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ENGINEERING • PLANNING

PRELIMINARY DRAINAGE REPORT

WING POINT GOLF & COUNTRY CLUB

NEW PRO SHOP AND MAINTENANCE BUILDING REPLACEMENT

Parcel No.'s 262501-1-011-2000, -003-2000

5253-000-001-0002, 5253-000-002-0001

SECTION 26, TOWNSHIP 25 NORTH, RANGE 1 EAST, W.M.

PREPARED FOR: Wing Point Golf and Country Club
PO Box 10460
Bainbridge Island, WA 98110

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DATE: November 8, 2024

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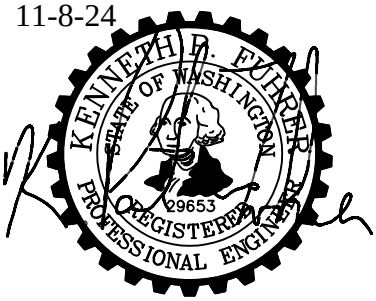

NOTE: THIS DOCUMENT IS INSCRIBED WITH A DIGITIZED SIGNATURE BY THE ENGINEER AS PROVIDED BY WAC 196-23-070(2)

REFERENCES

Kitsap County Stormwater Design Manual. Kitsap County, October 4, 2021

Stormwater Management Manual for Western Washington. Washington State Department of Ecology, 2019

USDA Natural Resources Conservation Services National Cooperative Soil Survey

Geotechnical Evaluation, Cobalt Geosciences September 13, 2023

Topographic Map. AGO Land Surveying, LLC, November 27, 2023

Preliminary Storm Drainage Analysis, Roats Engineering, January 20, 1989

Addendum to FEIS North Hill at Wing Point (East and West), Author unknown, September 19, 1989

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PRELIMINARY DRAINAGE REPORT
FOR
WPGCC New Pro Shop and Replacement Maintenance Bulding

I. PROJECT DESCRIPTION

The Wing Point Golf and Country Club (WPGCC) is located at 811, 865, and 873 Cherry Avenue NE in Bainbridge Island, Washington. A Clubhouse and Pro Shop occupy one building at 811 Cherry Avenue on Tax Parcel No. 262502-1-003-2000, along with an enclosed golf cart storage building, putting green and driving range, a swimming pool, tennis courts, and member parking areas. A maintenance building and maintenance yard and storage area occupy 873 and 865 Cherry Ave NE on Tax Parcel No.'s 5253-000-001-0002 and 5253-000-002-0001, respectively. The golf course itself lies on Tax Parcel No. 262502-1-011-2000.

WPGCC is proposing to construct a new Pro Shop building adjacent to the existing clubhouse and add cart parking to the lower floor, and reconfigure the adjacent putting greens, chipping greens, and drive range to accommodate the new structure. As part of the same land use application, WPGCC is also proposing to demolish and reconstruct a new Maintenance Building with a yard/storage area consisting of a new trash enclosure, sand and gravel aggregate storage bins, a covered cart and equipment wash pad, an above-ground fueling station, and enclosed chemical storage and equipment structure.

A pre-application meeting was held with City of Bainbridge Island Staff on March 25, 2024 and this project with require a Major Site Plan and design Review application, a Major Conditional Use Permit application, and a Boundary Line Adjustment application to consolidate the tax parcels and allow for current zoning setbacks with the golf course parcel.

As shown on the Topographic Survey prepared for this project, there are two drainage basins associated with the Clubhouse and Maintenance building/yard and parking portion of the project site. The parking areas and the maintenance yard area are located in the east basin which sheet-flow towards Cherry Avenue and is conveyed by an open ditch on the west side of Cherry Avenue along the property frontage where the flow then enters a series of stormwater pipes and catch basins southerly towards Wing Point Way NE. From there, runoff is continued to be routed in a closed conveyance piped system westerly and under Wing Point Way to a natural ravine at the NE Corner of Hawley Cove Park, and ultimately joining the stream that flows to Eagle Harbor

approximately 2,600 feet downstream from the site. On-site stormwater runoff from the eastern basin is not treated nor has flow control stormwater facilities in the current condition.

The west basin within the proposed project area consists of the Clubhouse building and the existing putting green and driving range tees. Stormwater from this portion of the site is conveyed by sheetflow and area drains and pipes westerly to an existing regional detention pond facility (Pond 2 as shown in the Appendices) that was constructed in the late 80's/early 90's as part of the North Hill at Wing Point project which expanded the golf course and subdivided adjacent properties into single family lots. Several regional detention pond facilities were built as part of the project, and were sized using the Rational Method as was the adopted standard at that time by the then-City of Winslow, whereby peak flows from the developed 64.3-acre basin were not-to-exceed the pre-developed storm within the upstream catchment area from a Rational Method-derived 25-year design storm event. Pond No. 3, as shown on the basin map, flows as a stream south under Wing Point Way, and ultimately entering Eagle Harbor approximately 2,200 feet downstream of Pond No. 2. On-site stormwater from the western basin is not treated, but does have some degree of flow control from Detention Pond 2.

Stormwater flow control analyses and design storm events have changed significantly since the time that the 64.3 acre formerly-forested basin was developed in the early 90's. In 1992, the Washington State Dept of Ecology published it's first of many Stormwater Management Manuals for Western Washington, and the 1992 edition required the use of the Santa Barbara Urban Hydrograph Method (SBUH) with correction factors to be applied to stored runoff volumes to more-closely mimic pre-developed runoff conditions. This change in hydrologic modeling increased the size of detention ponds previously sized by the Rational Method up to 4 times. Later, as computational methods were more easily analyzed by computer, Continuous Hydrograph Simulation models were developed which were based on rainfall gage measurements over a long period of history. These models predicted even lesser peak flow rates in the pre-developed conditions than previously estimated in the SBUH single-event models, and we are finding that typical detention ponds are about 15% in size of the total catchment area.

Given the design standards and construction history of the site and the downstream regional ponds discussed above, it is my professional opinion that Pond 2 cannot be retrofitted in an economical manner to include this project and still meet minimum Requirement #7 for the upstream basin of Pond 2. A separate detention facility should be constructed to provide MR #7 flow control for the entire WPGCC proposal since both basins discharge to the same stream corridor system.

A Geotechnical Evaluation and soils investigation was conducted for the Pro Shop building site, and found that this part of the site is underlain by up to 15 feet of fill material. Conversations with the WPGCC Maintenance Superintendent concerning the underlying soils confirm that they are not suitable for infiltration, with large amounts of clays and silts. Given the historical ground disturbance on the site as well as the evidence above, infiltration is not feasible for this project. This project proposes 67,235 s.f. (1.5435 Ac.) of new/replaced hard surface area, and a total project disturbance footprint of 131,235 s.f. (3.01 Ac.). Compliance with Stormwater Minimum Requirements #1- #9 in accordance with BIMC 15.20 and the 2019 DOE SSMMWW is required

and is demonstrated herein for Site Plan Review and Conditional Use Permit approvals by the City of Bainbridge Island.

A Stormwater Pollution Prevention Plan and Narrative will be provided at the future GAF and building permit submittals including details and specifications to prevent silt laden runoff from leaving the site causing siltation in the downstream drainage course. A Construction Stormwater Discharge permit will also be required to be obtained from the Dept. of Ecology since ground-disturbing activities will exceed one acre.

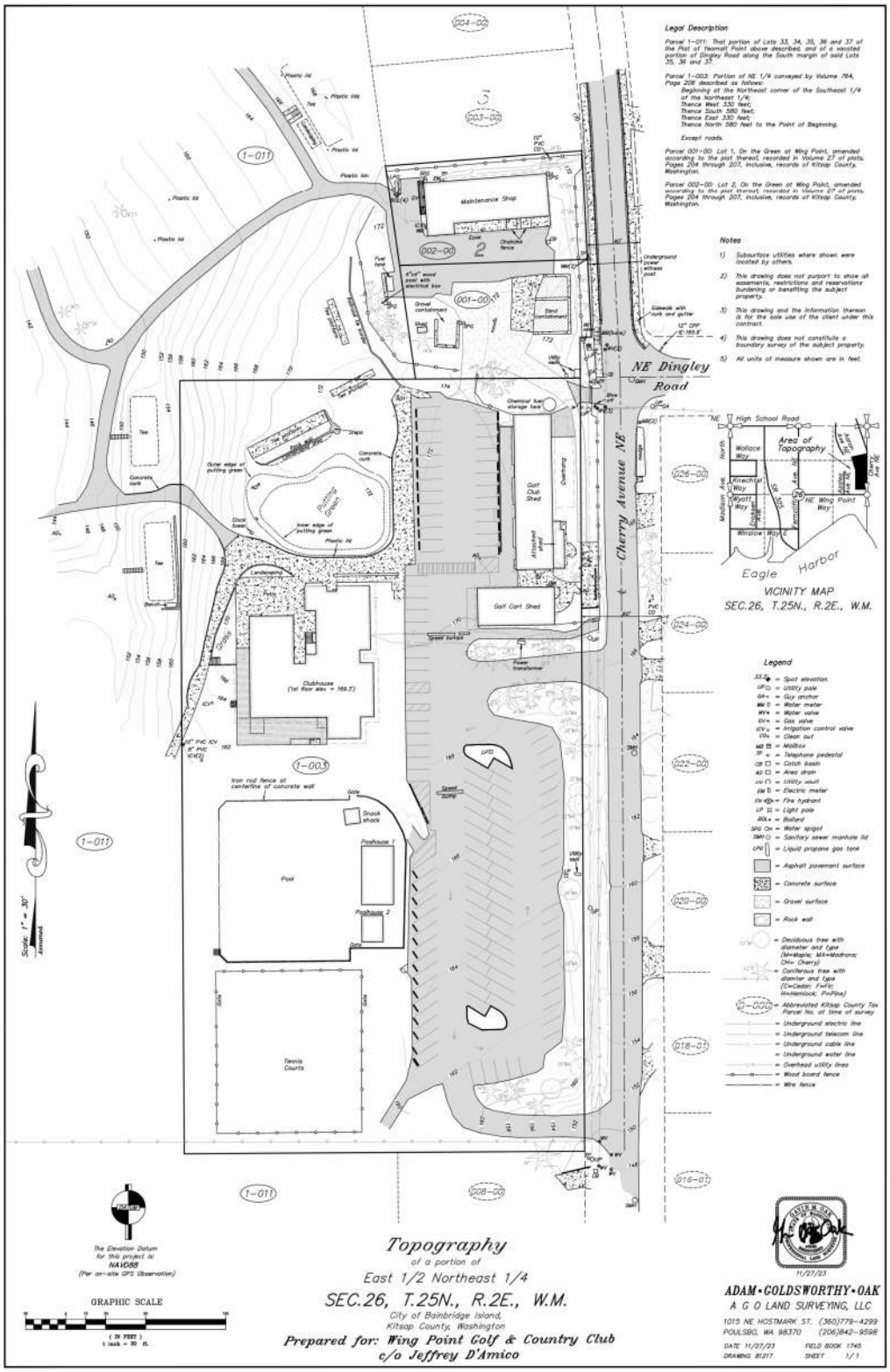
II. EXISTING CONDITIONS

A. TOPOGRAPHY AND FEATURES

A topographic survey was performed for the area of disturbance by AGO Land Surveying, LLC and is shown below and in the Preliminary Utilities Planset submitted for this project.. The ground surface slopes generally from the high point in the parking area east to Cherry Avenue at 3-5% and west to the golf course with flatter areas around the Putting Green and Clubhouse and steeper man-made landscaped slopes and terraces.

The site is well vegetated with a large tree buffer canopy along Cherry Avenue and well landscaped with groundcovers. The existing conditions plan and an aerial image from Google Earth are shown below.

1. Existing Conditions



2. Aerial

B. CRITICAL AREAS

No critical areas were identified on this affected portion of the WPGCC property or known to exist.

C. SOILS

According to the NRCS National Cooperative Soil Survey, on-site soils are classified as Kapowsin Gravelly Ashy Loam, and the Geotechnical Investigation found glacial through an undocumented fill area 15 feet below ground surface in the area of the new Proshop. Although the NRCS classifies these soils a belonging in Hydrologic Soil Group B, local stormwater manuals have always referred to Kapowsin-series soils belonging to Hydrologic Soil Group D. These soils are relatively impermeable and not conducive to on-site stormwater infiltration in the opinion of the Project Civil Engineer, and when coupled with the site's previous grading and ground disturbance infiltration Best Management Practices are not feasible for this project.

3. Soil Survey Map

Soil Map—Kitsap County Area, Washington
(WPGCC New Pro Shop and Maintenance Building)

Map Scale: 1:860 if printed on A portrait (8.5" x 11") sheet.
Meters: 0 10 20 40 60
Feet: 0 40 80 160 240
N
Map projection: Web Mercator Corner coordinates: WGS84

USDA Natural Resources Conservation Service | Web Soil Survey, National Cooperative Soil Survey | 10/15/2024 Page 1 of 3

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
22	Kapowsin gravelly ashy loam, 0 to 6 percent slopes	3.2	78.5%
23	Kapowsin gravelly ashy loam, 6 to 15 percent slopes	0.9	21.5%
Totals for Area of Interest		**4.0**	**100.0%**

III. DEVELOPED CONDITIONS

A. LAND COVER

This project proposes 67,235 s.f. (1.5435 Ac.) of new/replaced hard surface area, with a total project disturbance footprint of 131,235 s.f. (3.01 Ac.).

On-lot improvements assumed for the preliminary sizing of the stormwater facilities consists of:

- 14,424 s.f. of rooftops/flat
- 12,395 s.f. of Cart Path area (use Driveways/Mod for model input)
- 26,697 s.f. of Parking/Flat
- 13,719 s.f. of Sidewalk/Mod
- 64,000 s.f. of Pervious Landscaping (use Lawn/Mod for model input)

B. STORM WATER MANAGEMENT REQUIREMENTS

According to the Flow Charts for New and Re-Development for the project and City Development Engineering Staff review comments from the pre-application meeting, Stormwater Minimum Requirements #1 – #9 are required to be demonstrated as part of the Land Use permit review process and are discussed below.

4. Minimum Requirement # 1

1	Preparation of Stormwater Site Plans	Projects shall prepare a Stormwater Site Plan, providing comprehensive reporting of the technical information and analysis necessary to review compliance with the Stormwater Code.

Minimum Requirement #1 will be met. This preliminary drainage report and the accompanying Preliminary Drainage and Utility Plans are provided at the Site Plan Review and Conditional Use Permit application level to demonstrate that compliance with the City Stormwater Code is feasible, and the project will be conditioned to provide final design and construction permitting reports, plans, and specifications after land use permit approvals by the City of Bainbridge Island and before any land disturbing activities commence.

5. Minimum Requirement #2

2	Construction Stormwater Pollution Prevention	Requires projects to prevent erosion and discharge of sediment and other pollutants into receiving waters during construction activities.

Minimum requirement #2 will be met. Future Grade and Fill permit plans will include silt fencing, jute matting of slopes, a stabilized construction entrance, and a temporary sediment pond along with all details and notes for controlling discharge of sediment and other pollutants during construction. A SWPP Narrative will also be included with the permit documents outlining BMP's and project management to ensure no silt-laden runoff is discharged from the project during construction.

6. Minimum Requirement #3

3	Source Control of Pollution	All known, available and reasonable source control BMPs shall be applied to all projects.

Minimum requirement #3 will be met by following the guidance below taken from the 2019 DOE Manual for those potential pollution sources located within the maintenance yard and storage area:

SOURCE CONTROL FOR WASHING VEHICLES & EQUIPMENT

The source control for the cart washing and maintenance equipment cleaning shall be conducted in a structure with a roof area that is at least 4 feet wider than the area for washing. All wash water shall be discharged to sanitary sewer. Wash water shall be held with temporary storage prior to discharge to the sanitary sewer. The applicant is currently evaluating a closed-loop wash rack and/or a chemical mix/load/storage area with different manufacturer's products.

The following guidance is taken from the WSDOE SWMMWW (2019):

IV-2 Cleaning or Washing Source Control BMPs

S431 BMPs for Washing and Steam Cleaning Vehicles / Equipment / Building Structures

Description of Pollutant Sources: Pollutant sources include the commercial cleaning of vehicles, aircraft, vessels, and other transportation, restaurant kitchens, carpets, and industrial equipment, and large buildings with low- or high-pressure water or steam. This includes "charity" car washes at gas stations and commercial parking lots. The cleaning can include hand washing, scrubbing, sanding, etc. Washwater from cleaning activities can contain oil and grease, suspended solids, heavy metals, soluble organics, soaps, and detergents that can contaminate stormwater.

Permitting Requirements: Obtain all necessary permits for installing, altering, or repairing onsite drainage and side sewers. Restrictions on certain types of discharges may require pretreatment before they enter the sanitary sewer.

Pollutant Control Approach: The preferred approach is to cover and/or contain the cleaning activity, or conduct the activity inside a building, to separate the uncontaminated stormwater from the washwater sources. Convey washwater to a sanitary sewer after approval by the local sewer authority. Provide temporary storage before proper disposal, or recycling. Under this preferred approach, no discharge to the ground, to a storm drain, or to surface water should occur.

The Industrial Stormwater General Permit prohibits the discharge of process wastewater (e.g., vehicle washing wastewater) to ground water or surface water. Stormwater that commingles with process wastewater is considered process wastewater.

Applicable Structural Source Control BMPs:

Conduct vehicle/equipment washing in one of the following locations:

- At a commercial washing facility in which the washing occurs in an enclosure and drains to the sanitary sewer, or
- In a building constructed specifically for washing of vehicles and equipment, which drains to a sanitary sewer.

SOURCE CONTROL FOR STORAGE OF PESTICIDES AND FERTILIZERS

The pesticides and fertilizers are to be stored separately and not to be discharged into the sanitary sewer with the wash water from equipment and vehicle wash areas. There are no structural BMP's for these substances and the only BMP's involve employee education, including spill control education, and adequate materials for spill control mitigation.

