



PLANNING COMMISSION

MEETING PACKET

September 27, 2016

PLANNING COMMISSION

PRE-MEETING

September 27, 2016



**Planning Commission Briefing Agenda
September 27, 2016
7:00 P.M.**

Members

Greg Wasinger, Chairman
Bruce Freeman, Vice-Chairman
Cecil Pierce
Jes Walker-Wyse
Hal Hovey
Alyssa Merriman

1. Council Action Update
 - Time Extension for Plats – Ordinance No. 1782 adopted at September 6, 2016 Meeting
2. Delayed Agenda Item
 - Model Home Code Amendment moved to October 25 Planning Commission Meeting
3. Current Planning
 - Upcoming code amendments
4. Long Range Planning
 - County Comprehensive Plan, CWPP and Inter-local Agreement
5. Planning Commission questions and comments
 - Agenda Items
 - General
6. Next Meeting – October 25, 2016

**2016
PLANNING COMMISSION
REGULAR BUSINESS MEETING
PENDING AGENDA**

Order	Item	Staff	Public Hearing?	CC Anticipated Dates	Notes
October 25, 2016					
1	Model Homes Code Amendment	Ray	Yes	Nov 1 or Nov 15	Rescheduled from 8/23/16 PC Mtg
2	Low Impact Development	Dennis	Yes (tent.)	Nov 15 (tent.)	See LID calendar
3	Sign Code	Ray	No	TBA	
November 29, 2016					
1	Sign Code	Ray	Yes (tent.)	TBA	
2					
December ____, 2016					
1					
2					

PLANNING COMMISSION

AGENDA

September 27, 2016

1. ROLL CALL: WASINGER _____ FREEMAN _____
 PIERCE _____ MERRIMAN _____
 HOVEY _____ WALKER-WYSE _____

2. **Approval of Minutes – August 23, 2016 Regular Business Meeting.**

3. **Public Comment** – Planning Commission will accept public comment for items not otherwise on the agenda for the first 15 minutes of the Planning Commission meeting.

4. **Public Hearings and Meetings:**

A. MARIN WOODS PLANNED RESIDENTIAL DEVELOPMENT (PRD) AND PRELIMINARY PLAT – Public Hearing

The Planning Commission will conduct a public hearing to consider the PRD, Preliminary Plat and Subdivision Waiver submitted by the George F. Marin Family Trust, for a 43-lot single-family residential subdivision known as Marin Woods on 10.6 acres, located at 1292 SW Swantown Avenue, parcel number R13204-459-4200. The Planning Commission may forward a recommendation to the City Council after conducting the public hearing.

B. MODEL HOMES CODE AMENDMENT – Public Hearing*

**This item has been rescheduled for the 10/25/2016 Planning Commission Meeting.*

The Planning Commission will conduct a public hearing to consider a code amendment to allow for the construction of a limited number of model homes within a subdivision before that subdivision's final plat has been approved. This change will allow developers to construct homes to display for sale after public improvements have been completed to serve the model homes. The number of homes allowed will be limited and the City will require securities be posted to ensure compliance with applicable codes and completion of improvements. The Planning Commission may forward a recommendation to the City Council after conducting the public hearing.

C. LOW IMPACT DEVELOPMENT – Public Meeting

Staff will present a status report to the Planning Commission on the low impact development code amendment project.

5. **Next Regular Business Meeting October 25, 2016**

6. **Adjournment**

REVISED 09/22/2016 LF

MINUTES

August 23, 2016

**City of Oak Harbor
Planning Commission
Regular Meeting Minutes
August 23, 2016 at 7:30 PM**

1. Roll Call

Present:

Greg Wasinger (Chair)
Bruce Freeman (Vice Chair)
Jes Walker-Wyse
Hal Hovey
Alyssa Merriman
Sandi Peterson

Staff Present:

Steve Powers, Development Services Director
Cac Kamak, Senior Planner
Dennis Lefevre, Senior Planner
Ray Lindenburg, Associate Planner

Absent:

Cecil Pierce

Chairman Wasinger called the meeting to order at 7:30 PM.

2. Approval of Minutes – July 26, 2016

Motion: Hal Hovey moved to approve the July 26, 2016 minutes as presented. ***Second:*** Bruce Freeman seconded the motion. With all in favor, the motion carried unanimously.

3. Public Comment: There were no comments from the public.

4. CODE AMENDMENTS – TIME EXTENSIONS FOR PLATS – Public Hearing

Staff Presentation

Cac Kamak, Senior Planner, presented to the Planning Commission Draft Ordinance No. 1782 [Attachment 1], to amend OHMC 21.20.080 and 21.40.020 to reflect the changes to time limit extensions for preliminary plats and the vesting period for final plats that were adopted by the State Legislature in SSB 6544 and SHB 1074. The time extensions vary based on dates of preliminary plat approval and Shoreline Management Act (SMA) jurisdiction. This presentation is a follow-up to the public meeting on the same subject at the Planning Commission Meeting held on July 26, 2016.

Public Hearing / Planning Commission Questions and Comments

Following the staff presentation, Chairman Wasinger opened the public hearing at 7:42 PM.

Brian Gentry with Landed Gentry Homes was called to speak. Mr. Gentry spoke in favor of the proposed code amendment.

Commissioner Hovey inquired if the City has any potential plats in the SMA area that these code changes would affect. Mr. Powers explained that there are not any plats in the SMA that are undeveloped that this code revision would impact. Commissioner Peterson inquired what would happen to plats which are not completed within the timeframes established by the code. Mr. Kamak replied that in this case the developer would have to reapply, and would be subject to the current code at the time. Regarding applying for extensions, the City code matches the maximum allowable extension under State Statute.

Chairman Wasinger closed the public hearing at 7:46 PM.

Motion

Motion: Sandi Peterson moved to recommend the City Council approve Draft Ordinance No. 1782 as written, which amends OHMC 21.20.080 "Effect of approval" and 21.40.020 "Timeline for submittal of final plat and extensions for completion of improvements". **Second:** Jes Walker-Wyse seconded the motion. With all in favor, the motion carried unanimously.

5. LOW IMPACT DEVELOPMENT – Public Meeting

Staff Presentation

Dennis Lefevre, Senior Planner, gave a presentation on the process of aligning City code with Low Impact Development (LID) requirements as established by the Department of Ecology (DOE). Per the national ranking system regarding pollution standards, Oak Harbor is considered a phase 2 city. The Planning Commission reviewed the DOE Toolkit regarding LIDs [Attachment 2]. This presentation was a follow-up to one given in January 2016 by Brad Gluth, Civil Engineer, on LID Best Management Practices (BMPs). To date, Staff has conducted multiple meetings on this topic, both with an internal core management team, and an external team consisting of parties whose industry will be impacted. Staff has reviewed how the Comprehensive Plan, Shoreline Management Practices, existing design standards, including road design, and existing stormwater systems already incorporate LID standards. Staff is now in the process of a gap analysis to determine where the existing code does not address the specific subtopics and considerations that DOE has identified. The deadline to have the LID requirements in place is December 31, 2016; the topic will be brought before the Planning Commission and the City Council in the coming months to meet this deadline. There will likely be a Workshop scheduled specifically for code amendments for LID requirements.

Planning Commission Questions and Comments

The Commissioners made many inquiries to Staff as to the applicability of LID requirements in Oak Harbor. Mr. Powers explained Staff's concern about the resulting urban form that will come from the LID regulations, as they work better in a much denser urban area. Staff is striving to determine how the City can meet the State mandated permit requirements but still maintain a code that will yield a product that fits the community. The main goal of the LID requirements for Oak Harbor is to keep Puget Sound clean, and to improve on its current condition. Applicability of the requirements will depend on if the area in question can support the regulations, which will be determined by the soil conditions, and other considerations. The LID requirements are not a one-size-fits all, and this is why Staff is analyzing existing code and planning for practical application to see how LID requirements will actually be implemented in Oak Harbor.

Additional Item

Mr. Powers acknowledged Kathy Gifford for her 20 years of service to the City. Kathy worked for the Fire Department for four years and 16 years for Development Services and is now retiring. Mr. Powers and the Commissioners thanked Kathy for her exceptional service and contribution to the success of Development Services and the Planning Commission throughout her career.

Chairman Wasinger adjourned the meeting at 8:21 PM.

Respectfully submitted,

Lisa Felix
Administrative Assistant, Development Services

ORDINANCE NO. 1782

AN ORDINANCE AMENDING OAK HARBOR MUNICIPAL CODE SECTION 21.20.080 “EFFECT OF APPROVAL” AND SECTION 21.40.020 “TIMELINE FOR SUBMITTAL OF FINAL PLAT AND EXTENSIONS FOR COMPLETION OF IMPROVEMENTS”

WHEREAS, RCW 58.17.140 and RCW 58.17.170 establish the time limits for filing for final plat approval and vesting periods for final plats; and

WHEREAS, the State Legislature adopted SSB 6544 in 2010, EHB 2152 in 2012, and SHB 1074 in 2013 to extend the time limit for filing final plats based on the time of preliminary plat approval and Shoreline Management Act jurisdiction; and

WHEREAS, the City of Oak Harbor finds that it is in the public’s best interest to amend the code to reflect the changes made by the State; and

WHEREAS, the Planning Commission held a public hearing on the code amendments on August 23, 2016; and

WHEREAS, after due and proper notice, public hearings on the amendments were conducted by the City Council on September 6, 2016;

NOW THEREFORE, THE CITY COUNCIL OF THE CITY OF OAK HARBOR do ordain as follows:

Section One. Oak Harbor Municipal Code, Section 21.20.080 entitled “Effect of approval”, last amended by Ord. 1617 (2011), is hereby amended to read as follows:

21.20.080 Effect of approval.

- (1) Approval of the preliminary plat by the city council shall constitute approval for the applicant to develop construction plans and specifications for facilities and improvements, as required, in strict conformance with the approved preliminary plat, street and utility standards adopted by the city, and any special conditions required by the council.
- (2) Permission shall not be granted for installation of required improvements until all construction plans and specifications have been approved in writing by the city engineer.
- (3) **Time for Performance.** Except as provided for in OHMC 21.40.020, construction shall be completed within five (5) years of the date of the city council resolution approving the preliminary plat or the preliminary plat approval shall terminate and all permits and approvals issued pursuant to such authorization shall expire and be null and void. If construction has been commenced but the work has been abandoned for a period of one (1) year or more, and if no extension of time has been granted as provided in OHMC 21.40.020, the authorization granted for the preliminary plat shall terminate and all

permits and approvals issued pursuant to such authorization shall expire and be null and void except as provided below:

- (a) Construction shall be completed within ten (10) years of the date of city council resolution approving the preliminary plat if it was approved before January 1, 2008; or
- (b) Construction shall be completed within seven (7) years of the date of city council resolution approving the preliminary plat if it was approved before January 1, 2015 and within Shoreline Management Act jurisdiction.

Section Two. Oak Harbor Municipal Code Section 21.40.020, entitled “Timeline for submittal of final plat and extensions for completion of improvements”, last amended by Ord. 1658 (2010), is hereby amended to read as follows:

21.40.020 Timeline for submittal of final plat and extensions for completion of improvements.

- (1) Final plat approval is a Type IV review process, in accordance with Chapter 18.20 OHMC.
- (2) An application for final plat approval shall be submitted to the director within five (5) years of the preliminary plat approval and when either:
 - (a) The subdivider has completed and has received approval of the construction and installation of all improvements; or
 - (b) The subdivider has submitted an approved performance bond in lieu thereof.
- (3) An application for final plat approval shall be submitted to the director within ten (10) years of the preliminary plat approval if the plat was approved before January 1, 2008.
- (4) An application for final plat approval shall be submitted to the director within seven (7) years of the preliminary plat approval if the plat was approved before January 1, 2015 and within Shoreline Management Act jurisdiction.
- (5) The city council may grant a time extension for completion of the requirements for preliminary plat for a maximum of one (1) year. Said extension shall be conditioned upon:

 - (a) ~~The plat meeting all subdivision requirements which are in effect at the time the extension is granted; and~~
 - ~~(b) Upon a showing that the applicant has attempted in good faith to submit the final plat within the five (5) year period.~~

(6) Any lots in a final plat filed for record shall be a valid land use not withstanding any change in zoning laws, in accordance with time periods established in RCW 58.17.170 as hereafter amended.

Section Three. Severability. If any provision of this Ordinance or its application to any person or circumstance is held invalid, the remainder of the Ordinance or the application of the provision to other persons or circumstances is not affected.

Section Four. Effective Date. This Ordinance shall be in full force and effect five (5) days after publication.

PASSED by the City Council this 6th day of September, 2016.

Veto ()
Approve ()

THE CITY OF OAK HARBOR

By _____
Robert Severns, Mayor

Dated: _____

Attest:

Anna Thompson, City Clerk

Approved as to Form:

Nikki Esparza, City Attorney

Published: _____

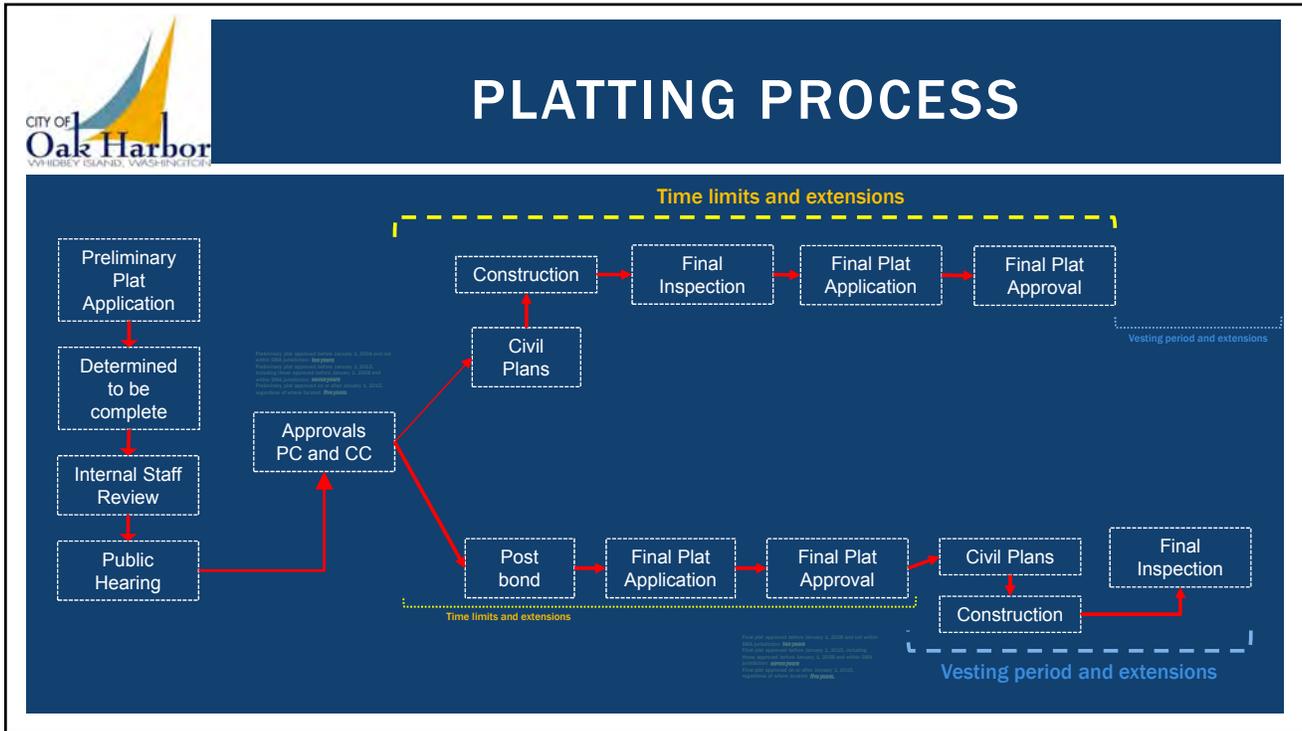


PLAT EXTENSIONS CODE AMENDMENTS



PLAT EXTENSIONS

- RCW 58.17.140 – sets time period to file Final Plats and Preliminary Plats
- That time limit is set at 5 years
- During down economical period legislature made several changes to extend that time – 2010, 2012 and 2013
- The changes extended filing periods to seven, nine and ten years
- The time periods apply differently based on when the Preliminary Plat was approved and whether it is under the SMA
- The time periods apply to preliminary plat extensions and final plat vesting



- **Preliminary plat** approved before January 1, 2008 and not within SMA jurisdiction: **ten years**
- **Preliminary plat** approved before January 1, 2015, including those approved before January 1, 2008 and within SMA jurisdiction: **seven years**
- **Preliminary plat** approved on or after January 1, 2015, regardless of where located: **five years**

- **Final plat** approved before January 1, 2008 and not within SMA jurisdiction: **ten years**
- **Final plat** approved before January 1, 2015, including those approved before January 1, 2008 and within SMA jurisdiction: **seven years**
- **Final plat** approved on or after January 1, 2015, regardless of where located: **five years**

Planning
Commission



OHMC CODE AMENDMENTS

- Two code section
 - Preliminary Plat – 21.20.080 Effect of Approval
 - Final Plat – 21.40.020 Timeline for submittal of final plat and extension

Questions?



PLAT EXTENSIONS
CODE AMENDMENTS

Planning
Commission

TOOLKIT (WDOE) TOPICS, SUBTOPICS & CONSIDERATIONS

Site Planning and Assessment (Topic)

- **Building locations (Subtopic)**
Can the code be revised to require that buildings are located away from critical areas and preserve soils with good infiltration potential for stormwater management?
(Consideration)
- **Parking area locations**
Can the code be revised to encourage positioning parking areas near the entrance to the site to reduce long driveways?
Are there any incentives to developers to provide parking within garages rather than surface parking lots?
- **Stormwater treatment/flow control BMP/facility locations**
Can the code be revised to require infiltrating LID facilities in areas with good infiltration potential?
Can the code include a site planning approach that emphasizes prioritizing the location of stormwater management facilities on site?

Healthy Soils

- **Protecting and restoring healthy soil**
Is a soil management plan in place that identifies soil protection zones and describes quantities of compost amendment?
Are protection areas required to be fenced?
- **Compost amendments**
Can code be revised to require amendment of disturbed soils?
Could compost be provided to incentivize small projects?
- **Compaction**
Can the code be revised to include types of equipment for clearing and grading that minimize compaction of soils?
Can clearing, grading, and soil disturbance outside the building footprint be limited or restricted?
Consider requiring contractors to reestablish permeability of soils that have been compacted by construction vehicles.

Landscaping, Native Vegetation, and Street Landscaping

- **Tree preservation**
Are there regulatory controls over tree clearance and removal of mature/forest stands?
Can the code be revised to place greater emphasis on preservation of conifers?
Can the code include strategies to orient retained vegetation and open space to disconnect impervious surfaces?

- Screening
Can the screening requirements be revised to include provisions for retaining native vegetation or replanting?
Can vegetation planted within LID facilities count towards site, parking, or perimeter screening requirements?
- Landscaping requirements for street frontages
Can the street frontage code be revised to include other landscaping between the sidewalk and the street?
Can vegetation planted within LID facilities count towards open space or landscaping requirements?
- Landscaping requirements for parking lots
Are minimum tree canopy or vegetation requirements specified for parking lots?

Hard and Impervious Surfaces

- Maximum impervious surface allowances
Does the code include maximum impervious surface limits for different land use types?
Can the maximum impervious surface limits be reduced in residential areas?
Can a portion of the impervious surface be designated as non-pollution generating impervious surface?
- Shared driveways
Are shared (or common) driveways for multiple single-family dwellings, multi-family structures, and/or commercial development allowed?
Can the use of shared driveways (for up to 4 or 6 houses) be incorporated?
- Minimum driveway width
Is a minimum driveway width specified?
Can the minimum driveway width be reduced to 9 feet or less (one lane), 18 feet (two lanes), or 16 feet (shared driveway)?
- Use of permeable pavement for driveways
Are alternative surfaces (other than conventional concrete or asphalt) allowed?
Can the code be revised to include incentives for use of permeable pavement for driveways?
- Two-track driveway design
Is a two-track driveway design allowed?

Bulk and Dimensional Considerations

- Building setbacks
Can setback distances be minimized in residential areas to increase flexibility in regard to house location?
Can frontage areas requirement be reduced in open space residential developments?

Are irregular lot shapes (pie, flag, zipper, etc.) allowed?

- Height limits

Can the maximum building height be increased if building footprints are reduced?

- Maximum square footage

Can code be revised to incentivize or encourage minimizing building footprints?

- Clustering

Are cluster development designs allowed?

Are cluster development designs allowed “by right” (no special permit or zoning variance required)?

Are flexible site design criteria available for developers that utilize cluster design options?

Clearing and Grading

- Protecting existing infiltration

Do clearing and grading regulations include provisions for minimizing site disturbance and protecting native vegetation and soils?

- Conserving native vegetation/soils

Is there an existing ordinance that requires or encourages the preservation of natural vegetation?

Is wholesale clearing (mass grading) of sites prohibited or limited?

Are developments required to set aside an undeveloped portion of the site?

Are there specific native vegetation retention standards based on land use and density?

Is there any incentive to developers or landowners to conserve land (open space design, density bonuses, stormwater credits, or lower property tax rates)?

Does the native vegetation definition (or other code section) include minimum tree density, minimum retention requirements, protecting native vegetation areas, replanting requirements, soil amendment standards, management plan specifications, and maintenance requirements?

- Construction sequencing

Does the code include methods for effective construction sequencing to minimize site disturbance and soil compaction?

Do engineering and street standards outline construction sequencing and practices for protecting pervious areas and LID BMPs during construction?

Can the code be revised to limit clearing to the building footprint and area needed for maneuvering machinery?

Streets and Roads

- Travel lane widths

What minimum travel lane widths are required based on street classification?

Is the travel lane wider than required by the fire department or other emergency responders?

Can street widths be reduced for local access streets?

Are narrower pavement widths allowed along sections of roadway where there are no houses, building, or intersections, and where on-street parking is not anticipated?
Are queuing lanes (i.e., cars wait between parked cars while approaching traffic passes) allowed?

- Right-of-way (ROW) widths
Can the minimum ROW width be reduced or include flexibility for LID considerations?
Can sidewalks be placed on one side of the street only in low-density residential areas?
Can alternate pedestrian networks (e.g. trails through common areas) be substituted for sidewalks?
- Use of permeable pavement for streets and roads
Can permeable pavement be used for road shoulders, parking lanes, and emergency parking areas?
Does the code require or encourage use of permeable pavement for future street/road resurfacing projects?
- Placement of utilities under paved areas in the ROW
Does the code allow utilities to be placed under the paved section of the ROW?
- Required turn around area (e.g., fire, USPS)
Is the minimum street section necessary for safe access and emergency response being used?
- Sidewalk widths
What is the minimum sidewalk width allowed?
Can sidewalk width requirements be reduced in areas where LID BMPs are present?
- Sidewalk slope
Does the code contain sidewalk slope direction requirements?
- Use of permeable pavement for sidewalks
Is permeable pavement allowed for sidewalks?
- Minimum cul-de-sac radius
What is the minimum cul-de-sac radius?
Can a landscaped island be placed in the center of the cul-de-sac and used for stormwater flow control and treatment?
- Alternatives to cul-de-sacs
Can hammerhead turnarounds or loop roads be used instead of standard cul-de-sacs?

Parking

- Minimum/maximum parking ratios
What is our minimum parking ratio for the following:
Professional office building
Shopping center

Single family home

Can the number of required parking spaces be reduced due to shared parking, proximity to transit, car sharing, etc.?

Are the parking requirements set as maximum or median (rather than minimum) requirements?

Can a maximum number of parking spaces be specified?

- Use of permeable pavement for parking lots (e.g., parking stalls, driving aisles)
Can permeable pavement be used for parking areas, parking lanes, and/or parking spaces?
Can permeable pavement be incentivized for spillover (infrequently used) parking areas?
- Parking stall dimensions
What is the minimum stall length and width for a standard parking space?
Can the parking stall length and/or width be reduced?
Are a fixed percentage of stalls (15 to 35%) assigned to compact cars?
- Driving aisle dimensions
Is the driving aisle wider than required by the fire department or other emergency responders?
Can one-way aisles be used in conjunction with angled parking stalls instead of two-way aisles?
- Off-street parking regulations
Can mechanisms be integrated to reduce parking requirements (e.g. shared parking, proximity to transit, car share, etc.)?
Can structured or tuck-under parking be incentivized?

Design Guidelines and Standards

- Trees and bioretention
Are specific street tree species included in the design guidelines and standards?
Can flexibility be incorporated to allow alternative tree species that are compatible with bioretention and can also meet similar street tree aesthetic requirements?
- Continuous curb requirements
Are conventional curbs and gutters required?
Can the curb and gutter requirements be eliminated or adjusted to allow the use of curb cuts (breaks that allow runoff to flow into bioretention cells) or “invisible” curbs (flush with the road surface)?
- Curb radii
Are minimum curb radii requirements specified for street intersections or pedestrian bulbs?
Can curb radii requirements be reduced to provide additional space for LID BMPs?

Stormwater Management and Maintenance

- Maintenance provisions
Does the adopted stormwater manual outline maintenance standards and/or procedures?
- Inspection access (covenants, easements)
Does the code allow access to inspect, maintain, and repair the facility if a private property owner fails to maintain the facility?
- Enforcement
Does the code include mechanisms to ensure reimbursement for any maintenance activities conducted?
Are public easements, maintenance covenants, or other legal agreements required?
Are incentives (reduction in stormwater fees) provided for private property owners that meet their maintenance requirements?

Subdivision and Planned Unit Development

- Individual open space requirements
Does a minimum percentage of open space have to be managed in a natural condition?
Can the open space requirement be increased?
Are open space areas required to be consolidated into larger units?
- Passive vs. active open space requirements
Are allowable and prohibited uses for open space defined?
Can LID BMPs such as bioretention count towards passive open space requirements?
Are native vegetation areas that integrate previous passive recreation areas, stormwater dispersion facilities, and/or stormwater restoration projects allowed?
- Opportunities for performance based designs (PUDs)
Are PUDs required for high density areas, such as city centers?
Are native vegetation and maximum impervious surface standards for PUDs and high density dwellings specified?

Critical Areas and Shoreline Management

- Allowance of LID BMPs in critical areas/shorelines when compatible
Are allowable or prohibited uses of buffers defined?
Are LID BMPs allowed within or adjacent to critical areas/shoreline/sensitive area/wetland buffers?
Can native vegetation associated with LID BMPs be used to meet buffer enhancement requirements?

MARIN WOODS

Planned Residential Development
(PRD) and
Preliminary Plat

Public Hearing

City of Oak Harbor Planning Commission Report

Date: September 27, 2016
Subject: Marin Woods PRD Subdivision
Preliminary Plat, PRD and
Subdivision Waiver Applications

FROM: Ray Lindenburg, Associate Planner

PURPOSE

This staff report presents the preliminary plat, PRD and subdivision waiver applications for the proposed Marin Woods subdivision. This is a Review Process IV, quasi-judicial proceeding intended to have Planning Commission review the preliminary plat and associated applications, accept public comment, and make a recommendation to the City Council. As a quasi-judicial proceeding, the hearing is subject to the Appearance of Fairness Doctrine, due process, and limitations of open record hearings contained in Chapters RCW 42.36 and 36.70B.

PROJECT INFORMATION

Applicant: George F. Marin Trust

Parcel Number: R13204-459-4200

Location: On the north side of Swantown Avenue, near the intersection of Fairway Lane. The property is bounded by the Hillcrest Village subdivision on the west and by the Highlands West subdivision to the east, which also includes two stubbed streets that end at the subject property.

Comprehensive Plan Designation: Low-Density Residential

Zoning: R-1 Single-family Residential

Site Area: 10.6 Acres

Lots: 43

Density: 4.1 dwelling units per acre

Open space provided: 1.3 acres

PROJECT DESCRIPTION

The proposal is a 43-lot Planned Residential Development (PRD) subdivision on 10.6 acres (see Attachment A, the original application packet including original plans; Attachment B, the updated review application packet; Attachment C, the updated review Preliminary Plat; and Attachment D, the updated review Preliminary PRD). The Applicant is seeking preliminary plat, PRD and subdivision waiver approval to subdivide the site and create associated street, sidewalk, landscape strip and pedestrian access improvements. The original preliminary plat application (and associated applications) depicted a public street connection between the project and Swantown Avenue. The updated preliminary plat application (and associated applications) does not include such a connection. The non-inclusion of this connection is the subject of one of the subdivision waivers.

Public residential streets are proposed to serve the development. The applicant proposes to extend two existing stubs from the Hillcrest Village subdivision – SW Putnam Drive on the north end of the property and SW Robertson Drive on the south.

The applicant is also proposing to set aside approximately 11 percent of the site as open space as required for Planned Residential Developments (PRD) by the Oak Harbor Municipal Code (OHMC) 19.31.100. Additionally, 15 percent of the site will be preserved or planted native vegetation as required by OHMC 19.46.140(3). These open space and native vegetation areas will be spread through the development in a network of commonly-owned tracts and easements on private lots (Attachment E, Landscape Plan).

PROJECT HISTORY

In September 2010, the owners of the subject submitted notice of intent to commence annexation proceedings for the property. Following staff review and public hearings, the annexation was approved by the City Council on October 12, 2012. In the Intent to Annex letter, the applicant expressed the desire to develop the property in a manner that respected the environment, using Low Impact Development techniques and retaining natural areas within the development. The application letter referenced working with City staff on a development concept for the property that included LID elements and a lot and street layout that connected to the existing neighborhood and Swantown Road. This development concept was submitted with the Intent to Annex packet as supporting information (Attachment F).

After the approval of the annexation, a pre-application was submitted by Kendall Gentry of Landed Gentry Homes, which was then followed by a formal submittal for Preliminary Plat and PRD in September of 2014. After staff review and meetings with the applicant, Gentry withdrew the application formally in December of 2014.

The following is a partial timeline of the application as it is currently under review.

TIMELINE AND SUBMITTALS

January 6, 2015	Staff meets with Marin family to discuss stormwater drainage issues
September 24, 2015	Mr. Rick Duran meets informally with staff to discuss application
November 6, 2015	Formal submittal for Preliminary Plat, PRD, associated applications
November 13, 2015	Application deemed complete; staff/applicant meeting set for 12/17/15
November 19, 2015	Three public notice signs posted on site
December 17, 2015	Staff/applicant meeting held
December 21, 2015	Revised comments sent to applicant
December 21, 2015	Email from Mr. Rick Duran summarizing meeting and discussing next steps
February 10, 2016	Email sent to applicant regarding schedule
February 18, 2016	Meeting with staff and applicant
February 26, 2016	Revisions submitted to staff
February 29, 2016	Email sent to applicant acknowledging partial submittal on February 26

March 7, 2016	Planning Commission meeting scheduled for March 22, advertised in WNT
March 7, 2016	Staff provides comments on partial submittal from February 26
March 11, 2016	Staff notifies applicant that Planning Commission hearing has been postponed
March 11, 2016	MDNS for SEPA issued. Appeal period ends March 28
March 14, 2016	Applicant submits revisions
March 28, 2016	Staff meets with engineer and applicant to discuss March 14 submittal
March 31, 2016	Applicant requests item be pulled from April 13 Planning Commission agenda
April 4, 2016	Applicant submits revised CC&Rs
April 7, 2016	Staff provides letter and attachments to applicant regarding road connection
April 20, 2016	Staff provides staff comments from review of CC&Rs
August 17, 2016	Staff meets with applicant team
August 22, 2016	Applicant submits revisions to Plat, PRD and includes Subdivision Waiver
September 7, 2016	Item is scheduled for September 27 Planning Commission hearing

Please see Attachment G for correspondence referred to in this timeline.

APPLICATIONS UNDER REVIEW

The proposed development review before the Planning Commission contains combined applications for a Preliminary Plat, Planned Residential Development and Subdivision Waivers. Associated applications submitted with this packet are listed below and will be addressed individually following. The Applicant has submitted all the necessary information as per the filing requirements prescribed in the Oak Harbor Municipal Code (OHMC).

- Preliminary Plat (PPL-15-01) – The document that sets lot dimensions, street locations, public improvements and other specific details for the subdivision itself. The Preliminary Plat approval allows the applicant to begin construction of the public improvements in advance of receiving Final Plat Approval when those improvements are completed and inspected by the City.
- Preliminary PRD (PLN-15-09) – The Planned Residential Development process allows applicants to mix smaller lots, modified setbacks and other variations to the underlying R-1 zone district in exchange for higher-quality home design, designated open spaces, additional landscaping and other improvements. The Planning Commission will review those improvements to ensure that the overall product is a “complete and sustainable neighborhood” as consistent with the purpose and intent section of the Planned Residential Development section (OHMC 19.31.010).
- Subdivision Waivers – These waivers allow for certain variations to subdivision requirements. In this application, the applicant has asked for a relief from requirements regarding street grade and street curve geometry. Another waiver requests relief from a requirement that neighborhood streets be gridded (see Attachment H for Subdivision Waiver applications).
- Landscape Plan (PLN-15-10) – As part of the PRD process, the Planning Commission will review an overall landscape plan for the subdivision. The plan will include all neighborhood

improvements, such as landscaping buffers, street trees, open space areas and resident amenities.

- Land Clearing Plan (LND-15-02) – Because the property is currently forested, a Land Clearing Plan is required to address how timber will be harvested from the property and regulate what protections will need to be in place to prevent impacts from increased runoff, potential erosion and damage from harvesting.
- Transportation Concurrency (TRC-15-11) – The traffic impact of new households on the greater community is considered through the review of Transportation Concurrency. Based on the number of homes proposed and the number of automobile trips those homes will be expected to generate, the applicant will be required to pay an impact fee.

The State Environmental Policy Act (SEPA) Checklist (SEP-15-09) is an associated application with this project, but *does not require further Planning Commission or City Council action*. The applicant provided a SEPA checklist describing the project, identifying potential impacts and possible mitigation for those impacts. The checklist asks for details regarding wetland areas, endangered species and traffic impacts.

PRELIMINARY PLAT (ATTACHMENT C)

The City's code (OHMC 21.20.080) and state law establish criteria for the review of preliminary plats. OHMC 18.20.260 outlines the steps by which a preliminary plat is reviewed. Planning Commission evaluates the preliminary plat and makes a recommendation to the City Council after taking comments in a public hearing. Since the ultimate approval authority for preliminary plats is the City Council, the review criteria address the City Council, but Planning Commission will use the same criteria to make its recommendation. Below, staff is providing responses to the review criteria to assist Planning Commission in its decision.

The City Council shall inquire into the public use and interest proposed to be served by the establishment of the subdivision and dedication(s). It shall make written findings (OHMC 21.20.070):

(a) Whether appropriate provisions have been made for, but not limited to, the public health, safety and general welfare, for open spaces, drainage ways, transit stops, potable water supplies, sanitary wastes, parks and recreation, playgrounds, schools and schoolgrounds, and all other relevant facts, including sidewalks and other planning features that assure safe walking conditions for students who walk to and from school.

Response:

- Public health, safety and general welfare: The applicant proposes to promote the public health, safety and welfare in the preliminary plat by including providing provisions for utility connections, an internal street network that follows the standards of the OHMC and infrastructure to channel stormwater runoff. However, the lack of a street intersection at Swantown Avenue does not serve the public purpose by maximizing connectivity.

- Open spaces: There is no minimum open space requirement for preliminary plats, however it is required for a PRD subdivision. Those requirements will be addressed in the following PRD section of this staff report. In addition, the applicant will pay impact fees which will be used to construct new parks and park capital facilities within Oak Harbor to serve the residents of this subdivision.
- Drainage Ways: The applicant is proposing that stormwater runoff from rooftops will be collected from each property and conveyed through a newly-constructed system releasing the flow into a new stormwater detention facility located at the south end of the property, near Swantown Avenue. Runoff from streets and sidewalks will be directed to, and flow through stormwater pipes constructed as part of the public improvements in the subdivision. From there, runoff will be managed and released into existing facilities that drain into the Golf Course drainage basin area per a 1997 drainage plan. Review of the preliminary stormwater report and design finds them to be mostly code compliant. However, final review and approval may lead to re-design of a portion of the facilities due to possible discrepancies in a portion of the design calculations.
- Transit stops: There is currently no transit service in the vicinity. No transit provisions are included in this application.
- Potable water: Each lot within the subdivision will be connected to the City's public water system, which meets state quality requirements. The City has planned for and can accommodate the growth in population on the subject site to serve it with potable water.
- Sanitary wastes: Each lot within the site will be served by the City's sewer and solid waste services. The capacity to serve the proposed subdivision is accounted for in the City's wastewater collection and treatment system.
- Parks and recreation, playgrounds: The applicant will pay a impact fee to help offset the City's cost of providing park and recreation facilities to the residents of the subdivision.
- Schools and school grounds: The Oak Harbor School District will serve the residents and children of the proposed subdivision for educational needs from kindergarten through grade 12. The residents of the subdivision will contribute to the funding of the school district through the payment of property taxes.
- Sidewalks and safe routes to school: The applicant is proposing to provide sidewalks on both sides of the public streets within the subdivision. In addition, the applicant proposes a pedestrian/bike connection to Swantown Avenue.
- Other relevant facts: OHMC 21.50.080 states that, "streets, sidewalks, pedestrian or bike paths shall be linked within and between neighborhoods to create a continuous and interconnected network of roads and pathways... Local streets, arterials and collectors

shall be extended to the boundary of the development...” In this manner, the appropriate provisions have not been made and the public good has not been fully served without a street connection to Swantown Avenue. Further detail on this point is available below in the section entitled, “Subdivision Waivers.”

(b) Whether the public use and interest will be served by the platting of the subdivision and dedications(s)

Response:

- The public interest for this property is represented in part by the City of Oak Harbor Comprehensive Plan, which designates this site for low-density residential development. The applicant is proposing to subdivide the site to allow for future construction of single-family residences, which is an allowed use in the R-1 Single-Family Residential zone, which implements the City’s comprehensive plan. In addition, the applicant is proposing public facilities to serve the lots such as public water and sewer, which will help ensure that the public interest is served through the provision safe, efficient utilities and transportation.

The Comprehensive Plan also plays a role in determining if the public interest is met with respect to the applicant’s proposal regarding the number and dedication of public streets associated with the subdivision. At the time of annexation of the Marin Woods property, the Comprehensive Plan included the following similar policies which were included in the agenda bill for annexation:

Goal 5 – New neighborhoods annexed into the City should contribute in a positive manner to sustain and enhance the quality of life for all Whidbey Island citizens while promoting a strong sense of place for Oak Harbor.

Policy 5.b - Where topography allows, new annexation areas should develop in the traditional lot and block grid pattern that typified early Oak Harbor development and enhances the provision of public facilities and services.

Goal 2 from the 2016 Transportation Element of the Comprehensive Plan is “Connected and Efficient.” The Oak Harbor Comprehensive Plan included the following goal and policies in the Urban Growth Area Element. Policies associated with that goal include:

2.a. Encourage the efficient movement of people and goods through an effective and inter-connected transportation network that includes: collector and arterial streets, trails, bike paths, public transit and other transportation facilities and is in balance with the land use and transportation requirements in the City of Oak Harbor.

2.b. Provide for the efficient movement of people and goods on arterial streets through a balanced approach that only increases the automobile capacity of roadways when necessary.

For these reasons, as well as those noted previously, because the proposed subdivision does not provide a public street connection to Swantown Avenue, the public interest is not fully served.

Also submitted with the Preliminary Plat application were preliminary CC&Rs and a Stormwater Operations and Maintenance Manual. These items were reviewed and will need modification. However, any modifications or updates submitted by the applicant, reviewed by staff and will be in a complete and approvable format before Final Plat approval.

PRELIMINARY PLANNED RESIDENTIAL DEVELOPMENT (ATTACHMENT D)

The proposed project utilizes the planned residential development (PRD) district provisions in Oak Harbor Municipal Code (OHMC) 19.31. The purpose of the PRD district is to create a process to promote diversity and creativity in site design, and to protect and enhance natural and community features.

The unique aspect of the PRD process is that it includes requirements for open space, allows for variations in lot sizes and street standards, requires architectural drawings demonstrating the character of the proposed development and demonstration of superior design components such as landscaping and reduction of impervious surfacing materials. The submissions defining these components for the final PRD are in addition to those required for the Preliminary Plat.

PRD Review Criteria

The PRD approval will require that development shall conform in all major respects with the submitted plan sets. The Planning Commission's review and action on PRD applications shall be based on the following criteria from OHMC 19.31.170:

- (1) *Aside from the specific regulations, requirements or standards proposed to be varied, the project otherwise meets the requirements of the Oak Harbor Municipal Code.*

Response: The project meets the requirements set forth in the Oak Harbor Municipal Code.

- (2) *Critical areas should be preserved and incorporated into the open space of the PRD. Buffer averaging and buffer enhancements shall qualify as preservation if such is recommended in an approved critical areas report.*

Response: There are no known critical areas on the project site.

- (3) *If smaller lot sizes and dimensions or decreased setbacks are proposed from what is required by the underlying zoning, buildings on these lots must meet requirements (3)(a) through (c) of this section or requirement (3)(d) or requirement (3)(e) of this section:*

- (a) *Garage walls facing the street must be no closer than the wall containing the main entrance, or to the edge of a covered porch or deck if provided.*

Response: The applicant has submitted house plans that meet this requirement by placing the garage further from the street than either front porches or living space, depending on the model (sheet PL3).

(b) A garage door wall which faces the street must not be more than one-half of the facade width.

Response: Home plans submitted by the applicant meet this requirement (sheet PL3).

(c) The main entrance must be prominent, easily visible and directly accessible from the street frontage.

Response: The main entrance for each home plan is located on the front of the home via a large and easily visible front porch. The designs meet this requirement (sheet PL3).

(d) No two adjacent buildings on the same side of the street may have the same front setback. Setbacks must alternate from building to building. Minimum front setback variation must be two feet or greater.

Response: Because the applicant has met requirements (a) through (c) above, this setback variation is not required. The applicant may choose to employ such variation, however.

(e) Residential buildings are accessed from an alley at the rear of the lots.

Response: Because the applicant has met requirements (a) through (c) above, this design feature is not required. The applicant has not proposed any alley access on the site.

(4) If nonresidential uses are included in the PRD, such uses shall be easily accessible to pedestrians, meaning that primary building entrances are oriented to the street and set back no more than 10 feet from the property line or a six-foot-wide pedestrian path is included connecting the nearest public sidewalk to the primary entrance of the secondary use.

Response: No such uses are proposed.

(5) Ten percent common open space is provided which complies with OHMC 19.31.110 through 19.31.130.

Open space has been provided to comply with this requirement. Passive and active open space calculations are shown on page PL-1 of the Landscape plan and meet the 5% and 10% requirements that are set forth in the OHMC sections noted above.

(6) *The PRD shall comply with all of the following adopted standards:*

(a) *The requirements of OHMC Title 21, Subdivisions. Variations from the requirements in OHMC Title 21 may be requested and reviewed as part of the PRD application. Other than the specific standards being varied from, PRDs must meet all applicable standards of OHMC Title 21, including the general design standards (Chapter 21.50 OHMC) and the residential design standards (Chapter 21.60 OHMC).*

Response: Planning and Engineering staff review has found the application to be in substantively in compliance with the above-referenced sections with the exception of three items to which the applicant has filed subdivision waivers to allow for variation from the code. Minor variations may exist and will be addressed in the civil and construction phases of the project. Staff will ensure such details as number and location of specific trees, infrastructure, amenities and other items will be provided to meet standards set forth in the OHMC. For further review and discussion of the waivers, please see section entitled, "Subdivision Waivers."

(b) *The standards and requirements of this chapter. If there is a conflict between the standards of this chapter and the standards in OHMC Title 21, the standards in this chapter shall take precedence.*

Response: None.

(c) *The Oak Harbor comprehensive plan policies.*

Response: The proposed use is consistent with Comprehensive Plan policies regarding housing and is compatible with the surrounding residential uses. The land use element of the Comprehensive Plan identifies specific land uses within the city to allow for the cohesive and logical growth of the city. These land use designations are intended to reduce potential conflicts between uses, provide appropriate connections and relationships with compatible uses, reduce encroachment upon NAS Whidbey, and provide sufficient land area for appropriate developments. The location of this plat has been identified as being appropriate for low-density residential uses to accommodate increases in population in Oak Harbor.

The zoning for the site of the plat is R-1 Single-Family Residential, which corresponds with the Comprehensive Plan land use designation. R-1 is the lowest density residential zone within the city. PRD developments and their allowed flexibility of particular zone district regulations are permitted in this location. The characteristics of the proposed plat (including density, lot configuration, setbacks, open space, etcetera) all meet the standards defined in the Comprehensive Plan and OHMC.

The project and its design as shown in the PRD drawings is not fully consistent with Comprehensive Plan Transportation goals and policies. Please see the preliminary plat section of this report for additional information regarding this topic.

(d) The design guidelines and regulations, if applicable.

Response: Not applicable.

(e) All other standards adopted by the city of Oak Harbor, including engineering details and drawings.

Response: None.

(7) Applicants must meet either subsection (7)(a) or (b) of this section:

(a) Enhanced design which includes one or more of the following on each building within the development:

(i) A variety of exterior building materials such as brick, stucco, stone, and wood used as primary siding or as accent materials on front facades; or

(ii) Building articulation (offsetting walls, inclusion of windows, changes in material types) on side and rear walls of buildings; or

(iii) Side- or rear-loaded garages; or

(iv) Other applicant-proposed building design enhancements.

(b) Optional site design elements which includes one or more of the following:

(i) Low impact development stormwater techniques are employed on the site.

(ii) Ten percent or more of units within the development are qualified affordable housing as defined by OHMC [19.08.695](#).

(iii) Inclusion of a mix of residential and nonresidential uses within the development.

(iv) Fifteen percent or more of the gross area is open space.

(v) The project will not only preserve but enhance or rehabilitate the functions and values of a critical area of the site, such as significant woodlands, wildlife habitats, streams or wetlands, subject to the recommendations in an approved critical areas report. (Ord. 1567 § 2, 2010).

Response: The applicant has chosen to meet the standards of subsection (7)(a) – discussion below. As stated in that section, “one or more of the following” must be met:

- i. The proposed architectural elevations (sheet PL-3) show a variety of materials including horizontal lap siding, board and batt, shingle siding, stone-clad columns and composition roofing. Such wall treatments shall be either cementous board or wood, and not vinyl, aluminum or similar material.
- ii. Building articulation is provided through the use of prominent front porches, dormers on the second floor and recessed garage façades.
- iii. Garages are front-loaded, but recessed behind the front line of the home and de-emphasized through the use of rooflines and architectural features.
- iv. The applicant has not supplied specific other enhancements.

SUBDIVISION WAIVERS (ATTACHMENT H)

1. An administrative waiver has been requested to allow for the applicant to utilize a narrower street cross-section along a small portion of Valea Vista per the process in OHMC 21.60.060. *As an administrative request, this information is being provided to explain the existence of the design on the submitted documents; no action is needed by the Planning Commission or City Council.* City Planning and Engineering staff support an approval for the proposed change from street standard “Local Residential Narrow” to the proposed “Local Narrow Tier 1 Alternative”, which eliminates a short section of parallel parking lane between proposed Tracts A and B, with the clarification that exact street geometry is still subject to civil/construction plan review and approval. The applicant has demonstrated that the minimum public parking requirement can be met with the reduction of parallel parking lane per the requirements of 21.60.060.
2. A request to vary from curve geometry requirements (OHMC 11.17.100(1)) for the street bends at the northwest corner of the property. The applicant is proposing a 90-degree turn at that location to resolve lot layout and slope issues. Planning and Engineering staff support approval of the proposed waiver on road geometry for curve length and tangent length, with the clarification that exact street geometry is still subject to civil/construction plan review and approval.
3. A request to vary from the maximum street grade requirements at one location on Upper Marin Drive. Because the land in that location is greater than the 10% slope allowed by OHMC 11.17.100(4)(a), without significant grading and filling of the entire parcel, roadway construction would not be possible. Planning and Engineering staff supports the approval of the proposed variance for road grade steeper than 10% on the street proposed as Upper Marin Drive for the short distance indicated on the submitted street profile, approximately between

stations 6+00 and 8+00 with a maximum slope of 13.5%. This is contingent upon maintaining access to Robertson Drive and grades no greater than 7% on Valea Vista, and with the clarification that exact street geometry is still subject to civil/construction plan review and approval.

4. A request to vary from OHMC 21.60.100(1) and (2) to forgo a public street connection to Swantown Avenue. In order to fully evaluate this waiver request, staff prepared some background information.

Background

Oak Harbor Municipal Code Title 21, Subdivisions, was amended in 2011 in part to emphasize connectivity of vehicle, pedestrian, and bicycle trips within the community. This was done for several reasons. In general, it has been recognized both nationally and locally that past road system layouts that rely on few major roads to serve poorly gridded neighborhoods results in heavy congestion of the major roads during peak hours of travel. Correcting these system deficiencies is extremely expensive for the public.

As a result of the recognition of this problem, there has been a return in transportation design towards designing and providing well gridded local streets. This not only helps provide alternate vehicular “pressure relief” routes, but also allows more localized pedestrian and bicycle travel, resulting in fewer vehicular trips.

State Route 20 is the primary transportation facility serving Oak Harbor and all of Whidbey Island. It is vital to the entire community and region that it functions as a reliable and efficient facility. SR-20 is beginning to experience capacity deficiencies at peak travel times, particularly between the intersections of Beeksma Drive and Swantown Avenue. Travel demands are expected to slowly increase in the future which will put more pressure on the entire transportation network but especially on SR-20. Depending on the season, approximately half of the 20,000 trips per day on SR-20 are local trips by Oak Harbor residents traveling within the City. The most efficient and economical way to preserve the reliability and efficiency of SR-20 is to provide alternate routes for local trips so that residents crossing town while conducting their daily lives do not necessarily need to travel on SR-20. The primary tool for this strategy is providing efficient street connections between neighborhoods linking them together and to the larger transportation network.

Oak Harbor is on an island with two naval reservations, state parks and geologic limitations. If SR 20 were ever to arrive at a failed level of service, providing an alternative principal arterial to bypass SR20 would be extremely expensive and take years to implement. The intention to prevent this situation from occurring is part of the reasoning behind the code change in 2011.

Review of the Waiver

The applicant submitted a subdivision waiver request as outlined by OHMC Section 21.50.040 to not connect the plat of Marin Woods to Swantown Avenue. That code section is shown below:

(1) Any subdivider can make application for a waiver from one or more of the design standards contained in this chapter, provided the request is received concurrently with the proposed subdivision, short subdivision, binding site plan or dedication. In addition, the waiver process described in this section may be used to vary from the residential design standards in Chapter 21.60 OHMC. A waiver shall be granted only upon a finding that strict compliance with the provisions for subdivision, short subdivision, binding site plan or dedication would cause unusual and unnecessary hardship on the subdivider due to the following:

- (a) Because of the size of the tract to be subdivided; or
- (b) Its topography; or
- (c) The condition or nature of adjoining areas; or
- (d) The existence of unusual physical conditions.

(2) No waiver shall be granted which allows a subdivision, short subdivision or binding site plan, which is not in the public interest as identified in RCW 58.17.010 et seq.

(3) Subdivision waivers are a Type IV review process, as described in Chapter 18.20 OHMC, and shall accompany and be processed with the preliminary plat, short subdivision, binding site plan or boundary line adjustment application.

(4) Such conditions may be required which may achieve, insofar as practicable, the objectives of the requirements for which a waiver is authorized.

(5) Application for an adjustment or waiver from the local residential street designs contained in Table 21.50-1 shall be processed in accordance with the provisions of OHMC 21.60.070 and 21.60.080, not the provisions of this section.

Staff's review of the applicant's supporting information for the four criteria used to evaluate the waiver request yields the following comments (please note it is only necessary to satisfy one of the criteria in order for a waiver to be approved). Staff's comments are organized by the code criteria.

OHMC 21.50.040(1)(a) - Size of Tract

The applicant states that due to the size of the frontage along Swantown Avenue a hardship is created in that no adequate road options can be found to connect the subject property to Swantown Avenue. According to the submitted waiver, the subject property has 277 feet of

street frontage along Swantown Avenue. Staff disagrees with the applicant's statement that the road frontage is so narrow that it creates a hardship and believes that 277 feet is sufficient width to provide a 50 foot wide right-of-way. A November 6, 2015 preliminary plat plan package submitted by the applicant demonstrated that sufficient width is available for a road connection to Swantown Avenue. The applicant also states that the most adequate road connection option requires the removal of the only house on the property. Removal of the house is not related to inadequate size of the tract, but is to the location of the house on the tract. It is very common with a standard plat that the existing house is removed or relocated due to the challenges of fitting it into both a new subdivision design and a code compliant lot and street layout.

OHMC 21.50.040(1)(b) – Topography

The applicant states that the property slope is too steep to provide a road meeting standard grades established in OHMC. The November 6, 2015 preliminary plat plan package submitted by the applicant included a road profile demonstrating compliance with City road grade standards. This circumstance could be addressed through a waiver to exceed City road grades (if necessary) for a road connection to Swantown Avenue as was done (and supported by staff) for the same grade standards further up the hill. It is not necessary to eliminate the street connection to address this circumstance.

OHMC 21.50.040(1)(c) - The condition or nature of adjoining areas

The applicant states that a road connection from Marin Woods to Swantown Avenue should or cannot be made due to obsolete geometrics of the existing intersection of Fairway Lane and Swantown Avenue. The applicant's argument relies on the perspective that all geometrics of the existing intersection must be brought up to current design recommendations or standards presented in the 6th Edition of AASHTO's A Policy on Geometric Design of Highways and Streets in order to add a fourth leg to the street intersection. The foreword (page xli) in the manual clearly states that this is not the case:

“The fact that new design values are presented herein does not imply that existing streets and highways are unsafe, nor does it mandate the initiation of improvement projects. This publication is not intended as a policy for resurfacing, restoration, or rehabilitation (3R) projects. For projects of this type, where major revision to horizontal or vertical curvature are not necessary or practical, existing design values may be retained. Specific site investigations and crash history analyses often indicate that the existing design features are performing in a satisfactory manner. The cost of full reconstruction for these facilities particularly where major realignment is not needed, will often not be justified.”

The applicant has not identified an inherently unsafe condition that will be created within the vicinity of the intersection by connecting Marin Woods to Swantown Avenue. Additionally,

the City has not indicated to the applicant that they are responsible for addressing the existing Fairway Lane/Swantown Avenue intersection in any significant way.

OHMC 21.50.040(1)(d) - The existence of unusual physical conditions

The applicant states that there are three unusual physical conditions that create a hardship. These are:

- a. Inadequate intersection of Fairway Lane and Swantown Avenue.
- b. Location of the existing home, conflicting with the alignment of the road connection to Swantown.
- c. Topography of the slopes approaching Swantown Avenue.

These three items are a repetition of the above items a), b), and c) in a different order and are not unusual physical conditions. Although repetitious, these three items are also addressed with short summary statements below.

Regarding a. - As presented above, in Item c) AASHTO's manual does not mandate that all road projects alter all existing roads to correlate with current design recommendations or standards.

Regarding b. - As presented above, in Item a) removal or relocation of an existing house in a standard plat is not unusual. Preservation of an existing house in a standard plat is the exception. More often than not, the existing homes are removed due to the difficulty of fitting them to the street layout, lot layout, and architecture of the new homes. In citing the existing house as a conflict, the applicant included an exhibit that details what they have termed as "projected burdensome hardship costs." These costs total \$380,000. Staff offers the following comments on this topic:

- Of this total, \$145,000 is attributed to loss of the existing house. As was noted above, the removal of an existing house from the land area of a new subdivision is not uncommon, and is more the norm than the exception. In making this statement, staff is in no way trivializing the removal of an existing home. Rather, staff merely notes that this is not an unusual physical condition to deal with.
- An additional \$90,000 of the "projected burdensome hardship costs" is associated with the "potential loss of lot for right-of-way." The total number of lots actually realized through the platting process is not determined until all design considerations and standards have been addressed. Lots do not exist within a new subdivision until the final plat is approved and recorded. Therefore, the applicant is essentially saying that they will lose a lot that does not yet exist.
- The remaining \$145,000 is divided between items typically associated with the cost of street construction. With the exception perhaps of the retaining wall, there is none of the listed items or costs are unusual in a typical subdivision project.

Staff Review Conclusion

Based on the information presented above, staff does not find the applicant has met the burden of proof demonstrating that one of the four applicable criteria for subdivision waiver has been met. Further, it is staff's opinion that the granting of the waiver would not be in the public interest, which would be in direct conflict with OHMC 21.50.040(2) ("no waiver shall be granted which allows a subdivision, short subdivision or binding site plan, which is not in the public interest as identified in RCW 58.17.010 et seq."). **In light of the above information and analysis, staff is unable to recommend approval of this requested subdivision waiver.**

Supplemental Information and Staff Comment

The applicant also addressed the subject of their waiver request in a letter to the City dated August 22, 2016. Staff's review of that information yields the following comments.

Neighborhood Connections

The neighborhood in question abuts City and County areas. The applicant states that the connectivity of the neighborhood is in line with other neighborhoods in the vicinity. This included a submittal of narrative, various maps of nearby neighborhoods, and a qualitative comparison of number of homes per number of street connections for each neighborhood.

This comparison is not fully accurate in its representation of the number of connections in several of the neighborhoods, creating an underrepresentation of the number of connections per home. It also does not appear to consider existing street stubs that will provide future connections when adjacent lands develop. These future street extensions will result in a lower ratio of homes per neighborhood connection.

The neighborhood street system presented by the applicant to serve the subject development was referred to as the "Loerland-Heller-Swantown neighborhood." The applicant asserts that there are seven access points to this neighborhood. This is not entirely accurate when that neighborhood is examined closer. The Shannon Forest subdivision should not be considered part of this neighborhood since its connections are very inefficient for neighboring subdivisions to use to access Heller or Swantown Avenues. This drops the connections from seven to five. Two of the remaining five are very localized. The three connections that will be utilized by the residents in the Marin Woods area to get to a collector or arterial are Thornberry Drive to get to Swantown Avenue, Putnam Drive to get to Heller Avenue southbound, and Loerland Drive via Roeder Drive to get to Heller Avenue northbound. In the absence of a direct connection to Swantown Avenue, Marin Woods's residents would use the same connections.

When considering street connectivity, it is also important to consider the quality of the connectivity. Not all streets serve as well as others. The internal street system referred to as

the “Loerland-Heller-Swantown neighborhood” is a circuitous street network that was constructed under older standards and intended to provide property access rather than efficient transportation. In addition, some of the roads in the area are County roads and do not have pedestrian facilities. Adding more traffic volume through this street system is less desirous than providing a direct connection to Swantown Avenue.

Without the street connection through Marin Woods to Swantown Avenue, 42 additional homes would rely on Thornberry for access to Swantown Avenue. Most of Thornberry Drive that lies south of SW Robertson Drive is a County road with no pedestrian facilities. It also has some existing grade and horizontal curve issues near the connection to City limits that are not conducive to increased volumes of traffic.

Finally, staff provided a detailed letter on April 7, 2016 (Attachment I) to the applicant that provided support for the City’s position that the public street connection is required by code and is necessary. A copy of this letter is provided as additional, supporting background information on this topic.

LANDSCAPE PLAN (ATTACHMENT E)

As part of a Planned Residential Development, certain landscaping elements are required such as environmental amenities or common open space (OHMC 19.31.100) – including active (19.31.110) and passive (19.31.120) areas and perimeter landscaping around the boundaries of the project (19.31.140). In addition, all subdivisions are required to include a landscaping buffer of at least 25 feet along all minor arterial roads (21.60.180). The review of this landscape plan is occurring concurrently with the subdivision and PRD review as per OHMC 19.46.110(1).

The applicant has provided a comprehensive landscaping plan to address the requirements listed above, found on sheets PL-1 and PL-2, as well as dimensions and space calculations on sheet PL-4. These sheets also show required native vegetation planting areas (OHMC 19.46.140), street trees, pedestrian pathways and a stormwater detention area and the associated landscaping surrounding.

Specifically, the applicant has proposed the following to meet the criteria listed above:

- Open space required: 10% of the gross area of the PRD
 - Provided in this application: 6% passive, 5% active, 11% total
- Perimeter landscaping required: 20 feet around exterior boundaries
 - Provided in this application: 20 feet around boundaries except those places where side yards exist adjacent to existing neighborhoods, to provide for consistent appearance between existing and new construction, as suggested by City staff.
- Landscape buffer along Swantown Avenue: 25 feet
 - Requirement is met in this application. This landscaped buffer will also function as a bioretention cell as allowed by OHMC 21.60.190(1)(f) and shall meet all other requirements for buffers set forth in 21.60.190.

Details may be subject to change slightly to allow for design flexibility, but the required elements will be required as part of the final subdivision approval and staff will inspect the sight before final plat approval to ensure that they are included in the finished project.

LAND CLEARING PLAN

As noted in the comments received on the original MDNS, the Washington State Division of Natural Resources will require a Class IV General Forest Practice application prior to any clearing or logging of the site. The applicant will coordinate that effort and ensure that all State requirements are met.

TRANSPORTATION CONCURRENCY

Concurrency will be reviewed to determine any potential transportation impact fees to be paid by the applicant before Final Plat approval.

STATE ENVIRONMENTAL POLICY ACT (SEPA) CHECKLIST (ATTACHMENT J)

A Mitigated Determination of Non Significance (MDNS) was issued by the Director on March 11, 2016 for the project. No appeals were filed. With the mitigation measures described in the determination, all of the anticipated environmental impacts from the proposed subdivision project will be mitigated to a level of non-significance. The mitigation measures include complying with the City's Inadvertent Discovery Protocol, installing City-approved street lights and abandoning an existing water well in accordance with State and Island County regulations. No further action is required by the Planning Commission or City Council.

REVIEW PROCESS SUMMARY

The Oak Harbor Municipal Code details the process by which a subdivision is approved. This staff report and supporting documents are designed to assist the Planning Commission and City Council in making a decision that is rooted in Oak Harbor municipal requirements as well as State statute. The decision process begins with the Planning Commission considering the application based on the Municipal Code, and then giving a recommendation to the City Council. As was previously noted, the Planning Commission must review the application against the same criteria the Council is required to follow.

Once they receive a recommendation, the City Council will conduct a closed-record hearing, reviewing the application materials, analysis of the applications, testimony and recommendation passed from the Planning Commission hearing. Approval of a preliminary plat application by the City Council sets the stage for the next step in the project approval process. The effect of this approval is detailed in OHMC 21.20.080:

1. The applicant may develop construction plans for the proposed improvements, based in "strict conformance with the approved preliminary plat, street and utility standards adopted by the city, and any special conditions required by the council."
2. The construction of said improvements are not to begin until all plans have been approved in writing by the City Engineer.

In plain language, the plans submitted for review and approval must meet the City's adopted standards, because if approved, the applicant is authorized to develop the construction plans *based on those plans approved by the City Council*.

CONCLUSION

Based on the information provided by the Applicant and the thorough review and analysis conducted through the application process, staff finds the Applicant has sufficiently addressed the requirements of the OHMC relating to the following applications.

- Preliminary Plat (PPL-15-01) – The applicant has sufficiently addressed the Oak Harbor Municipal Code requirements regarding the preliminary plat and staff could, with the exception of the lack of public street connection to Swantown Avenue, recommend approval of the preliminary plat.
- Preliminary PRD (PLN-15-09) – The applicant has requested certain deviations from minimum lot size and setback dimensions in exchange for improved architectural design, open space and community amenities. Staff finds that the applicant has addressed OHMC and that approval of the preliminary PRD could be recommended, with the exception of the lack of public street connection to Swantown Avenue.
- Subdivision Waivers – The applicant has requested four separate waivers for design of roadways within the subdivision. The first is considered an administrative waiver and addresses street width – that waiver will not be considered by the Planning Commission or City Council. Two waivers deal with the slope of a section of roadway and the geometry of a curve. Staff has found the justification for these two waivers to be sufficient and could recommend approval to the Planning Commission.
- Landscape Plan (PLN-15-10) – The submitted landscape plan addresses the required portions of the OHMC with regard to subdivision and PRD landscaping and staff could recommend the Planning Commission approve the Landscape Plan as a part of the subdivision and PRD approval process, allowing the applicant to apply the landscape plan to the project as a part of the process to receive final plat approval.
- Land Clearing Plan (LND-15-02) – Staff could recommend approval of the Land Clearing Plan to allow the applicant to remove vegetation as needed to proceed with the development of the property.

The thorough review carried out by staff, as detailed above, has determined that the following application does not meet the standards and criteria set forth by the Oak Harbor Municipal Code and should be disapproved:

- Subdivision Waiver regarding the connection of the internal subdivision street system to Swantown Avenue.

As has been noted, the project drawings do not depict the code-required street connection to Swantown Avenue. After careful analysis, staff could not support the applicant's request for a

subdivision waiver that would allow the project to be approved without that connection. A revision to the project drawings is necessary. With that in mind, the previously referenced Effect of Approval code section (OHMC 21.20.080) has a role in shaping staff's recommendation on this project. Due to the fact that staff cannot recommend approval of the subdivision waiver regarding the connection to Swantown Avenue, staff cannot recommend approval of the preliminary plat, PRD and associated applications. Therefore, staff must recommend that the applications be disapproved.

The draft Findings of Fact provided to the Planning Commission are appropriate should the Commission accept staff's recommendation to disapprove the project. In the event the Planning Commission recommends approval of the project, the Findings of Fact will need to be revised.

Also in the event of an approval recommendation, staff has provided a list of Conditions of Approval that should be attached to the application (Attachment L).

RECOMMENDATION

1. Conduct the public hearing
2. Forward a recommendation to City Council for disapproval of the above-listed Preliminary Plat, Preliminary PRD, Subdivision Waivers and associated permits for the Marin Woods project.
3. Adopt Findings of Fact (see Attachment K).

ATTACHMENTS

Attachment A – Original Marin Woods Application packet
Attachment B – Updated review Application packet
Attachment C – Updated review Preliminary Plat Map
Attachment D – Updated review Preliminary PRD Plan
Attachment E – Landscape Plan
Attachment F – Annexation application packet
Attachment G – Correspondence between applicant and staff
Attachment H – Subdivision Waiver applications
Attachment I – Letter from staff regarding street connection
Attachment J – SEPA MDNS, dated March 11, 2016
Attachment K – Planning Commission Findings of Fact
Attachment L – Conditions of Approval (if needed)

MARIN WOODS

Attachment A:

Original Application Packet



City of Oak Harbor
Development Services Department
865 SE Barrington Drive, Oak Harbor, WA 98277
http://www.oakharbor.org

Phone: 360-279-4510
Fax: 360-279-4519

Development Application

Project Information

Project Name: Marin Woods
Project Address: 11292 SW Swantown Avenue
Oak Harbor, Washington
Description of Work: 43 lot Preliminary Plat/PRD for single family residences.

Assessor Parcel Number(s): R13204-459-4200
Land Area (sq. ft. or acres): 10.6 Acres Zoning District: R-1
What is the Project Valuation (best guess, if necessary) \$

Applicant Information

Applicant Name: George F. Marin Trust
Address: Christine R. Marin, Executor
F. R. Rick Duran, Development Mgr
City/State: 245 N Vine Street, Apt 301
Salt Lake City, UT 8 4103-1949

Hm 801-322-3440
CEL 801-916-9962
WK 801-240-3219

Email: MARINCR@LDSCHURCH.ORG

Applicant's Interest to Property* (check one):

- Owner Owner's Agent Lessee Contractor Licensed Architect Licensed Engineer
Other (specify)

Primary Contact (if other than applicant)
Name: F. R. Rick Duran, Development Mgr
The Archinomics Group, Inc.
Address: 342 Forest Street, Suite 300
Winnetka, IL 60093-3820
City/State: 847-274-1866
Email: frduran@archinomics.com

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CITY OF OAK HARBOR
Development Services Department

Property Owner(s) (if other than applicant)
Name: SAME AS APPLICANT
Address:
City/State: Zip: Phone/Fax:
Email:

All Persons/Firms having an ownership interest in the property:

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

Architect / Engineer: Michael E. Ryan, PE
Harmsen, Inc
Name: _____ 840 SE 8th Street, Suite 102
City/State: _____ Oak Harbor, WA 98277
360.675.5973
Email: _____ MichaelR@HarmsenInc.com

Architect / Engineer:

Name: _____ Address: _____

City/State: _____ Zip: _____ Phone/Fax: _____

Email: _____

Contractor:

Name of Business: _____

Contact Person: _____

Email: _____

Address: _____

City/State: _____ Zip: _____ Phone/Fax: _____

WA State Contractors License: _____ Exp. _____

City of Oak Harbor Business License: _____

Authorization

I declare under penalty of the perjury laws that the information I have provided on this form/application is true, correct, and complete.

Applicant Signature 

06/01/2015
Date

*Documentation demonstrating authorization to sign applications on behalf of the Owner(s) is required

Permit Type (check all that apply)

- Building
 Land Use
 Engineering
 Grading Only
 Land Clearing Only
 Demolition Only
 Residential Construction
 Commercial Construction

Please Note: Additional applications or supplementary pages may apply to your project.

