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INTERGATE COLUMBIA, LLC BUILDINGS A & B

ADDENDUM TO INDUSTRIAL WASTEWATER LAND TREATMENT SYSTEM ENGINEERING REPORT

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INTRODUCTION

The following information is provided by Grette Associates, LLC of Wenatchee, WA as an addendum to the Industrial Wastewater Land Treatment System Engineering Report, Intergate Columbia, LLC Buildings A & B, prepared by David Evans & Associates, Inc. on behalf of SABEY Corporation, DASCINC20001, revision dated September 2018. The information provided below serves as a supplement to the engineering report and addresses the following: Project Alternatives Analysis, Preferred Alternative Project Design Considerations: Landscape Irrigation Application, Preferred Alternative Project Design Considerations: Agricultural Spray Field, Crop Irrigation and Management Plan, and a letter of approved agents for treating non-contact cooling water provided by Douglas County Sewer District No. 1.

PROJECT INFORMATION

PROJECT ALTERNATIVES ANALYSIS

Several alternatives are available for the disposal of the non-contact cooling water generated by the SABEY data center facility located at 404 Grant Road in East Wenatchee, WA; parcels #22211030004 (Vacant), #22211030006 (Building D), #22211030008 (Building A), #22211030009 (Building B), and #22211030010 (Building C/Storage Tank Site); 47.4072 N lat./-120.1870 W long (Figure 1). These alternatives are outlined below.



Figure 1. SABEY Parcels within Douglas County, WA.

Currently, the non-contact cooling water from SABEY Buildings A and B is discharged to the Douglas County Sewer District's water treatment plant located in East Wenatchee. The cooling water is combined with the sanitary sewer discharge from the SABEY buildings and is added to the municipal sewage waste stream. Although this option is not limited by capacity or infrastructure, it is not an ideal long-term alternative due to the high on-going cost associated with the disposal of this volume of waste water. Additionally, since the non-contact cooling water is relatively free from contaminants, adding it to the sewage waste stream is unnecessary, provided an alternative mode of disposal can be implemented.

Evaporation ponds and open storage ponds were evaluated for their effectiveness in disposing of the non-contact cooling water. Water would be pumped uphill from the data centers to a series of ponds located on parcel #222110300004 (Vacant). This alternative is not preferred due to the risk of attracting migratory birds, waterfowl, and geese. Since the SABEY site is located within the Pangborn Memorial Airport overlay district, Douglas County has the ability to decline the permitting of any project that is in violation of the goals of the district, including any increase to the bird population (DCC Chapter 18.65.050 C.). In particular, the airport is concerned about the increased migration of ducks and geese across potential aircraft flight paths. The ponds would serve as an attractant to geese and waterfowl and would therefore negate the viability of this alternative. Additionally, due to the slope and the erosion-prone nature of the soils at the site, there is some concern over the potential for slope failure in the event that the ponds begin to leak or fail. Therefore, this alternative is not proposed.

PREFERRED ALTERNATIVE: NEAR-TERM DISPOSAL

The near-term preferred alternative involves the application of the non-contact cooling water generated by existing SABEY Buildings A and B, and a portion of the non-contact cooling water generated by future SABEY Building D (Quad #1) onto the already established and future landscape plantings and lawngrass located adjacent to the SABEY buildings. By collecting and re-routing the non-contact cooling water being generated at the site by Buildings A, B, and future Quad #1 of Building D, it can be used in place of domestic water for the irrigation of the existing and future landscaping. Based on recent water usage and disposal data for the SABEY site, it is estimated that over the course of the irrigation season (Mid-March through Mid-October), the non-contact cooling water generated by existing SABEY Buildings A and B with supplementation from water generated by future Quad #1 of Building D, can supply the entirety of the landscaping irrigation needs for the site even during the peak irrigation months of June through August. This alternative is ultimately limited in its maximum disposal capacity and will require some infrastructural build-out to become viable. However, these obstacles are relatively minor in nature and do not pose a significant barrier to implementation.

According to the monthly meter read, domestic water consumption for landscape irrigation at the SABEY site for June of 2018 (the peak irrigation month on the site) was approximately 968,479

gallons of water. This number accounts for the water usage of the existing landscaping on parcels #22211030008 (Building A), #22211030009 (Building B), and #22211030010 (Building C), but does not account for the future installation of additional landscaping on parcel #22211030006 (Building D) (Attachment A). Current peak production of non-contact cooling water for SABEY Buildings A and B during June of 2018 was approximately 500,000 gallons. Once up and running, SABEY Building D will be permitted to produce up to 1,240,000 gallons of non-contact cooling water per month (or up to 40,000 gallons per day; 10,000 gallons per quad per day). Although Building D is permitted to produce this volume of non-contact cooling water each month, it is likely that full utilization of the permitted amount will not occur immediately and will slowly ramp up over time as tenants begin to occupy the building. The preferred alternative for the near-term disposal of the non-contact cooling water is to collect all the non-contact cooling water generated by Buildings A, B, and Quad #1 of Building D, and store it temporarily within three 10,000-gallon storage tanks to be constructed on parcel #222110300010 (Building C/Storage Tanks Site). This stored water will be applied to the landscaping utilizing the existing irrigation system. Until Quad #1 of Building D is running at full capacity, the SABEY site will still require the use of some domestic water in addition to the non-contact cooling water to supplement the irrigation needs of the additional landscaping to be installed on parcel #22211030006 (Building D). As Quad #1 of Building D becomes fully utilized, the amount of domestic water required for landscape irrigation will decrease. Eventually, as all four quads within Building D become operational, a surplus of non-contact cooling water above and beyond what can be disposed of via the landscaping and irrigation system will be produced at the SABEY site. This surplus scenario is addressed in the long-term preferred alternative outlined below. During the non-irrigation season (November through early March), the amount of non-contact cooling water generated at the SABEY site is relatively low and would be added to the sanitary sewer discharge, per the current method of disposal. All irrigation systems and external plumbing would be drained and winterized during this time.

Given the effectiveness of this proposed alternative at both disposing of the non-contact cooling water while providing for the irrigation needs of the property at the same time, this project is the preferred alternative for non-contact cooling water disposal in the near-term. Details of the landscape irrigation application are discussed in the corresponding section below. As previously mentioned, although this alternative would solve the existing and near-term non-contact cooling water disposal needs of Buildings A and B plus Quad #1 of Building D, it does not address the future needs that will be generated through the eventual expansion of the data center; with Quads #2-4 of building D becoming fully operational as they are phased into service over time. Therefore, an additional preferred alternative is required for handling the future long-term non-contact cooling water disposal needs of the site. This long-term alternative is discussed in the following section.

PREFERRED ALTERNATIVE: LONG-TERM DISPOSAL

After a number of water tests were completed by Cascade Analytical (Appendix C), it was determined that the non-contact cooling water is appropriate for agricultural use. An additional preferred alternative was proposed to dispose of the future non-contact cooling water (roughly between 3,500,000 and 6,300,000 gallons over the course of the irrigation season) through the design of an agricultural spray field. The original spray field design proposed the application of the non-contact cooling water onto an annual commodity crop such as wheat or rye, or onto a perennial orchard crop such as cherries or apples. All crops listed above have historically been grown on and adjacent to the SABEY property and all are viable economically. However, this alternative is complicated by the location of the SABEY property within the Pangborn Memorial Airport overlay district. Because of the location within the overlay district, Douglas County and Pangborn Memorial Airport have the ability to limit the types of agricultural crops grown within the overlay boundaries. Since the primary concern of the airport involves the attractiveness of the crop to waterfowl, geese, and migratory birds, they were opposed to the original proposed cropping plan since grain crops are highly attractive to waterfowl, and orchard crops favor migratory birds. Therefore, an alternative cropping plan was required in order to construct a spray field proposal that would be acceptable to all parties with jurisdiction.

The re-designed spray field is the preferred long-term alternative for future non-contact cooling water disposal generated by Quads #2-4 of Building D at the Grant Road SABEY facility. The re-design of the spray field has incorporated the goals of the SABEY staff to utilize the non-contact cooling water in a secondary application that is beneficial to the site economically, environmentally, and socially. The proposed agricultural spray field incorporates these goals into the design by carefully choosing plant materials for their economic, environmental, and educational values, and integrating these plants into a flexible layout that can handle a fluctuating seasonally-based water load while maintaining soil structure and integrity. The size, location and irrigation methods for the spray field have been designed to correspond with the agronomic needs of the chosen plant material, and in conjunction with the physical limitations of the soil profile, including the relation of the spray field to the underlying hydrology. Proposed plant materials have been reviewed and approved by the Pangborn Airport management for compatibility with the goals of the airport overlay district. The agricultural spray field would be built out in phases and only as needed to accommodate the disposal of the non-contact cooling water which exceeds the volumetric capacity of the landscape irrigation disposal system discussed above. The agricultural spray field would be equipped with its own set of three 10,000-gallon storage tanks to be built on parcel #22211030004 (Vacant). Non-contact cooling water would be pumped uphill to the storage tanks from the wet well and would use a gravity feed system to irrigate plants within the agricultural spray field. A metering system would be installed to monitor and control the volume of non-contact cooling water being routed to both the landscape irrigation storage tanks and the agricultural spray field storage tanks. Non-contact cooling water would first be applied to the landscaping system before being applied to the spray-

field. The metering system would monitor the volume of water being applied within each disposal system in order to ensure design compliance and avoid over-application. The details of the re-designed agricultural spray field are outlined in the corresponding section below.

PREFERRED ALTERNATIVE PROJECT DESIGN CONSIDERATIONS: LANDSCAPE IRRIGATION APPLICATION

At maximum production, SABEY data center Buildings A and B plus Quad #1 of future Building D, produce approximately 30,000 gallons of non-contact cooling water per day as part of general operations. In order to dispose of this water, the applicant proposes to apply the non-contact cooling water onto the existing and future landscaping plants and turf surrounding Buildings A and B and future Building D, by utilizing the landscape irrigation systems on parcels #22110300008 (Building A), #22110300009 (Building B), #22110300010 (Building C), and #22211030006 (Building D); 47.4079 N lat. / -120.1891 W long. The landscape irrigation application is the preferred near-term alternative for the disposal of the existing non-contact cooling water from Buildings A and B and the future non-contact cooling water generated by Quad #1 of Building D, as it allows the data center to utilize the relatively clean water for the secondary purpose of irrigating the landscaping in place of domestic water, which is a more environmentally, economically, and socially responsible disposal method than adding it to the sewage water waste stream (the current method of disposal). Below is a discussion of the individual components associated with the design of this alternative.