The following is taken from the WSDOE SWMMWW (2019):

S444 BMPs for the Storage of Dry Pesticides and Fertilizers

Description of Pollutant Sources: Pesticides such as pentachlorophenol, carbamates, and organometallics can be released to the environment as a result of container leaks and outside storage of pesticide-contaminated materials and equipment. Inappropriate management of pesticides or fertilizers can result in stormwater contamination. Runoff contaminated by pesticides and fertilizers can severely degrade streams and lakes and adversely affect fish and other aquatic life.

Pollutant Control Approach: Store fertilizer and pesticide properly to prevent stormwater contamination.

Applicable Structural BMPs:

Store pesticides and fertilizers in enclosed impervious containment areas that prevent precipitation or unauthorized personnel from coming into contact with the materials..

Applicable Operational BMPs:

- Containers and bags must be covered, intact, and off the ground.
- Store all material so that it cannot come into contact with water.
- Immediately clean up any spilled fertilizer or pesticides.
- Keep pesticide and fertilizer contaminated waste materials in designated covered and contained areas, and dispose of properly.
- Store and maintain spill cleanup materials near the storage area.
- Sweep paved storage areas as needed. Collect and dispose of spilled materials. Do not hose down the area.
- Do not discharge pesticide contaminated stormwater or spills/leaks of pesticides to storm sewers or to the sanitary sewer. Contaminated stormwater must be collected and disposed of properly. Unused or spilled/leaked pesticides must be disposed of according to the label.
- Comply with WAC 16-228-1220 and Chapter 16-229 WAC.

SOURCE CONTROL FOR ABOVE GROUND FUEL TANKS

The source control for above ground fuel tanks requires tanks to be double-walled or be equipped with secondary containment. Fuel tanks shall be protected from damage from other equipment (forklifts, etc.)

The following is taken from the WSDOE SWMMWW (2019):

S428 BMPs for Storage of Liquids in Permanent Aboveground Tanks

Description of Pollutant Sources: Aboveground tanks containing liquids (excluding uncontaminated water) may be equipped with a valved drain, vent, pump, and bottom hose connection. Aboveground tanks may be heated with steam heat exchangers equipped with steam traps, if required. Leaks and spills can occur at connections and during liquid transfer. Oil and grease, organics, acids, alkalis, and heavy metals in tank water and condensate drainage can also cause stormwater contamination at storage tanks.

Pollutant Control Approach: Install secondary containment or a double-walled tank. Slope the containment area to a drain with a sump. Operators may need to discharge stormwater collected in the containment area to a Runoff Treatment BMP such as BMP T11.10: API (Baffle type) Separator or BMP T11.11: Coalescing Plate (CP) Separator, or an equivalent BMP. Add safeguards against accidental releases including protective guards around tanks to protect against vehicle or forklift damage, and tagging valves to reduce human error. *Tank water and condensate discharges are process wastewater that may need an NPDES Permit.*

Applicable Operational BMPs:

- Inspect the tank containment areas regularly for leaks/spills, cracks, corrosion, etc. to identify problem components such as fittings, pipe connections, and valves.
- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/unloading of tanks. Operators may need valved drain tubing in mounted drip pans.
- Vacuum sweep and clean the tank storage area regularly, if paved.
- Replace or repair tanks that are leaking, corroded, or otherwise deteriorating.
- Storage of flammable, ignitable, and reactive chemicals and materials must comply with the stricter of local zoning codes, local fire codes, the Uniform Fire Code (UFC), UFC standards, or the National Electric Code.

Applicable Structural BMPs:

- Locate permanent tanks in impervious (Portland cement concrete or equivalent) secondary containment surrounded by dikes as illustrated in Figure IV-5.5: Above-Ground Tank Storage, or use UL Approved double-walled tanks. The dike must be of sufficient height to provide a containment volume of either 10 percent of the total enclosed tank volume or 110 percent of the volume contained in the largest tank, whichever is greater.
- Slope the secondary containment to drain to a normally closed valve, for the collection of small spills.
- Include a tank overfill protection system to minimize the risk of spillage during loading.

SOURCE CONTROL FOR MATERIAL STORAGE BINS

The source control for material storage bins (in this case sand) is to provide an area with an impervious containment with berms/dikes to prevent discharge of TSS.

The following is taken from the WSDOE SWMMWW (2019):

S429 BMPs for Storage or Transfer (Outside) of Solid Raw Materials, Byproducts, or Finished Products

Description of Pollutant Sources: Some pollutant sources stored outside in large piles, stacks, etc. at commercial or industrial establishments include:

- Solid raw materials
- Byproducts
- Gravel
- Sand
- Salts
- Topsoil
- Compost
- Logs
- Sawdust
- Wood chips
- Lumber
- Concrete
- Metal products

Contact between outside bulk materials and stormwater can cause leachate, and erosion of the stored materials. Contaminants may include TSS, BOD, organics, and dissolved salts (sodium, calcium, and magnesium chloride, etc.).

Pollutant Control Approach: Provide impervious containment with berms, dikes, etc. and/or cover to prevent run-on and discharge of leachate pollutant(s) and TSS.

Applicable Operational BMPs:

- Do not hose down the contained stockpile area to a storm drain or a conveyance to a storm drain, or to a receiving water.
- Maintain drainage areas in and around storage of solid materials with a minimum slope of 1.5 percent to prevent pooling and minimize leachate formation. Areas should be sloped to drain stormwater to the perimeter for collection or to internal drainage "alleyways" where no stockpiled material exists.
- Sweep paved storage areas regularly for collection and disposal of loose solid materials.
- If and when feasible, collect and recycle water-soluble materials (leachates).
- Stock cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area.

Applicable Structural BMPs:

For stockpiles less than 5 cubic yards, place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as shown in Figure IV-5.7: Material Covered with Plastic Sheeting.

The source control BMP options listed below are applicable to:

- Stockpiles greater than 5 cubic yards of erodible or water soluble materials such as:
  - Soil
  - Road deicing salts
  - Compost
  - Unwashed sand and gravel
  - Sawdust
- Outside storage areas for solid materials such as:
  - Logs
  - Bark
  - Lumber
  - Metal products

Choose one or more of the following Source Control BMPs:

- Store in a building or paved and bermed covered area as shown in Figure IV-5.6: Covered Storage Area for Bulk Solids.
- Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as shown in Figure IV-5.7: Material Covered with Plastic Sheeting.
- Pave the area and install a drainage system. Place curbs or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater and to collect and convey runoff to treatment. Slope the paved area in a manner that minimizes the contact between stormwater (e.g., pooling) and leachable materials in compost, logs, bark, wood chips, etc.
- For large uncovered stockpiles, implement containment practices at the perimeter of the site and at any catch basins as needed to prevent erosion and discharge of the stockpiled material off-site or to a storm drain. Ensure that no direct discharge of contaminated stormwater to catch basins exists without conveying runoff through an appropriate treatment BMP.

SOURCE CONTROL FOR DUMPSTER ENCLOSURE

There is no specific source control for dumpster enclosures, other than to eliminate the potential for the illicit discharge to stormwater for possible contaminants and refuse in the dumpster/recycle enclosure. Typically, these enclosures have a catch basin that is either a type 2 catch basin with a sump that is to be vactored out as required or is connected to sanitary sewer.

Please note these source control design guidelines to satisfy Minimum Requirement #3 will be part of and implemented in the future final Grade and Fill Permit plans and specifications and Building Permit plans and specifications for this project.

7. Minimum Requirement #4

4	Preservation of Natural Drainage Systems and Outfalls	Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site shall not cause a significant adverse impact to downstream receiving waters and downgradient properties. All outfalls shall provide energy dissipation.

Minimum Requirement #4 will be met by the design of the project to mimic the natural topography existing flow paths downstream, and will not cause adverse impacts to downstream properties.

8. Minimum Requirement #5

5	On-site Stormwater Management	Projects shall employ On-site Stormwater Management BMPs in accordance with the prescribed projects thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on-site to the extent feasible without causing flooding or erosion impacts.

Figure I-3.3: Flow Chart for Determining MR #5 Requirements

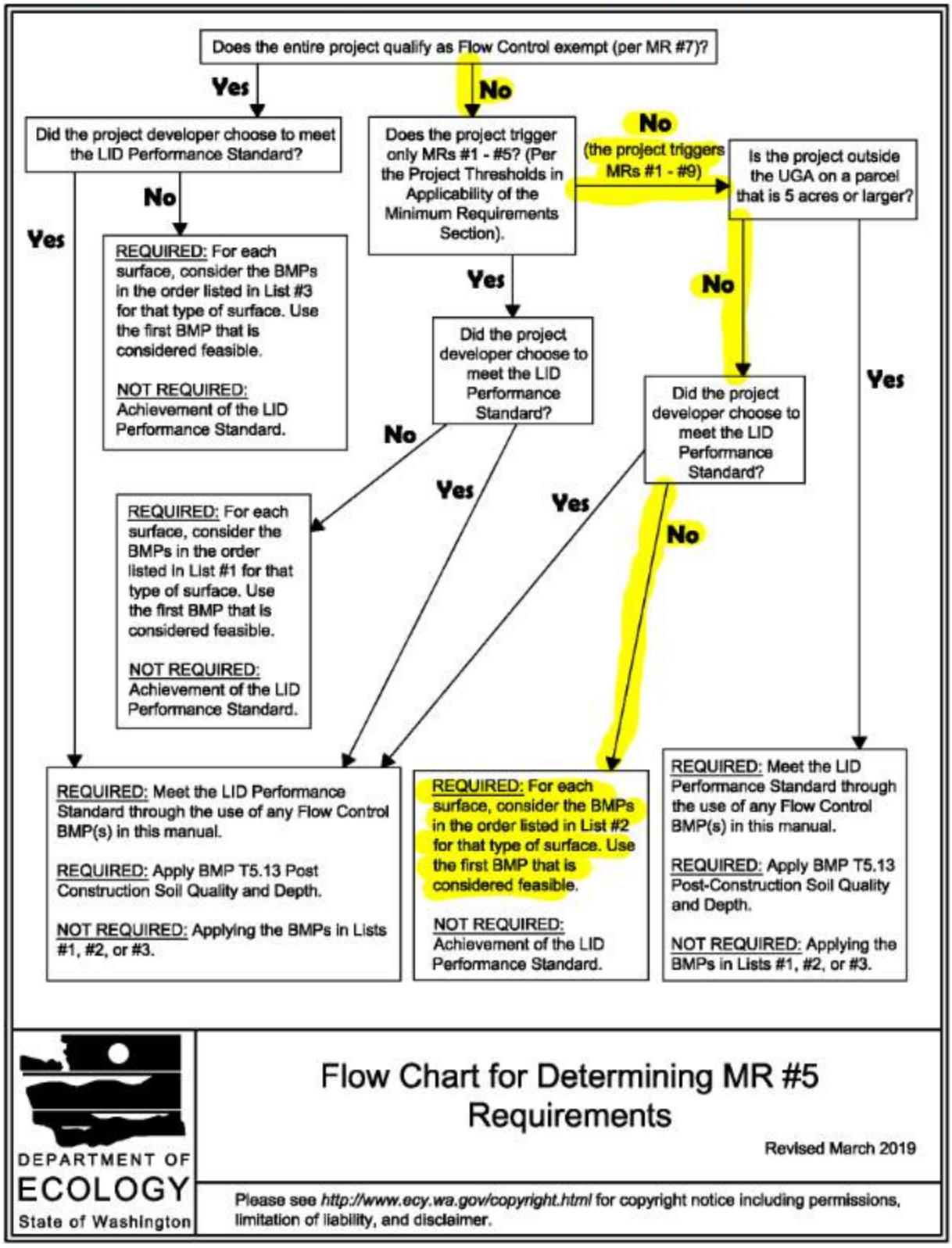


Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
Surface Type: Roofs		
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	4. BMP T5.10C: Perforated Stub-out Connections	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention	
	4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	

Notes for using the List Approach:

1. Size BMP T5.14: Rain Gardens and BMP T7.30: Bioretention used in the List Approach to have a minimum horizontal projected surface area below the overflow which is at least 5% of the area drain-

The MR#5 List #2 Feasibilities for this project are discussed and are determined by the Project Engineer to be Feasible or Infeasible as follows:

Lawn and Landscaped areas:

- *Post-Construction Soil Quality and Depth in Accordance with BMP T5.13 of Volume 5*

Soil amendment will be provided for all landscaped and disturbed graded areas with constructed slopes less than 33% (3H:1V), and these areas will be specified on the final GAF civils and landscape plans.

Roofs:

- *BMP T5.30: Full Dispersion:* **Not feasible due to lack of a downstream flowpath for rooftops through native vegetation.**

- *BMP T5.10A Downspout Full Infiltration:* **Not feasible due to site's clayey and compact soils and potential for slope destabilization and adjoining structure basement flooding.**

- *BMP T7.30: Bioretention:* **Not feasible due to site's clayey and compact soils, adjacent slopes, and potential for localized flooding of adjoining basements.**

- *BMP T5.10B Downspout Dispersion Systems:* **Not feasible on this project due to the lack of a downstream flowpath and adjacent slopes.**

- *BMP T5.10C Perforated stub-out connections:* **Not feasible on this site due to the potential for surface flow to enter and impact down-gradient golf course and also impact adjacent slopes.**

Other Hard Surfaces:

- *BMP T5.30: Full Dispersion:* **Not feasible due to lack of a downstream flowpath through native vegetation.**
- *BMP T5.15 Permeable Pavements:* **The underlying clayey soils, slopes of the adjacent areas, potential for flooding adjacent basements, and the history of site soil disturbance from past grading activities are not feasible for permeable pavement installation and benefits.**
- *BMP T7.30 Bioretention:* **A lined bio-retention cell (aka raingarden) with underdrain is feasible, and an area set aside on the project to direct runoff from vehicular parking and the maintenance yard area. This BMP is thought to be an attractive addition to the overall landscaping plan for the project, and will be well-maintained as is the entire WPGCC facility.**

- *BMP T5.12 Sheet Flow Dispersion:* **Not feasible due to lack of sufficient flow path adjacent to the hard surfaces through native vegetation and slopes.**
- *BMP T5.11 Concentrated flow Dispersion:* **Not feasible due to lack of sufficient flow path adjacent to the hard surfaces through native vegetation and slopes..**

Minimum Requirement #5 will be met for this site with the use of soil amendment for landscaped and other pervious disturbed areas having a grade less than or equal to 33% (3H:1V), and design/installation of a bio-retention cell for routing of runoff from vehicular parking areas and the maintenance yard and storage area.

9. Minimum Requirement #6

6	Runoff Treatment	Projects shall provide runoff treatment to reduce pollutant loads and concentrations in stormwater runoff using physical, biological, and chemical removal mechanisms so that beneficial uses of receiving waters are maintained and, where applicable, restored.

Minimum Requirement #6 is required to be met for this project since there is more than 5000 s.f. of pollution-generating hard surface area proposed. A bio-retention cell with an underdrain is proposed upstream of the detention pond and will treat over 91% of the runoff volume from the project's driveway and roadway areas. The clean runoff from the rooftops will be separately conveyed around the bio-retention cell and connected downstream to the detention pond.

Preliminary sizing of the bio-retention cell is included in this report.

10. Minimum Requirement #7

7	Flow Control	Projects shall provide flow control to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.

Flow control is required for this project.

As discussed on pages 1 and 2, retrofitting the downstream Regional Pond #2 that was constructed over 30 years ago under much less-stringent design codes to meet MR #7 flow rates and volume storage thresholds is not possible for this project.

Two possible new pond options were prepared and routed/reviewed by WGPCC Staff as shown below, both of which are located upstream of Pond #2 and down-gradient of the project's disturbance area. The Preferred location shown below was selected over the Alternate location because a pond in the Preferred location would be a better amenity for golf course play, conveying the stormwater to it would be more efficient, there is an existing stormwater conveyance system that connects to Pond #2 through this area, and upstream sheetflow from the upgradient course and parcels can be easily re-directed

around the Preferred Pond location. Also, there are sewer lines and an easement in the vicinity of the Alternate Location that could cause some design and construction limitations, and concerns over buffers from the man-made pond appear to exist on the City's SAR mapping overlay.

Preliminary sizing of the detention pond facility is included in this report, and MR #7 is satisfied.

11. Minimum Requirement #8

8	Wetlands Protection	Projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system shall comply with Volume II, Chapter 6 of this manual.

This project does not directly or indirectly through a conveyance system discharge to a wetland, therefore Minimum Requirement #8 is satisfied.

This project does not directly or indirectly through a conveyance system discharge to a wetland, therefore Minimum Requirement #8 is satisfied.

12. Minimum requirement #9

9	Operation and Maintenance	An operation and maintenance manual that is consistent with the provisions in Volume II, Chapter 7 of this manual shall be provided for proposed stormwater facilities and BMPs, and the party (or parties) responsible for maintenance and operation shall be identified.

A Stormwater Operations and Maintenance Manual will be provided for the stormwater facilities in this project as a requirement of the Grading and Fill Permit and prior to final approval of the construction. MR #9 is satisfied.