Permits Requested (check all that apply)

<input type="checkbox"/> Accessory Dwelling Unit	<input type="checkbox"/> Grading	<input type="checkbox"/> Site Plan – Type I, II, IV
<input type="checkbox"/> Binding Site Plan	<input type="checkbox"/> Land Clearing	<input type="checkbox"/> Short Plat
<input type="checkbox"/> Boundary Line Adjustment	<input type="checkbox"/> Lot Combination	<input type="checkbox"/> Shoreline Substantial Development
<input type="checkbox"/> Civil Plan Review	<input type="checkbox"/> Pre-Application	<input type="checkbox"/> Transportation Concurrency
<input type="checkbox"/> Conditional Use - Consolidated	<input checked="" type="checkbox"/> Preliminary PRD	<input type="checkbox"/> Simple Variance - Consolidated
<input type="checkbox"/> Conditional Use - Simple	<input type="checkbox"/> Preliminary Plat	<input type="checkbox"/> Variance - Simple
<input type="checkbox"/> Final Plat	<input checked="" type="checkbox"/> SEPA Review	<input type="checkbox"/> Zoning Code Text Amendment

Are you requesting to process the applications individually per OHMC 18.20.360(1)?
 Yes No

Project Details (fill in all applicable sections)

Ground Disturbance: Yes No If yes, completes the following questions:

Is disturbance greater than 100 cubic yards? Yes No

Type of equipment to be used conventional clearing, earth moving and paving equipment

Total cubic yards of excavation 12,000 cy Total cubic yards of fill 17,000 cy

Critical Areas:

Does the site contain a critical area as defined in OHMC 20.12.030(2) Yes No Unknown

If yes, please state critical area type(s) _____

Shoreline Development:

Is construction planned within 200 feet of ordinary high water? Yes No Unknown

Floodplain:

Is the project site /property/or portions of the property within a floodplain? Yes No Unknown

Project Details (fill in all applicable sections)

Stormwater:

Will the completed project result in 2,000 or more square feet of impervious surface? Yes No Unknown

Total replaced new and impervious surface (in sq. ft) 206,200 SF

What is the stormwater facility type(s) proposed to be used for the project? Bioswale, infiltration, conveyance

Land Clearing: Yes No If yes, complete the following questions:

Percentage of land to be cleared 80% Types of vegetation to be removed native forest and understory

Garry Oaks on the property? Yes No Estimated date of clearing Future. this is a perlim plat app.

Type of equipment to be used conventional clearing, earth moving and paving equipment

Transportation Concurrency:

Licensed Traffic Engineer Matt Pallmer, PE, Gibson Traffic, MattP@GibsonTraffic.com 425.339.8266

Total length of public streets 2,640 LF, approx Total length of private streets none

Existing property use One SFR, forest

Land Use Data:

Sq ft of new construction One SFR, forest

Existing property use One SFR, forest

Proposed Property Use Residential PRD

Housing Type Proposed SFR

Proposed Number of Buildings 43 SFR lots

Number of Existing Dwelling Units One

Number of Proposed Dwelling Units 43 SFR

Number of Existing Parking Spaces 4

Number of New Parking Spaces 4 per SFR, 172

Number of Existing Lots 1

Number of New Lots Proposed 43 SFR lots

Proposed Density Approx 4du/ac, gross calc. Approx 5du/ discounting roads and open space.



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Development Services Department

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Development Services Department

Critical Area Identification Form

Project Name (if applicable): Marin Woods

Associated Application(s):

Brief Description of Proposal: A 43 lot, preliminary PRD.

APPLICANT NAME/CONTACT PERSON George F. Marin Trust Christine R. Marin, Executor F. R. Rick Duran, Development Manager frduran@archinomics.com	F. R. Rick Duran, Development Manager The Archinomics Group, Inc. 342 Forest Street, Suite 300 Winnetka, IL 60093-3820 Phone and Fax: cell:847-274-1866
PROPERTY OWNER NAME (list multiple) George F. Marin Trust Christine R. Marin, Executor	Address: 245 N VINE ST APT 301 SALT LAKE CITY, UT 841031949
E-mail Address: frduran@archinomics.com	Phone and Fax: cell:847-274-1866

AUTHORIZATION:

The undersigned hereby certifies that the property affected by this application is in the exclusive ownership of the applicant or that the applicant has submitted the application with the consent of all owners of the affected property. In addition, the undersigned hereby certifies that all information submitted with this application is complete and correct. False statements, errors, and/or omissions may be sufficient cause for denial of the request.

I declare under penalty of the perjury laws that the information I have provided on this form/application is true, correct and complete.

Authorized Signature

06 NOV 2015

Date

Staff use only below this line

Yes	No		Critical Area Report Needed?
<input type="checkbox"/>	<input type="checkbox"/>	Wetland	_____
<input type="checkbox"/>	<input type="checkbox"/>	Fish and Wildlife Habitat Conservation Area	_____
<input type="checkbox"/>	<input type="checkbox"/>	Geologically Sensitive Area	_____
<input type="checkbox"/>	<input type="checkbox"/>	Frequently Flooded Area	_____
<input type="checkbox"/>	<input type="checkbox"/>	Critical Aquifer Recharge Area	_____

P:\Permit Coordinator\Permit Applications\Development Services Permits & Handouts\Critical Area Identification Form.doc
REV: 1/6/14



CITY OF OAK HARBOR
Development Services Department

Transportation Concurrency
Application Form

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CITY OF OAK HARBOR
 Development Services Department

Project Name:
 Marin Woods PRD

Description of Proposal:
 Preliminary Plat application for a 43 lot single-family home development with PRD overlay

APPLICANT NAME/CONTACT PERSON George F. Marin Trust Christine R. Marin, Executor F. R. Rick Duran, Development Mgr frduran@archinomics.com	Address: F. R. Rick Duran, Development Manager The Archinomics Group, Inc. 342 Forest Street, Suite 300 Winnetka, IL 60093-3820 cell: 847-274-1866
PROPERTY OWNER NAME (list multiple owners on a separate sheet): George F. Marin Trust c/o Christine Marin	Address: 245 North Vine Street #301 Salt Lake City, UT 94103
E-mail Address: n/a	Phone and Fax: Fax: 801-240-2804
LICENSED TRAFFIC ENGINEER: Gibson Traffic Engineers	Address: 2802 Wetmore Avenue Suite 220 Everett, WA 98201
E-mail Address: info@gibsontraffic.com	Phone and Fax: P: 425-339-8266
PROJECT SITE INFORMATION (address/location): 1292 SW Swantown Ave Oak Harbor, WA 98277	Number of Lots: 43
Total Length of Private Streets:	Total Length of Public Streets: 2200' +/-
Zoning: R1	Existing Property Use (Residential/Commercial): Residential
Legal Description (attach separate sheet): Attached	Parcel Number(s): R13204-459-4200
Section/Township/Range: NE 1/4, Section 4, Township 32N, R 1E W.M.	Size of Property (sq.ft./acres): 10.6 Acres

AUTHORIZATION:

The undersigned hereby certifies that this application has been made with the consent of the lawful property owner(s) and that all information submitted with this application is complete and correct. False statements, errors, and/or omissions may be sufficient cause for denial of the request.


 Authorized Signature

06 NOV 2015
 Date



CITY OF OAK HARBOR
Development Services Department

**Subdivision Waiver
Application Form**

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CITY OF OAK HARBOR
Development Services Department

Submittal requirements are subdivider must make the request concurrently with subdivision application as described in section 21.50.020 OHMC. Subdivider must include description of any and all detail necessary to support the application. (5 copies)

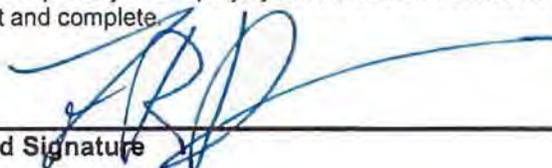
Project name: Marin Woods
Subdivision Waiver Application for Road Grade

APPLICANT NAME/CONTACT PERSON George F. Marin Trust Christine R. Marin, Executor F. R. Rick Duran, Development Manager frduran@archinomics.com	Address: F. R. Rick Duran, Development Manager The Archinomics Group, Inc. 342 Forest Street, Suite 300 Winnetka, IL 60093-3820
PROPERTY OWNER NAME (list multiple Christine R. Marin, Trustee George F. Marin Trust	Address: 245 N Vine St Apt 301 Salt Lake City, UT 84103-1949
E-mail Address:	Phone and Fax:
ENGINEER/SURVEYOR: Harmsen & Associates, Inc. Attn: Michael E. Ryan, PE MichaelR@HarmsenInc.com 360.675.5973	Address: 840 SE 8th Street, Suite 102 Oak Harbor, WA 98277
PROJECT SITE INFORMATION Marin Woods PRD 11292 SW Swantown Ave SW Swantown @ Fariway Ln, Oak Harbor	Parcel Number(s): R13204-459-4200
Legal Description (attach separate sheet): Please see Exhibit B	Acreage of Original Parcel(s): 10.6 Acres

AUTHORIZATION:

The undersigned hereby certifies that this application has been made with the consent of the lawful property owner(s) and that all information submitted with this application is complete and correct. False statements, errors, and/or omissions may be sufficient cause for denial of the request.

I declare under penalty of the perjury laws that the information I have provided on this form/application is true, correct and complete.



Authorized Signature **06 Nov 2015**
Date

LAND SURVEYING



CIVIL ENGINEERING

City of Oak Harbor
Development Services Department
865 SE Barrington Drive
Oak Harbor, WA 98277

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CITY OF OAK HARBOR
Development Services Department

19 September, 2014

Re: Marin Woods
Subdivision Waiver Application - Road Grade
Exhibits B: Narrative
Exhibit A: Legal Description

Greetings,

Following pages are exhibits that contain the narrative to support the Subdivision Waiver Application submitted for an exception to the residential road grade as per OHMC 11.17.100.a.

This waiver application is being submitted along with the preliminary PRD plans and documents and are included by reference.

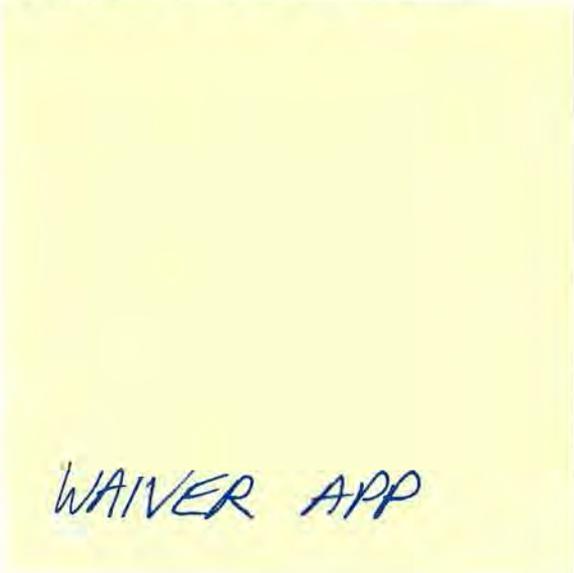
In short, we are requesting to exceed the 10% road grade for a short segment of a public roadway within this PRD.

I will eagerly address any questions that you may have. Please feel free to call or e-mail me as needed.

On Behalf of Landed Gentry and Marin Woods,

Thank you,

Michael E. Ryan, PE
Director, Oak Harbor
MichaelR@HarmsenInc.com
360.645.5973



ISLAND COUNTY
840 SE 8th Avenue, Ste. 102
Oak Harbor, Washington 98277
tel: (360) 675-5973 / fax: (360) 675-7255

SNOHOMISH COUNTY
125 East Main Street, Ste. 104
Monroe, Washington 98272
tel: (360) 794-7811 / fax: (360) 805-9732

SKAGIT COUNTY
603 South First Street
Mount Vernon, Washington 98273
tel: (360) 336-9199 / fax: (360) 982-2637

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www.HarmsenInc.com

Subdivision Waiver Application –Road Grade

Exhibit A:

We are seeking a subdivision deviation to exceed the City's road grade of 10% Maximum Grade as stated in OHMC 11.17.100.a.

In particular, we are seeking a waiver to allow approximately 350 feet of road grade on proposed SW Marin Drive at approximately 14%, measured PVI to PVI. Please See Sheet P4, SW Marin Drive Profile, sta 5+50 to sta 9+00.

All other internal roads as proposed do not exceed 10% and have ADA compliant crosswalks at all intersecting roads.

Constraints:

Existing and excessive grade: Marin Woods is dominated by a native grade slightly in excess of 11% that spans the majority of the width of the project and about the center third of the project length.

Existing Access points: SW Putnam Drive and SW Roberstson Drive currently exist and terminate abruptly at the boundary of this project site. A third access is available at Swantown, no other access points exist or are proposed. Connecting these access points require traversing this hillside.



 Subdivision Waiver Application – Road Grade
Justification:

To accommodate adequate vehicular access and to accommodate City block length concepts, two public streets were conceived as illustrated in the image above and per the accompanying preliminary PRD submittal.

May other road configurations were considered, none of which provided a more beneficial grade and far less beneficial lot and tract geometry.

As presented, the exceptional grade occurs on a vertical tangent for 50ft, with vertical curves at either end for a total length of 350 ft measured PVI to PVI, transitioning between a downhill road grade of 5% and an uphill grade of 7.6%.

This excessive grade occurs on a tangent in plan view with no compromise to sight distance.

Reasons to consider this Waiver:**The topography of the tract:**

- Native grades are steeper than the 10% maximum road grade allowed by the City. Obtaining 10% max grades throughout would require significant grading and earth movement.

Condition or nature of adjoining areas:

- Vehicular access points exist as SW Putnam Drive and SW Robetston Drive, both of which currently terminate at this site boundary. Connectivity to these fixed points adds additional constraints for grade management.

The existence of unusual, physical conditions:

- In addition to the topography of the site, the shape of the site is not conducive to alternate alignment options that may result in favorable grades without further compromising other city elements as to Block structure, lot access and lot geometry.
- A large rock, a glacial erratic, has been discovered in Tract A. This rock is sizable, and situated such that alternate road and lot configurations to avoid this rock were undesirable and further constrained lot and road geometry.
- In order to provide ADA compliant crosswalks, grade and crossfall values are further restrained to obtain suitable ADA compliant grades at intersecting roadways. Meeting ADA compliant intersection crosswalks results in adjacent roadway profile segments adjustments to recover grade and elevations differences. Such adjustments would otherwise require more significant earth moving and/or fewer intersections.

Subdivision Waiver Application –Road Grade

Exhibit B: Legal Description

LEGAL DESCRIPTION:

(Per Land Title Order #LT-107737, dated April 21, 2014)

The West 440 feet of the Northeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Willamette Meridian.

EXCEPT the following described tract:

Beginning at the point 700.5 feet South of the Northwest corner of the Northeast Quarter of the Northeast Quarter of said Section 4, and running thence South 340.6 feet to the North side of the county road;

thence South 50°38' East 105.8 feet;

thence North 39°22' East 262.4 feet;

thence North 50.26' West 322.2 feet to the point of beginning.

AND EXCEPT that portion lying Southwesterly of the Northeasterly right of way margin of Island County road right of way known as Swantown Road.

ALSO, that portion of the following described tract lying Northeasterly of the county road in the Southeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Willamette Meridian:

Beginning at the Northwest corner of said Southeast Quarter of the Northeast Quarter;

thence South along the West line of said Section a distance of 600 feet;

thence Northeasterly in a straight line to a point of the North line of said Southeast Quarter of the Northeast Quarter that is 336 feet East of the point of beginning;

thence West along the North line 336 feet to the point of beginning.

Situate in the County of Island, State of Washington.

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CITY OF OAK HARBOR
Development Services Department

Marin Woods Preliminary Plat / PRD

Introductory Narrative

The subject 10.6 site, originally in the City of Oak Harbor's Urban Growth Area was annexed from Island County into the City in October 2012.

A previous application (PLN-14-0001) by a proposed developer was removed from consideration in December, 2014. The current applicant is the landowner, George F. Marin Trust representing the six siblings who grew up on this property, and have ties to the community exceeding half a century.

Planned are 43 single-family homes, and associated neighborhood parks, and open space.

To meet City requirements, the existing home on property would require demolition, for a City request for a new street connection from Swantown Road tied into the Fairway Lane intersection.

The site is bounded on three sides by existing built-out plats.

On the north and west sides is Patton's Hillcrest Village, Div No 1, an Island County plat. On the east side is Highlands West, Div No 6, a City of Oak Harbor plat with two connecting streets into the subject.

Swantown Road is on the south side, and the requested new street would most likely be the primary entrance to the plat. Whidbey Golf and Country Club is across Swantown Road.

The property rises approximately 100 feet from Swantown Road to the northerly rear of the site, which is similar grade change to the adjacent Highlands West Div No 6. A challenge is, with 8 feet of grade change across many of the lots, creating usable building sites. Retaining walls and lot-perimeter drainage between the lots will help mitigate the grade. The grade also provides most of the lots with great views to the south-southwest. Most building sites will have long views of water.

Existing City of Oak Harbor utilities are located at the perimeter of the site at all three connecting points and have been described by City departments as generally sufficient to serve the subject site. Storm-water is governed by a 2002 Water Drainage Agreement (Golf Course Basin) and a (1997, revised 2007) drainage model which requires the site to discharge first into the surrounding system. The City and County are also signatories of this agreement.

Three tracts of open space have been established where the existing native forestation will remain, and additionally a site-perimeter will also preserve nature forestation.

The anticipated market for the completed homes is the Navy personnel housing needs in the coming years with expected price range of \$300,000 to \$325,000.

The proposed new street connecting to the Fairway Lane intersection would eliminate the existing home on property, originally planned for renovation and upgrade to fit the new surrounding development.

Work on-site is anticipated to begin in first quarter 2016, infrastructure construction beginning in the second quarter 2016, and first housing starts beginning in the third quarter 2016.

George F. Marin Trust

F. R. Rick Duran
Development Manager for the Trust

SEPA ENVIRONMENTAL CHECKLIST

CITY OF OAK HARBOR
 865 SE BARRINGTON DRIVE
 OAK HARBOR, WA 98277

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CITY OF OAK HARBOR
Development Services Department**Purpose of checklist:**

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants: [help]

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for non-project proposals: [help]

For non-project proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as

A. BACKGROUND [help]

1. Name of proposed project, if applicable: [help]

Marin Woods PRD

2. Name of applicant: [help]

George F Marin Trust**[1] Christine R. Marin, Executor****[2] F R Rick Duran, Development Manager**

3. Address and phone number of applicant and contact person: [help]

[1] Christine R Marin 245 Vine ST APT 301, Salt Lake City, UT 84103-1949**[2] F R Rick Duran, 342 Forest ST STE 300 Winnetka , IL 60093-3820**

4. Date checklist prepared: [help]

06 Nov 2015

5. Agency requesting checklist: [help]

City of Oak Harbor

6. Proposed timing or schedule (including phasing, if applicable): [help]

Plat construction Early Spring 2016

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. [help]

No

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. [help]

Storm Drainage Report

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. [help]

No

10. List any government approvals or permits that will be needed for your proposal, if known. [help]

Preliminary and Final Plat Approval from City of Oak Harbor

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) [help]

43 lot residential subdivision to include grading, installation of utilities, road construction

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. [help]

Site address: 1292 Swantown Road, Oak Harbor, WA 98277

Tax Parcel: R13204-459-4200

Located on the NE ¼, NE ¼, Sec 4, Twp 32 N, Range 1 E WM

Complete plan set and reports accompanies this checklist.

B. ENVIRONMENTAL ELEMENTS [help]

1. Earth

a. General description of the site [help] (circle one): Flat, rolling, **hilly**, steep slopes, mountainous, other _____
approximate 95 feet of grade change across the 10.6 acres over 1300 LF.

b. What is the steepest slope on the site (approximate percent slope)? [help]
15%

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. [help]
mostly glacial till

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [help]
none known

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. [help]
roads will be constructed with Whidbey Island pit run and processed gravels otherwise attempts will be made to balance the onsite cuts and fills.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [help]
yes, normal to this type of construction Applicant proposes to use appropriate management practices.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? [help]
47%
Roadways 92,700 SF,
driveways 27,700 SF,
Roofs 85,800 SF
= 206,200 / 461,736 SF

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: [help]
See storm drainage analysis report storm water will be collected, run through bio-retention system prior to discharge to existing exit ditch.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. [help]

During construction - equipment exhaust and dust

Dust control measures will be employed

After construction - new home heating system exhaust

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. [help]

none known

c. Proposed measures to reduce or control emissions or other impacts to air, if any: [help]

Dust emissions will be controlled by dampening the open soils to minimize dust

3. Water

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into. [help]

No

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans. [help]

Not applicable

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. [help]

Not applicable

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. [help]

Not applicable

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. [help]

No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. [help]

No

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. [help]

No ground water withdrawn or discharged to groundwater. The existing well will be formally decommissioned.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. [help]

Sanitary sewer will serve the site, so no sewage drainfield will be installed. The existing drainfield serving the existing house will be decommissioned along with the removal of the existing house.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow?

Will this water flow into other waters? If so, describe. [help]

See Conceptual Storm Water Analysis for the subject project. Source of runoff will be roadways, driveways and roofs that will be collected treated and discharged to existing exit ditch.

2) Could waste materials enter ground or surface waters? If so, generally describe. [help]

No

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Use BMP's per DOE manual

4. Plants [help]

a. Check the types of vegetation found on the site: [help]

- _X_deciduous tree: alder, maple, aspen, other
- _X_evergreen tree: fir, cedar, pine, other
- _shrubs
- _X_grass
- _pasture
- _crop or grain
- _Orchards, vineyards or other permanent crops.
- _wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- _water plants: water lily, eelgrass, milfoil, other
- _other types of vegetation

b. What kind and amount of vegetation will be removed or altered? [help]
As part of the project the City of Oak Harbor ordinances require 15% of site must be left or replanted as native vegetation.

c. List threatened and endangered species known to be on or near the site. [help]
None known

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: [help]
Per "B" above, graphically displayed on the attached landscape plans.

e. List all noxious weeds and invasive species known to be on or near the site.
None Known

5. Animals

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include: [help]

YES birds: hawk, heron, eagle, songbirds, other:

YES mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other _____

b. List any threatened and endangered species known to be on or near the site. [help]

None Known

c. Is the site part of a migration route? If so, explain. [help]

This site lies within the Pacific flyway, as does most of the Puget Sound basin.

d. Proposed measures to preserve or enhance wildlife, if any: [help]

A central park with most of the existing forest is planned to be retained.

e. List any invasive animal species known to be on or near the site.

None Known

6. Energy and natural resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. [help]

PSE & Cascade Natural Gas will be provided to each new lot for domestic residential use

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. [help]

Possibly in a favorable way - much of the forest site will be cleared opening areas adjacent to more sunlight

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any: [help]

The new homes will be built to the current energy codes.

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe. [help]

None Known

1) Describe any known or possible contamination at the site from present or past uses.
Very little as the site is surrounded on three sides by existing homes and a golf course on the fourth side.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.
Construction noise during plat and home construction short term during city authorized hours. Long term, some additional traffic.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Work during city authorized hours

4) Describe special emergency services that might be required.
Normal residential needs for 43 homes.

5) Proposed measures to reduce or control environmental health hazards, if any:
Community to comply with applicable City standards

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? [help]
Normal residential noise for 43 homes.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. [help]
Normal residential noise patterns for 43 homes.

3) Proposed measures to reduce or control noise impacts, if any: [help]
Community to comply with applicable City standards

8. Land and shoreline use

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. [help]

Currently the site is a forested vacant site. Residential uses on three sides, and

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or non-forest use? [help]

No

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No

c. Describe any structures on the site. [help]

One existing residence that is proposed to be moved off site or demolished

d. Will any structures be demolished? If so, what? [help]

Yes, the existing home will be moved or demolished

e. What is the current zoning classification of the site? [help]

R-1

f. What is the current comprehensive plan designation of the site? [help]

Residential

g. If applicable, what is the current shoreline master program designation of the site? [help]

Not applicable

h. Has any part of the site been classified as a critical area by the city or county? If so, specify. [help]

No

i. Approximately how many people would reside or work in the completed project? [help]

43 homes at 3 persons per home equals 129 people.

j. Approximately how many people would the completed project displace? [help]

0 - the existing two resident swill move to one of the new homes

k. Proposed measures to avoid or reduce displacement impacts, if any: [help]

None

L. Proposed measures to ensure the proposal is compatible with existing and projected land

uses and plans, if any: [help]

The PRD overlay assumes a more planned neighborhood to be built out by applicant

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

The creation of open spaces, and clustering of native vegetation. No agriculture nearby.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. [help]

43 homes for middle income families

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. [help]

one unit eliminated

c. Proposed measures to reduce or control housing impacts, if any: [help]

The project enhances the housing choices in the City of Oak Harbor.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? [help]

35 foot proposed to be within residential building code envelope

b. What views in the immediate vicinity would be altered or obstructed? [help]

By selective removal of some of the trees, some neighboring views could be enhanced – site slopes westerly over the golf course.

c. Proposed measures to reduce or control aesthetic impacts, if any: [help]

It will be a planned community by one builder intended to enhance the surrounding neighborhood

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur? [help]

Street light and residential home lighting

b. Could light or glare from the finished project be a safety hazard or interfere with views? [help]

Not likely

c. What existing off-site sources of light or glare may affect your proposal? [help]

None Known

d. Proposed measures to reduce or control light and glare impacts, if any: [help]

None needed – street lighting fixture selection

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity? [help]

Whidbey Golf & Country Club across the street. City parks and the on-site one-acre park

b. Would the proposed project displace any existing recreational uses? If so, describe. [help]

No

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: [help]

On-site park and pedestrian connectors and sidewalks

13. Historic and cultural preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe. [help]

No

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. [help]

No

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. [help]

None

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

None

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. [help]

The main entrance will be off Swantown Road but SW Putnam Drive and SW Robertson DR will connect to the east side of the plat. Site plan attached.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? [help]

No

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? [help]

Each lot will have a minimum of two off-street parking pots. Some of the home will have three-car garages.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). [help]

Yes – a new public street system will be built to serve the new lots

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. [help]

No

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? [help]

see attached traffic impact analysis (TIA) 42 PM peak hour trips

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

No

h. Proposed measures to reduce or control transportation impacts, if any: [help]

Pay traffic mitigation fees and comply with the recommendations of the traffic impact analysis

15. Public services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. [help]

Only as typical of a normal middle-income residential community of forty three homes.

b. Proposed measures to reduce or control direct impacts on public services, if any. [help] **participate in the current impact fee structure of the city**

16. Utilities

a. Circle utilities currently available at the site: [help]

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other cable TV

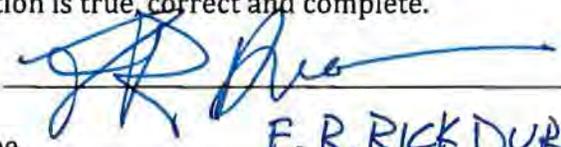
b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. [help]

**Sanitary sewer, refuse collection, water - City of Oak Harbor
Electric - PSE
Natural Gas - Cascade Natural Gas
Telephone & Cable - Frontier, Comcast**

C. SIGNATURE [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

I declare under penalty of the perjury laws that the information I have provided on this form/application is true, correct and complete.

Signature: 

Name of signee F. R. RICK DURAN

Position and Agency/Organization DEVELOPMENT MANAGER, GEORGE F. MARIN TRUST

Date Submitted: 06 NOV 2015

RECEIVED
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CITY OF OAK HARBOR
Development Services Department

**CONCEPTUAL STORM DRAINAGE
ANALYSIS FOR the PRD of
Marin Woods**

**11292 SW Swantown Avenue
Located at the intersection of
Swantown Ave and Fairway Lane
Oak Harbor, Washington**

September 23, 2014
Michael E. Ryan, PE



A N T I C I P A T E U N D E R S T A N D G U I D E D E L I V E R

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- A 2014 WWHM3 Screen Shots
- B 2014 NRSC Soil Data
- C 2014 Plan Sheet P1, “Existing Conditions/Topographic Survey”
- D 2014 Plan Sheet P2, “Preliminary Grading Plan
- E “1997 Study”, Golf Course Drainage Basin Stormwater Mitigation Study, August 1997
- F “2007 Update”, Golf Course Drainage Basin, North Basin Build-Out Stormwater Evaluation, published in 2007
- G “2002 Drainage Agreement”, Basin Study Agreement between the City of Oak Harbor, Island County and the Whidbey Golf Course
- H “2014 Agreement Letter”, Van Ness Feldman letter to Landed Gentry re “2002 Drainage Agreement”

PROJECT DESCRIPTION

This report is a Conceptual Drainage Report that is being submitted with Preliminary PRD plans of Marin Woods to the City of Oak Harbor for consideration and approval. A Final Drainage Reports and PRD Construction plans shall be submitted at a later date and after preliminary approval of this PRD is achieved.

Marin Woods is a proposed Planned Residential Development that is situated in approximately 10.6 acres of undeveloped area east of the intersection of Swantown Road at Fairway Lane. This nearly rectangular site is bound on three sides by developed residential neighborhoods, and slopes approximately and generally at 10% towards Swantown Road which borders the fourth side. This PRD proposes 43 individual lots for single family homes, public roadways with utilities and three tracts. The 1.6 Acres of tracts include opens space, preserved native vegetation, recreational areas and a bioretention cell that provides water quality for all pollution generating surfaces.

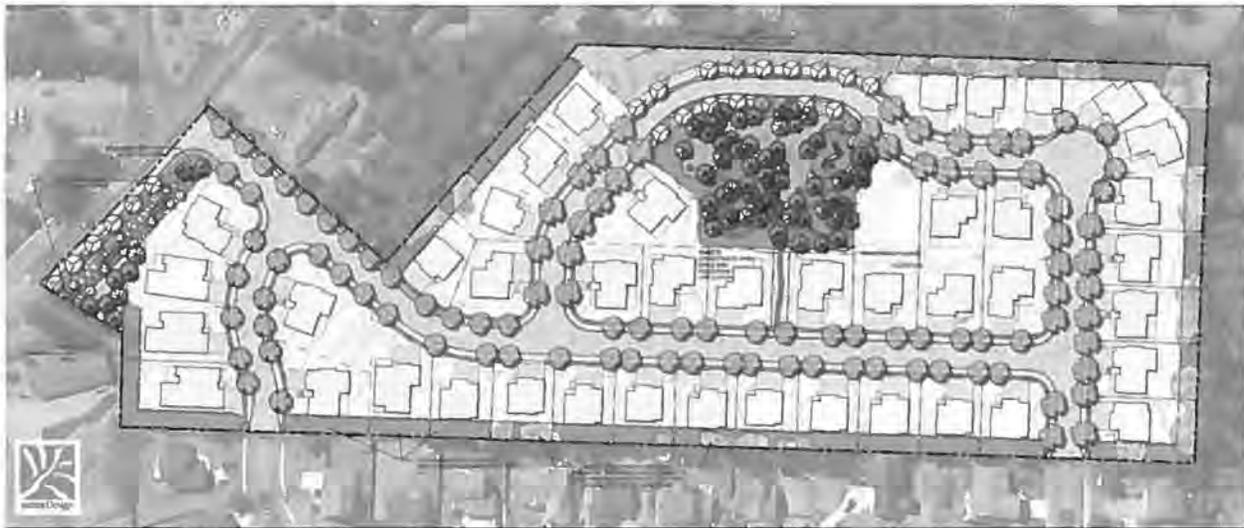


Figure 1 Marin Woods Conceptual Landscape Plan by ecos Design

Low Impact Development considerations include reduced roadway section standards per the City of Oak Harbor's "Local Residential, Narrow" and "Local LID Street #1". This consists of two drive lanes with one parking lane in areas containing homes, and two lanes without parking where the public road passes between tracts A and B. The hillside development will contain terraces with short MSE walls or rockeries to reduce the crossfall of yards. Roof runoff shall be provided by BMP T5.10 via perforated stub-outs as infiltration and vegetated flow paths are both unsuitable for infiltration or dispersion techniques in the vicinity of the homes. Disturbed soils shall be amended per BMP T5.13 and permanently landscaped.

Additionally, this project is seeking administrative approval to reduce the public sidewalks from the 5 ft typical width to 4 ft width on each side of the roadways within the PRD. The crosswalks have ADA compliant widths with 5% max slope or crossfall at intersections per WSDOT 1510.06, 151.07 and United States Access Board (USAB) chapter 3.

Sidewalks also cross driveways frequently which have the effect of a wider sidewalk at those locations and provide the pedestrian "passing lanes" per the ADA requirements for reduced sidewalk widths per WSDOT 1510.06, 151.07 and USAB chapter 3.

Water quality is achieved via a bioretention cell located in Tract C at the downhill edge of the development and parallel to Swantown Road. The bioretention facility is located in an area that may contain a different soil profile (than the upland home sites) that may be conducive to infiltration. Currently, this report assumes that infiltration is unavailable or inadequate, and the water quality facility has been designed with underdrains that will allow infiltration to occur at whatever capacity is available but provide a method for adequate drainage.

Although the bioretention facility will retard the discharge of stormwater and have some storage capacity, no stormwater detention is proposed.

Per the Golf Course Drainage Basin Stormwater Mitigation Study published August 1997 (1997 Study), and the subsequent 2007 Golf Course North Basin Build-Out Stormwater Evaluation (2007 Update) which updated 1997 Study, this development proposes rapid release of stormwater for Marin Woods.

The 1997 Study and the 2007 Update are attached as Appendices E and F.

A three-party agreement (Drainage Agreement) between the City of Oak Harbor, Island County and the Whidbey Island Golf Course was established in March of 2002. The 2002 Drainage Agreement outlines how future development shall be coordinated per the 1997 Study. In June of 2014, the 2002 Drainage Agreement was reviewed by Jay Derr, atty, with Van Ness Feldman, LLP, and an evaluation of the 2002 Drainage Agreement (Evaluation of Drainage Agreement) was prepared for Landed Gentry.

The 2002 Drainage agreement and the 2014 Evaluation of Drainage Agreement are attached as Appendices G and H.

SUMMARY OF THE 1997 STUDY AND 2007 UPDATE:

Marin Woods dominates the undeveloped areas labeled as N1 and N2 in 1997 Study and 2007 Update. Areas N1 and N2 are recommended for rapid release via the "Exit Ditch" which is the natural and historic waterway for all of area N1 and N2 which terminate into the Sound at West Beach.

The 1997 Study analyzed storm drainage of the existing conditions of areas surrounding the Whidbey Golf Course and proposed a basin approached solution for stormwater management. The 1997 Study predicted growth and development of the undeveloped areas, then was updated in 2007 to account for growth that had occurred and re-predict growth that was available. This PRD proposes more hardscape than did the original 1997 basin study, but significantly less hardscape than was measured and proposed in the 2007 Update.

Marin Woods is the last of the undeveloped 10.6 acre space available in the approximately 30 acres of basins N1 and N2. All other areas of N1 and N2 are currently platted into lots with single family homes in existence. Additional growth in areas N1 and N2 can only result in subdividing existing, developed lots, or by removing existing homes and reconfiguring lot lines. Additional growth is possible, but not likely to occur on a large scale.

Discharge from this site, the golf course basins and significantly larger contributing area that drains into Loer's Pond ultimately join and flow through the "Exit Ditch" to a release point to the Sound at West Beach. The basic premise of the 1997 Study which was upheld in the 2007 Update, is that the release from the 2400 acre golf course basin and even larger release potential from Loer's Pond is significant and somewhat delayed as compared to the release from the 30 acre drainage basin N1 and N2 (which contain 10.6 acres of Marin Woods). Areas N1, N2 and N3 and Loer's Pond release all gravity flow to West Beach whereas the Golf Course basin contains a pumped discharge from the Golf Course itself. The Marin Woods discharge peak flow and velocity is substantially less than the Golf course release and Loer's Pond release. The 1997 Study recommend that the release from areas N1, N2 and N3 (which contain Marin Woods) shall be allowed to flow ahead of/prior to the golf course surge and Loer's Pond surge, and thus not compound either subsequent surge.

METHODOLOGY

The drainage design for the site was prepared using the requirements of the Washington State Department of Ecology *Storm Water Management Manual for Western Washington, 2005*, (DOE Manual) as adopted by the City of Oak Harbor. Western Washington Hydrology Model, Version 3 (WWHM3), as supplied by the Department of Ecology, was used to prepare runoff calculations.

SOILS DATA

According to the Us Department of Agriculture Natural Resources Conservation Service (NRSC), this site contains more than 95% Everett-Alderwood complex covering all of the residential sites, and less than 5% Whidbey-Hoypus Complex in the vicinity of the bioretention facility along Swantown Road. The Everetet-Alderwood soil profile consists of a mixture of well draining soil (Everett) and non-draining soil (Alderwood) suggesting that the soil is very well draining in some locations and nearly impervious in others locations, not uncommon in the Oak Harbor area. The nature of the slopes combined with NRSC's predicted depths to impervious layers, infiltration of stormwater at home sites is neither likely nor advisable as infiltrate is likely to perch and follow impervious layers to downhill locations.

The Whidbey-Hoypus soil type near the bioretention facility is suggestive of favorable permeability as well as favorable depth to water tables. The bioretention facility is proposed with under drains, but infiltration may be likely. Infiltration testing in this location may determine infiltration abilities.

Relatively shallow depths to impervious layers suggest a high hazard for erosion on upland soil areas.

See Appendix B for NRSC soils data.

DRAINAGE ANALYSIS



Figure 2 Existing Conditions Aerial

EXISTING CONDITIONS

Marin Woods is currently a forested area with no wetlands, streams or critical areas, see Figure 2 Existing Conditions Aerial. Currently, the ground cover is first and second growth timber with understory on grades that generally fall northeast to southwest. The middle third of the site contains slopes that range 12% whereas as the upper third of the site is closer to 9% and the lower third approaches 6%.

Access to this site currently consists of two public streets, SW Robertson Drive and SW Putnam Drive, each of which are truncated at the east property line. Access is also available along the southern border along Swantown Rd.

Offsite runoff is expected to arrive along the northern and eastern boundaries, but in very reduced quantities as the contributing area is rear yards from developed neighborhoods that capture and convey roof and street runoff elsewhere.

Contours and a tree survey are depicted within the preliminary plan set on the Sheet P1 "Existing Conditions and Topography Survey", attached as Appendix C.



Figure 3 Developed Conditions

DEVELOPED CONDITIONS

Three access points are proposed for Marin Woods. From the east, SW Robertson Drive and SW Putnam Drive shall be continued through Marin Woods to a new, third connection with an improved intersection to Swantown Road at Fairway Lane.

43 lots with single family homes are proposed, as are at least two tracts to contain open space and recreational area, and one tract that will contain the water quality facility, a vegetated bioretention facility in addition to buffer plantings.

The entire area is a single drainage basin, and the natural and historic discharge route is followed as contained in the 1997 Study. Figure 3: Developed Conditions, indicates the extent of work and graphically shows the drainage basin area.

The proposed impervious surfaces are as follows:

Roadway Improvements, including Swantown frontage	92,700 sf
Driveways	27,700 sf
<u>Rooftops</u>	<u>85,800 sf</u>
Total	206,200 sf

The proposed drainage system is as follows:

Roadway Runoff: Runoff from the roadway, sidewalks, driveways and any tributary landscape areas will be collected and conveyed to the bioretention cell located in Tract C.

Roof Runoff: Roof downspouts shall be per 3.1 of the 2005 DOE Manual. Per the NRSC soil profiles and slopes of the site, downspout infiltration is neither likely nor advisable in the form of infiltration trenching or dry wells. Roof downspout controls are proposed following the DOE manual, section 3.1.3 Perforated Stub-Out Connections. As this development is terraced to a large degree, many walls exist at the terrace, separating adjacent parcels. Each wall shall be constructed with a drain. Wall and footing drains shall be directed to the storm drain system which passes through the bioretention facility in Tract C at the toe of the development. NRSC soil profiles suggest that the bioretention facility may lie on a more suitable soil that is conducive to infiltration. The location of the bioretention facility is less likely to promote flow along impervious layers.

Downspouts and the Bioretention facility are further addressed in Minimum Requirement 6 & 7. See Appendix A for site runoff calculations via WWHM3. See Storm Drain Analysis section of the report for water quantity control sizing.

Offsite runoff is expected from the adjacent rear yards of developed and landscaped home sites, which is small in area and the quantity is expected to be minimal and from non pollution generating surfaces. This offsite flow will be collected via an interceptor trench located along the east perimeter of the site. This interceptor shall contain perforated pipe and be conveyed to an existing storm catch basin located in Swantown Road.

The proposed conditions are also depicted in more detail within the preliminary plan set on the Sheet P7 "Preliminary Grading Plan", attached as Appendix D.

STORM DRAIN ANALYSIS

The storm drain plan for this development will be prepared using the 2005 DOE Manual, which allows for drainage basin plans. As such, we are complying with the 1997 Drainage basin study and subsequent 2007 Update to that study which recommends no detention for this geographic area which is a deviation from the typical Minimum Requirement #7. This proposal and Construction Storm Water Site Plan will need to meet Minimum Requirements #1-10 with the exception #7. These requirements and the proposed storm drain system are listed below:

Minimum Requirement #1: Preparation of Storm water Site Plans.

A Conceptual Storm Drainage Plan is submitted with the plans set accompanying this report. A Final Storm Drainage Plan shall be part of the construction drawings submitted to the City of Oak Harbor for review and approval.

Minimum Requirement #2: Construction Storm water Pollution Prevention.

The 12 elements of the erosion and sediment control plan will be detailed in a SWPPP Narrative, prepared as part of the construction permit documents.

Minimum Requirement #3: Source Control of Pollution

The proposed development is a single-family residential site. As such, it falls outside of the land uses described in Chapter 4 of the 2005 DOE Manual. The one source control that specifically applies is the Maintenance of Stormwater Drainage and Treatment Systems. An Operations and Maintenance Manual shall be prepared as a separate document for use by the Property Owners in maintaining the proposed storm drainage system. A Maintenance Manual will be provided with the Constuction Plans for review after preliminary approval is achieved.

Minimum Requirement #4: Preservation of Natural Drainage System

The natural drainage basins and discharge routes are preserved and in agreement with the 1997 Study and 2007 Update.

Minimum Requirement #5: On-site Stormwater Management

The following On-site Stormwater Management BMP's are proposed; BMP T5.13: Soil Quality and Downspout Infiltration per Section 3.1.1.

BMP T5.13: Soil Quality: All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

1. A topsoil layer with a minimum organic matter content of ten percent dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the original undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the

depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

2. Planting beds must be mulched with 2 inches of organic material
3. Quality of compost and other materials used to meet the organic content requirements:

- a. The organic content for “pre-approved” amendment rates can be met only using compost that meets the definition of “composted materials” in WAC 173-350-220. This code is available online at:

<http://www.ecy.wa.gov/programs/swfa/facilities/350.html>. The compost must also have an organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25:1. The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

- b. Calculated amendment rates may be met through use of composted materials as defined above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and meeting the contaminant standards of Grade A Compost. The resulting soil should be conducive to the type of vegetation to be established.

Implementation Options: The soil quality design guidelines listed above can be met by using one of the methods listed below

1. Leave undisturbed native vegetation and soil, and protect from compaction during construction
2. Amend existing site topsoil or subsoil either at default “preapproved” rates, or at custom calculated rates based on specifiers tests of the soil and amendment.
3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default “pre-approved” rate or at a custom calculated rate.
4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Roof Downspout Controls: Downspouts shall be managed via DOE section 3.1.3 Perforated Stub-out Connections. Per the NRSC soil profiles, infiltration is not

expected at the home sites. Vegetated flow paths of adequate length are not available to support splash block release per 3.1.2. The water quality facility has been adequately sized to receive all roof runoff. The sizing of this system is set forth in Minimum Requirement #7: Flow Control.

Minimum Requirement #6: Runoff Treatment

The proposed impervious subject to vehicular traffic is greater than 5,000 sf.

This is a residential neighborhood and is absent of elements that trigger oil control BMP's for a "High use site" per DOE, Oil Control is not specifically required. Enhanced treatment is not required as the proposal is a single-family residential development. Therefore, Basic Treatment is required.

The bioretention cell contains soils amended specifically in the 2005 DOE Volume III chapter 3 to adequately treat residential runoff, including phosphorus.

Stormwater not infiltrated within the bioretention cell will be conveyed via underdrain to an existing storm catch basin located on Swantown Road.

The proposed method for providing this treatment is a Bioretention Cell. The Bioretention Cell uses a layer of amended soil to treat runoff prior to infiltration into the sub-soils. In this case, runoff from all PGS areas as well as sidewalks, rooftops, walls and foundations are directed through this bioretention cell. 99.8% of all runoff entering this cell will pass through the water quality soils. NRSC soil profiles suggest that the location of this facility is likely to have adequate soil types and depths to groundwater to allow infiltration to occur. This system provides Runoff Treatment for the entire project site and is further described in Minimum Requirement #7.

These systems are sized as follows:

Bioretention Cell: Based on the 2005 DOE Appendix III-C.

Soils: The soil of the bioretention facility is a principle design element for determining infiltration capacity, sizing and rain garden type. The planting soil mix placed in the cell is a highly permeable soil mixed thoroughly with compost amendment, and a surface mulch layer. Soil depth should be a minimum of 18 inches to provide acceptable minimum pollutant attenuation and good growing conditions for selected plants. The texture for the soil component of the bioretention soil mix should be a loamy sand (USDA Soil Textural Classification). Clay content for the final soil mix should be less than 5 percent. The final soil mixture should have a minimum organic content of approximately 10 percent by dry weight. The pH for the soil mix should be between 5.5 and 7.0.

Mulch layer: Bioretention areas can be designed with or without a mulch layer.

Compost: Material must be in compliance with WAC chapter 173-350-220. This code is available online at

<http://www.ecy.wa.gov/programs/swfa/facilities/350.html>.

The pH should be between 5.5 and 7.0 with carbon nitrogen ratio between 20:1 and 35:1 (35:1 CN ratio recommended for native plants). Organic matter content should be between 35% and 65%.

Installation: Minimize compaction of the base and sidewalls of the bioretention area. Excavation should not be allowed during wet or saturated conditions. Excavation should be performed by machinery operating adjacent to the bioretention facility and no heavy equipment with narrow tracks, narrow tires or large lugged, high pressure tires should be allowed on the bottom of the bioretention facility. On-site soil mixing or placement should not be performed if soil is saturated. The bioretention soil mixture should be placed and graded by excavators and/or backhoes operating adjacent to the bioretention facility.

Plant materials: Plants should be tolerant of ponding fluctuations and saturated soil conditions for the length of time anticipated by the facility design, and drought during the summer months. In general, the predominant plant material utilized in bioretention areas are facultative species adapted to stresses associated with wet and dry conditions.

Maximum ponding depth: A maximum ponding depth of 12 with a maximum surface pool drawdown time of 24 hours is recommended. Ponding depth and system drawdown should be specified so that soils dry out periodically in order to:

- Restore hydraulic capacity to receive flows from subsequent storms.
- Maintain infiltration rates.
- Maintain adequate soil oxygen levels for healthy soil biota and vegetation.
- Provide proper soil conditions for biodegradation and retention of pollutants.

Infiltration Rate: The amended soil is to have a long term infiltration rate of 2 in/hr. This may be lower than the long term infiltration rate of the subsurface soils provided by NRSC, and an underdrain is proposed at this time. With an underdrain, the amended soil is the controlling element in the sizing calculations. As such, 2in/hr was used to calculate that 99.8% of the stormwater will pass through the bioretention facility, per WWHM3.

Infiltration, to whatever capacity is available, may occur beneath the bioretention facility. Overflow and the underdrain shall be connected to the existing storm drain conveyance system in Swantown Road and exit to the Sound at West beach via a series of pipes and open ditches.

Use the following method of determining the infiltration rate for the imported soil in a bioretention facility:

- Use ASTM D 2434 Standard Test Method for Permeability of granular Soils (Constant Head) with a compaction rate of 80% using ASTM D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- Use 4 as the infiltration reduction correction factor.

WVHM3 was used to size the bioretention cell to infiltrate 99.8% of the tributary runoff through the amended soils and thus into the subsurface soils. Per the modeling software, the required bottom area is 3,220 sf.

See Appendix A for WVHM3 modeling output and sizing calculations.

Roof Downspout Management: Based on Section 3.1.3 of the DOE Manual, downspouts shall be connected to perforated stub-out connections.

A detail for the perforated stub outs shall be included on the construction plans.

Minimum Requirement #7: Flow Control

Per the 197 Study and the 2007 Update, Flow control is not required. However, flow will be reduced and slowed through the use of a bioretention cell and roof downspout perforation stub-outs.

Additionally, Marin Woods is using reduced width roadways in form of City Standard sections "Local Residential, Narrow" and "Local LID #1". A waiver is applied for to also reduce the standard 5ft sidewalk width to 4ft wide. The reduced pavement and sidewalk widths are all aimed at reducing stormwater flow.

Minimum Requirement #8: Wetlands Protection

There are no wetlands on or near the site.

Minimum Requirement #9: Basin Planning

The basin containing this development is in compliance with the 1997 Drainage Basin Study.

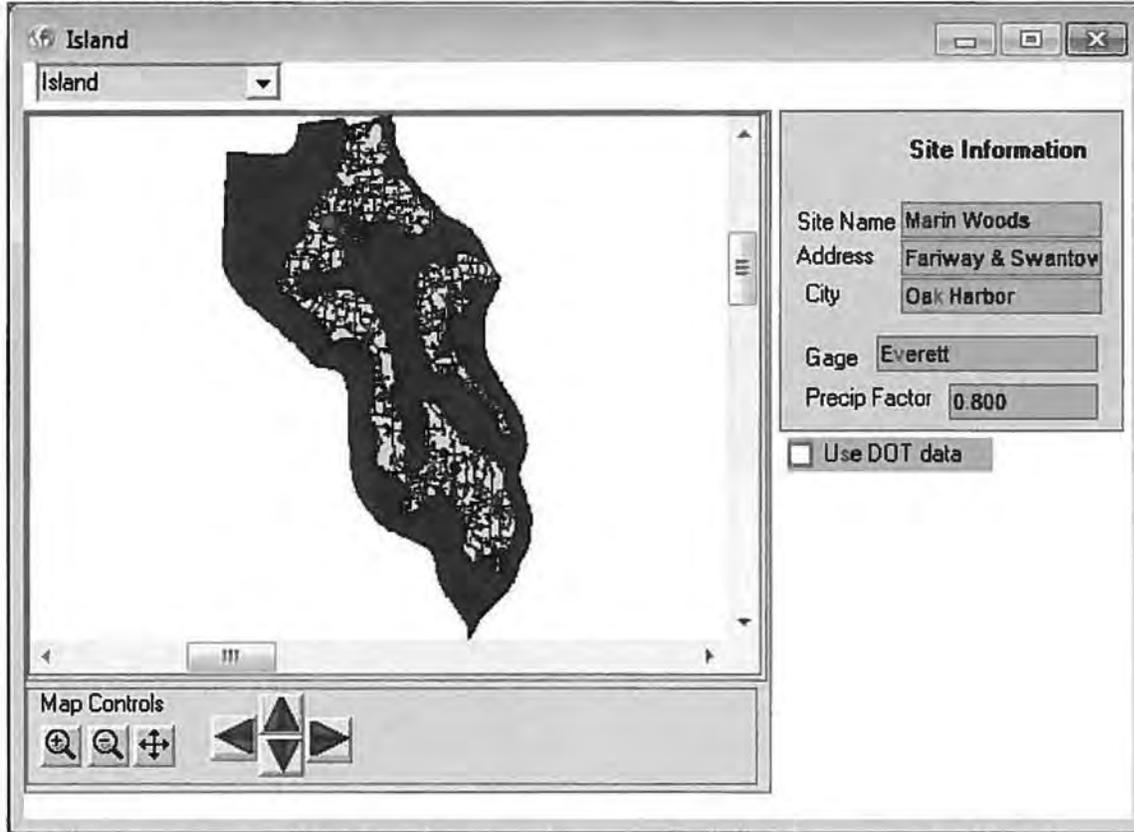
Minimum Requirement #10: Operation and Maintenance

An Operations and Maintenance Manual shall be provided with the construction plans.

Appendix A

WWHM3 Screen Shots

Location and Rainfall Data



A N T I C I P A T E U N D E R S T A N D G U I D E D E L I V E R

Pre-Development Basin

SCENARIOS

Predeveloped

Mitigated

Run Scenario

ELEMENTS

Move Elements

Subbasin Name: Basin 1

Flows To: Surface Interflow Groundwater

Area in Basin Show Only Selected

Available Pervious		Available Impervious	
<input checked="" type="checkbox"/> C. Forest, Flat	1.053	<input checked="" type="checkbox"/> ROADS FLAT	0
<input checked="" type="checkbox"/> C. Forest, Mod	8.424	<input checked="" type="checkbox"/> ROADS MOD	0
<input checked="" type="checkbox"/> C. Forest, Steep	1.053	<input checked="" type="checkbox"/> ROOF TOPS FLAT	0.054
<input checked="" type="checkbox"/> C. Pasture, Flat	0	<input checked="" type="checkbox"/> DRIVEWAYS FLAT	0.046
<input checked="" type="checkbox"/> C. Pasture, Mod	0	<input checked="" type="checkbox"/> DRIVEWAYS MOD	0

Pervious Total: 10.53 Acres Impervious Total: 0.1 Acres

Basin Total: 10.63 Acres

Mitigated Basin, Pollution Generating Surfaces

SCENARIOS
 Predeveloped
 Mitigated
 Run Scenario

ELEMENTS

Move Elements

Subbasin Name: Basin 1 - PGS Designate as bypass for POC

Flows To: Surface: Bioretention 1, Interflow: Bioretention 1, Groundwater: []

Area in Basin Show Only Selected

Available Pervious		Available Impervious	
<input checked="" type="checkbox"/>	ROADS FLAT	<input checked="" type="checkbox"/>	1.08
<input checked="" type="checkbox"/>	ROADS MOD	<input checked="" type="checkbox"/>	1.05
<input checked="" type="checkbox"/>	DRIVEWAYS FLAT	<input checked="" type="checkbox"/>	09
<input checked="" type="checkbox"/>	DRIVEWAYS MOD	<input checked="" type="checkbox"/>	54

Pervious Total: 0 Acres
 Impervious Total: 2.76 Acres
 Basin Total: 2.76 Acres

Mitigated Basin, Non-Pollution Generating Surfaces

SCENARIOS
 Predeveloped
 Mitigated
 Run Scenario

ELEMENTS

Move Elements

Subbasin Name: Basin 1 - NPG Designate as bypass for POC

Flows To: Surface: Bioretention 1, Interflow: Bioretention 1, Groundwater: []

Area in Basin Show Only Selected

Available Pervious		Available Impervious	
<input checked="" type="checkbox"/>	C Forest, Flat	<input checked="" type="checkbox"/>	ROOF TOPS FLAT
<input checked="" type="checkbox"/>	23	<input checked="" type="checkbox"/>	1.97
<input checked="" type="checkbox"/>	C Forest, Mod		
<input checked="" type="checkbox"/>	81		
<input checked="" type="checkbox"/>	C Pasture, Flat		
<input checked="" type="checkbox"/>	1.27		
<input checked="" type="checkbox"/>	C Pasture, Mod		
<input checked="" type="checkbox"/>	3.99		

Pervious Total: 5.9 Acres
 Impervious Total: 1.97 Acres
 Basin Total: 7.87 Acres

Bioretention Cell

Sand Filter 1 Mitigated

Facility Name Bioretention 1

Outlet 1 0 **Outlet 2** 0 **Outlet 3** 0

Downstream Connections

Facility Type Sand Filter

Precipitation Applied to Facility Quick Filter

Evaporation Applied to Facility

Facility Bottom Elevation (ft) 0

Facility Dimensions

Bottom Length	201
Bottom Width	16
Effective Depth	4
Left Side Slope	3
Bottom Side Slope	0
Right Side Slope	3
Top Side Slope	0

Outlet Structure

Riser Height (ft)	3
Riser Diameter(in)	48
Riser Type	Flat
Notch Type	

Infiltration YES

Hydraulic Conductivity(in/hr)	Orifice Number	Diameter (In)	Height (Ft)	QMax (cfs)
2	1	0	0	0
1.5	2	0	0	0
	3	0	0	0

Filter material depth(ft) 1.5

Total Volume Filtered(acre-ft) 535.685

Total Volume Through Riser(acre-ft) 1.107

Total Volume (acre-ft) 536.793

Percent Filtered 99.79

Filter Storage Volume at Riser Head 525

Pond Increment 0.10

Show Pond Table Open Table

Appendix B

2014 NRSC Soil data





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 Island County, Washington

Marin Woods and Adjacent Area



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

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Soil Map

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

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)		Area of Interest (AOI)		Spoil Area
Soils		Soil Map Unit Polygons		Stony Spot
		Soil Map Unit Lines		Very Stony Spot
		Soil Map Unit Points		Wet Spot
Special Point Features		Blowout		Other
		Borrow Pit		Special Line Features
		Clay Spot	Water Features	
		Closed Depression		Streams and Canals
		Gravel Pit	Transportation	
		Gravelly Spot		Rails
		Landfill		Interstate Highways
		Lava Flow		US Routes
		Marsh or swamp		Major Roads
		Mine or Quarry		Local Roads
		Miscellaneous Water	Background	
		Perennial Water		Aerial Photography
		Rock Outcrop		
		Saline Spot		
		Sandy Spot		
		Severely Eroded Spot		
		Sinkhole		
		Slide or Slip		
		Sodic Spot		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: Island County, Washington
 Survey Area Data: Version 11, Dec 7, 2013

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

Date(s) aerial images were photographed: Jul 9, 2010—Aug 28, 2011

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

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Map Unit Legend

Island County, Washington (WA029)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2010	Whidbey-Hoypus complex, 2 to 15 percent slope	0.7	4.4%
3017	Everett-Alderwood complex, 3 to 15 percent slopes	10.4	65.3%
3019	Everett-Alderwood complex, 15 to 40 percent slopes	4.8	30.3%
Totals for Area of Interest		15.9	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

Custom Soil Resource Report

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.

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Island County, Washington**2010—Whidbey-Hoypus complex, 2 to 15 percent slope****Map Unit Setting**

National map unit symbol: 2dvrw
Elevation: 0 to 300 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Whidbey and similar soils: 60 percent
Hoypus and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whidbey**Setting**

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glacial drift over dense glacial drift

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 6 inches: gravelly loam
Bw - 6 to 20 inches: very gravelly sandy loam
Bg - 20 to 37 inches: very gravelly sandy loam
2Cd - 37 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Natural drainage class: Moderately well 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 12 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B/D
Ecological site: Pseudotsuga menziesii-arbutus menziesii/holodiscus discolor/
 goodyera oblongifolia (F002XN901WA)

Description of Hoypus**Setting**

Landform: Hillslopes

Custom Soil Resource Report

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glacial outwash

Typical profile

O_i - 0 to 1 inches: slightly decomposed plant material
A - 1 to 5 inches: sandy loam
Bw₁ - 5 to 20 inches: loamy sand
Bw₂ - 20 to 36 inches: very gravelly loamy sand
C - 36 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (K_{sat}): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: Pseudotsuga menziesii-arbutus menziesii/holodiscus discolor/
 goodyera oblongifolia (F002XN901WA)

3017—Everett-Alderwood complex, 3 to 15 percent slopes**Map Unit Setting**

National map unit symbol: 2dzc6
Elevation: 0 to 590 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Everett and similar soils: 70 percent
Alderwood and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Everett**Setting**

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glacial outwash

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 9 inches: sandy loam
Bw1 - 9 to 13 inches: gravelly sandy loam
Bw2 - 13 to 30 inches: very gravelly coarse sand
C - 30 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: Tsuga heterophylla-thuja plicata/vaccinium parvifolium-gaultheria shallon/polystichum munitum (F002XN906WA)

Description of Alderwood

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glacial drift over dense glaciomarine deposits

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 10 inches: extremely gravelly sandy loam
Bw - 10 to 18 inches: extremely gravelly coarse sandy loam
Bg - 18 to 36 inches: extremely gravelly coarse sandy loam
2Cd - 36 to 60 inches: gravelly silty clay loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Natural drainage class: Moderately well 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 12 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Custom Soil Resource Report

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: B/D

Ecological site: Tsuga heterophylla-thuja plicata/vaccinium parvifolium-gaultheria shallon/polystichum munitum (F002XN906WA)

3019—Everett-Alderwood complex, 15 to 40 percent slopes

Map Unit Setting

National map unit symbol: 2dzc8

Elevation: 0 to 590 feet

Mean annual precipitation: 25 to 40 inches

Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 200 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Alderwood and similar soils: 45 percent

Everett and similar soils: 45 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Everett

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Glacial outwash

Typical profile

O_i - 0 to 2 inches: slightly decomposed plant material

A - 2 to 9 inches: sandy loam

Bw₁ - 9 to 13 inches: gravelly sandy loam

Bw₂ - 13 to 30 inches: very gravelly coarse sand

C - 30 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 15 to 40 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (K_{sat}): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): 7e

Land capability classification (nonirrigated): 6e

Custom Soil Resource Report

Hydrologic Soil Group: A

Ecological site: Tsuga heterophylla-thuja plicata/vaccinium parvifolium-gaultheria shallon/polystichum munitum (F002XN906WA)

Description of Alderwood**Setting**

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Glacial drift over dense glaciomarine deposits

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

A - 1 to 10 inches: extremely gravelly sandy loam

Bw - 10 to 18 inches: extremely gravelly coarse sandy loam

Bg - 18 to 36 inches: extremely gravelly coarse sandy loam

2Cd - 36 to 60 inches: gravelly silty clay loam

Properties and qualities

Slope: 15 to 40 percent

Depth to restrictive feature: 20 to 40 inches to densic material

Natural drainage class: Moderately well 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 12 to 20 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): 7e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B/D

Ecological site: Tsuga heterophylla-thuja plicata/vaccinium parvifolium-gaultheria shallon/polystichum munitum (F002XN906WA)

Minor Components**Morancreek, cool**

Percent of map unit: 10 percent

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Tsuga heterophylla-thuja plicata/vaccinium parvifolium-gaultheria shallon/polystichum munitum (F002XN906WA)

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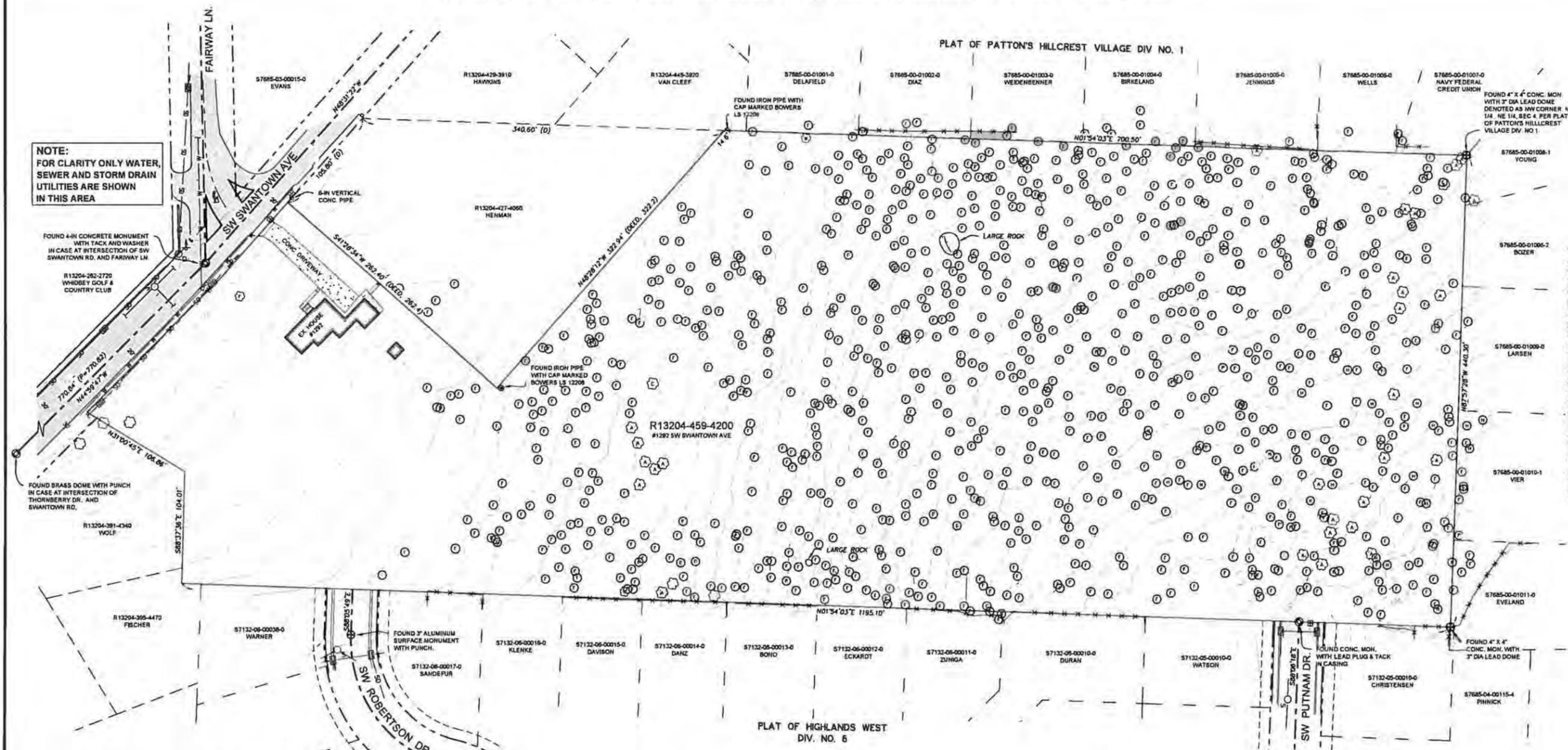
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Appendix C

2014 Plan Sheet P1, Existing Conditions/Topographic Survey

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



NOTE:
FOR CLARITY ONLY WATER,
SEWER AND STORM DRAIN
UTILITIES ARE SHOWN
IN THIS AREA

GENERAL LEGEND & ABBREVIATIONS

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> ⊗ SURVEY PLAT MONUMENT, AS NOTED ⊙ SURVEY MONUMENT IN CASE, AS NOTED ⊕ FOUND IRON PIPE, AS NOTED ⊞ STORM CATCH BASIN ○ STORM MANHOLE ○ SEWER MANHOLE ↑ TRAFFIC SIGN ⊞ GENERIC SIGN POST ⊞ WATER VALVE ⊞ WATER METER ⊞ ALDER TREE ⊞ COTTON WOOD TREE ⊞ CEDAR TREE ⊞ DECIDUOUS TREE ⊞ FRUIT TREE ⊞ FIR TREE ⊞ HEMLOCK TREE | <ul style="list-style-type: none"> CONC - CONCRETE CL - CENTER LINE CPP - CORRUGATED PLASTIC PIPE CULV - CULVERT D - DEED BEARING OR DISTANCE DIA - DIAMETER EX - EXISTING FF - FINISHED FLOOR FT - U.S. SURVEY FEET G - GAS G.E. - GRATE ELEVATION GOV'T - GOVERNMENT HH - HAND HOLE I.E. - INVERT ELEVATION IN - INCH MON - MONUMENT MPH - MILE PER HOUR P - PLAT BEARING OR DISTANCE PVC - POLY-VINYL-CHLORIDE RD - ROAD SF - SQUARE FEET SD - STORM DRAIN SS - SANITARY SEWER ST - STREET TYP - TYPICAL UP - UNDERGROUND POWER UT - UNDERGROUND TELEPHONE WI - WITH W - WATER W.M. - WILLAMETTE MERIDIAN | <ul style="list-style-type: none"> — GAS LINE — UNDERGROUND POWER LINE — SEWER LINE — TELEPHONE LINE — TELEPHONE LINE (UNDERGROUND) — FIBER OPTIC LINE — WATER LINE — FENCE, AS DESCRIBED — POWER LINE (OVERHEAD) — STORM DRAIN LINE — EDGE OF GRAVEL — DITCH CENTER LINE — PROPERTY LINE — PLAT LINE — RIGHT-OF-WAY LINE — RIGHT-OF-WAY CENTER LINE — EASEMENT LINE — SECTION LINE — ADJOINING PROPERTY LINE |
|--|--|--|

LEGAL DESCRIPTION:

(Per Land Title Order #LT-107737, dated April 21, 2014)
The West 440 feet of the Northeast Quarter of the Northeast Quarter, Section 32 North, Range 1, East of the Willamette Meridian.
EXCEPT the following described tract:
Beginning at the point 700.5 feet South of the Northwest corner of the Northeast Quarter of the Northeast Quarter of said Section 4, and running thence South 340.6 feet to the North side of the county road;
thence South 50°38' East 105.8 feet;
thence North 39°22' East 262.4 feet;
thence North 50°25' West 322.2 feet to the point of beginning
AND EXCEPT that portion lying Southwesterly of the Northeastly right of way margin of Island County road right of way known as Swantown Road.
ALSO, that portion of the following described tract lying Northeastly of the county road in the Southeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Willamette Meridian:
Beginning at the Northwest corner of said Southeast Quarter of the Northeast Quarter;
thence South along the West line of said Section a distance of 600 feet;
thence Northeastly in a straight line to a point of the North line of said Southeast Quarter of the Northeast Quarter that is 336 feet East of the point of beginning;
thence West along the North line 336 feet to the point of beginning.
Situate in the County of Island, State of Washington.



TREE INFORMATION

- THE TREES SHOWN ON THIS PLAN WERE LOCATED DURING TOPOGRAPHIC FIELD SURVEY CONDUCTED IN MAY AND JUNE OF 2014.
- ALL TREES LOCATED ARE EQUAL TO OR GREATER THAN 12-INCHES IN DIAMETER WHEN MEASURED AT 4 FT ABOVE THE BASE OF THE GROUND
- THIS SURVEY LOCATED 973 TREES WITHIN THE PROJECT BOUNDARIES WHICH MEET THE AFOREMENTIONED CRITERIA.

REVISIONS

DATE:	08-05-14
BY:	JTB
CHK. BY:	JTB
DATE:	08-05-14
JOB #:	14-028
P/B #:	NA
SCALE:	1"=50FT

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PHONE: (360) 675-5973

IF SHEET SIZE IS LESS THAN 22"x34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY.

MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
LANDED GENTRY DEVELOPMENT INC.
EXISTING CONDITIONS/
TOPOGRAPHIC SURVEY

DRAWING REF:
P1

PRELIMINARY PRD

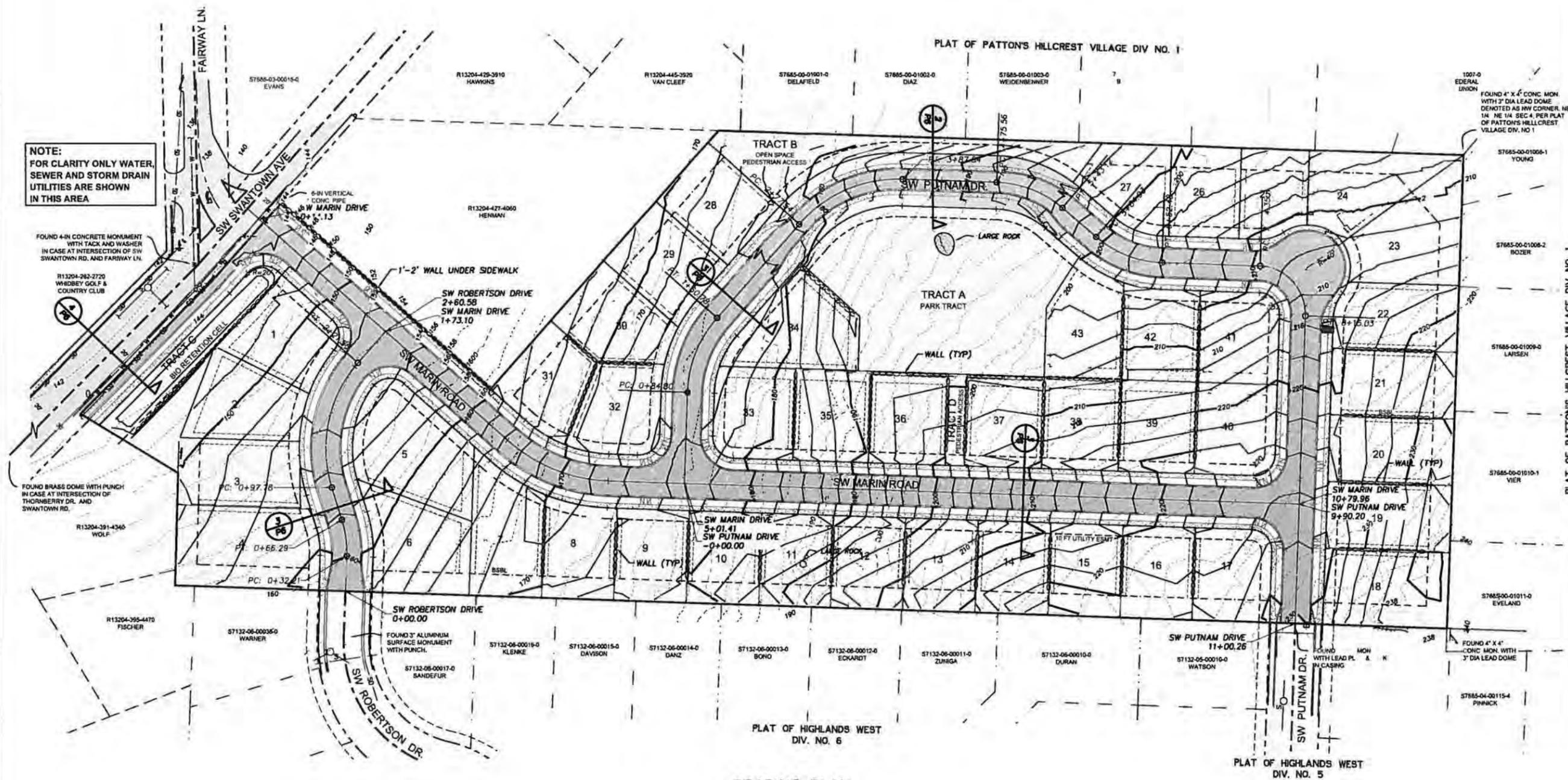
VERTICAL DATUM
NAVD 88
DERIVED BY GPS



Appendix D

2014 Plan Sheet P2, Preliminary Grading Sheet

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



NOTE:
FOR CLARITY ONLY WATER,
SEWER AND STORM DRAIN
UTILITIES ARE SHOWN
IN THIS AREA

GRADING PLAN
SCALE: 1" = 50'



REVISIONS

DWN. BY: JTF
CHK. BY:
DATE: 08-08-14
JOB #: 14-028
P/B: F:NA
SCALE: 1"=50'

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PRINT. REDUCE SCALE
ACCORDINGLY

MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
LANDED GENTRY DEVELOPMENT INC.
PRELIMINARY GRADING PLAN

DRAWING REF:

P7



PRELIMINARY PRD

Appendix E

“1997 Study”

Golf Course Drainage Basin Stormwater Mitigation Study, August 1997

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

AUGUST 1997

PREPARED BY:

***FAKKEMA AND KINGMA, INC.
840 SE 8TH AVENUE, SUITE 102
OAK HARBOR, WA 98277
(360) 675-5973***

GOLF COURSE DRAINAGE BASIN STORMWATER MITIGATION STUDY

AUGUST 1997

PREPARED BY:

GREGORY R. CANE, P.E.



OF

FAKKEMA AND KINGMA, INC.
840 SE 8TH AVENUE, SUITE 102
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APPENDIX B *RAINFALL HISTORY*

APPENDIX C *CALIBRATION RUNS*

APPENDIX D *ANALYSIS OF CONVEYANCE*

APPENDIX E *POSTDEVELOPMENT PARAMETERS*

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APPENDIX H *POSTDEVELOPMENT MODEL RUNS*

APPENDIX I *LOERS' POND STORMWATER LEVELS - AFTER IMPROVEMENTS*

MAPS *PRE- AND POSTDEVELOPMENT PARAMETERS*

GOLF COURSE DRAINAGE BASIN STORMWATER MITIGATION STUDY

INTRODUCTION

Historically, the geographical depression containing the 18 hole golf course of the Whidbey Golf and Country Club (WGCC) has been the collection point for the 2,400 acre drainage basin lying to the southwest of the City of Oak Harbor on North Whidbey Island (Figure 1). In recent years, largely as a result of increased rainfall run-off from residential development within the " Golf Course Basin", low lying homes adjacent to the Golf Course have been subject to an increased frequency of flooding.

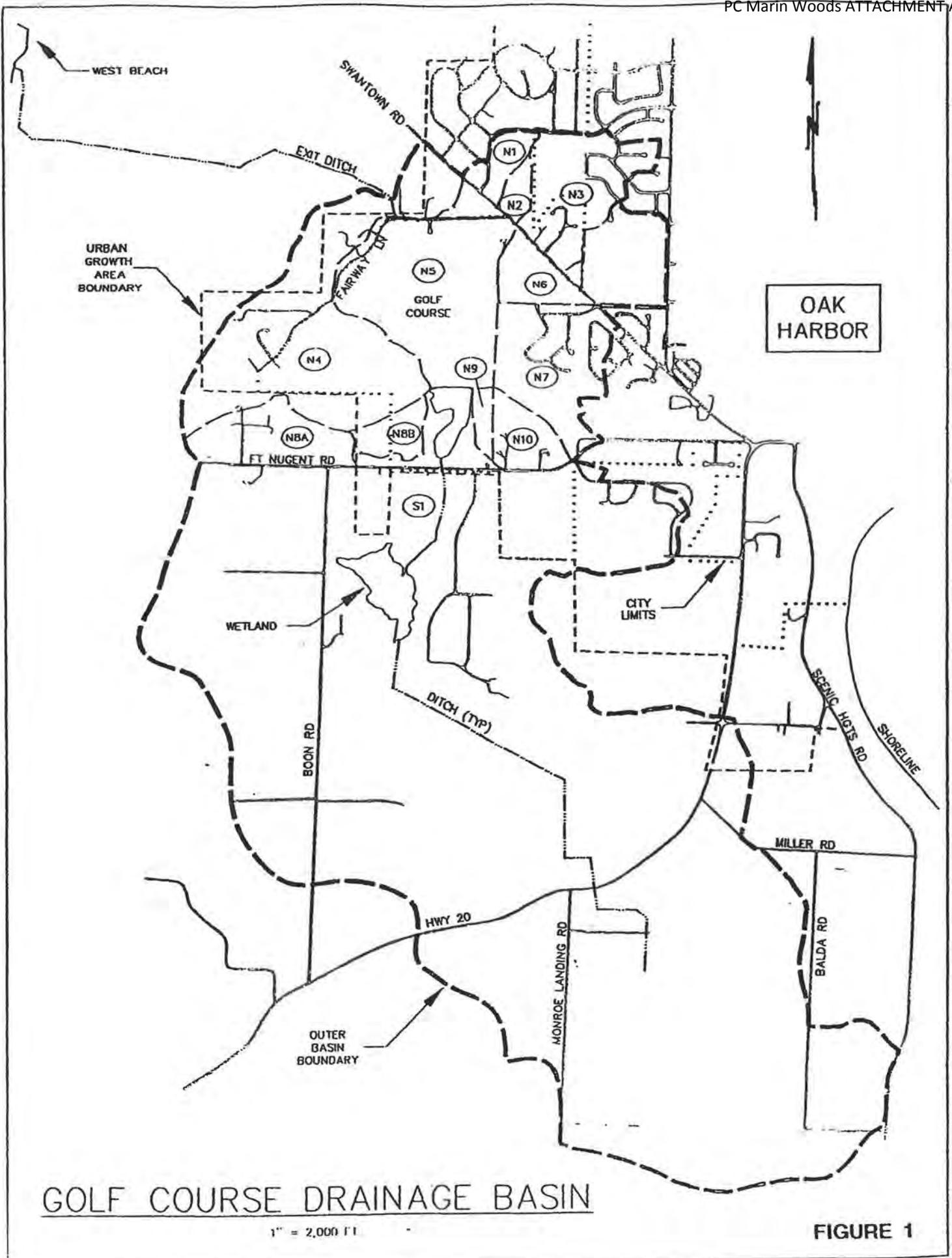
Most of the golf course basin area north of Ft. Nugent Road is designated in the Oak Harbor Comprehensive Plan for Low Density Residential (3 to 6 dwelling units/acre) growth. In line with the Washington State Growth Management Act directives regarding mitigation of development impacts, the proponents of various future residential developments within the Golf Course Drainage Basin¹ have commissioned this stormwater analysis and report to address the control of increased run-off. The goals of this study are as follows:

- 1) Consider the use of basin-wide detention in accordance with the expanded environmental checklist submitted under SEPA, prepared for the annexation of the golf course and adjacent properties.
- 2) Utilize stormwater computer modeling to assess the existing and proposed rates and volumes of surface water run-off for applicable storms.
- 3) Propose capital and operational improvements to mitigate the impacts of the residential developments.

In accordance with the City of Oak Harbor Comprehensive Plan, the proponents are planning the construction of new homes in sub-basins N3, N4, N5, N7a, N7b, N8, and N10 (Figure 13)².

¹ Approximately 350 single family and townhouse units proposed. The Swantown Ridge and Shannon Forest subdivisions will add an additional 230 (+/-) houses.

² Two single family residential plats, Shannon Forest and Swantown Ridge, are currently under construction in sub-basin N6. The increase in impervious surface and the constructed drainage facilities have been incorporated into the postdevelopment analysis.



OAK HARBOR

GOLF COURSE DRAINAGE BASIN

1" = 2,000 FT.

FIGURE 1

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY*****3**

With the exception of predevelopment parameters, this report has been prepared by the staff of Fakkema and Kingma. Predevelopment parameters were prepared by Keilwitz Engineering, Coupeville, WA in the capacity as subconsultant (see Appendix A).

EXISTING CONDITIONS**GOLF COURSE BASIN**

The assessment of existing conditions was performed by the use of the City of Oak Harbor aerial topographic maps (1991), Island County aerial photography (1985 and 1992), SCS soils maps, construction record drawings and field investigation.

For the purpose of analysis, the Golf Course Basin has been divided into 12 existing sub-basins: (Figure 2)

S1 (1712 acres) - This sub-basin lying south of Ft. Nugent Road largely consists of farm and forest land and a low housing density. Although it is sparsely developed, by virtue of its size, S1 contributes more run-off during large rainstorms than the sum of all other sub-basins combined. Given the size of S1 and the existence of a large wetland approximately 1,500 feet south of Ft. Nugent Road, the downstream impacts of a given rainfall event are delayed by about 20 hours and significantly decreased. This lag and attenuation of run-off, typical of large sub-basins in a natural state, reduces stormwater impacts to the Golf Course and surrounding properties.

S1 outlets into Loers' Pond through two 18" culverts crossing Ft. Nugent Road.

N10 (24 acres) - Primarily forested, the run-off from this basin flows to the southeast corner of the golf course.

N9 (8 acres) - The State of Washington Department of Fish and Wildlife maintains a wetland and forested area within this sub-basin. In order to impound water for the creation of the wetland, a berm was constructed on the north line of the sub-basin. Run-off from the wetland is directed over the berm to the southeast corner of sub-basin N5.

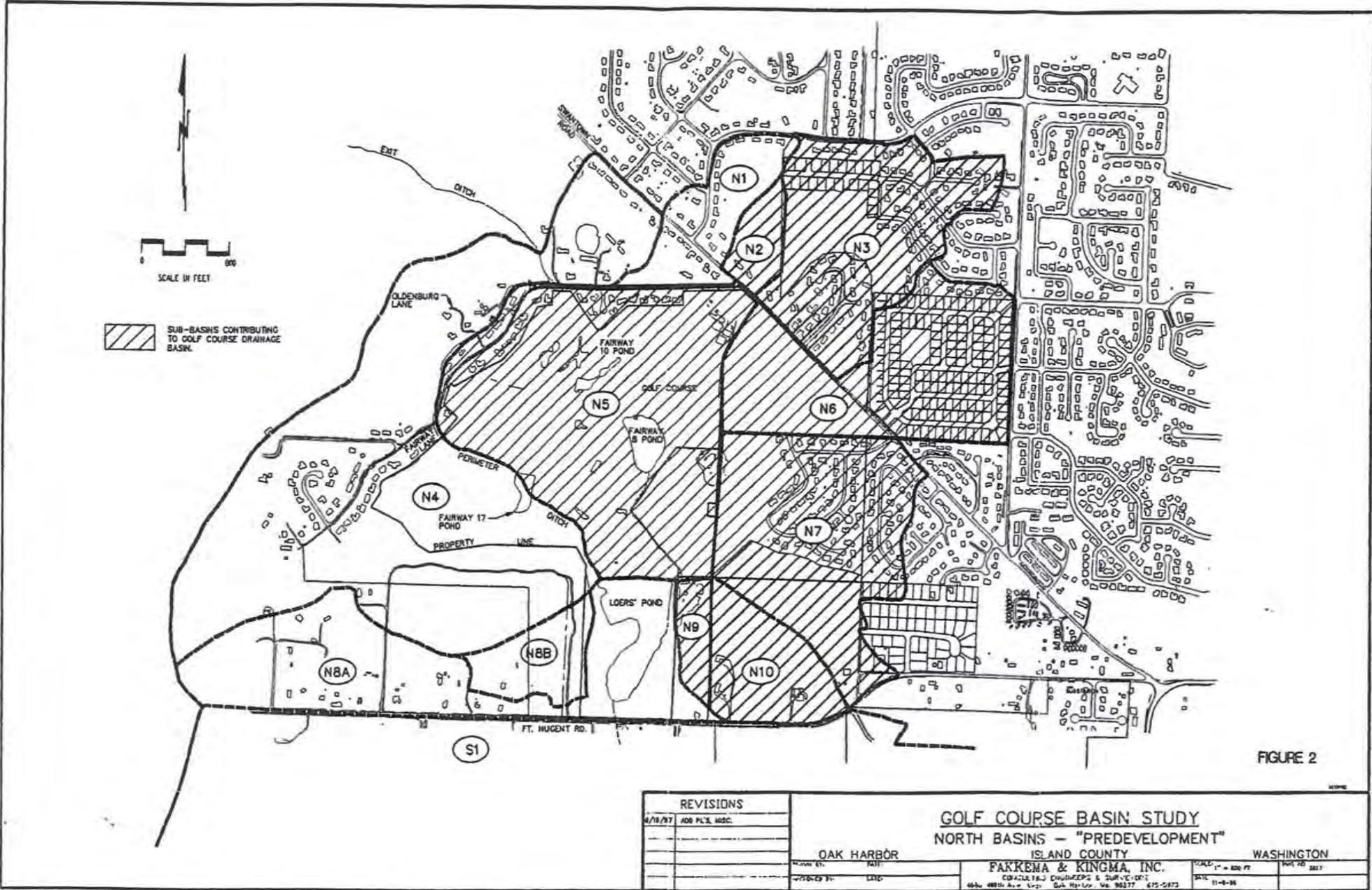


FIGURE 2

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY*****5**

N8a (73 acres) - This area is characterized by a combination of forest land and residential development along with a small portion of the golf course greens and fairways surrounding Loers' Pond. Run-off travels overland from this sub-basin to Loers' Pond.

The 10 acre Loers' Pond, operated as a transit for the stormwater flow from the sizeable basin south of Ft. Nugent Road and for the storage of irrigation water, was enlarged to its current size by WGCC in 1979. Based on limited soundings performed for this study (Appendix F), it is estimated that the current useful storage volume in the Pond is 47 acre-feet (5 feet of useful storage; one foot of freeboard). The outlet structure for Loers' Pond consists of a 24" pipe with a rectangular overflow weir. During the dry season the 24" discharge pipe is blocked to raise the water level for golf course irrigation. The board is removed in the wet season, permitting the pond water level to drop approximately 4 feet below the overflow level. Reducing the pond level increases run-off storage, thereby attenuating rain storm peaks.

Immediately downstream of the pond outlet structure there is a 12" culvert pipe with a small sandbag impoundment constructed around the upstream pipe end. The effect of this impoundment is to direct the flow from the 24" discharge pipe into the 12" pipe, effectively reducing the discharge capacity from the pond.

N8b (16 acres) - Like N8a this area is composed of scattered housing and forested land. Run-off from N8b enters the perimeter ditch.

N7 (68 acres) - The sub-basin N7 is comprised of the Crosswoods residential subdivision (approx. 40% of area), forest (40%) and a marsh area bordering sub-basins N5 and N7 (20%). The natural contours of the sub-basin route some storm run-off to the golf course through the marsh, with the remainder traveling overland into the southeast portion of the course.

N6 (69 acres) - When this study was initiated, the Plat of Shannon Forest had been partly constructed. In order to assess the impacts of new subdivisions, and to establish a baseline for measuring the effectiveness of proposed mitigation measures, sub-basin N6 was modeled in its natural state for the predevelopment condition. Prior to subdivision, N6 consisted of forest and farmland.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY*****6**

N5 (125 acres) - The major portion of the WGCC 18 hole golf course lies within N5.

Prior to the siting of a farm at this location in the 1900's, the area contained a small lake. In order to by-pass the large volume of water entering the sub-basin from the south, the Loers family constructed an elevated flume from an area near the current location of Loers' pond to the vicinity of the "exit" ditch to the north. With the sale of the Loers' farm, the flume fell into disrepair and was replaced in the 1950's with the perimeter ditch in existence today.

The perimeter ditch is generally in fair condition. A reconnaissance level field review of the ditch and appurtenances indicated some requirement for removal of accumulated siltation. Vegetation and grasses are overgrown along portions of the ditch. Area residents and WGCC staff have indicated that the ditch has overflowed its banks under certain conditions following large storm events. Such large events have additionally overtopped Loers' Pond.

Currently run-off from sub-basins N2, N3, N6, N7, N8, N9 and N10 combines with run-off from N5 and travels, through a series of ponds, pipes and swales to the Fairway 10 Pond, actually an interconnected series of ponds at the lowest point in the golf course. WGCC personnel indicate that stormwater is pumped from the Fairway 10 Pond to the exit ditch through an 8" pipe utilizing from 1 to 3 pumps, as dictated by the level of rainfall intensity and anticipated flooding:

Level 1: Single electric powered pump operated; Rate (approx.) = 250 gallons per minute (gpm).

Level 2: Tractor powered pump put on-line. Both pumps discharge through the 8" pipe; Rate (approx.) = 1,350 gpm; Total rate = 1,600 gpm.

Level 3: Additional diesel powered pump placed into service with 6" pipe laid overland to exit ditch; Rate (approx.) = 1,350 gpm; Total Rate = 2,950 gpm.

N4 (197 acres) - Area N4 is similar to N8 in that it contains a sparse density of residential housing along with forested land. A portion of the golf course lies within its westerly boundary. Run-off from N4 enters the perimeter ditch and, given its close proximity to the golf course, run-off peaks reach the ditch and leave the basin much earlier than the run-off peak from S1.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

7

N2 and N3 (73 acres, total) - About 60% of the land area in these sub-basins is composed of single family residential development, with the remainder primarily in forest. Stormwater is directed through two culverts across Swantown Road to the marsh on the N5/N7 border and then to N5.

N1 (23 acres) - This sub-basin consists of single family residential housing and forest land. Run-off bypasses the golf course by being directed through a 12 inch culvert across Swantown Road and through a road ditch along Fairway Lane to the exit ditch.

DOWNSTREAM DRAINAGE

To increase flow capacity, the exit ditch was deepened for a distance of approximately 800 feet north of Fairway Lane in early 1996. Prior to this rechanneling, a large storm event in late November 1995 created a situation where the combination of run-off in the perimeter ditch and the discharge from all three of the golf course pumps caused stormwater to overflow the banks of the perimeter ditch near the exit ditch. Water ran south over Fairway Lane back into the golf course, worsening the ongoing flooding of low-lying golf course areas.

Drainage proceeds in a well defined, but somewhat overgrown, channel and through culverts at farm access roads to a large (38 acre) impoundment east of West Beach Road. The impoundment is drained to Admiralty Inlet by two tidegate structures. During site visits in April and May, 1996, water was standing in the low area to a depth of several feet.

In previous years a pump station had been operating at the site that, in combination with the tide gates, would permit farming of the area (the pump station has since been abandoned). Given previous flooding problems, Island County replaced the tidegates in July, 1991, and has maintained the West Beach outfall since that time.

ANALYSIS OF EXISTING SYSTEM

INTRODUCTION

In the selection of an approach to analysis of a given drainage basin the following should be considered:

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

8

- Are there easily erodible channels downstream?
- What is the hydraulic capacity of downstream conveyance facilities?
- Are there large detention ponds to analyze?

Field review of stream channels within the basin and in downstream reaches did not reveal erosive activity in existing ditches. Although some specific areas appear to lack sufficient hydraulic capacity and require upsizing (see Improvements section), with proper maintenance, as well as procedures and facilities to control the total stormwater flow, the conveyance system will be able to pass large rainstorm events. Given these factors, which are typical for Whidbey Island, the City and County governments have not usually required analysis and control of the relatively small 6-month and 2-year storm events.³

The scope of this project required the consideration of the use of Loers' pond as a regional detention facility (pond). Inherent in the design of large ponds is the characteristic of filling quickly during large storms and then "metering out" water slowly over a period of time. Problems arise when ponds remain partially full from an earlier storm when another storm arrives. Adequate pond capacity may not be available for control of the second storm.

Given the above considerations, it was decided to analyze the Golf Course Basin for the following storms: (Figures 4 through 6)

- 10 year - 24 hour⁴ (abbreviated 10 yr herein)
- 25 year - 24 hour (abbreviated 25 yr)
- 100 year - 24 hour (for use in sizing conveyance) (abbreviated 100 yr)
- 25 year - 24 hour preceded by 2 year - 24 hour (abbreviated 2-25 yr)
- 100 year - 24 hour preceded by 2 year - 24 hour (abbreviated 2-100 yr)

³ A notable exception is the detention pond constructed for projects within N6 where the downstream conveyance system consists of golf course pumps with a limited discharge capacity. The pond was designed and constructed to control the peak release rate for the 2, 10, and 100 year storm.

⁴ More readily interpreted as the storm that has a 1 in 10 chance of occurring during a given year. A 100 year storm has a 1 in 100 chance of occurring in a given year. "24 hour" relates to the depth of rainfall over a 24 hour period.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY*****9**

Hydrologic analysis was performed using Waterworks computer software, Ver. 4.11. The summarized results of the analysis are shown in Table 1.

Once the existing system (often called "Predevelopment") computer model was set up (see flowchart, Figure 7) and calibrated, run-off peak rates were determined for the applicable storms. The resulting run-off pattern, displayed in time vs. flow rate format (hydrograph), is shown in Figures 8 through 12 at the end of this section.

Capital improvements are proposed herein to prevent exceedence of these predevelopment release rates.

CALIBRATION

In order to increase the level of confidence in the results of the analysis, the computer model was checked (calibrated) against actual field conditions, as described by WGCC staff, existing during two recent storms. Rainfall data was obtained from the weather station at the Whidbey Island Naval Air Station for storms on November 26-29, 1995 and February 5-8, 1996 (see calibrated runs - Appendix C).⁵ As indicated in Table 2, a reasonable calibration was obtained. Where possible, the model was additionally checked against the modeling performed for the 1994 City of Oak Harbor Comprehensive Storm Drainage Plan.

⁵ Rainfall data is collected every three hours at the Naval Air Station, making it useful for calibration. Daily rainfall records are also kept at WGCC. On February 7, 1996 records for the two stations did not agree. Additional research including review of rainfall records kept at the City of Oak Harbor Wastewater Treatment Plant supported the theory that the storm dropped variable rainfall depths in different areas. The recorded rainfall depth from WGCC was utilized, proportioning over the 3 hour pattern of the Air Station.

PREDEVELOPED CONDITIONS GOLF COURSE BASIN STORMWATER ROUTING

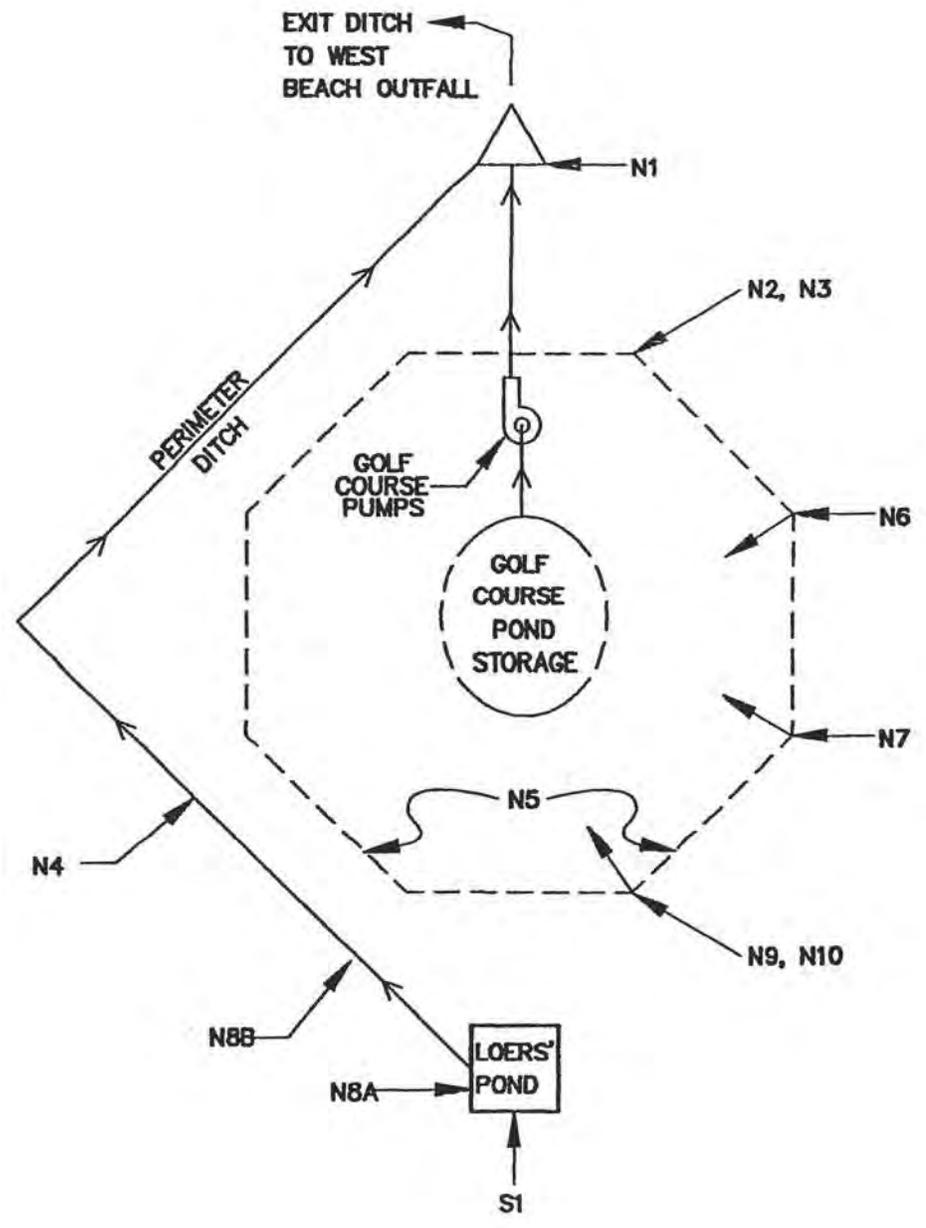


FIGURE 3
SWAMI

TABLE 1 - Results of Computer Model Runs - Golf Course Basin

PREDEVELOPMENT RUNS						
Runs	Hydrograph Exiting Basin (Peak Rate - CFS)¹	Loer's Pond Level	Golf Course		Total Runoff Volume (Ac-Ft)³	Notes
			Level Below Flood Stage (ft)	Peak Pumping Rate (GPM)²		
25 yr - 24 hr	37.2	Slightly Over Top	2.4 ⁽⁵⁾	2,950	175.5	Golf Course Flood Stage Est: 172.0 ft
100 yr - 24 hr	87.7	Over Top	0.8 ⁽⁵⁾	2,950	279.5	
25 yr - 24 hr Preceded by 2 yr - 24 hr	95.1	Over Top	0.7	2,950	319.0	
100 yr - 24 hr Preceded by 2 yr - 24 hr	148.3	Over Top	-0.5 ⁽⁴⁾	2,950	436.7	
POSTDEVELOPMENT RUNS						
25 yr - 24 hr	29.9	0.7 ft Below Overflow Spillway	2.9	2,950	200.2	
100 yr - 24 hr	87.4	0.1 ft Below Overflow Spillway	1.8	2,950	309.5	
25 yr - 24 hr Preceded by 2 yr - 24 hr	93.6	0.1 ft Above Overflow Spillway	2.0	2,950	350.7	
100 yr - 24 hr Preceded by 2 yr - 24 hr	143.5	1.0 ft Over Overflow Spillway	0.6	2,950	471.1	

¹ - cubic feet per second² - gallons per minute³ - acre-feet⁴ - negative sign indicates above flood stage⁵ - records indicate that rainfall w/intensities between 25 year and 100 year storms have in reality resulted in flooding at the No. 10 pond. The model did not account for water overtopping the perimeter ditch at locations within the golf course and may not match observed conditions in the predeveloped conditions..

24 HOUR STORMS

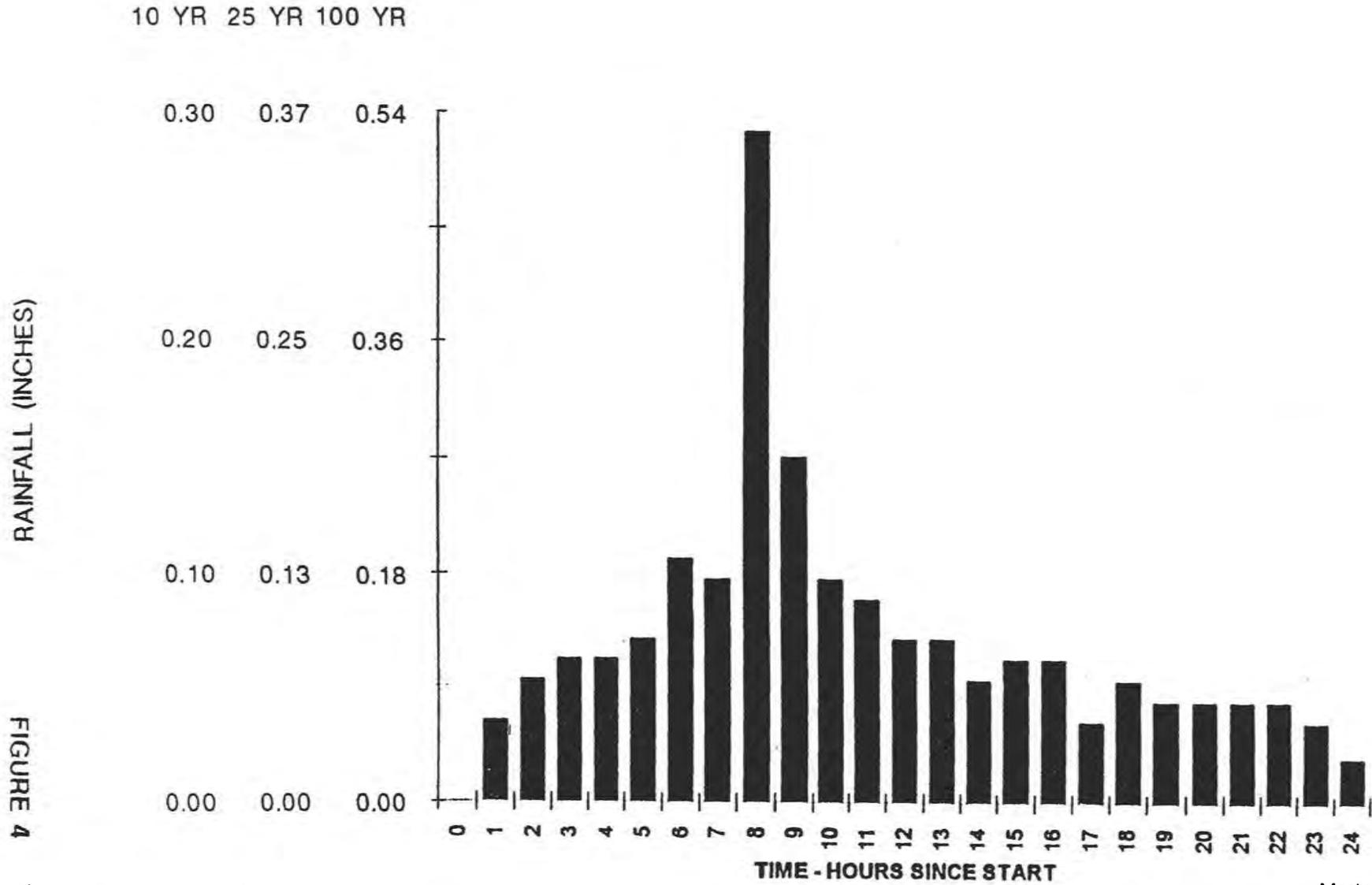


FIGURE 4

25 YR PRECEDED BY 2 YR STORM

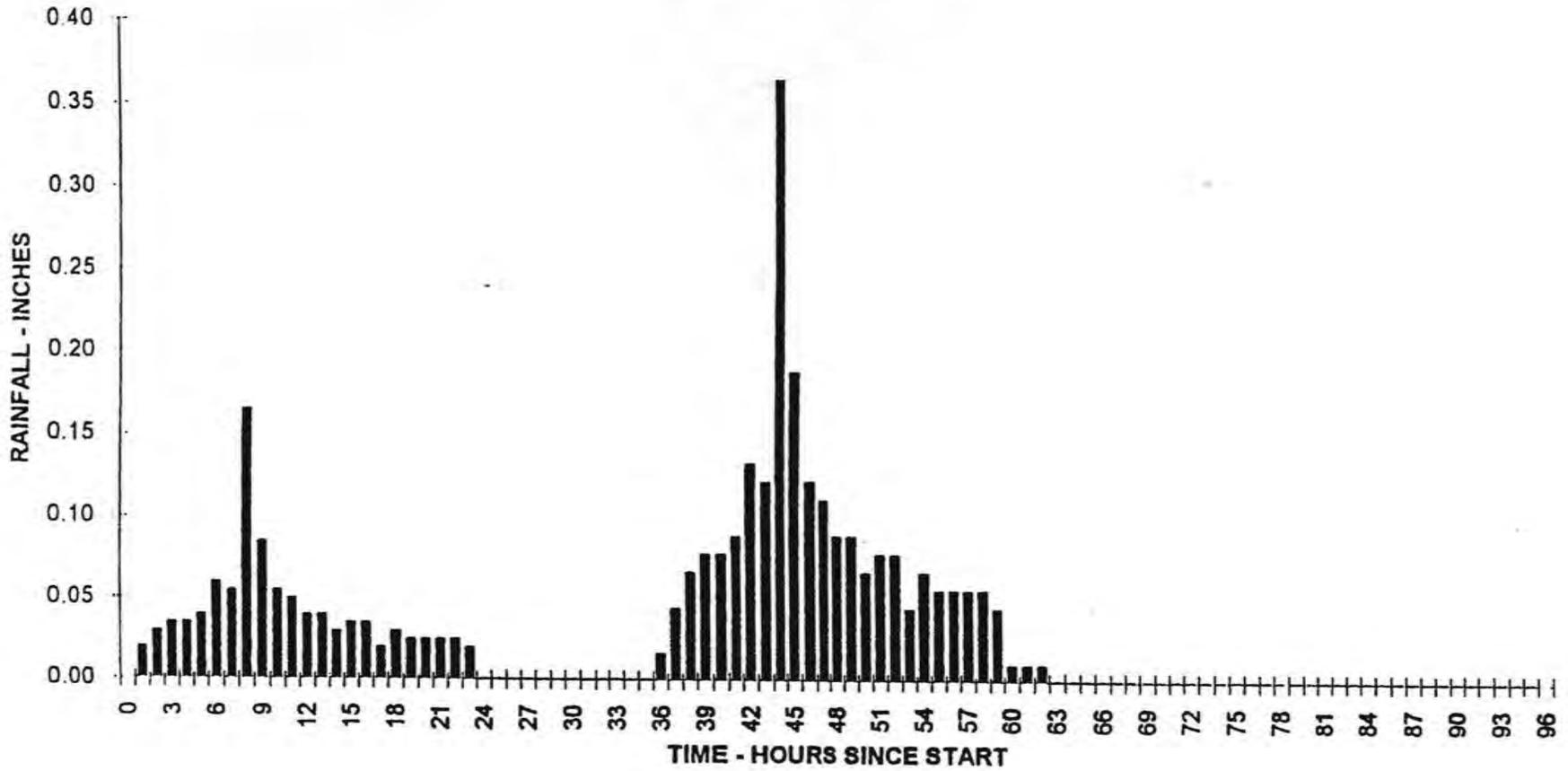


FIGURE 5

100 YR PRECEDED BY 2 YR STORM

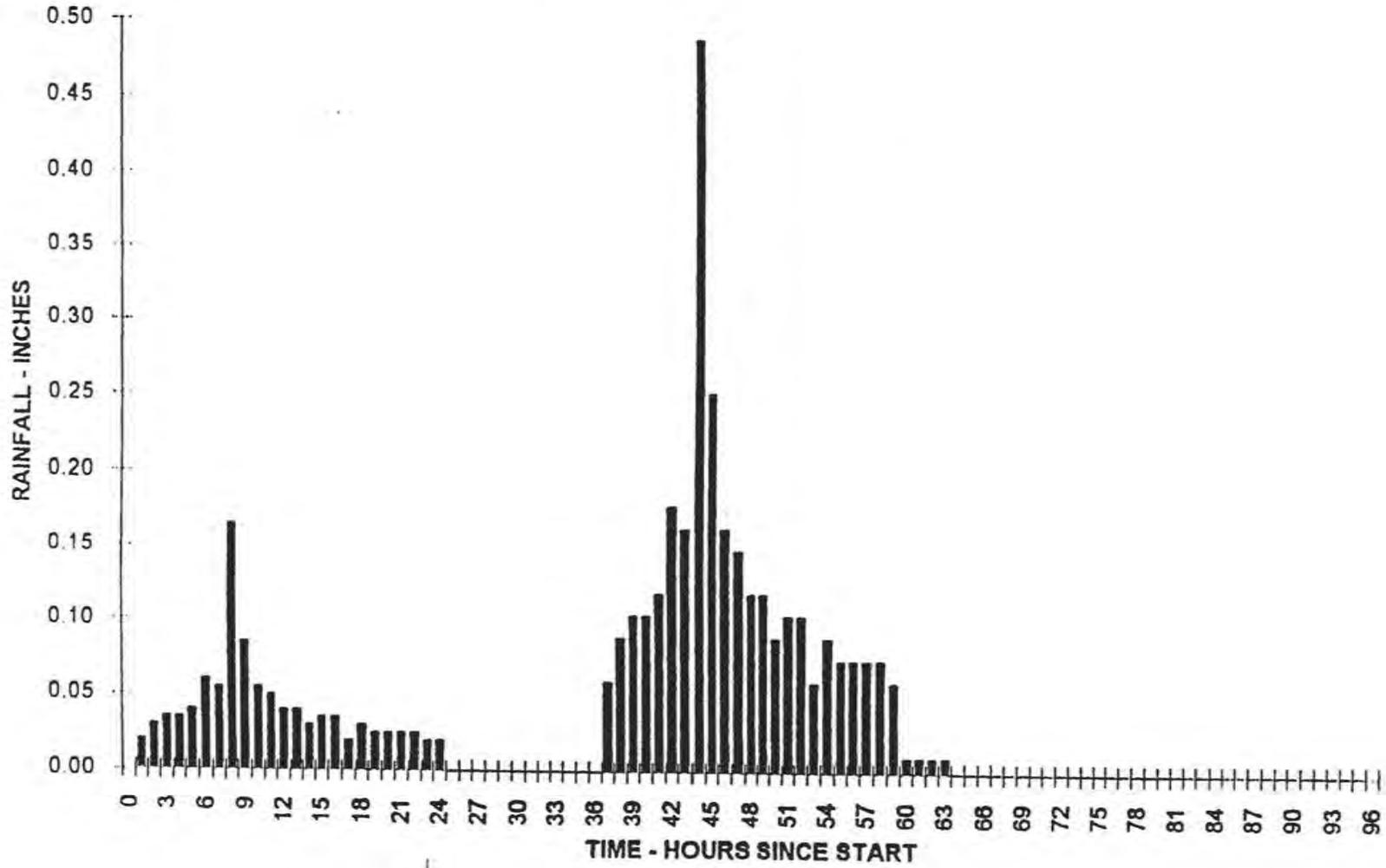


FIGURE 6

GOLF COURSE BASIN STUDY – PREDEVELOPMENT MODEL FLOWCHART

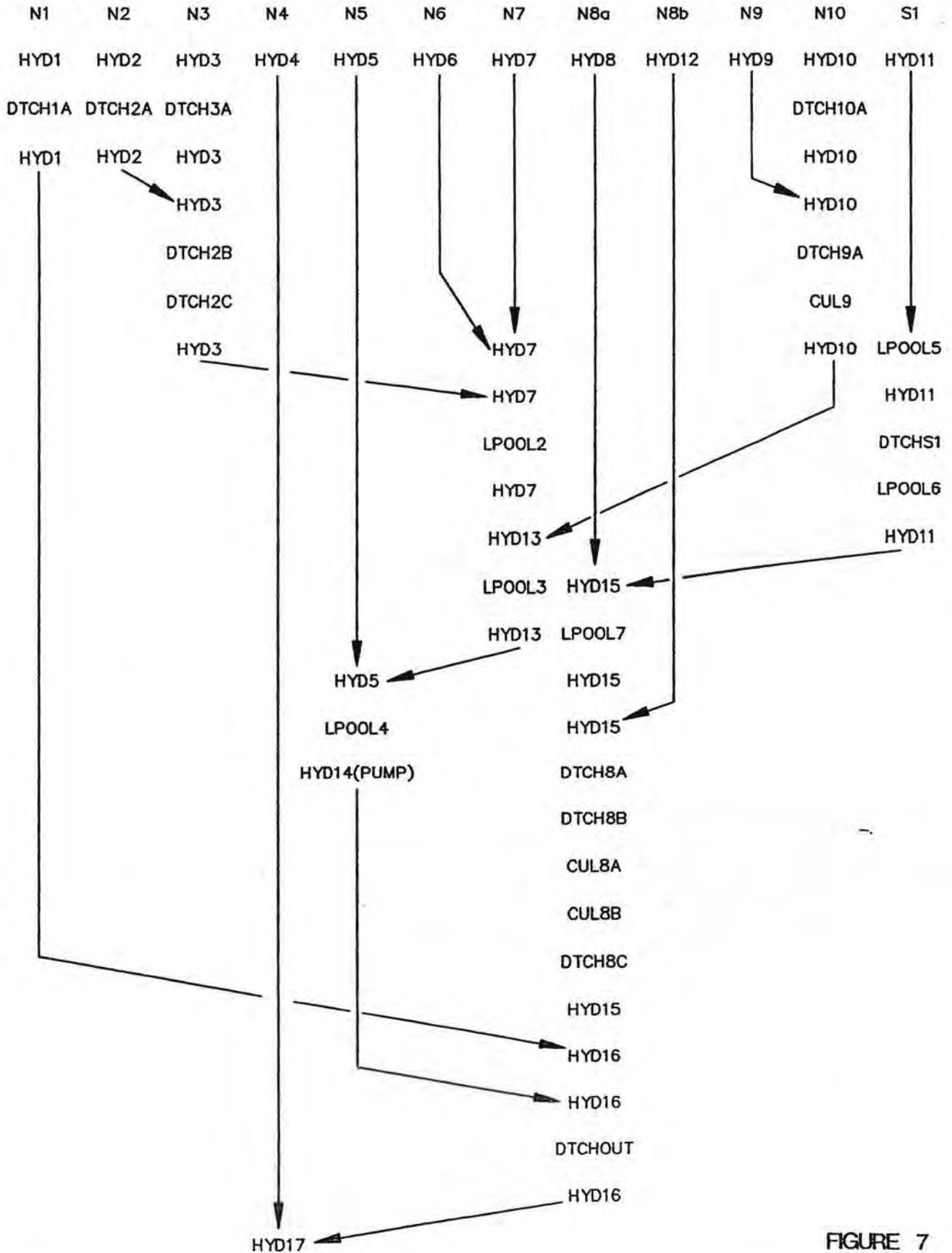
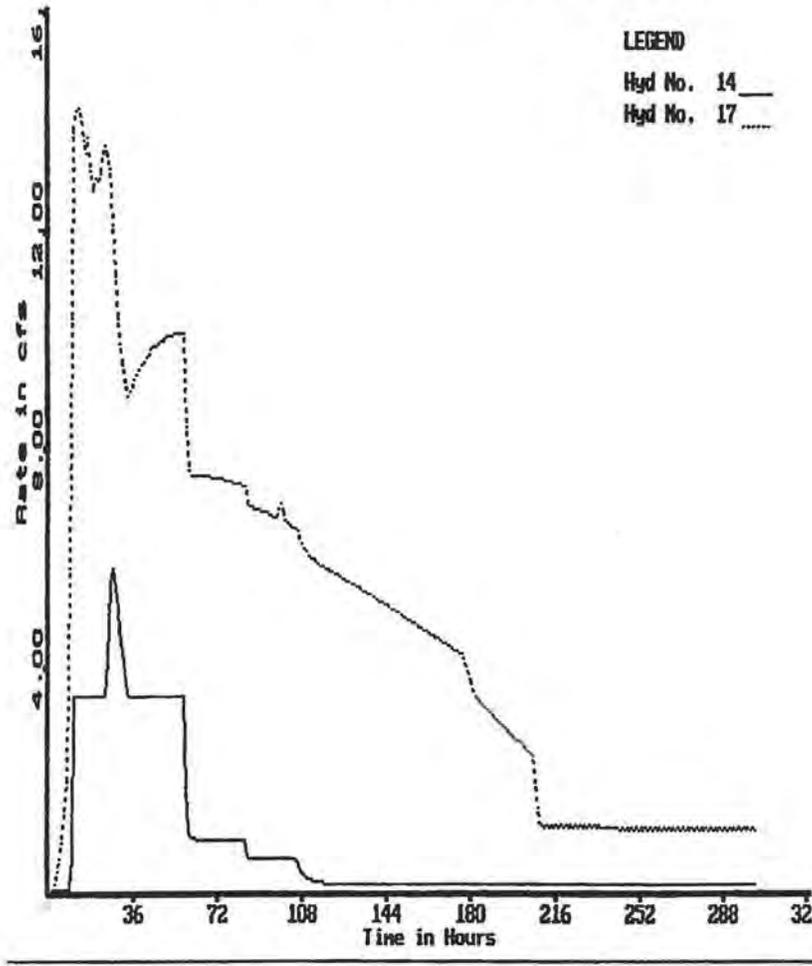


FIGURE 7

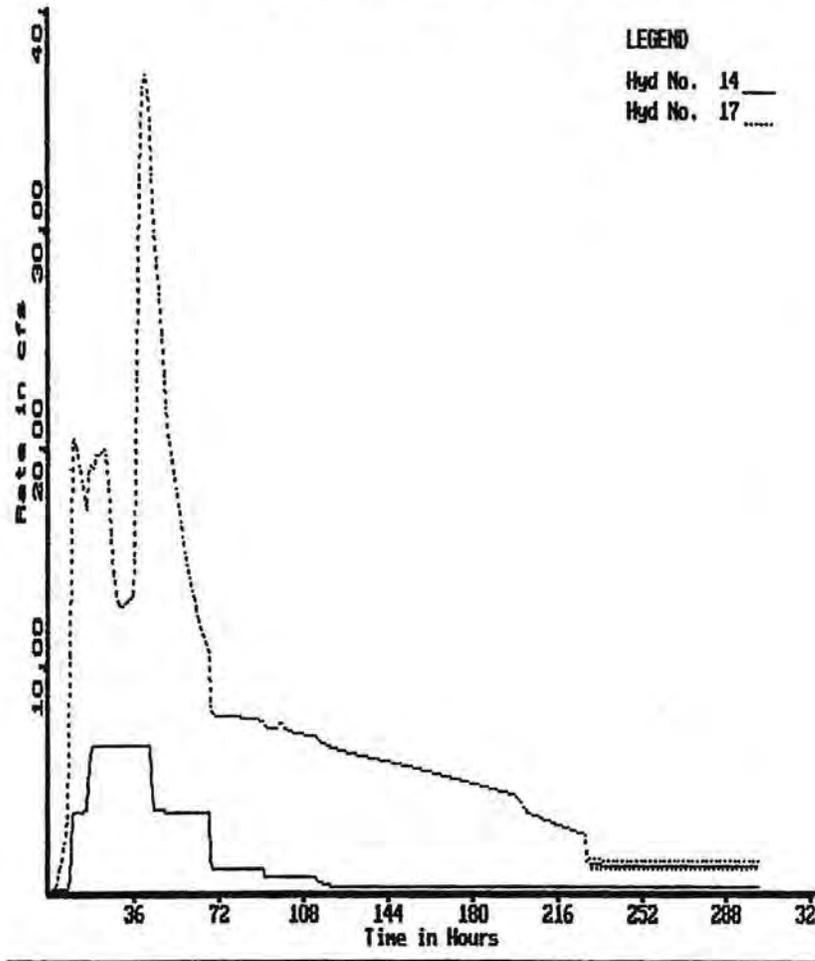
REDEVELOPMENT I 10 YR - 24 HR STORM



Hyd No.: 14 Pumped
Rate: 5.91 cfs Time: 26.00 hr
Vol : 19.57 Ac-ft Int: 60.00 min

Hyd No.: 17 Basin Outflow
Rate: 14.29 cfs Time: 12.00 hr
Vol : 121.29 Ac-ft Int: 60.00 min

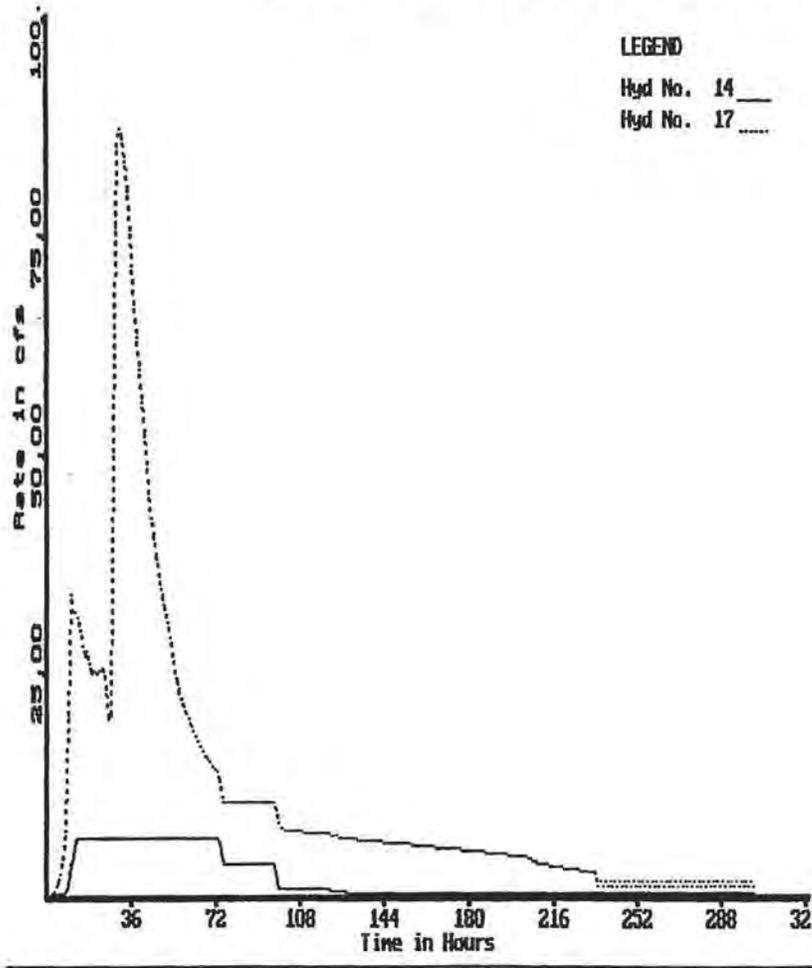
PREDEVELOPMENT 25 YR - 24 HR STORM



Hyd No.: 14 Pumped
 Rate: 6.57 cfs Time: 27.00 hr
 Vol : 27.98 Ac-ft Int: 60.00 min

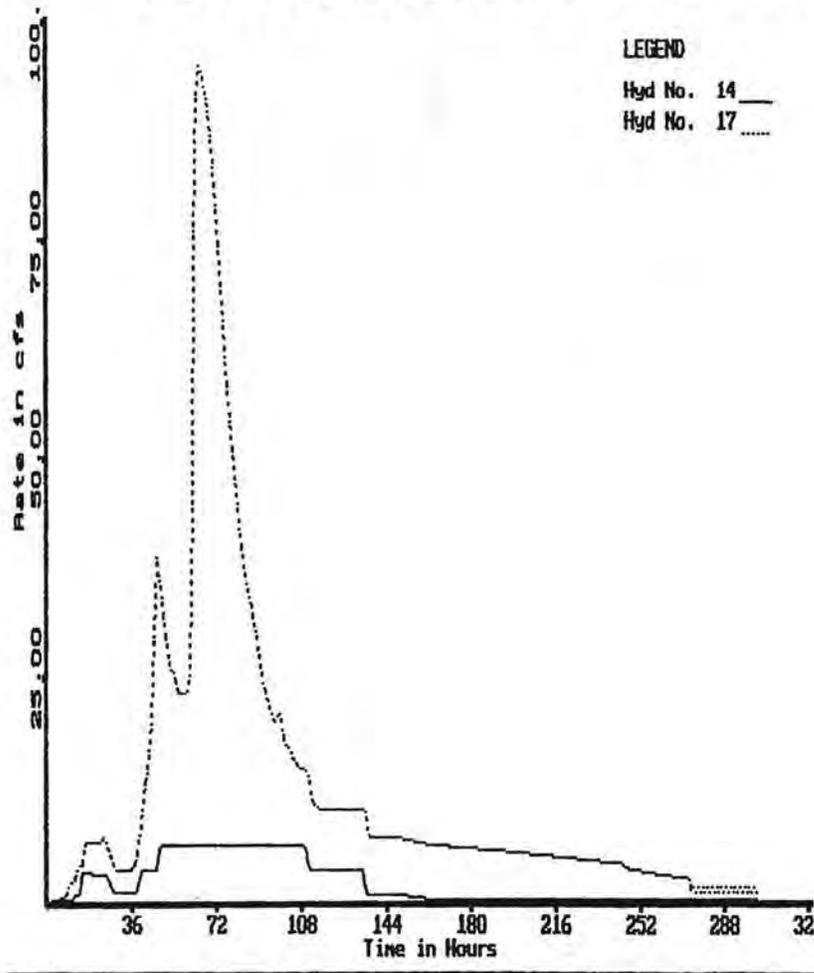
Hyd No.: 17 Basin Outflow
 Rate: 37.25 cfs Time: 39.00 hr
 Vol : 175.48 Ac-ft Int: 60.00 min

PREDEVELOPMENT 100 YR - 24 HR STORM



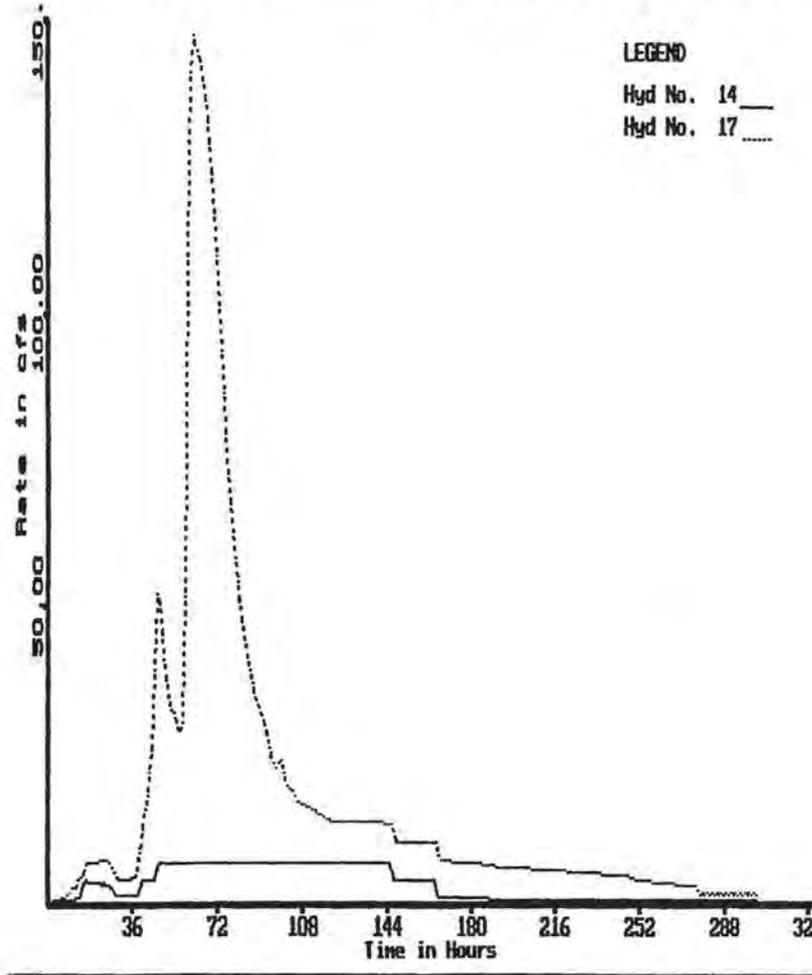
Hyd No.: 14 Pumped
Rate: 6.57 cfs Time: 29.00 hr
Vol : 43.85 Ac-ft Int: 60.00 min
Hyd No.: 17 Basin Outflow
Rate: 87.65 cfs Time: 30.00 hr
Vol : 279.45 Ac-ft Int: 60.00 min

PREDEVELOPMENT 25 YR PRECEDED BY 2 YR STORM



Hyd No.:	14	Pumped		
Rate:	6.57	cfs	Time:	64.00 hr
Vol :	49.87	Ac-ft	Int:	60.00 min
Hyd No.:	17	Basin Outflow		
Rate:	95.05	cfs	Time:	63.00 hr
Vol :	318.98	Ac-ft	Int:	60.00 min

PREDEVELOPMENT 100 YR PRECEDED BY 2 YR STORM



Hyd No.	Pumped		
	Rate:	6.58 cfs	Time: 65.00 hr
	Vol :	67.64 Ac-ft	Int: 60.00 min
Hyd No.:	17 Basin Outflow		
	Rate:	148.22 cfs	Time: 60.00 hr
	Vol :	436.70 Ac-ft	Int: 60.00 min

TABLE 2 - Model Calibration - Table of Results

Calibration Storm	Parameter	Model Result	Field Observation ¹	City of Oak Harbor Storm Drain Comprehensive Plan ²	Notes
February 5-9, 1996	N5/N7 Marsh	Slightly Below Road	Almost Overtopped		
	Ft. Nugent Rd. Crown	1.6' Below Crown	Not Over Road		
	Fairway 10 Pond	Elevation 168.4	Elevation 168.4		
	Loers' Pond	0.1' Below Top	1.0' Below Top		
	Fairway 8 Pond	Slightly Over Top	Over Top		
November 26-29, 1995	N5/N7 Marsh	Over Road	Over Road		
	Ft. Nugent Rd. Crown	0.7' Over Crown	Not Over Crown		
	Fairway 10 Pond	Elevation 170.8	Minor Flooding of Home (>172.0)		Overflow of Loer's Pond and Along Fairway Lane Increase Flooding in Golf Course - Overflows not Modeled, See Note 5, Table I
	Loers' Pond	Over Top	NA		
	Fairway 8 Pond	Over Top	Over Top		
100 yr - 24 hr	Storm Volume, Basin S1	203.3 Acre-Feet		249.1 Acre-Feet	City of Oak Harbor Comprehensive Plan, Basins GC1-GC10
10 yr - 24 hr	Hydrograph Peak at Ft. Nugent	25.2 CFS		26 CFS	City of Oak Harbor Comprehensive Plan, Basins GC1-GC10

Notes: 1 - Elevations and distances are estimated; from conversations w/WGCC staff and local residents
2 - Comparison of model results of two studies, not a true calibration;
NA - Not Available

ANALYSIS OF POSTDEVELOPMENT CONDITIONS DESCRIPTION OF SUB-BASINS

In 1995, the City of Oak Harbor, in accordance with the Washington State Growth Management Act (RCW 36.70A.040), adopted the Oak Harbor Comprehensive Plan. As part of the Plan, the Urban Growth Area Report has analyzed that portion of the study area contained within the Urban Growth Area (UGA) and assigned residential densities to those undeveloped parcels planned for housing. The UGA planning criteria was used for estimating future (postdevelopment) conditions.

A 20 year planning horizon was used for estimating future conditions. It is assumed herein that those residential sub-divisions proposed for sub-basins N3, N5, N7a, N7b, N8, and N10 will be fully developed by the end of the planning period. Additionally, a background growth rate of 3.5% was assumed for the undeveloped areas in the sub-basins within the Urban Growth Area. It would not be possible to predict the location of future development for this back-ground growth rate. A larger proportion of new homes (and associated impervious surface) were located in sub-basins with anticipated higher growth, following existing growth patterns in the area (see Table 3).

The land use map for the Urban Growth Area projects Low Density Residential development for most sub-basins north of Ft. Nugent Road. Per the Comprehensive Plan, areas with a Low Density Residential land use designation are proposed for development at 3-6 dwelling units/acre. Conceptual plans, as provided by the proponents, were used to more precisely determine the densities used in this study.

For analysis of the postdevelopment conditions, the Golf Course Basin was divided in 12 sub-basins, similar to the predevelopment sub-basins: (Figure 13).

S1 - Although S1 is nearly all outside the Urban Growth Area, this basin was modeled in the postdeveloped condition with a significant increase in impervious surface area. Utilizing a 3.5% background growth rate over the 20 year study period, impervious surface is approximately doubled. This is likely a conservative assumption, but is useful to confirm the capacity of Loers' Pond improvements and downstream conveyances.

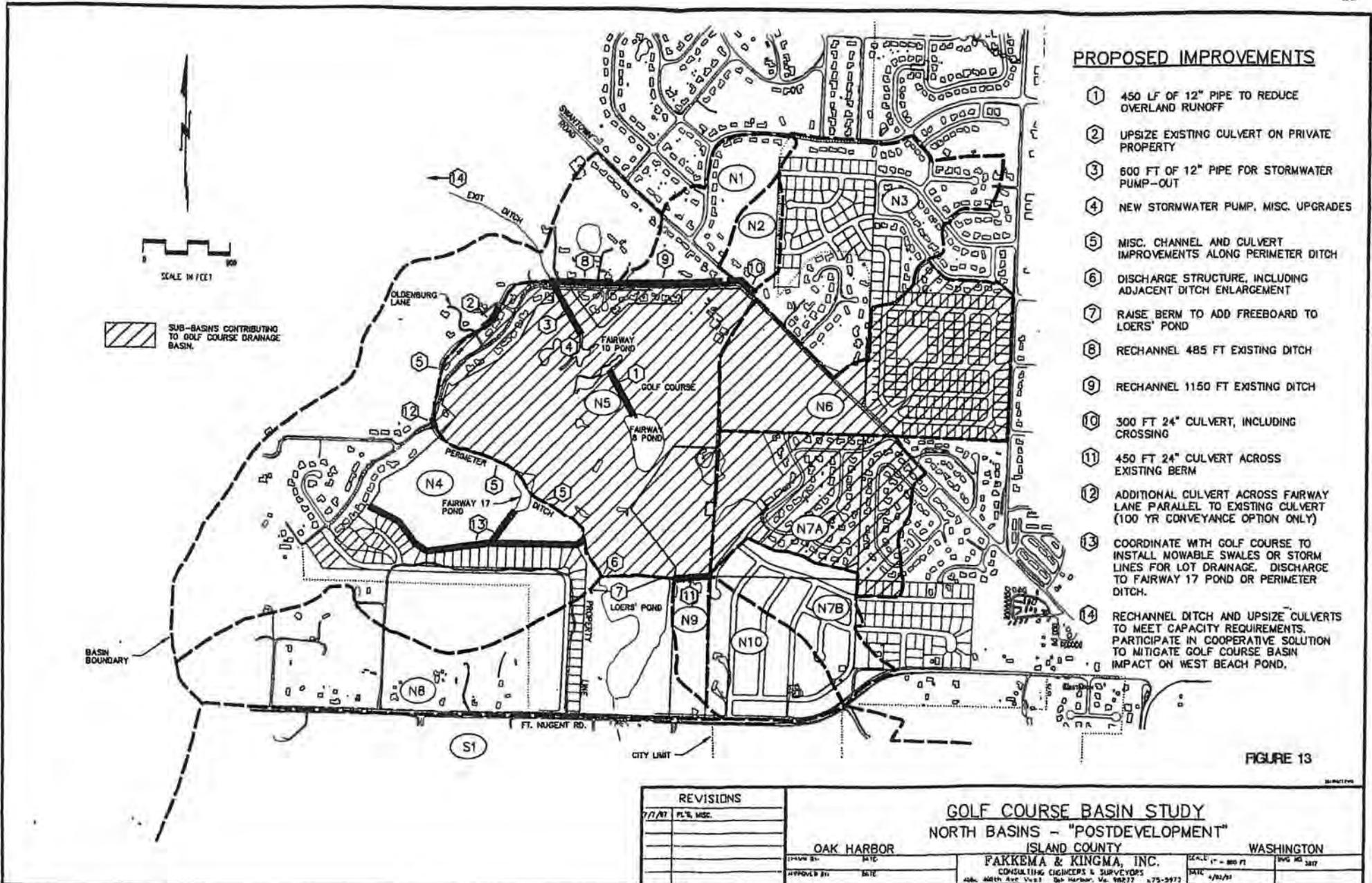


FIGURE 13

REVISIONS		GOLF COURSE BASIN STUDY			
DATE	PL% USE	NORTH BASINS - "POSTDEVELOPMENT"		WASHINGTON	
		OAK HARBOR ISLAND COUNTY			
		PAKKEMA & KINGMA, INC.		SCALE: 1" = 800 FT	DATE: 4/21/11
		CONSULTING ENGINEERS & SURVEYORS			
		404 46th Ave S1st St. Oak Harbor, WA 98271			

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY*****25**

remainder resulting from the background growth rate. N4 will continue to drain to the perimeter ditch.

N3 - The construction of additional single family units within this sub-basin will increase impervious surface from 5.8⁶ acres to approximately 19.1 acres. Given the existence of large individual lots within the sub-basin, average density at buildout is estimated to be 2.5 units/acre. Nearly all of the additional houses are part of planned developments. Run-off from N3 will be directed to the exit ditch.

N2 - It is estimated that background growth will add 15 new homes to this area. Run-off will be diverted to the exit ditch.

N1 - Twenty (20) new homes from background growth are estimated for sub-basin N1. Run-off will continue to drain toward the exit ditch.

A summary of dwelling units, by basin, is included on the following page:

⁶ The predeveloped condition for N3 is taken prior to recent Highlands West Divisions. The postdeveloped condition includes existing and proposed Highlands West Divisions.

**GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY**

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**TABLE 3
DWELLING UNITS, BY BASIN**

SUB-BASIN	PREDEVELOPMENT UNITS	PROPOSED UNITS	BACKGROUND UNITS	TOTAL ESTIMATED UNITS IN 2010
S1	195	0	*	*
N1	30	0	20	50
N2	2	0	15	17
N3**	51	118	0	169
N4	71	47	44	162
N5	27	40	0	67
N6	10	230	0	240
N7 (Combined)	97	119	0	216
N8 (Combined)	19	13	11	43
N9	0	0	0	0
N10	3	85	0	88
TOTAL N1-N10	310	652	90	1,052

* Not determined. Total impervious surface for sub-basin S1 estimated to double by 2016.