SOILS

Dominant soils on parcels #22110300008 (Building A), #22110300009 (Building B), and #22110300010 (Building C/Storage Tanks Site) are characterized by the NRCS soils database (<https://websoilsurvey.nrcs.usda.gov>) as belonging to Burch loam, 0-3% slopes (74) (Figure 2). Due to the construction of SABEY Buildings A and B, this area is highly modified in nature, but the original NRCS farmland classification for the Burch loam is Prime Farmland if Irrigated. Historically, this area was farmed commercially with orchard crops and annual grasses, as is typical of the region. Installation of the SABEY Buildings A and B and their associated structures, required the removal of agricultural crops and intense groundwork was performed to level and prepare the site for construction. However, areas of on-site landscaping (the focus of this proposed alternative) were established within the original soils and therefore the following structural characteristics apply:

1. Erosion potential is moderate. Burch loam is particularly sensitive to wind erosion. Soils should not be worked during periods of excessive wind or when soils are desiccated. For the purpose of this proposal, wind erosion is not expected to occur as soils are adequately

- vegetated and water is being applied regularly. Surface water erosion is not expected to occur due to the lack of slope and the appropriate design of the existing irrigation system.
2. Compaction potential through equipment use is high. The soil is moisture sensitive, and the density of the soil changes greatly with added moisture. For the purpose of this proposal, compaction issues are not expected to arise as equipment use within the application areas has already occurred and future equipment use is not expected.
 3. Potential for surface puddling is moderate. This risk is counteracted by the continued proper application rate of irrigation water consistent with the current timing schedule already in use.
 4. Nitrate leaching potential and organic material depletion potential are high due to the rapid infiltration rate of the soil. Continued proper application of fertilizers and irrigation water will counteract this potential issue.
 5. Salinization and surface salt deposit formation is low. No surface salt formation has been observed within the established landscaping to date, and is not expected to occur in the future.

Overall, the Burch loam is well suited for landscape plantings and is appropriate for the application of the non-contact cooling water within the already established irrigation system. If applied at the same rate as the current system, no issues should arise from the application of the non-contact cooling water onto the existing landscape plantings in place of the domestic water, which is the irrigation method currently being used.

Dominant soils on parcel #22211030006 (Building D) are characterized by the NRCS soils database (<https://websoilsurvey.nrcs.usda.gov>) as belonging to Magallon fine sandy loam, 3-8% slopes (229) (Figure 2). Due to the current construction of SABEY Building D this area is highly modified in nature, but the original NRCS farmland classification for the Magallon loam is Prime Farmland if Irrigated. Historically, this area was farmed commercially with orchard crops and annual grasses, as is typical of the region. Installation of the SABEY building required the removal of agricultural crops and intense groundwork was performed to level and prepare the site for construction. However, areas of on-site landscaping (the focus of this proposed alternative) will be established within the original soils and therefore the following structural characteristics apply:

1. Erosion potential is moderate. Magallon loam is particularly sensitive to wind erosion. Soils should not be worked during periods of excessive wind or when soils are desiccated. For the purpose of this proposal, wind erosion is not expected to occur as soils will be adequately vegetated and water will be applied regularly. Surface water erosion is not expected to occur due to the lack of slope and the appropriate design of the future irrigation system.
2. Compaction potential through equipment use is moderate. The soil profile is composed of both rock fragments, sand, and softer sediment. Rock fragments and sand help to

moderate compaction issues. For the purpose of this proposal, compaction issues are not expected to arise as equipment use within the application areas has already occurred and future equipment use is not expected.

3. Potential for surface puddling is low. The soil has excellent drainage, which eliminates potential for surface puddling.
4. Nitrate leaching potential and organic material depletion potential are high due to the rapid infiltration rate of the soil. Proper application of fertilizers and irrigation water will counteract this potential issue.
5. Salinization and surface salt deposit formation is low. Salt formation is not expected to occur in the future.

Overall, the Magallon loam is well suited for landscape plantings and is appropriate for the application of the non-contact cooling water within the proposed irrigation system. No issues should arise from the application of the non-contact cooling water onto the future landscape plantings.



Figure 2. NRCS Soils Map for SABEY site.

AQUIFER

Surrounding well log information is provided in Appendix E. Well #142616 is located in proximity to the proposed landscape irrigation application sites adjacent to SABEY Buildings A, B, and D. At this well, water is located approximately 150 ft below grade. Well #142616 will be sampled as part of the spray field design (discussed below) for nitrate levels in order to establish base-line data at the site. The well will be re-sampled according to the spray field designed maintenance plan (below) and any changes to water levels, conductivity, pH, or nitrate levels will be noted and addressed. Application of the non-contact cooling water, in lieu of domestic water, within the established and future landscape irrigation systems is not expected to have any impact on the underlying aquifer.

LANDSCAPE IRRIGATION LAYOUT, DESIGN, AND HYDRAULIC CONSIDERATIONS

The landscape irrigation system associated with SABEY Buildings A and B is already installed and fully functioning. This system is composed of approximately 9.4 acres utilizing a sprinkler irrigation system and 1.9 acres utilizing a drip irrigation system (Sheet 4). Both systems were designed by ecoPLAN-DESIGN of Wentachee, in collaboration with S&W Irrigation Supply of Wenatchee. The irrigation plan for Buildings A and B is included in Attachment A. In order to utilize the existing infrastructure for the application of the non-contact cooling water currently being generated within SABEY Buildings A and B, the existing irrigation system will be re-plumbed with an additional valve to tie the irrigation system in to the existing non-contact cooling water plumbing. Water from the wet well would enter a set of three 10,000-gallon storage tanks located on parcel #22110300010 (Building C). Once entering the storage tanks, the water would be applied to the landscaping consistent with the current application rate being utilized for irrigation using domestic water. Both the filling of the storage tanks and the application of the water through the irrigation system would be metered and monitored to ensure design compliance and avoid over-application. Ultimately, at current production rates, the non-contact cooling water generated by SABEY Buildings A and B (approximately 500,000 gallons during June of 2018) can supply approximately 50% of the water needs of the existing landscaping on parcels #22110300008 (Building A), #22110300009 (Building B), and #22110300010 (Building C) during the peak irrigation season (approximately 968,000 gallons during June of 2018).

The landscaping and irrigation system associated with future SABEY Building D has been designed by KDWSALASO'BRIEN of Seattle Washington in collaboration with DAVID EVANS & ASSOCIATES, INC of Everett, Washington. This system will be composed of approximately 1.42 acres utilizing a sprinkler irrigation system and 0.36 acres utilizing a drip irrigation system (Sheets 5-7). The irrigation plan for Building D is included in Attachment A. The newly installed irrigation system will also be plumbed to connect it to the non-contact

cooling water storage tank system. The application rate of the non-contact cooling water will be consistent with the current application rate being utilized for the existing landscaping. Ultimately, at peak production rates, the non-contact cooling water generated by Quads #1-4 of SABEY Building D will max out at approximately 1,240,000 gallons during the month of June; approximately 310,000 gallons per quad per month. The non-contact cooling water from Quad #1 of Building D will be utilized in conjunction with the water being produced by Buildings A and B for the irrigation of the existing and future landscaping. Until peak production of non-contact cooling water is attained within Quad #1 of Building D, supplemental water when needed, will be supplied by the domestic water supply; consistent with the current irrigation plan. When peak production of non-contact cooling water from Buildings A, B, and Quads #1-4 of Building D eventually exceeds the demand of the landscape irrigation system, the excess non-contact cooling water will be applied to the agricultural spray field discussed below. Application of water within the two systems will be controlled by a metering system to ensure design compliance.

No hydraulic concerns are associated with this preferred alternative disposal method of the non-contact cooling water. Application rates within the existing and future systems are designed to avoid puddling and over-loading of the soil's water holding capacity. There are no significant slopes associated with the existing or future landscaping which require special mitigation. Additionally, the underlying water table at the site is located approximately 150 ft below grade. The application of the irrigation water is not expected to result in any impact to the underlying hydrology.

PLANTING STOCK

A landscaping plan for SABEY Buildings A and B was designed by ecoPLAN-DESIGN of Wenatchee. The landscaping plan is included in Attachment A. Plants were chosen for their climatic suitability to the site and were grouped according to their water needs. As this is an already established and thriving planting plan, no additional information is being provided about the cultural requirements for each species. A landscaping plan for SABEY Building D was designed by KDWSALASO'BRIEN of Seattle. As with the existing landscaping, plants were chosen for their climactic suitability to the site and will be grouped according to their water needs. As this system has been designed by a State of Washington Landscape Architect, no additional information is being provided about the cultural requirements for each species.

Care of the existing and future plantings is managed by Clean Sweep and Precision Pest Solutions of Wenatchee. Plants are fertilized as part of a regular maintenance plan. Any required application of herbicides or insecticides is also handled by an outside contractor on a regular maintenance schedule. As is typical for an established commercial landscape planting, any dead or diseased plant material is replaced as needed with comparable planting stock. No changes to this established maintenance system are proposed as a result of the application of non-contact cooling water in place of domestic water within the irrigation system.

NUTRIENT AND ORGANICS MANAGEMENT

Samples of non-contact cooling water from the Quincy and Grant Road centers were analyzed by Cascade Analytical (Appendix C).

The Biological Oxygen Demand (BOD) from both samples were less than 2 mg/L each; well below the typical standard of 20 mg/L or less for three-stage treated municipal sewage, and within the normal range of most non-pristine rivers located within the U.S. (2-8 mg/L) as prescribed by the EPA. Therefore, no special recommendations for BOD mitigation are required for the application of the non-contact cooling water within the existing irrigation system.

Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) within both water samples were analyzed. The Quincy sample had a recorded TDS level of 224 mg/l and a TSS level of 7.7 mg/l. The Grant Road sample did not have a TDS level and the TSS level was 4.5 mg/l. Although there is no federally enforceable standard for TDS in drinking water, a maximum concentration of TDS below 500 mg/l is acceptable as prescribed by the EPA. The results from these samples are far below that standard and therefor, no special recommendations for TSS/TDS mitigation are required for the application of the non-contact cooling water within the existing irrigation system.

