILITIES, IMPROVEMENTS, ETC. AS SHOWN, UNLESS OTHERWISE DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
15. CONTRACTOR SHALL DISCONNECT, ABANDON, PLUG OR REMOVE ALL POWER, TELEPHONE, TV AND GAS UTILITIES SERVING THE EXISTING STRUCTURES. CONTRACTOR TO CONTACT LOCAL FRANCHISE UTILITY COMPANIES IN ADVANCE OF PROJECT DEMOLITION TO COORDINATE SERVICE DISCONNECTS AND OBTAIN PERMITS.
16. CONTRACTOR TO COORDINATE WITH GOVERNING JURISDICTION FOR DISCONNECTION OF EXISTING STORM DRAIN, SANITARY SEWER, FIRE, DOMESTIC WATER, AND IRRIGATION LINES CURRENTLY SERVING THE SITE IF REQUIRED. DEMOLISH, ABANDON, PLUG OR REMOVE ALL UTILITIES IF INDICATED ON THE DRAWINGS.
17. CONTRACTOR SHALL BACKFILL ALL EXCAVATION RESULTING FROM, OR INCIDENTAL TO, DEMOLITION ACTIVITIES. BACKFILL SHALL BE ACCOMPLISHED WITH APPROVED MATERIALS, AND SHALL BE PLACED AS COMPACTED ENGINEERED FILL AS REQUIRED TO SUPPORT NEW IMPROVEMENTS. BACKFILLING SHALL OCCUR IMMEDIATELY AFTER DEMOLITION ACTIVITIES UNLESS OTHERWISE DIRECTED BY THE OWNER'S REPRESENTATIVE.
18. DEMOLITION AREAS SHALL BE GRADED TO MATCH ADJACENT TERRAIN TO FORM A SMOOTH, CLEAN (FREE OF DEBRIS), FREE DRAINING SURFACE, UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR APPROVED BY THE OWNER'S REPRESENTATIVE.
19. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES AND OWNER'S REPRESENTATIVE FOR RELOCATION OF EXISTING SIGNS, PARKING LOT LIGHTS, ETC., IF SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE ALL MATERIALS AND PAY ALL COSTS FOR EXCAVATION, BACKFILL, CONDUIT, WIRING, BASES, AND APPURTENANCES REQUIRED TO COMPLETE THE WORK.
20. CONTRACTOR SHALL SAWCUT EXISTING ASPHALT UPON COMPLETION OF PARKING LOT CONSTRUCTION AND PRIOR TO PARKING TO CREATE A CLEAN STRAIGHT JOINT.
21. CONTRACTOR SHALL EXCAVATE FROM BEHIND CURB AND REMOVE CURB WITHOUT DAMAGING EXISTING ASPHALT.



(#) STANDARD KEYED DEMOLITION NOTES

- P PROTECT AT ALL TIMES DURING CONSTRUCTION. ADJUST TO NEW FINISHED GRADE AS REQUIRED. ANY DAMAGE SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE.
- P1 PROTECT EXISTING LIGHT POLE AND CONCRETE BASE DURING CONSTRUCTION.
- P2 PROTECT EXISTING WOOD FENCE. (SEE PLANS FOR LIMITS TO PROTECT)
- R1 REMOVE EXISTING WOOD RAIL FENCE. (SEE PLANS FOR LIMITS OF REMOVAL) CONTRACTOR TO FIELD ADJUST/FIT FOR TRANSITION OF PROTECTED FENCE TO REMOVED FENCE.
- R2 REMOVE EXISTING GRAVEL PATH.
- R3 REMOVE AND SALVAGE EXISTING LIGHT POLE. SALVAGE CONCRETE BASE IF POSSIBLE. COORDINATE WITH OWNER AND REFER TO PLANS FOR RELOCATION AFTER COMPLETION OF CONSTRUCTION.
- R4 REMOVE EXISTING RETAINING WALL. (SEE PLANS FOR LIMITS OF REMOVAL)
- S SAWCUT EXISTING PAVEMENT, SIDEWALK, AND CURB FOR STRAIGHT BUTT JOINT

[#] SITE SPECIFIC DEMOLITION KEYED NOTES

1. EXISTING IRRIGATION ADJUSTMENTS TO BE COORDINATE WITH OWNER BY CONTRACTOR. EXISTING IRRIGATION LINE TO BE CAPPED AND ADJUSTED AS NEEDED FOR IMPROVEMENTS.

SCALE 1" = 20 FEET

20 0 8 12 16 20

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

ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900
TUALATIN

DEMOLITION PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED

DATE: 05/10/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2004
CRAIG E. GIBBONS
RENEWS: JUNE 30, 2017

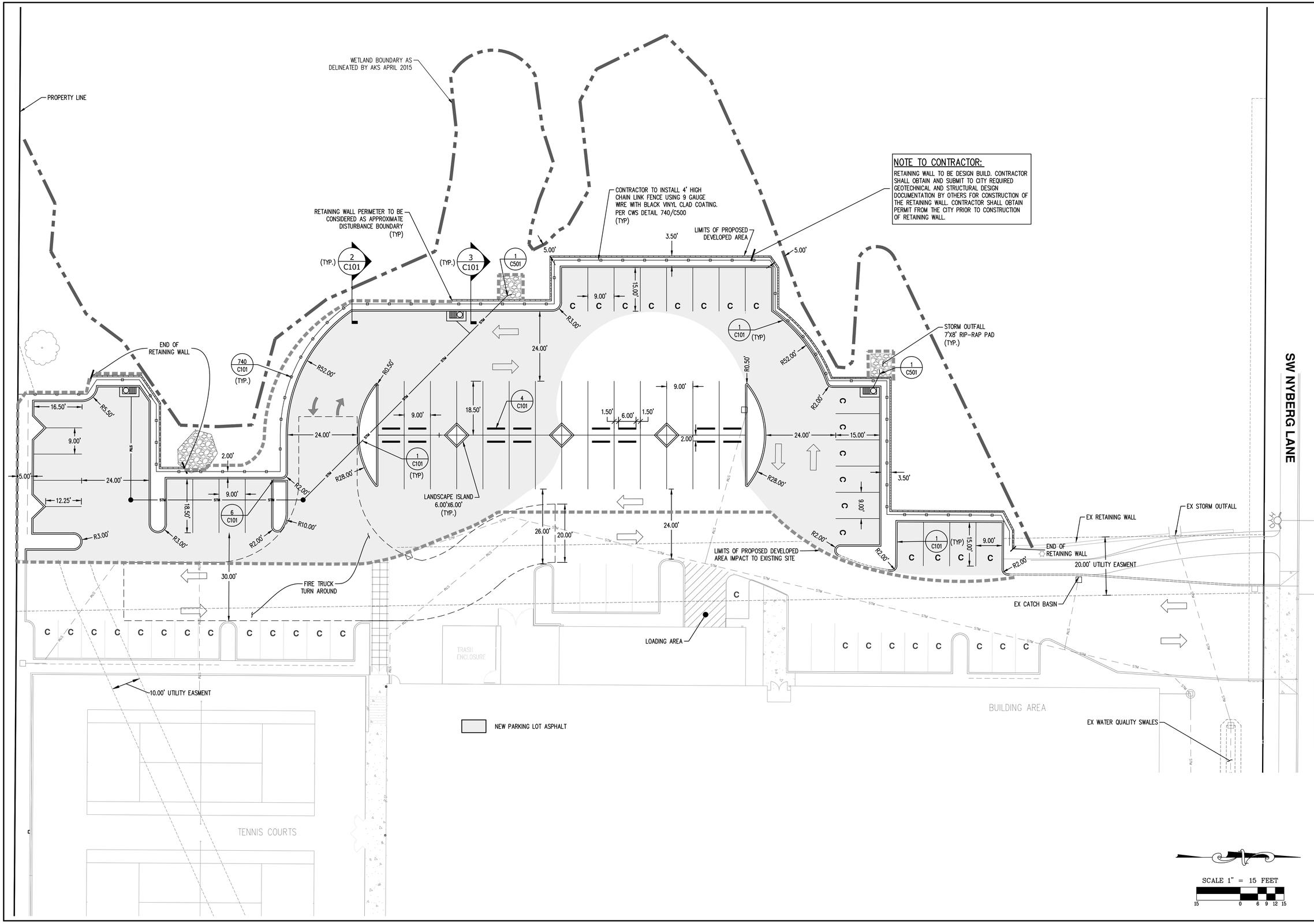
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C090

AKS DRAWING FILE: 4490 C003 DEMO.DWG | LAYOUT: C003 DEMO



SCALE 1" = 15 FEET

15 0 6 9 12 15

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

SITE DIMENSIONING PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 05/10/2016	

REGISTERED PROFESSIONAL ENGINEER
OREGON
CHRISTOPHER E. GOODELL
RENEWS: JUNE 30, 2017

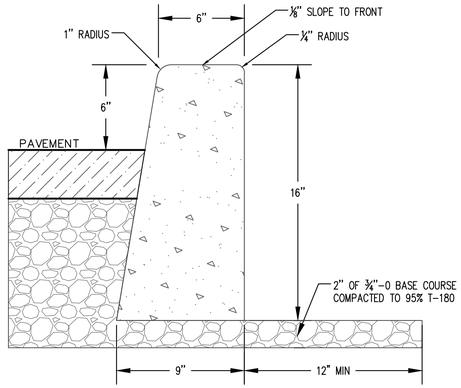
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