13. Preliminary Drainage Plan

NOTE:
THE FINAL DETENTION POND CONFIGURATION WILL BE REVISED AT THE TIME OF FINAL DESIGN AFTER REVIEW/COORDINATION WITH GOLF PLAY ARCHITECT

DETENTION POND
LIVE STORAGE EL.=132.0
136.0 CONTOUR AREA=16,730 SF
132.0 CONTOUR AREA=10,070 SF
125.5 CONTOUR AREA=1,320 SF

SEE PRELIMINARY GRADING PLAN SHEET 3 OF 5

EXISTING STORMWATER CONVEYANCE PIPING AND CATCH BASIN MAY NEED RELOCATING BASED ON FURTHER INVESTIGATION IN THE FINAL DESIGN

PROPOSED OVERFLOW STRUCTURE
RIM=135.0

PROPOSED CONTROL STRUCTURE
RIM=136.0
I.E.=132.0

1,524 SF RAIN GARDEN w/ LINER

FLOW SPREADER

ROOF DRAIN CONNECTION

PERFORATED UNDER-DRAIN PIPE

CHIPPING GREEN

S/C TEE

RANGE TEES

PRO SHOP
UPPER FINISH FLOOR = 173.00
LOWER FINISH FLOOR = 162.00

TERRACE

PUTTING GREEN

CART PARKING

CLOCK

CATCH BASIN AND STORM WATER PIPING (TYPICAL)

EX. CLUBHOUSE
1st FLOOR EL. = 169.3

EQUIPMENT STORAGE

CHEM. TANK

FUEL

CART WASH

MAINTENANCE BUILDING

MATERIAL BIN

MATERIAL BIN

TRASH ENCLOSURE

17th TEE

18th GREEN

9th GREEN

16th GREEN

17th TEE

CHERRY AVENUE NE

NE DINGLEY ROAD

CHERRY AVENUE NE

(004-00)

(003-00)

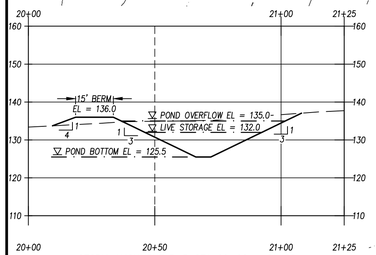
(026-00)

(024-00)

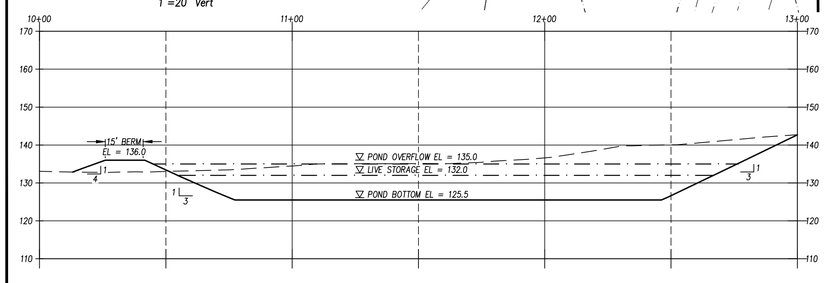
NORTH

30 0 15 30 60
(IN FEET)
1 inch = 30 ft.

STORM LEGEND
- CATCH BASIN
- YARD DRAIN
- STM — STORM DRAINAGE LINE
- SD — YARD/ROOF DRAINAGE LINE



STORM ALIGNMENT B–B STA 20+00 – 21+25
1"=30' Horiz
1"=20' Vert



STORM ALIGNMENT A–A STA 10+00 – 13+00
1"=30' Horiz
1"=20' Vert

WING POINT GOLF & COUNTRY CLUB
NEW PRO SHOP & MAINTENANCE BUILDINGS - SITE PLAN REVIEW

PRELIMINARY DRAINAGE PLAN

FOR
Wing Point Golf and Country Club
811 Cherry Avenue NE
Bainbridge Island, WA 98110

CONTACT
Jeff D'Amico, Director
jeffd@wingpointgolf.com

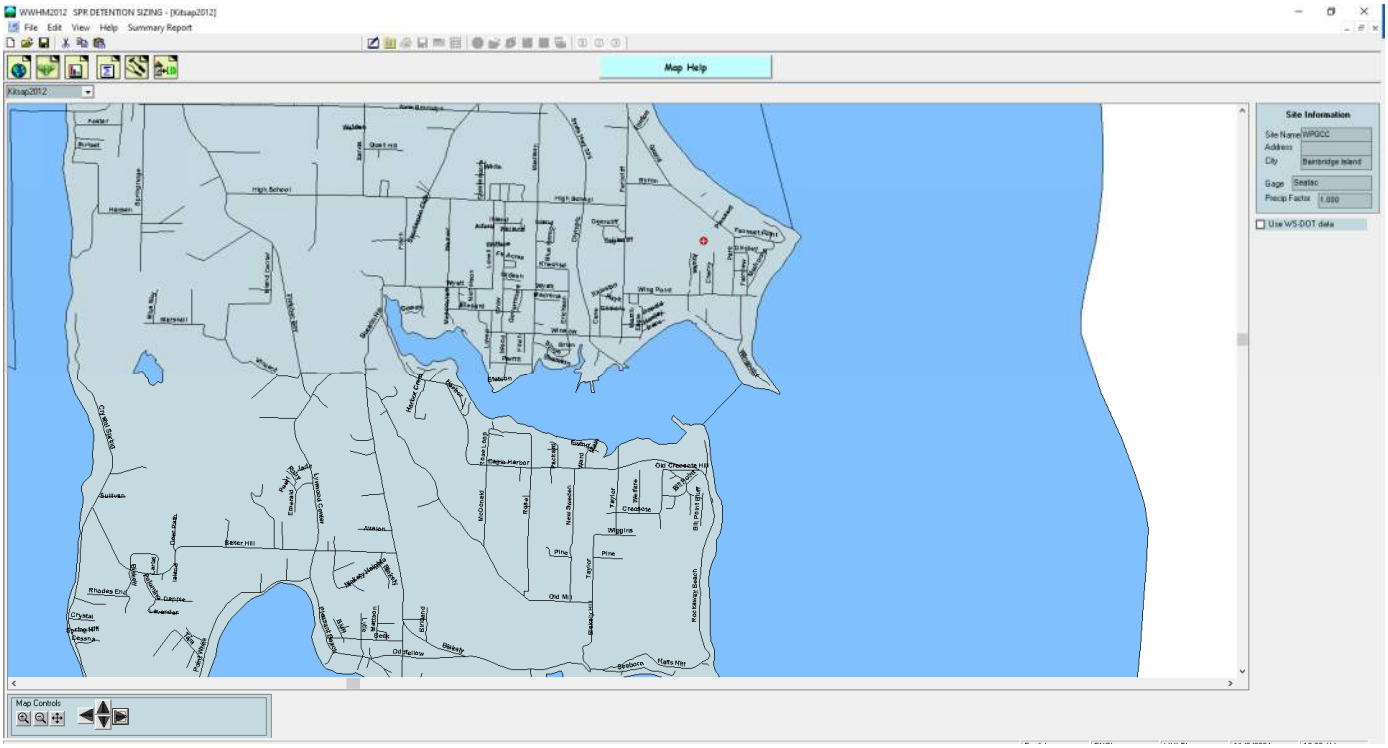
MAP LTD
P.O. Box 720 • 10045 Old Frontier Road NW
Silverdale, Washington 98383
(360) 692-5525
ENGINEERING • SURVEYING
PLANNING

NO.	DATE	DESCRIPTION	BY

CALCULATED	DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET
				10-23-24	1" = 30'	6888	4 of 5

IV. Modeled Predeveloped and Mitigated Land Use Basin Definitions

Shown below is a catchment plan used to define the land use basins in the Mitigated Condition and size code-appropriate flow control and water quality facilities in the WWHM2012 continuous simulation model. The site is first located and tied to the SEATAC historical rainfall gage:



This project proposes 67,235 s.f. (1.5435 Ac.) of new/replaced hard surface area, with a total project disturbance footprint of 131,235 s.f. (3.01 Ac.).

On-lot improvements assumed for the preliminary sizing of the stormwater facilities consists of:

- 14,424 s.f. of rooftops/flat
- 12,395 s.f. of Cart Path area (use Driveways/Mod for model input)
- 26,697 s.f. of Parking/Flat
- 13,719 s.f. of Sidewalk/Mod
- 64,000 s.f. of Pervious Landscaping (use Lawn/Mod for model input)

CHERRY AVENUE

CONC. SIDEWALK 465 SF
CONC. SIDEWALK 690 SF
CONC. AREA 65 SF
CONC. SIDEWALK 145 SF
ASPHALT PARKING 3,890 SF
ASPHALT DRIVE AISLES 9,940 SF
TRASH ENCLOSURE CONC. AREA 845 SF
MAINTENANCE BUILDING 8,198 SF
MAINTENANCE ASPHALT AREA 9,580 SF
ASPHALT CART PATH 1,790 SF
ASPHALT NO-PARKING 627 SF
ASPHALT PARKING 810 SF
ASPHALT NO-PARKING 289 SF
ASPHALT PARKING 651 SF
COVERED EQUIPMENT STORAGE AREA 535 SF
COVERED CART WASH AREA 378 SF
PUTTING GREEN SURROUNDING CONC. AREA 7,408 SF
CONC. SIDEWALK 405 SF
COVERED ARBOR 787 SF
1,500 SF RAIN GARDEN
CONC. SIDEWALK 730 SF
1st LEVEL RANGE TEE AREA 676 SF
CLUBHOUSE
PUTTING GREEN
PRO SHOP 4,050 SF
CHIPPING GREEN
2nd LEVEL RANGE TEE AREA 1,321 SF
CONC. SIDEWALK 100 SF
CLUBHOUSE DECK AREA 520 SF
PRO SHOP PATIO AREA 917 SF
17th TEE
17th TEE
CONC. SIDEWALK 57 SF
ASPHALT CART PATH 10,605 SF

003-00

50 0 25 50 100
(IN FEET)
1 inch = 50 ft.

NORTH

CATCHMENT AREAS

BUILDINGS:
COVERED ARBOR AREA = 787 SF
COVERED CART WASH AREA = 378 SF
COVERED EQUIP. STORAGE AREA = 535 SF
MAINTENANCE BUILDING AREA = 8,198 SF
PRO SHOP BUILDING AREA = 4,050 SF
SHELTERED TEE ROOF AREA = 476 SF

ASPHALT:
CART PATH AREA = 12,395 SF
DRIVE AISLES AREA = 9,940 SF
MAINTENANCE ASPHALT AREA = 9,580 SF
NO-PARKING AREA = 916 SF
PARKING AREA = 5,351 SF

CONCRETE:
MAINTENANCE CONCRETE AREAS = 910 SF
PUTTING GREEN SURROUNDING AREA = 7,408 SF
PRO SHOP PATIO/RANGE AREA = 1,018 SF
1st LEVEL RANGE TEE CONCRETE AREA = 2,238 SF
SIDEWALK AREA = 2,535 SF

DECK:
CLUBHOUSE DECK AREA = 520 SF

PERVIOUS AREA = 64,000 SF

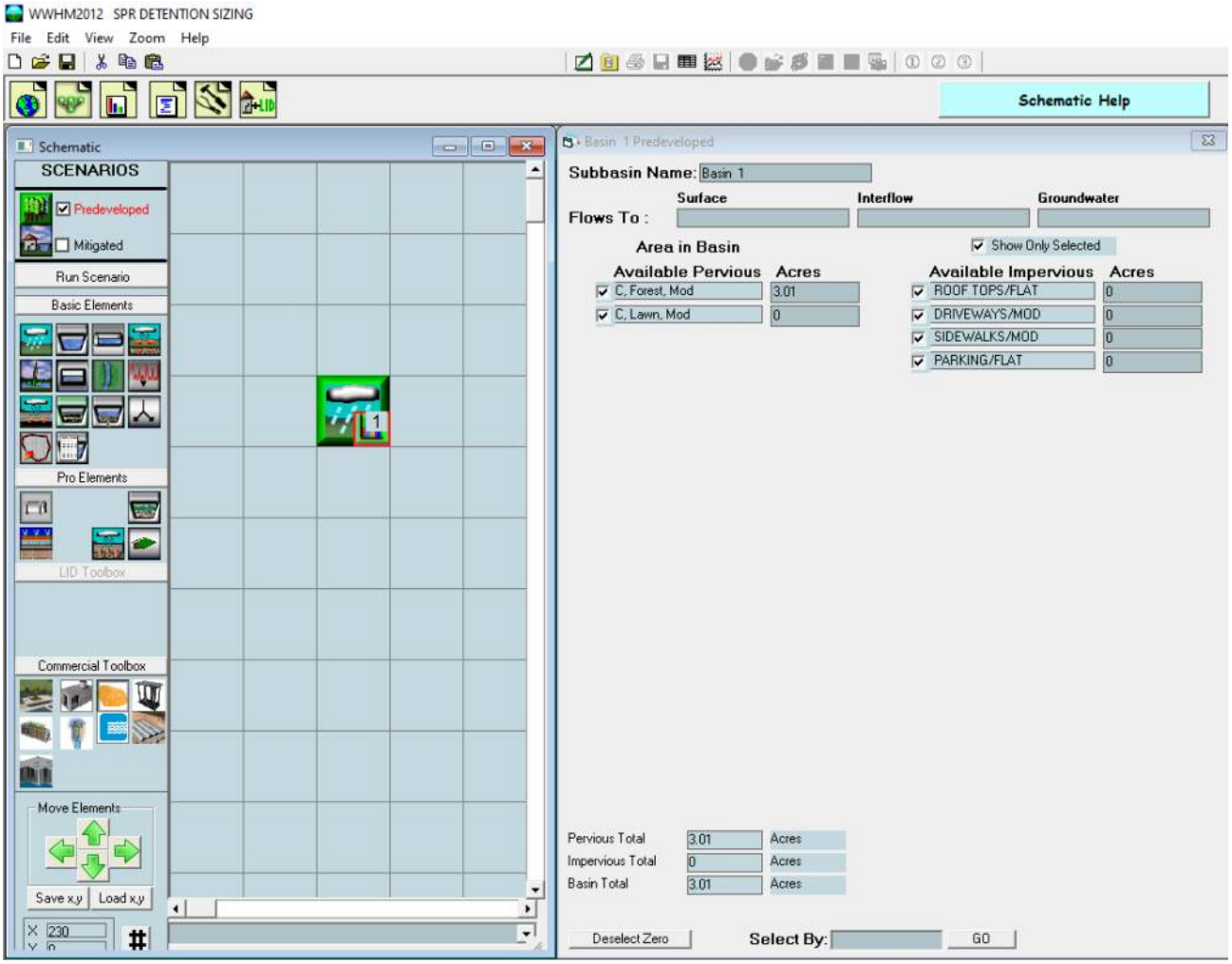
SCHEMATIC CATCHMENT PLAN

FOR
CONTACT

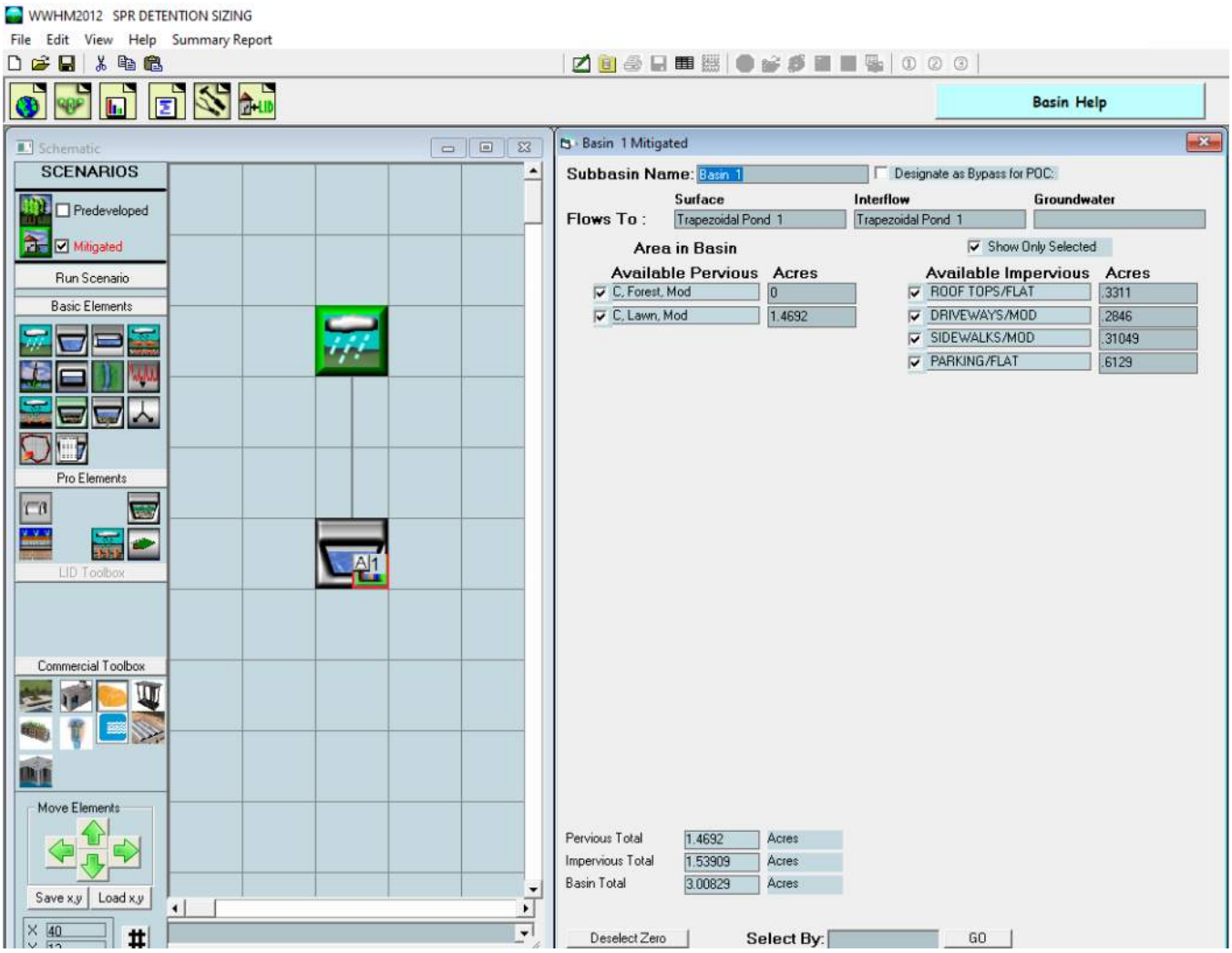
MAP LTD
P.O. Box 729 • 18845 Old Frontier Road NW
Silverdale, Washington 98383
(360) 692-5525
ENGINEERING • SURVEYING
PLANNING

CALCULATED	DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET
					1" = 50'	6888	

The 3.01 Acre Predeveloped scenario land use basin was then inputted and represented as a moderately-sloped Forest with Hydrologic Soil Group “C” till soils:



Subsequently, the Mitigated Land Use Basin was defined and inputted based on the developed catchment areas calculated above:

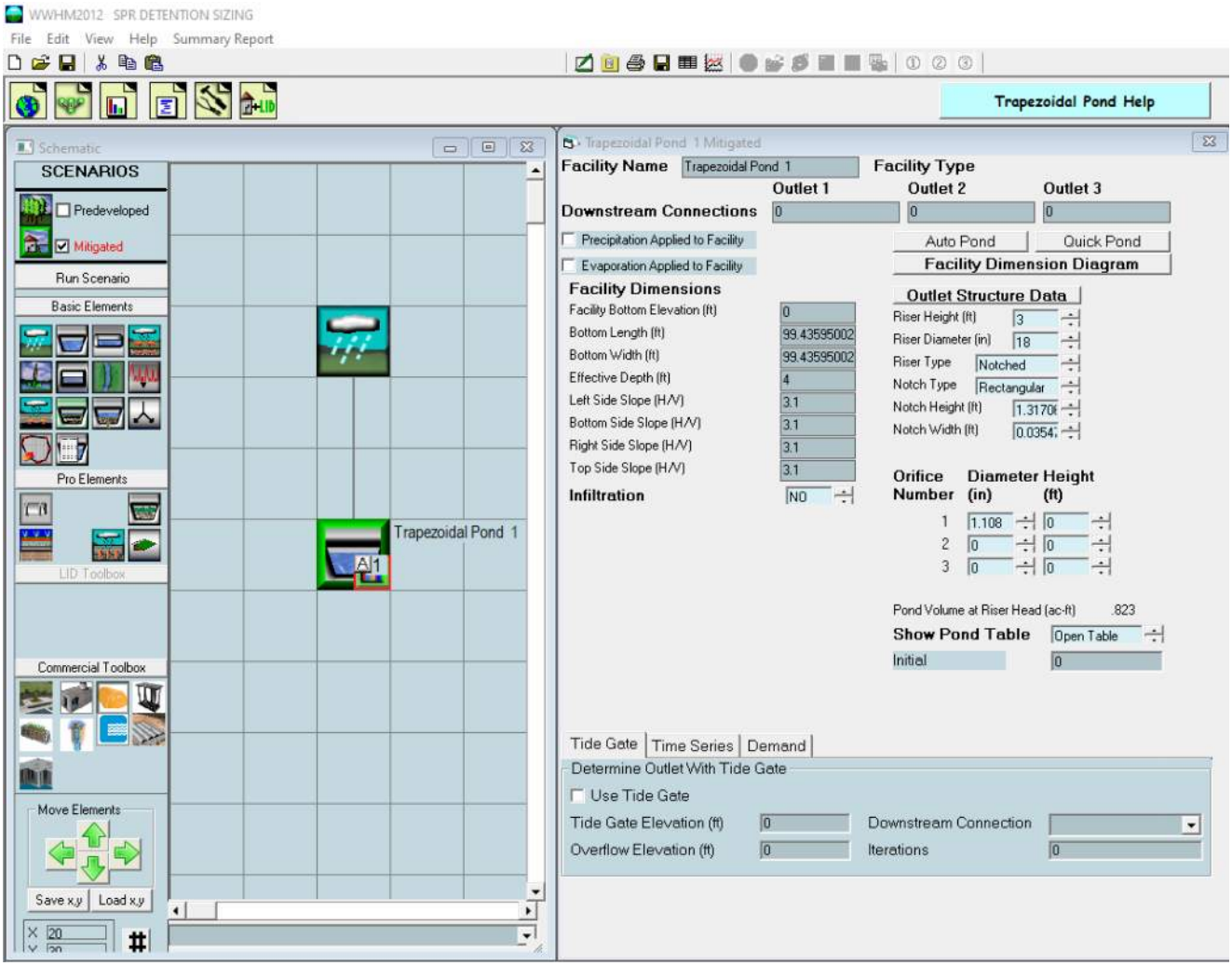


V. Modeled Flow Quantity Facility Sizing

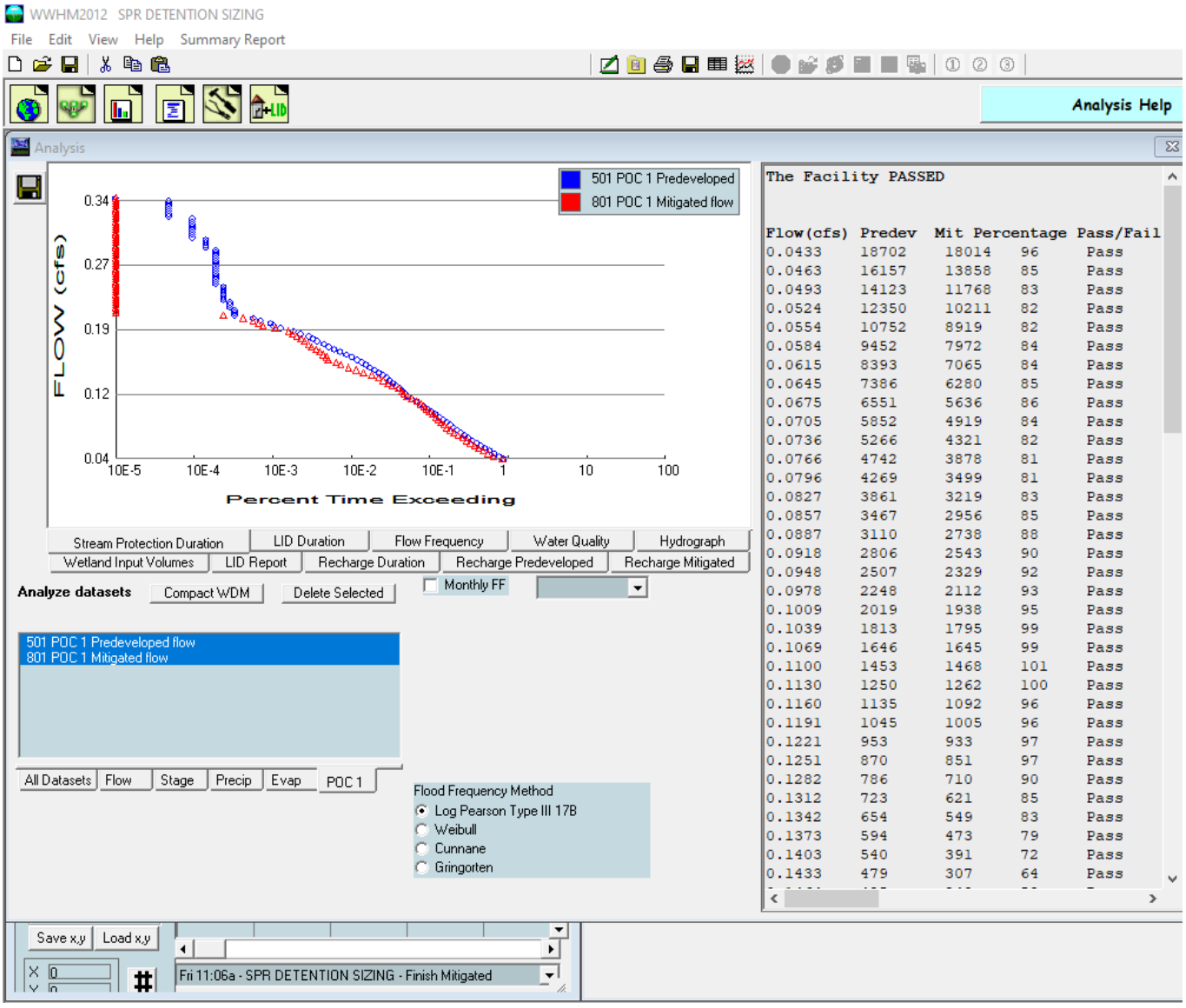
The Auto Pond feature in the WWHM2012 software was used to develop a stage-storage-discharge model that met the required performance volume and discharge standards for the new detention pond. The model shows that a pond with 4 feet of effective depth (3 feet of live storage volume plus 1 foot of freeboard) with a bottom area of approximately 100'x100', or 10,000 s.f, and 3.1:1 sideslopes was acceptable. A control structure with a 1.1" diameter orifice and a 7/16" notched-weir 1.32 feet tall was determined.

As this pond will be in the field of course play, the sideslopes need to be greater than 3:1 so a fence is not required, and the applicant's also wish to include as much "dead" storage below the

pond outlet as possible. As shown on the Preliminary Drainage Plan approximately 7 feet of dead storage depth is available for this aesthetic value. It should be noted that the configuration of this pond will likely change after Site Plan Review approval as the design will be reviewed and modified by a Professional Golf Architect to produce a pleasing end-product for the golfers.



The Mitigated Land Use Basins were then routed through the proposed stormwater management facilities as discussed above with "PASSED" results over the 76-yr historical SEATAC rainfall record of the Predevelopment Forested Land Use Basin:

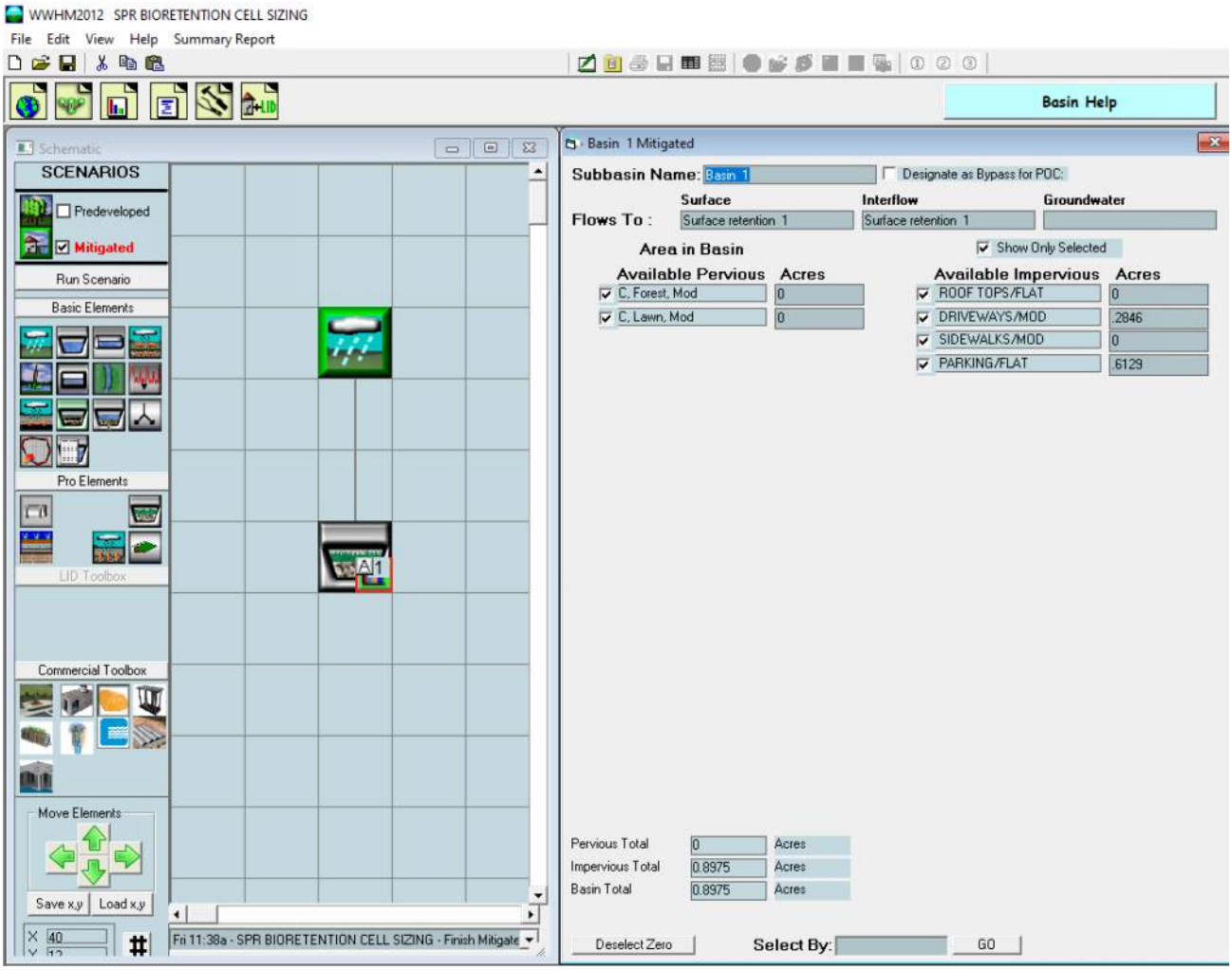


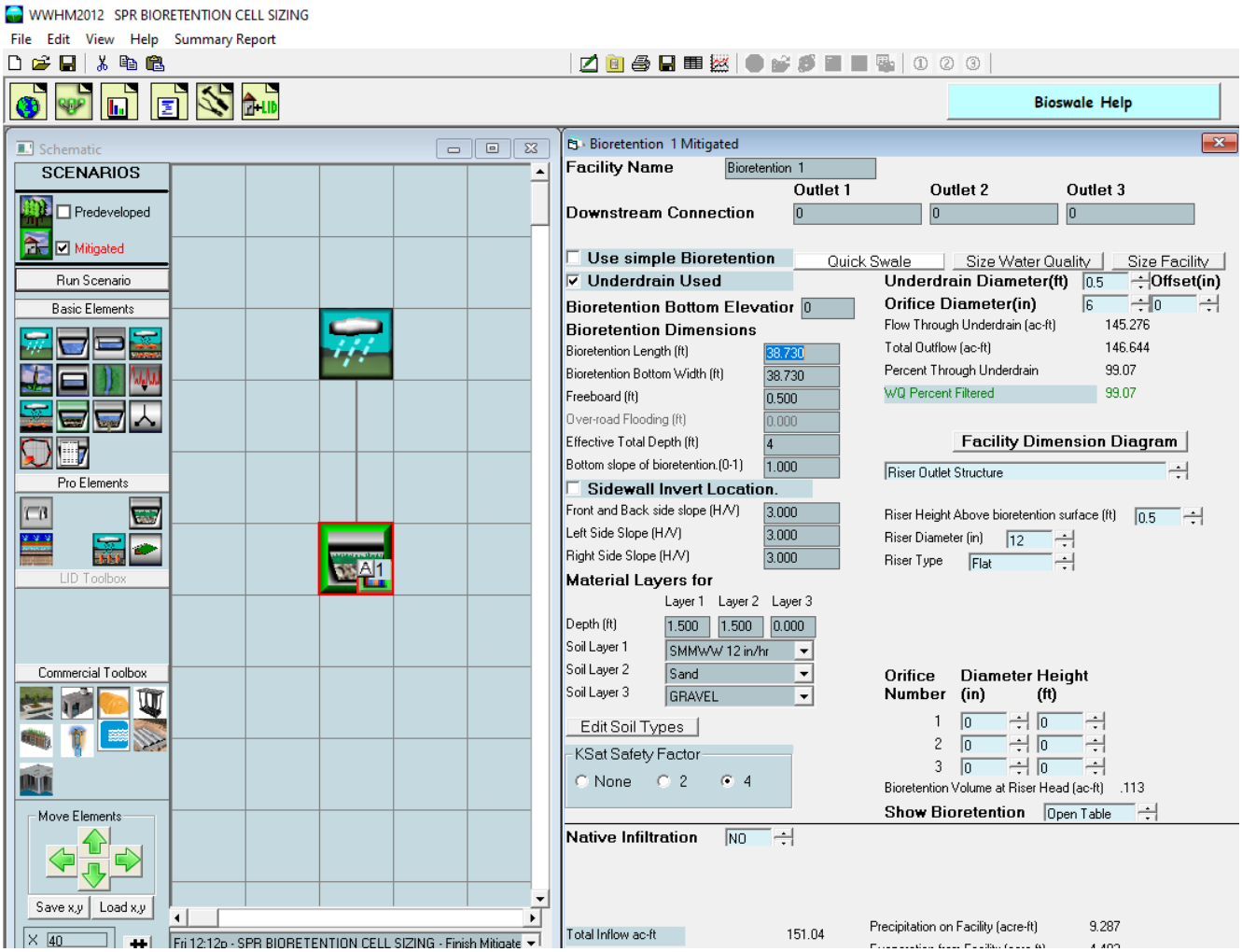
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0433	18702	18014	96	Pass
0.0463	16157	13858	85	Pass
0.0493	14123	11768	83	Pass
0.0524	12350	10211	82	Pass
0.0554	10752	8919	82	Pass
0.0584	9452	7972	84	Pass
0.0615	8393	7065	84	Pass
0.0645	7386	6280	85	Pass
0.0675	6551	5636	86	Pass
0.0705	5852	4919	84	Pass
0.0736	5266	4321	82	Pass
0.0766	4742	3878	81	Pass
0.0796	4269	3499	81	Pass
0.0827	3861	3219	83	Pass
0.0857	3467	2956	85	Pass
0.0887	3110	2738	88	Pass
0.0918	2806	2543	90	Pass
0.0948	2507	2329	92	Pass
0.0978	2248	2112	93	Pass
0.1009	2019	1938	95	Pass
0.1039	1813	1795	99	Pass
0.1069	1646	1645	99	Pass
0.1100	1453	1468	101	Pass
0.1130	1250	1262	100	Pass
0.1160	1135	1092	96	Pass
0.1191	1045	1005	96	Pass
0.1221	953	933	97	Pass
0.1251	870	851	97	Pass
0.1282	786	710	90	Pass
0.1312	723	621	85	Pass
0.1342	654	549	83	Pass
0.1373	594	473	79	Pass
0.1403	540	391	72	Pass
0.1433	479	307	64	Pass

VI. Bio-retention Cell Water Quality Sizing

The Pollution Generating Impervious Surfaces consist of the 0.2846 acres of driveway and 0.6129 acres of parking areas from the Mitigated Land Use Basin and were then routed through the proposed approximately 1,500 s.f. bio-retention cell defined below and shown on the Preliminary Drainage Plan.