A sample from the Quincy site confirmed that very low amounts of phosphorus (0.22 mg/L) and combined nitrogen (1.15 mg/L) were present within the non-contact cooling water. The sample from the Grant Road site did not contain any additional nutrients. Because of the relatively inert nature of the non-contact cooling water, the existing landscape planting will require the continued addition of supplemental fertilizer in order to meet the nutritional demands of the planting stock. Currently, the SABEY property has contracted with Clean Sweep of Wenatchee for fertilization of their established landscaping plantings. Clean Sweep amends the established plantings with an 18-0-2 all-purpose phosphorus free fertilizer, and a 10-0-0, 4% iron supplement as needed throughout the growing season (Appendix C). It is expected that a similar approach will be used for the fertilization of the landscaping after the application of the non-contact cooling water in lieu of the domestic water commences. Specific nutrient requirements will be designed using the results of regular soil testing. Details on the required soil testing are outlined in the monitoring section listed below.

MONITORING

In order to ensure the long-term success of the application of non-contact cooling water onto the existing and future landscaping, several key parameters will be periodically monitored over the life of the project. In particular, given the alkaline nature (pH 8.29-8.79) of the non-contact cooling water, soil pH will be monitored and amended as recommended if it exceeds a background level of 8.0, in order to avoid any adverse impacts to plant productivity over time;

primarily limitations to Iron uptake (See Pacific Northwest Extension PNW 599-E; September 2007). Soil testing and leaf analysis testing is recommended to both establish base-line data and monitor for changes. If changes to soil pH are observed, it will be addressed promptly as remediation becomes more difficult when delayed.

Additionally, given the characteristics of the Burch and Magallon soil profiles and their susceptibility to nutrient leaching, water from well #142616 will be periodically analyzed for an increase in nitrates over the baseline. Sampling will occur as part of the monitoring plan designed for the agricultural spray field. No additional testing beyond the proposed monitoring schedule for the spray field is required. The EPA recommends testing private wells every 3 years for nitrates when the well is located near areas of intensive agriculture. Based off of the #142616 well-log data and the NRCS Burch and Magallon soils profiles, groundwater at the site is located more than 150 ft below grade. It is not expected that the application of non-contact cooling water onto the existing and future landscaping will affect the local water table in any way, and testing for nitrates is suggested as a precaution only.

Irrigation systems require regular maintenance in order to properly function. It is imperative that the system is inspected regularly and broken emitters are replaced in a timely manner in order to insure proper water application rates, eliminate the risk of wind-driven soil erosion, and to improve plant survivorship. When emitter replacement is required, it will be replaced with a part that offers a comparable application mode and rate (gpm). Failure to replace the damaged emitter with a comparable part will ultimately affect the uniformity of the application rate and the overall effectiveness of the landscape irrigation system to properly operate. Additionally, a meter will be installed to assist with monitoring and controlling the volume of water being discharged into the irrigation and spray field systems to ensure proper application rates are being observed.

DISCUSSION

The proposed application of non-contact cooling water from SABEY Buildings A, B, and Quad #1 of Building D, onto the existing and future landscaping utilizing the landscape irrigation system is not expected to cause any detrimental harm to the soil profile or the underlying aquifer. Very little infrastructural improvements will need to be made in order to tie the non-contact cooling water system into the existing irrigation system. The system will still require the use of some domestic water in order to meet the irrigation needs of the established plantings until Quad #1 of Building D is operating at peak capacity. This proposed alternative is preferred in that it lessens the overall environmental impact of the SABEY site by utilizing the relatively inert non-contact cooling water for a secondary purpose while decreasing the demand for domestic water at the site.

PREFERRED ALTERNATIVE PROJECT DESIGN CONSIDERATIONS: AGRICULTURAL SPRAY FIELD

At maximum production, the SABEY data center Building D will produce approximately 40,000 gallons of non-contact cooling water per day as part of general operations (approximately 10,000 gallons per quad per day). In order to dispose of this water, the applicant first proposes to apply water from Quad #1 (approximately 10,000 gallons/day) on to the site landscaping along with non-contact cooling water generated from Buildings A and B. Once the volume of non-contact cooling water generated by Buildings A, B, and Quad #1 of Building D exceeds the capacity of the landscape irrigation system, the applicant proposes to install an agricultural spray field on their parcels #222110300004 (Vacant) and #222110300006 (Building D) for the disposal of the remainder of the water generated by Quads #2-4 of Building D; 47.4072 N lat./ -120.1870 W long (Photographs 1-2). The agricultural spray field is the preferred alternative for future non-contact cooling water disposal as it allows the data center to utilize this relatively clean water for a secondary purpose which is more environmentally, economically, and socially responsible than adding it to the sewage water waste stream (the current method of disposal). This alternative will be built in phases and only as needed to accommodate the disposal of non-contact cooling water which cannot be disposed of via the landscape irrigation system discussed above.

Below is a discussion of the individual components associated with the design of this alternative.

SOILS

Soils in the location of the proposed agricultural spray field are characterized by the NRCS soils database (<https://websoilsurvey.nrcs.usda.gov>) as belonging to Pogue loam, 8-15% slopes (270) (Appendix B and D). Pogue loam is classified as Farmland of Unique Importance. Historically, this portion of the properties has been farmed commercially as dry-land grain crops and is easily distinguishable in aerial photographs. A site visit was conducted by Grette Associates, LLC in October of 2018. During the visit several test pits were dug using a large commercial excavator. The soil profile was exposed in two separate locations within the Pogue loam. The soil was dug to a depth of approximately 5 ft (Photograph 2). Soil within the pit can be characterized as belonging to a true loam; devoid of any stone or cobble, with a fine-medium texture composed primarily of silt and fine sand.

Based on NRCS data, the Pogue loam has the following important structural characteristics which have been taken into consideration during spray-field design:

1. Erosion potential is high. Pogue loam is particularly sensitive to wind and surface water erosion. Therefor tillage and harvest practices will be properly timed, and water application rates will be calculated accordingly to avoid potential erosion events.

2. Compaction potential through equipment use is high. Heavy equipment will not be driven within the project area immediately following irrigation.
3. Displacement potential is low and suitability to mechanical site preparation is high. The site will respond well to leveling and preparation activities provided that work happens outside of periods of both saturation and extreme desiccation.
4. Rates of irrigation seepage is high due to the rapid infiltration rate of the underlying structure and the topographic slope. Potential for surface puddling and crusting is moderate. Methods of irrigation will be limited to sprinkler, micro sprinkler, or drip systems only. The site is not suited to surface trenching or sub-irrigation.
5. Irrigation application rates will be timed appropriately to avoid surface puddling and crusting by allowing for proper initial infiltration, the avoidance of over-saturation due to the low water holding capacity of the soil, and the avoidance of irrigation stress to planting stock due to excessive drainage over a relatively short period of time.
6. Nitrate leaching potential and organic material depletion potential are high. The installation of a mow-able turf/cover crop between planting rows, and the proper application of fertilizers and irrigation water will counteract this potential issue.
7. Salinization and surface salt deposit formation potential is low. There is no need to apply additional water to counteract soil salinity.

Overall, the Pogue loam is well suited to agricultural use and is appropriate for the installation of the spray field. Traditional farming methods for this soil type include irrigated orchards and irrigated hay and pasture. A comparable cropping system will be installed at the site as part of the spray field design.

AQUIFER

Surrounding well log information is provided in Appendix E. Well #142616 is located in proximity to the proposed spray field site. At this location, water is located approximately 150 ft below grade. As part of the initial project set up, this well will be sampled for nitrate levels in order to establish base-line data at the site. The well will be re-sampled according to the designed maintenance plan and any changes to water levels, conductivity, pH, or nitrate levels will be noted and addressed. The spray field is not expected to affect the surrounding water table. The application rate and water budget for the spray field have been calculated to result in a near neutral budget; with plant uptake and evaporation approximately equaling the application rate. The spray field has been designed to include multiple irrigation zones. Zones can be turned on and off independently. This allows for flexibility in increasing or decreasing application rates depending on climactic conditions. Zones have been designed with rest days between applications to avoid over saturation. No additional irrigation water will be required for maintaining spray field planting stock however the system will be plumbed with a hook-up to domestic water in the event that the non-contact cooling water becomes temporarily unavailable.

SPRAY FIELD LAYOUT AND HYDRAULIC CONSIDERATIONS

Although there is a relatively large portion of the SABEY properties available for the development of the proposed spray field, the area of Pogue loam was chosen for its suitability as an agricultural soil. The proposed spray field site has been broken apart into several planting blocks of various sizes (Sheets 1,2, and 3). The planting blocks correspond to different irrigation requirements (Table 4). Each planting block may consist of more than one irrigation zone, depending on the size of the block. Maximum irrigation zone size is limited in order to preserve uniformity and efficiency of the non-contact cooling water application, and to allow flexibility in application timing. Each irrigation zone can be watered independently of the other zones in order to maximize the appropriate rest period between applications and maintain proper drainage by avoiding over-saturation of the soil profile. Additionally, due to the independent nature of each irrigation zone, SABEY does not need to build out the entire spray field at one time but can install the zones as needed due to increased demand. The specific characteristics of each planting block and their corresponding irrigation zones are described below.

1. **Planting Block 1** (Irrigation Zones 2-5 and 7-10) is approximately 3.75 acres in size and is composed primarily of turf and high-water trees/nursery stock. This block is the highest water using portion of the spray field. This block offers flexibility to the spray field design in that, once established, plants within this block are able to handle an application rate of slightly more or slightly less water than what is outlined in the water budget. Water application volume in this block will range from .5 to 2.4 inches per week during the irrigation season (Mid-March through Mid-October). The irrigation system within the zones of this block will be composed of solid set sprinklers. Application rates within each zone (gpm) are listed on Sheet 3. Zones will be watered on a staggered schedule. Length of application set times will change seasonally, with a minimum rest period of 3 days between sets within each zone. A planting plan for this block can be found on Sheet 2 and a list of planting stock can be found in Table 5. A water budget is available in Table 4.
2. **Planting Block 2** (Irrigation Zone 1) is approximately 0.25 acres in size and is composed primarily of turf and mid to low-water trees/nursery stock. This block requires regular irrigation but is not as demanding as Planting Block 1. This block offers flexibility to the spray field design in that, once established, plants within this block are able to handle an application rate of slightly more or slightly less water than what is outlined in the water budget. If needed, water can be diverted entirely from this block for brief periods of time in order to accommodate an increase in irrigation needs within Block 1. Water application volume in this block will range from .2 to 1 inch per week during the irrigation season (Mid-March through Mid-October). The irrigation system within the zone of this block will be composed of solid set sprinklers with an application rate of 18 gpm (Sheet 3). Length of set times per zone will change seasonally, with a minimum rest

period of 3 days between sets. A list of planting stock for this block can be found in Table 5. A water budget is available in Table 4.