** Estimated 48 units - future construction. To fully account for increased runoff, predeveloped condition for N3 considered to be prior to some Highlands West Divisions.

STUDY RESULTS - RECOMMENDED IMPROVEMENTS

A number of model iterations were performed to assess the impact of the increased run-off and the redirection of run-off around the golf course area. Model runs were performed according to the logic detailed in Figures 14 and 15. As expected, without mitigation, peak run-off rates were increased for both "early" (from sub-basins near the exit ditch) and "delayed" (from sub-basin S1) hydrographs (Figures 16 through 20), and total run-off volume increased.

As can be seen in Figure 16 for the 10 year storm, the early hydrograph has a higher peak rate than the delayed hydrograph; both postdevelopment peaks are higher than predevelopment peaks.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

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As the early hydrograph is mainly the result of the close-in basins (N1 - N4), reducing the postdevelopment peak to the predevelopment rate would require the construction of a 1 to 2 acre-foot detention pond in the vicinity of the Exit Ditch and Fairway Lane. Attenuating the postdevelopment peak on the delayed hydrograph requires the installation of a relatively small orifice on Loers' Pond to control the release rate of stormwater for the 10 year storm. The undesired side effect of installing a 10 year control orifice on Loers' Pond is the exceptionally long period of time it would take after a given rainstorm to drain the pond. Calculations indicate that a full pond would drain at a rate of less than one inch per day. By not draining more rapidly, the pond would not have sufficient storage capacity to control a large follow-up storm.

- Given:
- 1) that a prolonged detention of stormwater in Loers' Pond could in some instances, leave downstream areas without adequate stormwater control for larger storms and,
 - 2) that the 10 year post-development peak run-off rate would not cause significant erosion in downstream ditches,

it was decided to use the larger storms (those with the highest likelihood for causing property damage) for the postdevelopment analysis.

Modeling indicated that for control of peak discharge for the larger (25 year, 100 year, 2-25 year, 2-100 year) storms, the structural improvements detailed below would be required:

Loers' Pond

Recommended changes to Loers' Pond are as follows: (Figures 21 - 23)

- a) Raise level of pond berm approximately 10" to provide needed freeboard at full pond conditions.
- b) Construct discharge structure with orifice tee for control of 25 year storm. Construct concrete weir and spillway for control of 2-25 year and 2-100 year storms, respectively. Control manhole will be designed with a low-level entrance pipe for wet season (reference Figure 24) pond operation (maximum storage) and a mid-level entrance pipe to allow for some filling of the pond in Spring. During the dry season, valves on both entrance pipes will be shut to maintain the pond at its highest level.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

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- c) Reconstruct existing ditch immediately downstream of pond. Provide for golf cart crossing.
- d) Extend 8-inch drain line, currently in place in the pond berm, to outlet in the reconstructed ditch.

Modeling indicates that the implementation of these changes will reduce the postdevelopment run-off peak flow to less than predevelopment peak rates as shown in Table 1 and Figures 17 - 20.

Prior to the use of Loers' Pond as a detention facility, it should be determined whether this will conflict with wetland ordinances and regulations. Preliminary indications are that, given that the pond is man-made and currently level-controlled, use as a detention pond may be allowable. Further discussions with the City of Oak Harbor, Washington State Department of Ecology, and the Army Corps of Engineers are required in order to make a formal determination.

Golf Course Pump-out Capacity

The diversion of run-off from sub-basins N2, N3, N7b, N9, and N10 results in a net decrease in run-off volume into the golf course for the storms evaluated (e.g. 45 Acre-Feet to 38 Acre-Feet for the 100 year storm). Given this decreased in flow volume, the existing estimated golf course pump capacity of 2,950 gpm should be adequate to maintain the water level at 1.8 feet below flood stage during the 100 year storm.

Although pump capacity appears to be adequate for golf course run-off control, the existing pumps and outlet pipes would not be considered reliable in an emergency situation. It is recommended that a 2,500 gpm electric pump station be installed at Pond 10 in order to replace most of the existing capacity. The pump station will incorporate a manifold connection for the existing tractor-mounted and portable pumps. These pumps will provide additional capacity during large storm events, and backup during power outages. Outlet piping capacity should be increased by the installation of a permanent 12-inch pipeline, placed parallel to the existing line.⁶

⁶ The flow capacity of the existing pump-out pipe should be verified prior to final design.

GOLF COURSE DRAINAGE BASIN STORMWATER MITIGATION STUDY

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Conveyance System

The postdevelopment conveyance system was checked for capacity during the 25 year and 100 year storms.⁷

To route stormwater around the golf course, 24-inch storm lines would be required as follows:

- 300 linear feet east of the Swantown Road/Fairway Lane intersection to divert sub-basins N2 and N3 around the golf course.
- 450 linear feet along the northern boundary of N9, across the existing berm to divert stormwater from N7b, N9, and N10 into Loers' Pond.

Preliminary sizing calculations for culverts downstream of Loers' Pond indicated the need to upsize some of the culverts as indicated on Table 4 and Figure 14.

In most areas, the hydraulic capacity of the perimeter ditch was adequate to carry the 25 year storm run-off. Some areas will need to be widened and deepened for the 100 year storm as indicated in Table 4.

Downstream and West Beach Improvements

Accompanied by the land owners, the capacity of the Exit Ditch was evaluated in January, 1997. Portions of the ditch require re-excavation to increase capacity. Additionally, replacement of an existing single 18" culvert will be required. The Exit Ditch travels adjacent to field access roads and, as such, capacity upgrades and maintenance would not be difficult. Project proponents have agreed to make capacity improvements (see Table 4) herein described.

As indicated above, the impoundment tidegates at West Beach appeared to be stuck in the open position there have been some problems with maintaining tidegate function in the past. Although it is beyond the scope of this study, an evaluation of the tidegate elevations, operations, and

⁷ Because of the high cost of construction, many municipal storm drainage systems do not have adequate capacity to convey a 100 year storm. Based on a review of costs vs. benefits for providing a 100 year system, agencies will often opt for conveyance systems with lower capacity, e.g. 25 year or less. For this reason, the conveyance system was additionally analyzed for its ability to pass the 25 year storms without overtopping.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

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capacity would likely indicate that upgrades to these outlet pipes would result in a more rapid draining of the impoundment area.

City of Oak Harbor and Island County Engineering staff have indicated that, given the existing drainage problems in the West Beach Area, it is their expectation that the proponents of the projects described herein participate in the mitigation of downstream stormwater volume. Mitigation is required and would require coordinating with county staff with respect to tidegate improvements. Given the unknowns and the need for continuing coordination between the governmental agencies and the proponents, it is not clear at this point how the impacts of increased volume should be handled.

The impact of the proposed projects, and background growth over the 20 year period is to increase the run-off volume from 293 Acre-Feet to 310 Acre-Feet during the 100 year storm, approximately 6%. When the background growth rate is excluded, the impact of the proposed projects adjacent to the Golf Course is to increase the runoff volume for the 100 year storm by approximately 3%.

Improvement Priorities

In order to provide the proponents, WGCC, and governmental agencies with guidance, the improvements described herein have been ranked in order of priority. The ordering is based upon the opinion of the author and relies on the following criteria:

- A) Will the improvement enhance public safety?
- B) Will the improvement reduce the risk of property damage?
- C) Will the improvement reduce public inconvenience caused by flooding?

This is a recommended ranking. The order of implementation may be modified by the involved parties:

- Raise berm to add freeboard to Loers' Pond.
- Construct Loers' Pond discharge structure and associated work.
- Divert N2 and N3 to Exit Ditch with associated storm pipe and ditch improvements along Swantown Road and Fairway Lane.

***GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY***

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- Install 12" pipe for stormwater pump-out from Fairway 10 Pond to Exit Ditch.
- Upsize existing culvert in backyard of private property on Fairway lane northerly of Oldenburg Lane.
- Install new stormwater pump and associated upgrades at Fairway 10 Pond.
- Construct other culvert and channel improvements along perimeter ditch.
- Install ditch and culvert improvements along Exit Ditch.
- Participate in mitigation of Golf Course Basin Stormwater Impact on West Beach impoundment.
- Construct parallel culvert on Fairway Lane - 100 year conveyance option only.
- Install 12" storm line to reduce overland flow from Fairway 8 Pond to lower ponds.

Some proposed improvements should be installed in conjunction with an associated development. The following are examples; each plat will have its own associated internal and off-site stormwater facility requirements, as dictated by site conditions:

- Construct 24" storm line across N9 berm; install with development of N7b and N10.
- Construct swale/storm line improvement to better channel runoff to perimeter ditch and Fairway 17 Pond; install with proposed development on southern portion of N4.

Long-Term Maintenance and Operation of Basin Drainage Facilities

At this time, maintenance for the drainage facilities in the Golf Course Basin appears to be performed by WGCC, Island County, the City of Oak Harbor, and individual landowners. – Stormwater control, by its nature, is best managed by a public authority. For long term reliability, it is recommended that the maintenance and operation of the Golf Course Basin facilities be transferred entirely to a public entity.

The first step in a long-term maintenance plan would be the establishment of easements along drainage ways. Easements to the City of Oak Harbor along the perimeter ditch from Ft. Nugent, northerly to the crossing at Fairway lane were secured as a part of the annexation of the golf course into the City. For that portion of the perimeter ditch from Fairway Lane to the Exit Ditch and for the Exit Ditch to West Beach additional research and/or negotiations will be required to secure the required maintenance easements. For reference, an estimate of annual maintenance costs has been compiled, and is included in Appendix F.

RECOMMENDED IMPROVEMENTS GOLF COURSE BASIN

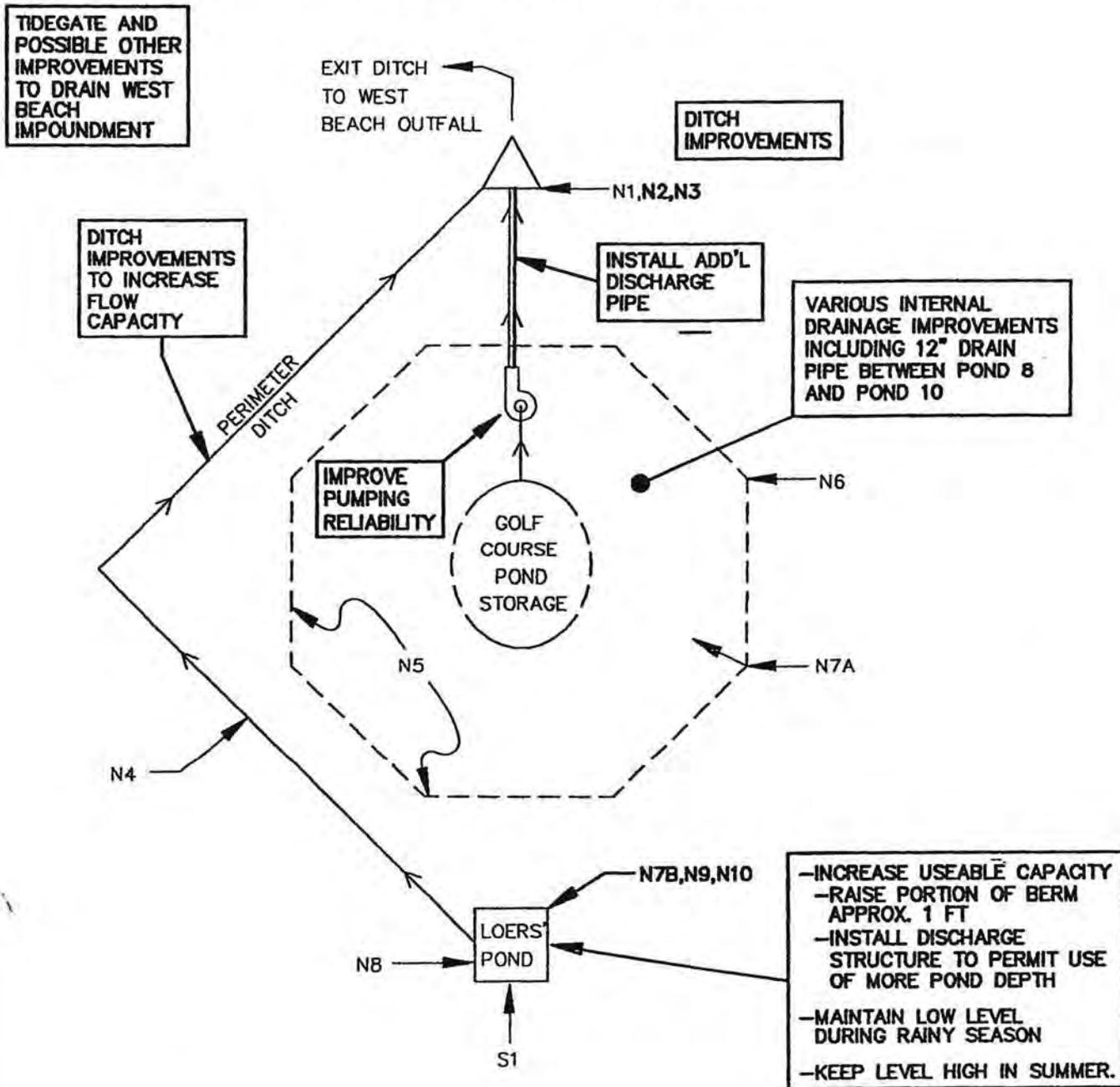


FIGURE 14

SWAN 1

GOLF COURSE BASIN STUDY – POSTDEVELOPMENT MODEL FLOWCHART

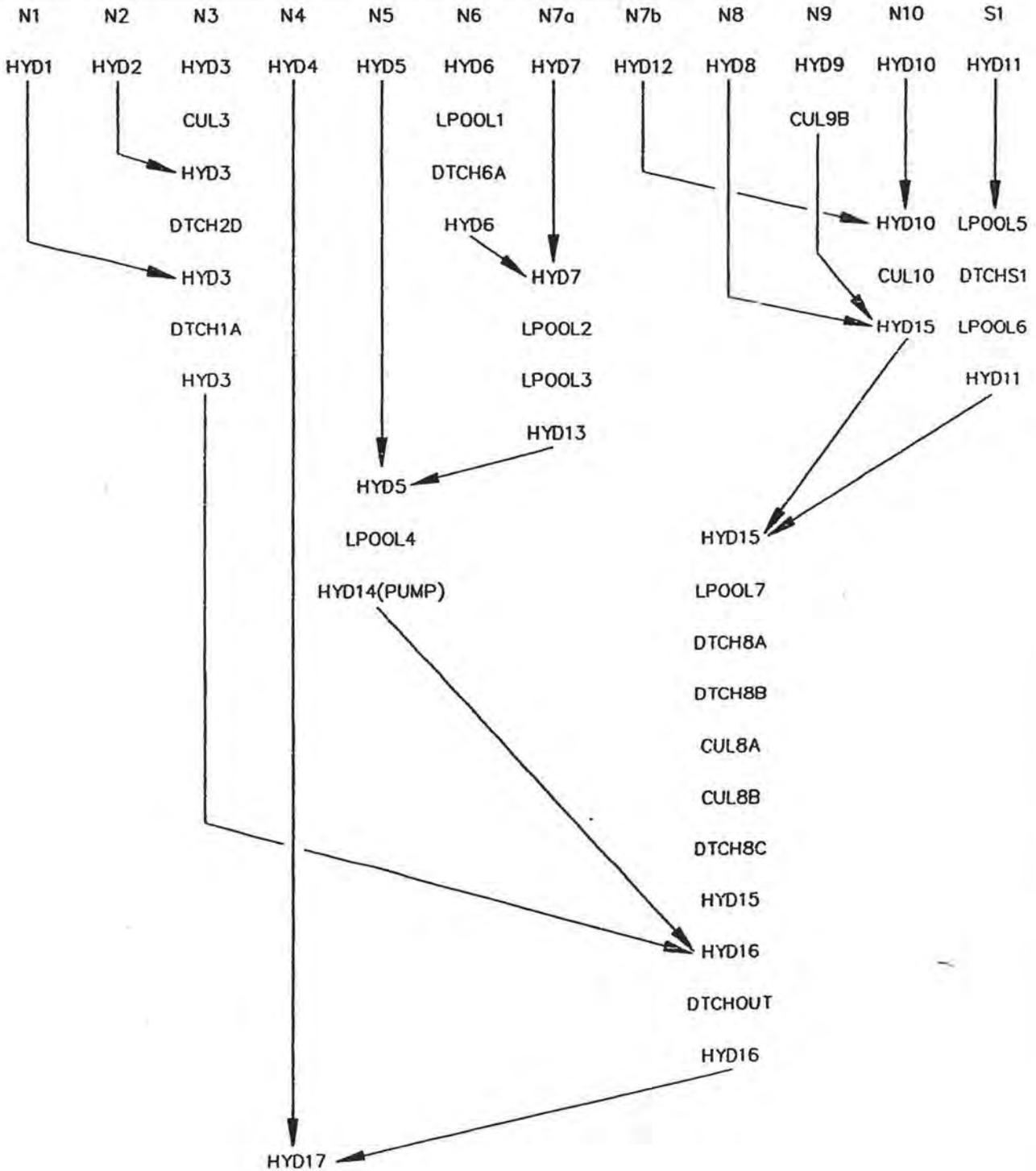
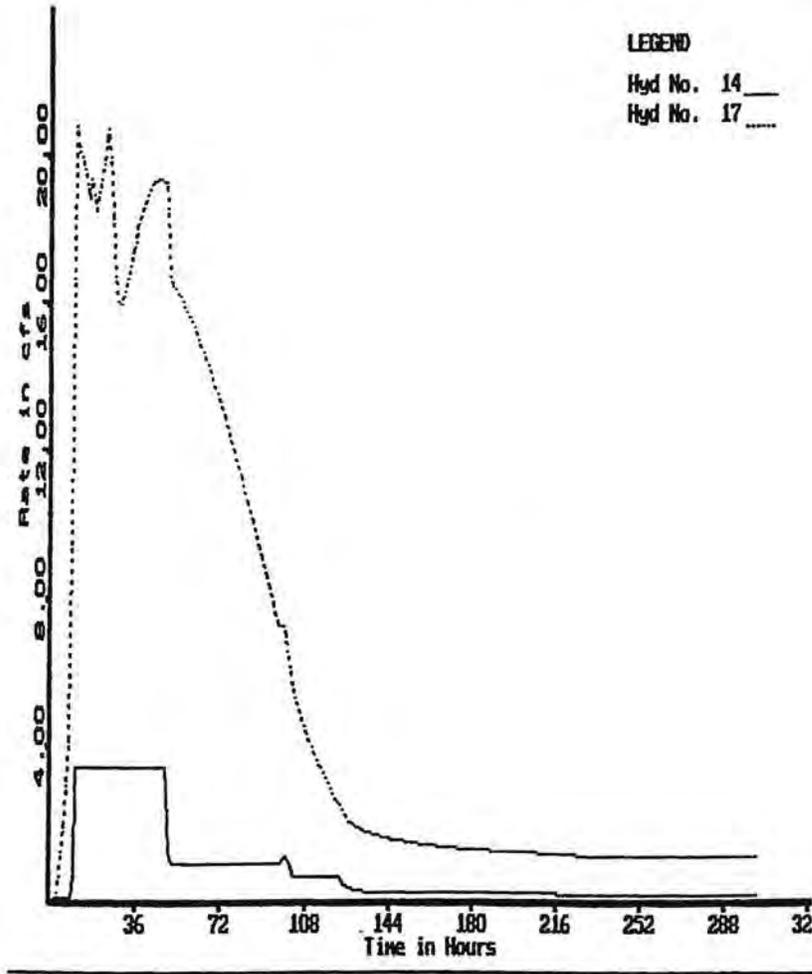


FIGURE 15

POSTDEVELOPMENT I 10 YR - 24 HR STORM

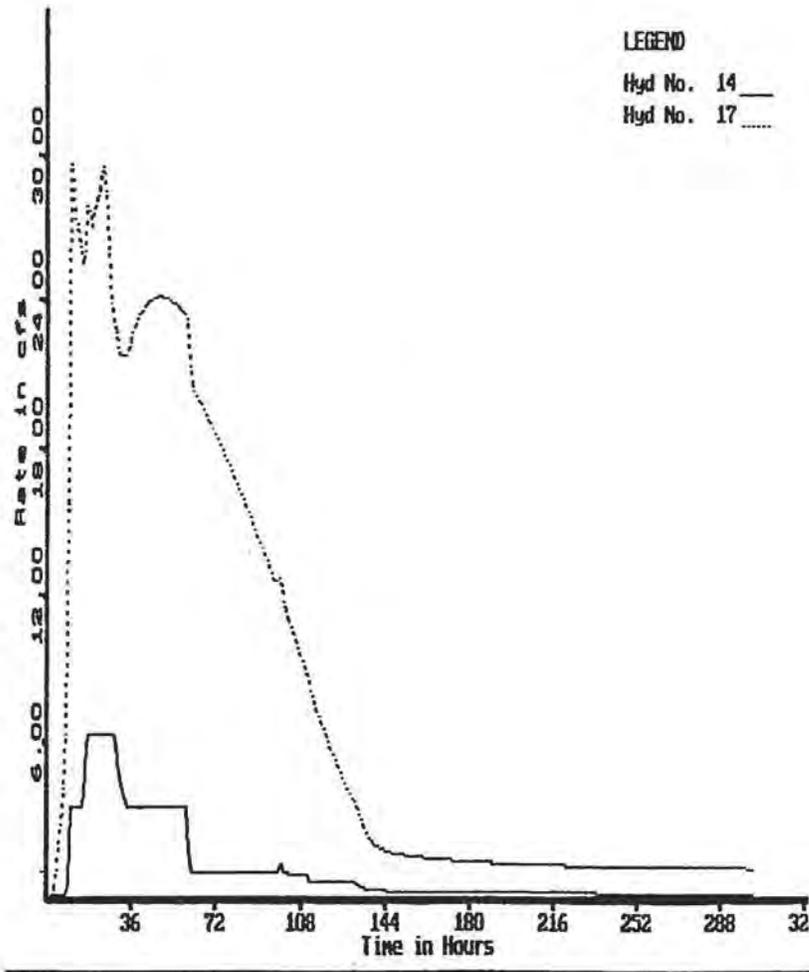


Hyd No.: 14 Pumped

Rate: 3.57 cfs Time: 25.00 hr
Vol Int: 60.00 min

Hyd No.: 17 Basin Outflow

Rate: 20.93 cfs Time: 10.00 hr
Vol : 142.17 Ac-ft Int: 60.00 min



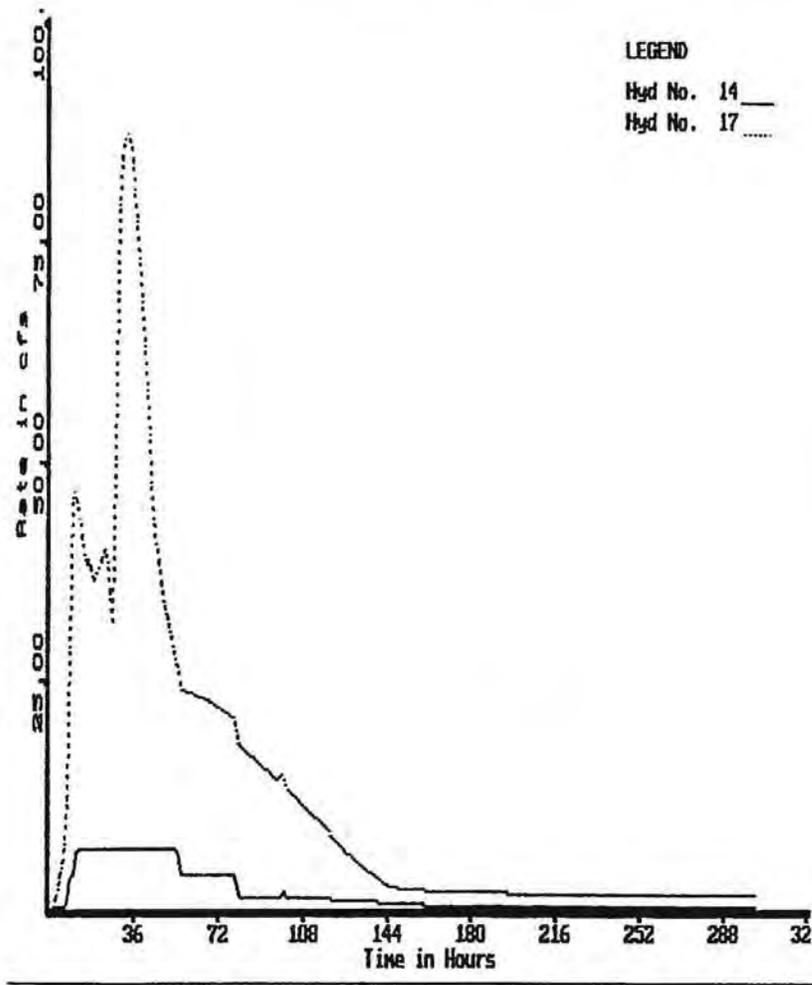
Hyd No.: 14 Pumped

Rate: 6.57 cfs Time: 24.00 hr
Vol : 24.72 Ac-ft Int: 60.00 min

Hyd No.: 17 Basin Outflow

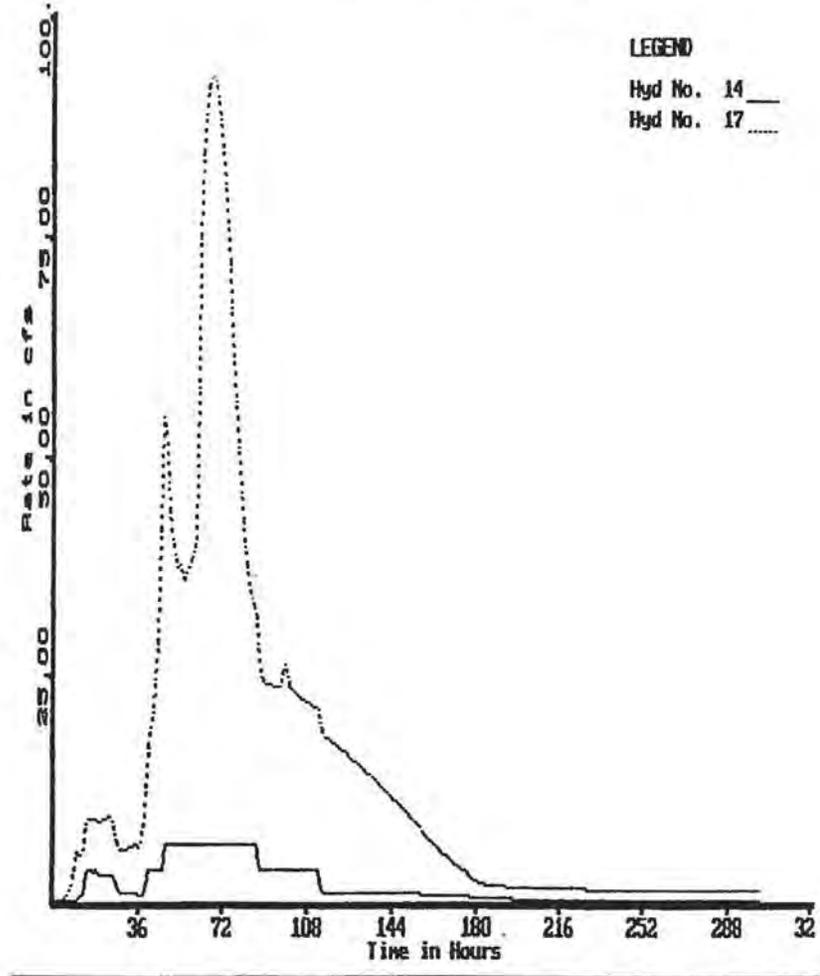
Rate: 29.88 cfs Time: 10.00 hr
Vol : 200.21 Ac-ft Int: 60.00 min

100 YR - 24 HR STORM



Hyd No.: 14 Pumped
Rate: 6.57 cfs Time: 27.00 hr
Vol : 36.89 Ac-ft Int: 60.00 min
Hyd No.: 17 Basin Outflow
Rate: 87.44 cfs Time: 32.00 hr
Vol : 309.46 Ac-ft Int: 60.00 min

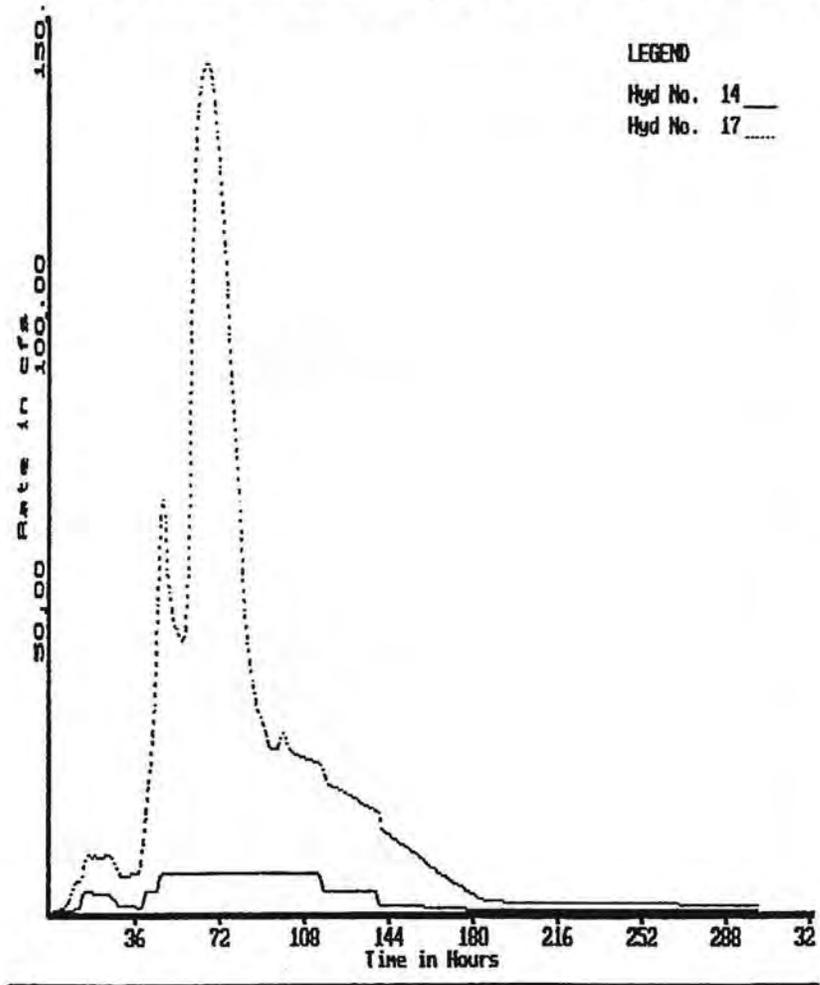
25 YR PRECEDED BY 2 YR STORM



Hyd No.: 14 Pumped
 Rate: 6.57 cfs Time: 62.00 hr
 Vol : 41.47 Ac-ft Int: 60.00 min

Hyd No.: 17 Basin Outflow
 Rate: 93.56 cfs Time: 66.00 hr
 Vol : 350.71 Ac-ft Int: 60.00 min

100 YR PRECEDED BY 2 YR STORM

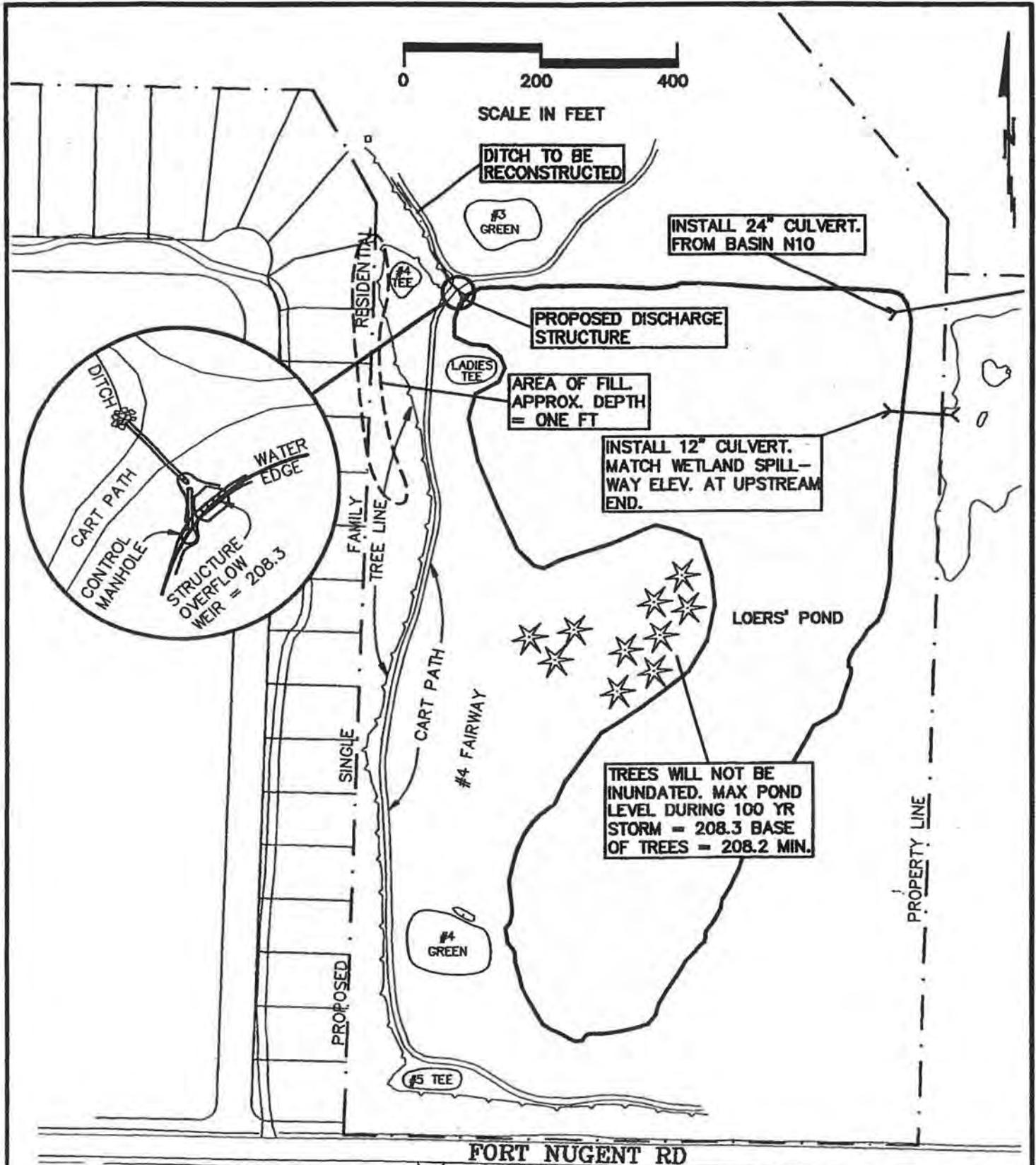


Hyd No.: 14 Pumped

Rate: 6.57 cfs Time: 63.00 hr
Vol : 53.19 Ac-ft Int: 60.00 min

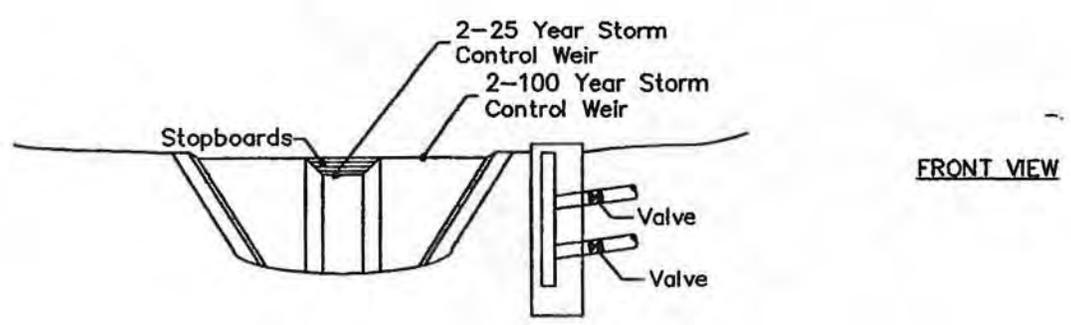
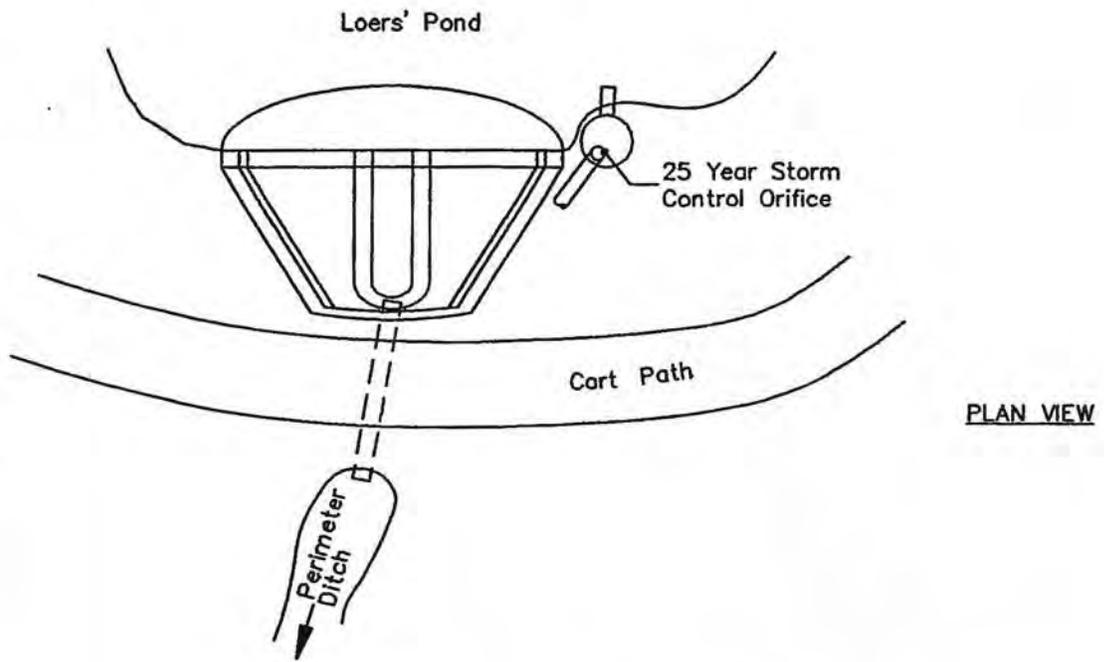
Hyd No.: 17 Basin Outflow

Rate: 143.53 cfs Time: 64.00 hr
Vol : 471.12 Ac-ft Int: 60.00 min



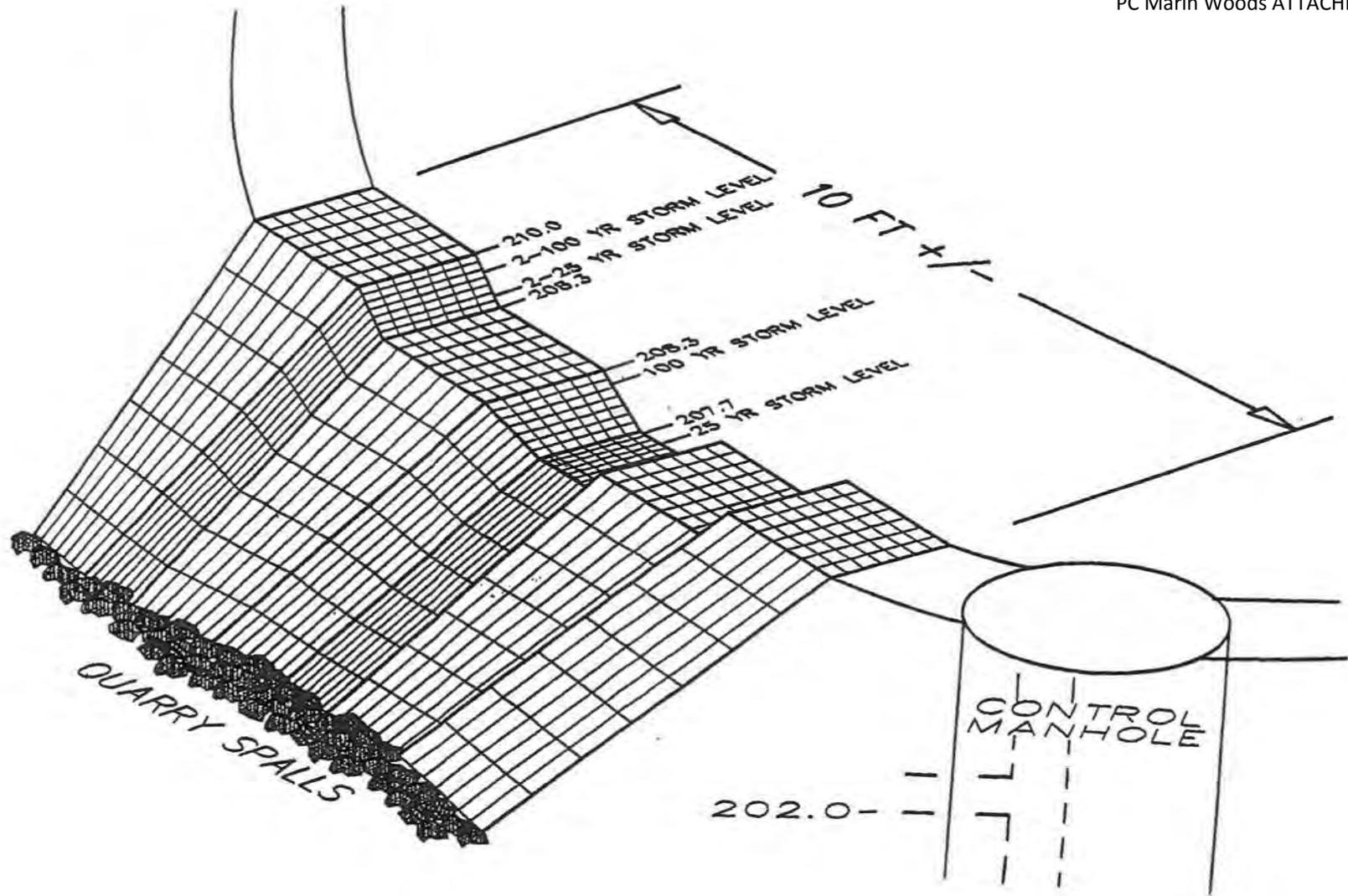
GOLF COURSE DRAINAGE BASIN
STORMWATER MITIGATION STUDY
PROPOSED CHANGES TO LOERS' POND
(ELEVATIONS SHOWN ARE ESTIMATES. TO BE REVISED)
DURING DESIGN PHASE

FIGURE 21



DISCHARGE STRUCTURE

FIGURE 22



LOERS' POND DISCHARGE STRUCTURE

NOT TO SCALE

FIGURE 23

WHIDBEY ISLAND AND VICINITY - PROPORTION OF ANNUAL RAINFALL - BY MONTH

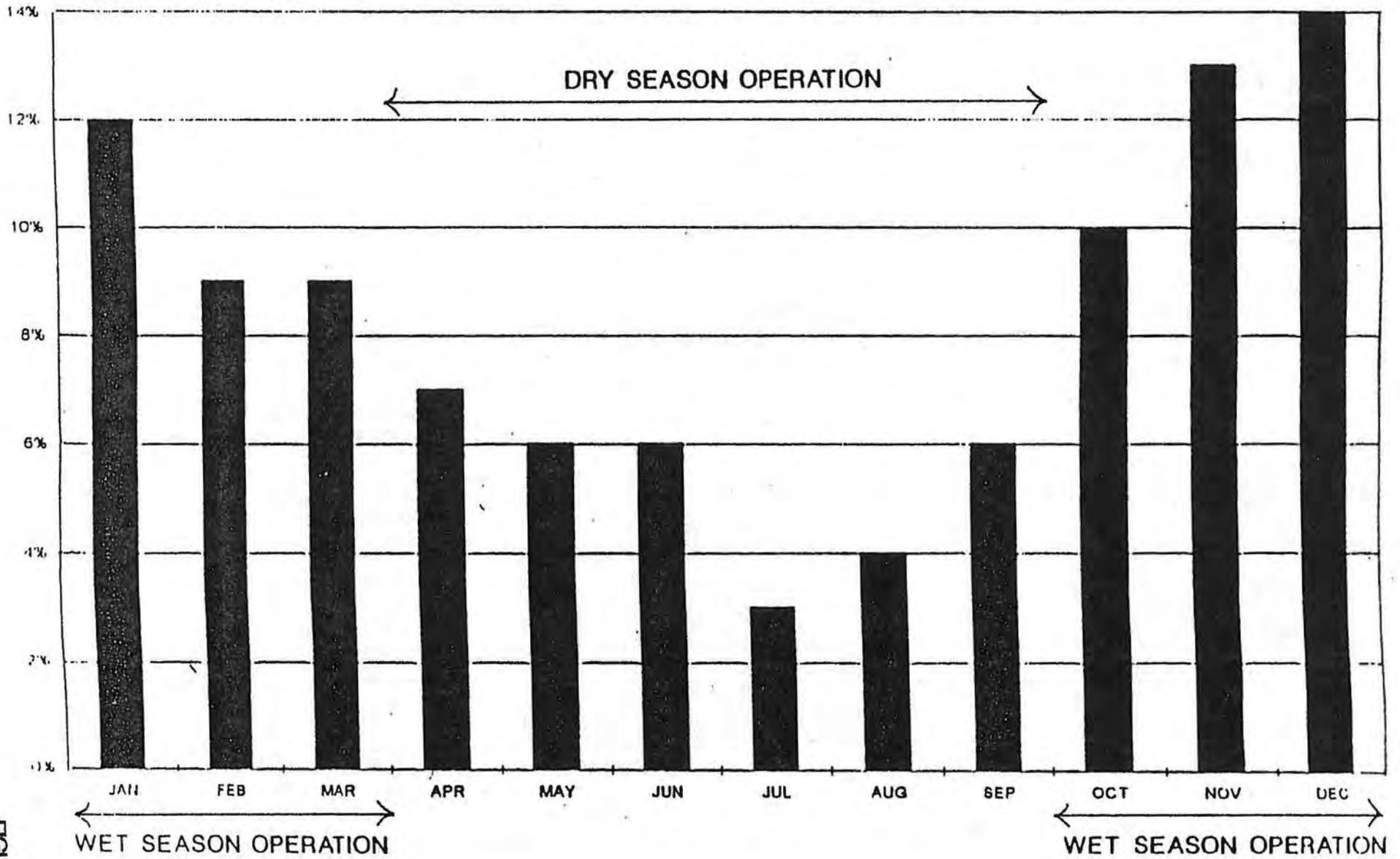


FIGURE 29

TABLE 4 - GOLF COURSE BASIN - SUMMARY OF IMPROVEMENTS**DITCHES (25 YEAR CONVEYANCE SYSTEM)**

The following ditches will require rechanneling:

DITCH I.D.	DESCRIPTION	REQUIRED DITCH CROSS-SECTION (or Equivalent Hydraulic Capacity)			ESTIMATED COST	NOTES
		Base (Ft)	Sides	Depth (Ft) ²		
1A	North Side of Fairway Lane (From Exit Ditch, 485 LF Easterly Along Road)	2	1:1	3.5	\$4,500	485 Linear Feet Upgrade in Conjunction with Development
2D	North Side of Fairway Lane (From Swantown Road, 1,150 LF Westerly Along Road)	2	1:1	2.5	\$6,500	1,150 Linear Feet Upgrade in Conjunction with Development

DITCHES (100 YEAR CONVEYANCE SYSTEM)

The following ditches will require rechanneling:

DITCH I.D.	DESCRIPTION	REQUIRED DITCH CROSS-SECTION (or Equivalent Hydraulic Capacity)			ESTIMATED COST	NOTES
		Base (Ft)	Sides	Depth (Ft) ¹		
1A	North Side of Fairway Lane (From Exit Ditch 485 LF Easterly Along Road)	2	1:1	3.5	\$4,500	485 Linear Feet Upgrade in Conjunction with Development
2D	North Side of Fairway Lane (From Swantown Road, 1,150 LF Westerly Along Road)	2	1:1	2.5	\$6,500	1,150 Linear Feet Upgrade in Conjunction with Development
8A	Loer's to Fairway 17 Pond	4	5:1	3.0	\$5,500	Raise Ditch Sides, Excavate, As Required. Cost Estimate Does Not Include Right-of- Way or Easement Acquisition.
8B	Fairway 17 Pond to Oldenburg Lane	5	2:1	4.5	\$17,000	
8C	Oldenburg Lane to Exit Ditch	5	2:1	4.5	\$6,500	

¹ Costs include estimated engineering fees and permits.² Ditch depth includes at least one foot of freeboard.

CULVERTS AND STORM DRAIN LINES - (25 YEAR CONVEYANCE SYSTEM)

CULVERT I.D.	DESCRIPTION	REQUIRED CULVERT (or Equivalent Hydraulic Capacity)	ESTIMATED COST	NOTES
10	New pipe from proposed developments in n10 and n7b	450 LF - 24"	\$40,000	Install in Conjunction with Development
3	North side of Swantown Rd. (including road crossing)	300 LF - 24"	\$20,000	Install in Conjunction with Development
8A	North of Oldenburg Lane (existing 24")	80 LF - 36"	\$10,000	90 LF of Existing 36" Culvert to Remain in Place
Unnamed	Miscellaneous Golf Course Culvert Upgrades		\$10,000	Replace Most Culverts at Ditch Crossings w/Cart Paths
Unnamed	New Pipe From Pond 8 to Pond 10	450 LF - 12"	\$11,500	

CULVERTS AND STORM DRAIN LINES - (100 YEAR CONVEYANCE SYSTEM)

CULVERT I.D.	DESCRIPTION	REQUIRED CULVERT (or Equivalent Hydraulic Capacity)	ESTIMATED COST	NOTES
10	New pipe from proposed developments in n10 and n7b	450 LF - 24"	\$40,000	
3	North side of Swantown Rd. (including road crossing)	300 LF - 24"	\$20,000	
8A	North of Oldenburg Lane (existing 24")	170 LF - 48"	\$26,000	Replace existing 24" & 36"
Unnamed	Crosses Fairway Lane	70 LF - 36"	\$10,000	Install Parallel to Existing Culvert.
Unnamed	Miscellaneous Golf Course Culvert Upgrades		\$10,000	Replace Most Culverts at Ditch Crossings w/Cart Paths
Unnamed	New Pipe From Pond 8 to Pond 10	450 LF - 12"	\$11,500	

LOER'S POND IMPROVEMENTS

DESCRIPTION	ESTIMATED COST	NOTES
Discharge Structure, Including Adjacent Ditch Enlargement	\$28,500	
Additional Soil to Permit Increase in Elevation of Berm Approximately 10" at Two Low Areas	\$8,500	Provides Freeboard.

IRRIGATION & PUMPOUT IMPROVEMENTS

DESCRIPTION	ESTIMATED COST	NOTES
Install 600 LF of 12" Pipe for Stormwater Pump-Out To Exit Ditch	\$35,000	Represents New 2,500 GPM Pump w/Manifold Provided For Portable Pump Connection. Existing Pump To Be Retained.
New Stormwater Pump	\$40,000	

DOWNSTREAM IMPROVEMENT (Exit Ditch and West Beach)

DESCRIPTION	ESTIMATED COST	NOTES
Install Dual 30" Culverts On Field Access Road	\$3,000	Form of Participation to be Determined Based on Discussions with Governmental Agencies.
Ditch Cleaning	\$2,000	
West Beach - Participation in Mitigation to Stormwater Impact on West Beach Impoundment		

**COMMENTS AND CORRESPONDENCE
RELATED TO DRAFT STUDY**

NOVEMBER, 1996

WHIDBEY GOLF AND COUNTRY CLUB
1411 W. Fairway Lane
Oak Harbor, WA 98277

February 19, 1997

Mr. Ryan Kingma
Fakkema and Kingma Inc.
4086 400th Ave. West
Oak Harbor, WA 98277

Dear Mr. Kingma:

The Whidbey Golf and Country Club (Club) wishes to be a good neighbor and to work with the surrounding land owners, the City of Oak Harbor, Island County and the State to develop an effective and fitting drainage plan for stormwater. We believe it is in the Club's best interest to support such a plan.

Following are our comments and suggestions regarding the draft Golf Course Drainage Basin Stormwater Mitigation Study (Study) dated November 1996. These comments and suggestions are made in a positive fashion in an effort to improve the draft study to make it more effective and fitting to the situation in the sub-basin of the larger watershed drainage basin.

The introduction to the Study, page 1, provides four goals of the study.

1. With regard to the first goal, we suggest that the goal of this stormwater mitigation study should be to develop a program leading to the efficient handling of the current and increasing future flows of stormwater due to development activities in areas N1 thru N10 as shown on Figure 1 (page 2) bearing in mind the significant flows north from area S1. This program goal should cover the golf course sub-basin including the exit ditch from the golf course to Puget Sound from the standpoint of developing and maintaining an effective means of moving the stormwater to Puget Sound.

The referenced Oak Harbor Mitigated Determination of Non-Significance for the 1992 Swanlow Annexation does not mention and certainly does not require the golf course itself to be the detention location for "development" stormwater. This, of course, does not preclude the use for other locations, such as the Homestead site, for such detention facilities nor the continued use of certain Club ponds as transit facilities.

2. With regard to the third goal, over the past several years the Club has spent considerable time and effort to increase its water storage capabilities for summer irrigation. At present, the Club believes it has sufficient storage for its summer requirements and is not looking for any additional flow to its facilities at any time of the year. We suggest that this goal be eliminated.

The next series of comments relate to the Study's section on existing conditions.

1. On page 4, we suggest that the last sentence in the description of N8b be changed to read "Run-off from N8b, other than from the small section of fairway, enters the ditch at the border of the properties and flows into the ditch which receives the water from Loers Pond." This is the actual condition.

Also on page 4 in the second paragraph, it should be noted that the extension of Loers Pond was from an existing pond-wetland combination. Therefore, we suggest the first sentence read, "The 10 acre Loers Pond, operated as a transit for the stormwater flow from the sizable area south of Ft. Nugent Road and for the storage of irrigation water, was extended in 1979 by the WGCC."

2. On page 5, we suggest that "N8" be removed from the first sentence of the last paragraph since this stormwater exits using the perimeter ditch.
3. On the bottom of page 5, the single electric 7hp submersible pump is rated (approx.) at 250 gpm. The level 2 pump is rated 1,350 gpm (total 1,600 gpm). The level 3 pump is rated 1,350 gpm (total 2,940 gpm).
4. On page 6 and regarding the last paragraph, it is our understanding that the pump station and tide gates have not been operating for at least ten years. You might add this comment to the text.
5. On page 7 in the paragraph starting "Field review", we suggest the second sentence be modified to read "section), with some additional work and proper maintenance as well as procedures and facilities to control the total stormwater flow, the conveyance system will be able to pass large rain storm events." This is not presently the case.
6. On page 9, we believe it would be helpful to show the Club's property line on this Figure and also on Figure 13 (page 31) and on Figure 1 (page 2).
7. On page 10, Figure 3 should show N8A flowing to the perimeter ditch and not to Loers Pond to be consistent with page 3. We realize a portion of this water flows to Loers Pond by means of the ditch along Ft. Nugent Road.

Before we list our comments and suggestions regarding the Analysis of Post-development Conditions starting on page 23, we need to mention three items which form the backdrop for our comments.

As mentioned on the first page, we believe we have sufficient storage for summer irrigation and are not looking for additional stormwater runoff during that period. In any event, very little if any summer stormwater reaches the convergence point just prior to the exit ditch to Puget Sound. Therefore, we do not believe the study should consider back-flowing stormwater from the convergence point to fairway 10 pond.

With regard to the conveyance system down-stream of Fairway Lane, it is our understanding that the ditch to the pond at West Beach can accommodate a regulated amount of stormwater flow if some further ditching work is done and if a larger culvert is installed at the dam on this property. In order for this system to function, we believe the tidegates and other mechanism at West Beach need to be operational and maintained and the ditch maintained.

More than half of the stormwater runoff in the sub-basin during large storms comes from the sizeable area south of Ft. Nugent Road. Currently, Loers Pond can not accommodate large flows that we have been experiencing without overflowing. Additional work may be severely limited at Loers Pond. In any event, we believe this pond should continue to handle only water from the large area to the south and not be burdened with a significant portion of the other half of the sub-basin's runoff. The large runoff from the south can only increase in rate and certainly total volume as development takes place in this area. Loers Pond must be available to accommodate this flow.

The following comments and suggestions, therefore, are based on 1) the items mentioned on the previous page regarding existing conditions, 2) no summer runoff to the Club at Fairway Lane, 3) an effective and maintained conveyance system from Fairway Lane to Puget Sound and 4) Loers Pond continuing to absorb only waters crossing Ft. Nugent Road.

Starting in the northeast, we agree in general with items 8, 9 and 10 regarding 300 feet of 24 inch culvert along the north side of Swantown Road with a road crossing to the rechanneled ditch along Fairway Lane leading to the exit ditch. However, we question the use of a culvert along Swantown Road when so much of the stormwater reaches the ditch opposite the Club's property arriving at a right angle from the up hill developments in N1, N2 and N3. The other portions of the ditch should be reworked to assure adequate flow. You might consider a concrete lined ditch at some distance on either side of the culvert crossing to Fairway Lane. Because of the current significant flow of stormwater from this area and its increase due to planned future development, a retention pond may be required.

We also agree with items 3 and 4 regarding 600 feet of 12 inch pipe from fairway 13 pond to the exit ditch and a new stormwater pump which we would prefer to be electric. Fairway ponds 10 and 18 are very shallow and improved control of stormwater would result from the dredging of these ponds.

It is also appropriate to upsize the 170 feet of existing culvert, item 2, to 48 inches and to add a second culvert across Fairway Lane, item 12.

We agree that the perimeter ditch, item 5, along and adjacent to Fairway Lane needs to be reworked. We also agree that the perimeter ditch between fairway 17 pond and Fairway Lane needs to be deepened and the culverts under the four cart paths replaced with bridges to allow unobstructed flow of stormwater. We also believe the perimeter ditch and pipe between Loers Pond, other than near the discharge structure, and fairway 17 pond needs to be enlarged.

The Fairway Lane road ditches, particularly to the south of the crossing of the perimeter ditch, need to be reworked to prevent flows to the fairways. Additionally, the ditch on the north side of Ft. Nugent Road should be reviewed to see if some stormwater can be diverted away from Loers Pond.

To the southwest, the ditch along fairway 16 ending in fairway 17 pond needs to be reworked to be able to handle the increased flow of development storm water. The current ditch along the property line to the west of Loers Pond also needs to be reworked and a more definitive entrance made to the perimeter ditch north of Loers Pond. Additionally, the ditch along the property line on the curve in fairway 3 needs to be reworked to handle the increase in volume.

We need a better understanding of the need for and design of item 6, the \$20,000 new discharge structure at Loers Pond.

One of the most significant increased flows of development stormwater currently and in the near future, based on existing development and the plans of the proponents, will come from areas N5, N6, N7 and N10. This flow will increase in both rate and in total volume. We are not prepared to handle the significantly increased flows due to development. Therefore, the Study should look to alternate proposals which would gather this stormwater and directly transport it in some fashion to the exit ditch to West Beach.

We believe the stormwater flows need to be analyzed to determine that the various flows reach the exit ditch in a manner consistent with the ability of that facility. At year-end 1996, we witnessed a flow of stormwater quickly characterized as a 2 or 3 year storm which created significant problems.

As you indicated, the study would not be complete without a long-range operating and maintenance plan based on a program identifying the timing and financing of the necessary drainage facilities.

The draft Study is a good start toward developing an effective plan. We believe our comments and suggestions, which are based on our knowledge of the physical conditions and not on an engineering evaluation, will make the Study more effective and useful. We are prepared to work with you and others to complete an effective and fitting drainage plan.

We hope the discussion of our comments and suggestions today has answered any questions you may have. Please feel free to contact me with any additional questions or comments.

Sincerely,

Roy Dickerson
Roy Dickerson
President

CC: Mr. Roy Allen, Island County Engineer
Mr. Richard Fakkema
Mr. Robert Fakkema
Mr. Ryan Goodman, City Engineer, City of Oak Harbor

P.O. Box 5000
Coupeville, WA 98239



Phone: (360) 679-7331
From Camano: 629-4522
From S. Whidbey: 321-5111
SCAN: 592-7331 FAX: 678-4550

Larry Kwarsick, Director

Roy Allen, County Engineer
Lew Legat, Assistant County Engineer

March 3, 1997

Gregory R. Cane, P.E.
Fakkema & Kingma, Inc.
830 S.E. 8th Avenue, Suite 102
Oak Harbor, WA 98277

MAR - 6

Subject: Golf Course Drainage Basin Plan

Dear Greg:

One of Island County's goals is to support the initiative of land owners who are seeking to solve basin-wide surface water problems. One of the primary vehicles that is available to land owners is the formation of a surface water utility. To be considered for adoption as the basis of a surface water utility plan, the draft Golf Course Basin Plan would have to be amended to comply with statutory, administrative and grant planning requirements. This would include developing a program for construction of capital facilities, suggest a funding mechanism with a rate schedule, identify affected property owners, prepare list of easements needed for proposed improvements. A "comprehensive" plan should include the entire watershed and not be restricted to only those areas most likely to develop. One of the major deficiencies of the existing draft study is that it does not effectively analyze the downstream conditions.

As an example, the Marshall Drainage Basin Plan was drafted after repeated requests for assistance from property owners affected by local flooding. Extensive public review and comment preceded the final draft and adoption of the Plan. The Golf Course Study does not propose or present opportunities for citizen input. To date, we have not heard from local property owners residing in the Swantown Drainage Basin about proposed stormwater improvements. Only land owners planning development in the Golf Course Basin have voiced support for the Study. While the BOCC supports watershed based utilities to solve area drainage problems, there needs to be a demonstration of broad based "local" support, particularly from properties impacted by inadequate surface water systems.

The Golf Course Basin Plan suggests that a "public entity" accept responsible for long-term maintenance and operation of the Golf Course Basin drainage facilities. Funding for M&O and capital improvements would have to come from a local Storm and Surface Water Utility similar to the Marshall Utility. Given the fact that the majority of the property delineated as the "Golf Course Drainage Basin" is located either within the

Gregory R. Cane
March 3, 1997
Page 2

incorporated area of the City of Oak Harbor or within the UGA of Oak Harbor, it would appear to be appropriate that the City take the lead in the creation of a surface water utility. If proponents expand the Basin Plan to include the entire Swantown watershed, then a City/County joint utility would more accurately represent the property owners.

On December 19, 1996, Island County staff members met with Greg Cane, Robert Fakkema, and representatives from the City of Oak Harbor and Whidbey Golf and Country Club. Mr. Fakkema explained the phased installation of the Swantown drainage system. This phasing requires the Golf Course to accept increasing volumes of water until completion of the improvements. Recent comments from the Golf Course suggest alternate detention may be needed.

In summary, we would like to see a "Comprehensive" Golf Course Drainage Basin Plan include the following:

- analysis of downstream conditions, as well as upstream, with associated drainage improvements;
- represent an effort by the existing community to solve an area drainage problem;
- conform with planning requirements for a storm and surface water utility;
- resolve issues with Whidbey Golf and Country Club regarding irrigation and the use of Loer's Pond as a detention facility.

I appreciate the opportunity to comment on the Draft Golf Course Drainage Basin Plan. The County looks forward to continued involvement in the development of the Swantown drainage improvements. Please feel free to call me at (360) 679-7331 if you have any questions.

Sincerely,



Julie Buktenica,
Surface Water Manager

cc: Board of County Commissioners
Ryan Goodman, City of Oak Harbor
Robert Fakkema
Roy Dickerson, Whidbey Golf and Country Club





**Fakkema
And
Kingma, Inc.**

Robert D. Gray, P.E.
Edward K. Lockman, P.E.
Garth D. Gray, P.E.
Gregory R. Case, P.E.

Civil Engineers & Land Surveyors • 840 SE 8th Ave., Suite 102 • Oak Harbor, WA 98277 • (360) 675-5973 • (360) 321-7242

April 3, 1997

Roy Dickerson, President
Whidbey Golf & Country Club
1411 W. Fairway Lane
Oak Harbor, WA 98277

RE: Response to Whidbey Golf & Country Club Letter
Golf Course Basin Study

Dear Roy:

Thank you for your response to the Draft Golf Course Drainage Basin - Stormwater Mitigation Study. Your input is critical to this process, and we appreciate the thoroughness that you and the Drainage Committee have shown in the review of the draft document.

As detailed below, we have responded to WGCC's comments and concerns by either:

- 1) making revisions to the draft study and/or
- 2) responding herein, in detail, to your concerns.

In order to better coordinate our letters, I have keyed my responses to the format of your February 19, 1997, letter. It is our intent that both letters, along with other plan comments, be incorporated into the appendix of the final study.

Page 1, Item 1, 2nd Paragraph

This goal has been reworded to say, "Consider the use of basin-wide detention in accordance with the expanded environmental checklist submitted under SEPA as prepared for the annexation of the golf course and adjacent properties."

Page 1, Item 2

Per WGCC comment, this goal has been eliminated. References to, and considerations of, improvements to irrigation have been eliminated from the study.

Page 2, Item 1

This typographical error has been corrected. Some modification has been made to the sentence addressed in paragraph 2.

RESPONSE TO WG&CC LETTER
GOLF COURSE BASIN STUDY
ROY DICKERSON

2

Page 2, Item 2

“n8” deleted.

Page 2, Item 3

The revised pump capacities have been included in the report. The stormwater model was rerun with the changed pump capacities. As would be expected, the flood levels in the Fairway 10 area of the golf course rose for the calibration runs. The model now more closely represents observed conditions during the two calibration storms.

Page 2, Item 4

WGCC comment acknowledged.

Page 2, Item 5

WGCC comment acknowledged.

Page 2, Item 6

WGCC property lines added to Figures 1, 2, and 13.

Page 2, Item 7

The typographical errors in the text on pages 3 and 4 of the study have been modified to conform to Figure 3, and the stormwater model.

Page 3, Paragraph 5

Given that the study is, by its nature, an analysis and planning document, the configuration of proposed improvements are conceptual, utilizing available information. Since the preparation of the draft study in November, 1996, the design of the stormwater conveyance from Swantown Road, along Fairway Lane to the exit ditch has been completed. Given the slopes, it was possible to convey the 100 year storm runoff through an 18” stormwater pipe. The stormwater pipe will run the entire length from Swantown Road to the exit ditch along Fairway Lane.

Page 4, Paragraph 1

WGCC comments acknowledged.

RESPONSE TO WG&CC LETTER
GOLF COURSE BASIN STUDY
ROY DICKERSON

3

Page 4, Paragraph 2

WGCC comments acknowledged.

Page 4, Paragraph 3

WGCC comments acknowledged.

Page 4, Paragraph 4

The concerns regarding existing ditches along Fairway Lane south of the crossing with the exit ditch are acknowledged. With respect to the diversion of Ft. Nugent ditches around Loers' Pond, given the significant ability of Loers to attenuate runoff peaks, routing of stormwater around the pond would increase the rate of runoff flow to downstream property owners.

Page 4, Paragraph 5

WGCC comments acknowledged.

Page 4, Paragraph 6

Meetings with the appropriate WGCC members are planned to better explain the operation of the discharge structure.

Page 4, Paragraph 7

Loers' Pond has available storage for stormwater control if a discharge structure similar to the one modeled in the study is constructed at the outlet. Given:

- 1) that with the proposed modifications to Loers' can adequately store and attenuate future runoff with the addition of stormwater from the proposed developments without overtopping,
- 2) that regional detention is an acknowledged responsible method for the management of increased runoff volumes, and
- 3) that alternatives for routing runoff from the basins would significantly increase pumping requirements and would not likely result in an equivalent moderation of downstream flows

we strongly believe that the use of Loers' Pond for stormwater control for the proposed projects is likely the most responsible of available alternatives

RESPONSE TO WG&CC LETTER
GOLF COURSE BASIN STUDY
ROY DICKERSON

4

Page 4, Paragraph 8

Given the available storage in a facility the size of Loers' Pond, the study proposes that by detaining stormwater during the peak storm period, it is possible to reduce the runoff rate below that which is experienced by comparable storms in the present condition. We acknowledge that some existing downstream conveyance facilities are inadequate, even for existing conditions, and have been working with property owners to determine the need for ditch and culvert improvements.

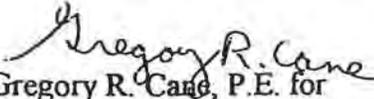
Page 5, Paragraph 1

More than 97% of the runoff volume analyzed in the study results from sources and areas other than the proponents projects. Given that the large majority of the water is from other sources and that the maintenance of stormwater facilities is inherently a function of public entities, it is reasonable to expect that the City or County would take the lead in facility maintenance.

The improvements proposed herein do not require specialized or unique maintenance. It is expected that ongoing discussions with the City, County, and WGCC will result in effective and ongoing maintenance of proposed and existing facilities.

Again, thank you for your input to the draft study. If we can be of additional service in answering questions or comments, do not hesitate to call.

Sincerely,
FAKKEMA AND KINGMA, INC.


Gregory R. Cane, P.E. for
Ryan H. Kingma, P.E.
kgm:WGCC-GRC.RHK

WHIDBEY GOLF AND COUNTRY CLUB
1411 W. Fairway Lane
Oak Harbor, WA 19277

April 22, 1997

Mr. Ryan Kingma
Fakkema and Kingma Inc.
4086 400th Ave. West
Oak Harbor, WA 98277

Dear Mr. Kingma:

The Whidbey Golf and Country Club (Club) wishes to modify and amplify the letter to you of February 19, 1997 based upon your letter of April 3, 1997 and meetings with Greg Cane. This letter does not replace our February letter since it deals with only a few aspects of the Golf Course Drainage Basin Stormwater Mitigation Study.