SHEET C100

AKS DRAWING FILE: 4490 C100 SITEPLAN C0.DWG | LAYOUT: C100 SITE PLAN

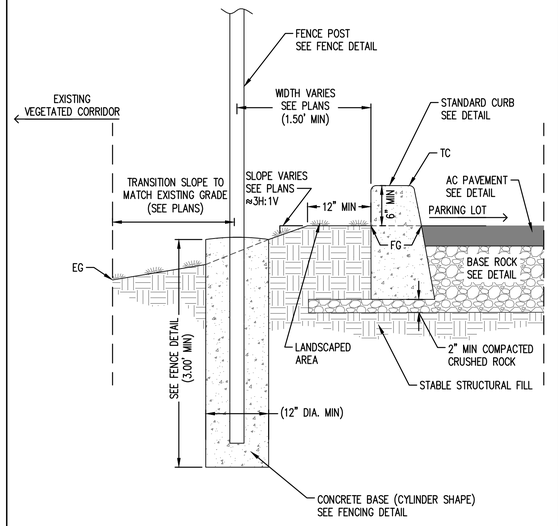


NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,300 PSI AT 28-DAYS.
2. THE TOP EDGE TO BE ROUNDED OFF WITH A 1" RADIUS ON THE PAVEMENT SIDE AND 1/4" RADIUS ON THE LANDSCAPED SIDE.
3. EXPANSION JOINTS TO BE PROVIDED: AT POINT OF TANGENCY OF THE CURB, AT EACH COLD JOINT, AT THE SIDE OF INLET STRUCTURES, AT THE ENDS OF DRIVEWAYS AND AT LOCATIONS NECESSARY TO LIMIT SPACING TO 45 FEET.
4. CONTRACTION JOINTS SHALL NOT BE SPACED MORE THAN 15 FEET AND SHALL BE 1 ½" IN DEPTH.
5. BASE OF CURB SHALL REST ON BASE ROCK THAT IS AT A MINIMUM OF 2 INCHES IN THICKNESS.
6. BASE ROCK: 3/4"-0", COMPACTED TO 95% MAX DENSITY (T-180).
7. EXPOSED SURFACES SHALL BE BROOM FINISHED LONGITUDINALLY.

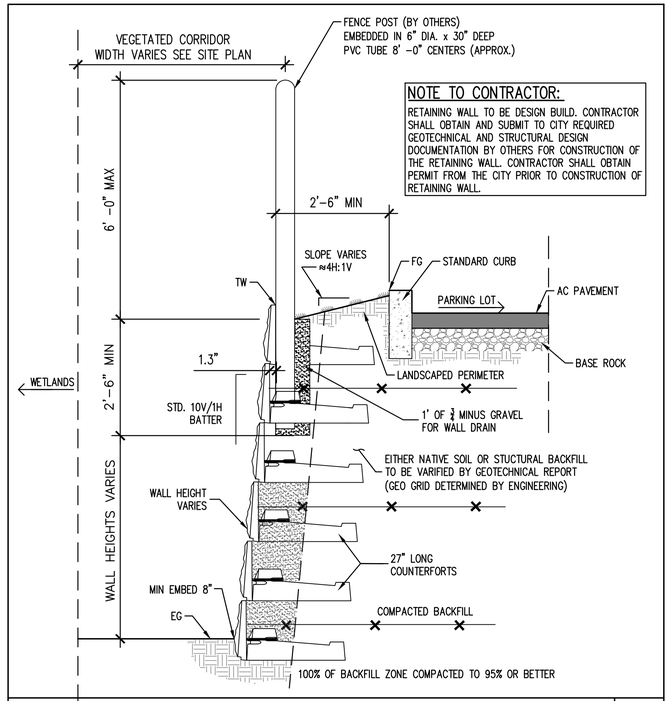
STANDARD VERTICAL CURB DETAIL
N.T.S.

1



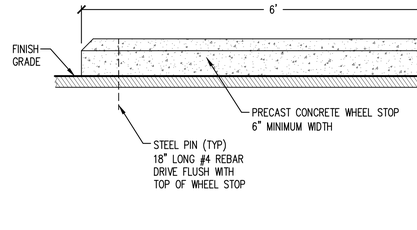
PERIMETER FENCE/GRADING TRANSITION FOR NO RETAINING WALL
N.T.S.

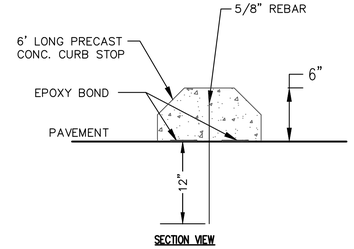
2



PERIMETER RETAINING WALL DETAIL FOR REFERENCE
N.T.S.

3





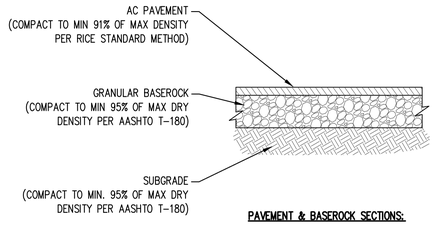
SECTION VIEW

NOTE:

1. CONTRACTOR SHALL COORDINATE WITH OWNER'S REPRESENTATIVE FOR PLACEMENT OF WHEEL STOPS.

CONCRETE WHEEL STOP DETAIL
N.T.S.

4



PAVEMENT & BASEROCK SECTIONS:

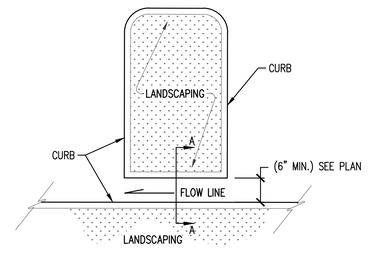
3" AC PAVEMENT
10" OF 1"-0 GRANULAR BASEROCK

NOTES:

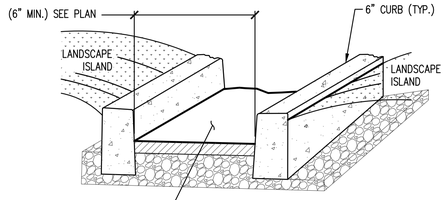
1. SEE PLANS FOR LOCATION OF NEW PAVEMENT
2. DESIGN SUBGRADES SHALL BE COMPACTED AND PROOF-ROLLED PRIOR TO PLACEMENT OF BASEROCK. IF SUBGRADE PASSES PROOF-ROLL BUT FAILS DENSITY TESTING, INSTALL MIN. 4.5 OZ NON-WOVEN GEOTEXTILE FABRIC ON SUBGRADE PRIOR TO PLACEMENT OF BASEROCK. FAILURE OF PROOF-ROLL WILL REQUIRE OVEREXCAVATION OR REPAIR AS DIRECTED BY PROJECT GEOTECHNICAL ENGINEER OR OWNER'S REPRESENTATIVE.
3. IF SUBGRADE FAILS THE PROOF-ROLL, SUBGRADE SHALL BE OVEREXCAVATED TO FIRM AND UNYIELDING SOIL AND BACKFILLED WITH COMPACTED BASEROCK OVER MIN. 8.0-OZ. NON-WOVEN FABRIC AS REQUIRED TO ALLOW COMPACTION OF UPPER (DESIGN) BASEROCK SECTION AND TO MAINTAIN STRUCTURAL INTEGRITY OF SUBGRADE SOILS. TYPICAL MINIMUM OVEREXCAVATION REQUIRED IS 12-INCHES. NO RUBBER TIRED EQUIPMENT ALLOWED ON SUBGRADE FOLLOWING OVEREXCAVATION.
4. PASSING PROOF-ROLL ON BASEROCK IS ALSO REQUIRED IMMEDIATELY PRIOR TO PAVING.
5. CONTRACTOR SHALL CONFORM TO ALL RECOMMENDATIONS IN GEOTECHNICAL REPORT.

AC PAVEMENT SECTION
NTS

5



PLAN



SECTION A-A

LANDSCAPE ISLAND CURB BREAK
N.T.S.

6

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

AKS
ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

SITE DETAILS

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 05/10/2016	

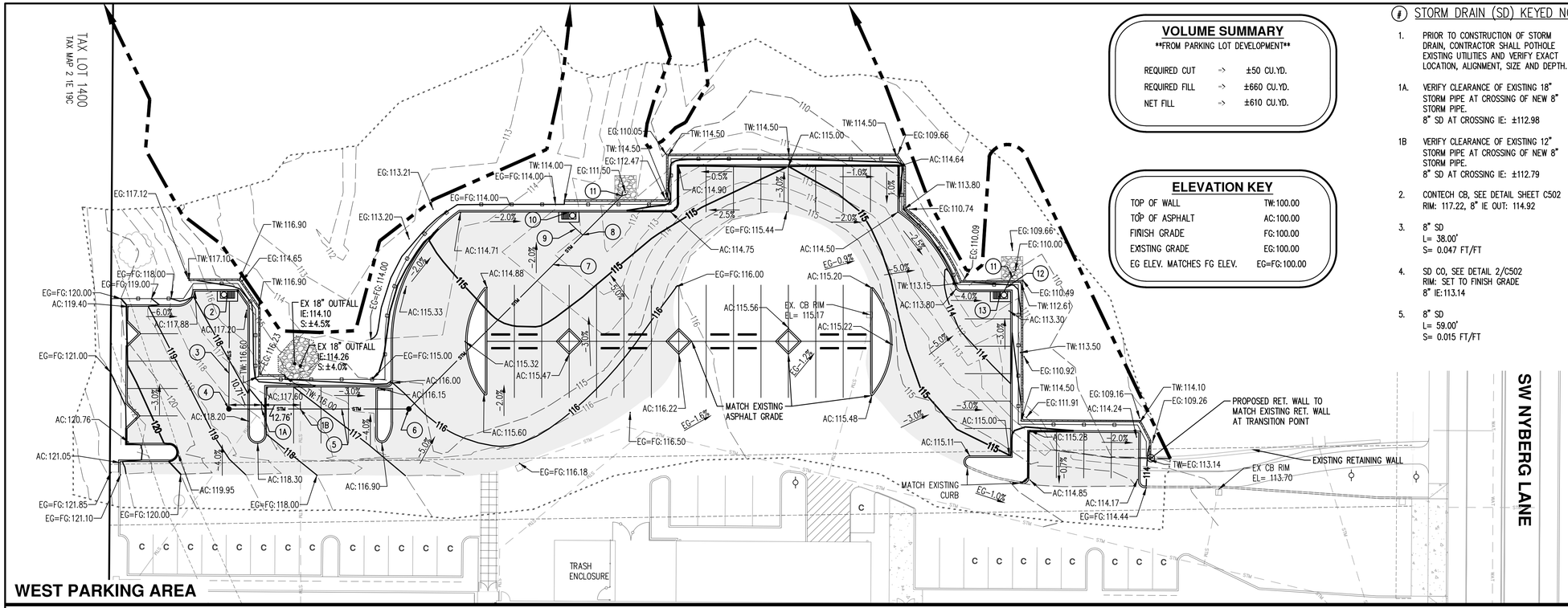
REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 13, 2004
CRAIG E. GOWARD
RENEWS: JUNE 30, 2017

PRELIMINARY
NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C101



VOLUME SUMMARY

FROM PARKING LOT DEVELOPMENT

REQUIRED CUT	->	±50 CU.YD.
REQUIRED FILL	->	±660 CU.YD.
NET FILL	->	±610 CU.YD.