3. **Planting Block 3** (Irrigation Zone 6) is approximately 0.5 acres in size and is composed primarily of xeric, native, and low-water nursery stock. This block offers flexibility to the spray field design in that the plants within this block are able to handle less water or no water situations once established. If unforeseen irrigation needs increase in Planting Blocks 1 or 2 (due to weather or wind), water can be diverted from the Block 3 budget to accommodate. Water application volume in this block will range from 0 to .25 inches per week during the irrigation season (Mid-March through Mid-October). The irrigation system within the zone of this block will be composed of a fixed drip system with an application rate of 19.5 gpm (Sheet 3). Length of application set times will change seasonally, with a minimum rest period of 5 days between sets. A list of planting stock for this block can be found in Table 5. A water budget is available in Table 4.

IRRIGATION DESIGN

Irrigation for the site was designed in conjunction with S&W Irrigation Supply in Wenatchee Washington. S&W is the leading irrigation supplier for agricultural applications within the greater Wenatchee valley (Sheets 1 and 3). The Irrigation system design utilizes several factors:

1. The spray field irrigation system is compatible with the existing landscaping irrigation systems already installed on the SABEY properties, to the greatest extent possible. This will allow the proposed spray field irrigation system to be easily operated, maintained, and repaired by SABEY maintenance staff with limited additional required training.
2. The irrigation system is designed to be compatible with the limitations described for the Pogue soil series. Based on information provided within the NRCS National Engineering Handbook, Washington Irrigation Guide, and the NRCS soil mapper website, the water application method will be limited to sprinkler, micro sprinkler, or drip systems only. Head selection will focus on small droplet size at a rate that allows for proper infiltration and avoids ponding.
3. The application rate and frequency has been designed utilizing best available science. A water budget has been completed for the project using regional climactic and agricultural data (Tables 1-4). This water budget has been used for selecting emitter style and will be used for programming application cycles into the automatic irrigation timer.
4. Irrigation application will be uniform in nature. Layout of the irrigation system is designed in a grid pattern to maximize uniformity of water application across the spray field.
5. The irrigation system is adaptable and low-maintenance. Irrigation of the spray field is broken into zones which can be operated independently via an automatic timer. The system is designed to minimize labor associated with maintenance and repairs.

6. Irrigation system will be tied in to the domestic water supply as a backup. In the event that the non-contact cooling water becomes temporarily unavailable, domestic water can be supplied to the spray field planting stock for irrigation purposes.

Initial research indicates that the spray field will contain two different emitter systems. The high and moderate water-using areas (mixed turf and trees/nursery stock) are best suited to the installation of a solid-set under tree permanent sprinkler system. The low water-using areas (xeric and natives) are best suited to a permanent drip irrigation system. Application methods will not be mixed within zones in order to ensure proper application rates are achieved.

PLANTING STOCK

The proposed spray field will incorporate a mixture of trees, nursery plants, turf/ground cover, and xeric natives (Sheet 2). Planting stock species for the spray field were chosen for their ability to fulfill a set of site-specific goals. Plants were chosen based on their hardiness, their overall water consumption needs, their potential economic value, their relatively low maintenance qualities, and/or their environmental value. During the site visit conducted by Grette Associates, LLC in October of 2018, SABEY staff also indicated that priorities for the spray field should include the construction of a park-like setting for tenants, potential replacement nursery stock for landscaping located across all SABEY properties, and the encouragement of species that would be beneficial to the surrounding agricultural system; primarily pollinators. Based on the location of the property within the airport overlay district of Douglas County, plants were also chosen for their compatibility with this zoning designation. A complete list of airport approved planting stock and their major cultural requirements are included in Table 5.

The following guidelines will be utilized for maintaining the health of the planted area:

1. Planting stock will be installed on a grid system and will be grouped by water and space requirements. Culturally appropriate methods of irrigation will be installed within each grouping.
2. Planting stock will be installed in early-mid spring or mid-fall to avoid plant stress and improve survivorship. Tree shelters may be installed around saplings to protect from browsing deer and voles. Trees will be staked for wind protection.
3. Planting stock will be monitored regularly for survivorship and replaced as needed within the first 3 years of installation.
4. Foundational pruning will be required for most tree and landscaping species within 3 years of planting. No more than 30% of the plant growth will be removed during any one season to ensure the continued health of the planting stock. Pruning will be managed by Clean Sweep of Wenatchee or another professional landscaping service or arborist. Clean

Sweep is currently contracted to manage landscaping for all SABEY properties in the region.

5. Planting stock will be regularly monitored for insect infestations and disease. Application of treatments for infestations and disease will be managed by Clean Sweep of Wenatchee or another professional landscaping service or arborist. Clean Sweep is currently contracted to manage landscaping for all SABEY properties in the region.
6. Weeds will be controlled during plant establishment. Landscape plants and trees may be planted through weed barrier/landscape fabric to control weeds. If weed barrier is not installed, an approved herbicide will be applied up to two times annually for the first 3 years to control weeds within a 2 ft in diameter of the landscaping plants and trees. Application of herbicide will be managed by Clean Sweep of Wenatchee or another professional landscaping service or arborist. Clean Sweep is currently contracted to manage weed control for all SABEY properties in the region.
7. Trees associated within the wood lot plots will be thinned to a spacing of 25 ft once reaching 8" in diameter. Trees associated with the wood lot plots will be thinned to a spacing of 35 ft once reaching a diameter of 20". Trees associated with the wood lot plots will be thinned to a spacing of 50 ft once reaching a diameter of 30". Thinning work and any timber sales will be contracted out to a local forester, professional landscaping service, or arborist.

NUTRIENT AND ORGANICS MANAGEMENT

Samples of non-contact cooling water from the Quincy and Grant Road centers were analyzed by Cascade Analytical (Appendix C).

The Biological Oxygen Demand (BOD) from both samples were less than 2 mg/L each; well below the typical standard of 20 mg/L or less for three-stage treated municipal sewage, and within the normal range of most non-pristine rivers located within the U.S. (2-8 mg/L) as prescribed by the EPA. Therefore, no special recommendations for BOD mitigation are required for the spray field design.

Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) within both water samples were analyzed. The Quincy sample had a recorded TDS level of 224 mg/l and a TSS level of 7.7 mg/l. The Grant Road sample did not have a TDS level and the TSS level was 4.5 mg/l. Although there is no federally enforceable standard for TDS in drinking water, a maximum concentration of TDS below 500 mg/l is acceptable as prescribed by the EPA. The results from these samples are far below that standard and therefore, no special recommendations for TSS/TDS mitigation are required for the spray field design.

A sample from the Quincy site confirmed that very low amounts of phosphorus (0.22 mg/L) and combined nitrogen (1.15 mg/L) were present within the non-contact cooling water. The sample from the Grant Road site did not contain any additional nutrients. Because of the relatively inert nature of the non-contact cooling water, the spray-field planting stock will require the addition of supplemental fertilizer in order to meet the nutritional demands of the planting stock. Currently, the SABEY property has contracted with Clean Sweep of Wenatchee for fertilization of their established landscaping plantings. Clean Sweep amends the established plantings with an 18-0-2 all-purpose phosphorus free fertilizer, and a 10-0-0, 4% iron supplement as needed throughout the growing season (Appendix C). It is expected that a similar approach will be used for the fertilization of the spray field. Specific nutrient requirements will be designed using the results of the pre-planting soil test. Details on the required soil testing are outlined in the monitoring section listed below.

MONITORING

In order to ensure the long-term success of the spray field, several key parameters will be periodically monitored over the life of the project. In particular, given the alkaline nature (pH 8.29-8.79) of the non-contact cooling water, soil pH will be monitored and amended as recommended if it exceeds a background level of 8.0, in order to avoid any adverse impacts to plant productivity over time; primarily limitations to Iron uptake (See Pacific Northwest Extension PNW 599-E; September 2007). Soil testing and leaf analysis testing is recommended to both establish base-line data and monitor for changes. If changes to soil pH are observed, it will be addressed promptly as remediation becomes more difficult when delayed.

Additionally, given the characteristics of the Pogue soil profile and its susceptibility to nutrient leaching, water from well #142616 will be periodically analyzed for an increase in nitrates over the baseline. The EPA recommends testing private wells every 3 years for nitrates when the well is located near areas of intensive agriculture. Based off of the #142616 well-log data and the NRCS Pogue soils profile, groundwater at the site is located more than 150 ft below grade. It is not expected that the spray field will affect the local water table in any way, and testing for nitrates is suggested as a precaution only.

Irrigation systems require regular maintenance in order to properly function. It is imperative that the system is inspected regularly and broken emitters are replaced in a timely manner in order to insure proper water application rates, eliminate the risk of water-caused soil erosion, and to improve plant survivorship. When emitter replacement is required, it will be replaced with a part that offers a comparable application mode and rate (gpm). Failure to replace the damaged emitter with a comparable part will ultimately affect the uniformity of the application rate and the overall effectiveness of the spray field to operate within the prescribed water budget. Additionally, a meter will be installed to assist with monitoring and controlling the volume of

water being discharged into the irrigation and spray field systems to ensure proper application rates are being observed.