Third paragraph on page 4.

We prefer that the culverts under the four cart paths be replaced by larger culverts, or more than one culvert, as appropriate, rather than by bridges. The required flow can be achieved with lower initial cost as well as lower maintenance costs. We also suggest that a berm be placed on the north side of fairway 17 pond to accommodate more water, particularly since water from fairway 16 lots, plus a couple of lots along fairway 3, will flow directly to this pond, avoiding Loers Pond.

Additionally, the revised draft should provide the specifics of the ditching discussed at the April 7 meeting along fairways 16, 3 and 4 leading to fairway 17 pond.

Sixth paragraph on page 4

Your revised proposal for Loers Pond will likely be acceptable when we see it in the revised draft. Greg Cane's discussion with us on April 7 was very helpful. It would be useful if the drawing "Proposed Changes To Loers Pond" also provided the location of the swale to the west of fairway 4, the lengthening of the berm near the ladies' tee and the entry pipe to Loers Pond near this location. We also discussed the possible need for additional berming at the Northeast corner of the pond based on a detailed evaluation of the Pond's contours as well as the critical importance of the capacity of Loers Pond.

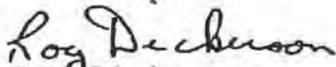
We believe the water exiting the Swantown Estates retention pond would be best handled by the installation of a pipe from the exit point directly to fairway 8 pond. This pipe with an enlargement of the existing gravity pipe between fairway 8 pond and fairway 10 pond, and the dredging of both fairway 10/18 and 13 ponds, will provide an adequate pathway for this significant volume of water. In so doing it will also protect the road to, and the area around, the new sewer lift station.

Fifth paragraph on page 3

Now that Homestead Northwest has agreed to do the proposed improvements identified as eight and nine in the study, as well as work on the Fakkema Farm ditch, as a trade-off for the Study sponsors assuming responsibility for the N6 area stormwater and since the Club is doing a portion of proposed improvement ten, we suggest the revised draft reflect these actions. In this regard, the cost to the club of the Swantown Road crossing should remain as a cost to be reimbursed by the Study sponsors.

We hope these comments and suggestions are helpful to you in developing the revised draft of the Study. Please feel free to contact me with any questions or comments.

Sincerely,


Roy Dickerson
President

CC: Mr. Roy Allen, Island County Engineer
Mr. Richard Fakkema
Mr. Robert Fakkema
Mr. Ryan Goodman, City Engineer, City of Oak Harbor

COMMENTS FROM TELEPHONE CONVERSATION

JUNE 20, 1997

WGCC drainage committee in general is dissatisfied with the level of detail provided in the study.

Some areas of concern included the need for more information regarding the volume of Loers' Pond, the berm and swale proposed for the northwest corner of Loers' Pond, the drainage facilities and discharge locations for the proposed housing in the southeast corner of N5, and the method of transmitting water from N6 detention pond to Pond 8.

Response of Author:

It is critical in the design phase that improvements described in this study be evaluated in detail. The author feels that a prudent conservatism has been incorporated into the study (e.g. significantly increasing impervious area in the postdevelopment model for S1 and determining that Loers' Pond has a storage volume capacity in excess of that required to control the 100 year - 24 hour storm) so that "surprises" during the design phase will not nullify the core findings of this study. The study incorporates a level of detail comparable to studies of this type and should be taken as a first (major) step.

Further coordination will be required between the project proponents and WGCC members to come to agreement allowing the use of golf course facilities for stormwater control. A discussion of these details herein is beyond the scope of this study.

August 4, 1997

Mr. Ryan Kingma
Fakkema and Kingma Inc.
4086 400th Ave. West
Oak Harbor, WA 98277

Dear Mr. Kingma:

After a Stormwater Committee meeting and discussions with Ryan Goodman, City of Oak Harbor, we continue to believe there are several significant deficiencies in the July draft of the Golf Course Drainage Basin Stormwater Mitigation Study.

Until these deficiencies, listed below, are appropriately dealt with, we believe it makes little sense to further consider other matters in the draft report.

1. Page 24 - N8 - The Study offers no conceptual plan for the drainage of this stormwater other than it will go to Loers Pond.

In our proposal, the existing ditch or a swale or drain along the boundary continues to drain the stormwater from 8a entering the ditch to fairway 17 pond north of fairway 3 green - as it does currently.

2. Page 24 - N6 - We recommended that the "routed to N5" be identified as a pipe from the detention pond to fairway 8 pond. We believe this is the proper way to handle this increasing flow of stormwater rather than to let it simply flow across the Golf Course and its maintenance road until it reaches fairway 8 pond.
3. Page 24 - N5 - What is the conceptual plan for stormwater drainage for the approximately 20 duplex units?
4. Page 25 - It should be noted that the run-off from N2 and N3 has been handled by an agreement dated January 29, 1997 wherein the Club agreed to take the water from the detention pond on a short term temporary basis and provided that this stormwater be included in the mitigation of the Study proponents. The Club and Homestead are currently incurring expenditures to move the proponent stormwater by drainage pipe from Swantown Road through Fairway Lane to the exit ditch.
5. Page 27 states "Raise level of pond berm approximately 10" to provide needed freeboard at full pond conditions." We suggest adding "at the two low areas" to be consistent with page 45 and our latest understanding of your proposal.

6. Page 29 - In the last sentence in the first paragraph of the section "Downstream and West Beach Improvements", it appears that Homestead Northwest, Inc. is now one of the project's proponents. Is this true?

We understand the field west of the south end of the exit ditch will have additional soil added to raise its level.

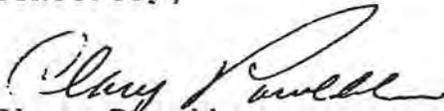
We hope we have again made clear our concerns. In this regard, please see page 59 of the July draft.

Please feel free to contact me with any questions or comments.

If these concerns are adequately addressed, I feel the Committee is prepared to move ahead.

We look forward to your response.

Sincerely,



Clary Powell
President

CC: Mr. Roy Allen, Island County Engineer
Mr. Richard Fakkema
Mr. Robert Fakkema
Mr. Ryan Goodman, City Engineer, City of Oak Harbor

Appendix F
“2007 Update”
Golf Course Drainage Basin
North Basin Build-Out Stormwater Evaluation
published in 2007

GOLF COURSE DRAINAGE BASIN

NORTH BASIN BUILD-OUT — STORMWATER EVALUATION

Background

In September 2005, the stormwater model initially prepared for the 1997 Golf Course Drainage Basin – Stormwater Mitigation Study was updated by Thomas Cleverdon, P.E., to reflect most constructed facilities resulting from the Study's recommend capital improvements.¹ As with the 1997 Study, this "archive" model-run evaluated the 100-year, 24-hour storm event for impervious surface areas calculated for the Study's design year (2016). Also, as with the 1997 model, the large southerly Sub-basin "S1" was modeled with two times the impervious surface determined at the time of the Study. This decision relative to S1 impervious area was initially made to apply a degree of conservatism to the Study, and a factor of safety to its recommended facility upgrades. The Build-out analysis discussed herein leaves in place this conservative assumption.

Build-Out Stormwater Model

This model was prepared in order to accompany a request for the establishment of a latecomers' agreement for cost recovery for capital improvements in the north portion of the Golf Course Basin. The recovery period for a latecomers' agreement is 15 years. It is therefore necessary to reflect, by analysis, a long-term adequate capacity of the stormwater system improvements for the proposed cost recovery period. The purpose of this model, therefore, was to adjust the program's input parameters in order to represent a situation that reflected "worst-case" conditions at the end of the latecomers' period. To be safe, the north sub-basins (n1 through n10) were evaluated for build-out density and impervious surface area, as reflected in Table I.

¹ Constructed improvements that affected only the sub-basins were not necessarily modeled in this update.

Model Results

As described in greater detail in the 1997 Study, runoff characteristics of the Golf Course Basin are strongly influenced by the 1,700 acre sub-basin S1. This sub-basin's size and attenuated hydrograph have a considerable impact on the runoff characteristics within the main conveyances in the northerly sub-basins. This overarching influence continues to be evident in the build-out condition. Figure 1 is a snapshot of model results of the 2005 archive and the build-out runs. As reflected therein, runoff parameters are little influenced by the increased impervious surface.

Two exceptions are as follows:

- The runoff peak for Sub-basin n4 is significantly higher than in the archived run (increased from 26.2 cfs to 38.2 cfs). As with any stormwater model, sub-basin hydrographs are added at the downstream end of the sub-basin. The impact of this convention is that runoff from n4 is not routed through the Perimeter Ditch and associated culverts. It therefore becomes necessary to manually check the conveyance capacity of this section of the Golf Course Basin by adding the n4 hydrograph to the Loers' discharge hydrograph. This, in essence, adds the n4 runoff at the upper end of the Perimeter ditch and provides a good check of the capacity of all the elements along the ditch length. Figure 2 reflects these two hydrographs individually, and combined. As shown therein, the first combined peak occurs at 9 hours after the start of the storm event. This peak coincides with the n4 hydrograph peak and reflects a total runoff rate of 41.6 cfs. The second peak occurs at 33 hours, reflects a runoff rate of 61.1 cfs and is a result of the sub-basin S1 hydrograph.

This analysis reflects a conservative assumption that n4 will enter the perimeter ditch at its upper reach. Even with this conservative assumption, the predicted peak of the

combined hydrographs is negligibly (0.5%) greater than the Loers' discharge hydrograph alone.

Given the size of n4, the runoff will enter the Perimeter Ditch at multiple locations. During the planning for future development, the engineer will be required to size the conveyances from a given project to the Perimeter Ditch.²

- The other area which will experience a significant increase in runoff in the build-out condition is sub-basin n8. This analysis evaluates an increase in impervious surface from 16.9 acres to 36.9 acres and an associated increase in peak runoff from 12.8 cfs to 18.3 cfs.

Sub-basin n8 is routed through Loers Pond. The calculated maximum water surface level for Loers Pond (Figure 1) is unchanged between the 2005 Archive model and the Build-out model. This increased discharge from n8, therefore, does not notably impact the operation of this detention structure during the analyzed storm event.

Summary and Conclusions

The model discussed herein is significantly conservative for the purpose of checking available stormwater system capacity during the latecomers' recovery period. The conservative assumptions employed in this analysis are as follows:

- Sub-basin S1 is modeled with a more impervious surface than is anticipated for this area.
- The Build-out impervious surface modeled herein is larger than the impervious surface that is predicted to be constructed during the 15 year latecomers' period.

² To get a feel for the magnitude of required improvements, it is instructive to look at the size of conveyance(s) required to carry a peak discharge of 38.2 cfs. This flow rate can typically be handled by 2 - 24 inch culverts

With the conservative assumptions made herein, this analysis reflects that the stormwater capacity of the constructed capital facilities is greater than that which would be required during the latecomers' period. It would therefore follow that landowners, which are included in the latecomers' recovery area, could reasonably expect to receive value for their latecomer fee in the form of adequately sized stormwater capacity in the Golf Course Basin.

Two notes:

- 1) This model conservatively estimates the runoff during the time period discussed, and serves the purpose of verifying the capacity of constructed improvements. It does not represent an up-to-date model in all respects. As with any planning tool, the model will require further updating (including calibration) in order to address changes within the individual sub-basin areas.
- 2) The 1997 Study recommended a change in the water surface level of Loers Pond during the wet and dry seasons. It is important to be cognizant of this requirement, and to perform this seasonal adjustment, in order to safely mitigate large rainfall events.

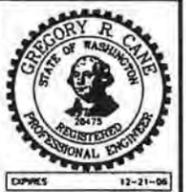
TABLE I						
Build-Out Model - Impervious Surface - North Sub-Basins						
Sub-Basin	1997 Report Description	Total Area (Acres)	1997 Report Impervious (Acres)	Build-out Impervious (Acres)	Build-Out Model Assumptions Density (Gross Impervious)	Notes
n1	Twenty (20) new homes from background growth are estimated for sub-basin N1. Run-off will continue to drain toward the exit ditch.	22.9	6.0	8.7	3.5 DU/ Ac (38%)	
n2	It is estimated that background growth will add 15 new homes to this area. Run-off will be diverted to the exit ditch.	8.2	1.6	3.1	3.5 DU/ Ac (38%)	
n3	The construction of additional single family units within this sub-basin will increase impervious surface from 5.8 acres to approximately 19.1 acres. Given the existence of large individual lots within the sub-basin, average density at buildout is estimated to be 2.5 units/acre. Nearly all of the additional houses are part of planned developments. Run off from N3 will be directed to the Exit Ditch.	64.4	19.1	21.9	3.0 DU/ Ac (34%)	
n4	An estimated total of 91 additional homes are analyzed in the postdevelopment condition. Forty-seven (47) of these homes are to be located within proposed developments with the remainder resulting from the background growth rate. N4 will continue to drain to the Perimeter Ditch.	196.5	20.0	66.8	3.0 DU/ Ac (34%)	
n5	Approximately 20 duplex units (40 homes) are planned for the southeast corner of N5. Some additional impervious surface has been factored into the analysis to account for expansion to WGCC facilities. Run-off from this increase in impervious surface will continue to flow toward the Golf Course.	125	22.4	27.4		Increased by 5 acres
n6	... approximately 230 single family homes will be constructed in this subbasin. Runoff will be directed through a 5.5 Acre-Feet detention pond in order to reduce peak rate of discharge, and then routed to N5.	68.5	27.5	27.5		No Change - Currently at 40% impervious.
n7a	This sub-basin consists of the N7 area that will continue to drain to the golf course. Proposed development includes the construction of 10 duplexes and approximately 17 single family units within the sub-basin.	44	15.7	16.7	3.5 DU/ Ac (38%)	
n7b	Residential development within the sub-basin is proposed at a 3.5 unit/acre density. Runoff will be diverted to Loers' Pond.	23.7	8.3	9	3.5 DU/ Ac (38%)	
n8	A portion of a proposed residential subdivision will lie within the eastern part of N8. Based on the owner's plans and an estimate of growth from background development, the run-off impacts from a total of 24 units were analyzed. Presently a portion of N8 drains to the Perimeter Ditch. The postdevelopment condition will route all run-off to Loers Pond.	89.1	16.9	36.9		Loers Pond= 10 Acres Impervious. Remaining 79.1 Acres at 3.0 DU/ Ac
n9	Change was made in run-off parameters from the predevelopment conditions. As with N10, sub-basin discharge will be intercepted and directed to Loers' Pond. No change in the N9 pond elevation is planned.	7.5	1.3	2.9	3.5 DU/ Ac (38%)	
n10	Based on the conceptual plans of the owner, this sub-basin is anticipated for development at a density of 3.5 single family units per acre, or approximately 85 homes. Run-off will be intercepted and directed to Loers Pond	24.3	9.0	9.2	3.5 DU/ Ac (38%)	



BUILD-OUT MODEL

RUNOFF CHARACTERISTICS	MODEL RESULTS	
	2005 ARCHIVE MODEL	BUILD-OUT
(A) LOER'S POND-MAXIMUM WATER SURFACE ELEVATION	207.5 FT.	207.5 FT.
(B) 48 IN. CULVERT-% FULL	72%	73%
(C) EXIT DITCH-MAXIMUM DISCHARGE	67 CFS	68 CFS
(D) FAIRWAY 10 POND-MAXIMUM WATER SURFACE ELEVATION	170.2 FT.	170.2 FT.
(E) LOER'S POND-MAXIMUM DISCHARGE	60.8 CFS	61.1 CFS
(F) SUB-BASIN N4-PEAK RUNOFF	26.2 CFS	38.2 CFS
(G) SUB-BASIN N8-PEAK RUNOFF	12.8 CFS	18.3 CFS
(H) LOER'S INLET-PEAK FLOW RATE	70.0 CFS	70.2 CFS
(I) DITCH - NORTH SIDE OF FAIRWAY LANE-FLOW DEPTH	1.7 FT.	1.8 FT.
(J) PERIMETER DITCH-FLOW DEPTH	1.1 FT.	1.1 FT.

Cane Engineering
 Tel: 360-279-0615
 Fax: 360-679-5046
 925 East Doyle
 Oak Harbor, WA 98277
 Email: greg@caneengineering.com



NO.	DATE	DESCRIPTION

GOLF COURSE BASIN
 COST RECOVERY
 BUILD-OUT MODEL RESULTS

PLAT: CE-INCL-CTR	DES: GRC
SCALE: AS SHOWN	DRW: KJB
DATE: 12-04-2006	CHK:
PROJ. NO.: 04-05-T01	CHK:
DRAWING NO.:	
SHEET 1 OF 1	

Figure 1

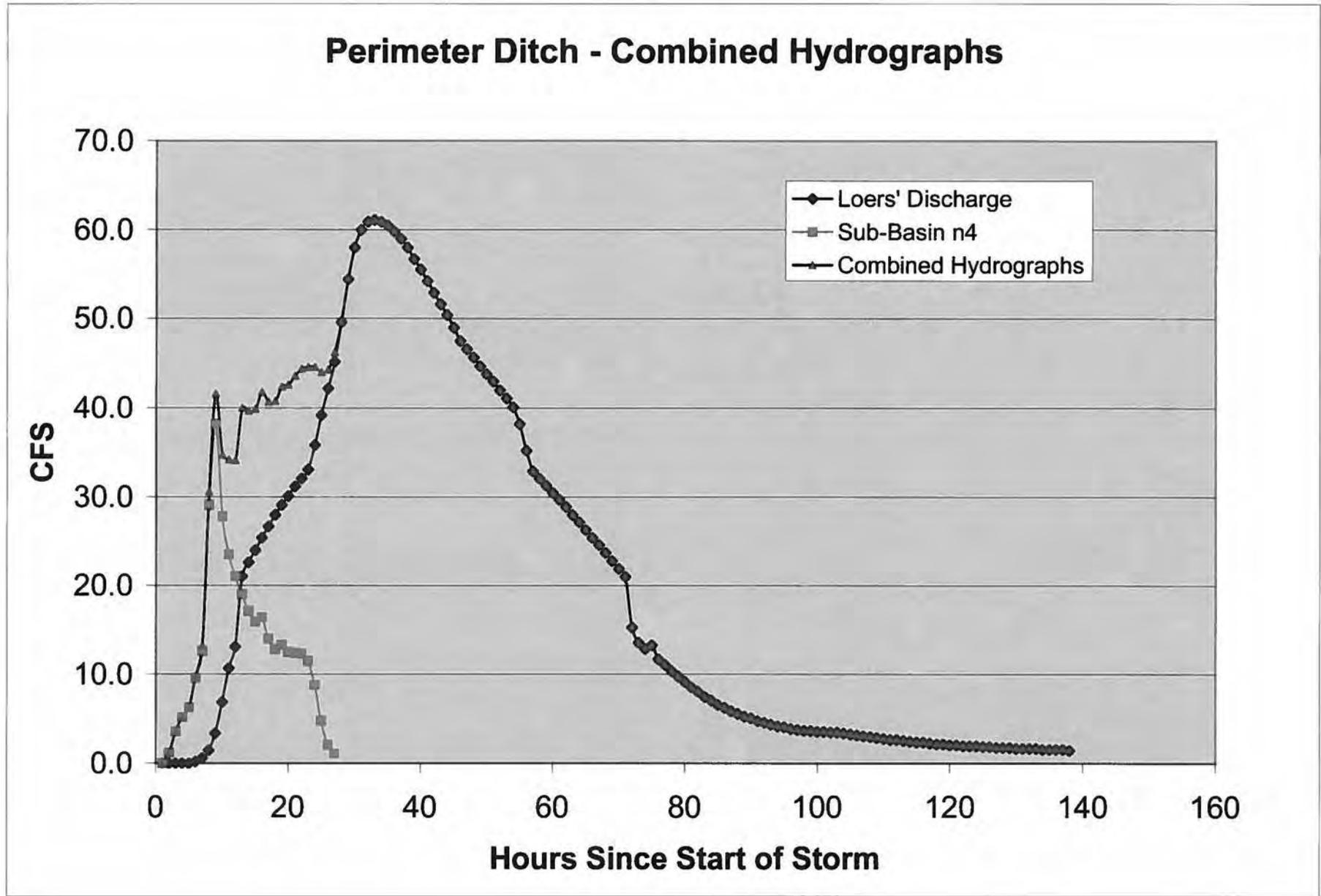


Figure 2

Appendix G
“2002 Drainage Agreement”
Basin Study Agreement between the City of Oak Harbor, Island County and the
Whidbey Golf Course



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Page: 1 of 18
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ISLAND COUNTY AUDITOR

AGR

RETURN TO: City of Oak Harbor
865 SE Barrington Drive
Oak Harbor, WA 98277
Attn: Rosemary Morrison

DRAINAGE AGREEMENT

THIS Drainage Agreement, is entered into this 14 day of March, 2002, by and between the following parties; Island County, hereinafter referred to as "County"; the City of Oak Harbor, hereinafter referred to as the "City"; and Whidbey Golf & Country Club, a Washington non-profit corporation, hereinafter referred to as "Golf Club"; PTN Portion NE SW 4-32-1E; See Attachment B for full legal; Assessor parcel no. R13204-262-2721;

WHEREAS in the City and County, surface water from Waterloo and Swantown drainage basins, in Section 4, Township 32 North, Range 2 East, W.M., Island County, Washington flow onto Golf Club property through culverts under Fort Nugent Road and from other areas within the Swantown Basin;

WHEREAS, the Golf Club property has, during periods of intense rainfall, the potential to receive a large volume of water runoff; and

WHEREAS, during peak drainage periods the water could possibly overwhelm and impede the capacity of the Golf Club drainage system causing flooding and associated nuisances on and in the vicinity of the Golf Club property; and

WHEREAS, the parties hereto are desirous of entering into an agreement to establish drainage system operation and maintenance responsibilities to assure fair and reliable system performance; and

WHEREAS, the Golf Club has previously entered into a memorandum of understanding regarding drainage with certain property owners regarding system improvements, attached to this agreement as Attachment C; and

WHEREAS, most system capital and maintenance needs have been identified in a study entitled "Golf Course Drainage Basin Stormwater Mitigation Study" by Fakkema and Kingma, dated August, 1997, hereinafter referred to as the Study; and

WHEREAS, the City has established a stormwater utility with the purpose of providing reliable storm system operation and maintenance, and recent development and annexations contribute or will contribute runoff that affects the Golf Club system; and

WHEREAS, pursuant to Chapter 36.89 RCW, the use of County funds for the purpose of installing stormwater control facilities within such County is declared to be a County purpose; and

WHEREAS, the Golf Club has established a program for managing and controlling stormwater runoff and provisions for irrigation on the Golf Club property; and

WHEREAS, the Golf Club desires to continue to operate this system in its best interest; and

WHEREAS, in consideration of the mutual and valuable benefits to be derived by the parties pursuant to this agreement;

WITNESSETH: It is hereby agreed by and among the parties; the City, the County, and the Golf Club, as follows:

1. The Golf Club agrees to the following:
 - a. Assume responsibility for the operation and maintenance of the stormwater control and conveyance system as outlined on Attachment A and as shown in the Study within the property of the Golf Club, identified as Property A in Attachment B; when obtained, the ditch easement near Fairway Lane, identified as Property B in Attachment B; and when obtained, the exit ditch easement through Beachview Farm and other properties until it reaches the County property at Lake Swantown, identified as property C in Attachment B.
 - b. Use all City and County monetary contributions solely for the purposes stated in 1.a above, including maintenance and future replacement of the 2,500 GPM stormwater pump.
 - c. Provide annual operating and maintenance expenses for City and County review and record keeping by February 15 of each succeeding year.
 - d. Comply with current standards for stormwater quality and best management practices, in managing properties described in 1.a. above, as identified in the current Department of Ecology Technical Manual as adopted by the City and County.
 - e. Use good faith efforts to obtain drainage easements of a variable width for the benefit of, and at no cost to the County as required to provide maintenance access to the drainage system within lots 28-34 of the plat

of Whidbey Country Club Estates, Division #1, and the properties within Beachview Farms, from Fairway Lane, where it meets fairway fifteen of the Golf Club, to Lake Swantown identified as Property B and C in Attachment B.

- f. That total reimbursements sought for operation and maintenance of the system described in 1.a. shall not exceed \$10,000 annually without written authorization of the parties.

2. The City agrees to the following:

- a. Coordinate proposed development under City jurisdiction within this basin and drainage improvements as identified within the study.
- b. Reimburse the Golf Club a proportionate share of maintenance and operation costs defined in Attachment A of this agreement. Reimbursement shall be made annually by April 1 based upon the previous year's expenses. This reimbursement shall be the City's only responsibility in the operation and maintenance of the drainage system between Fort Nugent Road and the County's property known as Lake Swantown.
- c. As new development occurs and mitigation measures are required:
 - (1) Inform the Golf Club of any proposed development activity that requires a permit and could affect storm water runoff; and give the Golf Club notice of proposed mitigation measures;
 - (2) Proposed mitigation measures may include improvements on Golf Club property if the Golf Club approves; and
 - (3) The purposes for such measures, if required, should include protection of Golf Club property.
- d. City crews will be available on an emergency basis in consideration of other citywide emergency situations, and assistance will be rendered based upon priorities established by the City. Labor and materials shall be reimbursable to the City or credited to the annual payment as agreed upon by the parties.
- e. Refund the Golf Club for the operation and maintenance portion of the storm water utility fee paid. Such refund shall be paid by April 1 along with the amount identified in 2.b., above, or in another manner acceptable to the Golf Club.

3. The County agrees to the following:

- a. Coordinate proposed development under County jurisdiction within this basin and drainage improvements as identified within the study.
- b. Reimburse the Golf Club a proportionate share of maintenance and operation costs defined in Attachment A of this agreement.

Reimbursement shall be made annually by April 1 based upon the previous year's expenses. This reimbursement shall be the County's only responsibility for the drainage system from Fort Nugent Road to Lake Swantown.

- c. As new development occurs and mitigation measures are required:
 - (1) Inform the Golf Club of any proposed development activity that requires a permit and could affect storm water runoff; and give the Golf Club notice of proposed mitigation measures;
 - (2) Proposed mitigation measures may include improvements on Golf Club property if the Golf Club approves; and
 - (3) The purposes for such measures, if required, should include protection of Golf Club property.
 - d. County crews will be available on an emergency basis in consideration of other countywide emergency situations, and assistance will be rendered based upon priorities established by the County. Labor and materials shall be reimbursable to the County or credited to the annual payment as agreed upon by the parties.
 - e. Accept the public easements obtained by the Golf Club described in 1.e. above.
4. Except for any action, claim, demand, liability, loss or damage arising out of negligent acts or omissions of the City and/or County, their agents or employees, Golf Club, for itself, its heirs, executors, administrators, successors and assigns, jointly and severally, does hereby agree to and does hereby release the City and/or County, their officials, agents, employees, and contractors and does hereby remise and relinquish to them all actions or causes of action, claims, demands, liabilities, loss, damage or expense of whatsoever kind or nature including attorney's fees, which said Golf Club has sustained or shall at any time sustain or incur by reason or in consequence of any work done or which should be done on that portion of the drainage system to be constructed, operated and/or maintained by the Golf Club.
 5. It is mutually understood and agreed by the parties hereto that the Golf Club is in no sense an agent of or employed by the City or County, shall not represent itself as such, and have no authority to bind the City and/or County to any such agreement or act as agents of the City and/or County in any way.
 6. It is agreed that any amendment, modifications, or changes to this agreement must be in writing and approved by all parties to this agreement.
 7. This agreement shall take effect upon its execution by Whidbey Golf & Country Club, the City of Oak Harbor and the Board of County Commissioners of Island County, Washington and shall have a term of twenty (20) years. Prior to the

completion of the term, the parties agree to renegotiate in good faith an extension of this agreement.

- 8. Attachment A shall be reviewed and amended annually by July 15 of each year specifically for City and County pro-rata share cost adjustments, due to factors such as land use, annexation, environmental laws and other unspecified impacts. Amendments to Attachment A will become effective for the following calendar year.

IN WITNESS THEREOF, the parties have caused this agreement to be executed this 20th day of February, 2002.

Whidbey Golf & Country Club, a Washington non-profit corporation

Vicki Boltz
Vicki Boltz, President

Board of County Commissioners
Island County, Washington

Mike Shelton 2/25/02
Mike Shelton, Chairman

Lois Rothe
Lois Rothe, Secretary *L m r*

William F. Thorn 2/25/02
William F. Thorn, Member

(acknowledgement attached)

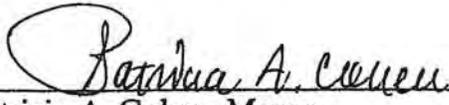
Wm. L. McDowell 2/25/02
Wm. L. McDowell, Member

Attest:

Elaine Marlow
Elaine Marlow, Clerk of the Board

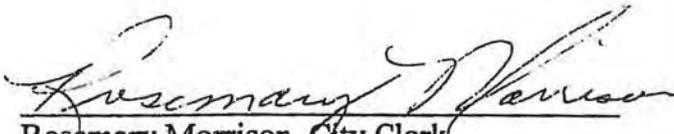


City of Oak Harbor:



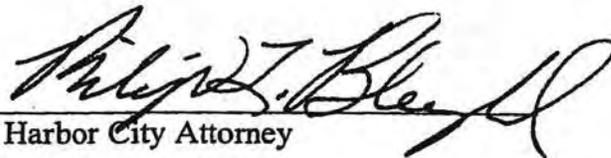
Patricia A. Cohen, Mayor

Attest:



Rosemary Morrison, City Clerk

Approved as to form:



Oak Harbor City Attorney

STATE OF WASHINGTON)
) ss:
COUNTY OF ISLAND)

THIS IS TO CERTIFY that on this 20th day of Feb., 2002, before me, the undersigned, a notary public in and for the State of Washington, duly commissioned and sworn, personally appeared Vicky Boltz, to me known to be President of Whidbey Golf and Country Club, the corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation for the uses and purposes therein mentioned, and on oath stated that said individual was authorized to execute said instrument.

WITNESS my hand and official seal the day and year in this certificate first above written.

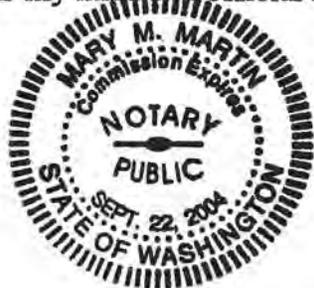


MARY M. MARTIN
Mary M. Martin
Notary Public in and for the State of Washington, Island County.
Commission expires: 09/22/04

STATE OF WASHINGTON)
) ss:
COUNTY OF ISLAND)

THIS IS TO CERTIFY that on this 20th day of Feb., 2002, before me, the undersigned, a notary public in and for the State of Washington, duly commissioned and sworn, personally appeared Lois Rothe, to me known to be Secretary of Whidbey Golf and Country Club, the corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation for the uses and purposes therein mentioned, and on oath stated that said individual was authorized to execute said instrument.

WITNESS my hand and official seal the day and year in this certificate first above written.



MARY M. MARTIN
Mary M. Martin
Notary Public in and for the State of Washington, Island County.
Commission expires: 09/22/04

Drainage Agreement
Whidbey Golf & Country Club
Page 7 of 7

ATTACHMENT A

Anticipated Golf Club Operating and Maintenance Items
and Estimated Normal Costs

Golf Club Property – Annual

Mowing, weeding and spraying of grass lined ditches	\$ 500
Clearing, trimming and pruning of trees and bushes of other ditches	500
Inspection of ditches and other facilities, including adjacent areas	200
Electric power for pump	400
Other – including pump setup, maintenance and repair, valve control and maintenance; and tractor (pump) maintenance	<u>250</u>
	<u>\$1,850</u>

Pump replacement - \$45,000 pump with a 10 year life span.

Other than Golf Club Property

Cleaning of Fairway Lane ditch and the Beachview Farm ditch every two years or as needed	\$4000-5000
--	-------------

Total annual estimated range of costs \$1,850-\$6,850

The type of cost incurred is limited to those listed above unless otherwise agreed upon by the parties in writing.

Proportional Reimbursement Formula

Based upon actual Golf Club operating and maintenance costs submitted in detail in a form acceptable to the City, by the Golf Club by February 15 of the year following expenditures the City and County will reimburse the Golf Club by April 1 of that same year based on the following: 34% County; 56% City; 10% Golf Club.

The formula determining City and County cost allocation is based upon calculated flows taken from the "Golf Course Drainage Basin Stormwater Mitigation Study", July 1997, by Fakkema & Kingma, Inc. The formula is based upon predicted stormwater volume increases in the "Golf Course Drainage Basin Summary of Runoff Volumes" as shown in the study attached; City stormwater post development flows expressed as a percentage of the total being the responsibility of the City; and the remainder the responsibility of the County. The Golf Club responsibility shall be held at 10% in recognition of their administrative responsibilities and cooperative efforts.

It is understood that existing conditions at the time of the study are to be considered the baseline for this calculation; that existing flows from basin S1 are not to be used in calculating cost distribution without mutual consent.

Drainage Agreement
Whidbey Golf & Country Club
Attachment A
Page 1 of 2

ATTACHMENT A

Percentages by Contributing Flow

GOLF COURSE DRAINAGE BASIN
SUMMARY OF RUNOFF VOLUMES

1. Contributing Flows

<u>County</u>	<u>City</u>	<u>Golf Club</u>	<u>Total</u>
146.3	35.4	11.0 cfs (n5)	65.5 cfs
-126.2 (S1)	-3.4 (S1)		
20.1 cfs	+2.4 (n5)		
	34.4 cfs		

Basin	Pre-Development Runoff Volume (AF)		Estimated Volumes by Jurisdiction (AF)			
	25 Year	100 Year	City		County	
			25 Year	100 Year	25 Year	100 Year
n1	1.9	3.1	0	0	1.9	3.1
n2	0.5	0.8	0	0	0.5	0.8
n3	4.6	7.5	3.5	5.8	1.1	1.7
n4	14.1	23.2	4.4	7.2	9.7	16.0
n5	13.7	20.6	13.4	20.1	0.3	0.5
n6	0.8	2.0	0.8	2.0	0	0
n7	7.4	10.5	7.4	10.5	0	0
n8a	6.2	9.7	0	0	6.2	9.7
n8b	0.8	1.5	0.4	0.7	0.4	0.8
n9	0.7	1.1	0.7	1.1	0	0
n10	1.4	2.4	1.4	2.4	0	0
S1	129.6	203.3	3.4	5.3	126.2	198.0
Totals	181.7	285.7	35.4	55.1	146.3	230.6

2. Percentage by agency:

<u>County</u>	<u>City</u>	<u>Golf Club</u>
$\frac{20.1}{65.5} = 30.7\%$	$\frac{34.4}{65.5} = 52.5\%$	$\frac{11}{65.5} = 16.8\%$

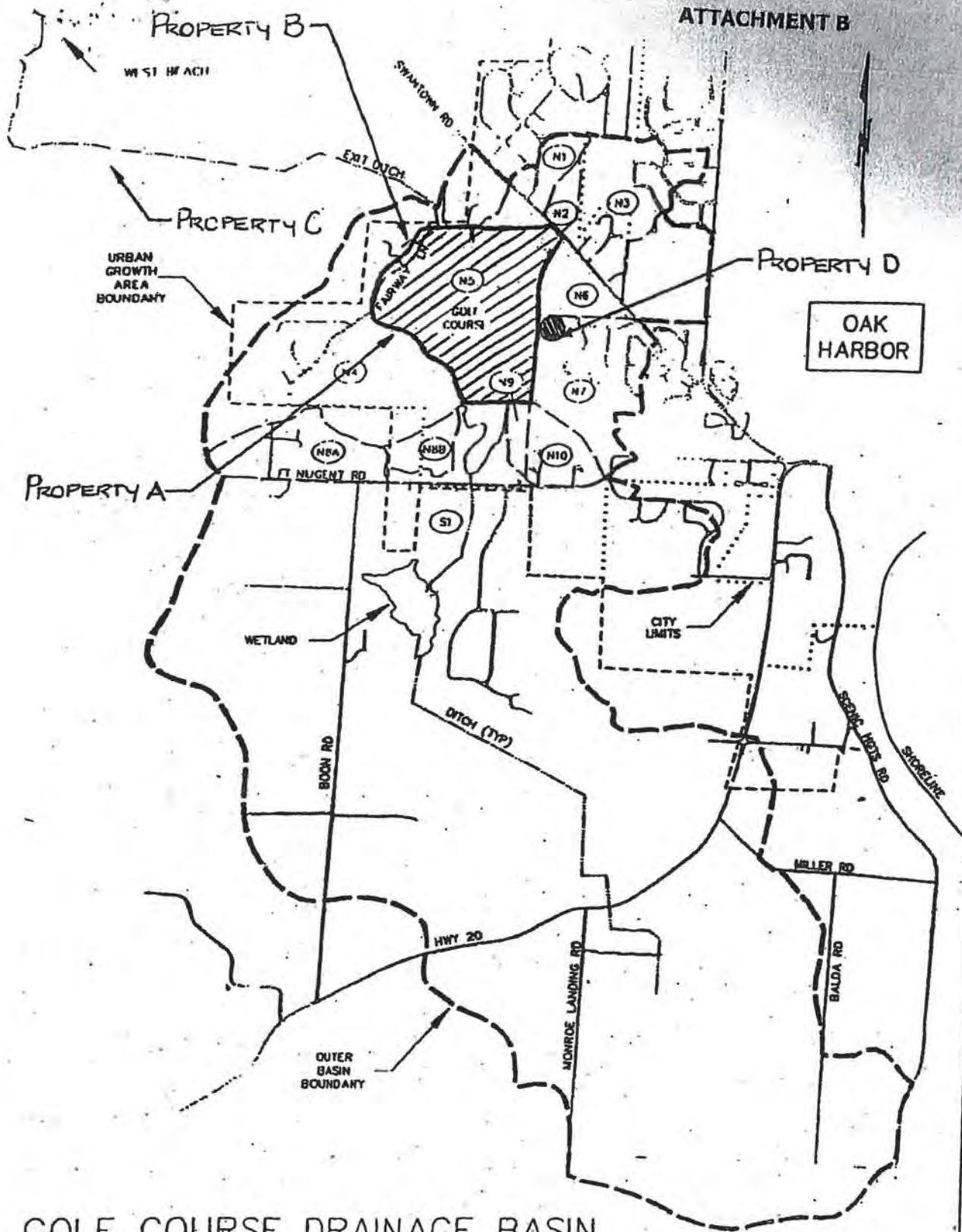
n5 detail

Total area = 125 ac Total Flow
 City 22/125 = 18% x 13.4 = 2.4
 County 103/125 = 82% x 13.4 = 11.0

Drainage Agreement
 Whidbey Golf & Country Club
 Attachment A
 Page 2 of 2

ATTACHMENT B
LAND DESCRIPTION

- **PROPERTY A - Golf Club**
 - 1. Included in the Golf Club property is a 2,500 GPM stormwater pump with connection to the exit ditch on Beachview Farm
- **PROPERTY B - Fairway Lane**
- **PROPERTY C - Lake Swantown**
- **PROPERTY D - Swantown Ridge Detention Pond**



GOLF COURSE DRAINAGE BASIN

FIGURE 1

PROPERTY A
 EXHIBIT A
 Page 1

Assessor's parcel no. S8410-00-0000A-0 & S8410-02-0000B-0
 That portion of Section 4, Township 22 North, Range 1 East, W.H., described as follows:

Beginning at the Southeastern corner of Lot 44 of the Plat of Whidbey Country Club Estates, Division No. 2, as per Plat recorded in Volume 9 of Plats, Page 59, Records of Island County, Washington; thence
 South 31° 10' 00" West along the Southwesterly extension of the Southeasterly boundary of said Lot 44 a distance of 105.00 feet; thence
 South 65° 06' 09" East 307.53 feet; thence
 South 39° 03' 36" East 245.98 feet; thence
 South 59° 24' 14" East 133.60 feet; thence
 North 81° 21' 18" East 360.00 feet; thence
 South 89° 52' 41" East parallel to the South line of the North 1/2 of the Southwest 1/4 of the aforesaid Section 4 a distance of 795.00 feet; thence
 South 30° 24' 36" East 190.00 feet; thence
 South 00° 46' 10" West parallel to the West line of the Southwest 1/4 of the Southeast 1/4 of the aforesaid Section 4 a distance of 1387.60 feet to the Northerly margin of the Fort Nugent Road; thence
 South 89° 49' 22" East along said Northerly margin a distance of 507.82 feet to the West line of the East 1/2 of the East 1/2 of the Southwest 1/4 of the Southeast 1/4 of said Section 4; thence
 North 00° 38' 29" East 1301.94 feet to the Northwest corner of the aforesaid East 1/2; thence
 North 00° 38' 29" East 80.00 feet; thence
 North 40° 35' 04" West 681.35 feet; thence
 North 33° 43' 42" East 698.35 feet; thence
 South 09° 24' 04" East 400.00 feet to the East line of the Northwest 1/4 of the Southeast 1/4 of said Section 4; thence
 North 00° 35' 56" East 147.26 feet to the Northeast corner of the said Northwest 1/4 of the Southeast 1/4; thence
 North 00° 42' 19" East along the East line of the Southwest 1/4 of the Northeast 1/4 of said Section 4 a distance of 725.02 feet; thence
 North 29° 48' 06" East to the Southwesterly margin of Seamount Road; thence
 Northwesterly - - - along said Southwesterly margin to the Southerly margin of Fairway Lane, as shown on the Plat of Whidbey Country Club Estates, Division No. 1, as per Plat recorded in Volume 7 of Plats, Page 65, Records of Island County, Washington; thence
 South 87° 34' 37" West along said Southerly margin to the Northeasterly corner of Lot 1 of said Plat; thence

10-11-1

PROPERTY A

EXHIBIT A

Page 2

Southerly and Westerly along the boundary of said Plat the following courses and distances:

- South 02° 25' 23" East 125.00 feet; thence
- South 87° 35' 37" West 560.09 feet; thence
- South 46° 20' 00" East 327.07 feet; thence
- South 87° 35' 37" West 45.00 feet; thence
- North 17° 30' 00" East 477.74 feet; thence
- North 89° 52' 47" West 161.12 feet; thence
- South 00° 07' 13" West 125.00 feet; thence
- South 79° 04' 00" West 133.03 feet; thence
- South 25° 47' 30" East 355.00 feet; thence
- South 42° 34' 05" West 234.50 feet; thence
- South 59° 20' 40" West 499.82 feet; thence
- North 34° 39' 20" East 44.26 feet to the Northeastly corner of Fairway Lane, as shown on the aforesaid Plat of Whidbey Country Club Estates, Division No. 2; thence

Southerly and Westerly along the Easterly boundary of said Plat of Whidbey Country Club Estates, Division No. 2, the following courses and distances:

- South 15° 10' 51" West 207.94 feet; thence
- South 49° 09' 20" East 171.52 feet; thence
- South 37° 40' 40" West 245.54 feet; thence
- South 47° 54' 40" West 396.24 feet; thence
- South 59° 30' 40" West 237.00 feet to the beginning of a curve to the left;

thence
 Southwesterly along said curve to the left, having a radius of 17.00 feet, through an arc of 40° 12' 40" a distance of 49.13 feet to the beginning of a curve to the left; thence
 Southerly along said curve to the left, having a radius of 105.00 feet, through an arc of 40° 45' 55" a distance of 74.69 feet; thence

South 31° 10' 00" West 67.54 feet to the Point of Beginning.

Also included in this conveyance are the following two tracts situated in Island County, Washington:

Tract A, Plat of Whidbey Country Club Estates, Div. No. 1, as recorded in Volume 7 of Plats, page 65, records of Island County, Washington; and,

Tract B, Plat of Whidbey Country Club Estates, Div. No. 2, as recorded in Volume 9 of Plats, page 59, records of Island County, Washington.

 | - 10-01
 TED D. ZYLSTRA (date)

10-11-1

10-11-1

State of Washington)
 County of ISLAND)
 I, Suzanne Sinclair, County Auditor,
 do hereby certify that the foregoing instrument is
 a true and correct copy of the document now on
 file or recorded in the office of the County Auditor.
 In witness whereof, I hereunto set my hand
 this 13th day of Oct 2016
 Suzanne Sinclair, County Auditor
 [Signature] Deputy



ATTACHMENT C

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) is the basis of an agreement between Whidbey Golf & Country Club (WG&CC) and a group of property owners who own land abutting or near to the golf course owned by WG&CC. This group consists of Reicon, Inc. (R.P. Fakkima and R.H. Kingma), K. Krieg and MK Partnership (K. Manni and K. Kreig), (Collectively referred to as the Proponents).

BACKGROUND

All parties were aware of the history of flood problems at and near the golf course and at the Beachview Farm, that land around the golf course is planned for residential development and that any such development would exacerbate existing flooding problems. The Proponents have funded a stormwater drainage study, titled "Golf Course Drainage Basin Stormwater Mitigation Study" (Study), prepared by Greg Cane, PE, of Fakkima and Kingma, Inc., which was completed in late 1997. The Study contains an analysis of existing conditions and the proposed improvements needed to correct both existing problems and the impact of further basin development, including mitigation of these impacts. The Study and associated letters provides the basis for this MOU.

The purpose of the MOU is to delineate the responsibilities of the individual Proponents regarding new development on properties whose stormwater drains to the property of the WG&CC. This MOU will be followed as soon as practical with an agreement which will incorporate the items in the MOU, detail the Proponents financing arrangement, describe the credits to the Proponents and the WG&CC associated with any additional development in the golf course basin, describe maintenance responsibilities and any other pertinent items.

As indicated above, when properties other than those of the Proponents identified herein reach the development stage, the WG&CC will work with the Proponents to accommodate late-comers or other appropriate agreements.

At the initiation of the first project identified on Schedule A, the Proponents will install the pump and discharge line identified as item 2 on Schedule A. Installation will be completed as a condition of final plat of this first project. The installation will include a new pump station, a new 12" discharge line thru Fairway Lane capable of volumes up to 3,000 gpm and containing "quick-connect" ports for additional portable pump connection as a further back-up.

PROPOSED IMPROVEMENTS

The attached list of improvements (Schedule A) is a summary of the mitigation to be completed by the Proponents as a condition to final plat approval of their development projects. Additional information can be found in the Study.

ATTACHMENT C (cont'd)

The preliminary plat for each property proposed for development will include a drainage plan as required by the City of Oak Harbor as part of the approval process. These plans will include drainage collection details and discharge paths to the various detention ponds and ditches, and will address the basin mitigation requirements. Unless specifically approved by the WG&CC, all drainage systems will be located on the Proponents' property other than covered transit lines to the WG&CC's ponds and perimeter ditch. Aesthetics are important to the WG&CC and to the Proponents and the design must take this into consideration. The Proponents agree that their respective development proposals can receive final plat approval only after completing the appropriate mitigating item or items.

The conceptual drainage plan for each project must be approved by the WG&CC based on the MOU and the agreement resulting from this MOU, and such approval shall not be withheld unreasonably. If approval is not initially granted and an agreement can not be reached, the Oak Harbor City Engineer shall act as arbitrator of the intent of this MOU. Once conceptual design is agreed upon, WG&CC will receive final construction plans for review to insure that final design conforms with conceptual design.

The attached Schedule A contains an itemized list of drainage improvements, a brief description of each improvement, the name of the responsible proponent(s) scheduled to finance the cost of the improvement, and the development or project which will trigger the improvement.

DEVELOPMENT USING THE LOERS POND AND PERIMETER DITCH SYSTEM

Work on this integrated system to be effective must be completed so that the entire system is improved. Recognizing the cost of this work, the WG&CC agrees that it can be completed in two stages. The first stage, to be completed as a condition of final plat for the first project using this system, will consist of items 3 and 4 on Schedule A. The second stage, to be completed within one year of final plat for the first project using this system, will consist of items 5 and 6 on Schedule A. The second stage could receive joint financing as several developments are associated with use of the system.

SYSTEM MAINTENANCE, GOVERNMENTAL RESPONSIBILITY

The Proponents and the WG&CC agree that the long-term maintenance of the drainage system operated by the WG&CC is essential to the basin's development. The Proponents therefore support the efforts of the WG&CC to seek a reasonable compensation from the City of Oak Harbor for the annual operation and maintenance of the stormwater drainage system in the basin including a flow measurement device at E.L. Nugent Road and the ditch to the west of Fairway Lane, not on WG&CC property, which ends at the start of the exit ditch on Beachview Farm.

ATTACHMENT C (cont'd)

The Proponents and the WG&CC also agree that the exit ditch which runs through the Beachview Farm and other private property to the road at West Beach Road and then to the Strail of Juan de Fuca must periodically maintained. The Proponents and the WG&CC hereby agree to work with Island County and the City of Oak Harbor to establish responsibility for this maintenance.

Entered into this 8 day of December, 1998.

Libby Golf & Country Club
[Signature]
Gary Powell, Vice President

[Signature]
Ryan H. Kingma, President

[Signature]
Manni, Partner

Karl & Darlyne Kreig
[Signature]
Karl Kreig III

ATTACHMENT C (cont'd)

PROPOSED IMPROVEMENTS
Golf Course Drainage Basin
Stormwater Mitigation Study
Improvement

Schedule A

Study	Responsible Proponent(s)	Trigger
1. Preparation of the Golf Course Drainage Basin Mitigation Study.	1. All Proponents	Completed
New Pumping Facility		
2. New electric pump(s) system near 13 pond and approximately 500 feet of pipe from the pump thru the existing pipe under Fairway Lane to the exit ditch.	2. All Proponents	First project initiated
Loers Pond and Perimeter Ditch System		
3. Install 170 feet of 48 inch pipe in place of existing 24 and 38 inch pipe north of Oldenburg Lane and excavate, as required, the perimeter ditch from Fairway Lane to the exit ditch (not on WG&CC property).	3. Epicon, Inc. has lead responsibility	Triggered by the first development to use the complex- either:
4. Additional culvert across Fairway Lane parallel to existing culvert for the perimeter ditch.	4. Same	a. Development associated with access to Loers Pond or to the perimeter ditch for stormwater emanating from the area adjacent to fairways 3 and 4, or
5. Raise perimeter ditch sides and excavate, as required, from Loers Pond to Fairway Lane. Replace or modify culverts at perimeter ditch crossing cart paths.	5. Same	b. Development associated with access to 17 pond or the perimeter ditch for stormwater emanating from the area adjacent to fairways 3 and 16, or
6. Replace existing Loers Pond discharge structure, including adjacent ditch enlargement, and add additional soil to the berm of Loers Pond at two locations.	6. Same	c. Development associated with access to Loers pond for stormwater emanating from the areas identified as N10 and N7b.
Townhouse Project		
7. Install approximately 500 feet of pipe running from the Homestead detention pond to 8 pond along with appropriate valves at the pond exit.	7. Nelson, Inc.	Triggered by the development of the "Townhouse" project to the east of WG&CC properties associated with the access to 8 pond. Item 6 is subject to regulatory review regarding wetlands.
8. Install approximately 450 feet of pipe from 8 pond to 10 pond.	8. Same	

Note:
The above is based on the 100 year conveyance system as identified to date. Additional or substitute improvements may be indicated by detailed engineering.

September 18, 1998

[Handwritten signatures and initials]
7

Appendix H

“2014 Agreement Letter”

Van Ness Feldman letter to Landed Gentry re “2002 Drainage Agreement”



719 Second Avenue, Suite 1150
 Seattle, WA 98104-1728
 206-623-9372
 vnf.com

June 27, 2014

Brian Gentry
 Landed Gentry Homes & Communities
 Old City Hall Building
 504 E. Fairhaven Ave.
 Burlington, WA 98233

Re: Marin Woods | Evaluation of Drainage Agreement

Dear Brian:

This letter summarizes my evaluation of the March 14, 2002, Drainage Agreement (“Drainage Agreement”) among Island County (“County”), the City of Oak Harbor (“City”), and the Whidbey Golf & Country Club (“Golf Club”) addressing plans and commitments to manage surface water drainage in the Waterloo and Swantown drainage basins including, but not limited to, parcels N-1 and N-2 (“Marin Woods”). I have reviewed the following public information which you provided:

1. March 14, 2002 Drainage Agreement
2. August 1997 Golf Course Drainage Basin Stormwater Mitigation Study (“Drainage Study”)

Based on that information, it is my opinion that development of parcels N-1 and N-2 are subject to and entitled to rely upon the stormwater management design as recommended in the Drainage Study and as established and enforced by the commitments in the Drainage Agreement. The Drainage Agreement clearly establishes mutual contract obligations and commitments regarding stormwater management for these properties. The Agreement further establishes the duration of those commitments through 2022, with the potential for a “good faith” negotiation of an additional extension beyond that date. Thus development of parcels N-1 and N-2 at this time fall within the duration and the express provisions of the Drainage Agreement.

Key provisions of the Drainage Agreement that support this conclusion include the following:

- **Agreement Section 1:** The Golf Club has assumed responsibility for operation and maintenance of the various stormwater management facilities for these drainage basins as they are described in the Drainage Study.
- **Agreement Section 2 (City) and Section 3 (County):** Stormwater utility funds are used to reimburse the Golf Club for operation and maintenance costs of the drainage improvements in the Drainage Study. Parcels N-1 and N-2 are within that City Stormwater Utility (all properties within the City limits, OHMC Chapter 12.40), have

been paying assessments to the utility, and are included in the proportionate share calculations in the Drainage Agreement.

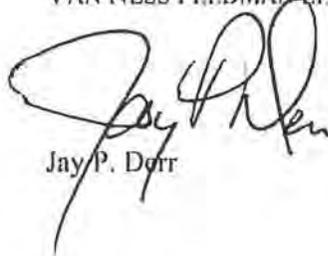
- **Agreement Sections 2 and 3:** The City and County are both obligated to “coordinate” proposed development within their respective jurisdictions in the affected drainage basins consistent with the drainage improvements identified within the Drainage Study.
- **Agreement Section 7:** Drainage Agreement duration is 20 years, plus agreement to negotiate extension in good faith.

In addition to these legal reasons why parcels N-1 and N-2 are entitled to be developed in reliance on the stormwater mitigation measures established in the Drainage Study and the Drainage Agreement, it is my understanding that the nature and timing of peak stormwater flows in these basins further support direct discharge so that the stormwater detention facility capacity is not exceeded when upstream peak flows pass through the same stormwater detention facilities. Thus, not only does the contract support this conclusion, but sound stormwater engineering practices do so as well. The 2005 Stormwater Manual, as adopted by the City in OHMC Chapter 12.30, specifically provides for drainage basin or subbasin planning to modify stormwater minimum requirements.

It is my understanding that you may choose to share this letter with the City of Oak Harbor, to assist the City in its evaluation of the Drainage Agreement and its implications for stormwater management for Marin Woods development. However, in doing so, that should not be deemed by any party as a waiver of other attorney-client communications between us regarding this issue, or any other issues related to the Marin Woods project development.

Very truly yours,

VAN NESS FELDMAN LLP



Jay P. Derr

RECEIVED

NOV 06 2015

CITY OF OAK HARBOR
Development Services Department

GTC

Gibson Traffic Consultants
2802 Wetmore Avenue
Suite 220
Everett, WA 98201
425.339.8266

Marin Woods Traffic Impact Analysis

**Prepared for: Landed Gentry Development, Inc.
Jurisdiction: City of Oak Harbor**

August 2014



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1. INTRODUCTION

Gibson Traffic Consultants (GTC) has been retained to provide a traffic impact study for the proposed Marin Woods residential development. This traffic impact analysis is intended to provide the City of Oak Harbor the necessary traffic generation, trip distribution, level of service, and sight distance analysis to facilitate their concurrency and SEPA reviews of for the proposed residential development.

The proposed development will consist of 43 new single-family residential units. There is an existing single-family residence on the site that will be removed. The development site is located on the northeast side of SW Swantown Rd opposite Fairway Lane. The site will also have access to the city street system via SW Putnam Dr and SW Robertson Dr. The proposed future build-out is anticipated to be completed and occupied by 2017; therefore, 2017 was used for future analysis to satisfy SEPA requirements.

2. METHODOLOGY

The trip generation calculations for the site are based on the latest edition of the Institute of Transportation Engineers' (ITE) *Trip Generation, 9th Edition* (2012). ITE Land Use Code 210, single-family residential unit, was used for the trip generation calculations for the proposed use. The trip distribution is based on peak-hour turning movement counts, surrounding uses, and prior traffic studies completed in the site vicinity.

Scoping conversations with City of Oak Harbor staff have identified the following seven intersections to do level of service analysis:

1. Langley Blvd at Ault Field Rd - Signalized
2. Clover Valley Rd at Ault Field Rd - Unsignalized
3. Heller Rd at Whidbey Ave - Signalized
4. SW Swantown Rd at Fairway Lane - Unsignalized
5. Heller Rd at SW Swantown Rd - Unsignalized
6. SW Fort Nugent Ave at SW Swantown - Signalized
7. SW Swantown Rd at SR-20 - Signalized

Traffic congestion is generally measured in terms of level-of-service (LOS). Peak-hour level-of-service was conducted and was determined using the methodology described in the 2010 Highway Capacity Manual (HCM). In accordance with the Manual, road facilities or intersections are rated between LOS A and F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. A summary of the level-of-service criteria has been included in Table 1. The level-of-service at intersections is measured in terms of average delay per vehicle in seconds. For unsignalized intersections, the level-of-service is determined by the worst case of all the calculated lane groups at the intersection. For signalized intersections, the level-of-service is determined as an average delay for all the entering vehicles. The *Synchro 8.0 (Build 805)* software was used to analyze the study intersections.

Table 1: Level of Service Criteria for Intersections

Level of ¹ Service	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized Intersections
A	Little/No Delay	≤10	≤10
B	Short Delays	>10 and ≤15	>10 and ≤20
C	Average Delays	>15 and ≤25	>20 and ≤35
D	Long Delays	>25 and ≤35	>35 and ≤55
E	Very Long Delays	>35 and ≤50	>55 and ≤80
F	Extreme Delays ²	>50	>80

The City of Oak Harbor has identified LOS D for city streets and LOS E as the acceptable level of service standard for the SR-20 corridor.

3. STREET SYSTEM AND TRAFFIC CONTROL

The City street system in the vicinity of the development site is shown on Figure 1. The major roadway in the site vicinity are Swantown Road. **Swantown Road** is a two lane roadway with a posted speed of 35 mph which connects SR-20 to Crosby Road to the northwest. Swantown Road has a 1-2 foot paved shoulder on the north side of the roadway along and a curb, gutter, sidewalk along the south side east of Fairway Lane. Daily traffic volumes based on the PM peak-hour counts are less than 1,800 daily trips along Swantown Road.

¹ **Source:** *Highway Capacity Manual 2010*.

LOS A: Free-flow traffic conditions, with minimal delay to stopped vehicles (no vehicle is delayed longer than one cycle at signalized intersection).

LOS B: Generally stable traffic flow conditions.

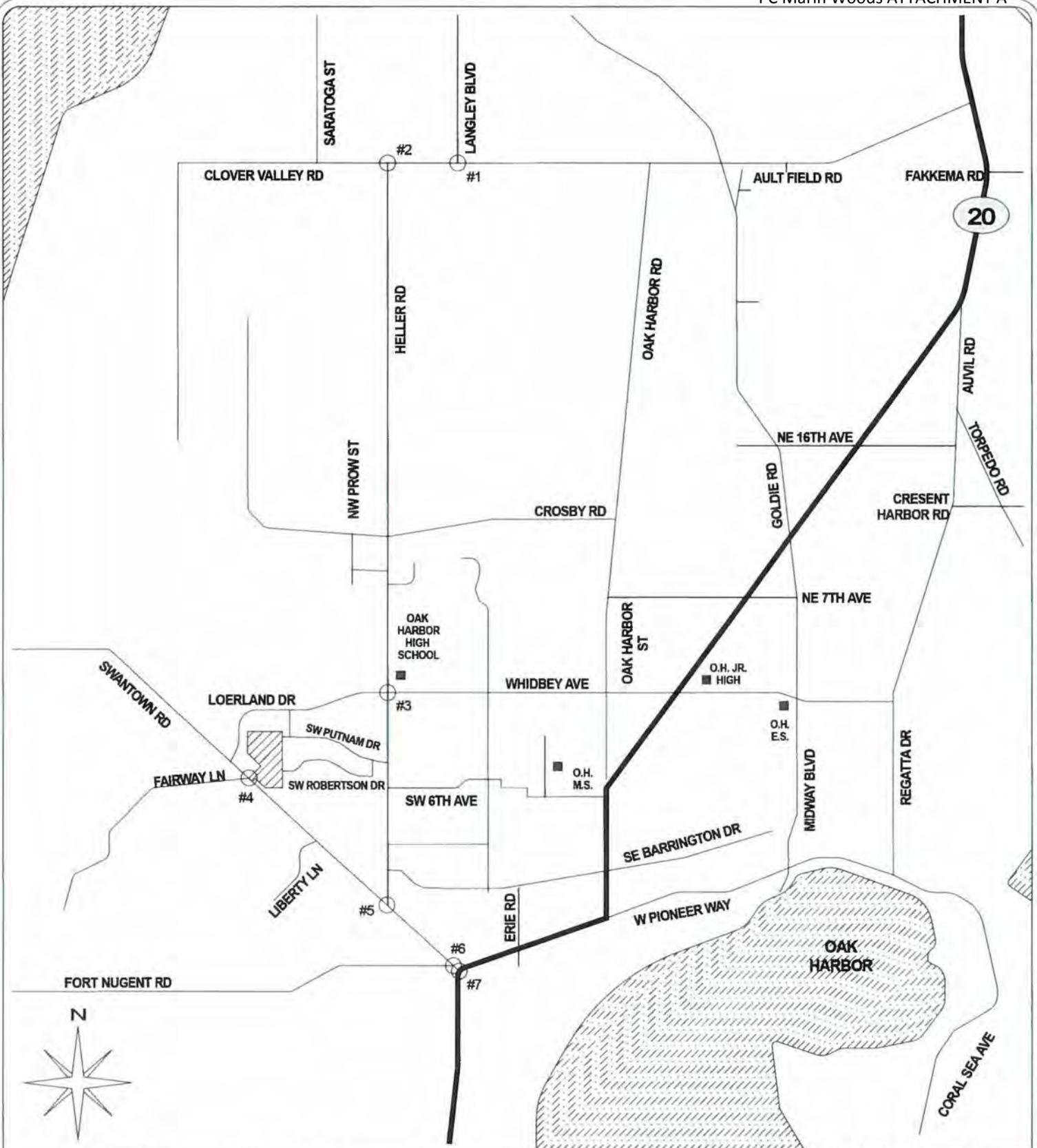
LOS C: Occasional back-ups may develop, but delay to vehicles is short term and still tolerable.

LOS D: During short periods of the peak hour, delays to approaching vehicles may be substantial but are tolerable during times of less demand (i.e. vehicles delayed one cycle or less at signal).

LOS E: Intersections operate at or near capacity, with long queues developing on all approaches and long delays.

LOS F: Jammed conditions on all approaches with excessively long delays and vehicles unable to move at times.

² When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection.



G IBSON T RAFFIC C ONSULTANTS

**TRAFFIC IMPACT STUDY
GTC #14-175**

**MARIN WOODS
(42 NEW SINGLE-FAMILY UNITS)**

LEGEND



DEVELOPMENT SITE



STUDY INTERSECTION

FIGURE 1

SITE VICINITY MAP

4. TRIP GENERATION

Trip generation calculations for the Marin Woods are based on national statistics contained in ITE's *Trip Generation, 9th Edition* (2012). The average trip generation rates for ITE Land Use Code 210, single-family residential units, were used to calculate the trips generated by the development. The development will consist of 43 total units; there is an existing single-family unit on the site that will be credited towards the developments trips. Therefore, 42 new units will be adding trips to the surrounding street system. The development will generate 400 ADT with 31 AM peak-hour trips (8 inbound/23 outbound) and 42 PM peak-hour trips (26 inbound/16 outbound). A Trip Generation summary has been included in Table 2.

Table 2: Trip Generation Summary

Land Use	Units	Average Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Single-Family	43 SFD	410	8	24	32	27	16	43
Single-Family (Removed)	-1 SFD	-10	0	-1	-1	-1	0	-1
Total	42 SFD	400	8	23	31	26	16	42

The trip generation calculations have been included in the attachments.

The proposed development will generate fewer trips during the AM peak-hour than the PM peak-hour; this confirms that the PM peak-hour is the critical commuter peak for level of service impact analysis.

5. TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution and assignments for the proposed Marin Woods are based on existing counts, adjacent land uses, and previous traffic studies for residential developments in the site vicinity. The distribution has been approved by Brad Gluth at the City of Oak Harbor. It is anticipated that 40% of the site traffic will travel along Swantown Road, thirty-five percent to the east and five percent to the west. Approximately 45% of the site traffic will travel along Heller Road, thirty-five percent to the north and ten percent to the south. The remaining 15% will travel to and from the east along Whidbey Avenue. The PM peak-hour trip distribution is included in Figure 2.

6. LEVEL OF SERVICE

6.1 Existing Analysis

Existing traffic volumes during the PM peak-hour were collected by Idax Data at the study intersections on August 12, 2014. The existing turning movements are shown in Figure 3. The level of service analysis shows that the intersections all currently operate at level of service C or better. The existing level of service is summarized in Table 3.

6.2 Baseline 2017 Analysis

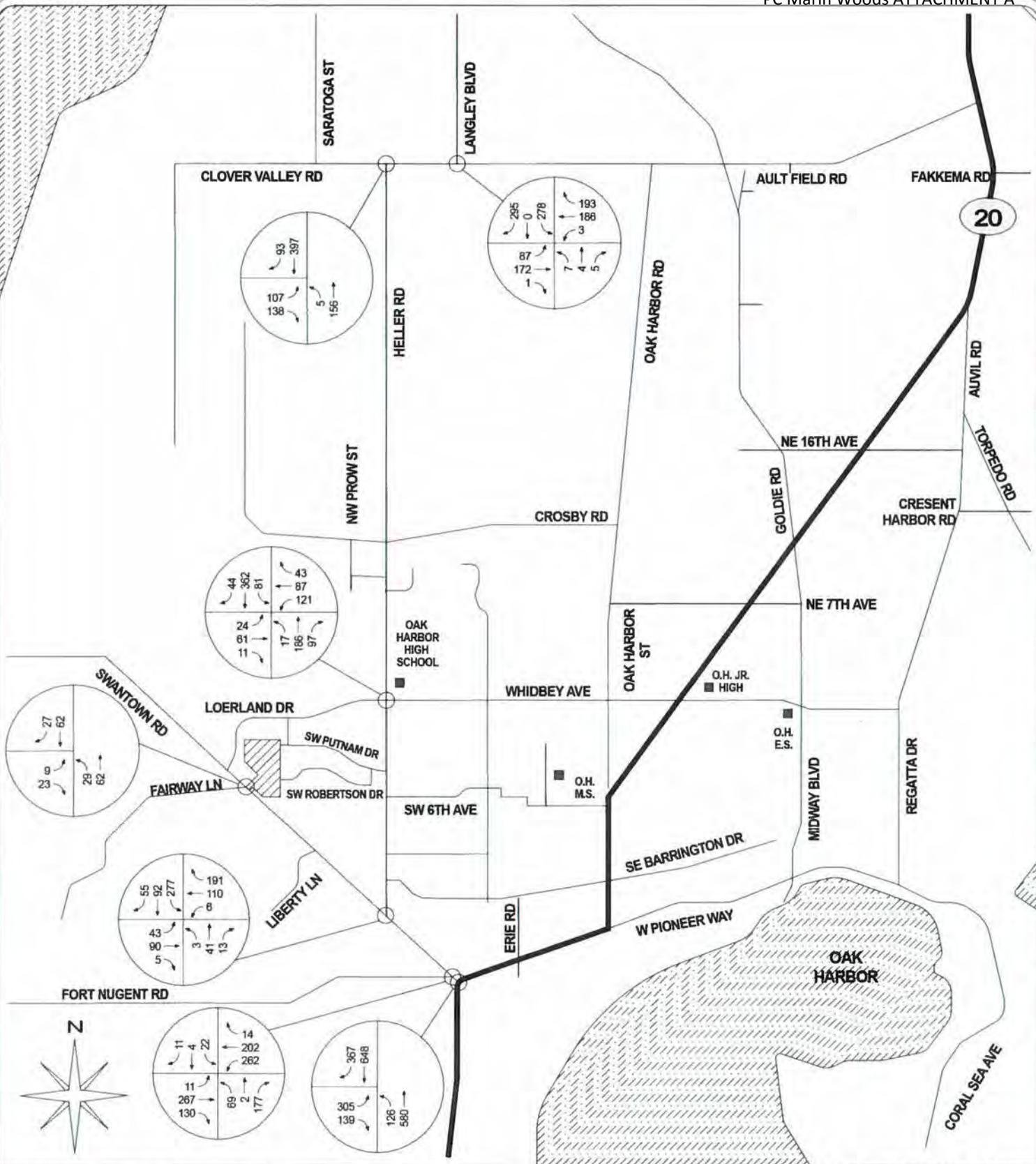
Baseline traffic volumes were factored by an annually compounding growth rate of 3% to achieve baseline 2017 (horizon planning year) conditions with background growth. The baseline 2017 turning movements are shown in Figure 4. The level of service analysis shows that the intersections all continue to operate at level of service D or better. The baseline 2017 level of service is summarized in Table 3.

6.3 Future 2017 With Development

The future 2017 with development volumes were calculated by adding the development trip assignments to the baseline 2017 turning movements. The future 2017 with development turning movements are shown in Figure 5. The level of service analysis shows that the intersections all will continue to operate at level of service D or better. The future 2017 with development level of service is summarized in Table 3.