ELEVATION KEY

TOP OF WALL	TW:100.00
TOP OF ASPHALT	AC:100.00
FINISH GRADE	FG:100.00
EXISTING GRADE	EG:100.00
EG ELEV. MATCHES FG ELEV.	EG=FG:100.00

(#) STORM DRAIN (SD) KEYED NOTES:

1. PRIOR TO CONSTRUCTION OF STORM DRAIN, CONTRACTOR SHALL POTHOLE EXISTING UTILITIES AND VERIFY EXACT LOCATION, ALIGNMENT, SIZE AND DEPTH.

1A. VERIFY CLEARANCE OF EXISTING 18" STORM PIPE AT CROSSING OF NEW 8" STORM PIPE.
8" SD AT CROSSING IE: ±112.98

1B VERIFY CLEARANCE OF EXISTING 12" STORM PIPE AT CROSSING OF NEW 8" STORM PIPE.
8" SD AT CROSSING IE: ±112.79

2. CONTECH CB, SEE DETAIL SHEET C502
RIM: 117.22, 8" IE OUT: 114.92

3. 8" SD
L= 38.00'
S= 0.047 FT/FT

4. SD CO, SEE DETAIL 2/C502
RIM: SET TO FINISH GRADE
8" IE: 113.14

5. 8" SD
L= 59.00'
S= 0.015 FT/FT

6. SD CO, SEE DETAIL 2/C502
RIM: SET TO FINISH GRADE
8" IE: 112.25

7. 8" SD TO OUTFALL
L= 100.00'
S= 0.0075 FT/FT
IE OUT: 111.50

8. INSTALL 8" "WYE" WHERE CB LEAD INTERSECTS STORM MAINLINE

9. 8" SD
L= 7.50'
S= 0.006 FT/FT

10. CONTECH CB, SEE DETAIL SHEET C502,
RIM: 114.00, 8" IE OUT: 111.70

11. INSTALL 4'X10' STORM OUTFALL PER DETAIL 1/C501, MATCH EXISTING GRADE.

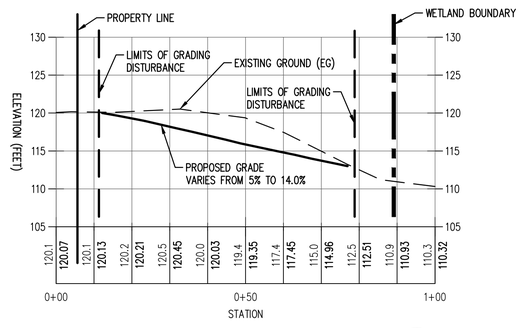
12. 8" SD TO OUTFALL
L= 7.00'
S= 0.13 FT/FT
IE OUT: 110.00

13. CONTECH CB, SEE DETAIL SHEET C502,
RIM: 113.22, 8" IE OUT: 110.92

NEW PARKING LOT ASPHALT

SCALE 1" = 20 FEET

FLOOD PLAIN CUT/FILL BALANCE AREA



CUT SECTION 1

SCALE: HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=10'

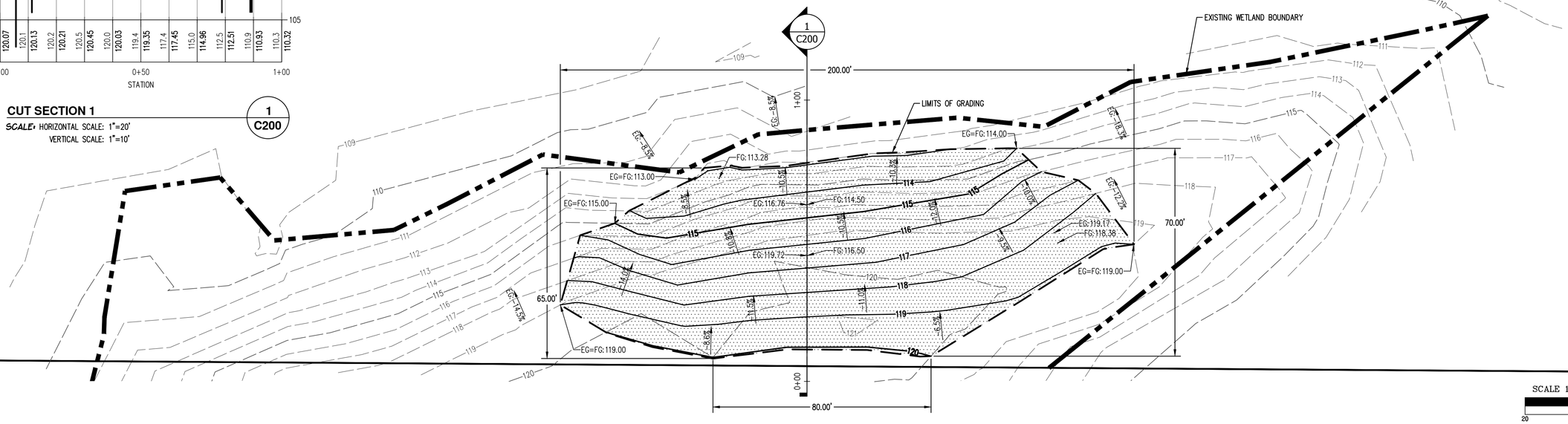
1 / C200

CUT/FILL BALANCE GRADING AREA

VOLUME SUMMARY

FOR GRADING BALANCE SITE

REQUIRED CUT	->	±610 CU.YD.
REQUIRED FILL	->	0 CU.YD.
NET CUT	->	±610 CU.YD.



SCALE 1" = 20 FEET

GRADING AND DRAINAGE PLAN

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE:	05/10/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 19, 2005
CRAIG E. GOODWARD
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

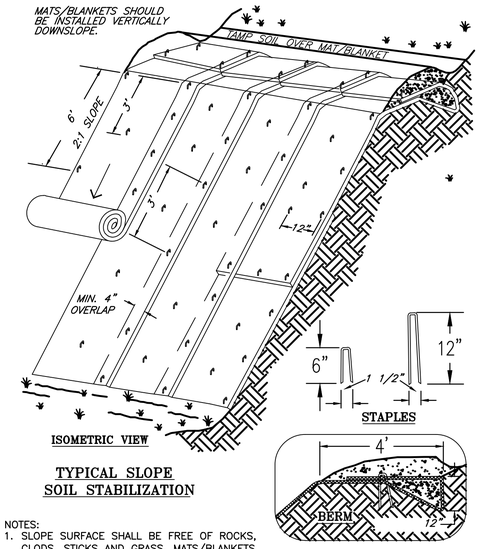
SHEET C200

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

AKS ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900
CLACKAMAS COUNTY TAX MAP 2 1E 19C

AKS DRAWING FILE: 4490 C200 GRADING AND DRAINAGE.DWG | LAYOUT: C200 GRADING&DRAINAGE



TYPICAL SLOPE SOIL STABILIZATION

NOT TO SCALE

NOTES:
1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
4. STAKING OR STAPLING LAYOUT PER MANUFACTURERS SPECIFICATIONS.

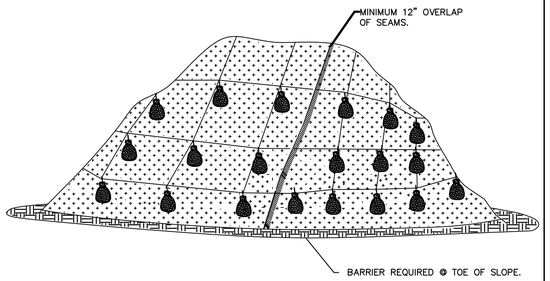
FILE: BLNKTSLP

MATTING SLOPE INSTALLATION

DRAWING NO. 805 REVISED 12-06

CleanWater Services Our commitment is clear.

FOR FURTHER INFORMATION ON DESIGN CRITERIA SEE CHAPTER 4 OF CLEAN WATER SERVICES EROSION PREVENTION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.



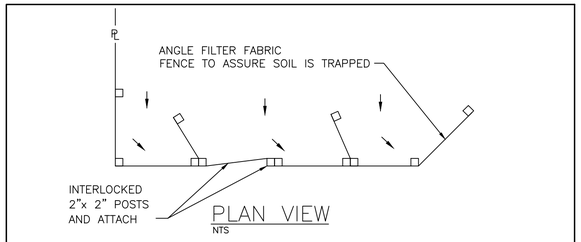
PLASTIC SHEETING

NOTES:
1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER REQUIRED @ TOE OF STOCK PILE.
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPES WITH A MAXIMUM 10' GRID SPACING IN ALL DIRECTIONS.