The following monitoring schedule is proposed:

Prior to Installation-

- Planting area will be prepped utilizing industrial grading and excavation equipment. Site will be minimally graded to construct a relatively level planting surface and minimize surface erosion potential.
- After grading and site prep, no less than two soil samples from different portions of the spray field will be sent to Cascade Analytical in Wenatchee for soil fertility evaluation Eastern Washington Complete (pH, EC, B, NO₃, P, K, Ca, Mg, SO₄, Zn, %OM, Fe, Cu, Mn, and Lime requirement). These soil tests will offer base-line information regarding the fertility of the planting area, including current soil pH, and will include application rate recommendations for major nutrients or soil amendments. If specific amendments are flagged within the soil report, they will be applied before planting takes place as application after-the-fact is difficult to achieve.
- A sample from well #142616 will be sent to Cascade Analytical in Wenatchee and tested for nitrates, pH, and conductivity. This test will offer base-line information regarding the ambient nutrient levels present within groundwater at the site.

Growing Season 1-

- SABEY maintenance staff or an appointed contractor will perform a walk-through of the planted area every week during the irrigation season (Mid-March through Mid-October) to monitor the irrigation system for leaks and necessary repairs. Soils will be monitored for signs of over-saturation or surface erosion and will be immediately addressed if needed.
- Planting stock will be inventoried regularly for survivorship and replaced as needed.
- A tree leaf analysis test will be conducted by Cascade Analytical from within the center of the spray field. Sampling will occur between mid-July and mid-September. The leaf analysis will offer base-line data on the fertility and nutrient availability of the spray field.

Growing Season 2-

- Soil tests and leaf analysis will be repeated as close to the same time of year as the original testing. Any significant changes will be noted and addressed.

Growing Season 4-

- Soil tests and leaf analysis will be repeated as close to the same time of year as the original testing. Any significant changes will be noted and addressed.
- Nitrate test for well #142616 will be repeated. Any significant changes will be noted and addressed.

On-going-

Soil testing and leaf analysis should continue at least every 3 years following Growing Season 4. Nitrate testing should be periodically continued at the applicant's discretion. The irrigation system should be continuously monitored for leaks and repairs. Plant material should be pruned and replaced as necessary.

DISCUSSION

The proposed spray field is not expected to cause any detrimental harm to the existing soil profile or the underlying aquifer. The best available science was used to construct the water budget and capacity estimates with the goal of producing a near neutral effect. Estimates on spray field capacity are skewed toward the conservative side as ET data used for plant material calculations was derived from Manson, WA; which has a slightly cooler and shorter growing season than the SABEY Grant Road site. At its current size, the spray field will be able to handle a larger volume of water than that which is listed, within reason (+/- .25 inches/acre). The spray field is also designed to maximize flexibility for the applicant. By incorporating planting blocks with different water requirements and on different irrigation zones, build-out of the spray field can be phased, and non-contact cooling water can be allocated as needed to meet the changing production rates of the SABEY facility without causing harm to the planting stock, underlying soils, or the aquifer.

IRRIGATION AND CROP MANAGEMENT PLAN

S_.A. ANNUAL SUMMARY OF FARM OPERATIONS FOR PREVIOUS YEAR

1. Year 1-Summary is Not Applicable.
Annual Summary will be completed prior to the start of Year 2.

S_.B. CROPPING AND IRRIGATION SCHEDULE FOR UPCOMING YEAR

1. Crop Management Information:
 - a. Proposed Acreage:
 - i. Turf/Ground Cover: 1.75 Acres; permanent
 - ii. Trees/Landscape/Nursery (High Water): 2 Acres; permanent
 - iii. Trees/Landscape/Nursery (Moderate-Low Water): .25 Acres; permanent
 - iv. Xeric/Native Landscape (Low Water): .5 Acres; permanent
 - b. Cultivation and Harvesting Requirements:
 - i. No cultivation or harvesting is expected; however, the following maintenance tasks will be performed:
 1. Planting stock will be surveyed for survivorship in the spring (April-May) and replaced as needed.
 2. Plant shelters and tree stakes, if installed, will be checked and replaced as needed.
 3. Turf/Ground Cover will be top-seeded in the spring, if needed, (March-April) to ensure uniformity of coverage.
 4. No foundational pruning is prescribed for Year 1.
 - c. Expected Crop Yields:
 - i. Crops are permanent in nature. No crop yields are expected in Year 1.
 - d. Methods for Establishing a Crop:
 - i. Crops are permanent in nature. Establishment will involve regular application of non-contact cooling water in accordance with the prescribed water budget, and control of weeds, pests, and nutrients as outlined below.
 - e. Proposed Schedule for Herbicide, Pesticide, and Fertilizer Application:
 - i. Trees/Landscaping/Nursery stock will require weed control up to 2 times during the growing season if weed barrier is not installed. 2-4-D or glyphosate are recommended for control. Dicamba should be avoided due to compatibility issues with proposed turfs/ground covers. Weed control is

recommended in a 2 ft diameter radius around all trees and nursery stock to limit competition during establishment. Application will be contracted with Clean Sweep of Wenatchee or another appointed contractor. Weed barrier may be installed at the time of planting to function in lieu of chemical control.

- ii. Plants will be monitored on a regular schedule for pest infestations (no less than 1 time per month). Infestations will be treated immediately. Monitoring will be contracted with Clean Sweep of Wenatchee or another appointed contractor.
- iii. Soil testing at two locations (preferably from different planting blocks) within the spray field will be performed in the spring, prior to the start of the growing season (March-April). Results will be compared to the previous year and any changes to soil pH or nutrient availability will be noted and addressed immediately. Soil Testing will be completed at Cascade Analytical in Wenatchee and may be completed by SABEY staff or another appointed contractor.

2. Irrigation Management:

a. Frequency and Timing of Wastewater and Supplemental Irrigation Water Application

- i. Frequency will be scheduled according to the monthly water budget of each planting block and the application rate of its corresponding irrigation system (solid-set vs. drip).
- ii. Irrigation set timing will be handled via a programmable irrigation timer. Length of set will change monthly according to the water budget for each planting block.
- iii. Recommended rest periods will be utilized within each irrigated zone to prevent over saturation and preserve soil structure and integrity.
- iv. No supplemental irrigation water is required for this spray field. Spray field will remain plumbed to domestic water as a precaution in the event that non-contact cooling water becomes temporarily unavailable.

b. Recommended Rest Cycles for Hydraulic Loading

- i. Irrigation Zones within Block 1 will be watered every 3+ days to allow for proper drainage.
- ii. Irrigation Zones within Block 2 will be watered every 3+ days to allow for proper drainage.
- iii. Irrigation Zones within Block 3 will be watered every 5+ days to allow for proper drainage.

c. Estimated Leaching Requirement

- i. N/A- TDS, TSS, and salts are not expected to be problematic for this spray field. Additional application of water for leaching is not proposed at this time.
- 3. Estimated Annual Total Net Nitrogen, Water Load Capacity, Fixed DSS, BOD
 - a. The non-contact cooling water to be applied to the spray field is devoid of significant amounts of nitrogen. No field loading is expected. Nitrogen and supplemental nutrients will be added as recommended by the prescribed soil testing.
 - b. The spray field is designed to accommodate a maximum water load of 30,000 gallons/day during June, July and August. A spreadsheet of estimated capacity by month is attached (Table 4).
 - c. The non-contact cooling water to be applied to the spray field is devoid of significant amounts of DSS. No field loading is expected.
 - d. The non-contact cooling water to be applied to the spray field is devoid of significant amounts of BOD. No field loading is expected.

IRRIGATION AND CROP MANAGEMENT PLAN ADDITIONAL REQUIREMENTS; PGS. 14-15 WASHINGTON STATE DEPARTMENT OF ECOLOGY GUIDELINES FOR PREPARATION OF ENGINEERING REPORTS FOR INDUSTRIAL WASTEWATER LAND APPLICATIONS SYSTEMS, MAY 1993 PUBLICATION #93-36

All additional requirements outlined on Pgs. 14-15 are included below in ***bold italics***. Responses are in standard text.

The system must be operated according to approved design loading and in a manner that will protect the existing and future beneficial use of the ground water.

The proposed spray field has been designed utilizing the best available science (Tables 1-4). Soils data was compiled from WSDA NRCS. The AWC was calculated for the Pogue loam, and Net Irrigation requirements were determined utilizing NRCS recommended MAD values for the proposed spray field planting stock. Crop specific ET data, ET(r) data, and Pan ET data for the proposed site were compiled utilizing USBR, NRCS, NOAA WETS, and Washington State University atmospheric data. Irrigation inefficiencies were calculated utilizing NRCS data. Precipitation and effective precipitation information was calculated using NOAA WETS data. All factors were combined to create an accurate water budget (in./wk) for planting stock utilized within the proposed spray field. The monthly spray field capacity was calculated utilizing a neutral water budget, a positive water budget (defaulting to the highest water demand in each

planting block) and a negative water budget (defaulting to the lowest water demand in each planting block). By applying the non-contact cooling water at a rate that is recommended within the range of the proposed water budgets (+/- .25 in./acre/wk), the spray field will not affect ground water. Further, water samples of the non-contact cooling water were analyzed by Cascade Analytical. The non-contact cooling water will not contain any materials that will affect loading of the soils. Therefor the system will be operated in a manner that will protect existing and future beneficial use of the ground water.

Warm weather management should be done such that wastewater constituents of concern are chemically treated or biologically treated or removed by the crops to a degree that will minimize leaching losses. Application of wastewater during colder periods when biological and vegetation activities are low may not be appropriate if there are constituents of concern in the wastewater or treatment byproducts in the soil that would not be substantially stored in the root zone by physical or chemical means.

Not Applicable. The non-contact cooling water does not contain any materials of concern either chemically or biologically. Water will not be applied to the site during the winter months (November-March) when planting stock is dormant and ET values are minimal.

Wastewater must not be applied in a manner that would result in a surface discharge off the approved treatment site. Sites that would allow a surface discharge of wastewater or melt water due to slope and topography may not be appropriate for application when the soils are frozen or saturated.

The water budget and proposed application rates for the site take into consideration the slope and water holding capacity of the Pogue loam. Appropriate rest periods have been incorporated into the design of the spray field to allow for proper drainage between applications. Application rates of the irrigation system are appropriate for facilitating proper initial infiltration and the avoidance of surface ponding. No surface discharge of wastewater is expected to occur as a result of this project. Additionally, water will not be applied to the spray field from November through the end of March. This avoids the potential for application when soils are frozen or saturated.

The following conditions are to be avoided by proper design management:

- ***The application of wastewater over all or portions of the site in quantities that significantly reduce or destroy the long-term infiltration rate of the soil.***

The water budget and application rate of the spray field have been designed in accordance with the limitations of the Pogue loam as outlined by NRCS data. Long-term infiltration rates will not be affected by this project.