As shown above, this proposed bio-retention cell will treat around 99% of all of the runoff from the project's PGIS. The requirement is 91%, so the final design may allocate a smaller area. Additionally, this facility will need to be lined due to it's proximity to landscape walls.

VII. UPSTREAM BASIN

No off-site upstream basin areas are contributory to the on-site improvements shown, as the proposed Clubhouse and Maintenance buildings and associated parking areas are located at the topographic high point of the basin. There is an upstream contributing area above the proposed detention pond facility, but this area will be designed with either new conveyance piping or surface grading to bypass the pond.

VIII. DOWNSTREAM ANALYSIS

As shown on the Topographic Survey prepared for this project, there are two drainage basins associated with the Clubhouse and Maintenance building/yard and parking portion of the project site. The parking areas and the maintenance yard area are located in the east basin which sheet-

flow towards Cherry Avenue and is conveyed by an open ditch on the west side of Cherry Avenue along the property frontage where the flow then enters a series of stormwater pipes and catch basins southerly towards Wing Point Way NE. From there, runoff is continued to be routed in a closed conveyance piped system westerly and under Wing Point Way to a natural ravine at the NE Corner of Hawley Cove Park, and ultimately joining the stream that flows to Eagle Harbor approximately 2,600 feet downstream from the site. On-site stormwater runoff from the eastern basin is not treated nor has flow control stormwater facilities in the current condition.

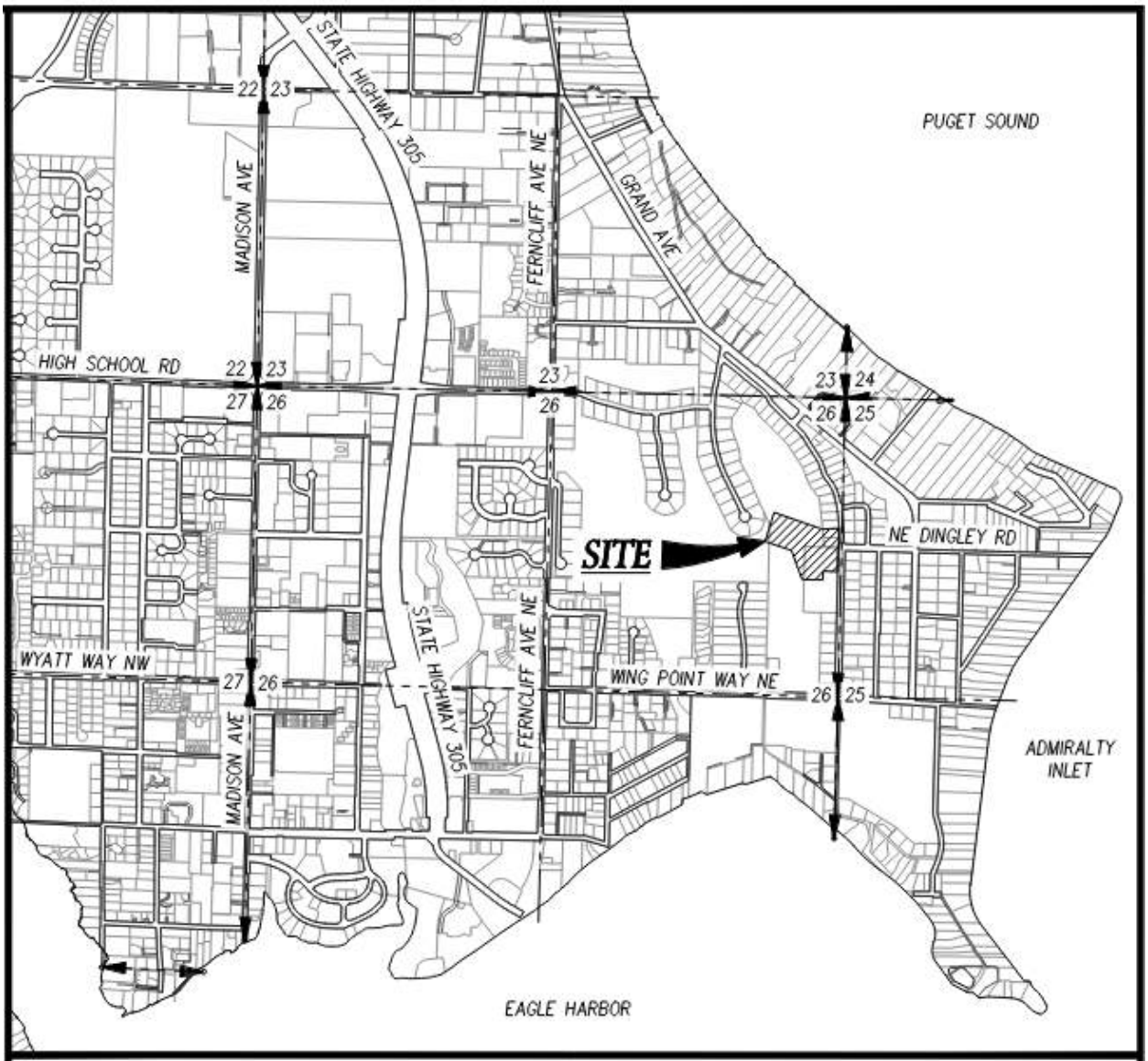
The west basin within the proposed project area consists of the Clubhouse building and the existing putting green and driving range tees. Stormwater from this portion of the site is conveyed by sheetflow and area drains and pipes westerly to an existing regional detention pond facility (Pond 2 as shown in the Appendices) that was constructed in the late 80's/early 90's as part of the North Hill at Wing Point project which expanded the golf course and subdivided adjacent properties into single family lots. Several regional detention pond facilities were built as part of the project, and were sized using the Rational Method as was the adopted standard at that time by the then-City of Winslow, whereby peak flows from the developed 64.3-acre basin were not-to-exceed the pre-developed storm within the upstream catchment area from a Rational Method-derived 25-year design storm event. Pond No. 3, as shown on the basin map, flows as a stream south under Wing Point Way, and ultimately entering Eagle Harbor approximately 2,200 feet downstream of Pond No. 2. On-site stormwater from the western basin is not treated, but does have some degree of flow control from Detention Pond 2.

IX. SILT AND EROSION CONTROL

A Storm Water Pollution Prevention Plan and Narrative will be prepared and included with the Grade and Fill Permit application submittal following Site plan Review and Major Conditional Use Permit application approvals by the City of Bainbridge Island. The detention pond will be used as a temporary sediment pond, silt fence will be placed along the down-gradient side of the clearing limits both for sedimentation control and to delineate the boundary of the grading and disturbed area activity limits, so that native vegetation is preserved and protected from compaction. A Stabilized Rock Construction Entrance will be provided to keep sediments from tracking onto Cherry Avenue from the new project entrance. Jute matting will be specified on all slopes exceeding 33%, and all disturbed soils will receive soil amendment and hydroseeding and/or landscaping. Also, the plans contain notes for Erosion and Sediment Control should additional measures be required during construction, as well as maintenance requirements.

An Erosion Control Performance Bond will be required to be kept during the life of construction and remain in force until the site is stabilized. Lastly, a Construction Stormwater Discharge Permit will be required to be obtained by the applicant from the WA State Department of Ecology prior to commencing site clearing activities, and any runoff. discharge monitored and reported to DOE by a Certified Erosion Control Lead

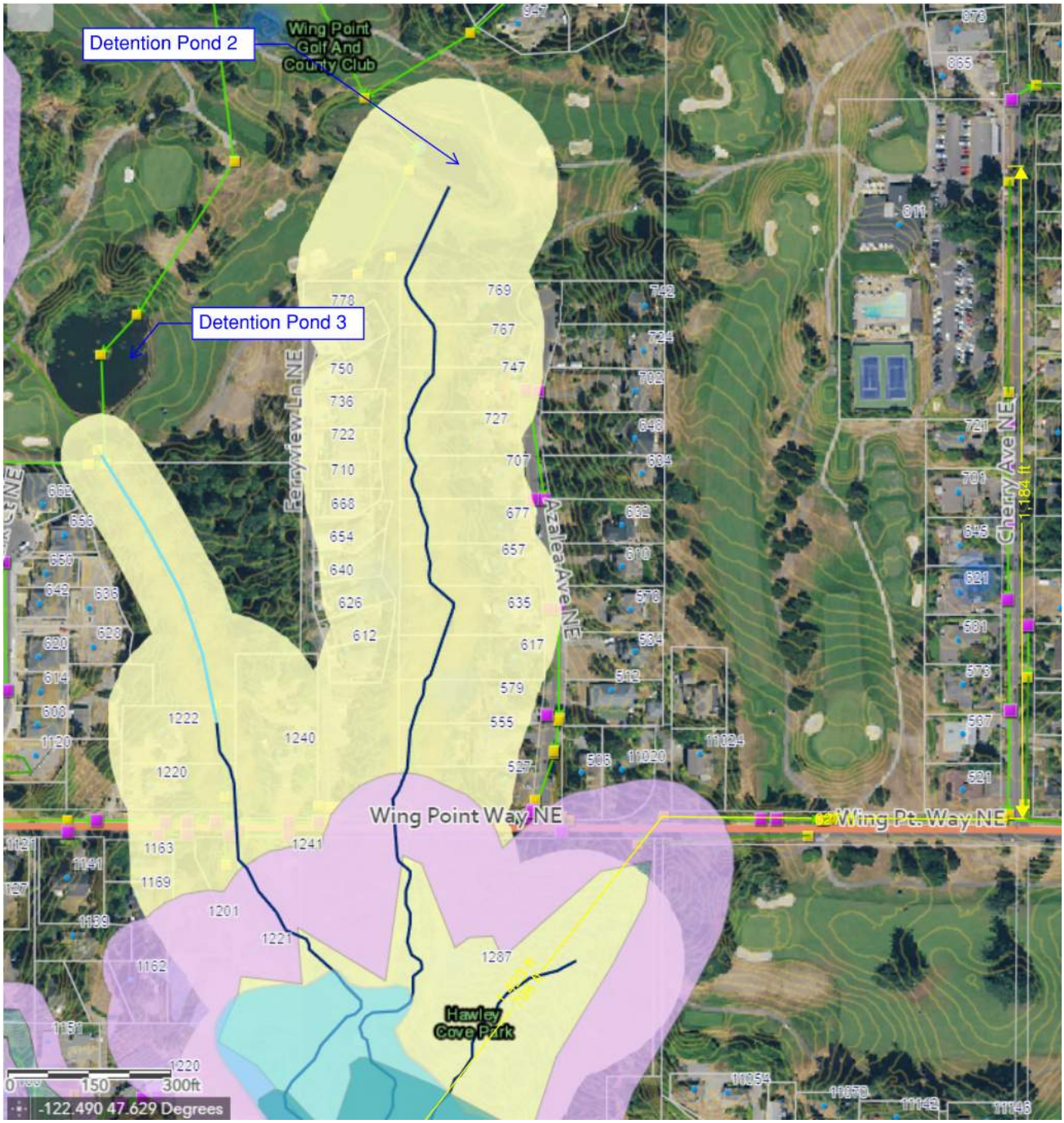
APPENDIX A VICINITY MAP



VICINITY MAP

A PORTION OF THE EAST ½ OF THE NE ¼, SECTION 26, TOWNSHIP 25 NORTH, RANGE 2 EAST, W.M.
KITSAP COUNTY WASHINGTON

APPENDIX B DOWNSTREAM BASIN MAP



Engineering • Planning

APPENDIX C GOLF COURSE PREL. STORM DRAINAGE ANALYSIS

FILE 5238

WATER AND SEWERAGE, PERMITS, PLANNING, BULKHEADS, ROADS, PLATTING & LAND SURVEYING

ROATS ENGINEERING
ENGINEERS AND SURVEYORS

HERBERT A. ARMSTRONG
PETER C. DeGROOT
GREGORY G. ROATS

GEORGE ROATS 1919 - 1987

P.O. BOX 995
POULSBO, WASHINGTON 98370
TELEPHONE 779-3939

January 20, 1989

PRELIMINARY STORM DRAINAGE ANALYSIS

EXISTING CONDITIONS

The proposed project site currently consists of 64.3 wooded acres with slopes that vary from approximately 1% to 15%. Average slopes throughout the site are less than 5% with the steeper slopes occuring in localized areas along the West and South boundaries. Vegetation on the site consists of typical Northwest mixed forest with heavy underbrush. The site is divided into two drainage basins (see the attached Preliminary Storm Drainage Plan) and surface runoff in each is collected in an existing drainage channel, each running generally from North to South. Runoff is carried from the South property line 600 to 1000 feet South to Wing Point Way where two culverts carry the water under the road and South about 500 feet to Eagle Harbor. In the Northern half of the property the existing drainage channels are meandering watercourses with poorly defined channels in many areas. Toward the southern end of the property slopes on the site generally increase resulting in better defined channels with side slopes increasing to approximately 15 %.

OFF-SITE RUNOFF

Each on-site drainage basin has substantial off-site contributing areas. Off-site runoff in the western drainage basin primarily enters the site at existing culverts under Ferncliff Ave. 500 feet South of High School Road. Off-site runoff in the eastern drainage basin enters the property primarily from the ditch on the East side of Ferncliff Ave. 300 feet North of High School Road and overland from the north and east of the site.

This site and its contributing off-site areas are a part of Drainage Basin E as identified in the City of Winslow's 1985 Comprehensive Storm Drainage Plan.

IMPACT OF DEVELOPMENT ON SURFACE RUNOFF

Three options have been analyzed for their impact on surface runoff from the project site:

1. No development
2. Construction of residential lots at the maximum density allowed under the existing zoning.
3. Construction of the proposed residential/golf course development.

All runoff computations have been made using the rational formula (Q-CIA, where Q= runoff in cfs, C=runoff coefficient, I=rainfall intensity, and A= contributing area in acres) and the design values and formulas used by Kitsap County. Peak runoff is calculated for the 25 year frequency storm.

1. No Development.

The peak rate of surface runoff from the 64.3 Acre Site in the existing undeveloped state amounts to 4.24 cubic feet per second. (cfs).

2. Residential Development to the Maximum Allowable Density.

The current City of Winslow zoning in this area requires a minimum lot size of 15,000 square feet (s.f.) This would amount to a maximum density of 2.9 units per acre or a maximum of 186 lots. This development would result in an increase in the peak rate of surface runoff of 25.4 cfs over the undeveloped state or a total of 29.6 cfs. This amounts to a 6 fold increase in peak runoff and would require substantial on-site storm water collection and detention facilities to control in accordance with local regulations.

3. Proposed Residential/Golf Course Development

The proposed development would place 39 residential lots on the site for an average density of 0.6 units per acre. This would result in an increase in the peak rate of surface runoff of 8.8 cfs over the undeveloped state or a total of 13.0 cfs.

A preliminary storm drainage system design has been prepared for this proposed development (see the attached Preliminary Storm Drainage Plan). The major features of the design are as follows:

Existing Drainage Channels

The two major existing drainage channels through the property will be maintained as open channels. This complies with the recommendations of the Winslow Comprehensive Storm Drainage Plan for this drainage basin. In addition, it has the advantage of maintaining the significant natural treatment process available in natural channels to remove pollutants from surface runoff. All surface runoff from the golf course area would continue to flow overland to these channels and leave the site in the existing manner.

Storm Water Collection System

Storm water runoff from the lots and roadways within the developed parts of the site will be collected in the roads in a closed (or piped) system. Storm drain pipe under the paved streets will be fed by a series of catch basins and curb inlets at the gutter line. These piped systems will discharge at their downstream ends to open channels that will carry the runoff to the existing drainage channels on the site.

Detention System

In order to meet the requirement that the peak rate of storm water discharge not exceed the pre-development rate and comply with the recommendations of the Winslow Comprehensive Storm Drainage Plan, all runoff from the site will pass through two open detention ponds prior to discharge from the site. These ponds will be sized to also provide detention for the development of the 16.7 acre site to the east consisting of 27 residential lots.

The ponds will be located along the two existing drainage channels at the South boundary of the Project site. The ponds will be permanent ponds constructed as part of the golf course development and their function as storm drainage detention facilites will result in a fluctuation of their water surface of less than one foot.