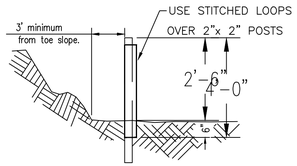
PLASTIC SHEETING

DRAWING NO. 810 REVISED 12-06

CleanWater Services Our commitment is clear.

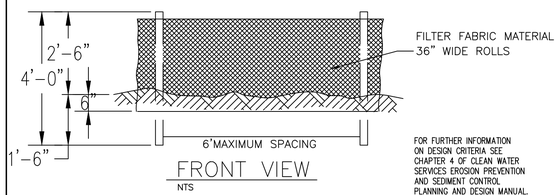


PLAN VIEW
NTS



PROFILE
NTS

NOTES:
1. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
2. 2"x 2" FIR, PINE OR STEEL FENCE POSTS.
3. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
4. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.
5. PANELS MUST BE PLACED ACCORDING TO SPACING ON DETAIL NO.940



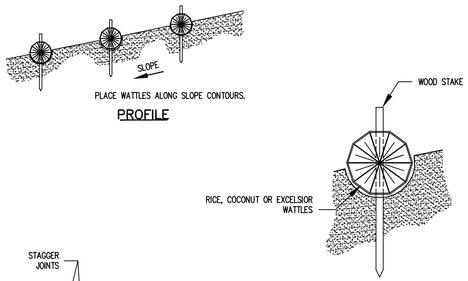
FRONT VIEW
NTS

FOR FURTHER INFORMATION ON DESIGN CRITERIA SEE CHAPTER 4 OF CLEAN WATER SERVICES EROSION PREVENTION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

SEDIMENT FENCE

DRAWING NO. 875 REVISED 12-06

CleanWater Services Our commitment is clear.



PLAN VIEW

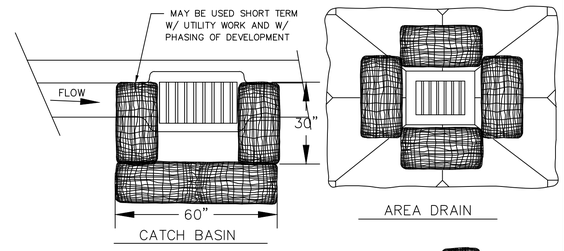
NOTES:
1. STAKING SPECIFICATIONS:
   a. 1"X2" WOODEN STAKES
   b. ADDITIONAL STAKES MAY BE INSTALLED ON DOWNHILL SIDE OF WATTLES, ON STEEP SLOPE OR HIGHLY EROSIVE SOILS.
2. SPACING IN ACCORDANCE WITH DETAIL 940.

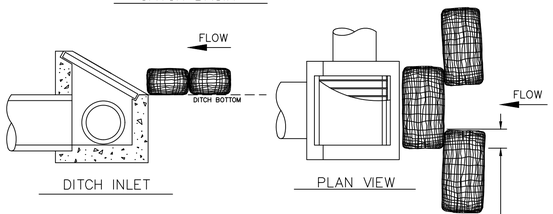
FOR FURTHER INFORMATION ON DESIGN CRITERIA SEE CHAPTER 4 OF CLEAN WATER SERVICES EROSION PREVENTION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

WATTLES

DRAWING NO. 880 REVISED 12-06

CleanWater Services Our commitment is clear.





NOTES:
1. ADDITIONAL MEASURES MUST BE CONSIDERED DEPENDING ON SOIL TYPES.
2. BIO-FILTER BAGS SHOULD BE STAKED WHERE APPLICABLE USING (2) 1"x2"WOODEN STAKES OR APPROVED EQUAL PER BAG.
3. WHEN USING 30" BIO-BAGS TO PROTECT A CATCH BASIN YOU MUST HAVE 4 BAGS AND THEY SHALL BE OVERLAPPED BY 6".

FOR FURTHER INFORMATION ON DESIGN CRITERIA SEE CHAPTER 4 OF CLEAN WATER SERVICES EROSION PREVENTION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

INLET PROTECTION TYPE 4

DRAWING NO. 915 REVISED 12-06

CleanWater Services Our commitment is clear.

CHAIN LINK FENCE AND GATE

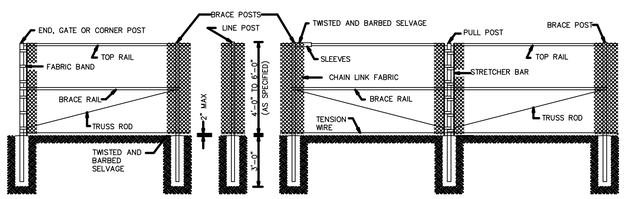
DRAWING NO. 740 REVISED 12-06

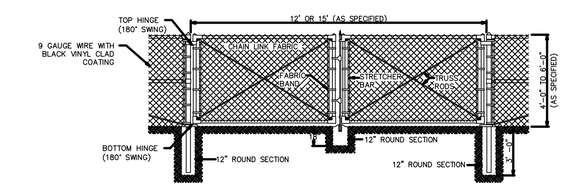
CleanWater Services Our commitment is clear.

MEMBER	NOMINAL DIA (IN)	MATERIAL
BRACE RAIL	1.660	GALV TUBULAR STL
GATE FRAME	2.00	GALV TUBULAR STL
LINE POSTS	2.375	GALV TUBULAR STL
END & CORNER POST	2.875	GALV TUBULAR STL
CHAIN LINK FABRIC		9 GA. W/BLACK VINYL CLAD COATING.

	GATE OPENING (ft)	NOMINAL DIA (IN)	MATERIAL
GATE POST	12' OR 15'	4	GALV TUBULAR STL

NOTES:
1. ALL FITTINGS, FASTENERS, & AND FABRIC TIES SHALL BE HOT DIP GALV.
2. CONC SHALL BE MIN 2500 PSI @ 28 DAYS.
3. PROVIDE BRACE RAIL BETWEEN END POSTS AND LINE POSTS. LENGTHS AS REQ'D.
4. PROVIDE GATE STOPS AND DROP RECEIVERS SET IN CONCRETE, EACH GATE.
5. PROVIDE EXTENSION ARMS ON LINE, END AND CORNER POSTS & GATE POSTS AS REQ'D.
6. PROVIDE SIGHT OBSCURING SLATS WITH ALL WASTEWATER PUMP STATIONS.
7. CENTER BRACE RAIL NOT REQUIRED WITH FENCE HEIGHT OF 5' OR LESS.
8. ALL POSTS AND RAILS TO MATCH FENCE COLOR.





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

AKS ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

DETAILS

DESIGNED BY:	CEG
DRAWN BY:	AJW
CHECKED BY:	CEG
SCALE:	AS NOTED
DATE: 05/10/2016	

REGISTERED PROFESSIONAL ENGINEER OREGON CRAIG E. GIBSON 2001 RENEWAL: JUNE 30, 2017

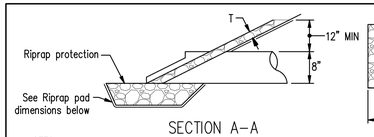
PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

SHEET C500

AKS DRAWING FILE: 4490 C500 DETAILS.DWG | LAYOUT: C500 ESC



SECTION A–A

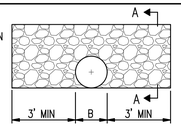
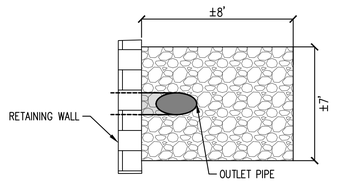
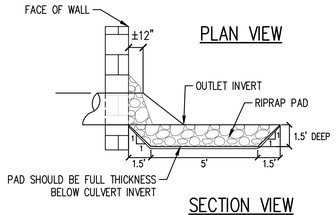


TABLE A	
Riprap Class	T Distance
50	6 Inches

NOTES:
1. SUITABLE VEGETATION CAN BE PLANTED IN RIPRAP.
2. B = OUTSIDE DIAMETER OF PIPE.
3. DO NOT EXCAVATE NON–ERODIBLE ROCK TO PLACE RIPRAP.

EMBANKMENT PROTECTION





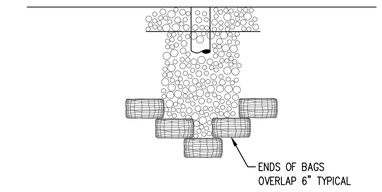
PLAN VIEW

SECTION VIEW

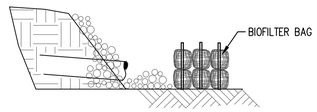
RIPRAP PAD DIMENSIONS

RIP–RAP OUTFALL
N.T.S.

1



PLAN VIEW
NTS

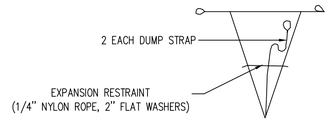


PROFILE

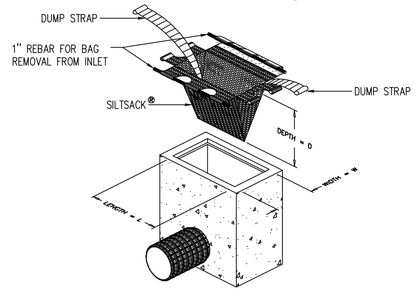
NOTE:
1. BIO BAGS ONLY REQUIRED WHEN DISCHARGING SEDIMENT LADEN WATER.
2. STAKING OF BAGS REQUIRED WITH EITHER METHOD USING (2) 1"x2"x3' WOOD STAKES OR APPROVED EQUAL PER BAG.

RIP–RAP OUTFALL PROTECTION
N.T.S.