- ***The application of wastewater over all or portions of the site in quantities that would cause long-term anaerobic conditions in the soil, especially when the microorganisms are highly active. Application under these conditions could result in excessive leaching of partial decomposition products or constituents of concern beyond the biological and root zones of the treatment system.***

Anaerobic conditions are not expected to occur as a result of this project. Pogue loam soils are characterized as ‘Somewhat Excessively Drained’ with a ‘Moderately Rapid’ to ‘Very Rapid’ permeability. The water budget and application rate have been designed to work within the confines of the water holding capacity of the Pogue loam and will not cause periods of anoxic conditions due to over-saturation of the soil profile. The proposed water budget has also been designed to avoid leaching beyond the root zones of the treatment system. Additionally, the non-contact cooling water does not contain any materials that will encourage anaerobic conditions.

- ***The application of wastewater over all or portions of the site in quantities that would cause prolonged ponding of wastewater for periods long enough to produce objectionable odors or provide sustenance for insects or vectors from the ponded area.***

See responses above.

- ***The application of wastewater over all or portions of the site in quantities or for durations that would cause unacceptable leaching losses of constituents of concern beyond the treatment zone or in excess of the approved design.***

See responses above.

The application of wastewater to bare soil at rates that destroy the short-term infiltration capability of the soil and for durations sufficient to cause objectionable odors from ponding or to cause site runoff.

See responses above.

Constituents of concern are constituents in the wastewater, partial decomposition products, or soil constituents that would alter ground water quality in amounts that would affect current and future beneficial uses.

Ground water is not expected to be affected by this project. Well data indicates that ground water is located at least 150 ft below grade at the site. The proposed application rates for this project will not affect any current or future beneficial uses of ground water. The non-contact cooling water does not contain any constituents that would alter ground water quality. Additionally, nitrate data will be collected from well #142616 before the start of the project and as part of

regular monitoring. Any changes to nitrate levels, conductivity, or pH within the well will be addressed immediately.

QUALIFICATIONS

Eron Drew is a Biologist with expertise in limnology, freshwater ecology, salmonid and ESA species monitoring, plant identification and propagation, habitat assessment, and GIS mapping. Eron has 13 years of professional agricultural experience both designing and managing complex planting systems in central Washington State; including irrigation budgeting and crop selection. She holds bachelor of science degrees in Geology, Zoology, and Conservation Biology from the University of Wisconsin, Madison. Eron works with public and private clients on natural resource related projects including data collection analyses, and permitting related to both development and restoration activities.

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Washington State University, WSU Tree Fruit Research and Extension Center. WSU-TFREC Orchard Calculator. www.tfrec.wsu.edu

ADDENDUM TO INDUSTRIAL WASTEWATER LAND TREATMENT SYSTEM ENGINEERING REPORT

PHOTOGRAPHS



Photograph 1. Approximate location of proposed spray field on SABEY properties, parcels #222110300006 and #222110300004; 47.4072 N lat./ -120.1870 W long. Soils within the proposed location are composed of Pogue loam; looking southwest.

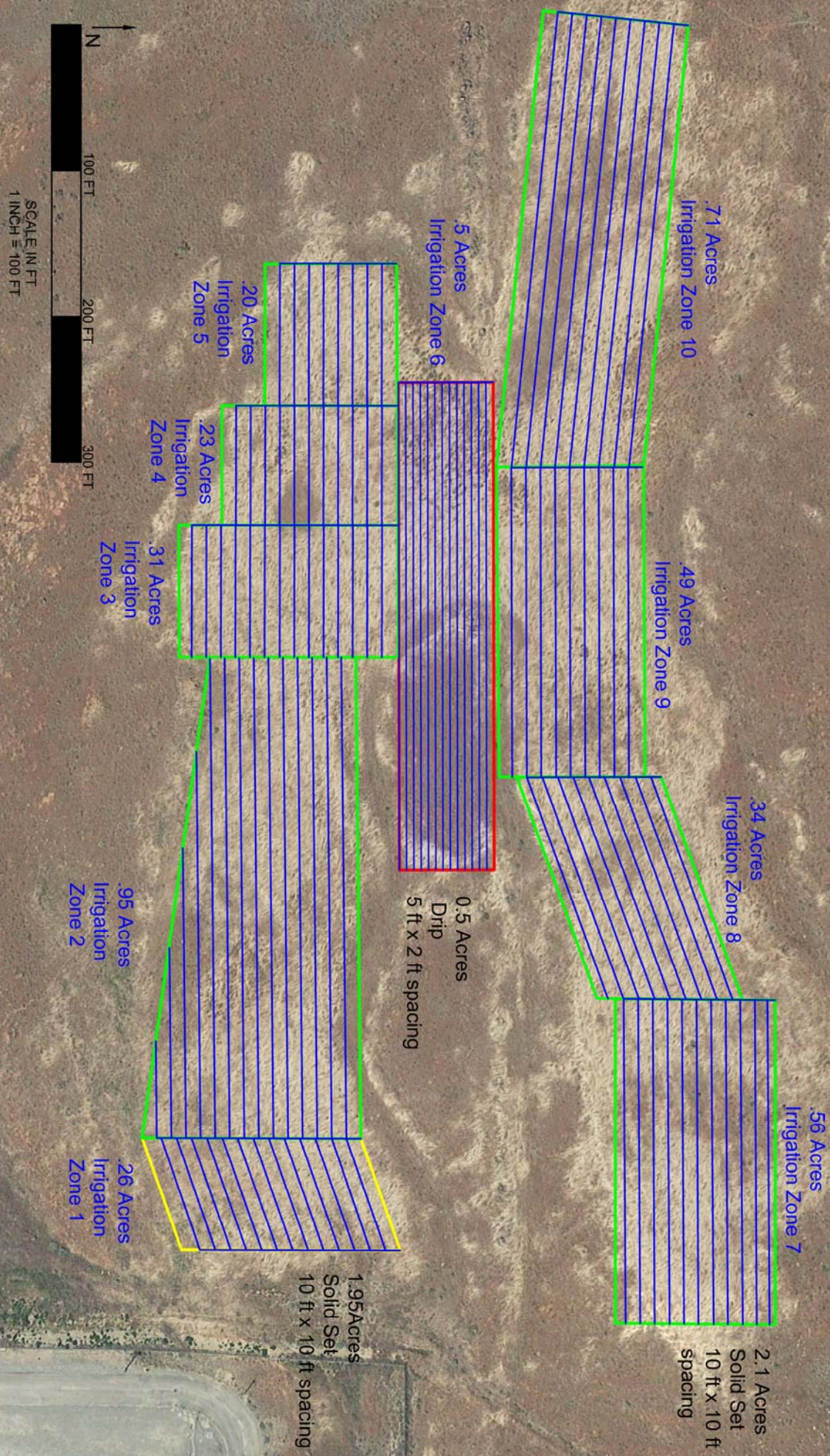


Photograph 2. Soil profile of Pogue Loam at SABEY site. Soil was dug to a depth of approximately 5 ft. utilizing an industrial excavator. No stones, gravel, or cobble was visible within the profile.

ADDENDUM TO INDUSTRIAL WASTEWATER LAND TREATMENT SYSTEM ENGINEERING REPORT

SHEETS AND TABLES

- Planting Block 1 - Trees and Turf, High Water Usage
- Planting Block 2 - Landscape/Nursery and Turf, Moderate Water Usage
- Planting Block 3-Xeric/Native, Low or No Water Usage



PURPOSE: INSTALLATION OF NON-CONTACT COOLING WATER SPRAY FIELD

ADJACENT PROPERTY OWNERS:

- INTERGATE COLUMBIA III LLC
12201 TUKWILA INTERNATIONAL BLVD, 4TH FLOOR
SEATTLE, WA 98168
- LEGACY LLC
305 OLDS STATION RD
WENATCHEE, WA 98801-0000