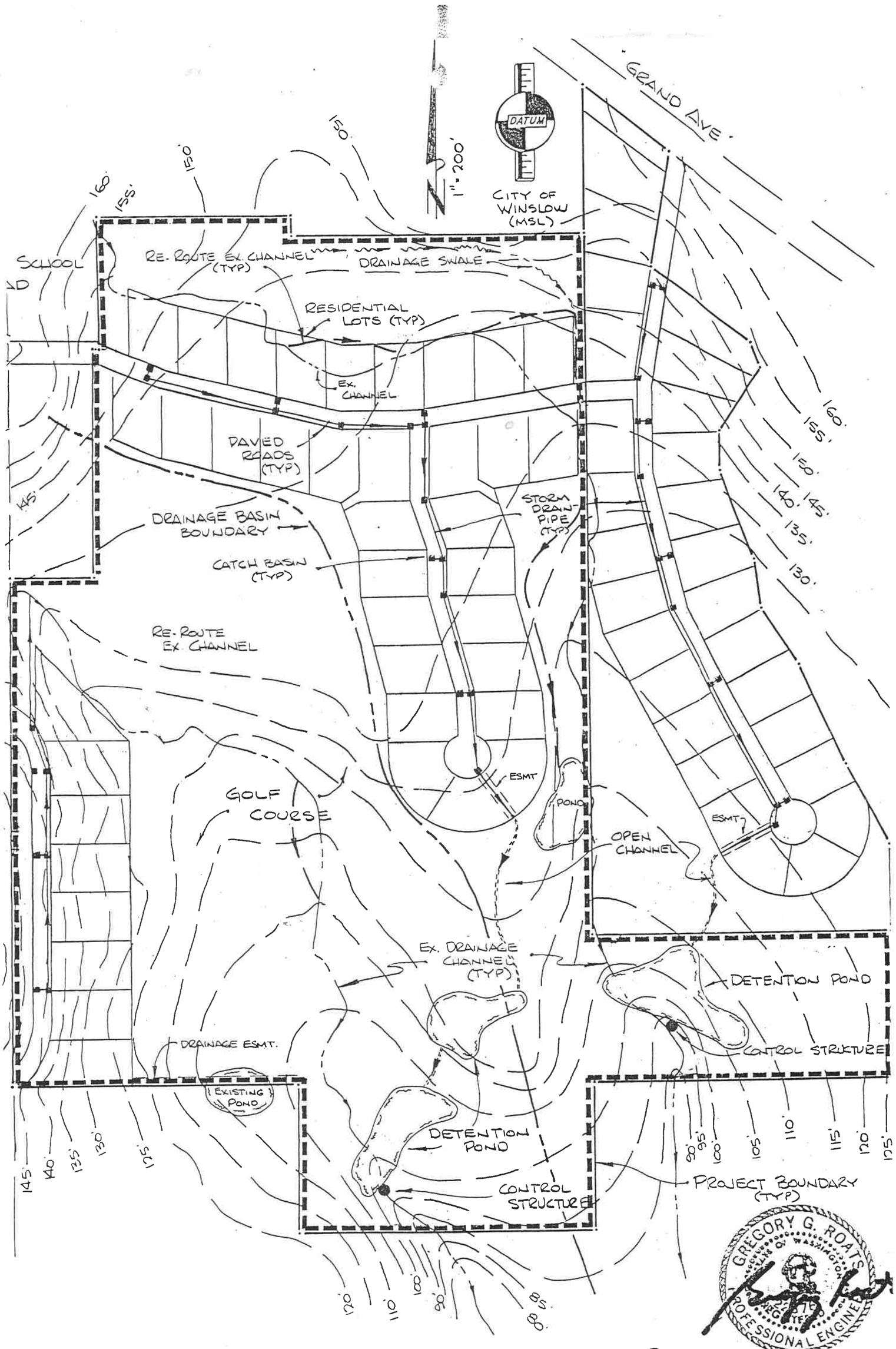
The ponds will have the additional benefit of serving as sedimentation basins, further improving the water quality of surface water discharges to Eagle Harbor from these drainage basins.

Discharge

Runoff discharged from the two detention ponds will enter the existing channels downstream of the ponds and travel to Eagle Harbor under Wing Point Way in the existing manner. Erosion protection and energy dissipation facilities will be installed at the point of discharge to prevent damage. In addition to the standard controlled discharge path from the ponds, there will be three overflow paths in case of a malfunction of the outflow control structure.

CONCLUSION

The construction of the proposed residential/golf course development will, due to its low average density, result in moderate increases in surface runoff when compared to residential development at the maximum density. Construction of the storm drainage system outlined above will provide the facilities required to insure that the peak rate of surface water runoff from this site will not increase over the pre-development state.



PRELIMINARY STORM DRAINAGE PLAN
ARONA CORPORATION

SEC. 23 & 26, T25N, R2E, WM.

PREPARED BY: ROATS ENGINEERING

1-9-88

APPENDIX D ADDENDUM TO FEIS NORTH HILL AT WING POINT

September 18, 1989

PROJECT: NORTH HILL AT WING POINT (EAST AND WEST)

TO: All recipients of the Final Environmental Impact Statement

---

The enclosed information constitutes an Addendum to the Final Environmental Impact Statement (FEIS) for North Hill at Wing Point dated August 11, 1989.

This Addendum has been prepared in accordance with WAC 197-11-25 and 197-11-706. This Addendum provides additional information regarding the North Hill at Wing Point residential and golf course project. This information does not substantially change the analysis of significant impacts and alternatives contained in the FEIS.

Pursuant to WAC 197-11-625 (4), this Addendum is being sent to all recipients of the FEIS. There is no review, comment or appeal period associated with this Addendum.

The additional information contained in this Addendum addresses the relationship of two adjacent plats which make up the project: Wing Point East and West Point West. This material has been presented in the form of drawings and brief text as a Master Plan.

September 19, 1989

NORTH HILL AT WING POINT:
ADDENDUM TO FEIS (WING POINT WEST)
AND FEIS WING POINT FAIRWAY VIEW (WING POINT EAST)

This is an addendum to the FEIS for North Hill at Wing Point (1989) and the FEIS for Wing Point Fairway View (1978). The purpose of this addendum is to document the interrelationship between the functioning of two plats within the City of Winslow: Wing Point East and Wing Point West. The attached site plan shows the two plats and the golf course expansion.

The City of Winslow has required that the North Hill at Wing Point East and Wing Point West projects be merged in a Master Plan. A Final Environmental Impact Statement was prepared for North Hill at Wing Point (West) and issued August 11, 1989. An existing approved Final Environmental Impact Statement for Wing Point Fairway View (August 18, 1978) was accepted in satisfaction of SEPA requirements for Wing Point East.

The earlier FEIS used for Wing Point East was developed for a PUD project of twice the density, with the same general layout of lots bordering a cul de sac from Grand Avenue. This FEIS met all SEPA guidelines and reviewed short term impacts due to construction and long term impacts of development. Impacts due to development of Wing Point East were determined to be parallel but less than those of Wing Point Fairway View PUD.

The current FEIS for North Hill and Wing Point West included overlapping information regarding Wing Point East. This was for two reasons: 1) the projects will be developed simultaneously by the same developer; 2) the projects are adjacent and linked by certain amenities, and utility systems. The Master Plan document and drawings finalizes this interrelationship. Common issues include: traffic, water, sewer, storm drainage, park and recreation space, construction practices. Key areas are discussed below.

Traffic:
Appendix G of North Hill FEIS includes road system and impacts for both plats. Text discussion is on pages 17 and 18. This expands information supplied in the 1978 FEIS (page 27 and 50). Both FEIS's indicate the concern about pedestrian traffic on Ferncliff Avenue. The City of Winslow has required that a pedestrian way (gravel or paved) be installed from High School Road to Wing Point Way, right of way permitting.

Wetlands:
Appendix F of the North Hill FEIS and Appendix B of the DEIS includes the wetlands analysis performed by Dr. Del Moral. This report described wetlands of Wing Point West. A supplemental

study for Wing Point East was performed as outlined in a letter report dated August 1, 1989. This report indicated that there were no wetlands in Wing Point East. The North Hill FEIS includes Figure 2 which is a revised drainage and wetland map, indicating the stipulations as required by the Department of Ecology and approved by Winslow. This figure includes both plats.

Eagles:
There was some question raised by public comment regarding the presence of eagles on both plats. After an aerial and vehicular survey and review by the Department of Wildlife, this question was resolved in a letter from Greg Schirato (April 25, 1989). No evidence of eagle nesting or use was discovered.

Golf Course Operations:
A small area at the southwest corner of the Wing Point East property is within the area of the Wing Point Golf Course expansion. The majority of the nine-hole expansion is within Wing Point West. Golf course operations were discussed in the North Hill FEIS, page 14-17, and expanded with technical data in Appendix E.

Storm Drainage:
Storm water issues are described on pages 36 and 57 of the 1978 FEIS. Since then, the City of Winslow has developed a stormwater ordinance and a storm Water Drainage Plan (1985). The North Hill FEIS includes a storm drainage plan which drains the Wing Point East plat into a pond on the Wing Point West plat. (Note: the projects will be developed simultaneously). This is illustrated on Figure 2 of the FEIS and discussed in Appendix D of the North Hill DEIS, as well as on pages 5 and 11-13 of the FEIS.

Water and sewer:
The link of water and sewer systems is outlined in Appendix D of the North Hill DEISm which is also included within the FEIS.

Park and recreation:
The City of Winslow required that one lot be set aside and developed by ARONA as a children's park. This area is to be dedicated to the City of Winslow. Lot 27 of the Wing Point East plat was designated as the future park. (Page 19 of the North Hill FEIS.) This park development is to satisfy the park and recreational component for both the East and the West plats.

MEMORANDUM

TO: BOB WALLAR, LAND USE ADMINISTRATOR, WINSLOW
FROM: SARAH BARTON, AGENT FOR ARONA CORPORATION
DATE: SEPTEMBER 18, 1989
SUBJECT: MASTER PLAN FOR NORTH HILL AT WING POINT E & W

The City of Winslow has requested that the plats for Wing Point East and Wing Point West be merged in a Master Plan. There are five sheets which summarize the relationship of the two plats.

After approval of preliminary plat for Wing Point West, the developer will purchase the property for Wing Point East and West, each of which is currently in separate ownership. ARONA will then proceed to develop the roads and utility systems simultaneously, treating the project as a whole. ARONA will clear the road widths and utility line easements as needed. ARONA will also develop Lot 27 of Wing Point East as a children's park as directed by Winslow. The golf course acreage will be deeded to the Wing Point Golf and Country Club as outlined in the attached contract between ARONA and Wing Point. The Golf Club will then develop the golf course. As noted in the attached agreement, the Golf Club will first install the ponds and all necessary drainage elements within the golf course property as required by the storm drainage plan approved by Winslow.

Maintenance of the streets and water, sewer and storm drainage facilities within the streets and subdivision lots will then become the responsibility of the City of Winslow after acceptance of final plat. Road right of way will be dedicated and all necessary easements will be granted to the City of Winslow. Storm drainage facilities such as ponds and control structures will be constructed by the Wing Point Golf and Country Club, as stated in the attached agreement. Ponds and drainage swales will be maintained by the Golf Club. Control structures will be maintained by the City of Winslow. Easements within the golf course area have been provided for City access and maintenance to sewer manholes, control structures in the ponds and utility lines.

The Master Plan consists of five sheets:

1) Roats Engineering prepared a summary of the lot layout, road configuration, and water, sewer and storm drainage. This is called the Master Plan - Utilities. It includes easements for maintenance of stormwater and sewer manholes and utility lines by the City of Winslow. It also includes the existing and rechanneled drainage channels with buffers as defined by the Department of Ecology and agreed by the City of Winslow. Storm drainage system including closed pipes, open channels and ponds with controlled discharge are indicated. Water system delineation includes the existing tie-in on Ferncliff through

both plats and looping with the storage tanks on Grand Avenue. Sewer system includes underground lines to gravity feed as part of service area #11, as well as access to the pump station on Ferncliff for the 8 lots bordering Ferncliff and Isaac Avenues. This sheet also includes the proposed pedestrian way along Ferncliff between High School Road and Wing Point Way. This route is dependent on availability of right of way from the City of Winslow. ARONA will install a gravel path or sidewalk as determined by Winslow. In addition, residents of North Hill at Wing Point by covenant will waive their right to protest inclusion in any future Ferncliff LID for street improvements.

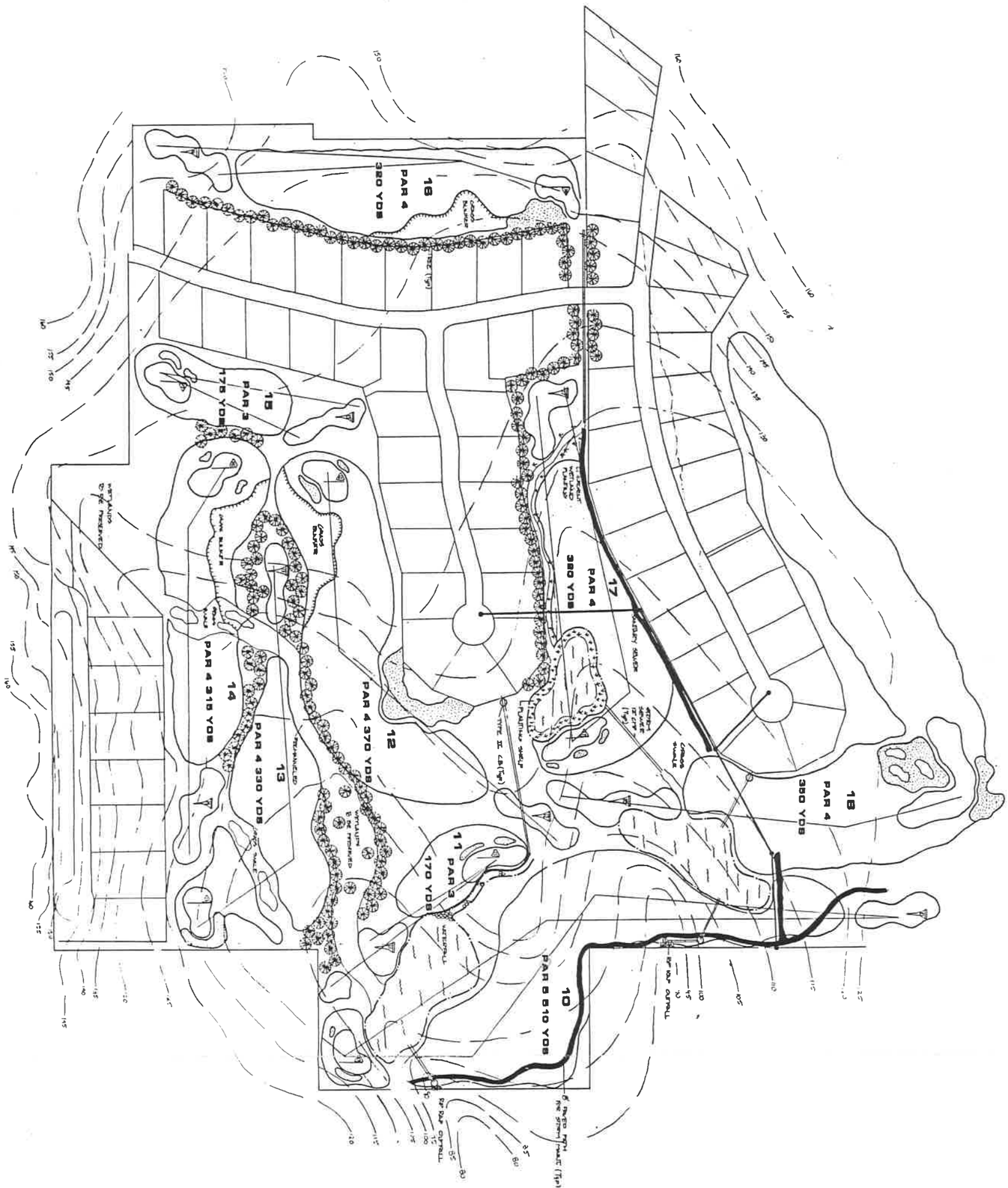
Final construction drawings for road and utility development have been completed by Roats Engineering. These will be reviewed by the City of Winslow before issuance of the grading permit.

2) Jack Frei, golf course architect has prepared the remaining four sheets. The initial sheet, Golf Course Master Plan, shows the layout of the additional nine holes of the golf course on property which is part of Wing Point East and West. This drawing includes the storm drainage elements of ponds and necessary easements.

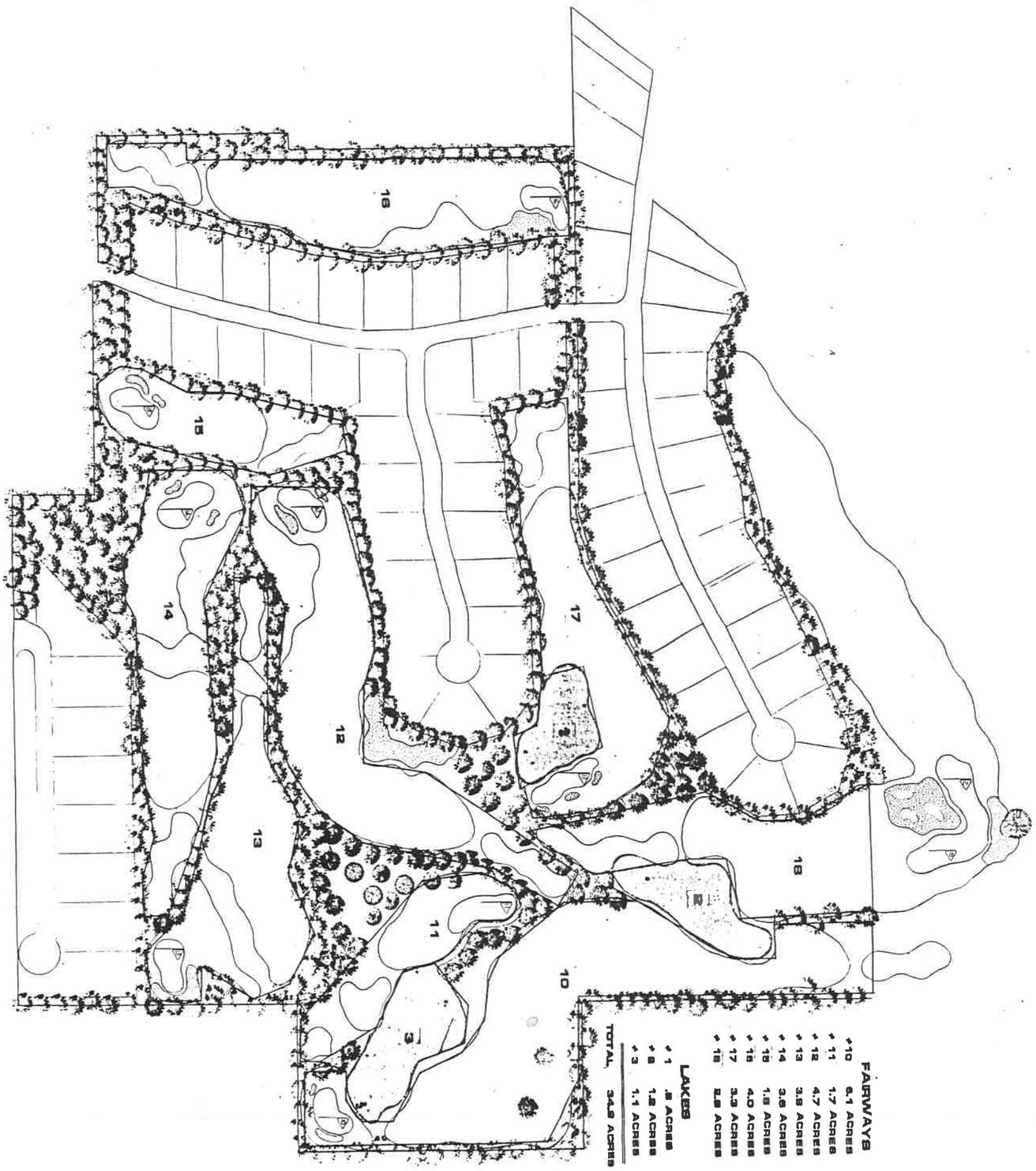
3) The Clearing Plan indicates area of proposed clearing for development of the golf course. This plan indicates that the existing trees will be maintained between the fairways. This In addition, ARONA will clear the area of the road and utility easements. Future lot purchasers will clear sites for homes. A restricted clearing area of 30 feet on the back of each lot bordering the golf course has been designated on the plat. No trees greater than six inches in diameter may be cut within this buffer.