2



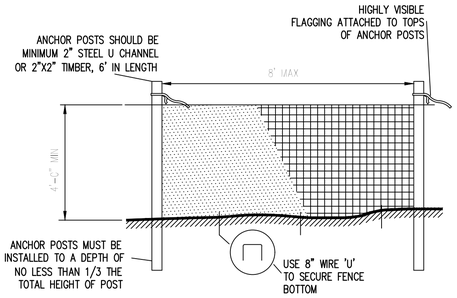
BAG DETAIL



NOTES:
1. USE REGULAR FLOW ONLY. DO NOT USE HIGH FLOW INSERT BAGS

INLET PROTECTION
N.T.S.

3



NOTES:
1. BLAZE ORANGE OR BLUE PLASTIC MESH FENCE FOR TREE PROTECTION DEVICE, ONLY
2. BOUNDARIES OF PROTECTION AREA WILL BE ESTABLISHED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION
3. BOUNDARIES OF PROTECTION AREA SHOULD BE STAKED AND FLAGGED BY THE CONTRACTOR PRIOR TO INSTALLING DEVICES.
4. AVOID DAMAGE TO CRITICAL ROOT ZONE. DO NOT DAMAGE OR SEVER LARGE ROOTS WHEN INSTALLING POSTS.
5. DEVICE SHOULD BE MAINTAINED THROUGHOUT CONSTRUCTION.

TREE PROTECTION FENCING DETAIL
N.T.S.

4

12"X18" SIGNS SHALL BE PLACED IN A MANNER AS TO CLEARLY IDENTIFY THE SENSITIVE AREA AND VEGETATED CORRIDOR AS WELL AS AT ALL POINTS OF ENTRY SUCH AS THE BEGINNING OF PATHS. TRAIL HEADS AND ANY PLACE THAT THE PUBLIC MAY WANT OR BE ABLE TO ENTER AREA.

4"X4" SIGNS SHALL BE USED FOR AREAS WHERE A LARGE NUMBER OF SIGNS ARE NEEDED SUCH AS THE BACK OR SIDE YARDS ON EACH LOT ADJACENT TO THE SENSITIVE AREA OR VEGETATED CORRIDOR IN NEW SUBDIVISIONS OF PARTITIONS.

VEGETATED CORRIDOR SIGNAGE

DRAWING NO. 790 REVISED 12–06

CleanWater Services
Our commitment is clear.

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

AKS
ENGINEERING - SURVEYING - NATURAL RESOURCES
FORESTRY - PLANNING - LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN
OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 19C
TAX LOTS 900

DETAILS

DESIGNED BY: CEG
DRAWN BY: AJW
CHECKED BY: CEG
SCALE: AS NOTED
DATE: 05/10/2016

REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 19, 2005
CHRISTOPHER E. GOODWARD
RENEWS: JUNE 30, 2017

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER
4490

SHEET
C501

AKS DRAWING FILE: 4490 C500 DETAILS.DWG | LAYOUT: C501 ESC STM

STORMFILTER CATCHBASIN DESIGN NOTES

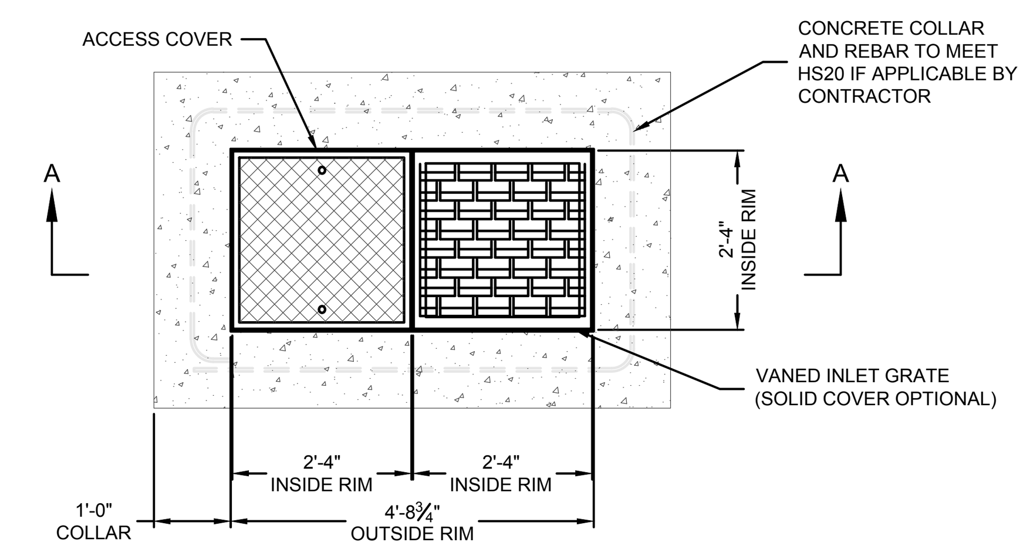
STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 1 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF ONE CARTRIDGE. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL.
PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION

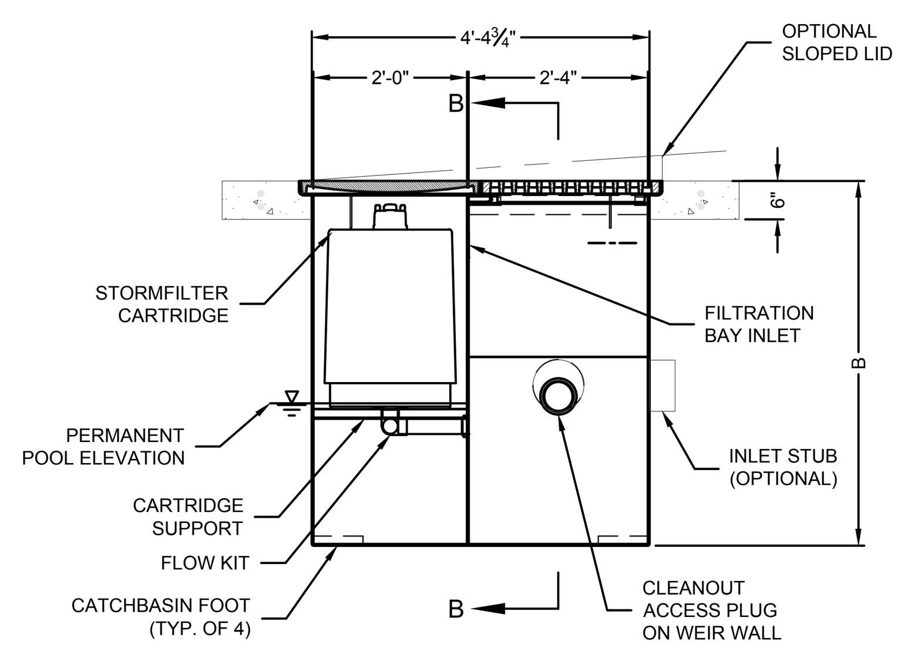
CARTRIDGE HEIGHT	27"		18"		18" DEEP	
MINIMUM HYDRAULIC DROP (H)	3.05'		2.3'		3.3'	
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	15	7.5
PEAK HYDRAULIC CAPACITY	1.0		1.0		1.8	
INLET PERMANENT POOL LEVEL (A)	1'-0"		1'-0"		2'-0"	
OVERALL STRUCTURE HEIGHT (B)	4'-9"		3'-9"		4'-9"	

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
4. INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
5. STORMFILTER CATCHBASIN EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING. STANDARD OUTLET STUB IS 8 INCHES IN DIAMETER. MAXIMUM OUTLET STUB IS 15 INCHES IN DIAMETER. CONNECTION TO COLLECTION PIPING CAN BE MADE USING FLEXIBLE COUPLING BY CONTRACTOR.
6. STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO M306 LOAD RATING. TO MEET HS20 LOAD RATING ON STRUCTURE, A CONCRETE COLLAR IS REQUIRED. WHEN REQUIRED, CONCRETE COLLAR WITH QUANTITY (2) #4 REINFORCING BARS TO BE PROVIDED BY CONTRACTOR.
7. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 37 SECONDS.
8. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

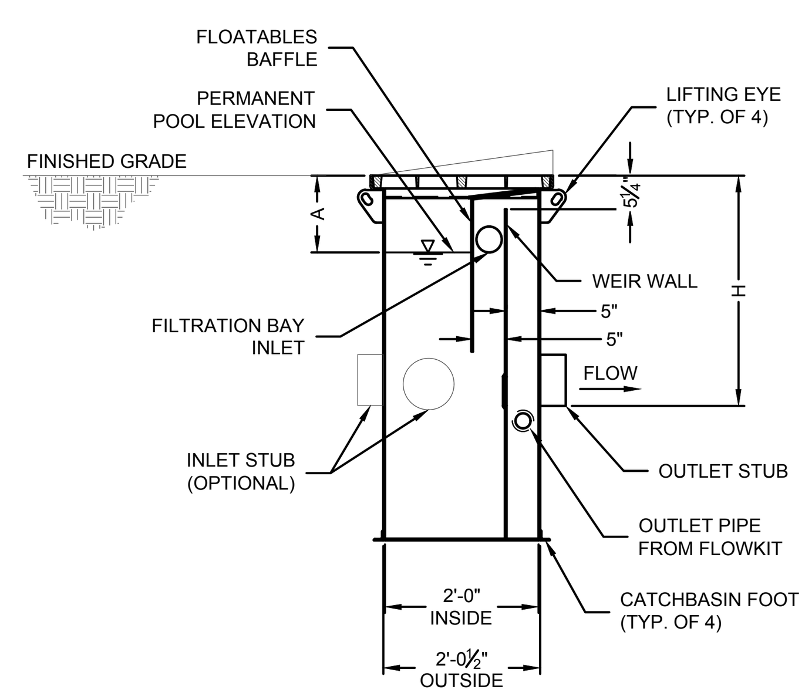
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.