Table 3: 2017 Future Level of Service Summary –PM Peak-Hour

Intersections	Existing Conditions		2017 Future Conditions			
			without Development		with Development	
	LOS	Delay	LOS	Delay	LOS	Delay
1. Langley Blvd at Ault Field Rd	C	20.7 sec	C	21.9 sec	C	22.1 sec
2. Clover Valley Rd at Ault Field Rd	C	21.9 sec	D	28.0 sec	D	28.9 sec
3. Heller Rd at Whidbey Ave	B	15.7 sec	B	16.4 sec	B	16.8 sec
4. SW Swantown Rd at Fairway Lane	A	9.3 sec	A	9.4 sec	B	10.5 sec
5. Heller Rd at SW Swantown Rd	C	16.5 sec	C	19.4 sec	C	20.2 sec
6. SW Fort Nugent Ave at Swantown Rd	C	28.2 sec	C	30.1 sec	C	30.4 sec
7. SR-20 at Swantown Rd	B	15.8 sec	B	18.9 sec	B	19.0 sec



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #14-175

MARIN WOODS
(42 NEW SINGLE-FAMILY UNITS)

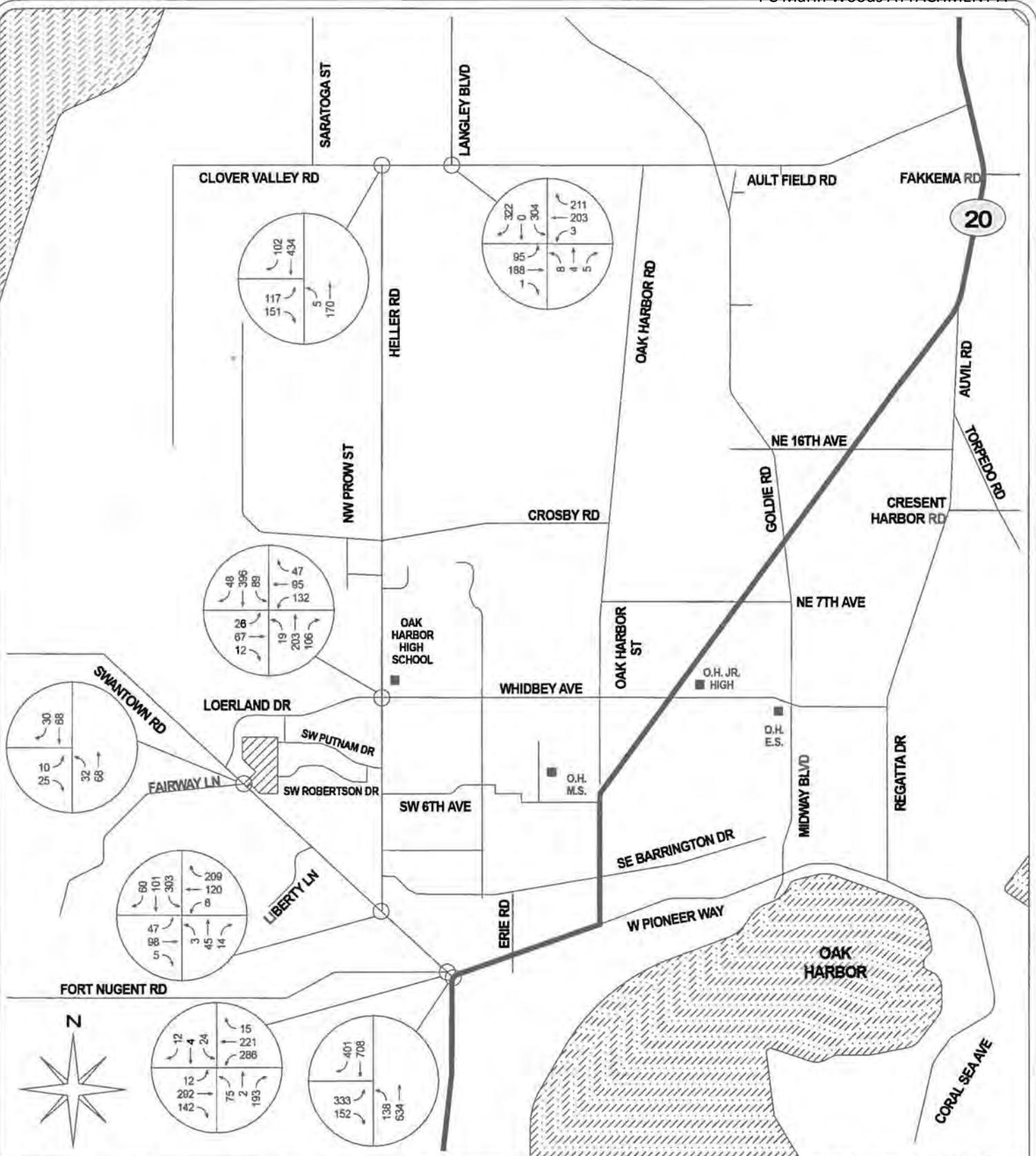
LEGEND

200 →

PM PEAK-HOUR
TURNING MOVEMENT VOLUMES

FIGURE 3

**EXISTING 2014
PM PEAK-HOUR
TURNING MOVEMENT**



GIBSON TRAFFIC CONSULTANTS

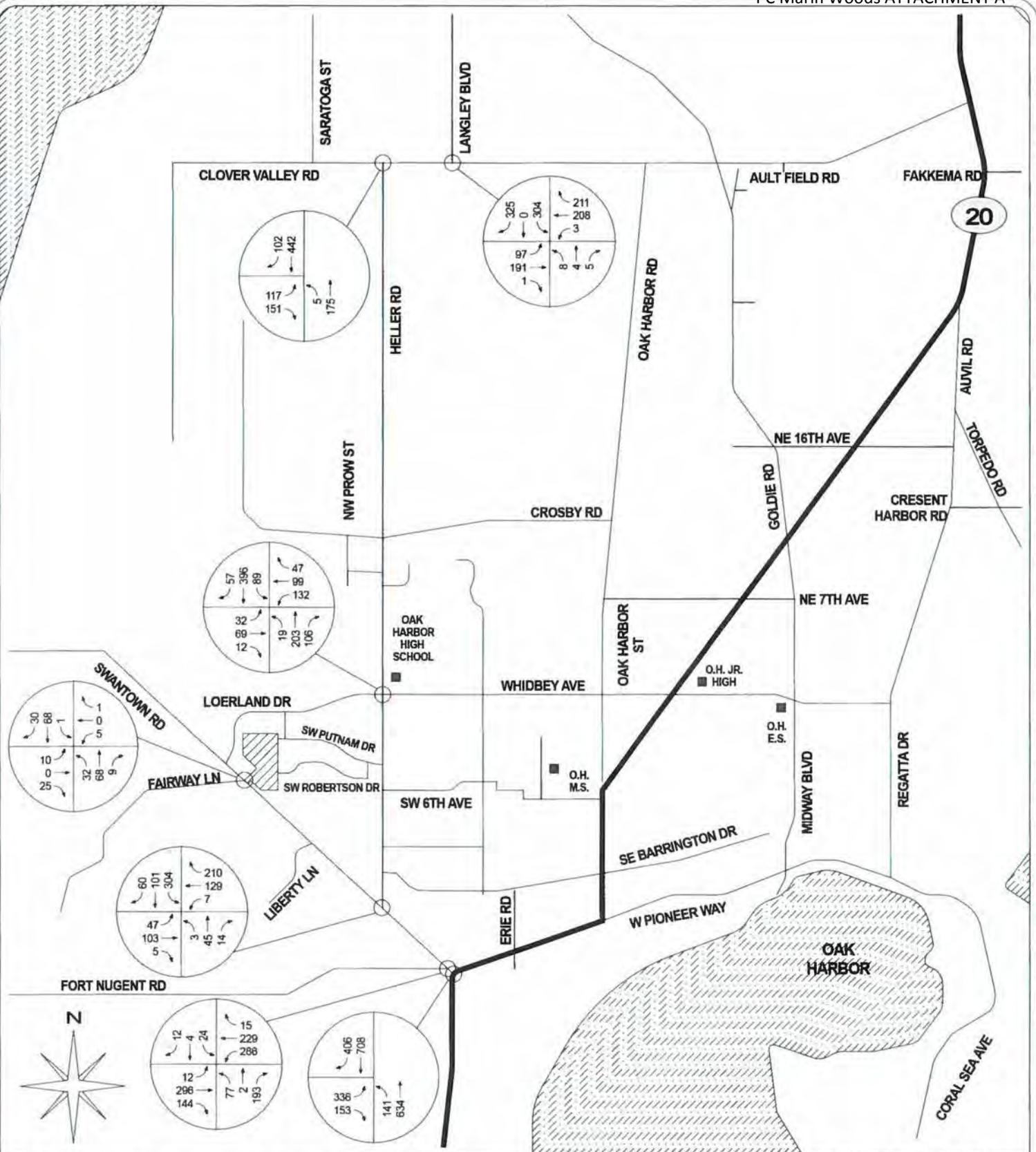
TRAFFIC IMPACT STUDY
GTC #14-175

MARIN WOODS
(42 NEW SINGLE-FAMILY UNITS)

LEGEND

205 → PM PEAK-HOUR
TURNING MOVEMENT VOLUMES

FIGURE 4
BASELINE 2017
PM PEAK-HOUR
TURNING MOVEMENTS



GIBSON TRAFFIC CONSULTANTS

**TRAFFIC IMPACT STUDY
GTC #14-175**

MARIN WOODS
(42 NEW SINGLE-FAMILY UNITS)

LEGEND

207 → PM PEAK-HOUR
TURNING MOVEMENT VOLUMES

**FIGURE 5
FUTURE 2017 WITH
PM PEAK-HOUR
TURNING MOVEMENTS**

7. ACCESS ANALYSIS

7.1 Sight Distance

Sight distance was analyzed for the proposed access to Swantown Road opposite Fairway Lane. The existing speed along Swantown Road is 35 mph. The sight distances have been evaluated based on criteria described in the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets (2011)*. Per AASHTO guidelines; a 35 mph design facility requires 250 feet of stopping sight distance and 390 feet of intersection sight distance.

To the east and west of the proposed access there is clear stopping sight distance to 250 feet and clear intersection sight distance to 390 ft. Therefore, the proposed access will meet or exceed safe stopping sight distance requirements and meet the intersection sight distance requirements.

7.2 Channelization Warrants

The future with development turning movement volumes were used to assess if left-turn and right-turn channelization are required on Swantown Road at the new proposed Site Access. Based on WSDOT's channelization standards, Exhibit 1310-7a (Left-turn) and Exhibit 1310-11 (Right-turn) of the *Design Manual*, and a posted speed limit of 35 mph an eastbound left-turn and westbound right-turn lane are not warranted based on the future volumes.

8. MITIGATION

The City of Oak Harbor has a set traffic mitigation fee of \$907.00 per residential unit. The development will consist of 42 new residential units, which will result in traffic mitigation fees of \$38,094.00.

9. CONCLUSIONS

The 42 new single-family residences in the Marin Woods development are anticipated to generate 400 new daily trips with 42 new PM peak-hour trips. The new units will result in traffic mitigation fees of \$38,094.00. All of the study intersection will operate at acceptable LOS D or better with the addition of development trips. There is adequate sight distances at the existing public intersections of Swantown Road at Fairway Lane and channelization lanes are not warranted at the new site access to Swantown Road.

Trip Generation Calculations

Marin Woods
GTC #14-175

Trip Generation for: **Weekday**
(a.k.a.): **Average Weekday Daily Trips (AWDT)**

LAND USES	VARIABLE	ITE LU code	Gross Trips		Internal Crossover		NET EXTERNAL TRIPS BY TYPE													
							IN BOTH DIRECTIONS						DIRECTIONAL ASSIGNMENTS							
							TOTAL	PASS-BY		DIVERTED LINK		NEW	PASS-BY		DIVERTED LINK		NEW			
In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In	Out	In	Out	In	Out	In	Out						
Single-family Residential	43 units	210	9.52	50%	50%	409	0%	0	409	0%	0	0%	0	409	0	0	0	0	205	204
Single-family Residential (Removed)	-1 units	210	9.52	50%	50%	-10	0%	0	-10	0%	0	0%	0	-10	0	0	0	0	-5	-5
Totals						400		0	400		0		0	400	0	0	0	0	200	200

Marin Woods
GTC #14-175

Trip Generation for: **Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 7 and 9 AM**
(a.k.a.): **Weekday AM Peak Hour**

LAND USES		VARIABLE	ITE LU code	NET EXTERNAL TRIPS BY TYPE																
				Gross Trips					Internal Crossover		TOTAL	IN BOTH DIRECTIONS				DIRECTIONAL ASSIGNMENTS				
				Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	In+Out (Total)		% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	NEW	PASS-BY		DIVERTED LINK	
Single-family Residential	43 units	210	0.75	25%	75%	32	0%	0	32	0%	0	0%	0	32	0	0	0	0	8	24
Single-family Residential (Removed)	-1 units	210	0.75	25%	75%	-1	0%	0	-1	0%	0	0%	0	-1	0	0	0	0	0	-1
Totals						31		0	31		0		0	31	0	0	0	0	8	23

Marin Woods
GTC #14-175

**Trip Generation for: Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 4 and 6 PM
(a.k.a.): Weekday PM Peak Hour**

LAND USES	VARIABLE	ITE LU code	NET EXTERNAL TRIPS BY TYPE																		
			Gross Trips						Internal Crossover		TOTAL In+Out (Total)	IN BOTH DIRECTIONS				DIRECTIONAL ASSIGNMENTS					
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	PASS-BY % of Ext. Trips	In+Out (Total)		DIVERTED LINK % of Ext. Trips	In+Out (Total)	NEW In+Out (Total)	PASS-BY In Out		DIVERTED LINK In Out		NEW In Out		
Single-family Residential	43 units	210	1.00	63%	37%	43	0%	0	43	0%	0	0%	0	43	0	0	0	0	27	16	
Single-family Residential (Removed)	-1 units	210	1.00	63%	37%	-1	0%	0	-1	0%	0	0%	0	-1	0	0	0	0	-1	0	
Totals						42		0	42		0		0	42	0	0	0	0	26	16	

Marin Woods
GTC #14-175

AM Version

%	New ADT	New AM Peak Hour Trips			%	New ADT	New AM Peak Hour Trips		
		In	Out	Total			In	Out	Total
100%	400	8	23	31	100%	400	8	23	31
1%	4.00	0.08	0.23	0.31	51%	203.92	4.08	11.73	15.81
2%	8.00	0.16	0.46	0.62	52%	207.92	4.16	11.96	16.12
3%	12.00	0.24	0.69	0.93	53%	211.92	4.24	12.19	16.43
4%	15.99	0.32	0.92	1.24	54%	215.91	4.32	12.42	16.74
5%	19.99	0.40	1.15	1.55	55%	219.91	4.40	12.65	17.05
6%	23.99	0.48	1.38	1.86	56%	223.91	4.48	12.88	17.36
7%	27.99	0.56	1.61	2.17	57%	227.91	4.56	13.11	17.67
8%	31.99	0.64	1.84	2.48	58%	231.91	4.64	13.34	17.98
9%	35.99	0.72	2.07	2.79	59%	235.91	4.72	13.57	18.29
10%	39.98	0.80	2.30	3.10	60%	239.90	4.80	13.80	18.60
11%	43.98	0.88	2.53	3.41	61%	243.90	4.88	14.03	18.91
12%	47.98	0.96	2.76	3.72	62%	247.90	4.96	14.26	19.22
13%	51.98	1.04	2.99	4.03	63%	251.90	5.04	14.49	19.53
14%	55.98	1.12	3.22	4.34	64%	255.90	5.12	14.72	19.84
15%	59.98	1.20	3.45	4.65	65%	259.90	5.20	14.95	20.15
16%	63.97	1.28	3.68	4.96	66%	263.89	5.28	15.18	20.46
17%	67.97	1.36	3.91	5.27	67%	267.89	5.36	15.41	20.77
18%	71.97	1.44	4.14	5.58	68%	271.89	5.44	15.64	21.08
19%	75.97	1.52	4.37	5.89	69%	275.89	5.52	15.87	21.39
20%	79.97	1.60	4.60	6.20	70%	279.89	5.60	16.10	21.70
21%	83.97	1.68	4.83	6.51	71%	283.89	5.68	16.33	22.01
22%	87.96	1.76	5.06	6.82	72%	287.88	5.76	16.56	22.32
23%	91.96	1.84	5.29	7.13	73%	291.88	5.84	16.79	22.63
24%	95.96	1.92	5.52	7.44	74%	295.88	5.92	17.02	22.94
25%	99.96	2.00	5.75	7.75	75%	299.88	6.00	17.25	23.25
26%	103.96	2.08	5.98	8.06	76%	303.88	6.08	17.48	23.56
27%	107.96	2.16	6.21	8.37	77%	307.88	6.16	17.71	23.87
28%	111.96	2.24	6.44	8.68	78%	311.88	6.24	17.94	24.18
29%	115.95	2.32	6.67	8.99	79%	315.87	6.32	18.17	24.49
30%	119.95	2.40	6.90	9.30	80%	319.87	6.40	18.40	24.80
31%	123.95	2.48	7.13	9.61	81%	323.87	6.48	18.63	25.11
32%	127.95	2.56	7.36	9.92	82%	327.87	6.56	18.86	25.42
33%	131.95	2.64	7.59	10.23	83%	331.87	6.64	19.09	25.73
34%	135.95	2.72	7.82	10.54	84%	335.87	6.72	19.32	26.04
35%	139.94	2.80	8.05	10.85	85%	339.86	6.80	19.55	26.35
36%	143.94	2.88	8.28	11.16	86%	343.86	6.88	19.78	26.66
37%	147.94	2.96	8.51	11.47	87%	347.86	6.96	20.01	26.97
38%	151.94	3.04	8.74	11.78	88%	351.86	7.04	20.24	27.28
39%	155.94	3.12	8.97	12.09	89%	355.86	7.12	20.47	27.59
40%	159.94	3.20	9.20	12.40	90%	359.86	7.20	20.70	27.90
41%	163.93	3.28	9.43	12.71	91%	363.85	7.28	20.93	28.21
42%	167.93	3.36	9.66	13.02	92%	367.85	7.36	21.16	28.52
43%	171.93	3.44	9.89	13.33	93%	371.85	7.44	21.39	28.83
44%	175.93	3.52	10.12	13.64	94%	375.85	7.52	21.62	29.14
45%	179.93	3.60	10.35	13.95	95%	379.85	7.60	21.85	29.45
46%	183.93	3.68	10.58	14.26	96%	383.85	7.68	22.08	29.76
47%	187.92	3.76	10.81	14.57	97%	387.84	7.76	22.31	30.07
48%	191.92	3.84	11.04	14.88	98%	391.84	7.84	22.54	30.38
49%	195.92	3.92	11.27	15.19	99%	395.84	7.92	22.77	30.69
50%	199.92	4.00	11.50	15.50	100%	399.84	8.00	23.00	31.00

Marin Woods
GTC #14-175

PM Version

%	New ADT	New PM Peak Hour Trips			%	New ADT	New PM Peak Hour Trips		
		In	Out	Total			In	Out	Total
100%	400	26	16	42	100%	400	26	16	42
1%	4.00	0.26	0.16	0.42	51%	203.92	13.49	7.93	21.42
2%	8.00	0.53	0.31	0.84	52%	207.92	13.76	8.08	21.84
3%	12.00	0.79	0.47	1.26	53%	211.92	14.02	8.24	22.26
4%	15.99	1.06	0.62	1.68	54%	215.91	14.29	8.39	22.68
5%	19.99	1.32	0.78	2.10	55%	219.91	14.55	8.55	23.10
6%	23.99	1.59	0.93	2.52	56%	223.91	14.82	8.70	23.52
7%	27.99	1.85	1.09	2.94	57%	227.91	15.08	8.86	23.94
8%	31.99	2.12	1.24	3.36	58%	231.91	15.35	9.01	24.36
9%	35.99	2.38	1.40	3.78	59%	235.91	15.61	9.17	24.78
10%	39.98	2.65	1.55	4.20	60%	239.90	15.88	9.32	25.20
11%	43.98	2.91	1.71	4.62	61%	243.90	16.14	9.48	25.62
12%	47.98	3.18	1.86	5.04	62%	247.90	16.41	9.63	26.04
13%	51.98	3.44	2.02	5.46	63%	251.90	16.67	9.79	26.46
14%	55.98	3.70	2.18	5.88	64%	255.90	16.93	9.95	26.88
15%	59.98	3.97	2.33	6.30	65%	259.90	17.20	10.10	27.30
16%	63.97	4.23	2.49	6.72	66%	263.89	17.46	10.26	27.72
17%	67.97	4.50	2.64	7.14	67%	267.89	17.73	10.41	28.14
18%	71.97	4.76	2.80	7.56	68%	271.89	17.99	10.57	28.56
19%	75.97	5.03	2.95	7.98	69%	275.89	18.26	10.72	28.98
20%	79.97	5.29	3.11	8.40	70%	279.89	18.52	10.88	29.40
21%	83.97	5.56	3.26	8.82	71%	283.89	18.79	11.03	29.82
22%	87.96	5.82	3.42	9.24	72%	287.88	19.05	11.19	30.24
23%	91.96	6.09	3.57	9.66	73%	291.88	19.32	11.34	30.66
24%	95.96	6.35	3.73	10.08	74%	295.88	19.58	11.50	31.08
25%	99.96	6.62	3.89	10.50	75%	299.88	19.85	11.66	31.50
26%	103.96	6.88	4.04	10.92	76%	303.88	20.11	11.81	31.92
27%	107.96	7.14	4.20	11.34	77%	307.88	20.37	11.97	32.34
28%	111.96	7.41	4.35	11.76	78%	311.88	20.64	12.12	32.76
29%	115.95	7.67	4.51	12.18	79%	315.87	20.90	12.28	33.18
30%	119.95	7.94	4.66	12.60	80%	319.87	21.17	12.43	33.60
31%	123.95	8.20	4.82	13.02	81%	323.87	21.43	12.59	34.02
32%	127.95	8.47	4.97	13.44	82%	327.87	21.70	12.74	34.44
33%	131.95	8.73	5.13	13.86	83%	331.87	21.96	12.90	34.86
34%	135.95	9.00	5.28	14.28	84%	335.87	22.23	13.05	35.28
35%	139.94	9.26	5.44	14.70	85%	339.86	22.49	13.21	35.70
36%	143.94	9.53	5.59	15.12	86%	343.86	22.76	13.36	36.12
37%	147.94	9.79	5.75	15.54	87%	347.86	23.02	13.52	36.54
38%	151.94	10.05	5.91	15.96	88%	351.86	23.28	13.68	36.96
39%	155.94	10.32	6.06	16.38	89%	355.86	23.55	13.83	37.38
40%	159.94	10.58	6.22	16.80	90%	359.86	23.81	13.99	37.80
41%	163.93	10.85	6.37	17.22	91%	363.85	24.08	14.14	38.22
42%	167.93	11.11	6.53	17.64	92%	367.85	24.34	14.30	38.64
43%	171.93	11.38	6.68	18.06	93%	371.85	24.61	14.45	39.06
44%	175.93	11.64	6.84	18.48	94%	375.85	24.87	14.61	39.48
45%	179.93	11.91	6.99	18.90	95%	379.85	25.14	14.76	39.90
46%	183.93	12.17	7.15	19.32	96%	383.85	25.40	14.92	40.32
47%	187.92	12.44	7.30	19.74	97%	387.84	25.67	15.07	40.74
48%	191.92	12.70	7.46	20.16	98%	391.84	25.93	15.23	41.16
49%	195.92	12.97	7.61	20.58	99%	395.84	26.20	15.38	41.58
50%	199.92	13.23	7.77	21.00	100%	399.84	26.46	15.54	42.00

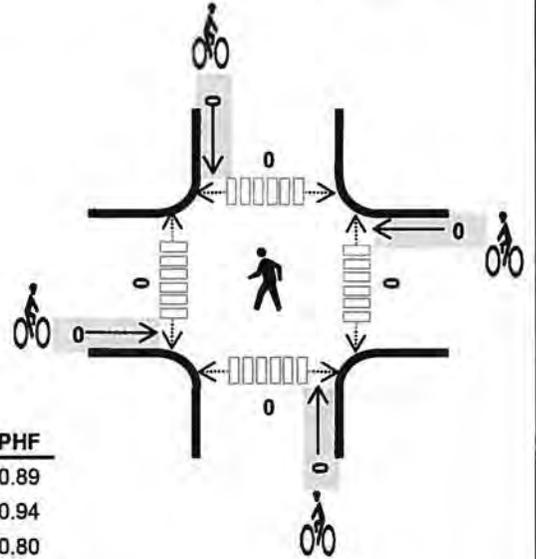
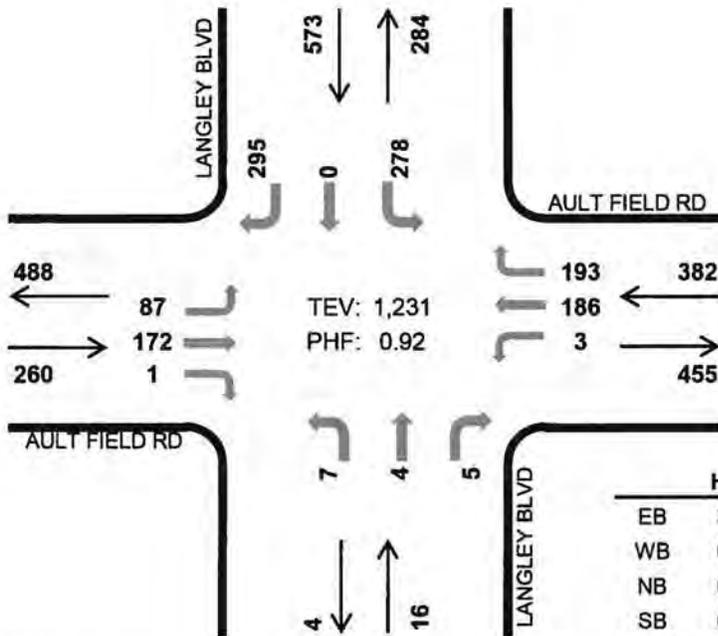
Count Data

LANGLEY BLVD AULT FIELD RD



Peak Hour

Date: Tue, Aug 12, 2014
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	3.5%	0.89
WB	0.8%	0.94
NB	0.0%	0.80
SB	0.2%	0.77
TOTAL	1.1%	0.92

Two-Hour Count Summaries

Interval Start	AULT FIELD RD Eastbound			AULT FIELD RD Westbound			LANGLEY BLVD Northbound			LANGLEY BLVD Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	18	36	0	0	43	47	2	1	1	94	0	93	335	
4:15 PM	29	44	0	2	45	46	1	3	0	73	0	85	328	
4:30 PM	22	41	0	1	42	59	0	0	3	58	0	76	302	
4:45 PM	18	51	1	0	56	41	4	0	1	53	0	41	266	1,231
5:00 PM	14	37	1	1	55	39	2	0	1	70	0	47	267	1,163
5:15 PM	18	48	1	1	46	49	1	0	0	62	0	31	257	1,092
5:30 PM	16	26	0	2	63	53	0	0	1	61	0	28	250	1,040
5:45 PM	11	37	0	1	47	38	4	0	0	48	0	38	224	998
Count Total	146	320	3	8	397	372	14	4	7	519	0	439	2,229	
Peak Hr	87	172	1	3	186	193	7	4	5	278	0	295	1,231	

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
4:15 PM	3	1	0	0	4	0	0	0	0	0	0	0	0	0	0
4:30 PM	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0
4:45 PM	3	2	0	0	5	0	0	0	0	0	0	0	0	0	0
5:00 PM	3	0	0	0	3	1	0	0	0	1	1	0	0	1	2
5:15 PM	3	0	0	0	3	0	1	0	0	1	0	0	0	2	2
5:30 PM	1	2	0	0	3	0	0	0	0	0	0	1	0	1	2
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Count Total	16	6	0	1	23	1	1	0	0	2	1	1	0	4	6
Peak Hr	9	3	0	1	13	0	0	0	0	0	0	0	0	0	0

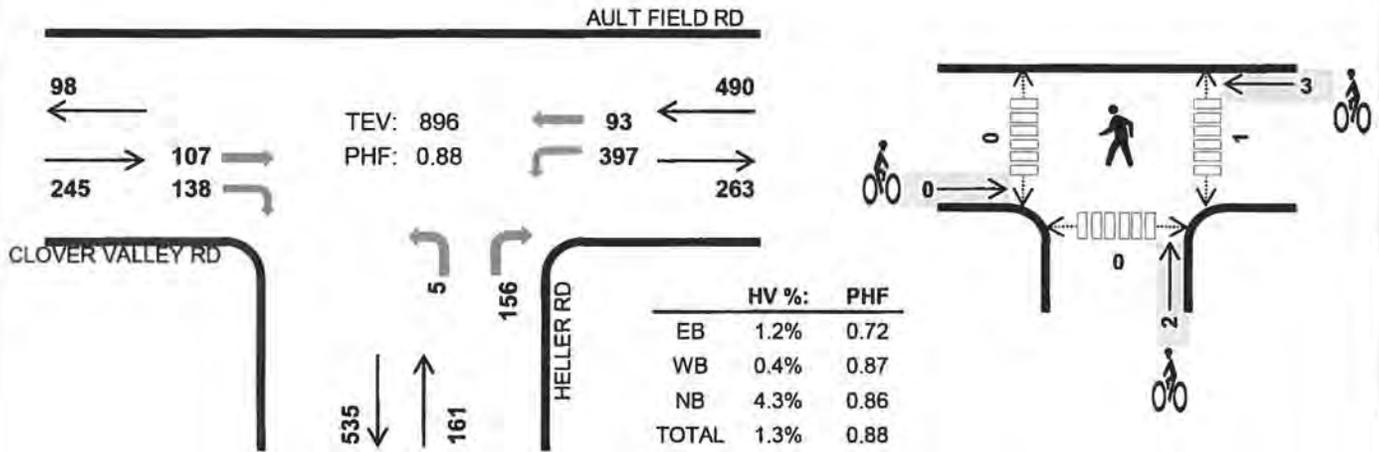


HELLER RD AULT FIELD RD



Peak Hour

Date: Tue, Aug 12, 2014
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:00 PM to 5:00 PM



Two-Hour Count Summaries

Interval Start	CLOVER VALLEY RD			AULT FIELD RD			HELLER RD			HELLER RD			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	30	55	116	25	0	1	0	28	0	0	0	255	
4:15 PM	0	31	44	112	19	0	1	0	44	0	0	0	251	
4:30 PM	0	18	26	93	25	0	3	0	44	0	0	0	209	
4:45 PM	0	28	13	76	24	0	0	0	40	0	0	0	181	896
5:00 PM	0	15	13	83	15	0	1	0	35	0	0	0	162	803
5:15 PM	0	25	17	63	19	0	3	0	39	0	0	0	166	718
5:30 PM	0	9	9	70	21	0	3	0	32	0	0	0	144	653
5:45 PM	0	17	13	63	23	0	3	0	33	0	0	0	152	624
Count Total	0	173	190	676	171	0	15	0	295	0	0	0	1,520	
Peak Hr	0	107	138	397	93	0	5	0	156	0	0	0	896	

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

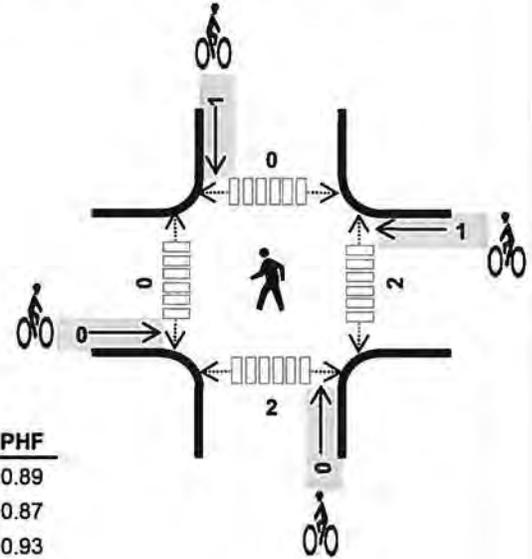
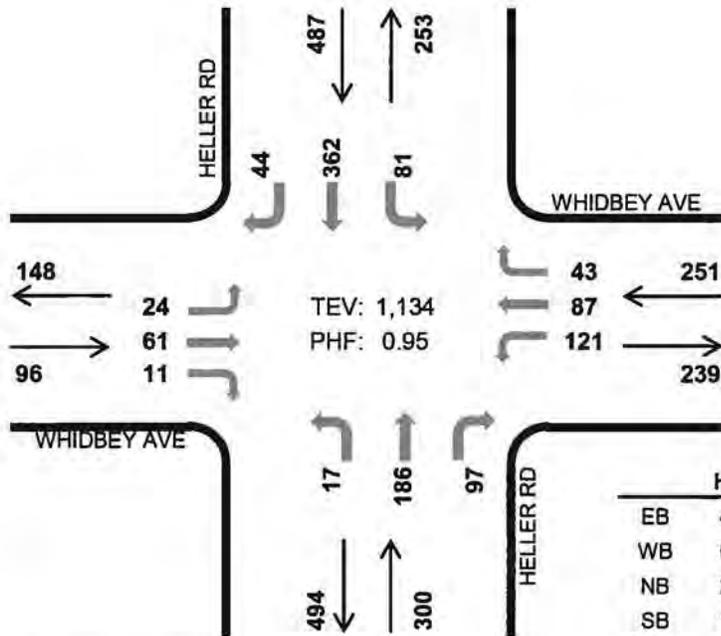
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
4:15 PM	1	0	2	0	3	0	2	2	0	4	1	0	0	0	1
4:30 PM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0
4:45 PM	1	2	3	0	6	0	0	0	0	0	0	0	0	0	0
5:00 PM	1	0	2	0	3	1	0	0	0	1	0	0	0	0	0
5:15 PM	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0
5:30 PM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0
Count Total	4	6	14	0	24	1	5	2	0	8	1	0	0	0	1
Peak Hr	3	2	7	0	12	0	3	2	0	5	1	0	0	0	1

HELLER RD WHIDBEY AVE



Peak Hour

Date: Tue, Aug 12, 2014
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:15 PM to 5:15 PM



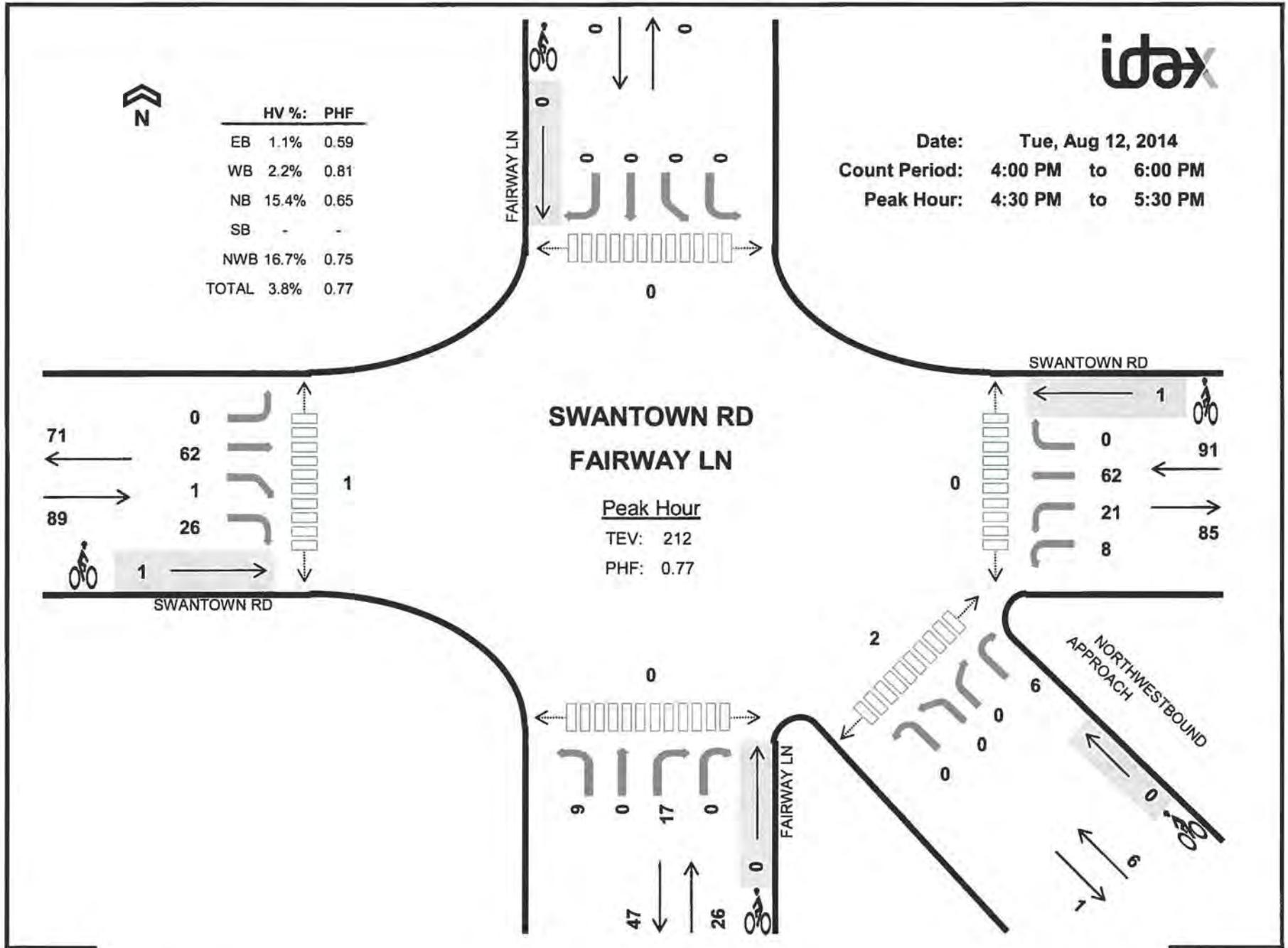
	HV %:	PHF
EB	4.2%	0.89
WB	0.8%	0.87
NB	2.3%	0.93
SB	1.0%	0.87
TOTAL	1.6%	0.95

Two-Hour Count Summaries

Interval Start	WHIDBEY AVE Eastbound			WHIDBEY AVE Westbound			HELLER RD Northbound			HELLER RD Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	5	8	2	33	26	9	5	29	15	17	106	13	268	
4:15 PM	7	19	1	24	27	11	4	42	22	25	100	15	297	
4:30 PM	6	15	2	31	20	8	6	47	22	21	94	7	279	
4:45 PM	9	12	5	28	16	14	3	50	28	18	82	10	275	1,119
5:00 PM	2	15	3	38	24	10	4	47	25	17	86	12	283	1,134
5:15 PM	4	9	0	20	29	13	5	64	27	7	59	14	251	1,088
5:30 PM	2	19	1	23	12	17	6	43	19	15	66	7	230	1,039
5:45 PM	2	11	4	26	16	13	3	48	21	13	67	5	229	993
Count Total	37	108	18	223	170	95	36	370	179	133	660	83	2,112	
Peak Hr	24	61	11	121	87	43	17	186	97	81	362	44	1,134	

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	2	3	5	0	0	0	1	1	0	0	0	2	2
4:30 PM	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0
4:45 PM	1	1	0	1	3	0	0	0	0	0	2	0	0	0	2
5:00 PM	2	1	2	1	6	0	1	0	0	1	0	0	0	0	0
5:15 PM	0	1	1	0	2	0	0	0	0	0	1	0	0	1	2
5:30 PM	1	0	0	3	4	0	0	0	1	1	1	0	0	0	1
5:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1
Count Total	5	5	8	8	26	0	1	0	2	3	4	1	0	3	8
Peak Hr	4	2	7	5	18	0	1	0	1	2	2	0	0	2	4



Two-Hour Count Summaries

Interval Start	SWANTOWN RD Eastbound				SWANTOWN RD Westbound				FAIRWAY LN Northbound				FAIRWAY LN Southbound				NORTHWESTBOUND APPROACH Northwestbound				15-min Total	Rolling One Hour
	LT	TH	BR	RT	HL	LT	TH	RT	LT	TH	RT	HR	LT	BL	TH	RT	HL	BL	BR	HR		
4:00 PM	0	7	0	2	2	6	11	0	0	0	2	0	0	0	0	0	0	0	0	0	30	
4:15 PM	0	8	2	1	3	4	18	0	3	0	7	0	0	0	0	0	0	0	0	1	47	
4:30 PM	0	31	0	7	5	3	12	0	4	0	5	0	0	0	0	0	0	0	2	69		
4:45 PM	0	8	0	3	0	3	18	0	4	0	6	0	0	0	0	0	0	0	2	44	190	
5:00 PM	0	13	0	9	2	5	15	0	1	0	4	0	0	0	0	0	0	0	0	49	209	
5:15 PM	0	10	1	7	1	10	17	0	0	0	2	0	0	0	0	0	0	0	2	50	212	
5:30 PM	0	13	0	5	5	13	13	0	2	0	2	0	0	0	0	0	1	1	0	0	55	198
5:45 PM	0	11	0	2	4	4	14	0	2	0	5	0	0	0	0	0	2	0	0	3	47	201
Count Total	0	101	3	36	22	48	118	0	16	0	33	0	0	0	0	0	3	1	0	10	391	
Peak Hr	0	62	1	26	8	21	62	0	9	0	17	0	0	0	0	0	0	0	0	6	212	

Note: Two-hour count summary volumes include heavy vehicles but excludes bicycles in overall count.

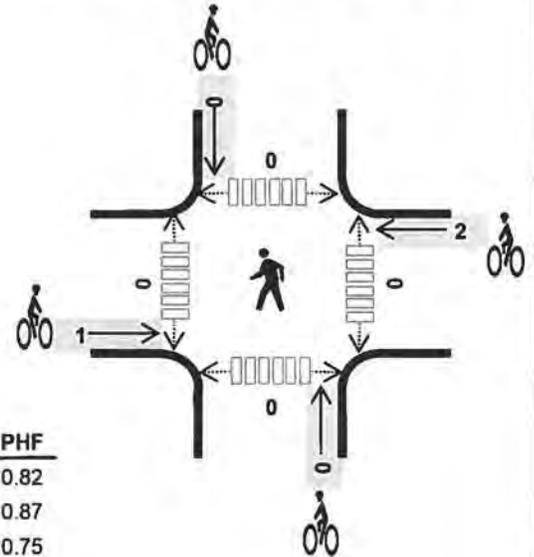
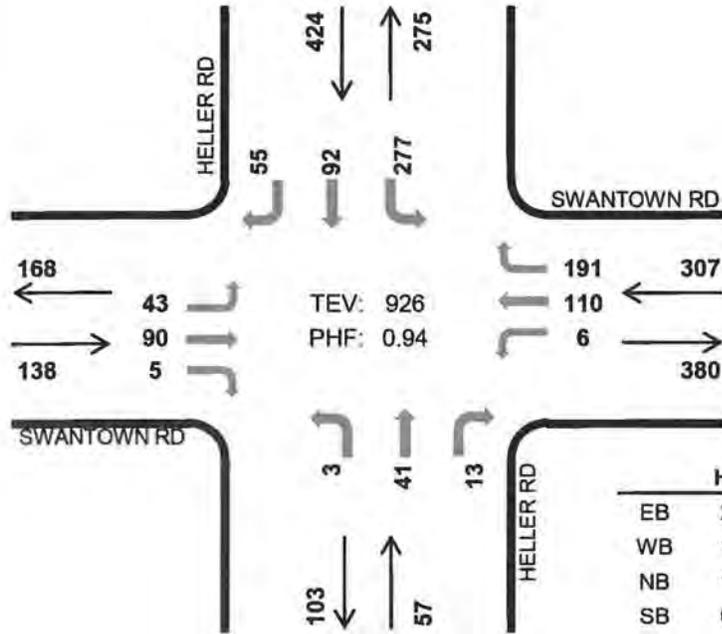
Interval Start	Heavy Vehicle Totals						Bicycles						Pedestrians (Crossing Leg)								
	EB	WB	NB	SB	NWB	Total	EB	WB	NB	SB	NWB	Total	East	West	North	South	SE	Total			
4:00 PM	0	1	0	0	0	1	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	1	1	0	1	4	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
4:45 PM	0	1	2	0	0	3	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1
5:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
5:30 PM	2	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
5:45 PM	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Count Total	3	5	4	0	1	13	3	1	0	0	0	4	0	1	0	0	0	3	4	4	4
Peak Hr	1	2	4	0	1	8	1	0	0	0	0	1	0	1	0	0	0	2	3	3	3

HELLER RD SWANTOWN RD



Peak Hour

Date: Tue, Aug 12, 2014
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	2.9%	0.82
WB	1.6%	0.87
NB	1.8%	0.75
SB	0.7%	0.91
TOTAL	1.4%	0.94

Two-Hour Count Summaries

Interval Start	SWANTOWN RD Eastbound			SWANTOWN RD Westbound			HELLER RD Northbound			HELLER RD Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
	4:00 PM	5	14	0	4	31	23	0	6	1	54	17		
4:15 PM	12	26	0	1	29	36	1	4	3	80	18	7	217	
4:30 PM	13	29	0	1	27	40	1	6	3	77	18	8	223	
4:45 PM	7	19	3	1	30	57	1	10	1	71	31	14	245	855
5:00 PM	15	21	0	3	24	39	0	11	5	71	19	19	227	912
5:15 PM	8	21	2	1	29	55	1	14	4	58	24	14	231	926
5:30 PM	11	13	1	4	34	39	0	9	3	55	17	11	197	900
5:45 PM	5	21	0	2	28	54	2	2	3	53	13	12	195	850
Count Total	76	164	6	17	232	343	6	62	23	519	157	100	1,705	
Peak Hr	43	90	5	6	110	191	3	41	13	277	92	55	926	

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

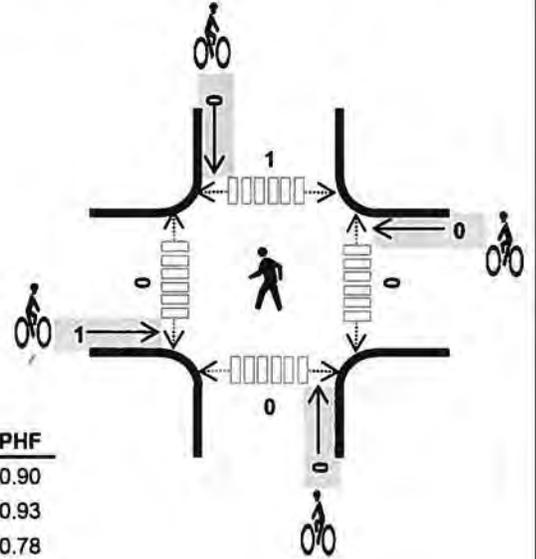
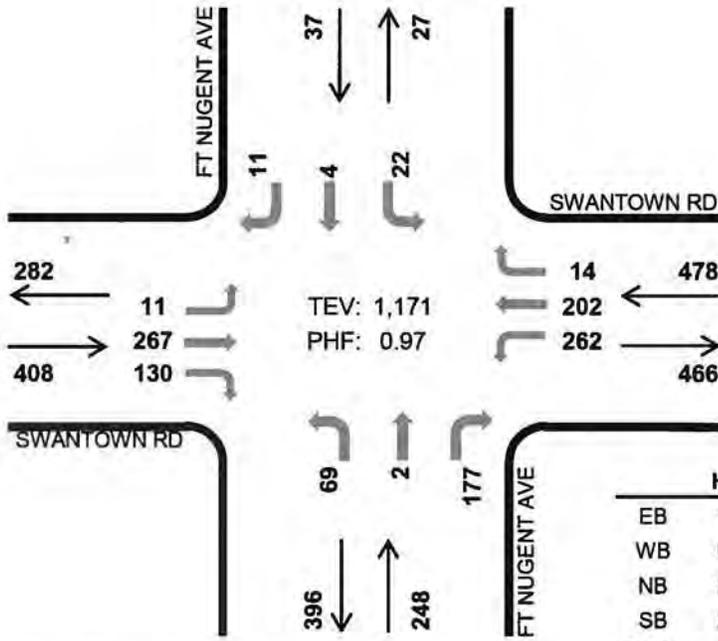
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	2	0	2
4:15 PM	1	1	0	1	3	0	0	0	1	1	0	0	0	0	0
4:30 PM	2	2	0	0	4	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0
5:00 PM	1	1	1	2	5	0	2	0	0	2	0	0	0	0	0
5:15 PM	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0
5:30 PM	2	1	0	2	5	0	0	0	0	0	0	0	2	2	
5:45 PM	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0
Count Total	7	8	1	7	23	1	2	0	3	6	0	0	2	2	4
Peak Hr	4	5	1	3	13	1	2	0	0	3	0	0	0	0	0

FT NUGENT AVE SWANTOWN RD



Peak Hour

Date: Tue, Aug 12, 2014
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:15 PM to 5:15 PM



	HV %:	PHF
EB	1.0%	0.90
WB	0.8%	0.93
NB	2.8%	0.78
SB	2.7%	0.93
TOTAL	1.4%	0.97

Two-Hour Count Summaries

Interval Start	SWANTOWN RD			SWANTOWN RD			FT NUGENT AVE			FT NUGENT AVE			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	54	19	54	51	1	12	0	53	4	1	2	251	
4:15 PM	3	73	29	62	46	5	16	0	34	8	2	0	278	
4:30 PM	3	77	33	75	47	6	14	0	39	3	0	5	302	
4:45 PM	2	55	28	60	60	1	23	0	57	5	1	3	295	1,126
5:00 PM	3	62	40	65	49	2	16	2	47	6	1	3	296	1,171
5:15 PM	3	48	27	63	61	0	22	0	46	2	0	2	274	1,167
5:30 PM	1	43	24	72	66	0	18	0	47	5	1	4	281	1,146
5:45 PM	2	54	22	53	44	2	22	0	42	2	0	4	247	1,098
Count Total	17	466	222	504	424	17	143	2	365	35	6	23	2,224	
Peak Hr	11	267	130	262	202	14	69	2	177	22	4	11	1,171	

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

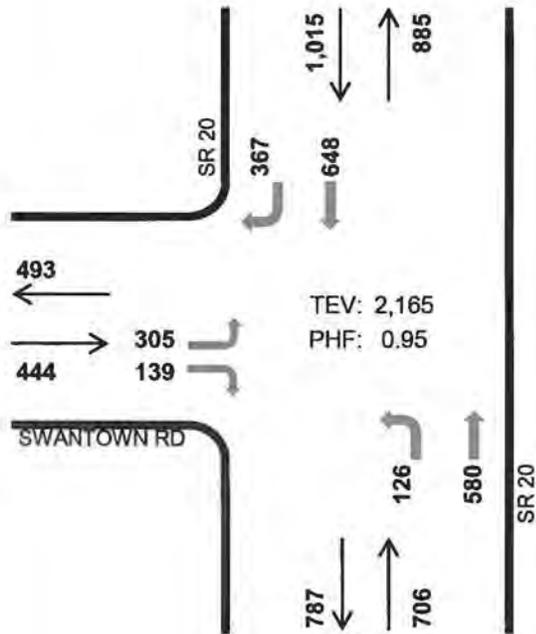
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	3	2	0	5	0	0	0	0	0	0	0	2	0	2
4:15 PM	1	1	2	0	4	0	0	0	0	0	0	0	1	0	1
4:30 PM	1	2	1	0	4	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	3	1	4	1	0	0	0	1	0	0	0	0	0
5:00 PM	2	1	1	0	4	0	0	0	0	0	0	0	0	0	0
5:15 PM	1	2	0	0	3	0	0	0	0	0	0	2	3	0	5
5:30 PM	2	1	0	0	3	1	0	0	0	1	0	0	0	0	0
5:45 PM	1	0	1	0	2	0	0	0	0	0	0	0	2	2	4
Count Total	8	10	10	1	29	2	0	0	0	2	0	2	8	2	12
Peak Hr	4	4	7	1	16	1	0	0	0	1	0	0	1	0	1

SR 20 SWANTOWN RD

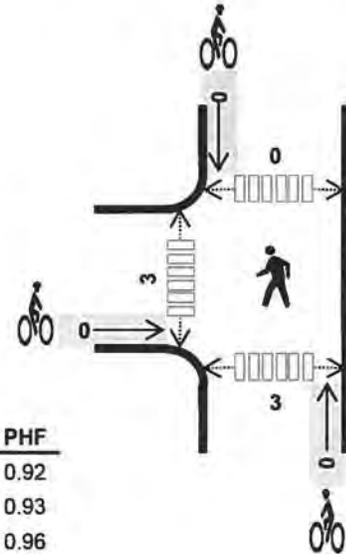


Peak Hour

Date: Tue, Aug 12, 2014
 Count Period: 4:00 PM to 6:00 PM
 Peak Hour: 4:30 PM to 5:30 PM



TEV: 2,165
 PHF: 0.95



	HV %:	PHF
EB	1.6%	0.92
NB	2.3%	0.93
SB	1.6%	0.96
TOTAL	1.8%	0.95

Two-Hour Count Summaries

Interval Start	SWANTOWN RD			SWANTOWN RD			SR 20			SR 20			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	72	0	25	0	0	0	14	137	0	0	165	93	506	
4:15 PM	77	0	44	0	0	0	21	119	0	0	160	91	512	
4:30 PM	77	0	38	0	0	0	23	167	0	0	164	101	570	
4:45 PM	82	0	39	0	0	0	37	153	0	0	146	89	546	2,134
5:00 PM	73	0	29	0	0	0	27	136	0	0	175	89	529	2,157
5:15 PM	73	0	33	0	0	0	39	124	0	0	163	88	520	2,165
5:30 PM	75	0	29	0	0	0	31	102	0	0	169	120	526	2,121
5:45 PM	68	0	29	0	0	0	22	107	0	0	136	83	445	2,020
Count Total	597	0	266	0	0	0	214	1,045	0	0	1,278	754	4,154	
Peak Hr	305	0	139	0	0	0	126	580	0	0	648	367	2,165	

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	0	2	6	9	0	0	0	0	0	0	0	0	1	1
4:15 PM	3	0	5	5	13	0	0	0	0	0	0	1	0	0	1
4:30 PM	3	0	8	2	13	0	0	0	0	0	0	2	0	0	2
4:45 PM	3	0	2	4	9	0	0	0	0	0	0	1	0	1	2
5:00 PM	1	0	3	4	8	0	0	0	0	0	0	0	0	2	2
5:15 PM	0	0	3	6	9	0	0	0	0	0	0	0	0	0	0
5:30 PM	1	0	6	1	8	0	0	0	0	0	0	0	0	0	0
5:45 PM	2	0	5	0	7	0	0	1	0	1	0	1	0	2	3
Count Total	14	0	34	28	76	0	0	1	0	1	0	5	0	6	11
Peak Hr	7	0	16	16	39	0	0	0	0	0	0	3	0	3	6

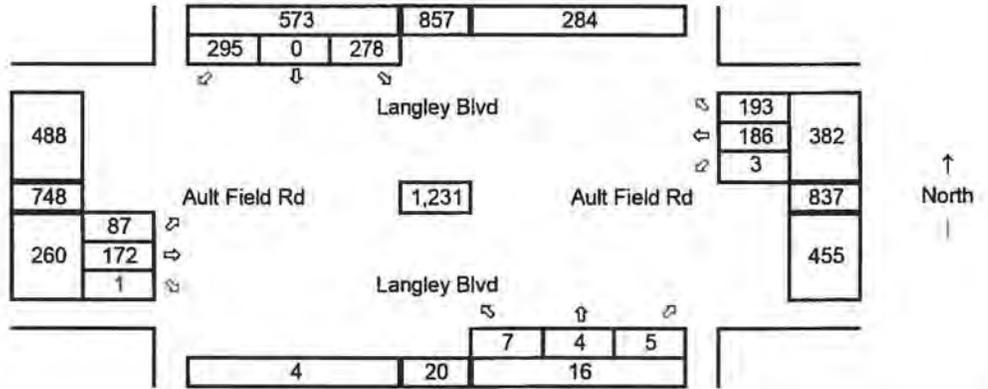
Turning Movement Calculations

1 Langley Blvd @ Ault Field Rd

Synchro ID: 1
Existing
 Average Weekday
 PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



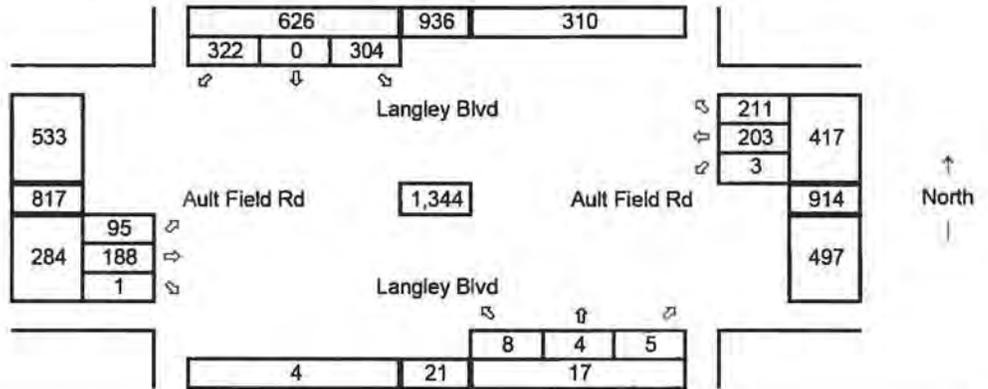
Future without Project
 Average Weekday
 PM Peak Hour

Year: 2017

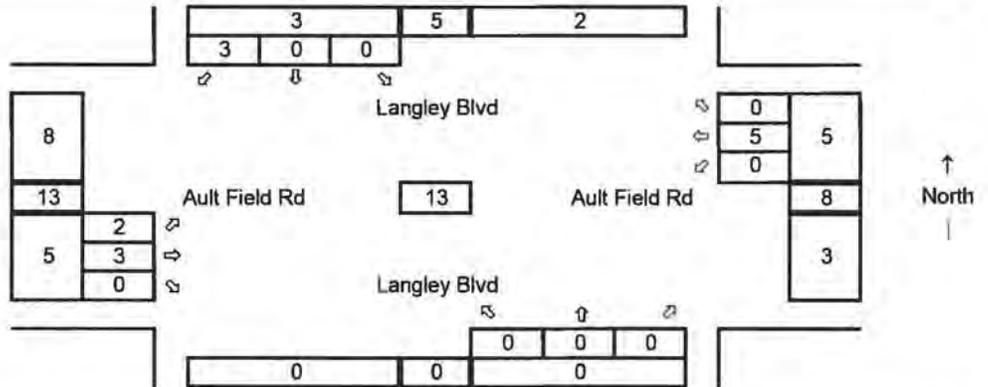
Growth Rate = 3.0%

Years of Growth = 3

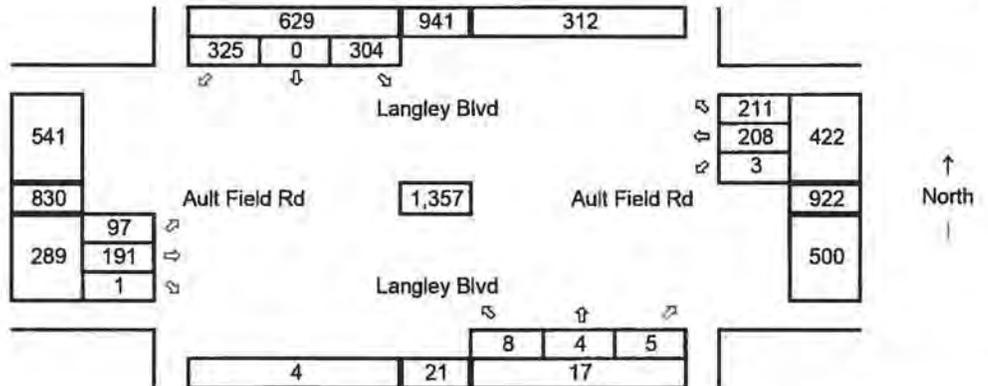
Total Growth = 1.0927



Total Project Trips
 Average Weekday
 PM Peak Hour



Future with Project
 Average Weekday
 PM Peak Hour

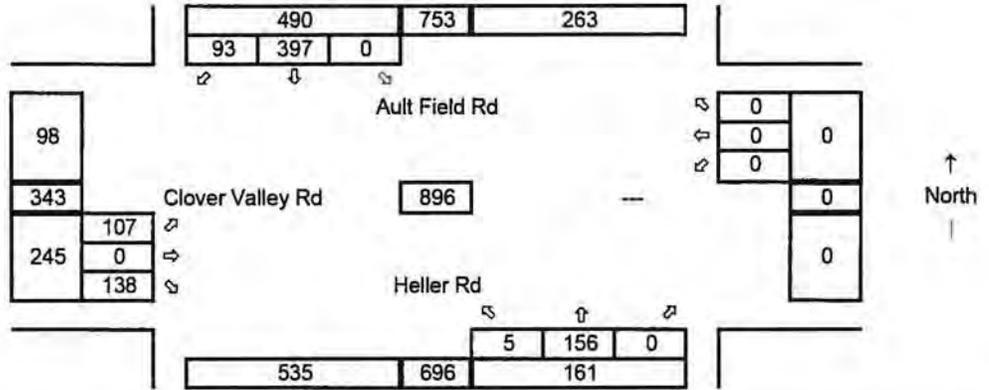


2 Clover Valley Rd @ Ault Field

Synchro ID: 2
Existing
 Average Weekday
 PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



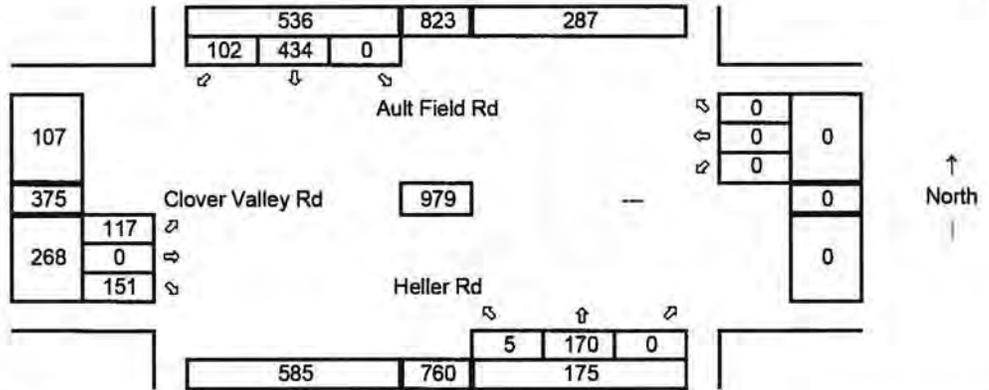
Future without Project
 Average Weekday
 PM Peak Hour

Year: 2017

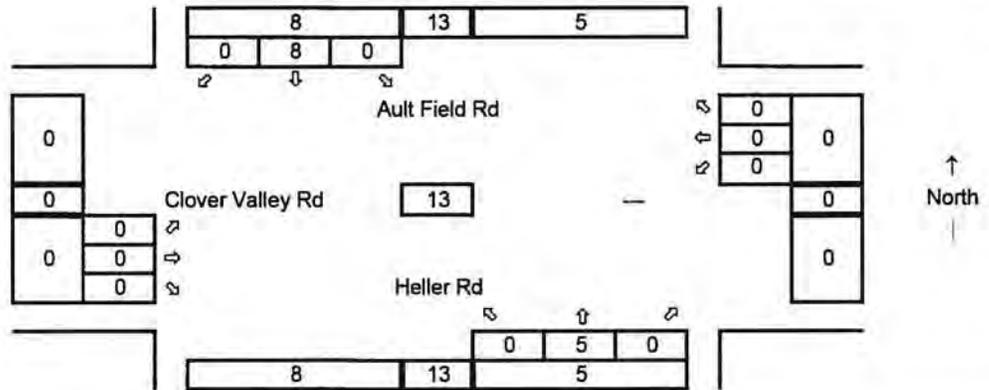
Growth Rate = 3.0%

Years of Growth = 3

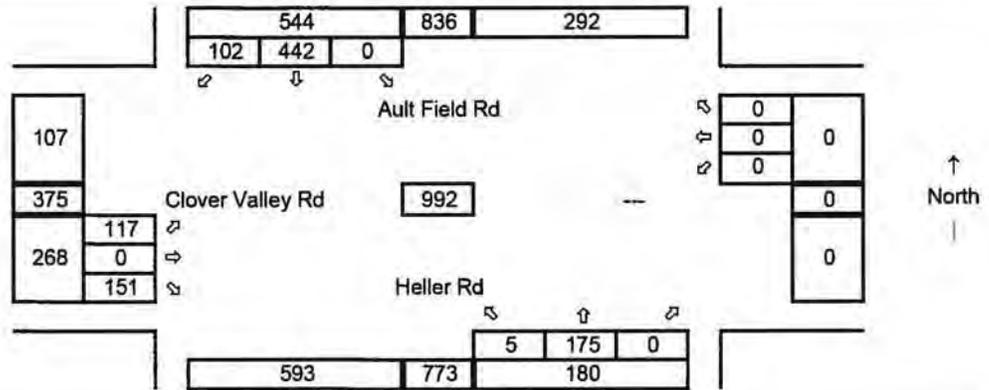
Total Growth = 1.0927



Total Project Trips
 Average Weekday
 PM Peak Hour



Future with Project
 Average Weekday
 PM Peak Hour

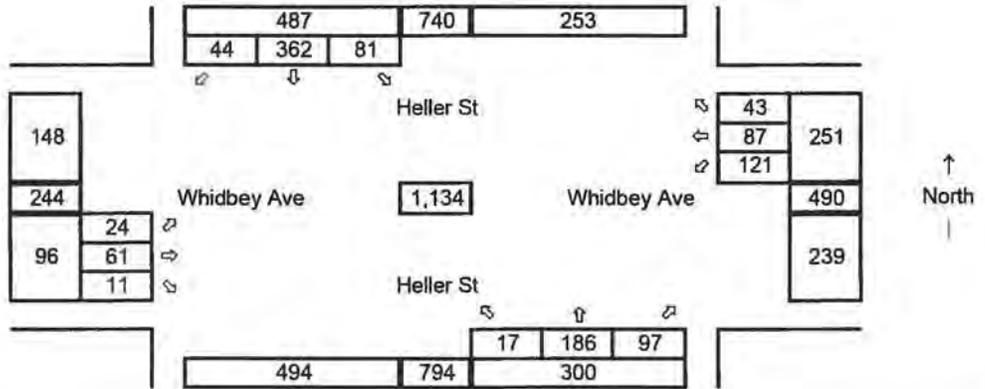


3 Heller St @ Whidbey Ave

Synchro ID: 3
Existing
 Average Weekday
 PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



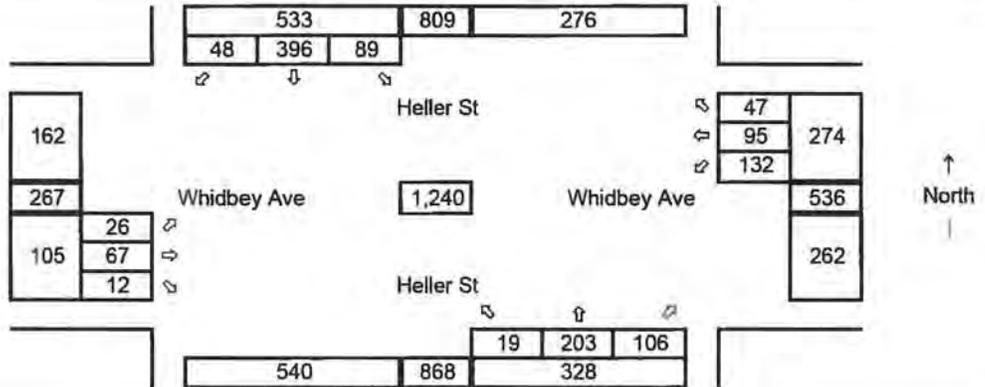
Future without Project
 Average Weekday
 PM Peak Hour