4) The Cut and Fill plan indicates current contours, with shaded areas to indicate the site of future grading actions. The earth work will be balanced on site. No fill will be imported with the exception of sand for purposes of drainage on the greens.

5) The Surface Drainage Plan indicates the direction of surface water flows within the golf course. This demonstrates the use of the existing drainage channels and the proposed pond system. Drainage control structures in the two southern ponds will ensure that the discharge rate after development is the same as or less than pre-development, as required by Winslow code.



DATE 9/14/89 1 OF 5		MASTER PLAN	JACK FREI PGA PROFESSIONAL GOLF COURSE DESIGNER	WINGPOINT GOLF & COUNTRY CLUB CITY OF WINSLOW BAINBRIDGE IS., WA	Design Two Four-Two Six, Incorporated landscape architecture • site development & irrigation planning 4205 148th Ave. NE, Suite 102 • Bellevue, WA 98007 • (206) 881-8428



FAIRWAYS	
# 10	6.1 ACRES
# 11	1.7 ACRES
# 12	4.7 ACRES
# 13	3.8 ACRES
# 14	3.8 ACRES
# 15	1.8 ACRES
# 16	4.0 ACRES
# 17	3.9 ACRES
# 18	2.9 ACRES

LAKES	
# 1	.8 ACRES
# 8	1.8 ACRES
# 3	1.1 ACRES
TOTAL	34.9 ACRES

NORTH

SCALE 1" = 100'

DATE 6/14/99

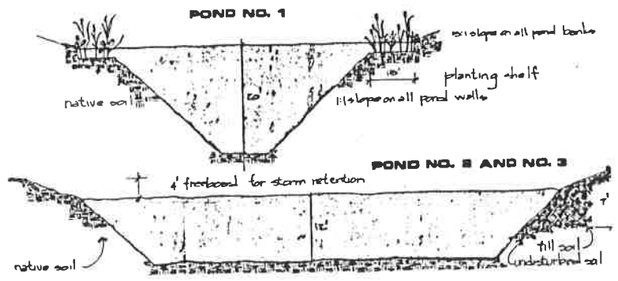
CLEARING PLAN

JACK FREI
PGA PROFESSIONAL
GOLF COURSE DESIGNER

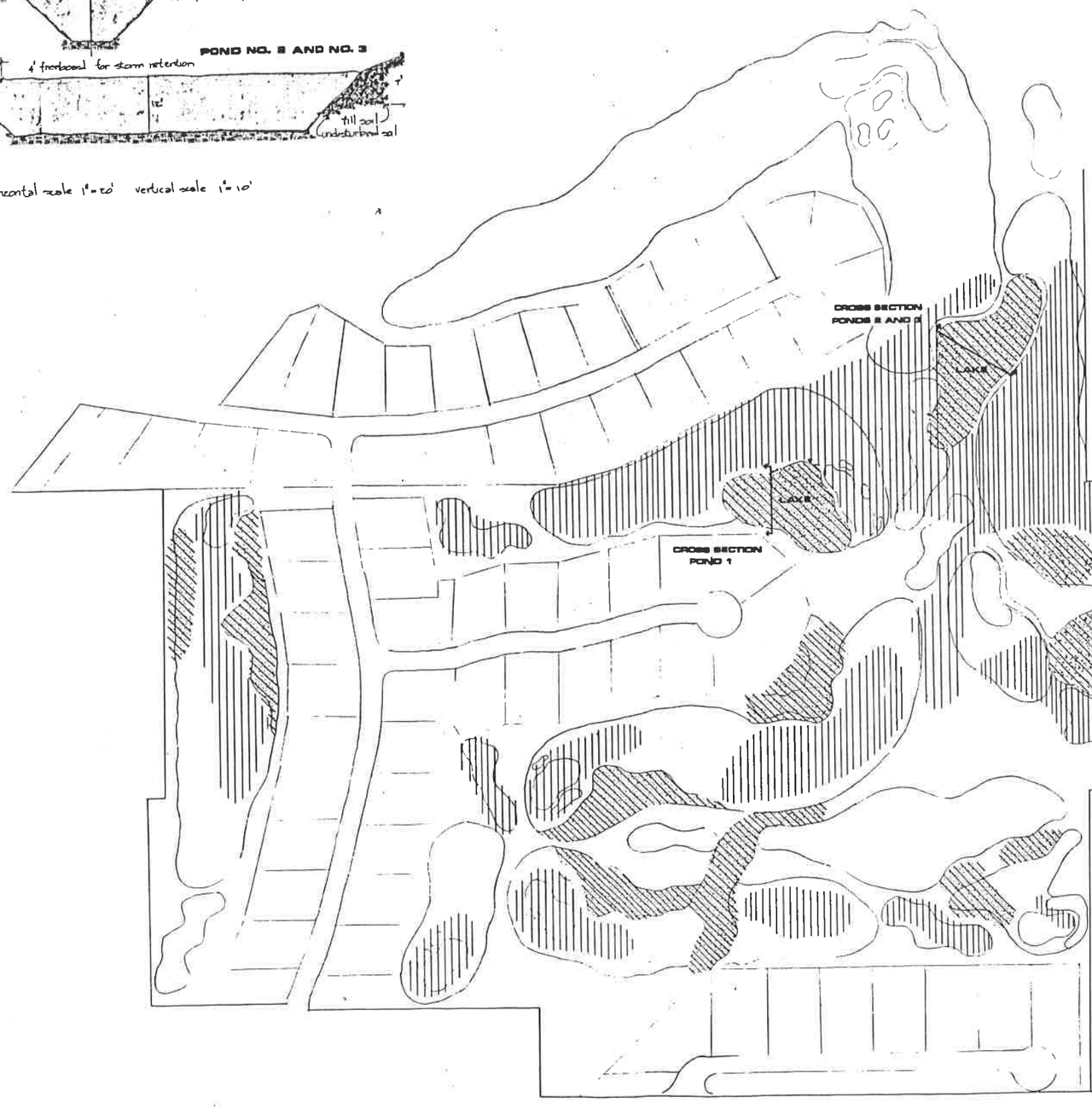
WINGPOINT GOLF & COUNTRY CLUB
CITY OF WINSLOW
BAINBRIDGE IS., WA

Design Two Four-Two Six, Incorporated
landscape architecture • site development & irrigation planning
4205 148th Ave. NE. Suite 102 • Bellevue, WA 98007 • (206) 881-8428

POND DETAILS



horizontal scale 1" = 20' vertical scale 1" = 10'



NORTH

SCALE 1" = 100'

FAIRWAY GRADING AND LEVELING 12,800 CUBIC YARDS

LAKE EXCAVATION 53,887 CUBIC YARDS

AREA TO BE CUT

AREA TO BE FILLED

Design Two Four-Two Six, Incorporated
landscape architecture • site development & irrigation planning
2200 148th Ave. NE, Suite 102 • Bellevue, WA 98007 • (206) 881-6426

WINGPOINT GOLF & COUNTRY CLUB

CITY OF WINSLOW

BAINBRIDGE IS., WA

JACK FREI

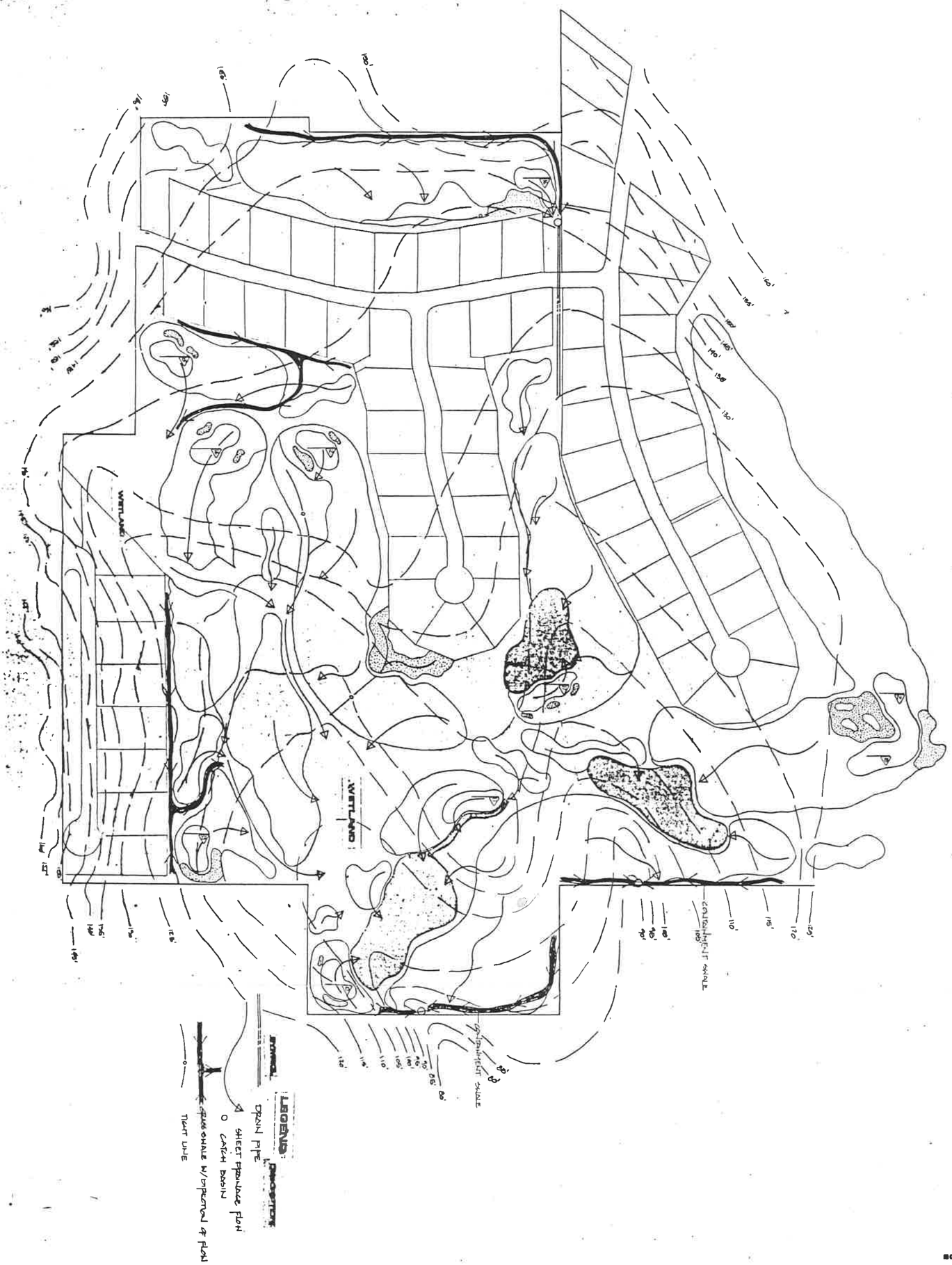
PGA PROFESSIONAL

GOLF COURSE DESIGNER

CUT AND FILL

DATE 9/14/88

3 OF 5



DATE: 9/14/98	SURFACE DRAINAGE	JACK FRIEI PGA PROFESSIONAL GOLF COURSE DESIGNER	WINDPOINT GOLF & COUNTRY CLUB SITE OF THE FUTURE RACINE, WI	Design Two Four-Two Six, Incorporated landscape architecture • site development & irrigation planning 4205 148th Ave NE Suite 102 • Bellevue WA 98007 • (206) 881-8488

APPENDIX E GEOTECHNICAL EVALUATION

Cobalt Geosciences, LLC
P.O. Box 1792
North Bend, WA 98045

September 13, 2023

Jeff Damico
jeffd@wingpointgolf.com

RE: Geotechnical Evaluation
Proposed Pro Shop/Storage Building
811 Cherry Avenue NE
Bainbridge Island, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter to discuss the results of our geotechnical evaluation at the referenced site.

The purpose of our evaluation was to provide recommendations for foundation design, grading, and earthwork.

Site Description

The site is located at 811 Cherry Avenue NE in Bainbridge Island, Washington. The site consists of one rectangular shaped parcel (No. 26250210032000) with a total area of about 4.03 acres.

The property is developed with a clubhouse building, accessory storage buildings, pool and patio areas, and parking lots. There are paths and lawn/golf course features in the western half of the property.

The site is locally level to slightly sloping downward in all directions from the central portions. There are locally steeper graded and man-made slopes/features. Relief is about 15 feet.

Site vegetation includes sparse bushes, grasses, shrubs, and variable diameter trees. The site is bordered to the east by Cherry Avenue NE, to the north and south by residential properties and golf course areas, and to the west by the golf course.

The proposed development includes a new building north of the current clubhouse. This building will likely include basement areas for cart and other storage. Cuts will likely be 12 feet or less for basement areas. Foundation loads will generally be light to moderate. We should be provided with the final plans to verify that our recommendations remain valid.

Area Geology

The Geologic Map of the Shilshole Bay Quadrangle, indicates that the site is underlain by Vashon Glacial Till.

Vashon Glacial Till includes dense mixtures of silt, sand, gravel, and clay. These deposits are typically impermeable below a weathered zone and become denser with depth.

Soil & Groundwater Conditions

The geotechnical field investigation program was completed on August 30, 2023 and included drilling and sampling one hollow stem auger boring with a limited access drill rig.

Disturbed soil samples were obtained during drilling by using the Standard Penetration Test (SPT) as described in ASTM D-1586. The Standard Penetration Test and sampling method consists of driving a standard 2-inch outside-diameter, split barrel sampler into the subsoil with a 140-pound hammer free falling a vertical distance of 30 inches. The summation of hammer-blows required to drive the sampler the final 12-inches of an 18-inch sample interval is defined as the Standard Penetration Resistance, or N-value. The blow count is presented graphically on the boring logs in this appendix. The resistance, or "N" value, provides a measure of the relative density of granular soils or of the relative consistency of cohesive soils.

The soils encountered were logged in the field and are described in accordance with the Unified Soil Classification System (USCS).

A Cobalt Geosciences field representative conducted the explorations, collected disturbed soil samples, classified the encountered soils, kept a detailed log of the explorations, and observed and recorded pertinent site features.

The boring encountered about 6 inches of grass and topsoil underlain by approximately 15.5 feet of medium dense to dense, silty-fine to medium grained sand trace gravel (Fill). These materials were underlain by very dense, silty-fine to medium grained sand with gravel (Glacial Till), which continued to the termination depth of the boring.

Groundwater was not encountered during the drilling. There is a chance that groundwater may become perched in the fill or on the glacial till during the wet season.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project. It would be necessary to install one or more piezometers to determine groundwater depths and fluctuations.

Erosion Hazard

The Natural Resources Conservation Services (NRCS) maps for Kitsap County indicate that the site is underlain by Kapowsin gravelly ashy loam (0 to 6 percent slopes) and Kapowsin gravelly ashy loam (6 to 15 percent slopes). These soils would have a slight to moderate erosion potential in a disturbed state depending on the slope magnitude.

It is our opinion that soil erosion potential at this project site can be reduced through landscaping and surface water runoff control. Typically, erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, such as silt fences, hay bales, mulching, control ditches and diversion trenches. The typical wet weather season, with regard to site grading, is from October 31st to April 1st. Erosion control measures should be in place before the onset of wet weather.

Seismic Parameters

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the International Building Code (IBC). A Site Class *D* applies to an overall profile consisting of medium dense to dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The following tables provide seismic parameters from the USGS web site with referenced parameters from ASCE 7-16.

Seismic Design Parameters (ASCE 7-16)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			F_a	F_v	S_{DS}	S_{D1}	
D	1.467	0.514	1.0	Null	0.978	Null	0.625

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The site has a very low to low likelihood of liquefaction. For items listed as "Null" see Section 11.4.8 of the ASCE.

Conclusions and Recommendations

General

The site is underlain by areas of fill and at depth by dense to very dense glacial till. The proposed building may be supported on a shallow foundation system bearing on pipe piles driven to refusal in dense soils below the site.

Alternatively, and if cuts are relatively significant, the building could be supported on medium dense to dense native soils or on properly compacted structural fill placed on the suitable native soils. This option requires removal of undocumented fill from below new foundation elements. The fill should be removed at a 1/2H:1V envelope from the edges of new footings and replaced with imported structural fill compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method).

Pile depths may be 10 to 20 feet depending on the final building location and elevations. Similarly, overexcavation depths for the shallow foundation option will vary based on location and elevations. The deeper cuts are planned, the less overexcavation would be anticipated.

All stormwater runoff should be collected and routed into existing systems. We anticipate that these either route toward Puget Sound or into City infrastructure. Infiltration is not recommended in fill materials or the denser till. Dispersion devices are feasible.

Site Preparation

Trees, shrubs and other vegetation should be removed prior to stripping of surficial organic-rich soil and fill. Based on observations from the site investigation program, it is anticipated that the stripping depth will be 6 to 18 inches. Deeper excavations will be necessary below foundations, large trees, and in areas underlain by fill.

The native soils consist of silty-sand with gravel. Most of the native soils may be used as structural fill provided they achieve compaction requirements and are within 3 percent of the optimum moisture. Some of these soils may only be suitable for use as fill during the summer months, as they will be above the optimum moisture levels in their current state. These soils are variably moisture sensitive and may degrade during periods of wet weather and under equipment traffic. Soils with more than 30 percent fines by weight should not be used as structural fill.