PLAN VIEW



SECTION A-A



SECTION B-B

1-CARTRIDGE CATCHBASIN STORMFILTER DATA		
STRUCTURE ID		PER_PLAN
WATER QUALITY FLOW RATE (cfs)		STM_RPT
PEAK FLOW RATE (<1 cfs)		.31
RETURN PERIOD OF PEAK FLOW (yrs)		25
CARTRIDGE FLOW RATE (gpm)		15
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)		ZPG
RIM ELEVATION		PER_PLAN
PIPE DATA:	I.E.	DIAMETER
INLET STUB	PER_PLAN	8"
OUTLET STUB	PER_PLAN	8"
CONFIGURATION (OUTLET / INLET / INLET)		
SLOPED LID		NO
SOLID COVER		YES

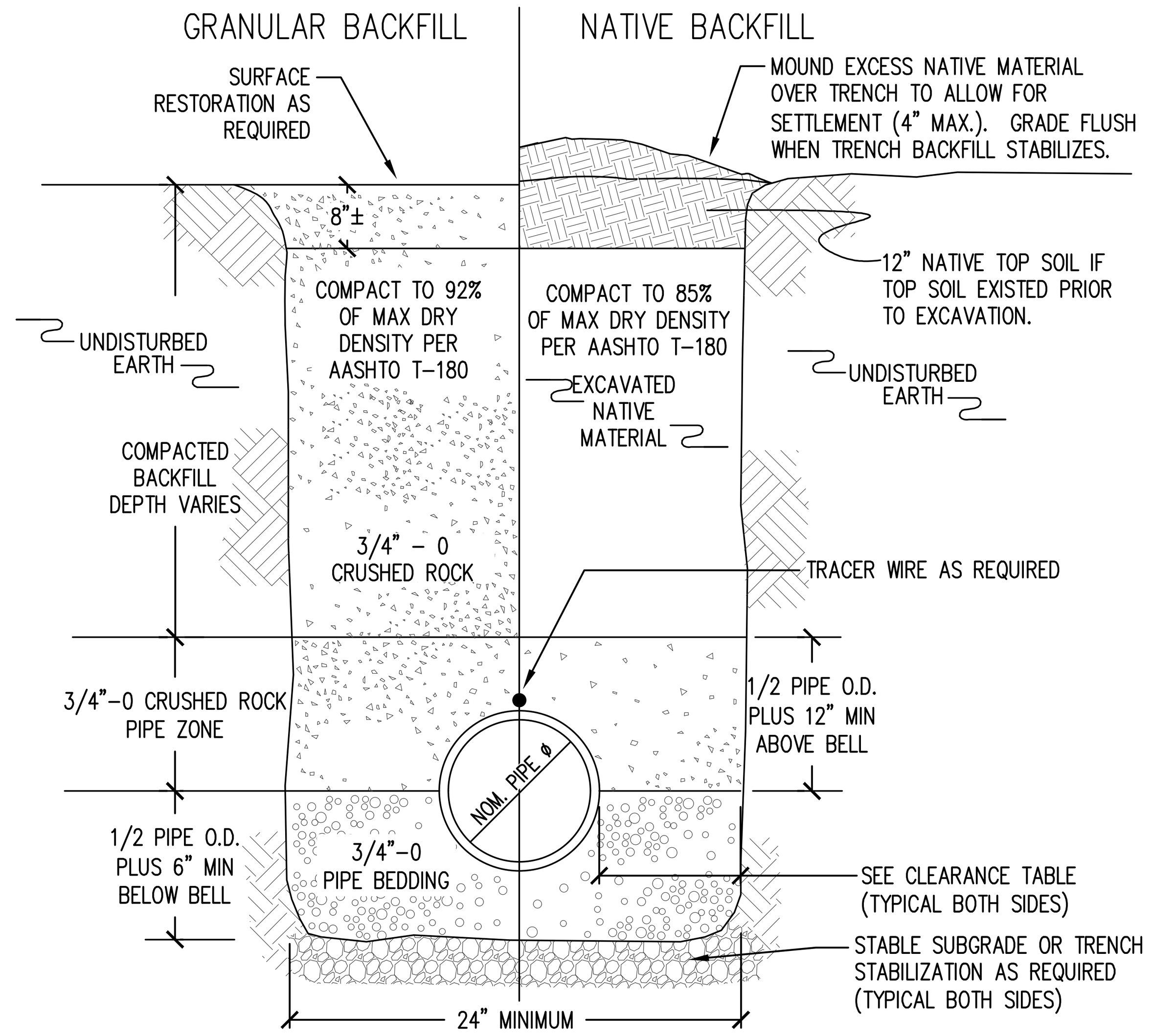
NOTES/SPECIAL REQUIREMENTS:
*SEE PLANS FOR SPECIFIC CATCH BASIN DATA (INVERT ELEVATIONS, RIM ELEVATIONS ETC.)
*SEE STORM REPORT FOR STORM WATER FLOW RATE DATA

The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: ... RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CONTECH ENGINEERED SOLUTIONS LLC
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

1 CARTRIDGE STEEL CATCH BASIN
STORMFILTER
STANDARD DETAIL

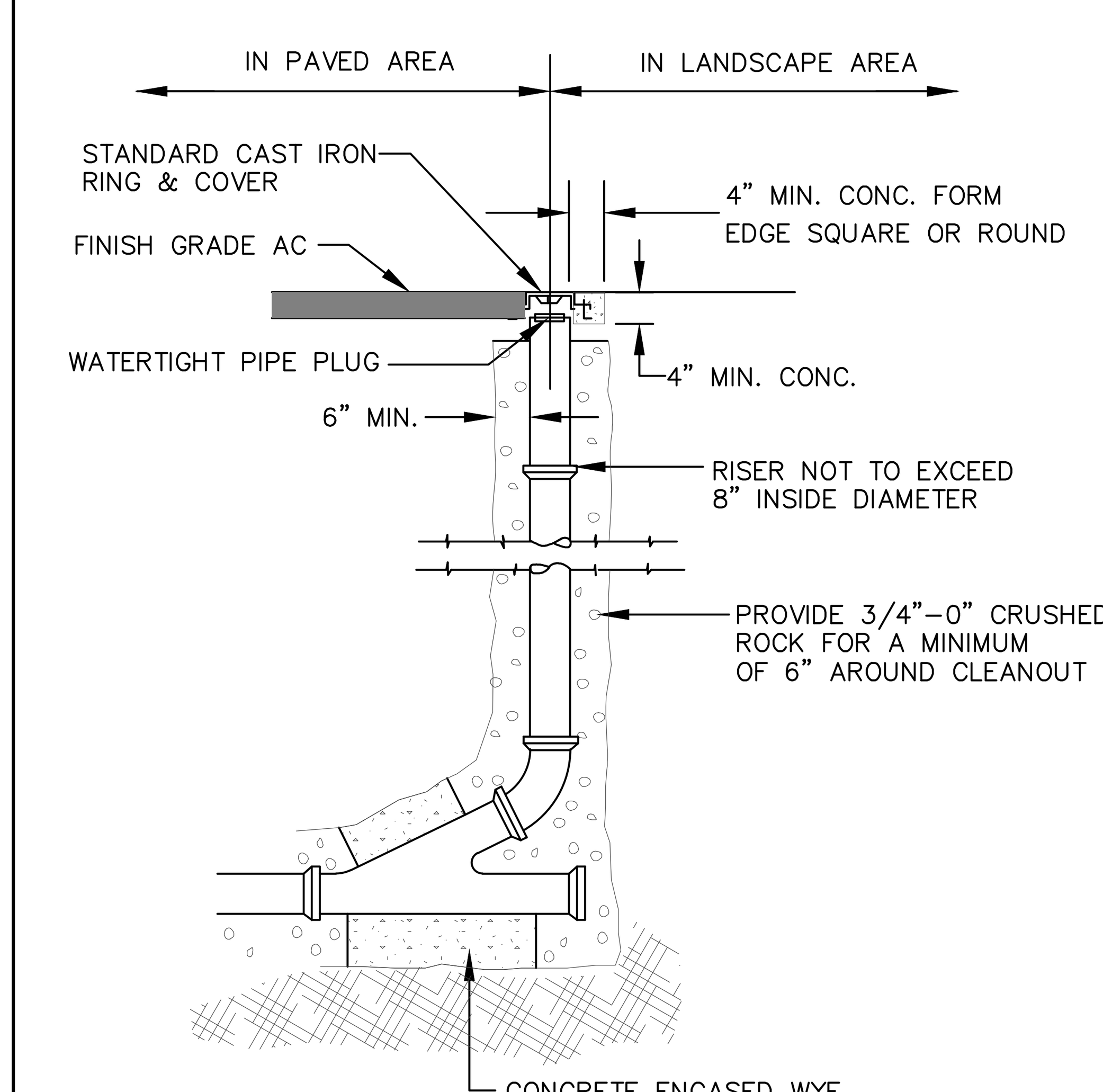


CLEARANCE TABLE	
NOM. PIPE DIAMETER	MIN/MAX CLEARANCE
≤10"	10"/18"
12"-16"	12"/18"
18"-21"	16"/24"
24"-30"	18"/30"
>30"	24"/36"