Year: 2017

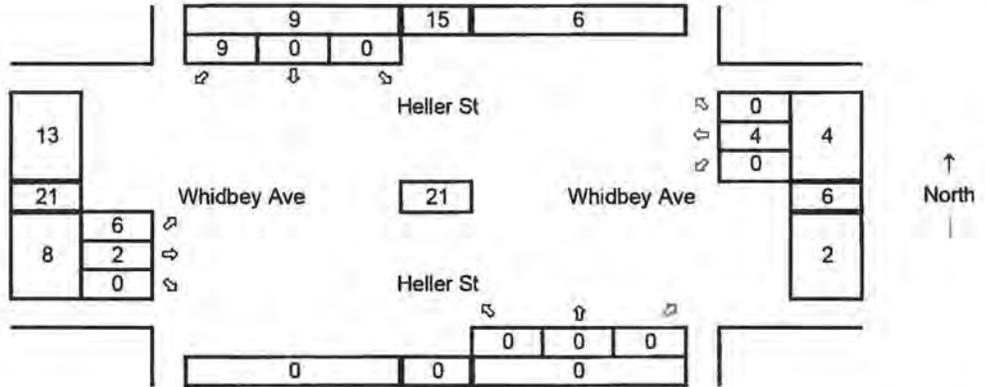
Growth Rate = 3.0%

Years of Growth = 3

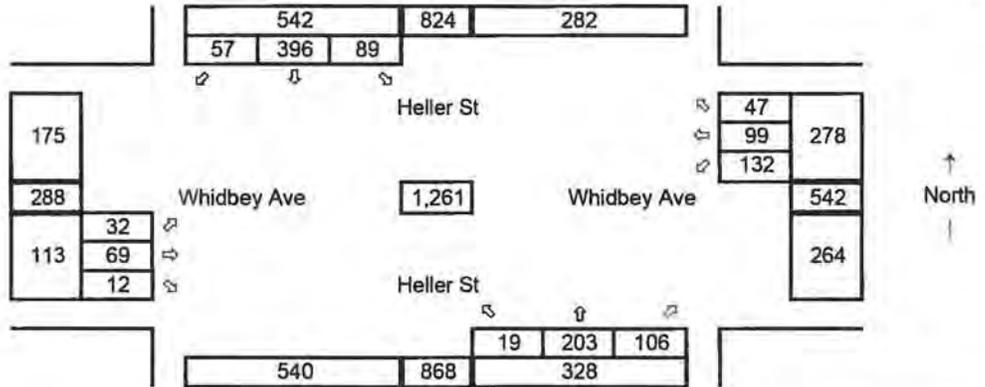
Total Growth = 1.0927



Total Project Trips
 Average Weekday
 PM Peak Hour



Future with Project
 Average Weekday
 PM Peak Hour



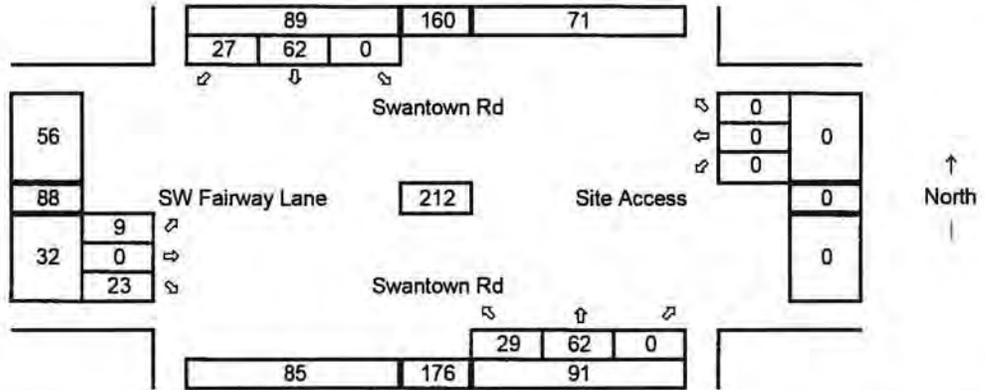
4 Swantown Rd @ Fairay Ln

Synchro ID: 4

Existing
Average Weekday
PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



Future without Project

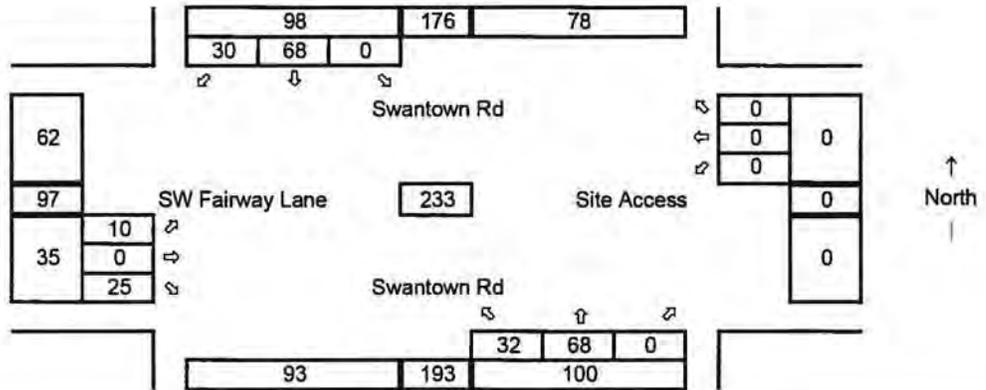
Average Weekday
PM Peak Hour

Year: 2017

Growth Rate = 3.0%

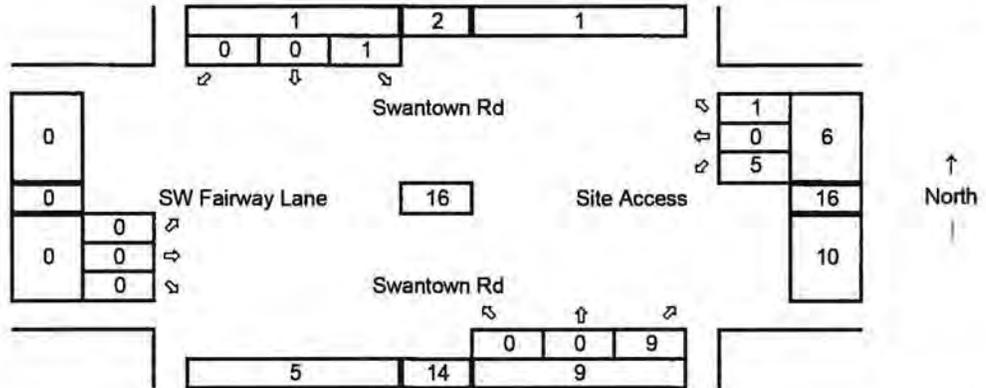
Years of Growth = 3

Total Growth = 1.0927



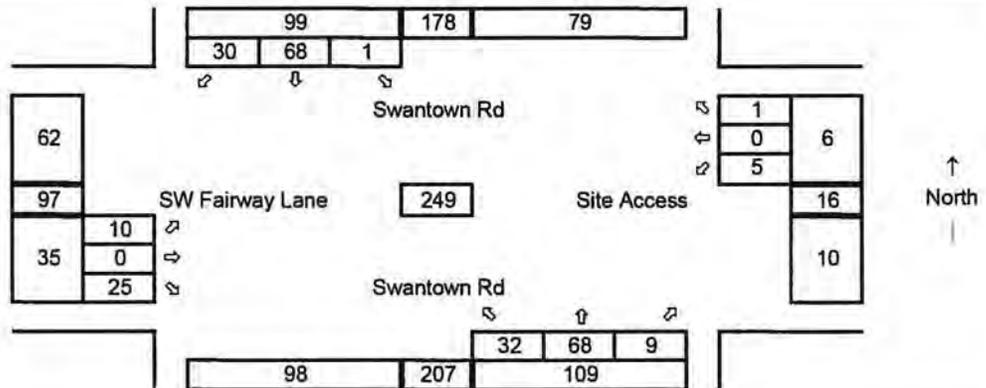
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

Average Weekday
PM Peak Hour



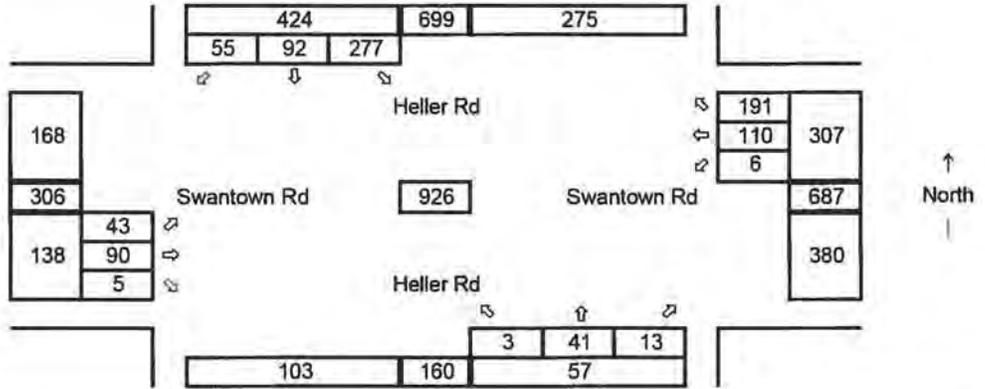
5 Heller Rd @ Swantown Rd

Synchro ID: 5

Existing
Average Weekday
PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



Future without Project

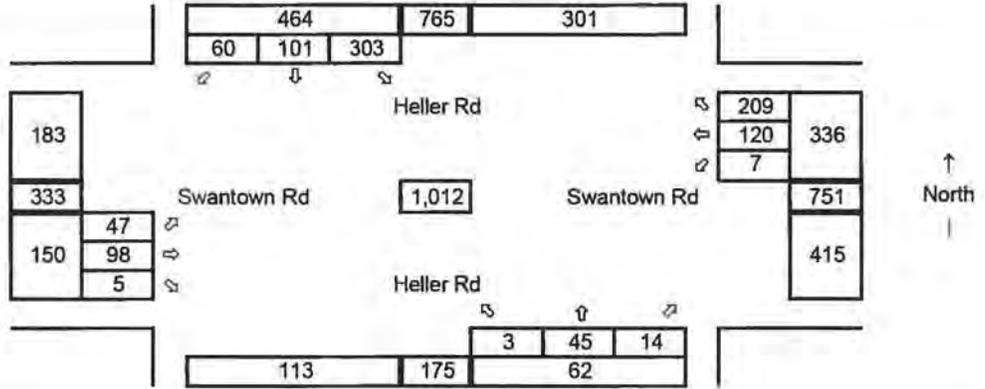
Average Weekday
PM Peak Hour

Year: 2017

Growth Rate = 3.0%

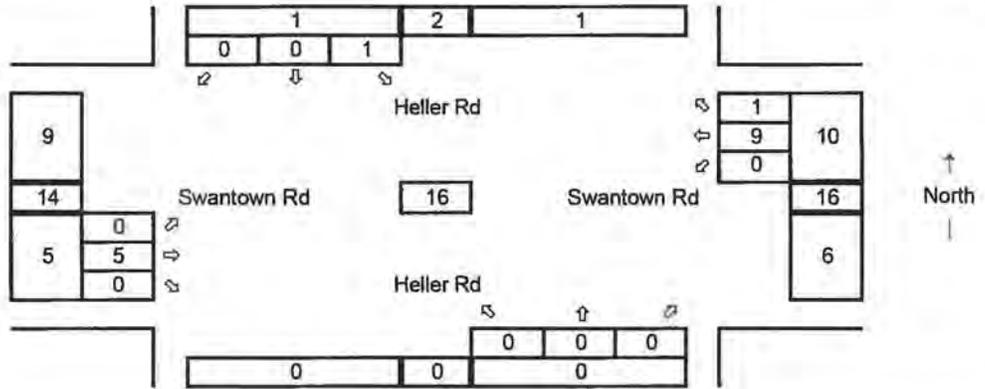
Years of Growth = 3

Total Growth = 1.0927



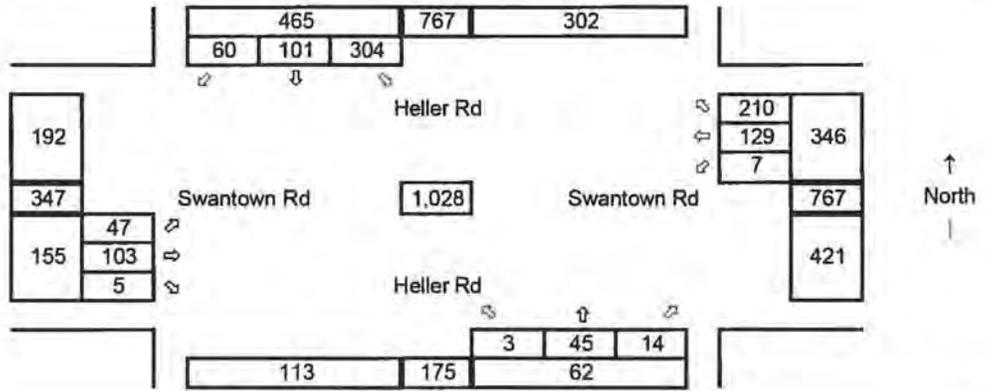
Total Project Trips

Average Weekday
PM Peak Hour



Future with Project

Average Weekday
PM Peak Hour



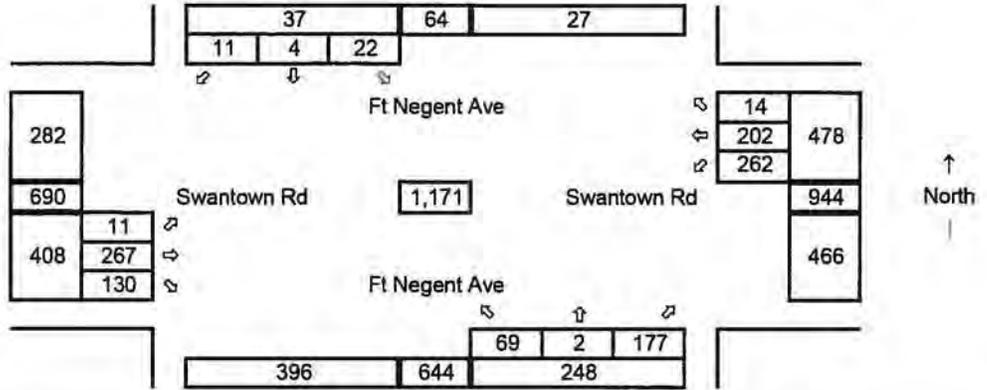
6 Ft Nugent @ Swantown Rd

Synchro ID: 6

Existing
Average Weekday
PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



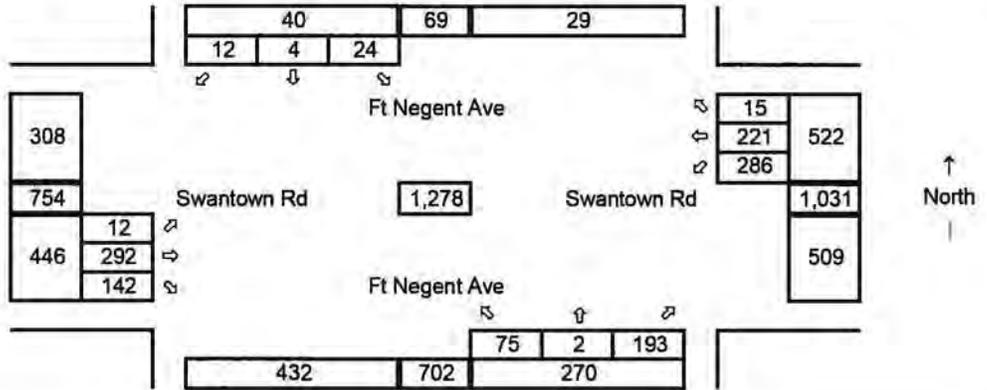
Future without Project
Average Weekday
PM Peak Hour

Year: 2017

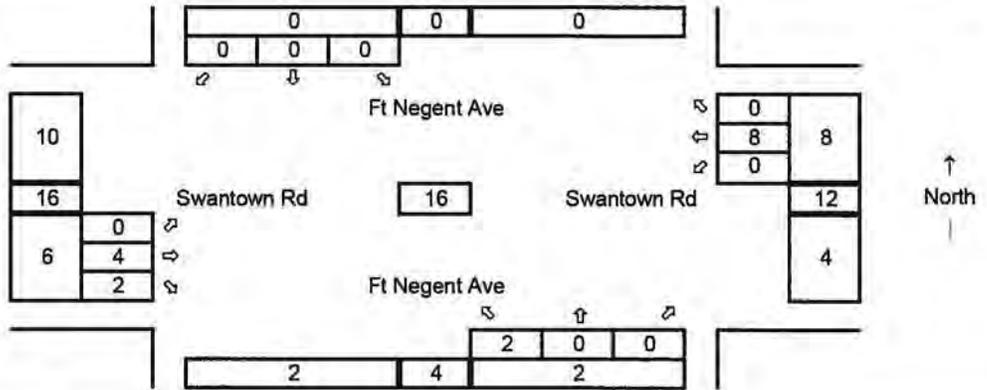
Growth Rate = 3.0%

Years of Growth = 3

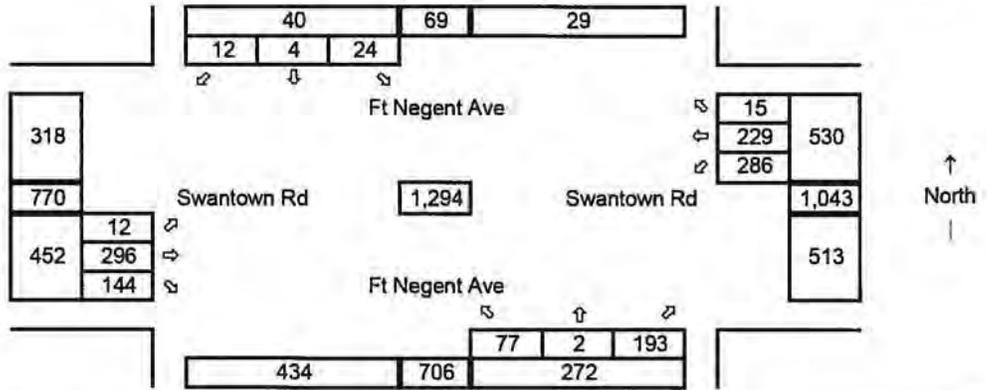
Total Growth = 1.0927



Total Project Trips
Average Weekday
PM Peak Hour



Future with Project
Average Weekday
PM Peak Hour

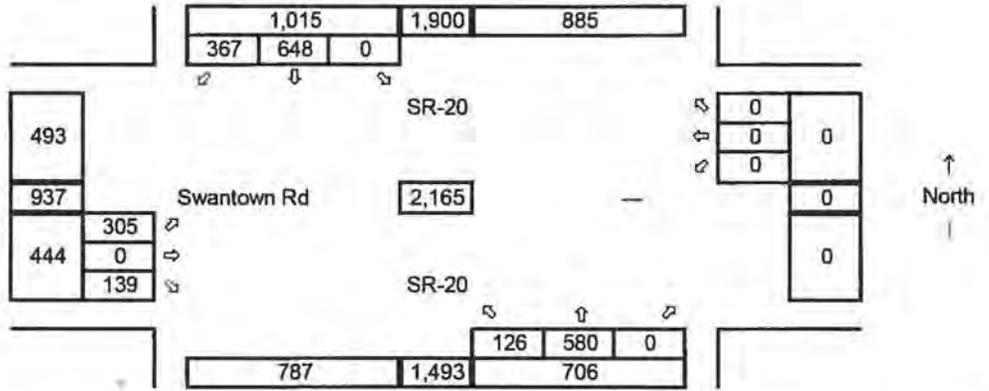


7 SR-20 @ Swantown Rd

Synchro ID: 7
Existing
 Average Weekday
 PM Peak Hour

Year: 8/12/14

Data Source: Idax Data



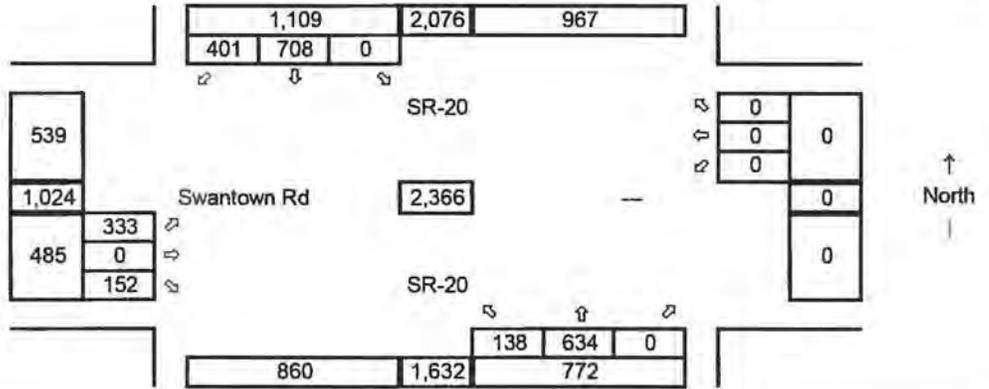
Future without Project
 Average Weekday
 PM Peak Hour

Year: 2017

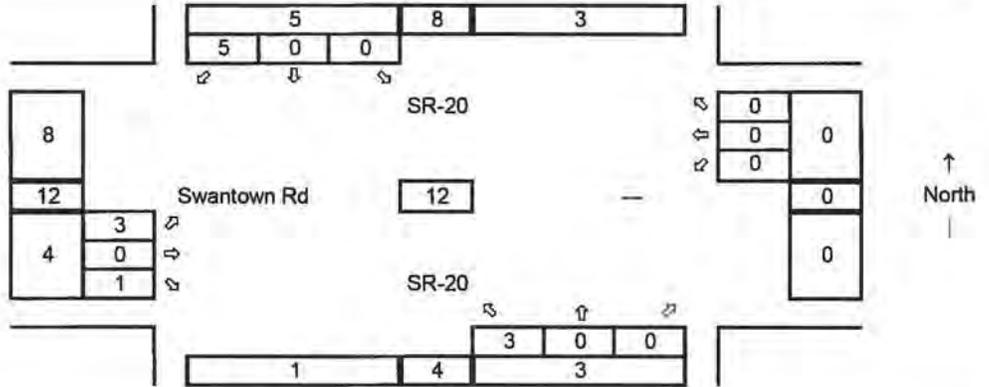
Growth Rate = 3.0%

Years of Growth = 3

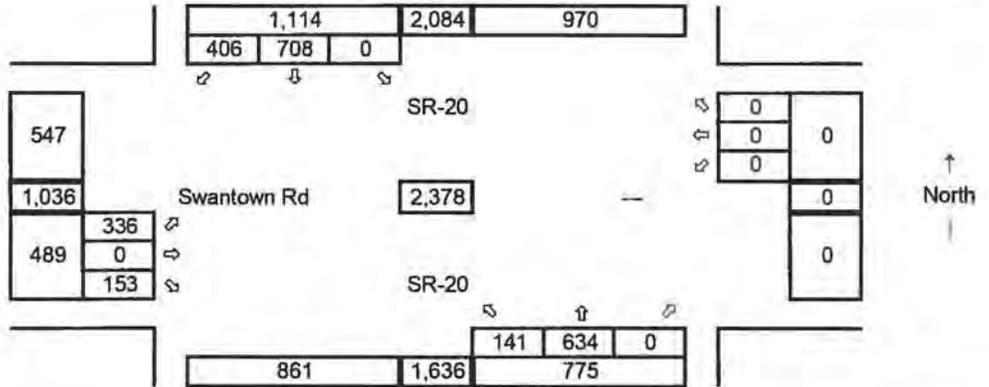
Total Growth = 1.0927



Total Project Trips
 Average Weekday
 PM Peak Hour



Future with Project
 Average Weekday
 PM Peak Hour



Existing PM Peak-Hour Level of Service Analysis

H:\2014\14-175\Synchro\Existing.syn
 1: Ault Field Rd & Langley Blvd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	172	1	3	186	193	7	4	5	278	0	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	70		0	50		150	0		0	0		50
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.960				0.850
Flt Protected	0.950			0.950				0.977			0.950	
Satd. Flow (prot)	1787	1879	0	1787	1881	1599	0	1764	0	0	1787	1599
Flt Permitted	0.950			0.950				0.408			0.746	
Satd. Flow (perm)	1787	1879	0	1787	1881	1599	0	737	0	0	1403	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						210		5				195
Link Speed (mph)		30			30			30				30
Link Distance (ft)		394			528			211				618
Travel Time (s)		9.0			12.0			4.8				14.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	95	187	1	3	202	210	8	4	5	302	0	321
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	188	0	3	202	210	0	17	0	0	302	321
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		6
Detector Phase	7	4		3	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0		8.0	20.0	20.0	20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	27.0		8.0	21.0	21.0	20.0	20.0		35.0	35.0	35.0
Total Split (%)	15.6%	30.0%		8.9%	23.3%	23.3%	22.2%	22.2%		38.9%	38.9%	38.9%
Maximum Green (s)	10.0	23.0		4.0	17.0	17.0	16.0	16.0		31.0	31.0	31.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5

GTC (MJP)

Existing 2014

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1: Ault Field Rd & Langley Blvd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0		0	0	0
Act Effct Green (s)	8.7	20.9		4.4	12.6	12.6		7.2			19.8	19.8
Actuated g/C Ratio	0.14	0.33		0.07	0.20	0.20		0.12			0.32	0.32
v/c Ratio	0.38	0.30		0.02	0.53	0.43		0.19			0.68	0.50
Control Delay	34.8	19.0		36.3	31.6	7.6		32.6			28.7	10.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	34.8	19.0		36.3	31.6	7.6		32.6			28.7	10.8
LOS	C	B		D	C	A		C			C	B
Approach Delay		24.3			19.5			32.6			19.5	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	34	47		1	71	0		4			101	36
Queue Length 95th (ft)	94	137		10	162	54		26			208	111
Internal Link Dist (ft)		314			448			131			538	
Turn Bay Length (ft)	70			50		150						50
Base Capacity (vph)	316	816		126	566	628		212			770	965
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.30	0.23		0.02	0.36	0.33		0.08			0.39	0.33

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 62.4
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 20.7
 Intersection Capacity Utilization 46.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 1: Ault Field Rd & Langley Blvd

20 s	35 s	8 s	27 s
		14 s	21 s

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 2: Heller Rd & Clover Valley Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh 6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	107	138	5	156	397	93
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	110	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	122	157	6	177	451	106

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	693	504	557	0	-	0
Stage 1	504	-	-	-	-	-
Stage 2	189	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3,509	3,309	2,209	-	-	-
Pot Cap-1 Maneuver	411	570	1019	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	846	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	409	570	1019	-	-	-
Mov Cap-2 Maneuver	409	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	841	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	21.9		0.3		0
HCM LOS	C				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1019	-	486	-	-
HCM Lane V/C Ratio	0.006	-	0.573	-	-
HCM Control Delay (s)	8.6	-	21.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	3.5	-	-

GTC (MJP)

Existing 2014

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3: Heller Rd & Whidbey Ave

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	61	11	121	87	43	17	186	97	81	362	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976			0.951			0.949			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1818	0	1770	1771	0	1770	1768	0	1770	1833	0
Flt Permitted	0.669			0.505			0.481			0.491		
Satd. Flow (perm)	1246	1818	0	941	1771	0	896	1768	0	915	1833	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			26			37			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		352			424			639			566	
Travel Time (s)		8.0			9.6			14.5			12.9	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	64	12	127	92	45	18	196	102	85	381	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	76	0	127	137	0	18	298	0	85	427	0
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	22.0		13.0	27.0		8.0	44.0		11.0	47.0	
Total Split (%)	8.9%	24.4%		14.4%	30.0%		8.9%	48.9%		12.2%	52.2%	
Maximum Green (s)	4.0	18.0		9.0	23.0		4.0	40.0		7.0	43.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	

GTC (MJP)

Existing 2014

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 3: Heller Rd & Whidbey Ave

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	11.6	8.4		18.6	15.5		47.0	43.9		52.0	49.3	
Actuated g/C Ratio	0.15	0.11		0.24	0.20		0.60	0.56		0.66	0.62	
v/c Ratio	0.12	0.38		0.41	0.37		0.03	0.30		0.13	0.37	
Control Delay	23.5	35.5		27.7	25.4		6.5	11.3		6.6	10.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.5	35.5		27.7	25.4		6.5	11.3		6.6	10.4	
LOS	C	D		C	C		A	B		A	B	
Approach Delay		32.5			26.5			11.0			9.8	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	9	32		50	44		3	73		14	88	
Queue Length 95th (ft)	27	72		94	102		11	136		34	203	
Internal Link Dist (ft)		272			344			559			486	
Turn Bay Length (ft)	150			150			100			100		
Base Capacity (vph)	209	422		323	536		578	1000		678	1148	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.18		0.39	0.26		0.03	0.30		0.13	0.37	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 78.9
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.41
 Intersection Signal Delay: 15.7
 Intersection Capacity Utilization 49.0%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 3: Heller Rd & Whidbey Ave

p1	p2	p3	p4
11 s	44 s	13 s	22 s
p5	p6	p7	p8
8 s	47 s	8 s	27 s

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 4: Swantown Rd & SW Fairway Ln

Marin Woods (14-175)

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	9	23	29	62	62	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	25	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	12	30	38	81	81	35

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	254	98	116	0	-	0
Stage 1	98	-	-	-	-	-
Stage 2	156	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	730	953	1460	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	867	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	710	953	1460	-	-	-
Mov Cap-2 Maneuver	710	-	-	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	844	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	9.3		2.4		0
HCM LOS	A				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1460	-	710	953	-	-
HCM Lane V/C Ratio	0.026	-	0.016	0.031	-	-
HCM Control Delay (s)	7.5	0	10.2	8.9	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

GTC (MJP)

Existing 2014

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 5: SW Heller St & Swantown Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh 8.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	43	90	5	6	110	191	3	41	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	0	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	96	5	6	117	203	3	44	14

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	117	0	0	101	0	0	398	320	98
Stage 1	-	-	-	-	-	-	190	190	-
Stage 2	-	-	-	-	-	-	208	130	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1471	-	-	1491	-	-	562	597	958
Stage 1	-	-	-	-	-	-	812	743	-
Stage 2	-	-	-	-	-	-	794	789	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1471	-	-	1491	-	-	446	576	958
Mov Cap-2 Maneuver	-	-	-	-	-	-	446	576	-
Stage 1	-	-	-	-	-	-	787	720	-
Stage 2	-	-	-	-	-	-	649	786	-

Approach	EB	WB	NB
HCM Control Delay, s	2.3	0.1	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	623	1471	-	-	1491	-	-	548	671
HCM Lane V/C Ratio	0.097	0.031	-	-	0.004	-	-	0.538	0.233
HCM Control Delay (s)	11.4	7.5	-	-	7.4	-	-	18.9	12
HCM Lane LOS	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	3.2	0.9

GTC (MJP)

Existing 2014

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 5: SW Heller St & Swantown Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	277	92	55
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	130	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	94	94	94
Heavy Vehicles, %	2	2	2
Mvmt Flow	295	98	59

Major/Minor	Minor2		
Conflicting Flow All	349	323	117
Stage 1	130	130	-
Stage 2	219	193	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	606	595	935
Stage 1	874	789	-
Stage 2	783	741	-
Platoon blocked, %			
Mov Cap-1 Maneuver	548	574	935
Mov Cap-2 Maneuver	548	574	-
Stage 1	847	786	-
Stage 2	702	718	-

Approach	SB
HCM Control Delay, s	16.5
HCM LOS	C

Minor Lane/Major Mvmt

GTC (MJP)

Existing 2014

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6: Ft Nugent Ave & Swantown Rd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	267	130	262	202	14	69	2	177	22	4	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952			0.996				0.850		0.961	
Flt Protected		0.999			0.973			0.954			0.971	
Satd. Flow (prot)	0	3366	0	0	3430	0	0	1777	1583	0	1738	0
Flt Permitted		0.999			0.973			0.954			0.971	
Satd. Flow (perm)	0	3366	0	0	3430	0	0	1777	1583	0	1738	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		87			3				182		11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		293			426			229			268	
Travel Time (s)		6.7			9.7			5.2			6.1	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	11	275	134	270	208	14	71	2	182	23	4	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	420	0	0	492	0	0	73	182	0	38	0
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA	
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (%)	25.0%	25.0%		25.0%	25.0%		25.0%	25.0%	25.0%	25.0%	25.0%	
Maximum Green (s)	16.0	16.0		16.0	16.0		16.0	16.0	16.0	16.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	

GTC (MJP)

Existing 2014

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 6: Ft Nugent Ave & Swantown Rd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)		12.8			14.5			16.1	16.1		16.1	
Actuated g/C Ratio		0.17			0.19			0.21	0.21		0.21	
v/c Ratio		0.66			0.74			0.19	0.38		0.10	
Control Delay		28.3			36.5			27.7	7.3		21.0	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		28.3			36.5			27.7	7.3		21.0	
LOS		C			D			C	A		C	
Approach Delay		28.3			36.5			13.1			21.0	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)		78			114			29	0		10	
Queue Length 95th (ft)		124			173			66	50		36	
Internal Link Dist (ft)		213			346			149			188	
Turn Bay Length (ft)									100			
Base Capacity (vph)		784			732			378	480		378	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.54			0.67			0.19	0.38		0.10	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 75.5
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 28.2
 Intersection Capacity Utilization 45.1%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 6: Ft Nugent Ave & Swantown Rd

02	06	04	08
20 s	20 s	20 s	20 s

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7: SR-20 & Swantown Rd

Marin Woods (14-175)

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	305	139	126	580	648	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	65			150
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit		0.850				0.850
Fit Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Fit Permitted	0.950		0.162			
Satd. Flow (perm)	1770	1583	302	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		146				143
Link Speed (mph)	30			30	30	
Link Distance (ft)	532			356	246	
Travel Time (s)	12.1			8.1	5.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	146	133	611	682	386
Shared Lane Traffic (%)						
Lane Group Flow (vph)	321	146	133	611	682	386
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (ft)	20	20	20	100	100	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	20	6	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases		4	2			Free
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	
Total Split (s)	32.0	32.0	13.0	68.0	55.0	
Total Split (%)	32.0%	32.0%	13.0%	68.0%	55.0%	
Maximum Green (s)	28.0	28.0	9.0	64.0	51.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	

GTC (MJP)

Existing 2014

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7: SR-20 & Swantown Rd

Marin Woods (14-175)

Lane Group						
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	19.1	19.1	43.7	43.7	34.2	71.7
Actuated g/C Ratio	0.27	0.27	0.61	0.61	0.48	1.00
v/c Ratio	0.68	0.28	0.36	0.54	0.77	0.24
Control Delay	35.0	6.6	9.0	10.2	23.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	6.6	9.0	10.2	23.9	0.4
LOS	C	A	A	B	C	A
Approach Delay	26.1			10.0	15.4	
Approach LOS	C			B	B	
Queue Length 50th (ft)	132	0	21	131	253	0
Queue Length 95th (ft)	275	45	53	274	463	0
Internal Link Dist (ft)	452			276	166	
Turn Bay Length (ft)			65			150
Base Capacity (vph)	771	772	389	1586	1355	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.19	0.34	0.39	0.50	0.24

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 71.7
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 15.8
 Intersection Capacity Utilization 68.0%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 7: SR-20 & Swantown Rd

	
68 s	32 s
	
13 s	55 s

GTC (MJP)

Existing 2014

Baseline PM Peak-Hour Level of Service Analysis

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1: Ault Field Rd & Langley Blvd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	188	1	3	203	211	8	4	5	304	0	322
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	70		0	50		150	0		0	0		50
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.962				0.850
Flt Protected	0.950			0.950				0.976			0.950	
Satd. Flow (prot)	1787	1879	0	1787	1881	1599	0	1766	0	0	1787	1599
Flt Permitted	0.950			0.950				0.405			0.746	
Satd. Flow (perm)	1787	1879	0	1787	1881	1599	0	733	0	0	1403	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						229		5				194
Link Speed (mph)		30			30			30				30
Link Distance (ft)		394			528			211				618
Travel Time (s)		9.0			12.0			4.8				14.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	103	204	1	3	221	229	9	4	5	330	0	350
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	205	0	3	221	229	0	18	0	0	330	350
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		6
Detector Phase	7	4		3	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0		8.0	20.0	20.0	20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	27.0		8.0	21.0	21.0	20.0	20.0		35.0	35.0	35.0
Total Split (%)	15.6%	30.0%		8.9%	23.3%	23.3%	22.2%	22.2%		38.9%	38.9%	38.9%
Maximum Green (s)	10.0	23.0		4.0	17.0	17.0	16.0	16.0		31.0	31.0	31.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5

GTC (MJP)

Baseline 2017

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 1: Ault Field Rd & Langley Blvd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0		0	0	0
Act Effct Green (s)	9.0	21.7		4.4	13.2	13.2		7.4			21.5	21.5
Actuated g/C Ratio	0.14	0.33		0.07	0.20	0.20		0.11			0.33	0.33
v/c Ratio	0.42	0.33		0.02	0.58	0.45		0.21			0.71	0.53
Control Delay	37.0	20.1		37.3	33.7	7.6		34.1			30.2	12.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	37.0	20.1		37.3	33.7	7.6		34.1			30.2	12.0
LOS	D	C		D	C	A		C			C	B
Approach Delay		25.8			20.6			34.1			20.8	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	40	57		1	86	0		5			120	48
Queue Length 95th (ft)	101	149		10	178	57		27			233	131
Internal Link Dist (ft)		314			448			131			538	
Turn Bay Length (ft)	70			50		150						50
Base Capacity (vph)	303	795		121	543	625		203			739	934
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.34	0.26		0.02	0.41	0.37		0.09			0.45	0.37

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 65.1
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 21.9
 Intersection Capacity Utilization 49.5%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 1: Ault Field Rd & Langley Blvd

20 s	35 s					8 s		27 s			
						14 s		21 s			

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 2: Heller Rd & Clover Valley Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh 7.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	117	151	5	170	434	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	110	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	133	172	6	193	493	116

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	756	551	609	0	-	0
Stage 1	551	-	-	-	-	-
Stage 2	205	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	377	536	974	-	-	-
Stage 1	579	-	-	-	-	-
Stage 2	832	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	375	536	974	-	-	-
Mov Cap-2 Maneuver	375	-	-	-	-	-
Stage 1	579	-	-	-	-	-
Stage 2	827	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	28		0.2		0
HCM LOS	D				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	974	-	451	-	-
HCM Lane V/C Ratio	0.006	-	0.675	-	-
HCM Control Delay (s)	8.7	-	28	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	4.9	-	-

GTC (MJP)

Baseline 2017

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 3: Heller Rd & Whidbey Ave

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	67	12	132	95	47	19	203	106	89	396	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.951			0.948			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1820	0	1770	1771	0	1770	1766	0	1770	1833	0
Flt Permitted	0.662			0.485			0.446			0.467		
Satd. Flow (perm)	1233	1820	0	903	1771	0	831	1766	0	870	1833	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			26			38			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		352			424			639			566	
Travel Time (s)		8.0			9.6			14.5			12.9	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	27	71	13	139	100	49	20	214	112	94	417	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	84	0	139	149	0	20	326	0	94	468	0
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	22.0		13.0	27.0		8.0	44.0		11.0	47.0	
Total Split (%)	8.9%	24.4%		14.4%	30.0%		8.9%	48.9%		12.2%	52.2%	
Maximum Green (s)	4.0	18.0		9.0	23.0		4.0	40.0		7.0	43.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	

GTC (MJP)

Baseline 2017

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3: Heller Rd & Whidbey Ave

Marin Woods (14-175)

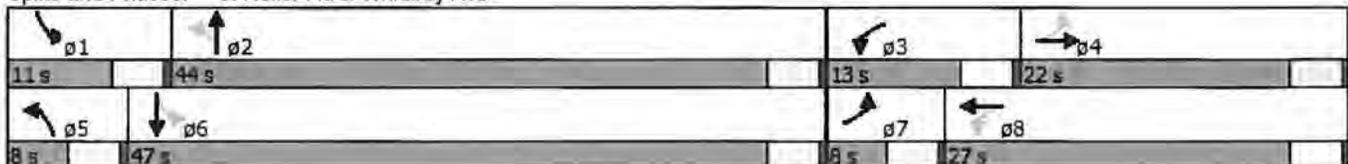
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	11.4	8.6		19.0	15.9		46.6	43.5		51.5	48.9	
Actuated g/C Ratio	0.14	0.11		0.24	0.20		0.59	0.55		0.65	0.62	
v/c Ratio	0.13	0.41		0.45	0.39		0.04	0.33		0.15	0.41	
Control Delay	23.5	36.5		28.4	26.0		6.7	11.9		6.8	11.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.5	36.5		28.4	26.0		6.7	11.9		6.8	11.1	
LOS	C	D		C	C		A	B		A	B	
Approach Delay		33.3			27.2			11.6			10.4	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	10	36		56	49		3	83		16	101	
Queue Length 95th (ft)	29	78		102	110		12	153		37	231	
Internal Link Dist (ft)		272			344			559			486	
Turn Bay Length (ft)	150			150			100			100		
Base Capacity (vph)	205	423		322	536		538	989		648	1138	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.20		0.43	0.28		0.04	0.33		0.15	0.41	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 78.9
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 16.4
 Intersection Capacity Utilization 52.0%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 3: Heller Rd & Whidbey Ave



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 4: Swantown Rd & SW Fairway Ln

Marin Woods (14-175)

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	10	25	32	68	68	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	25	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	13	32	42	88	88	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	279	108	127	0	-	0
Stage 1	108	-	-	-	-	-
Stage 2	171	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	707	940	1447	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	685	940	1447	-	-	-
Mov Cap-2 Maneuver	685	-	-	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	828	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	9.4		2.4		0
HCM LOS	A				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1447	-	685	940	-	-
HCM Lane V/C Ratio	0.029	-	0.019	0.035	-	-
HCM Control Delay (s)	7.6	0	10.4	9	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

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 5: SW Heller St & Swantown Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh 10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	47	98	5	7	120	209	3	45	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	80	-	-	0	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	104	5	7	128	222	3	48	15

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	128	0	0	110	0	0	435	350	107
Stage 1	-	-	-	-	-	-	207	207	-
Stage 2	-	-	-	-	-	-	228	143	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1458	-	-	1480	-	-	531	574	947
Stage 1	-	-	-	-	-	-	795	731	-
Stage 2	-	-	-	-	-	-	775	779	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1458	-	-	1480	-	-	408	552	947
Mov Cap-2 Maneuver	-	-	-	-	-	-	408	552	-
Stage 1	-	-	-	-	-	-	768	706	-
Stage 2	-	-	-	-	-	-	618	775	-

Approach	EB	WB	NB
HCM Control Delay, s	2.4	0.2	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	598	1458	-	-	1480	-	-	515	647
HCM Lane V/C Ratio	0.11	0.034	-	-	0.005	-	-	0.626	0.265
HCM Control Delay (s)	11.8	7.6	-	-	7.4	-	-	23	12.6
HCM Lane LOS	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	4.3	1.1

GTC (MJP)

Baseline 2017

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 5: SW Heller St & Swantown Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	303	101	60
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	130	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	94	94	94
Heavy Vehicles, %	2	2	2
Mvmt Flow	322	107	64

Major/Minor	Minor2		
Conflicting Flow All	381	353	128
Stage 1	143	143	-
Stage 2	238	210	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	577	572	922
Stage 1	860	779	-
Stage 2	765	728	-
Platoon blocked, %			
Mov Cap-1 Maneuver	515	550	922
Mov Cap-2 Maneuver	515	550	-
Stage 1	831	775	-
Stage 2	678	703	-

Approach	SB
HCM Control Delay, s	19.4
HCM LOS	C

Minor Lane/Major Mvmt

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6: Ft Nugent Ave & Swantown Rd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	292	142	286	221	15	75	2	193	24	4	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952			0.996				0.850		0.960	
Flt Protected		0.999			0.973			0.954			0.970	
Satd. Flow (prot)	0	3366	0	0	3430	0	0	1777	1583	0	1735	0
Flt Permitted		0.999			0.973			0.954			0.970	
Satd. Flow (perm)	0	3366	0	0	3430	0	0	1777	1583	0	1735	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		86			3				199			12
Link Speed (mph)		30			30			30				30
Link Distance (ft)		293			426			229				268
Travel Time (s)		6.7			9.7			5.2				6.1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	301	146	295	228	15	77	2	199	25	4	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	459	0	0	538	0	0	79	199	0	41	0
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA	
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (%)	25.0%	25.0%		25.0%	25.0%		25.0%	25.0%	25.0%	25.0%	25.0%	
Maximum Green (s)	16.0	16.0		16.0	16.0		16.0	16.0	16.0	16.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	

GTC (MJP)

Baseline 2017

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6: Ft Nugent Ave & Swantown Rd

Marin Woods (14-175)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		13.4			15.1			16.0	16.0		16.0	
Actuated g/C Ratio		0.17			0.20			0.21	0.21		0.21	
v/c Ratio		0.70			0.79			0.21	0.41		0.11	
Control Delay		30.1			39.4			28.2	7.3		21.1	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		30.1			39.4			28.2	7.3		21.1	
LOS		C			D			C	A		C	
Approach Delay		30.1			39.4			13.2			21.1	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)		89			130			32	0		12	
Queue Length 95th (ft)		138			#205			70	53		38	
Internal Link Dist (ft)		213			346			149			188	
Turn Bay Length (ft)									100			
Base Capacity (vph)		773			720			372	488		372	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.59			0.75			0.21	0.41		0.11	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 76.6
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 30.1
 Intersection Capacity Utilization 47.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 6: Ft Nugent Ave & Swantown Rd

 20 s	 20 s	 20 s	 20 s
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7: SR-20 & Swantown Rd

Marin Woods (14-175)

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	333	152	138	634	708	401
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	65			150
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.114			
Satd. Flow (perm)	1770	1583	212	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		160				143
Link Speed (mph)	30			30	30	
Link Distance (ft)	532			356	246	
Travel Time (s)	12.1			8.1	5.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	351	160	145	667	745	422
Shared Lane Traffic (%)						
Lane Group Flow (vph)	351	160	145	667	745	422
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (ft)	20	20	20	100	100	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	20	6	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases		4	2			Free
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	
Total Split (s)	32.0	32.0	13.0	68.0	55.0	
Total Split (%)	32.0%	32.0%	13.0%	68.0%	55.0%	
Maximum Green (s)	28.0	28.0	9.0	64.0	51.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	

GTC (MJP)

Baseline 2017

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 7: SR-20 & Swantown Rd

Marin Woods (14-175)

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	20.8	20.8	50.8	50.8	37.7	80.1
Actuated g/C Ratio	0.26	0.26	0.63	0.63	0.47	1.00
v/c Ratio	0.76	0.30	0.47	0.56	0.85	0.27
Control Delay	41.2	6.4	13.2	11.1	29.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	6.4	13.2	11.1	29.8	0.4
LOS	D	A	B	B	C	A
Approach Delay	30.3			11.5	19.1	
Approach LOS	C			B	B	
Queue Length 50th (ft)	164	0	26	171	315	0
Queue Length 95th (ft)	304	47	69	313	535	0
Internal Link Dist (ft)	452			276	166	
Turn Bay Length (ft)			65			150
Base Capacity (vph)	656	687	320	1492	1258	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.23	0.45	0.45	0.59	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 80.1
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 18.9
 Intersection Capacity Utilization 73.4%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 7: SR-20 & Swantown Rd

 68 s	 32 s
 13 s	 55 s

Future With Development PM Peak-Hour Level of Service Analysis

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1: Ault Field Rd & Langley Blvd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	191	1	3	208	211	8	4	5	304	0	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	70		0	50		150	0		0	0		50
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.962				0.850
Flt Protected	0.950			0.950				0.976			0.950	
Satd. Flow (prot)	1787	1879	0	1787	1881	1599	0	1766	0	0	1787	1599
Flt Permitted	0.950			0.950				0.405			0.746	
Satd. Flow (perm)	1787	1879	0	1787	1881	1599	0	733	0	0	1403	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						229		5				196
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		394			528			211			618	
Travel Time (s)		9.0			12.0			4.8			14.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	105	208	1	3	226	229	9	4	5	330	0	353
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	209	0	3	226	229	0	18	0	0	330	353
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases						8	2			6		6
Detector Phase	7	4		3	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0		8.0	20.0	20.0	20.0	20.0		20.0	20.0	20.0
Total Split (s)	14.0	27.0		8.0	21.0	21.0	20.0	20.0		35.0	35.0	35.0
Total Split (%)	15.6%	30.0%		8.9%	23.3%	23.3%	22.2%	22.2%		38.9%	38.9%	38.9%
Maximum Green (s)	10.0	23.0		4.0	17.0	17.0	16.0	16.0		31.0	31.0	31.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5

GTC (MJP)

Future 2017 With Development

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1: Ault Field Rd & Langley Blvd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0		0	0	0
Act Effct Green (s)	9.0	21.8		4.4	13.3	13.3		7.4			21.5	21.5
Actuated g/C Ratio	0.14	0.33		0.07	0.20	0.20		0.11			0.33	0.33
v/c Ratio	0.43	0.33		0.02	0.59	0.45		0.21			0.71	0.54
Control Delay	37.2	20.2		37.3	34.0	7.6		34.2			30.3	12.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	37.2	20.2		37.3	34.0	7.6		34.2			30.3	12.0
LOS	D	C		D	C	A		C			C	B
Approach Delay		25.9			20.8			34.2			20.8	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	42	58		1	88	0		5			121	49
Queue Length 95th (ft)	103	152		10	181	57		27			233	133
Internal Link Dist (ft)		314			448			131			538	
Turn Bay Length (ft)	70			50		150						50
Base Capacity (vph)	303	795		121	542	624		202			737	933
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.35	0.26		0.02	0.42	0.37		0.09			0.45	0.38

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 65.2
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 22.1
 Intersection Capacity Utilization 49.8%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 1: Ault Field Rd & Langley Blvd

20 s	35 s	8 s	27 s
		14 s	21 s

GTC (MJP)

Future 2017 With Development

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 2: Heller Rd & Clover Valley Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh 7.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	117	151	5	175	442	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	110	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	133	172	6	199	502	116

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	770	560	618 0
Stage 1	560	-	-
Stage 2	210	-	-
Critical Hdwy	6.41	6.21	4.11 -
Critical Hdwy Stg 1	5.41	-	-
Critical Hdwy Stg 2	5.41	-	-
Follow-up Hdwy	3.509	3.309	2.209 -
Pot Cap-1 Maneuver	370	530	967 -
Stage 1	574	-	-
Stage 2	827	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	368	530	967 -
Mov Cap-2 Maneuver	368	-	-
Stage 1	574	-	-
Stage 2	822	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28.9	0.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	967	-	445	-	-
HCM Lane V/C Ratio	0.006	-	0.684	-	-
HCM Control Delay (s)	8.7	-	28.9	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	5.1	-	-

GTC (MJP)

Future 2017 With Development

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3: Heller Rd & Whidbey Ave

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	69	12	132	99	47	19	203	106	89	396	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.952			0.948			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1820	0	1770	1773	0	1770	1766	0	1770	1827	0
Flt Permitted	0.660			0.473			0.441			0.468		
Satd. Flow (perm)	1229	1820	0	881	1773	0	821	1766	0	872	1827	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			25			38			11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		352			424			639			566	
Travel Time (s)		8.0			9.6			14.5			12.9	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	73	13	139	104	49	20	214	112	94	417	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	86	0	139	153	0	20	326	0	94	477	0
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	22.0		13.0	27.0		8.0	44.0		11.0	47.0	
Total Split (%)	8.9%	24.4%		14.4%	30.0%		8.9%	48.9%		12.2%	52.2%	
Maximum Green (s)	4.0	18.0		9.0	23.0		4.0	40.0		7.0	43.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	

GTC (MJP)

Future 2017 With Development

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 3: Heller Rd & Whidbey Ave

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	11.5	8.7		19.1	14.5		46.5	43.4		51.4	48.8	
Actuated g/C Ratio	0.15	0.11		0.24	0.18		0.59	0.55		0.65	0.62	
v/c Ratio	0.17	0.41		0.45	0.44		0.04	0.33		0.15	0.42	
Control Delay	24.0	36.5		28.4	28.5		6.7	12.0		6.9	11.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.0	36.5		28.4	28.5		6.7	12.0		6.9	11.2	
LOS	C	D		C	C		A	B		A	B	
Approach Delay		33.0			28.5			11.7			10.5	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	13	37		56	58		3	84		16	104	
Queue Length 95th (ft)	34	79		102	114		12	154		38	237	
Internal Link Dist (ft)		272			344			559			486	
Turn Bay Length (ft)	150			150			100			100		
Base Capacity (vph)	206	424		320	537		531	987		648	1133	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.20		0.43	0.28		0.04	0.33		0.15	0.42	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 78.9
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 16.8
 Intersection Capacity Utilization 52.6%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 3: Heller Rd & Whidbey Ave

11 s	44 s	13 s	22 s
8 s	47 s	8 s	27 s

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 4: Swantown Rd & SW Fairway Ln

Marin Woods (14-175)

Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	0	25	5	0	1	32	68	9	1	68	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	92	77	92	92	92	77	77	92	92	77	77
Heavy Vehicles, %	4	2	4	2	2	2	4	4	2	2	4	4
Mvmt Flow	13	0	32	5	0	1	42	88	10	1	88	39

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	287	291	108	286	305	93	127	0	0	98	0	0
Stage 1	110	110	-	176	176	-	-	-	-	-	-	-
Stage 2	177	181	-	110	129	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.52	6.24	7.12	6.52	6.22	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.14	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.018	3.336	3.518	4.018	3.318	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	661	619	940	666	608	964	1447	-	-	1495	-	-
Stage 1	890	804	-	826	753	-	-	-	-	-	-	-
Stage 2	820	750	-	895	789	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	644	599	940	627	589	964	1447	-	-	1495	-	-
Mov Cap-2 Maneuver	644	599	-	627	589	-	-	-	-	-	-	-
Stage 1	862	803	-	800	730	-	-	-	-	-	-	-
Stage 2	794	727	-	863	788	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	10.5	2.3	0.1
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1447	-	-	644	940	666	1495	-	-
HCM Lane V/C Ratio	0.029	-	-	0.02	0.035	0.01	0.001	-	-
HCM Control Delay (s)	7.6	0	-	10.7	9	10.5	7.4	0	-
HCM Lane LOS	A	A	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0	0	-	-

GTC (MJP)

Future 2017 With Development

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 5: SW Heller St & Swantown Rd

Marin Woods (14-175)

Intersection

Int Delay, s/veh 10.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	47	103	5	7	129	210	3	45	14	304	101	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	80	-	-	0	-	65	-	-	-	130	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	110	5	7	137	223	3	48	15	323	107	64

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	137	0	0	115	0	0	450	364	112	396	367	137
Stage 1	-	-	-	-	-	-	212	212	-	152	152	-
Stage 2	-	-	-	-	-	-	238	152	-	244	215	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1447	-	-	1474	-	-	519	564	941	564	562	911
Stage 1	-	-	-	-	-	-	790	727	-	850	772	-
Stage 2	-	-	-	-	-	-	765	772	-	760	725	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1447	-	-	1474	-	-	397	542	941	502	540	911
Mov Cap-2 Maneuver	-	-	-	-	-	-	397	542	-	502	540	-
Stage 1	-	-	-	-	-	-	763	702	-	821	768	-
Stage 2	-	-	-	-	-	-	609	768	-	673	700	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	0.2	11.9	20.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	588	1447	-	-	1474	-	-	502	637
HCM Lane V/C Ratio	0.112	0.035	-	-	0.005	-	-	0.644	0.269
HCM Control Delay (s)	11.9	7.6	-	-	7.5	-	-	24.2	12.7
HCM Lane LOS	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	4.5	1.1

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6: Ft Nugent Ave & Swantown Rd

Marin Woods (14-175)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	296	144	286	229	15	77	2	193	24	4	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952			0.996				0.850		0.960	
Flt Protected		0.999			0.974			0.954			0.970	
Satd. Flow (prot)	0	3366	0	0	3433	0	0	1777	1583	0	1735	0
Flt Permitted		0.999			0.974			0.954			0.970	
Satd. Flow (perm)	0	3366	0	0	3433	0	0	1777	1583	0	1735	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		86			3				199		12	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		293			426			229			268	
Travel Time (s)		6.7			9.7			5.2			6.1	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	305	148	295	236	15	79	2	199	25	4	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	465	0	0	546	0	0	81	199	0	41	0
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA	
Protected Phases	4	4		8	8		2	2		6	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (%)	25.0%	25.0%		25.0%	25.0%		25.0%	25.0%	25.0%	25.0%	25.0%	
Maximum Green (s)	16.0	16.0		16.0	16.0		16.0	16.0	16.0	16.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	

GTC (MJP)

Future 2017 With Development

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 6: Ft Nugent Ave & Swantown Rd

Marin Woods (14-175)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)		13.5			15.2			16.0	16.0		16.0	
Actuated g/C Ratio		0.18			0.20			0.21	0.21		0.21	
v/c Ratio		0.70			0.80			0.22	0.41		0.11	
Control Delay		30.4			39.9			28.3	7.3		21.1	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		30.4			39.9			28.3	7.3		21.1	
LOS		C			D			C	A		C	
Approach Delay		30.4			39.9			13.4			21.1	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)		91			132			33	0		12	
Queue Length 95th (ft)		140			#211			72	53		38	
Internal Link Dist (ft)		213			346			149			188	
Turn Bay Length (ft)									100			
Base Capacity (vph)		771			719			371	488		371	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.60			0.76			0.22	0.41		0.11	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 76.8
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 30.4
 Intersection Capacity Utilization 47.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 6: Ft Nugent Ave & Swantown Rd

 p2	 p6	 p4	 p8
20 s	20 s	20 s	20 s

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7: SR-20 & Swantown Rd

Marin Woods (14-175)

Lane Group						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	336	153	141	634	708	406
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	65			150
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.950		0.113			
Satd. Flow (perm)	1770	1583	210	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		161				144
Link Speed (mph)	30			30	30	
Link Distance (ft)	532			356	246	
Travel Time (s)	12.1			8.1	5.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	354	161	148	667	745	427
Shared Lane Traffic (%)						
Lane Group Flow (vph)	354	161	148	667	745	427
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (ft)	20	20	20	100	100	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	20	6	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	Free
Protected Phases	4		5	2	6	
Permitted Phases		4	2			Free
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	
Total Split (s)	32.0	32.0	13.0	68.0	55.0	
Total Split (%)	32.0%	32.0%	13.0%	68.0%	55.0%	
Maximum Green (s)	28.0	28.0	9.0	64.0	51.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	

GTC (MJP)

Future 2017 With Development

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 7: SR-20 & Swantown Rd

Marin Woods (14-175)

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	21.0	21.0	50.9	50.9	37.8	80.4
Actuated g/C Ratio	0.26	0.26	0.63	0.63	0.47	1.00
v/c Ratio	0.77	0.30	0.49	0.57	0.85	0.27
Control Delay	41.3	6.4	13.8	11.2	29.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	6.4	13.8	11.2	29.9	0.4
LOS	D	A	B	B	C	A
Approach Delay	30.4			11.7	19.2	
Approach LOS	C			B	B	
Queue Length 50th (ft)	166	0	27	172	317	0
Queue Length 95th (ft)	307	47	72	313	535	0
Internal Link Dist (ft)	452			276	166	
Turn Bay Length (ft)			65			150
Base Capacity (vph)	654	686	318	1489	1253	1583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.23	0.47	0.45	0.59	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 80.4
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 19.0
 Intersection Capacity Utilization 73.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 7: SR-20 & Swantown Rd

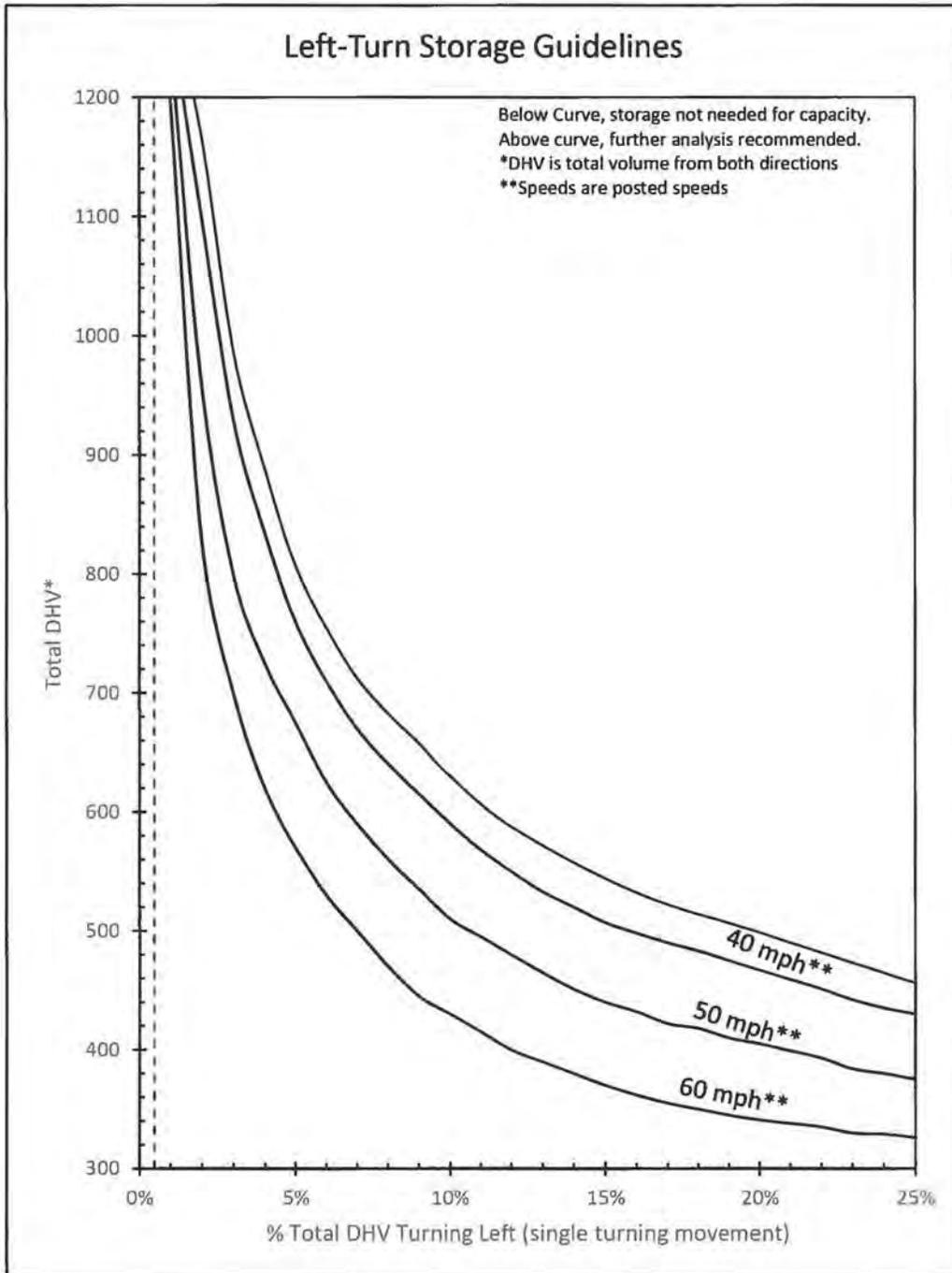
 p2 68 s	 p4 32 s
 p5 13 s	 p6 55 s

Channelization Warrants

Marin Woods
 GTC #14-175

GIBSON TRAFFIC CONSULTANTS

Swantown Road at Site Access - Future 2017



Posted Speed: 35 mph

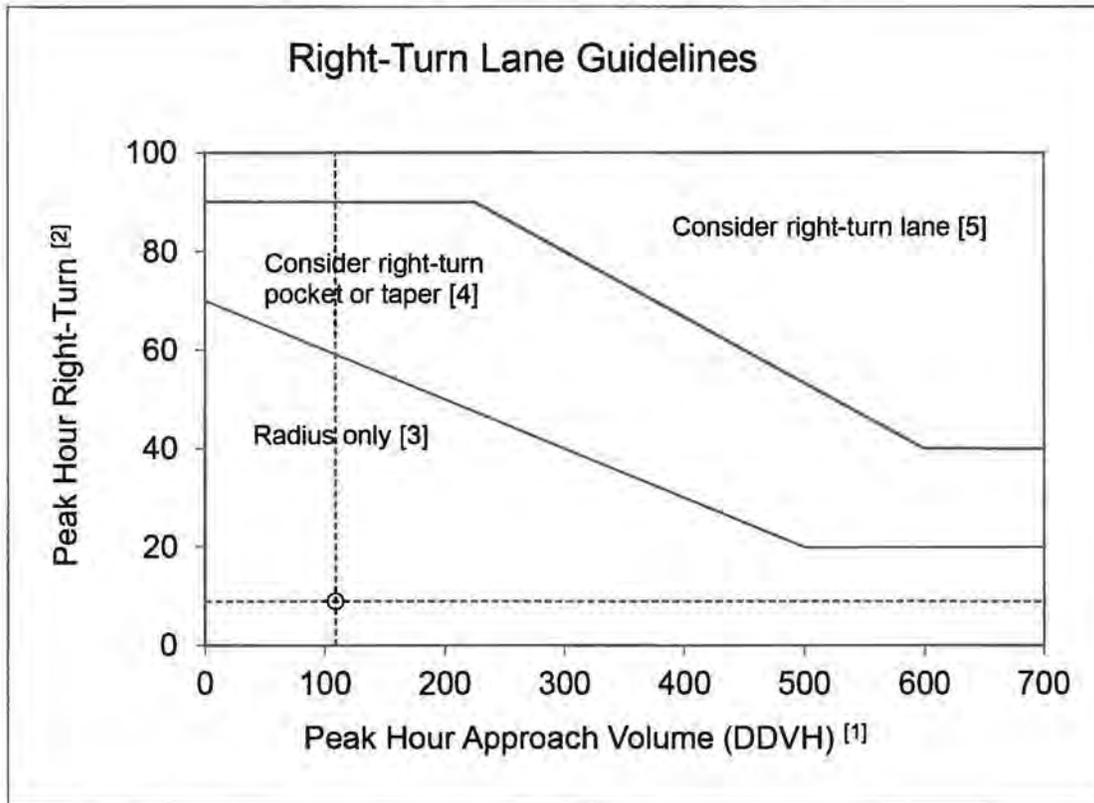
Total DHV: 208 - Below Graph
 Left Turns: 1
 % Left: 0.5%

Based on WSDOT July 2013 Design Manual: Exhibit 1310-7a, Page 1310-14.

Marin Woods
GTC #14-175

GIBSON TRAFFIC CONSULTANTS

Swantown Road at Site Access - Future 2017



Right Turn Volume: 9 [DDHV] Posted Speed: 35 mph
 Adjusted Right Turn Volume: 9 [DDHV]
 Pk Hr Curb Ln Approach Vol: 109 [DDHV]

[1] For two-lane highways, use the peak hour DDHV (through + right turn).
 For multilane, high speed highways (posted speed 45 mph or above), use the right-lane peak hour approach volume (through + right turn).

[2] When all three of the following conditions are met, reduce the right-turn DDHV by 20:
 - The posted speed is 45 mph or less
 - The right-turn volume is greater than 40 VPH
 - The peak hour approach volume (DDHV) is less than 300 VPH.

[3] For right-turn corner design, see Exhibit 1310-6.
 [4] For right-turn pocket or taper design, see Exhibit 1310-12.
 [5] For right-turn lane design, see Exhibit 1310-13.

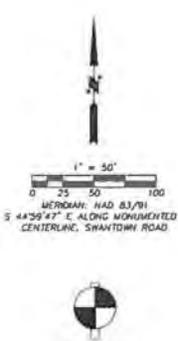
Based on WSDOT July 2013 Design Manual: Exhibit 1310-11, Page 1310-27.