Imported structural fill should consist of a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill should be placed in maximum lift thicknesses of 12 inches and should be compacted to a minimum of 95 percent of the modified proctor maximum dry density, as determined by the ASTM D 1557 test method.

Temporary Excavations

Based on our understanding of the project, we anticipate that the grading could include local cuts on the order of approximately 12 feet or less for foundation placement. Temporary excavations should be sloped no steeper than 1.5H:1V (Horizontal:Vertical) in loose native soils or fill, 1H:1V in medium dense native soils and medium dense to dense fill, and 3/4H:1V in dense to very dense native soils (if encountered). If an excavation is subject to heavy vibration or surcharge loads, we recommend that the excavations be sloped no steeper than 2H:1V, where room permits.

Temporary cuts should be in accordance with the Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. Temporary slopes should be visually inspected daily by a qualified person during construction activities and the inspections should be documented in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and reducing slope erosion during construction.

Temporary cut slopes should be covered with visqueen to help reduce erosion during wet weather, and the slopes should be closely monitored until the permanent retaining systems or slope configurations are complete. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

Soil conditions may not be completely known from the geotechnical investigation. In the case of temporary cuts, the existing soil conditions may not be completely revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of temporary slopes will need to be re-evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed and required deadlines can be met.

If any variations or undesirable conditions are encountered during construction, we should be notified so that supplemental recommendations can be made. If room constraints or groundwater conditions do not permit temporary slopes to be cut to the maximum angles allowed by the WAC, temporary shoring systems may be required. The contractor should be responsible for developing temporary shoring systems, if needed. We recommend that Cobalt Geosciences and the project structural engineer review temporary shoring designs prior to installation, to verify the suitability of the proposed systems.

Foundation Design

Shallow Foundations

The proposed structure may be supported on a shallow spread footing foundation system bearing on undisturbed medium dense or firmer native soils or on properly compacted structural fill placed on the suitable native soils. Any undocumented fill and/or loose native soils should be removed and replaced with structural fill below foundation elements. Structural fill below footings should consist of clean angular rock 5/8 to 4 inches in size. We should verify soil conditions during foundation excavation work. Fill would need to be removed at a 1/2H:1V envelope from the edges of all footings down to the denser native soils.

For shallow foundation support, we recommend widths of at least 16 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed structure. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 2,500 pounds per square foot (psf) may be used for design. If detention vaults are required, they may be designed using a bearing pressure of 5,000 psf if they are set at least 5 feet below site elevations and in dense soils.

A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than ½ inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 225 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas). The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

Pin Piles

Due to the presence of undocumented fill, the building could be supported on pipe piles if overexcavation is not selected. The pile spacing will be determined by the project structural engineer during their design work.

We anticipate a pile depth on the order of 10 to 20 feet (average of 15 feet); however, the final depths will be dependent on the loads required, building elevations, pile sizes, hammer sizes, and soil conditions during pile driving. In general, pile lengths would likely be 20 to 25 feet from existing site elevations.

Pipe piles should consist of Schedule 40 galvanized steel with mechanical couplers for splices. Battered piles may be necessary to provide lateral support to the structures.

The number of piles required depends on the magnitude of the design load. Allowable axial compression capacities of 6, 10, and 15 tons may be used for the 3-, 4-, and 6-inch diameter pin piles, respectively, with an approximate factor of safety of 2 for piles driven to refusal. Penetration resistance required to achieve the (refusal) capacities will be determined based on the hammer used to install the pile. Tensile capacity of pin piles should be ignored in design calculations.

It is our experience that the driven pipe pile foundations should provide adequate support with total settlements on the order of $^1/_2$-inch or less.

For 3-, 4-, and 6-inch pin piles, the following table is a summary of driving refusal criteria for different hammer sizes that are commonly used:

Hammer Model	Hammer Weight (lb) / Blows per minute	3" Pile Refusal Criteria (s/inch penetration)	4" Pile Refusal Criteria (s/inch penetration)	6" Pile Refusal Criteria (s/inch penetration)
Hydraulic TB 325	850 / 900	10	16	
Hydraulic TB 425	1,100 / 900	6	10	20
Hydraulic TB 725X	2,000 / 600	3	4	10
Hydraulic TB 830X	3,000 / 500			6

Please note that these refusal criteria were established empirically based on previous load tests on 3-, 4-, and 6-inch pin piles. Contractors may select a different hammer for driving these piles and propose a different driving criterion. In this case, it is the contractor's responsibility to demonstrate to the geotechnical engineer's satisfaction that the design load can be achieved based on their selected equipment and driving criteria.

A structural engineer shall perform the structural design of the pile including spacing and reinforcing steel. The structural engineer also should determine the buckling load for the slender piles and make sure that is not exceeded.

A 200 percent load test should be performed on 3 percent of the total piles. This test consists of increasing the load on a test pile in 25 percent increments up to 200 percent of the design load. This load is held for 1 hour and deflections are measured on a dial gauge (to the hundredths or lower) for each load up to 200 percent. The pile should be unloaded in 25 percent increments.

Lateral resistance for footings can be developed using battered piles or an allowable equivalent fluid passive pressure of 225 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas).

Concrete Retaining Walls

The following table, titled **Wall Design Criteria**, presents the recommended soil related design parameters for retaining walls with a level backslope. Contact Cobalt if an alternate retaining wall system is used. This has been included for new cast in place walls, if any are proposed.

Wall Design Criteria	
"At-rest" Conditions (Lateral Earth Pressure – EFD[+])	55 pcf (Equivalent Fluid Density)
"Active" Conditions (Lateral Earth Pressure – EFD[+])	35 pcf (Equivalent Fluid Density)
Seismic Increase for "At-rest" Conditions (Lateral Earth Pressure)	14H* (Uniform Distribution)
Seismic Increase for "Active" Conditions (Lateral Earth Pressure)	7H* (Uniform Distribution)
Passive Earth Pressure on Low Side of Wall (Allowable, includes F.S. = 1.5)	Basement Walls; Neglect upper 2 feet, then 300 pcf EFD[+]
Soil-Footing Coefficient of Sliding Friction (Allowable; includes F.S. = 1.5)	0.40

*H is the height of the wall; Increase based on one in 500 year seismic event (10 percent probability of being exceeded in 50 years),
+EFD – Equivalent Fluid Density

The stated lateral earth pressures do not include the effects of hydrostatic pressure generated by water accumulation behind the retaining walls. Uniform horizontal lateral active and at-rest pressures on the retaining walls from vertical surcharges behind the wall may be calculated using active and at-rest lateral earth pressure coefficients of 0.3 and 0.5, respectively. A soil unit weight of 125 pcf may be used to calculate vertical earth surcharges.

To reduce the potential for the buildup of water pressure against the walls, continuous footing drains (with cleanouts) should be provided at the bases of the walls. The footing drains should consist of a minimum 4-inch diameter perforated pipe, sloped to drain, with perforations placed down and enveloped by a minimum 6 inches of pea gravel in all directions.

The backfill adjacent to and extending a lateral distance behind the walls at least 2 feet should consist of free-draining granular material. All free draining backfill should contain less than 3 percent fines (passing the U.S. Standard No. 200 Sieve) based upon the fraction passing the U.S. Standard No. 4 Sieve with at least 30 percent of the material being retained on the U.S. Standard No. 4 Sieve. The primary purpose of the free-draining material is the reduction of hydrostatic pressure. Some potential for the moisture to contact the back face of the wall may exist, even with treatment, which may require that more extensive waterproofing be specified for walls, which require interior moisture sensitive finishes.

We recommend that the backfill be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. In place density tests should be performed to verify adequate compaction. Soil compactors place transient surcharges on the backfill. Consequently, only light hand operated equipment is recommended within 3 feet of walls so that excessive stress is not imposed on the walls.

Slab-on-Grade

We recommend that the upper 18 inches of the existing native soils within slab areas be re-compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method). Additional overexcavation could be required depending on the soil conditions of fill or native soils once areas are exposed. To avoid potential settlement of slab areas, all fill should be removed (if desired/required).

Often, a vapor barrier is considered below concrete slab areas. However, the usage of a vapor barrier could result in curling of the concrete slab at joints. Floor covers sensitive to moisture typically requires the usage of a vapor barrier. A materials or structural engineer should be consulted regarding the detailing of the vapor barrier below concrete slabs. Exterior slabs typically do not utilize vapor barriers.

The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapor barrier selection and floor slab detailing.

Slabs on grade may be designed using a coefficient of subgrade reaction of 180 pounds per cubic inch (pci) assuming the slab-on-grade base course is underlain by structural fill placed and compacted as outlined above. A 4- to 6-inch-thick capillary break layer should be placed over the prepared subgrade. This material should consist of pea gravel or 5/8 inch clean angular rock.

A perimeter drainage system is recommended unless interior slab areas are elevated a minimum of 12 inches above adjacent exterior grades. If installed, a perimeter drainage system should consist of a 4-inch diameter perforated drain pipe surrounded by a minimum 6 inches of drain rock wrapped in a non-woven geosynthetic filter fabric to reduce migration of soil particles into the drainage system. The perimeter drainage system should discharge by gravity flow to a suitable stormwater system.

Exterior grades surrounding buildings should be sloped at a minimum of one percent to facilitate surface water flow away from the building and preferably with a relatively impermeable surface cover immediately adjacent to the building.

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented, and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

Utilities

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The contractor is responsible for the safety of open trenches. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

In general, silty soils were encountered at shallow depths in the explorations at this site. These soils have low cohesion and density and will have a tendency to cave or slough in excavations. Shoring or sloping back trench sidewalls is required within these soils in excavations greater than 4 feet deep.

All utility trench backfill should consist of imported structural fill or suitable on site soils. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with the pipe manufacturer's recommendations.

The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. Depending on the depth and location of the proposed utilities, we anticipate the need to re-compact existing fill soils below the utility structures and pipes. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction procedures.

Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.

B-1 Approximate Boring Location

Kitsap County GIS Images

N

Provided site plan

Not to scale

COBALT GEOSCIENCES

Proposed Building
811 Cherry Avenue NE
Bainbridge Island, Washington

SITE MAP

FIGURE 1

Cobalt Geosciences, LLC
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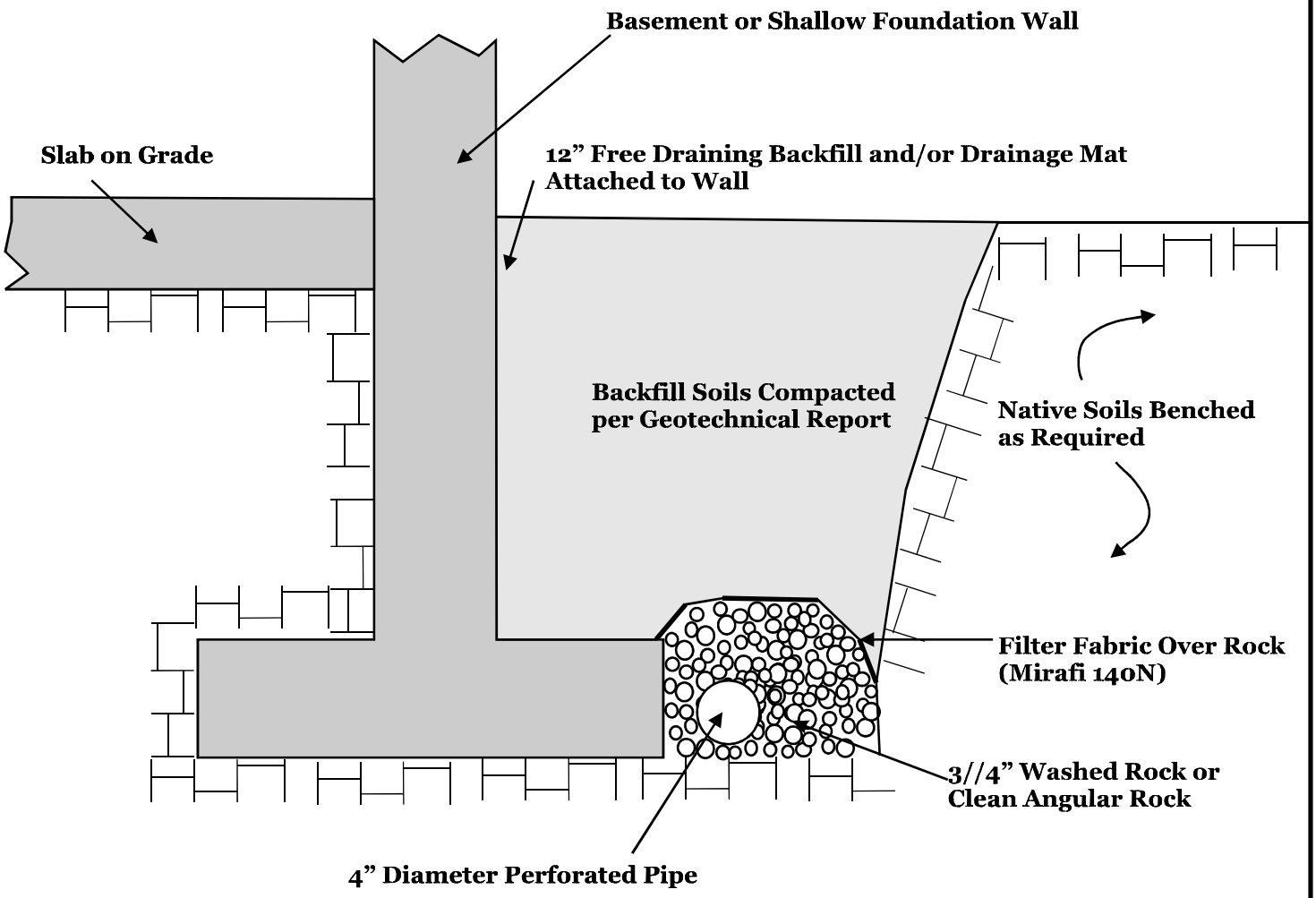
cobaltgeo@gmail.com



Not to Scale

COBALT GEOSCIENCES	**Typical Foundation Drain Detail**	**Attachment**	Cobalt Geosciences, LLC PO Box 1792 North Bend, WA 98045 (206) 331-1097 www.cobaltgeo.com phil@cobaltgeo.com

Unified Soil Classification System (USCS)

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Organic	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
			CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay
		Organic	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (ASTM D4427)

Classification of Soil Constituents

MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).

Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).

Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).

Grain Size Definitions

Description	Sieve Number and/or Size
Fines	<#200 (0.08 mm)
Sand	
-Fine	#200 to #40 (0.08 to 0.4 mm)
-Medium	#40 to #10 (0.4 to 2 mm)
-Coarse	#10 to #4 (2 to 5 mm)
Gravel	
-Fine	#4 to 3/4 inch (5 to 19 mm)
-Coarse	3/4 to 3 inches (19 to 76 mm)
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Relative Density (Coarse Grained Soils)

N, SPT, Blows/FT	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

Consistency (Fine Grained Soils)

N, SPT, Blows/FT	Relative Consistency
Under 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
Over 30	Hard

Moisture Content Definitions

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

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Soil Classification Chart

Figure C1

Log of Boring B-1

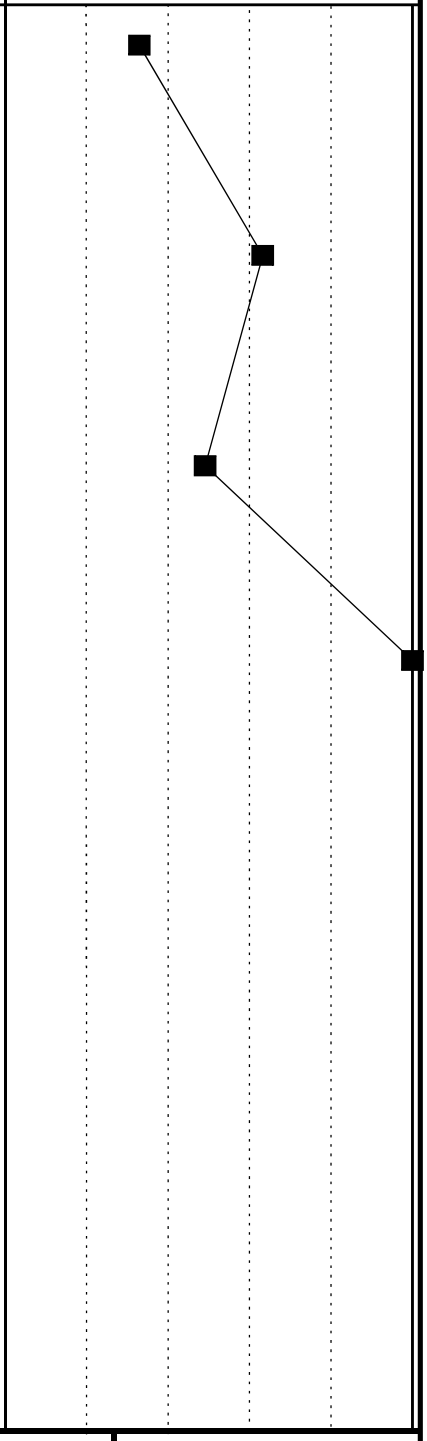
Date: August 30, 2023	Depth: 16.5'	Initial Groundwater: None
Contractor: CN	Elevation: N/A	Sample Type: Split Spoon
Method: Hollow Stem Auger	Logged By: KK Checked By: PH	Final Groundwater: None

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description
			6			Grass/Topsoil
2			7 10		SM	Medium dense to dense, silty-fine to medium grained sand trace to with gravel, dark yellowish brown to yellowish brown, dry to moist. (Fill)
4						
6			10 12 19			
8						
10			8 10 13			
12						
14						
16			23 43 43		SM	Very dense, silty-fine to medium grained sand trace gravel, grayish brown, moist. (Glacial Till)
						End of Boring 16.5'
18						
20						
22						
24						
26						
28						
30						

Groundwater

Moisture Content (%)
Plastic Limit — Liquid Limit

SPT N-Value
0 10 20 30 40 50



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Boring Log