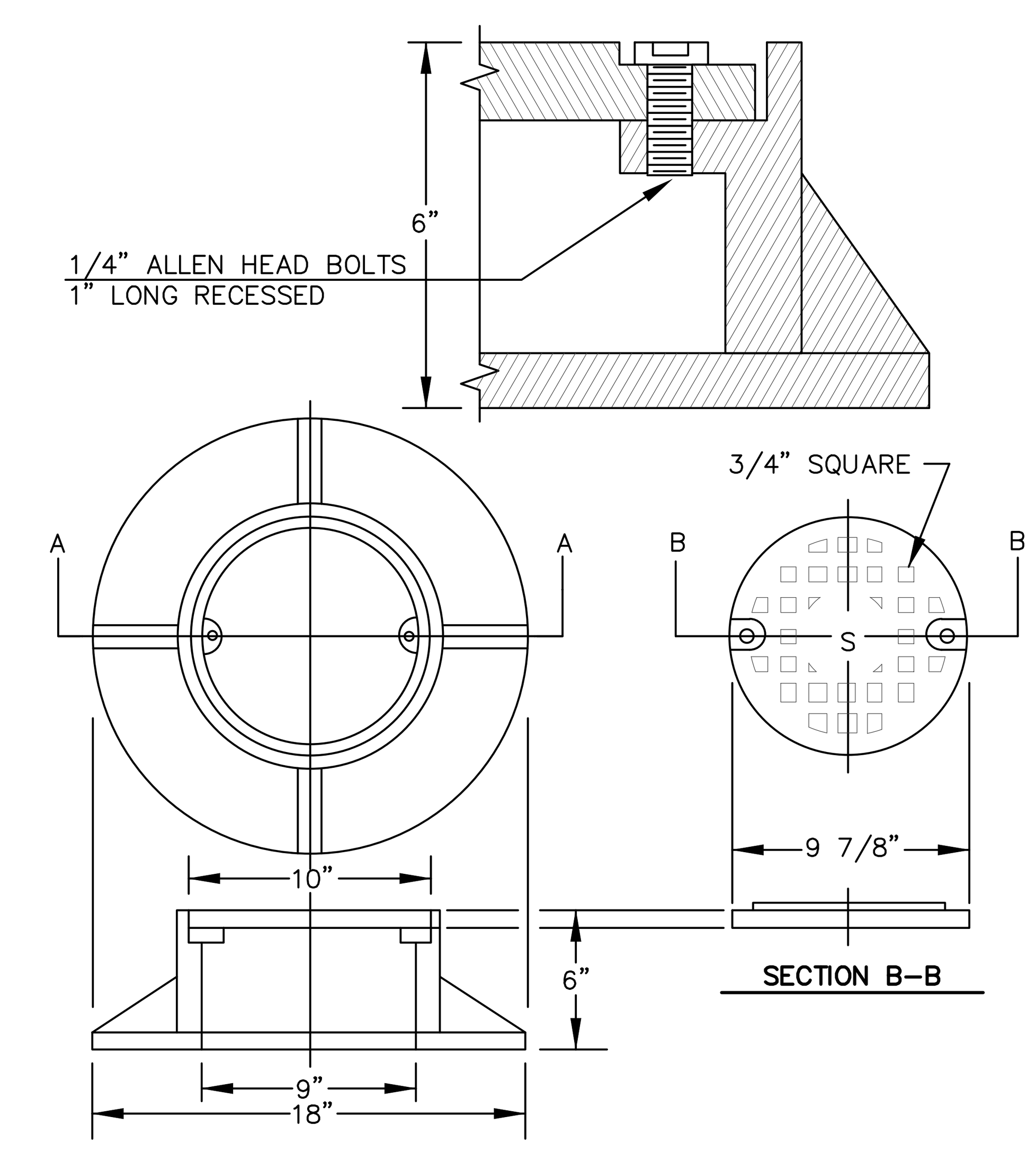
MULTIPLE PIPE INSTALLATIONS	
DIAMETER	SPACE BETWEEN PIPES
UP TO 21"	8" MIN / 12" MAX

NOTES:
1. GRANULAR BACKFILL REQUIRED UNDER ALL EXISTING OR FUTURE IMPROVED AREAS INCLUDING SIDEWALKS.
2. WHERE NEW PIPING IS IN SAME ALIGNMENT AS EXISTING PIPING, THE PIPE EMBEDMENT SHALL EXTEND TO A MINIMUM OF 6" BELOW THE NEW PIPING OR 6" BELOW EXISTING PIPING, WHICHEVER IS DEEPER.
3. FOR FLEXIBLE PIPE, BOTTOM OF TRENCH SHORING SHALL BE ABOVE SPRINGLINE AND UNDER THE PIPE HAUNCHES.

TRENCH BACKFILL
N.T.S.
1



STANDARD CLEANOUT (C.O.)
N.T.S.
2



CLEANOUT RING AND COVER
N.T.S.
3

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN OREGON

TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

DETAILS

DESIGNED BY: CEG
DRAWN BY: AJW
CHECKED BY: CEG
SCALE: AS NOTED
DATE: 05/10/2016

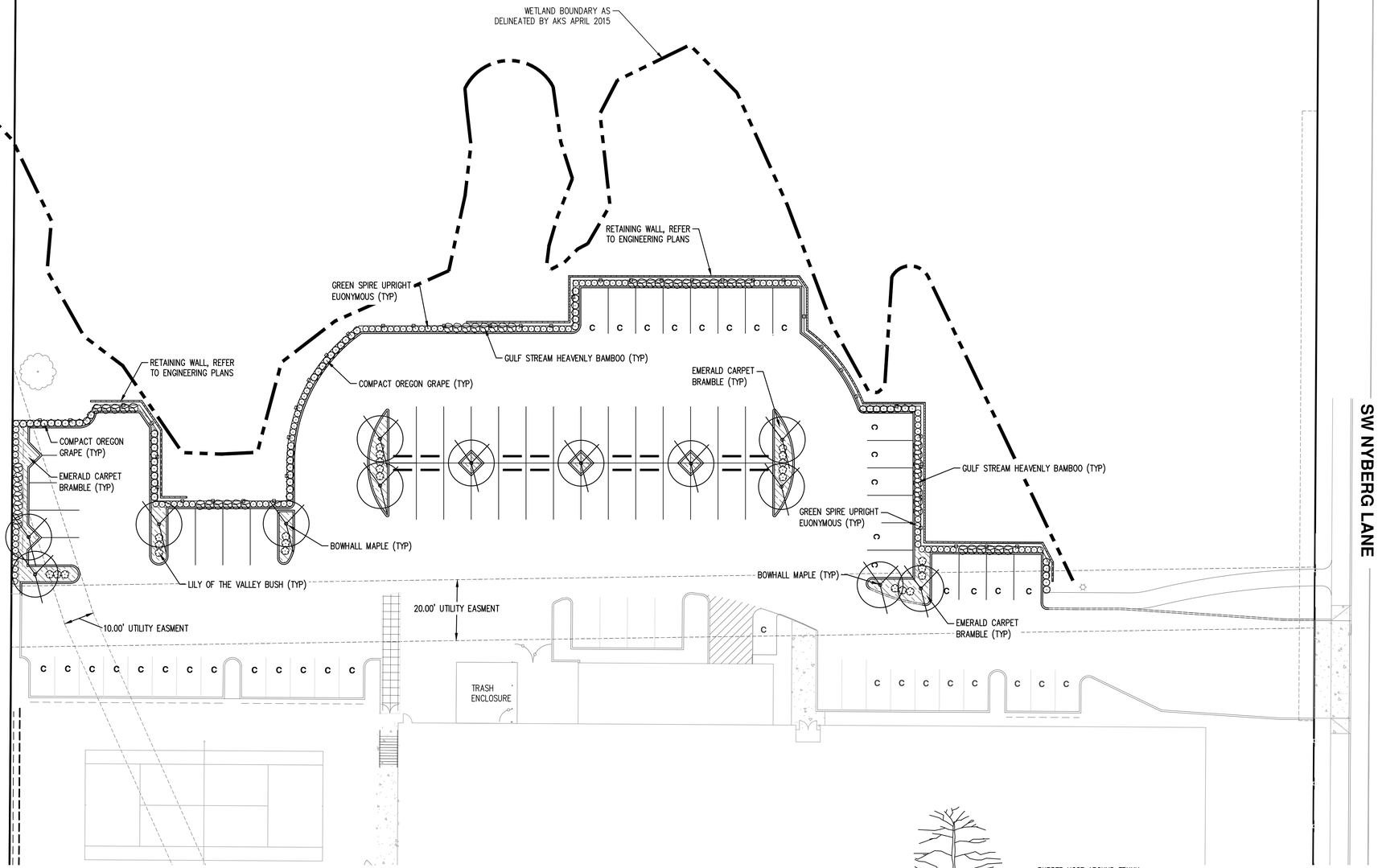
PRELIMINARY NOT FOR CONSTRUCTION
REGISTERED PROFESSIONAL ENGINEER OREGON ... RENEWS: JUNE 30, 2017

REVISIONS

JOB NUMBER
4490

SHEET
C502

AKS DRAWING FILE: 4490 C500 DETAILS.DWG | LAYOUT: C502 STM DETS

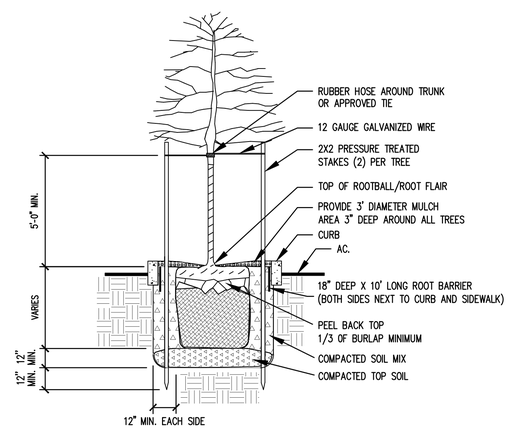


SCALE 1" = 20 FEET

20 0 8 12 16 20

PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE/CONTAINER	SPACING
	13	ACER RUBRUM 'BOWHALL'	BOWHALL MAPLE	2" CAL. B&B	AS SHOWN
SHRUBS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE/CONTAINER**	**SPACING**
	99	EUONYMUS JAPONICUS 'GREENSPIRE'	GREENSPIRE UPRIGHT EUONYMUS	2 GAL. CONT.	24" o.c.
	58	MAHONIA AQUIFOLIUM 'COMPACTA'	COMPACT OREGON GRAPE	2 GAL. CONT.	30" o.c.
	54	NANDINA DOMESTICA 'GULF STREAM'	GULF STREAM HEAVENLY BAMBOO	2 GAL. CONT.	36" o.c.
	25	PIERIS JAPONICA 'CAVATINE'	LILY OF THE VALLEY BUSH	2 GAL. CONT.	30" o.c.
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE/CONTAINER**	**SPACING**
	95	RUBUS CALYCINOIDES 'EMERALD CARPET'	EMERALD CARPET BRAMBLE	1 GAL. CONT.	36" o.c.