Site Plan

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



REQUIRED OPEN SPACE 10% = 46,280 SF CONDITION MET AS PROPOSED
50% ACTIVE OPEN SPACE REQUIRED



LEGAL DESCRIPTION.
(Per Long Tax Order #7 107737 dated April 21, 2014)
The West 440 feet of the Northeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Wabametta Meridian
EXCEPT the following described tract:
Beginning at the point 700.5 feet South of the Northwest corner of the Northeast Quarter of the Northeast Quarter of said Section 4, and running thence South 340.6 feet to the North side of the county road;
thence South 50°38' East 105.8 feet,
thence North 39°22' East 262.4 feet,
thence North 50°26' West 322.2 feet to the point of beginning.
AND EXCEPT that portion lying Southeast of the Northeast right of way margin of Island County road right of way known as Swanton Road
ALSO, that portion of the following described tract lying Northeast of the county road in the Southeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Wabametta Meridian
Beginning at the Northwest corner of said Southeast Quarter of the Northeast Quarter;
thence South along the West line of said Section a distance of 600 feet,
thence Northeast in a straight line to a point of the North line of said Southeast Quarter, 7 feet Northeast of the North line 336 feet East of the point of beginning;
thence West along the North line 336 feet to the point of beginning.
Situate in the County of Island, State of Washington

DRAFT - CONCEPT LAYOUT

REVISIONS

REV. BY	DATE	DESCRIPTION
1	08/11/14	ISSUE FOR PERMITS
2	08/11/14	ISSUE FOR PERMITS
3	08/11/14	ISSUE FOR PERMITS
4	08/11/14	ISSUE FOR PERMITS
5	08/11/14	ISSUE FOR PERMITS
6	08/11/14	ISSUE FOR PERMITS
7	08/11/14	ISSUE FOR PERMITS
8	08/11/14	ISSUE FOR PERMITS
9	08/11/14	ISSUE FOR PERMITS
10	08/11/14	ISSUE FOR PERMITS
11	08/11/14	ISSUE FOR PERMITS
12	08/11/14	ISSUE FOR PERMITS
13	08/11/14	ISSUE FOR PERMITS
14	08/11/14	ISSUE FOR PERMITS
15	08/11/14	ISSUE FOR PERMITS
16	08/11/14	ISSUE FOR PERMITS
17	08/11/14	ISSUE FOR PERMITS
18	08/11/14	ISSUE FOR PERMITS
19	08/11/14	ISSUE FOR PERMITS
20	08/11/14	ISSUE FOR PERMITS
21	08/11/14	ISSUE FOR PERMITS
22	08/11/14	ISSUE FOR PERMITS
23	08/11/14	ISSUE FOR PERMITS
24	08/11/14	ISSUE FOR PERMITS
25	08/11/14	ISSUE FOR PERMITS
26	08/11/14	ISSUE FOR PERMITS
27	08/11/14	ISSUE FOR PERMITS

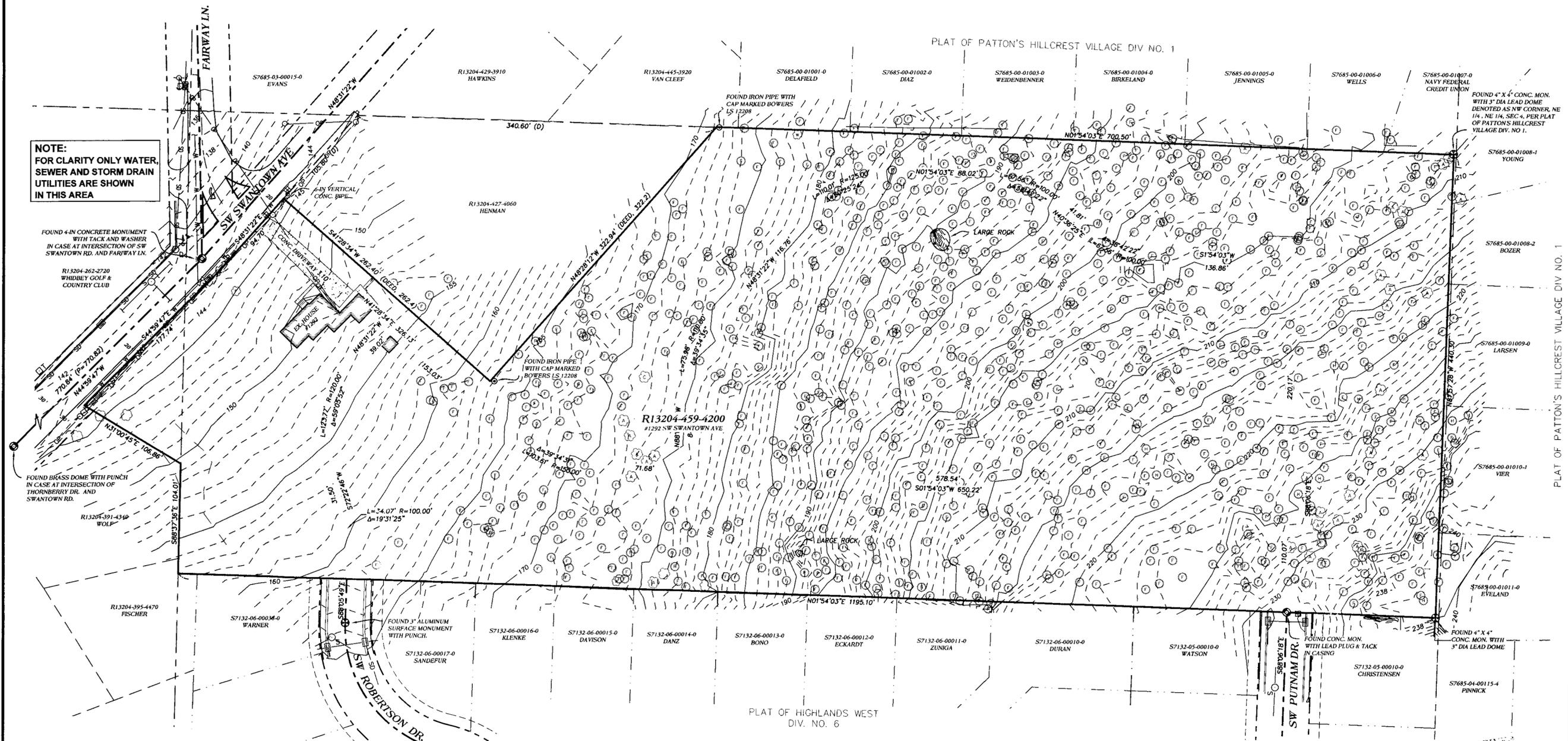
HARMSEN
LANDSCAPE ARCHITECTS & PLANNERS
1000 MARIN WOODS DRIVE
SEASIDE, WA 98138
TEL: (206) 885-9772
WWW.HARMSEN.COM

IF SCALE IS LESS THAN 1/8" = 100' IN ANY PLACE, PROTECTIVE SCALE, ACCORDINGLY

MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
LANDSCAPE DEVELOPMENT INC
PRELIMINARY SITE PLAN

P-1

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



NOTE: FOR CLARITY ONLY WATER, SEWER AND STORM DRAIN UTILITIES ARE SHOWN IN THIS AREA

FOUND 4-IN CONCRETE MONUMENT WITH TACK AND WASHER IN CASE AT INTERSECTION OF SW SWANTOWN RD. AND FAIRWAY LN.

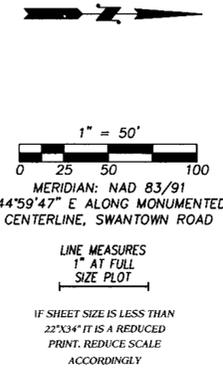
R13204-262-2720 WHIDDEY GOLF & COUNTRY CLUB

FOUND BRASS DOME WITH PUNCH IN CASE AT INTERSECTION OF THORNBERY DR. AND SWANTOWN RD.

R13204-391-4310 WOLF

GENERAL LEGEND & ABBREVIATIONS table listing symbols for survey monuments, utilities (gas, power, sewer, water, telephone), and trees (alder, cottonwood, cedar, deciduous, fruit, fir, hemlock).

LEGAL DESCRIPTION: (Per Land Title Order #LT-107737, dated April 21, 2014) The West 440 feet of the Northeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Willamette Meridian. EXCEPT the following described tract: Beginning at the point 700.5 feet South of the Northwest corner of the Northeast Quarter of said Section 4, and running thence South 340.6 feet to the county road; thence South 50°38' East 105.8 feet; thence North 39°22' East 262.4 feet; thence North 50.26' West 322.2 feet to the point of beginning. AND EXCEPT that portion lying Southwesterly of the Northeasterly right of way margin of Island County road right of way known as Swantown Road. ALSO, that portion of the following described tract lying Northeasterly of the county road in the Southeast Quarter of the Northeast Quarter, Section 4, Township 32 North, Range 1, East of the Willamette Meridian: Beginning at the Northwest corner of said Southeast Quarter of the Northeast Quarter; thence South along the West line of said Section a distance of 600 feet; thence Northeasterly in a straight line to a point on the North line of said Southeast Quarter of the Northeast Quarter that is 336 feet East of the point of beginning; thence West along the North line 336 feet to the point of beginning. Situate in the County of Island, State of Washington.



TREE INFORMATION: THE TREES SHOWN ON THIS PLAN WERE LOCATED DURING TOPOGRAPHIC FIELD SURVEY CONDUCTED IN MAY AND JUNE OF 2014. ALL TREES LOCATED ARE EQUAL TO OR GREATER THAN 12-INCHES IN DIAMETER WHEN MEASURED AT 4 FT ABOVE THE BASE OF THE GROUND. THIS SURVEY LOCATED 973 TREES WITHIN THE PROJECT BOUNDARIES WHICH MEET THE AFOREMENTIONED CRITERIA.



VERTICAL DATUM NAVD 88 DERIVED BY GPS



REVISIONS

DWN. BY: JTF
CHK. BY: DNS
DATE: 11-04-15
JOB #: 15-243
P/B #: LL
SCALE: 1" = 50FT

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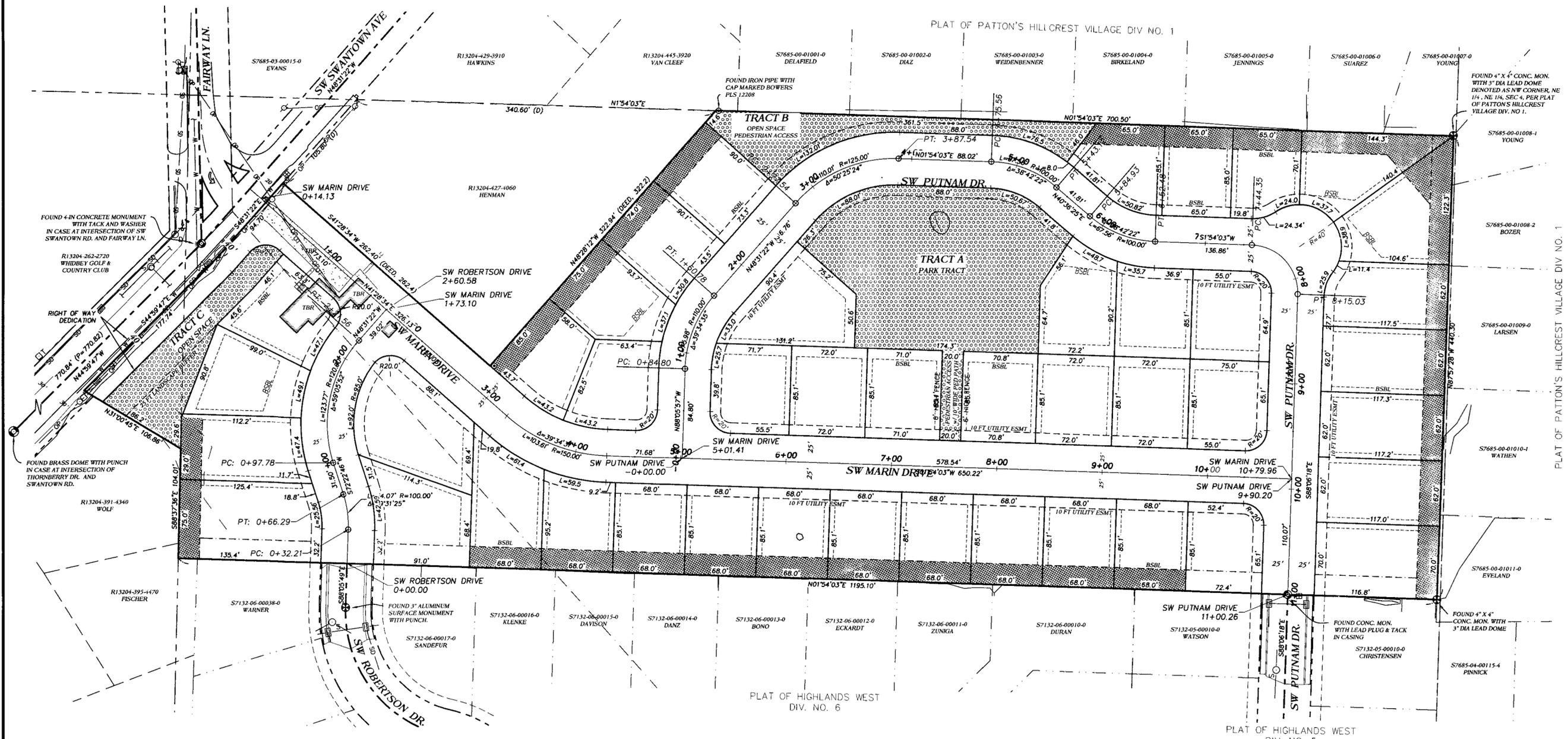


MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
GEORGE F. MARIN TRUST
EXISTING CONDITIONS/
TOPOGRAPHIC SURVEY

DRAWING REF:

P1

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



GENERAL LEGEND

- BUILDING SETBACK LINE
- EXTERNAL PROJECT BOUNDARY
- PROPOSED LOT LINE
- EASEMENT/BUFFER LINE
- PROPOSED RIGHT-OF-WAY CENTERLINE
- PROPOSED RIGHT-OF-WAY BOUNDARY
- EXISTING FENCE LINE
- ADJOINING PROPERTY LINE
- SURVEY PLAT MONUMENT, AS NOTED
- SURVEY MONUMENT IN CASE, AS NOTED

OPEN SPACE TRACT
 NATURAL VEGETATION BUFFER
 BSBL - BUILDING SETBACK LINE

LOT & TRACT TABLE

LOT	AREA (SF)	LOT	AREA (SF)
LOT 1	6,775	LOT 28	6,632
LOT 2	6,828	LOT 29	6,704
LOT 3	7,271	LOT 30	6,770
LOT 4	10,610	LOT 31	6,124
LOT 5	9,980	LOT 32	6,312
LOT 6	7,981	LOT 33	6,308
LOT 7	7,708	LOT 34	8,252
LOT 8	5,978	LOT 35	6,126
LOT 9	5,781	LOT 36	6,041
LOT 10	5,781	LOT 37	6,024
LOT 11	5,781	LOT 38	6,141
LOT 12	5,781	LOT 39	6,128
LOT 13	5,781	LOT 40	6,286
LOT 14	5,781	LOT 41	6,286
LOT 15	5,781	LOT 42	6,191
LOT 16	5,781	LOT 43	6,861
LOT 17	6,069	TOTAL	287,563
LOT 18	8,183		
LOT 19	7,259	AVERAGE	6,688
LOT 20	7,268	MAX	10,610
LOT 21	7,278	MIN	5,197
LOT 22	7,115		
LOT 23	8,603		
LOT 24	7,215	TRACT A	32,513
LOT 25	5,197	TRACT B	9,799
LOT 26	5,527	TRACT C	8,438
LOT 27	5,784	TOTAL	50,750

PRD DATA
 GROSS SITE AREA : 10.6 ACRES
 AREA IN LOTS & TRACTS : 7.8 ACRES
 AREA IN DEDICATED RIGHTS-OF-WAY : 2.9 ACRES
 AVERAGE RESIDENTIAL LOT SIZE : 6,688 SF
 DENSITY = 4 D.U. PER ACRE (MAX PER CODE IN R-1 ZONE IS 6 D.U. PER ACRE)

OPEN SPACE DATA
 OPEN SPACE TRACTS ARE PROPOSED ON TRACTS A, B, & C
 TOTAL OPEN SPACE REQUIRED = 43,301 (10% OF GROSS AREA)
 TOTAL OPEN SPACE PROPOSED = 50,750 SF
 TOTAL ACTIVE OPEN SPACE PROPOSED = 21,650 SF

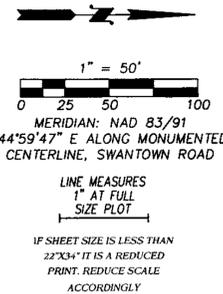
VEGETATION RETENTION
 OPEN SPACE TRACTS ARE PROPOSED ON TRACTS B, C AND A PORTION OF TRACT A AND ARE TO BE USED FOR NATIVE VEGETATION RETENTION AND PLANTING REQUIREMENTS. THE 20 FOOT PRD BUFFER AROUND THE EXTERNAL PROJECT BOUNDARIES SHOWN HEREON ARE PROPOSED TO BE USED FOR EITHER TREE RETENTION OR REPLANTING AS A NATIVE AREA BUFFER. TRACT C CONTAINS A BIORETENTION CELL THAT SHALL BE LANDSCAPED COMMENSURATE WITH A PRD BUFFER.

TOTAL NATIVE VEGETATION REQUIRED/PROPOSED = 69,450 SF (15% OF GROSS SITE AREA)
 TOTAL NATIVE VEGETATION PROPOSED :
 20 FOOT BUFFER RESERVE AREAS = 46,230 SF (IN ADDITION TO AREAS WITHIN TRACTS B AND C)

TRACT A = NOT LESS THAN 11,142 SF
 TRACT B = 9799 SF
 TRACT C = 8438 SF

PROPOSED BUILDING SETBACKS
 FRONT YARD: 10 FEET MINIMUM FOR HOUSE OR AS NOTED OTHERWISE.
 PER OHMC 19.31.190, FRONT SETBACKS SHALL BE A MINIMUM 60 FT LONG, AND NOT CLOSER THAN 10 FT TO THE FRONT PROPERTY LINE. HOME PLACEMENT SHALL COMPLY WITH 19.31.190 (a-c), OR 19.31.190 (d). AS SHOWN, HOME PLACEMENT NON-GARAGE DOMINANT PER 19.31.190 (a-c).

SIDE YARD: 5 FT EACH SIDE
 REAR YARD: 10 FT (UNLESS A PERIMETER LOT WHICH REQUIRES A 20 FT SETBACK OR AS OTHERWISE NOTED ON THIS PLAN)



REVISIONS

DWN. BY: JTF
 CHK. BY: DRS
 DATE: 11-04-15
 JOB #: 15-243
 P/B #: LL
 SCALE: 1"=50FT

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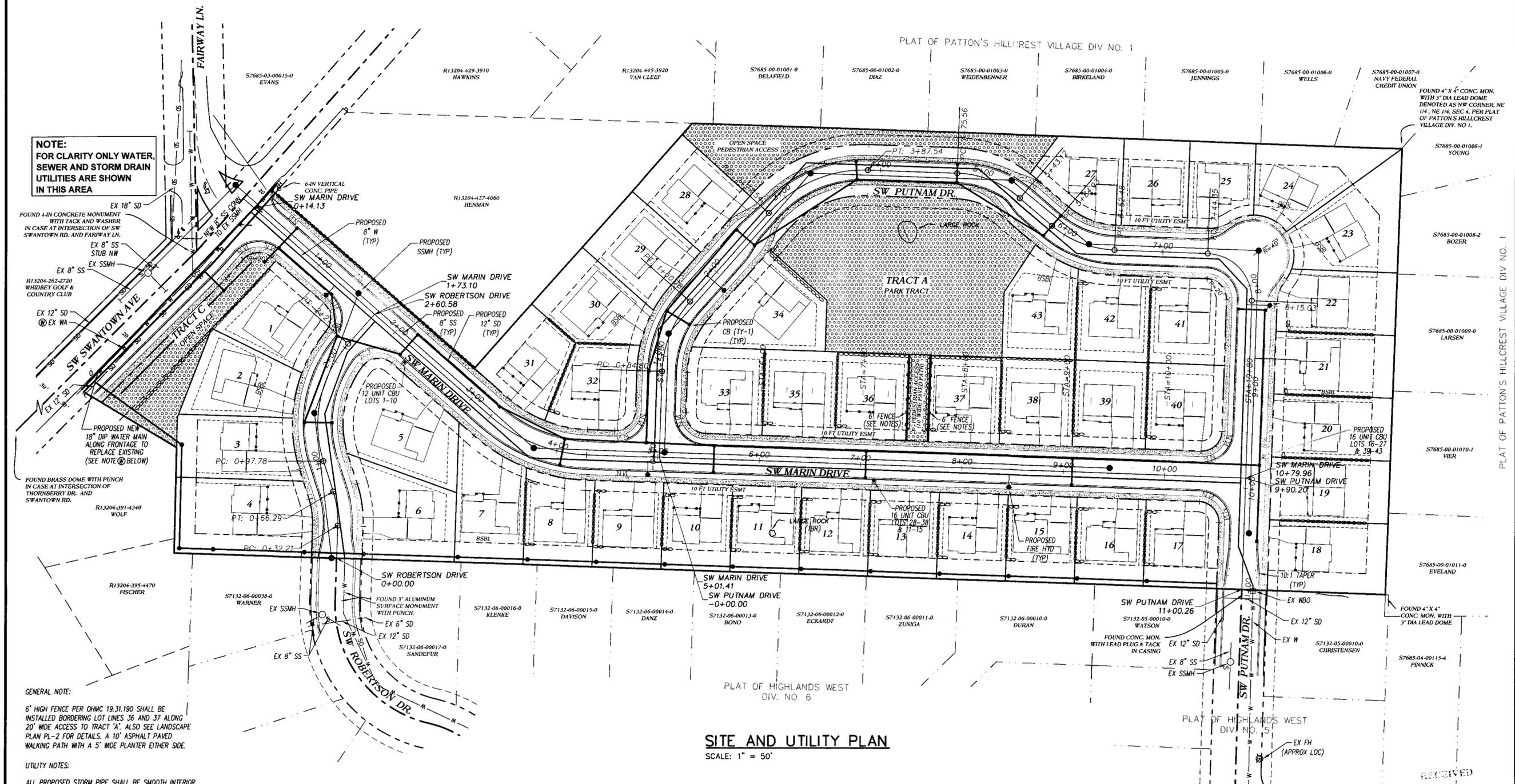


MARIN WOODS
 PLANNED RESIDENTIAL DEVELOPMENT
 GEORGE F. MARIN TRUST
 PRELIMINARY PRD PLAN

DRAWING REF:

P2

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



SITE AND UTILITY PLAN
SCALE: 1" = 50'

NOTE:
FOR CLARITY ONLY WATER,
SEWER AND STORM DRAIN
UTILITIES ARE SHOWN
IN THIS AREA

FOUND 4-IN CONCRETE MONUMENT WITH TACK AND WASHER IN CASE AT INTERSECTION OF SW SWANTOWN RD. AND FAIRWAY LN.

EX 18" SD

EX 8" SS STUB NW

EX 8" SS

EX 12" SD

EX WA

EX 12" SD

EX 12" SD

PROPOSED NEW 18" DIP WATER MAIN ALONG FRONTAGE TO REPLACE EXISTING (SEE NOTE @ BELOW)

FOUND BRASS DOME WITH PUNCH IN CASE AT INTERSECTION OF THORNBERY DR. AND SWANTOWN RD.

GENERAL NOTE:
6" HIGH FENCE PER OHMC 19.31.190 SHALL BE INSTALLED BORDERING LOT LINES 36 AND 37 ALONG 20' WIDE ACCESS TO TRACT 'A'. ALSO SEE LANDSCAPE PLAN PL-2 FOR DETAILS. A 10' ASPHALT PAVED WALKING PATH WITH A 5' WIDE PLANTER EITHER SIDE.

UTILITY NOTES:
ALL PROPOSED STORM PIPE SHALL BE SMOOTH INTERIOR 12" CPEP UNLESS OTHERWISE NOTED.
ALL PROPOSED SANITARY SEWER PIPE TO BE SMOOTH INTERIOR 8" PVC UNLESS OTHERWISE NOTED.
ALL PROPOSED WATER MAIN PIPE SHALL BE 8" C900 PVC UNLESS OTHERWISE SPECIFIED.
ALL PROPOSED FIRE HYDRANTS ASSEMBLIES SHALL BE PER CITY STANDARD WITH 4 1/2" PUMPER WITH 5" STORZ.
EXISTING WATER MAIN SIZE AND MATERIAL UNKNOWN. WATER MAIN TO BE POTHOLED IN THE VICINITY OF CONNECTIONS AND CROSSINGS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.

EXTENSION OF AN 18" DUCTILE IRON PIPE (DIP) ALONG SWANTOWN AVE ROAD FRONTAGE IS REQUIRED PER THE 2014 WATER SYSTEM PLAN. THE PROJECT PROPONENT MAY BE ELIGIBLE FOR AN OVER-SIZING REIMBURSEMENT. REFER TO OHMC 21.50.050 (1) AND 13.20.010.

INDIVIDUAL PRIV STATIONS WILL BE REQUIRED FOR ALL LOTS WITHIN THIS DEVELOPMENT.

PRELIMINARY PRD

P:\WORK\PROJECTS\2015\15-243 MARIN WOODS\CE\DWG\PRD SUBMITTAL SET\14-028 MARIN WOODS ROAD--STORM.DWG 11/05/2015

REVISIONS

DWN. BY: JTF
CHK. BY:
DATE: 11-04-15
JOB #: 15-243
P/B #: NA
SCALE: 1"=50FT

OAK HARBOR OFFICE:
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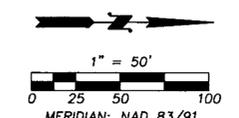
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MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
GEORGE F. MARIN TRUST
PRELIMINARY SITE & UTILITY PLAN

DRAWING REF:

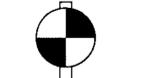
P3



1" = 50'
MERIDIAN: NAD 83/91
S 44°59'47" E ALONG MONUMENTED CENTERLINE, SWANTOWN ROAD

LINE MEASURES
1" AT FULL
SIZE PLOT

IF SHEET SIZE IS LESS THAN
22"x34" IT IS A REDUCED
PRINT. REDUCE SCALE
ACCORDINGLY

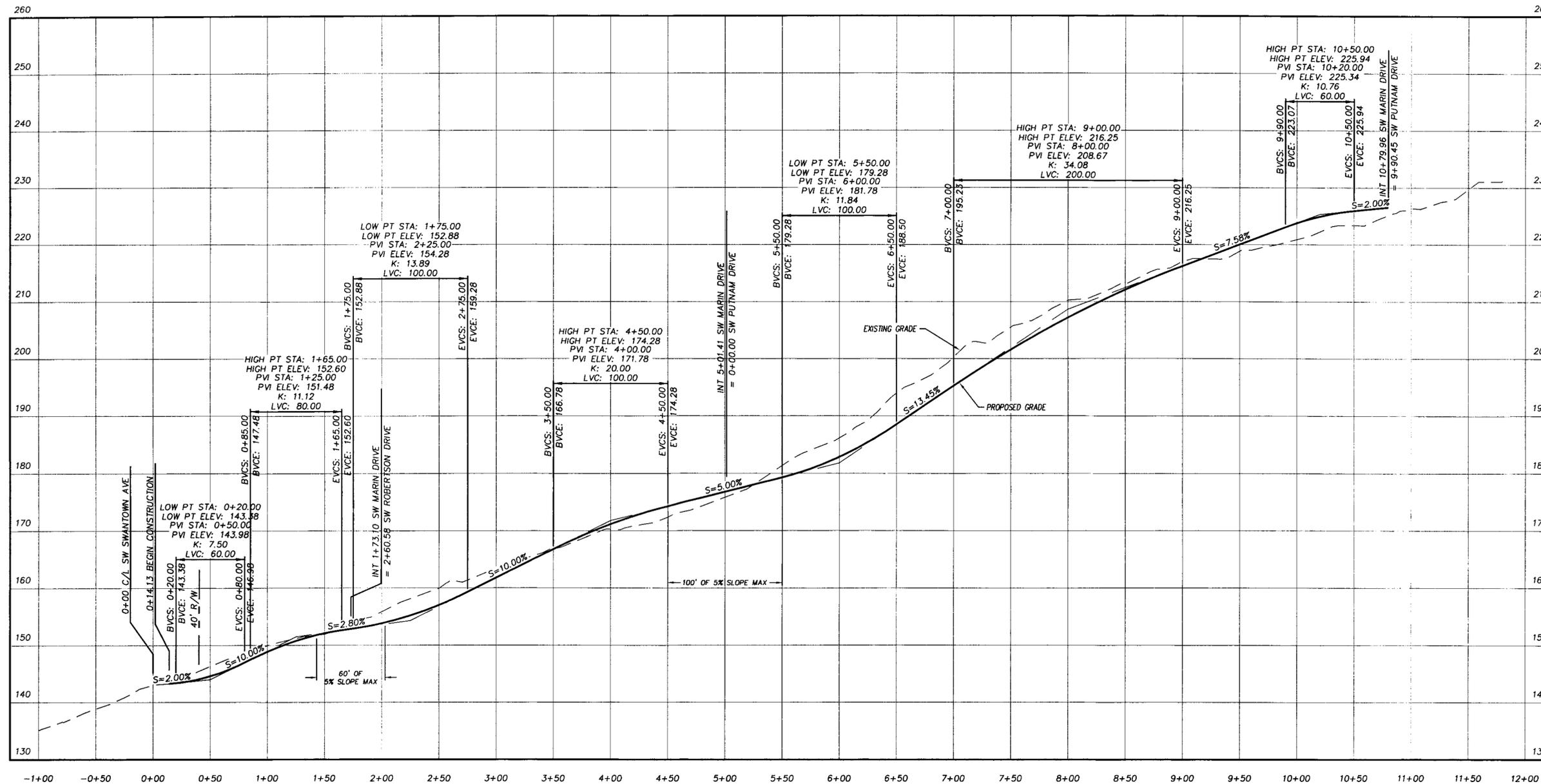


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NAVD 88
DERIVED BY GPS



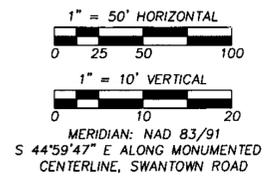
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A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



SW MARIN DRIVE PROFILE

SCALE: HORIZ 1" = 50'
VERT 1" = 10'



LINE MEASURES
1" AT FULL
SIZE PLOT

IF SHEET SIZE IS LESS THAN 22"x34" IT IS A REDUCED PRINT. REDUCE SCALE ACCORDINGLY

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DWN. BY: LDR
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DATE: 11-04-15
JOB #: 15-243
P/B #: NA
SCALE: 1"=50FT

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MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
GEORGE F. MARIN TRUST
PRELIMINARY ROAD PROFILES

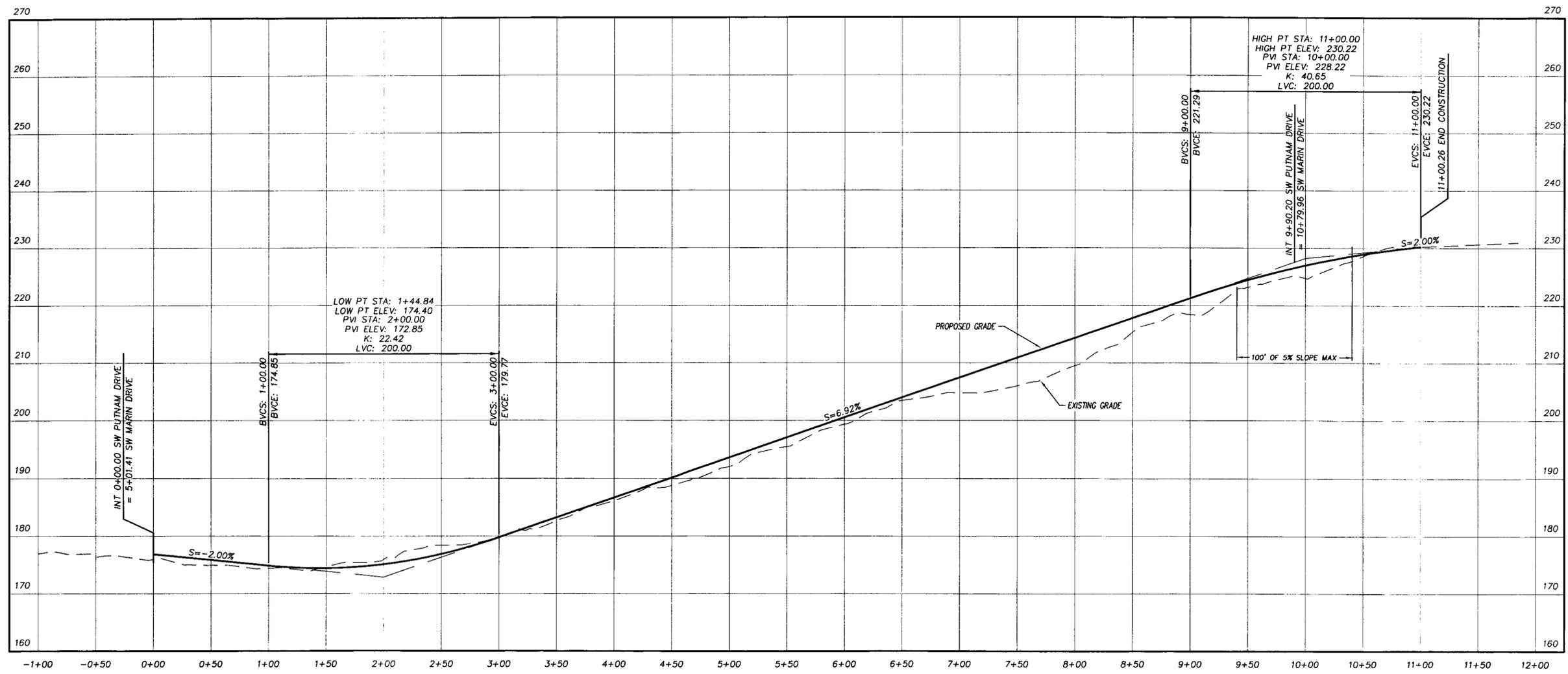
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P4

PRELIMINARY PRD

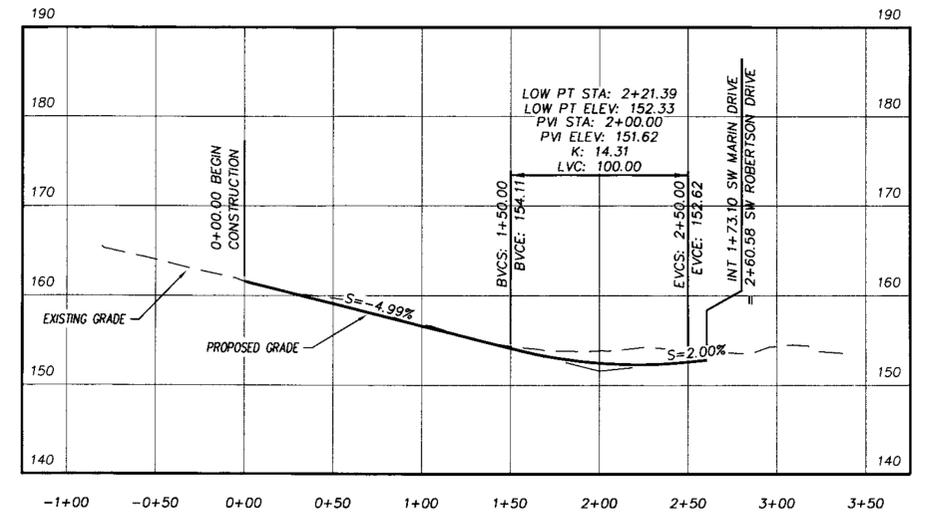
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A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



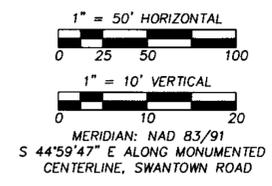
SW PUTNAM DRIVE PROFILE

SCALE: HORIZ 1" = 50'
VERT 1" = 10'



SW ROBERTSON DRIVE PROFILE

SCALE: HORIZ 1" = 50'
VERT 1" = 10'



LINE MEASURES
1" AT FULL
SIZE PLOT
IF SHEET SIZE IS LESS THAN
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DWN. BY: LDR
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DATE: 11-04-15
JOB #: 15-243
P/B #: NA
SCALE: 1"=50FT

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MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
GEORGE F. MARIN TRUST
PRELIMINARY ROAD PROFILES

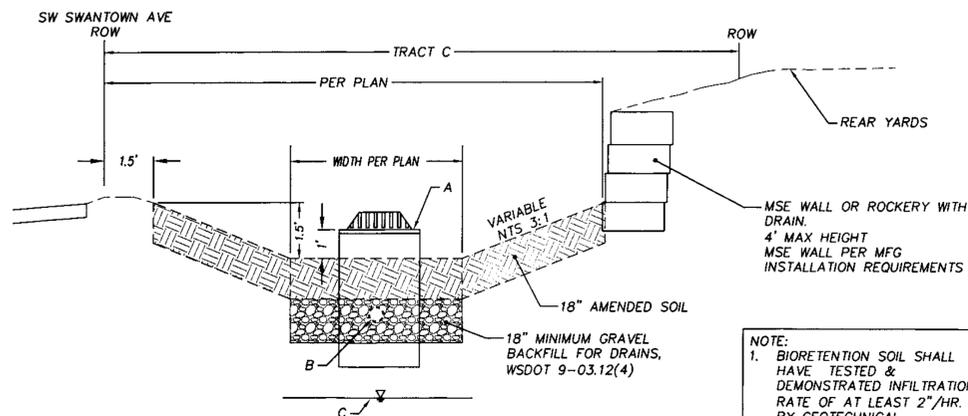
DRAWING REF:

P5



PRELIMINARY PRD

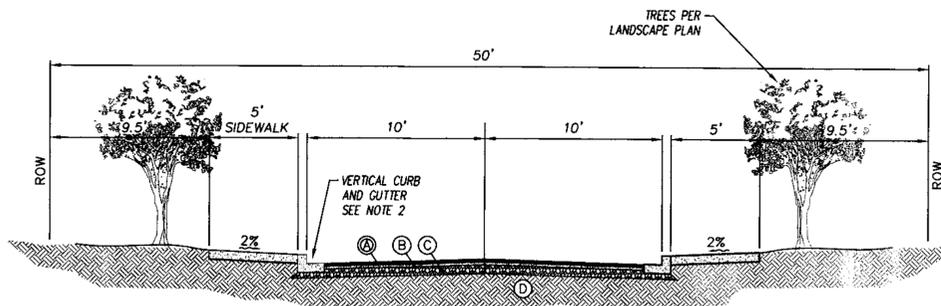
A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



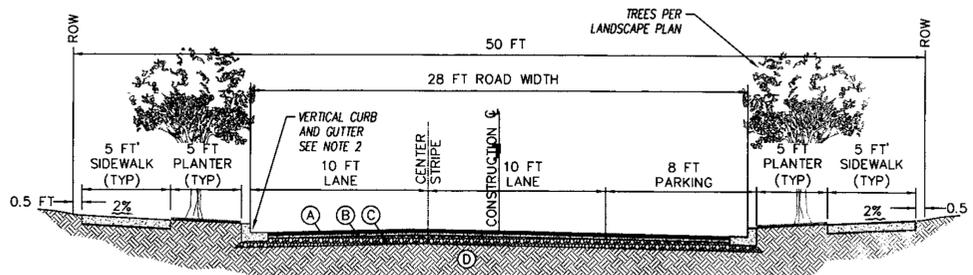
- A TYPE I CATCH BASIN WITH OLYMPIC FOUNDRY BEEHIVE/TRASH RACK GRATE SM60BH OR SIMILAR. LOCATION AND RIM ELEVATION PER PLAN.
- B 6" PERFORATED UNDERDRAIN 12" FROM BOTTOM OF ROCK, CONNECT TO CB
- C SEASONAL HIGH WATER TABLE OR IMPERVIOUS LAYER. IF MINIMUM VERTICAL SEPARATION IS NOT AVAILABLE, AN IMPERMEABLE LINER MAY BE REQUIRED.

- NOTE:
1. BIORETENTION SOIL SHALL HAVE TESTED & DEMONSTRATED INFILTRATION RATE OF AT LEAST 2"/HR. BY GEOTECHNICAL EVALUATION
 2. AS-BUILT DRAWINGS SHALL CONTAIN CERTIFICATION FROM THE ENGINEER THAT ALL LID FEATURES HAVE BEEN INSTALLED AND MEET THE MATERIAL SPECIFICATIONS OF THE APPROVED PLANS.
 3. PROVIDE ARMORING WHERE CONCENTRATED FLOWS ENTER CELL (ASSUME 1/4 CY PER CELL). ARMORING TO BE FIELD LOCATED WITH ENGINEER.

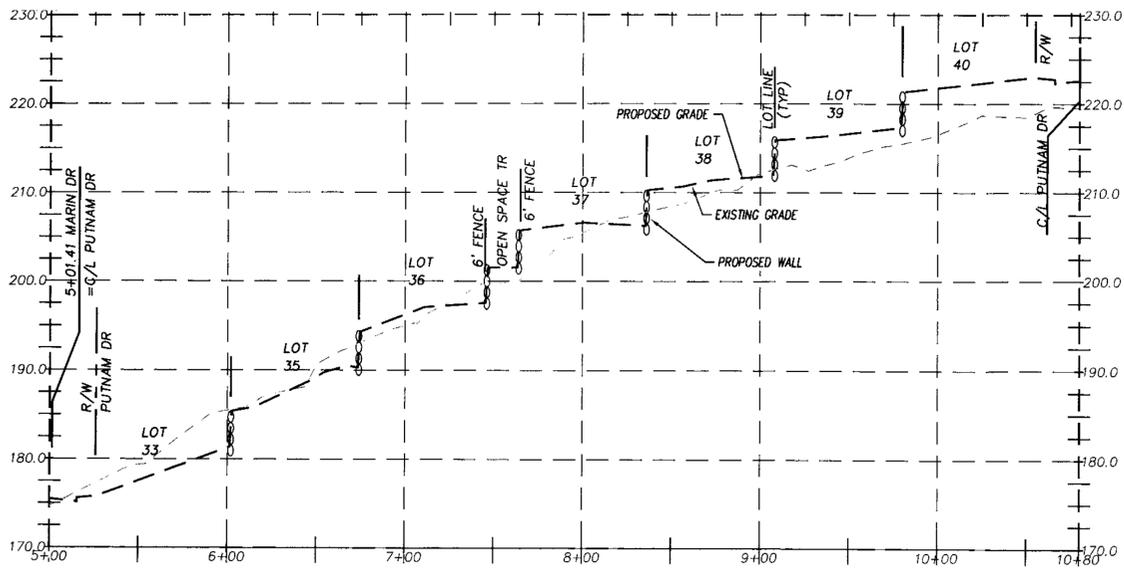
1 BIO-RETENTION CELL SECTION
P7 SCALE: NONE



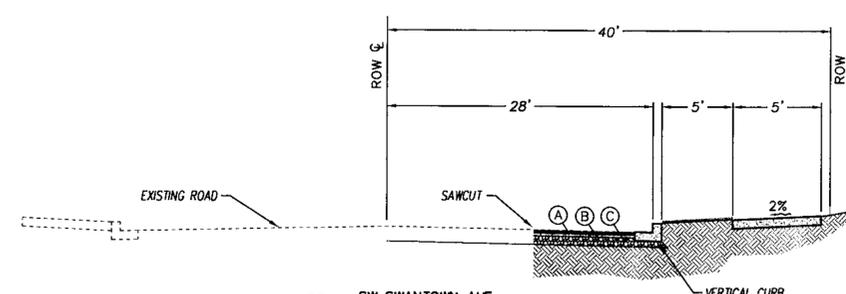
3 SW PUTNAM DRIVE
ROAD SECTION NORTH OF TRACT A
LOCAL LID STREET #1
NOT TO SCALE



4 SW MARIN DRIVE, SW PUTNAM DRIVE
TYPICAL ROAD SECTIONS
LOCAL RESIDENTIAL NARROW
PER COH 21.50.070
NOT TO SCALE



2 GRADING SECTION (LOTS 33-40)
P7 SCALE: HORIZ 1" = 50', VERT 1" = 10'



5 SW SWANTOWN AVE
TYPICAL ROAD SECTION
P7 NOT TO SCALE

- GENERAL NOTES:
1. PAVING AND SUBGRADE PREPARATION WILL CONFORM TO COH STD DETAIL ST-4, AS REFLECTED ON THIS PLAN.
 2. CONCRETE CURB & GUTTER (VERTICAL CURB) WILL BE INSTALLED PER COH STD DETAIL ST-6, REF SHEET C-8.
 3. SIDEWALKS SHALL BE CONSTRUCTED WHERE INDICATED PER COH STD DETAILS ST-9, REF SHEET C-8.
- PAVEMENT AND SUBGRADE: (PER COH STD DETAIL ST-4)
- Ⓐ 2" COMPACTED DEPTH HMA.
 - Ⓑ 2" COMPACTED DEPTH CRUSHED SURFACING TOP COURSE.
 - Ⓒ COMPACTION SHALL BE 95% MPD.
 - Ⓓ 6" COMPACTED DEPTH CLASS B GRAVEL BASE COURSE
 - Ⓔ COMPACTION SHALL BE 95% MPD.
 - Ⓕ SUBGRADE COMPACTED TO 95% MPD.

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JUN 26 2015
CITY OF OAK HARBOR
11200 MARIN WOODS ROAD DEPARTMENT

REVISIONS

DWN. BY: LDR
CHK. BY:
DATE: 11-04-15
JOB #: 15-243
P/B #: NA
SCALE: 1"=50FT

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MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
GEORGE F. MARIN TRUST
PRELIMINARY DETAILS

DRAWING REF:

P6



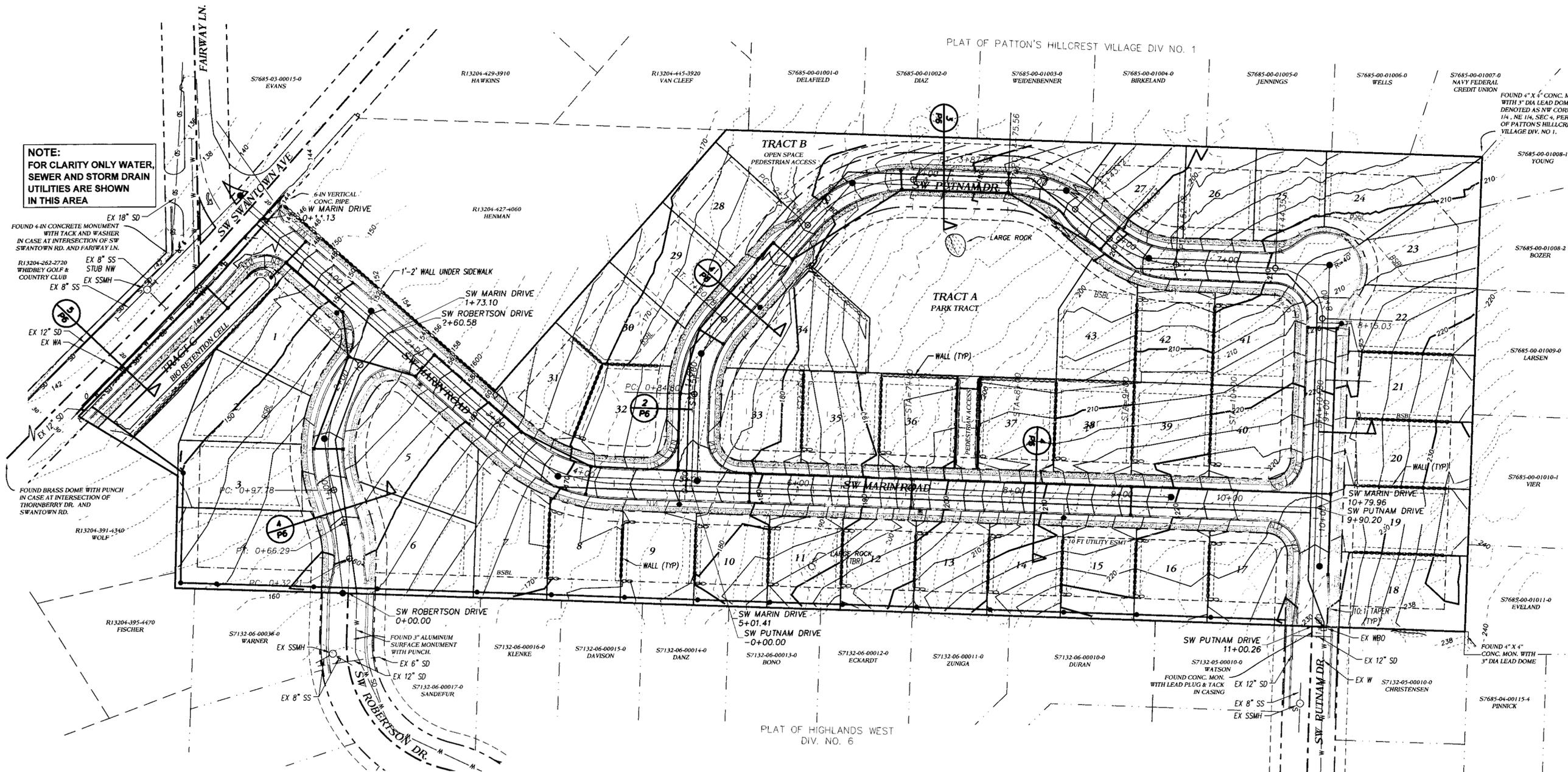
LINE MEASURES
1" AT FULL
SIZE PLOT

IF SHEET SIZE IS LESS THAN
22"x34" IT IS A REDUCED
PRINT. REDUCE SCALE
ACCORDINGLY



PRELIMINARY PRD

A PORTION OF THE NORTHEAST 1/4, SECTION 4, TOWNSHIP 32 NORTH, RANGE 1 EAST, W.M.



NOTE:
FOR CLARITY ONLY WATER,
SEWER AND STORM DRAIN
UTILITIES ARE SHOWN
IN THIS AREA

FOUND 4-IN CONCRETE MONUMENT
WITH TACK AND WASHER
IN CASE AT INTERSECTION OF SW
SWANTOWN RD. AND FAIRWAY LN.
EX 18" SD
EX 8" SS
EX 8" SS
EX 8" SS
EX 8" SS
EX 12" SD
EX WA

FOUND BRASS DOME WITH PUNCH
IN CASE AT INTERSECTION OF
THORNBERY DR. AND
SWANTOWN RD.
R13204-391-4340
WOLF

R13204-395-4470
FISCHER

S7132-06-00036-0
WARNER
EX SSMH

FOUND 3" ALUMINUM
SURFACE MONUMENT
WITH PUNCH.
EX 6" SD
EX 12" SD
EX 8" SS
S7132-06-00017-0
SANDEFUR

S7132-06-00016-0
KLENKE

S7132-06-00015-0
DAVISON

S7132-06-00014-0
DANZ

S7132-06-00013-0
BONO

S7132-06-00012-0
ECKARDT

S7132-06-00011-0
ZUNIGA

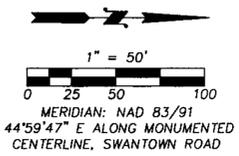
S7132-06-00010-0
DURAN

S7132-05-00010-0
WATSON
FOUND CONC. MON.
WITH LEAD PLUG & TACK
IN CASING
EX 12" SD
EX 8" SS
EX SSMH

EX WBO
EX 12" SD
EX W
S7132-05-00010-0
CHRISTENSEN

S7685-04-00115-4
PINNICK

GRADING PLAN
SCALE: 1" = 50'



1" = 50'
0 25 50 100
MERIDIAN: NAD 83/91
S 44°59'47" E ALONG MONUMENTED
CENTERLINE, SWANTOWN ROAD
LINE MEASURES
1" AT FULL
SIZE PLOT
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DATE: 11-04-15
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SCALE: 1" = 50FT

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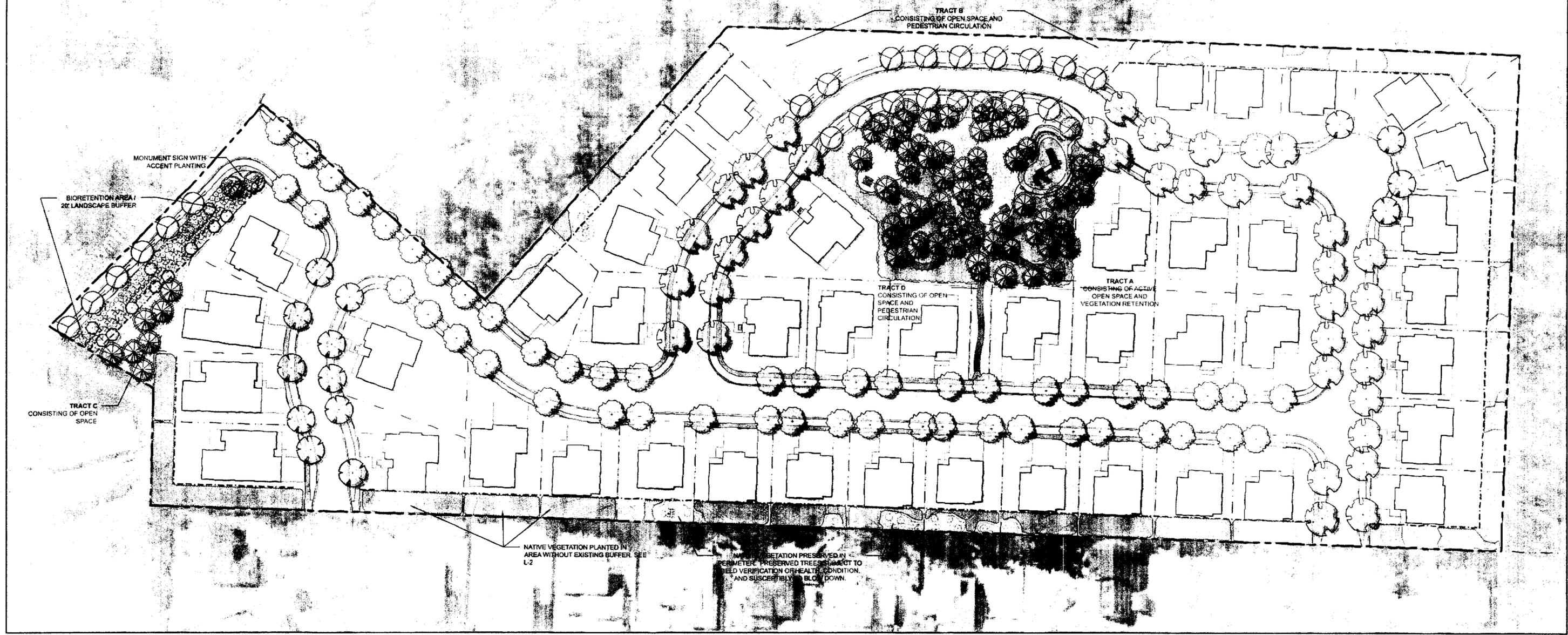
MARIN WOODS
PLANNED RESIDENTIAL DEVELOPMENT
GEORGE F. MARIN TRUST
PRELIMINARY GRADING PLAN

DRAWING REF:

P7

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NOV 06 2015
CITY OF OAK HARBOR
Development Services Dept.

PRELIMINARY PRD



STREET TREE AND BUFFER PLAN
1" = 40'-0" (CHECK SCALE BAR FOR ACCURACY)

PLANTING LEGEND

<p>Broadleaf Deciduous</p> <p>Symbol Scientific Name Common Name</p> <p>Acer circinatum Vine Maple</p> <p>Acer Rubrum 'Karpick' Karpick Maple</p> <p>Amelanchier alnifolia Serviceberry</p> <p>Betula utilis var. jacquemontii Himalayan White Birch</p> <p>Cercidiphyllum japonicum Katsura Tree</p> <p>Pyrus calleryana 'Chanticleer' Chanticleer Pear</p>		<p>Grass</p> <p>Symbol Scientific Name Common Name</p> <p>Miscanthus sinensis 'Little Kitten' Dwarf Maiden Grass</p>	
<p>Conifer Evergreen</p> <p>Symbol Scientific Name Common Name</p> <p>Pseudotsuga menziesii Douglas fir</p> <p>Thuja plicata 'Fastigiata' Hogan Cedar</p>		<p>Perennial</p> <p>Symbol Scientific Name Common Name</p> <p>Hemerocallis 'Stella de Oro' Daylily</p>	
<p>NATIVE VEGETATION TO BE RETAINED</p> <p>NATIVE VEGETATION TO BE REPLANTED</p>		<p>Shrub</p> <p>Symbol Scientific Name Common Name</p> <p>Berberis thunbergii 'Crimson Pygmy' Crimson Pygmy</p> <p>Cornus stolonifera 'Isanti' Isanti Redtwig Dogwood</p> <p>Gaultheria shallon Salal</p> <p>Hydrangea macrophylla 'Balmier' 'Endless Summer'</p> <p>Rhododendron 'Taurus' Taurus Rhody</p> <p>Ribes sanguineum Pink winter currant</p> <p>Symphoricarpos albus Common snowberry</p> <p>Viburnum davidii David's Viburnum</p> <p>Viburnum Tinus 'Spring Boquet' Spring Boquet Viburnum</p>	

Landscape Statistics			
	S F	Acres	Comments
GROSS ACREAGE		10.7	
Open Space Area Required (10%)	43,301		
Open Space Area Provided	59,588		> 100%
Active Open Space Area Required (15%)	21,651		
Active Open Space Provided in Tract C	>22,000		Program to consist of trails, playground area, picnic tables, benches, ornamental landscape lawn areas, and native vegetation
PRD Landscape Buffer (20' required on lots abutting PRD Boundary)			20 foot buffer to be provided with native vegetation retention or planted as a native landscape buffer
STREET FRONTAGE	1-1 1/2" caliper approved tree every 30' o.c. required	provided per code	Provided Per code on Swantonville Road and all interior streets

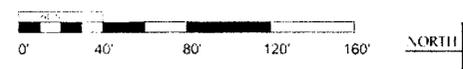
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Conceptual Landscape Plan

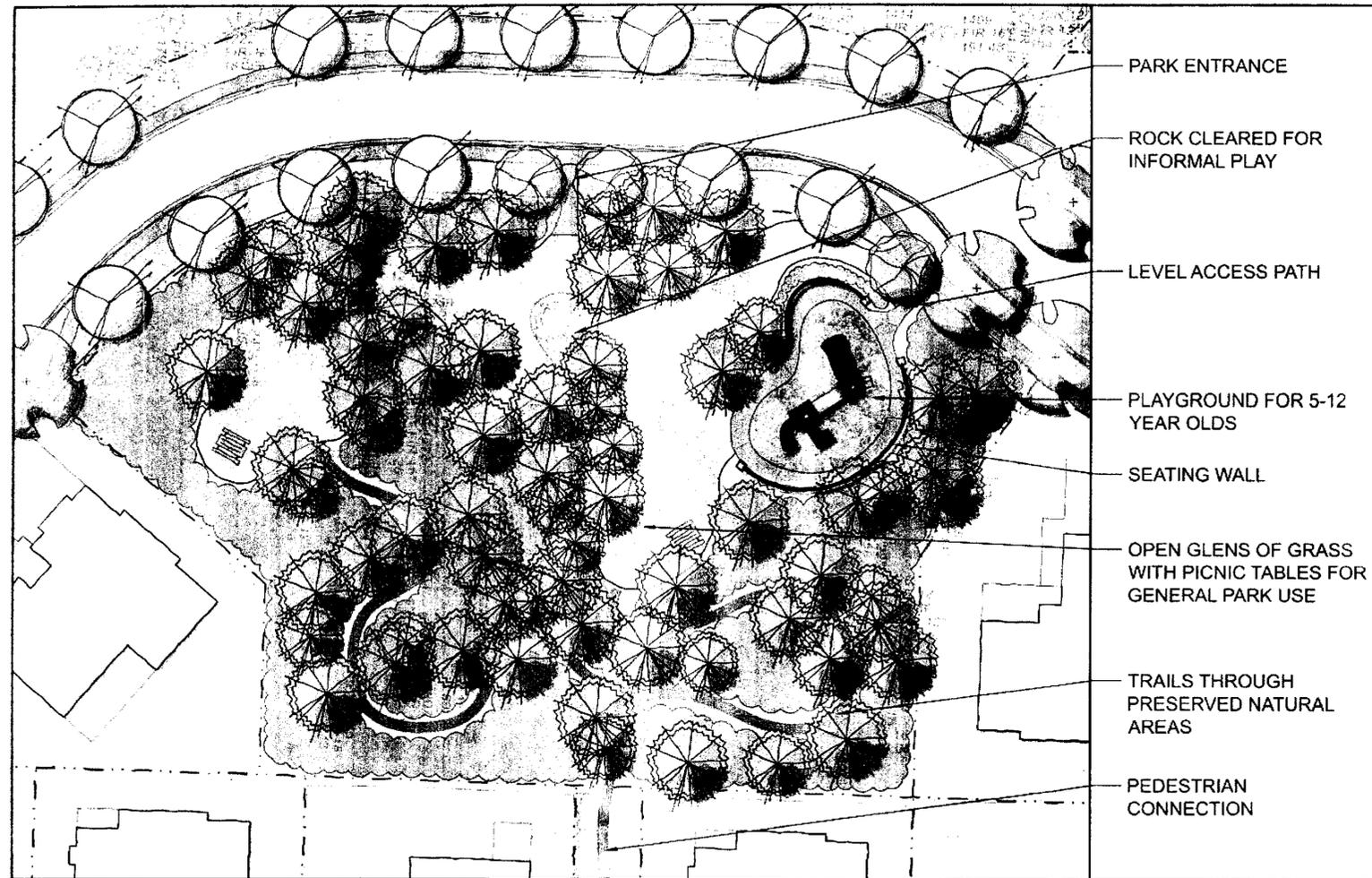
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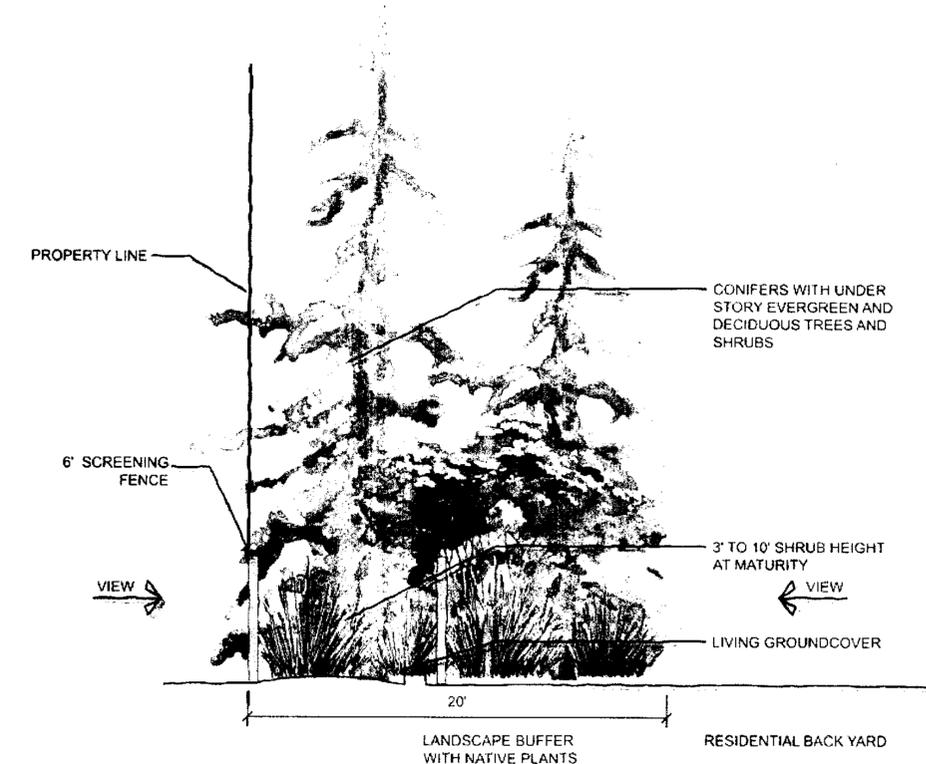


PL-1

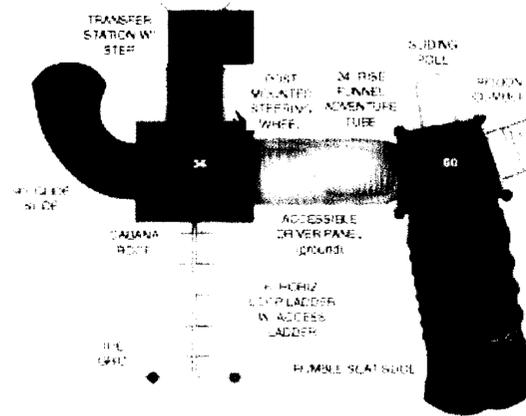
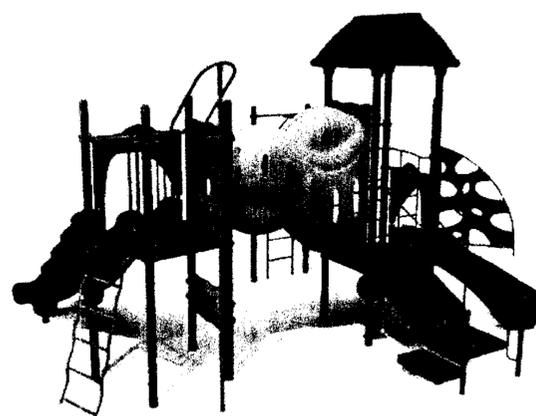
Sept. 22, 2014



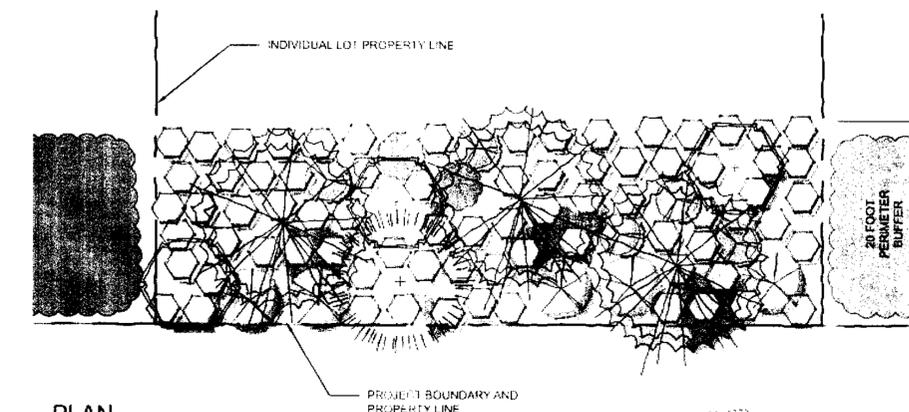
PRELIMINARY RECREATION SPACE CONFIGURATION
1" = 10'-0" (CHECK SCALE BAR FOR ACCURACY)



SECTION
1/4" = 1'-0"



CONCEPTUAL PLAYGROUND EQUIPMENT



PLAN
1" = 10'

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BUFFER PLANTING IN LIEU OF NATIVE RETENTION PLAN
SEE ABOVE, SCALES TO NO MATCH

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Conceptual Landscape Plan

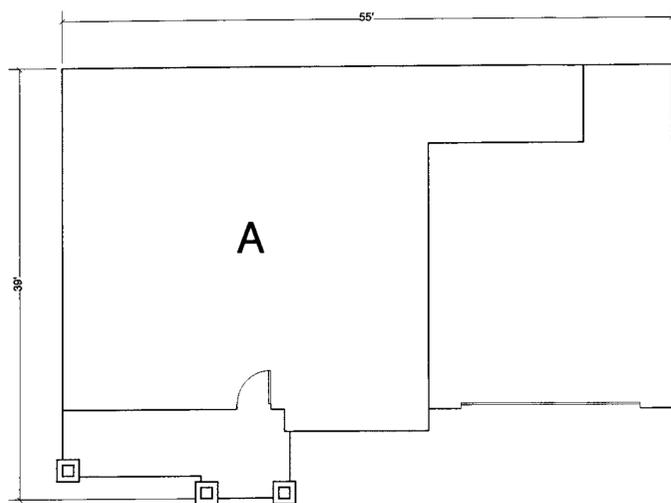
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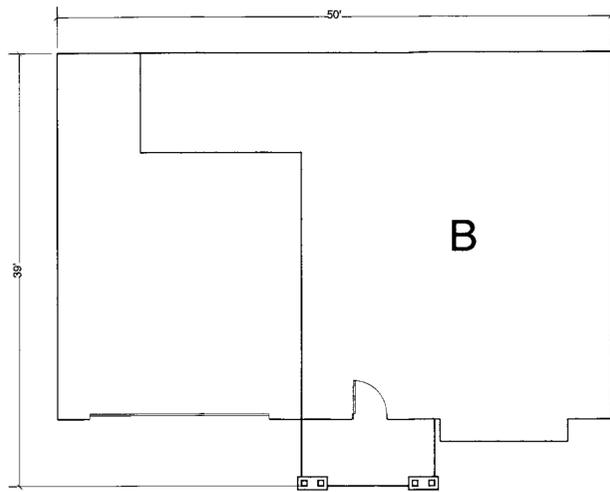


PL-2

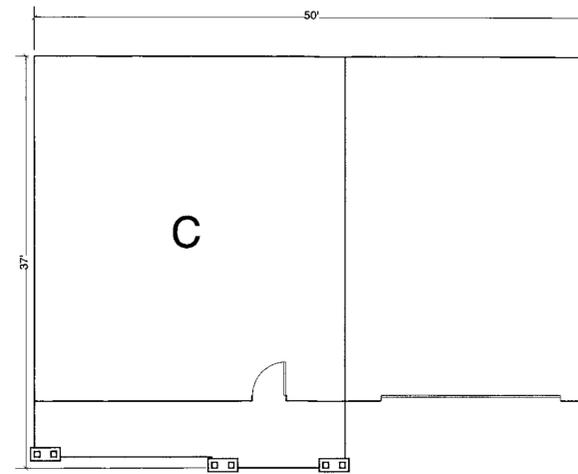
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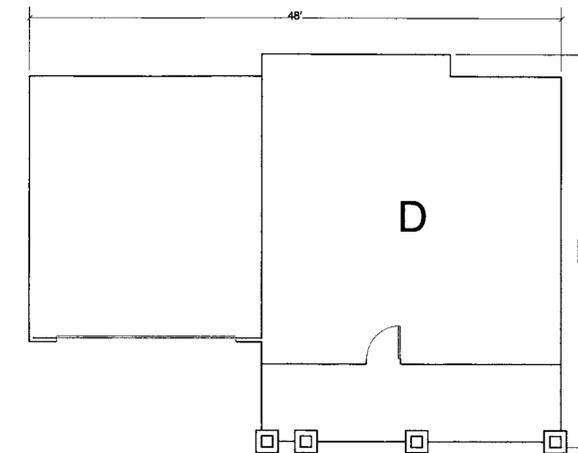
2 Model A Layout Scale 1/8"=1'-0"



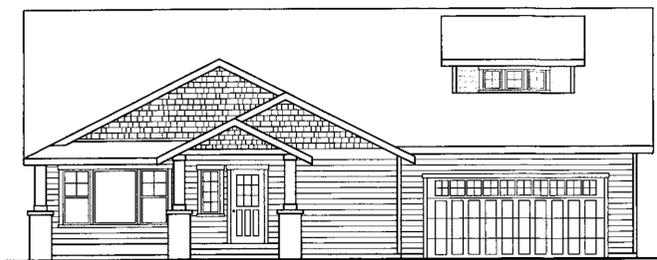
2 Model B Layout Scale 1/8"=1'-0"



2 Model C Layout Scale 1/8"=1'-0"



2 Model D Layout Scale 1/8"=1'-0"



1 Model A Front Elevation Scale 1/8"=1'-0"



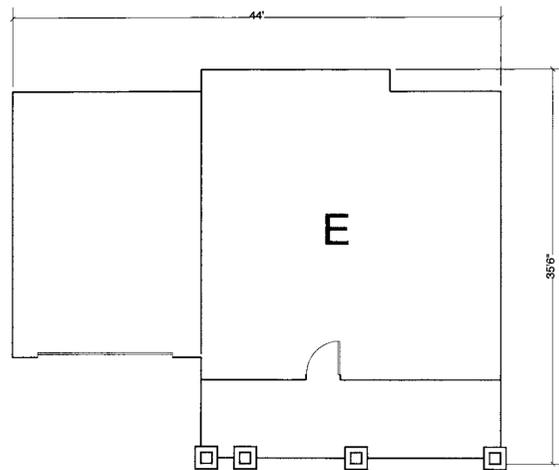
1 Model B Front Elevation Scale 1/8"=1'-0"



1 Model C Front Elevation Scale 1/8"=1'-0"



1 Model D Front Elevation Scale 1/8"=1'-0"



2 Model E Layout Scale 1/8"=1'-0"



1 Model E Front Elevation Scale 1/8"=1'-0"

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