1 / L100 TYPICAL TREE PLANTING DETAIL

NTS

NOTES:
1. DRIVE STAKES OUTSIDE OF ROOTBALL.
2. SET TREE 2" ABOVE FINISH GRADE TO ALLOW FOR SETTLING OF SOIL.
3. SOIL MIX FOR TREE PLANTING TO BE 1/3 ORGANIC MATERIALS, 1/3 TOPSOIL, AND 1/3 SANDY LOAM.
4. REMOVE ALL WIRES, METAL BASKETS, TWINE, AND OTHER NON-COMPOSTABLE MATERIALS FROM TREE ROOTBALL PRIOR TO PLANTING.

GENERAL LANDSCAPING NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PLANT QUANTITIES. IF DISCREPANCIES OCCUR, DESIGN INTENT PREVAILS OVER QUANTITIES LISTED.
2. PLANTS AND PLANTING ACTIVITY SHALL CONFORM TO THE CITY OF TUALATIN DESIGN STANDARDS AND TO AMERICAN NURSERY STANDARDS ASN 1260.1. PLANT IN ACCORDANCE WITH 'BEST-PRACTICE' INDUSTRY STANDARDS ADOPTED BY THE OREGON LANDSCAPE CONTRACTORS BOARD (OLCB). PLANTS SHALL BE HEALTHY, EVENLY BRANCHED, AND TYPICAL FOR THEIR SPECIES ACCORDING TO AMERICAN STANDARD FOR NURSERY STOCK ANSI Z60.1 CURRENT EDITION. CONTAINERIZED STOCK SHALL BE FULLY ROOTED IN THE CONTAINER IN WHICH THEY ARE DELIVERED.
3. TREES TO BE PLANTED SHALL MEET THE REQUIREMENTS OF THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN) STANDARDS FOR NURSERY STOCK (ANSI Z60.2) FOR GRADE NO. 1 OR BETTER. DOUBLE STAKE ALL NEW TREES. TREES SHALL BE SYMMETRICAL, WELL-BRANCHED, VIGOROUS, AND TYPICAL FOR THEIR SPECIES. BALLED AND BURLAPPED TREES SHALL BE GROWN UNDER FAVORABLE GROWING CONDITIONS IN THE NURSERY, HAVING RECEIVED THE PROPER CULTURAL TREATMENT TO DEVELOP A WELL-BRANCED ROOT SYSTEM AND HARVESTED WITH THE BALL OF EARTH IN WHICH THEY ARE GROWING REMAINING INTACT. ROOT BALL SIZE SHALL BE OF A DEPTH AND DIAMETER TO ENCOMPASS ENOUGH OF THE ROOT SYSTEM AS NECESSARY FOR THE FULL RECOVERY OF THE PLANT, A MINIMUM OF 20"-24" DIAMETER (REFER TO ANSI Z60.1.6.1 AND TABLE 6).
4. PROVIDE (2) 18" DEEP X 10' LONG ROOT BARRIERS PER TREE, ADJACENT TO PAVED DRIVELANES. CENTER ROOT BARRIERS ON EACH TREE TRUNK. ROOT BARRIERS SHALL BE DEEP ROOT UP 18-2 OR OTHER SIMILAR RIGID STYLE ROOT BARRIER.
5. SUBSTITUTIONS TO PLANT SPECIES, SPACING, SIZES, ETC. MAY BE ACCEPTED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION DUE TO UNFORESEEN SITE CONDITIONS, PLANT AVAILABILITY, ETC. WHERE ALLOWED UNDER CITY OF TUALATIN STANDARDS.
6. HATCHED AREAS ARE MEANT TO CONVEY GENERAL PLANT LOCATION. PLANT COVERAGE, SPACING, AND LAYOUT SHALL BE CONSISTENT WITH THE SPACING LISTED IN THE PLANT LEGEND FOR FULL COVERAGE.
7. CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF OFF-SITE, ALL ORGANIC AND/OR UNSUITABLE MATERIALS, INCLUDING TREES, STUMPS, ROOTS, BRUSH AND LIMBS, CONCRETE, ASPHALT, GRAVELS, ETC. IN SUCH A MANNER TO MEET ALL APPLICABLE REGULATIONS.
8. SOIL PREPARATION: UNDER NO CIRCUMSTANCES SHOULD THE ROOT SYSTEMS OF EXISTING PLANTS TO REMAIN BE DISTURBED. IN EXISTING PLANTING AREAS CONTRACTOR SHALL AMEND SOIL BY SPREADING A 2" LAYER OF ORGANIC COMPOST, SUCH AS YARD DEBRIS OR OTHER NON-ANIMAL SOURCED COMPOST, AND TILL TO A DEPTH OF 6". FINISH GRADE IN THESE AREAS SHALL NOT EXCEED GRADE OF ADJACENT EXISTING PAVEMENT. REMOVE ALL ROCKS, CONCRETE CHUNKS, AND ALL OTHER NON-ORGANIC EXTRANEOUS MATERIAL FROM EXISTING PLANTING BEDS. PLANTS IN EXISTING BEDS SHALL BE POCKET PLANTED WITH AMENDED SOIL CONTAINING 1/3 TOPSOIL, 1/3 ORGANIC COMPOST, AND 1/3 SANDY SOIL. WHERE NEW PLANTING BEDS ARE CREATED IN PREVIOUSLY ASPHALTED OR OVERLY-COMPACTED SOIL, CONTRACTOR SHALL ENTIRELY REMOVE PAVING, GRAVEL/ROCK, HARDENED SUB SOIL, AND OTHER SUBSTANCES HARMFUL TO PLANT GROWTH. PROVIDE AND SPREAD A MINIMUM OF 24" OF AMENDED SOIL MIX IN ALL NEW PLANTING AREAS OR AS NECESSARY TO MEET FINISH GRADE. AMENDED SOIL MIX SHALL CONSIST OF A BLEND OF 1/3 APPROVED TOPSOIL 1/3 ORGANIC MULCH, AND A 1/3 COARSE SAND. ORGANIC MULCH SHALL BE COARSE GRIND ROTTED BARK OR SAWDUST, PEAT MOSS, OR COMPOSTED YARD DEBRIS. TOPSOIL SHALL BE RICH DARK BROWN IN COLOR AND VOID OF ROOTS, PLANTS, SOD, STONES, CLAY LUMPS, ALKALI SALTS, DEBRIS, AND OTHER EXTRANEOUS MATERIALS HARMFUL TO PLANT GROWTH. FINISH GRADE OF NEW PLANTING AREAS SHALL SEAMLESSLY MEET FINISH GRADE OF SURROUNDING AREAS.
9. MULCH: APPLY 3" DEEP MEDIUM GRIND OR SHREDDED DARK HEMLOCK OR FIR BARK MULCH UNDER AND AROUND ALL NEW PLANTINGS. CARE SHALL BE TAKEN TO AVOID COVERING FOLIAGE OR ROOT CROWNS OF PLANTS. PLANTS SHALL BE PLANTED AT A DEPTH TO ACCOMMODATE BARK MULCH APPLICATION.
10. ALL LANDSCAPING SHALL BE CONTINUALLY MAINTAINED, INCLUDING NECESSARY WATERING, WEEDING, PRUNING, AND REPLACEMENT OF DEAD PLANT MATERIAL, IN A SUBSTANTIALLY SIMILAR MANNER AS THE LANDSCAPE PLANS APPROVED BY THE ARCHITECTURAL REVIEW PROCESS. ALL MAINTENANCE SHALL FOLLOW INDUSTRY 'BEST PRACTICE' STANDARDS.
11. CONTRACTOR SHALL PROVIDE A COMPLETE, WATER-EFFICIENT IRRIGATION SYSTEM FOR THE LANDSCAPE COMPONENTS INSTALLED UNDER THE SCOPE OF WORK. IRRIGATION TO RAISED INFILTRATION PLANTERS TO BE TEMPORARY AND REMOVED AFTER THE 2-YEAR MONITORING PERIOD IF APPROVED BY CWS. ALL OTHER IRRIGATION TO NEW PLANTINGS TO BE PERMANENT, UNDERGROUND DRIP IRRIGATION. REFER TO IRRIGATION PLAN.
12. CONTRACTOR SHALL WARRANT PLANT MATERIAL AND IRRIGATION SYSTEM FOR A PERIOD OF 1-YEAR AFTER FINAL ACCEPTANCE AGAINST FAILURE, DEFECTS, AND DEATH, AND SHALL REPLACE AT NO ADDITIONAL COST TO THE OWNER ANY PLANT OR IRRIGATION SYSTEM COMPONENT THAT FAILS DURING THAT PERIOD.

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

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

STAFFORD HILLS CLUB
5916 SW NYBERG LANE
TUALATIN OREGON
TAX LOTS 900 CLACKAMAS COUNTY TAX MAP 2 1E 19C

LANDSCAPE PLAN

DESIGNED BY:	TEB/KAH
DRAWN BY:	TEB
CHECKED BY:	KAH
SCALE:	AS NOTED
DATE: 05/10/2016	

REGISTERED LANDSCAPE ARCHITECT TIMOTHY E. BUSWALD OREGON 06 APR 2013

PRELIMINARY NOT FOR CONSTRUCTION

REVISIONS

JOB NUMBER 4490

SHEET L100

AKS DRAWING FILE: 4490 L100 LANDSCAPE PLAN.DWG | LAYOUT: LANDSCAPE PLAN