IRRIGATION LAYOUT

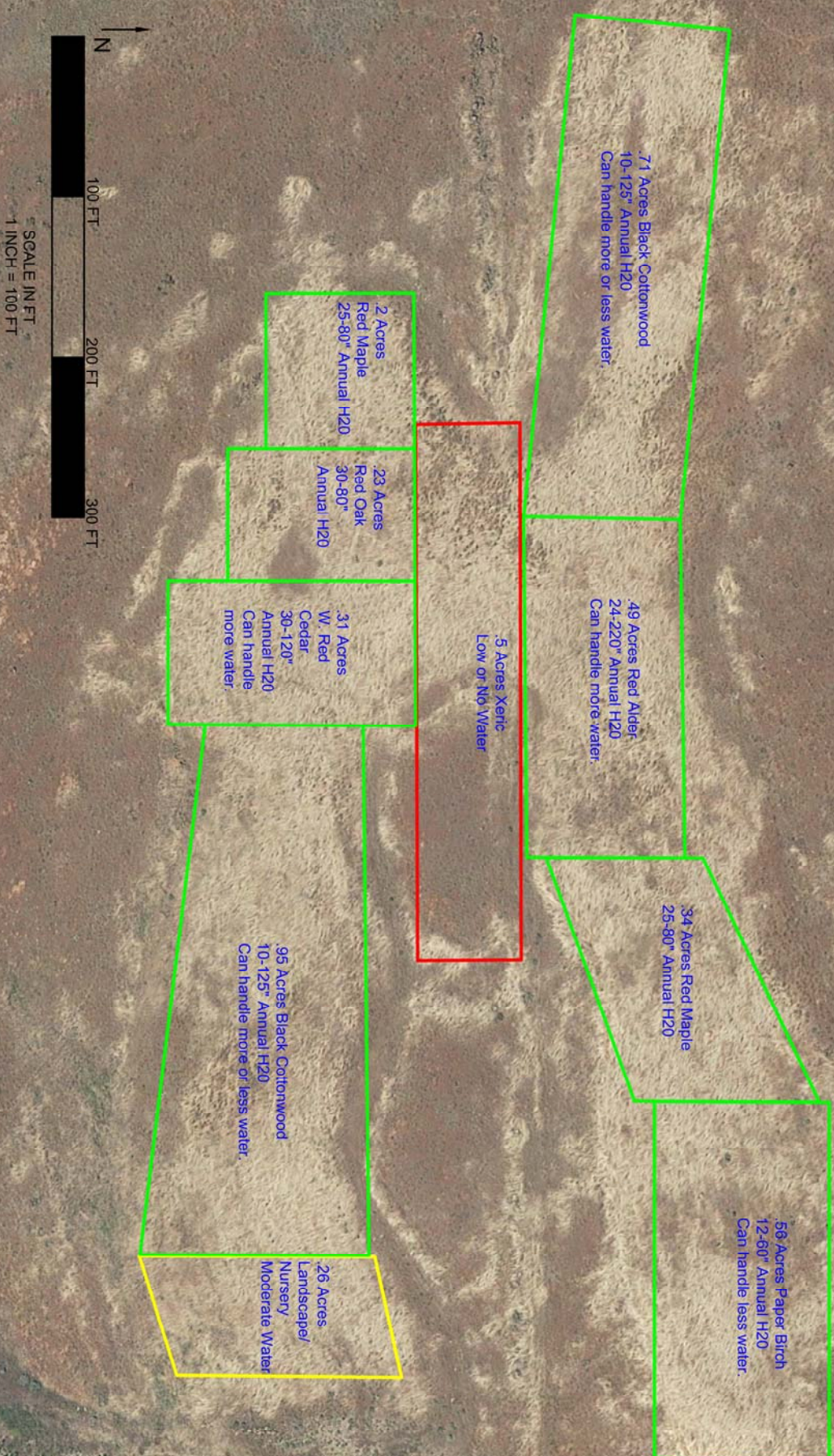


LAT. 47.4072 N / LONG. -120.1870 W

IN: SABEY DATA CENTER
404 GRANT ROAD
EAST WENATCHEE, WA
COUNTY OF: DOUGLAS
STATE: WA
APPLICATION BY:

SHEET NO. 1 OF 7 DATE: 4/24/19

- Planting Block 1 - Trees and Turf, High Water Usage
- Planting Block 2- Landscape/Nursery and Turf, Moderate Water Usage
- Planting Block 3-Xeric/Native, Low or No Water Usage



PURPOSE: INSTALLATION OF NON-CONTACT COOLING WATER

ADJACENT PROPERTY OWNERS:

① INTERGATE COLUMBIA III LLC

12201 TUKWILA INTERNATIONAL BLVD, 4TH FLOOR
SEATTLE, WA 98168

② LEGACY LLC

305 OLDS STATION RD
WENATCHEE, WA 98801-0000

PLANTING BLOCKS



Grete Associates LLC
ENVIRONMENTAL CONSULTANTS

LAT. 47.4072 N / LONG. -120.1870 W

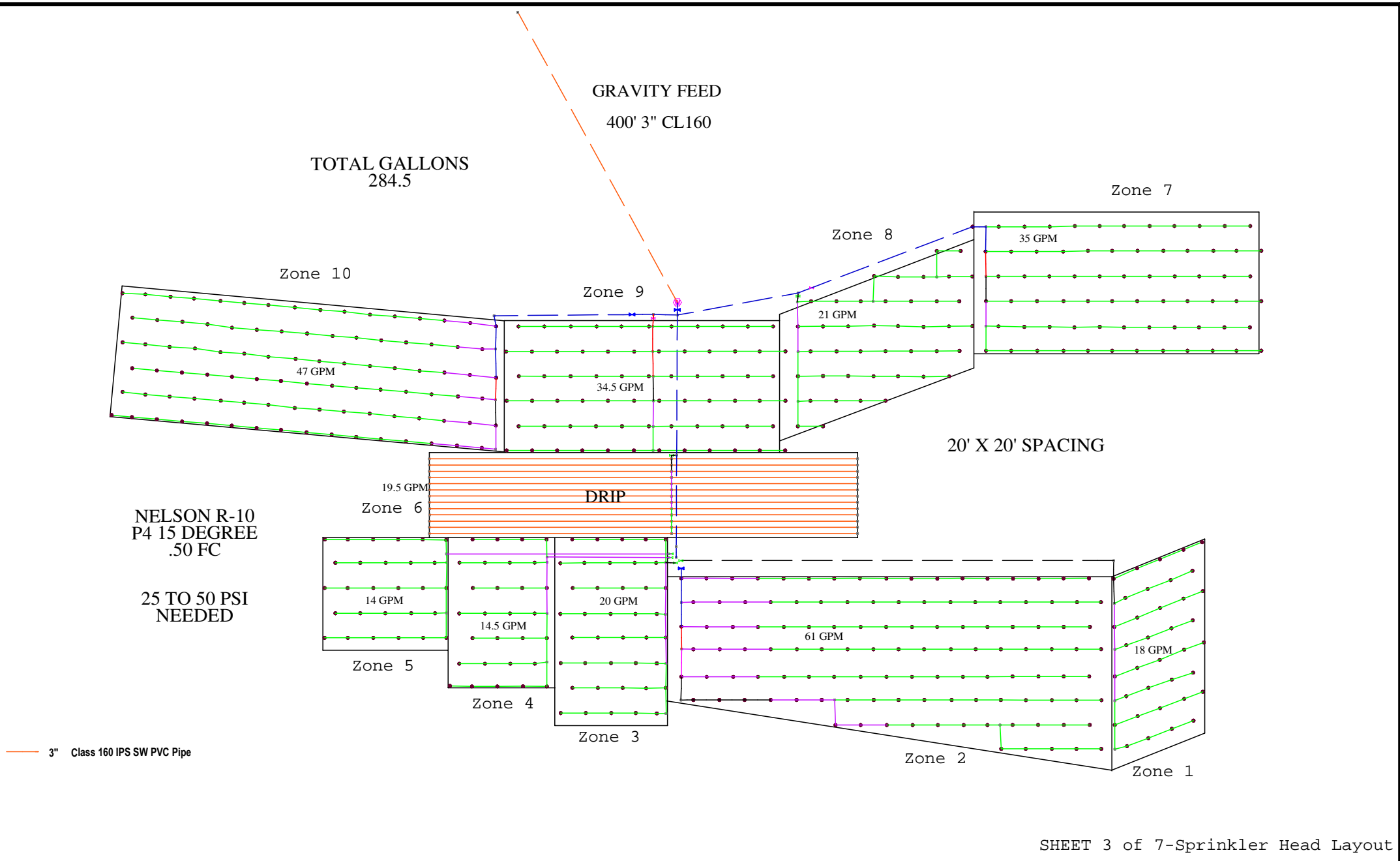
IN: SABEV DATA CENTER

404 GRANT ROAD
EAST WENATCHEE, WA

COUNTY OF: DOUGLAS

STATE: WA
APPLICATION BY:

SHEET NO. 2 OF 7 DATE: 4/24/19



<p>1-1/2" CLASS 200 PVC</p> <p>1/2" Hardie Round Hose (16mm)</p> <p>3/4" 200 PVC</p> <p>1" Class 200 Purple</p> <p>1 1/4" Class 160 IPS SW PVC Pipe</p> <p>1 1/2" Class 160 IPS SW PVC Pipe</p> <p>2" Class 160 IPS SW PVC Pipe</p>	<p>1" Electric Control Valve</p> <p>1 1/2" Electric Control Valve</p> <p>2" 700</p> <p>MP1000 90-210 MP1000210</p> <p>Water Supply</p> <p>NELSON R-10 P4 15 .50FC</p>	S & W IRRIGATION SUPPLY		Designer: Tom Toler
		SABEY DATA CENTER		Date: 3/14/2019
				Scale: 1" = 100'
		670-4782		File: SABEY DATA CENTER

SPRINKLER-9.43 ACRES

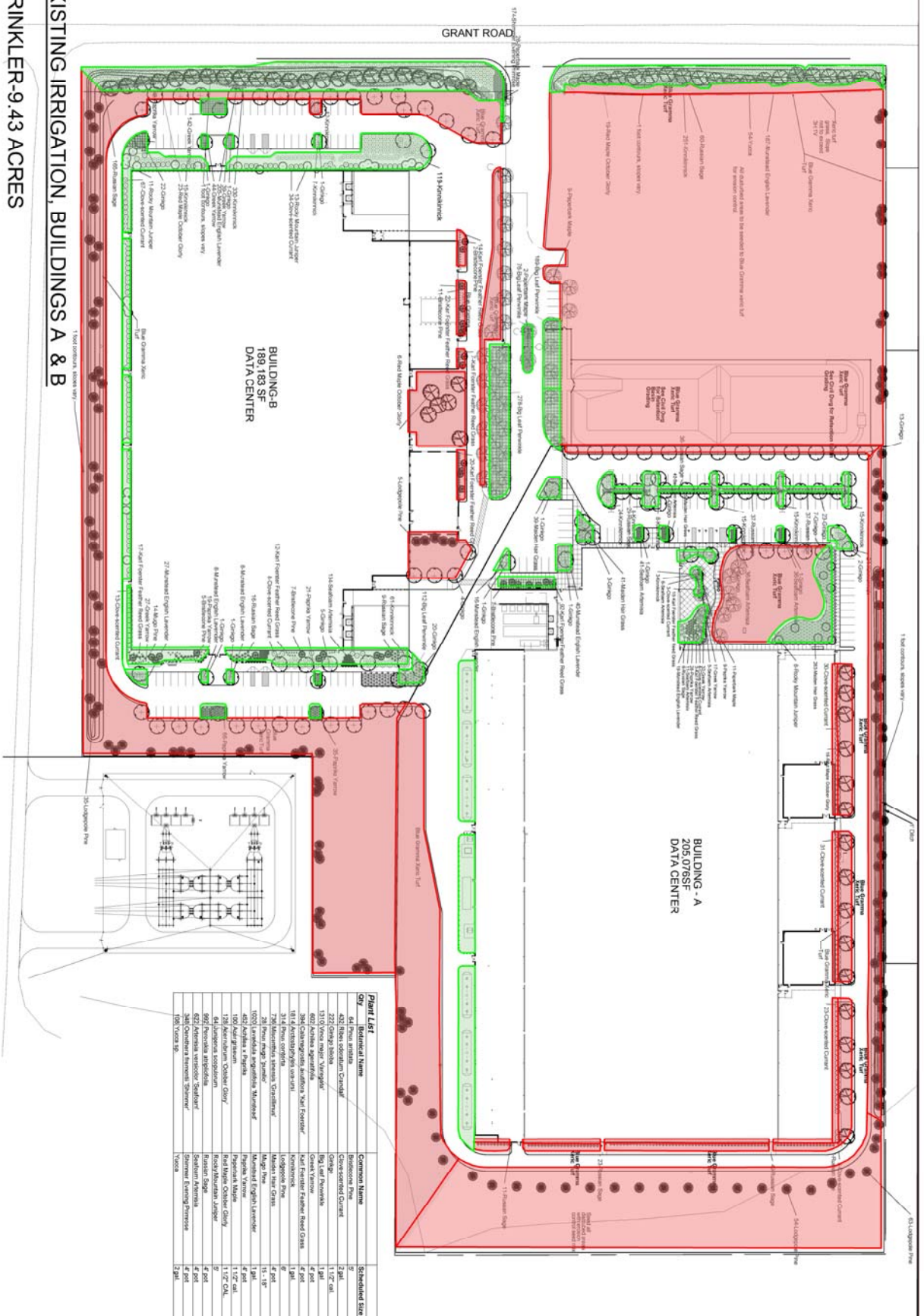


LANDSCAPE PLAN

 **Grete Associates**^{LLC}
ENVIRONMENTAL CONSULTANTS

IN: SABEY DATA CENTER
404 GRANT ROAD
EAST WENATCHEE, WA
COUNTY OF: DOUGLAS
STATE: WA
APPLICATION BY:

SHEET NO. 4 OF 7 DATE: 4/24/19



Plant List	Botanical Name	Common Name	Standard Size
Q1	64 <i>Bursera arborea</i>	Bursero Pine	5'
Q2	425 <i>Ipomoea grandiflora</i>	Creeper/Creeping Oxheart	2' tall
Q3	222 <i>Grasshopper Mimulus</i>	Grasshopper	1 1/2' tall
Q4	132 <i>Ipomoea pes-caprae</i>	Grasshopper Penstemon	1' tall
Q5	445 <i>Ipomoea aquatica</i>	Grasshopper Vine	1' tall
Q6	384 <i>Chamaecrista latifolia</i> 'Velvet Forest'	Velvet Forest	5' tall
Q7	191 <i>Antennaria plantaginifolia</i>	Kentucky	1 1/2' tall
Q8	314 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q9	214 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q10	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q11	1020 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q12	451 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q13	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q14	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q15	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q16	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q17	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q18	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q19	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q20	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q21	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q22	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q23	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q24	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q25	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q26	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q27	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q28	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q29	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q30	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q31	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q32	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q33	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q34	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q35	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q36	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q37	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q38	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q39	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q40	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q41	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q42	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q43	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q44	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q45	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q46	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q47	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q48	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q49	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q50	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q51	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q52	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q53	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q54	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q55	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q56	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q57	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q58	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q59	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q60	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q61	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q62	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q63	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q64	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q65	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q66	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q67	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q68	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q69	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q70	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q71	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q72	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q73	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q74	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q75	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q76	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q77	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q78	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q79	100 <i>Ipomoea pes-caprae</i>	Grasshopper Pine	5'
Q80	1		

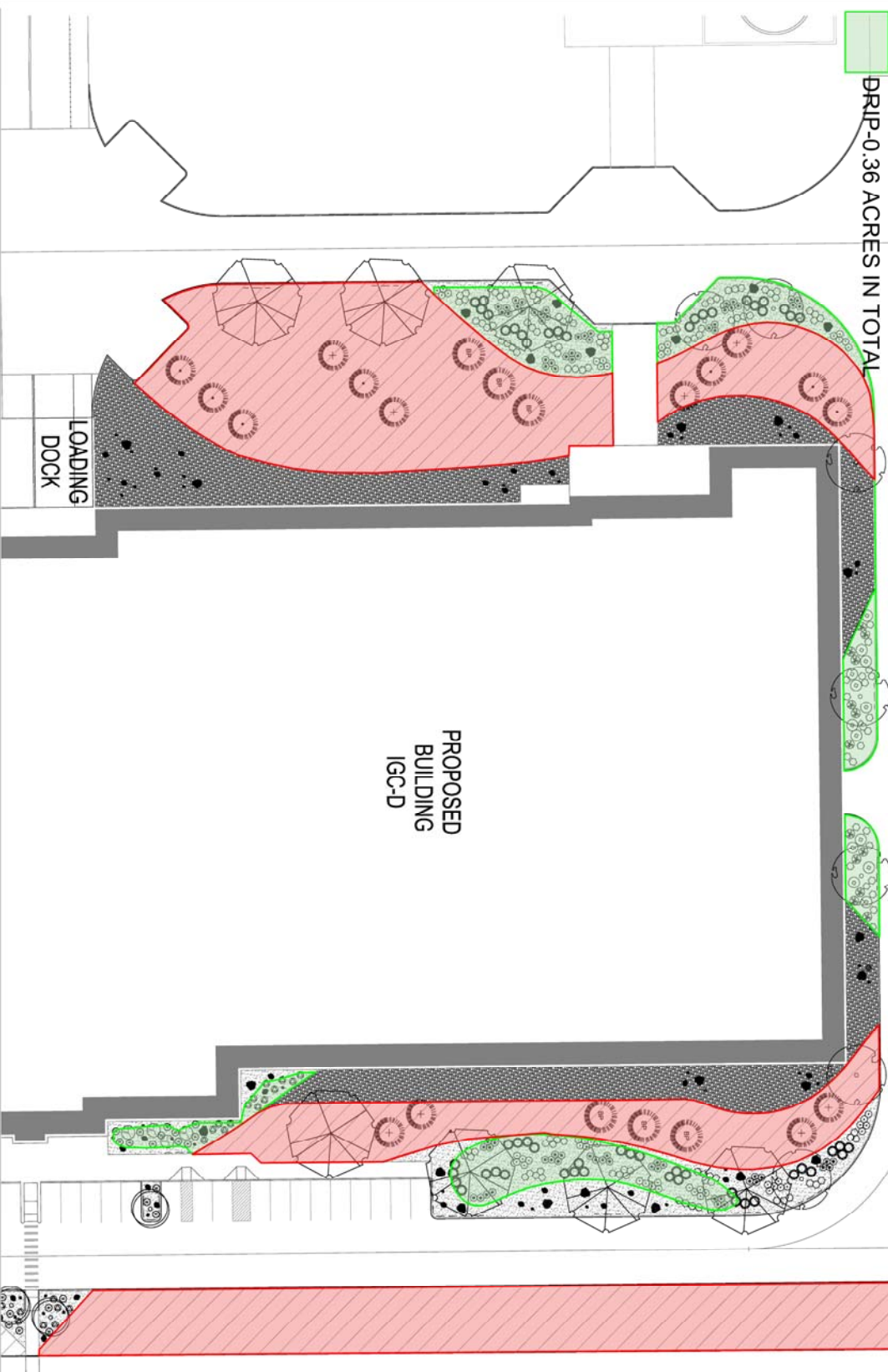
SABEY EXISTING/IRRIGATION, BUILDING D

A PORTION OF THE SW 1/4 OF SECTION 10, TWP 27 N., RGE 23 E., WM, EAST WENATCHEE, WASHINGTON

SPRINKLER-1.42 ACRES IN TOTAL

SERVICE ACCESS & FIRE LANE

DRIP-0.36 ACRES IN TOTAL



MATCHLINE - SEE SHEET L1.03

PURPOSE: INSTALLATION OF NON-CONTACT COOLING WATER

ADJACENT PROPERTY OWNERS:

① INTERGATE COLUMBIA III LLC

12201 TUKWILA INTERNATIONAL BLVD, 4TH FLOOR
SEATTLE, WA 98168

② LEGACY LLC

305 OLDS STATION RD
WENATCHEE, WA 98801-0000

IRRIGATION BLDG D-1



LAT. 47.4072 N / LONG. -120.1870 W



SCALE: 1" = 20'

LEGEND:

- WASHED ROCK MULCH TO 4" DEPTH
 - 6" TOPSOIL, TILLED INTO EXISTING SOIL
 - WED BARRIER
 - STEEL BOD CORBEL TO 12" DEPTH
 - WED BARRIER
 - BARK MULCH TO 3" DEPTH
 - 6" TOPSOIL, TILLED INTO EXISTING SOIL
 - SPORTS TURF
 - 4" TOPSOIL, SCAPER/ SUBGRADE TO 4" DEPTH
 - THREE MAIN BOULDER
 - ONE MAIN BOULDER
 - ROOT BARRIER
 - LANDSCAPE EROSION (WASHED ROCK MULCH AND STEEL BOD CORBEL AREAS ONLY)
- GENERAL NOTES:
- SEE LANDSCAPE SCHEDULE AND NOTES, SHEET L1.03
 - SEE PLANTING DETAILS, SHEET L1.03
 - SEE IRRIGATION PLANS, SHEETS L1.06 - L1.09

IN: SABEY DATA CENTER
404 GRANT ROAD
EAST WENATCHEE, WA
COUNTY OF: DOUGLAS
STATE: WA
APPLICATION BY:

SHEET NO. 5 OF 7 DATE: 4/24/19

SABEY EXISTING IRRIGATION, BUILDING D

A PORTION OF THE SW 1/4 OF SECTION 10, TWP 27 N, RGE 23 E, WM, EAST WENATCHEE, WASHINGTON
MATCHLINE - SEE SHEET L1.02

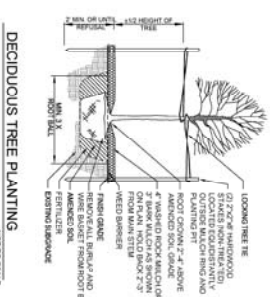
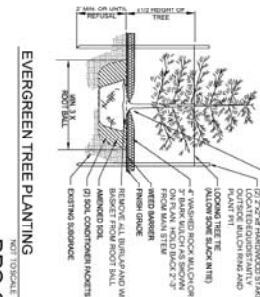
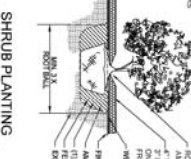
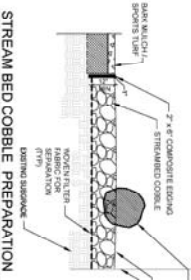
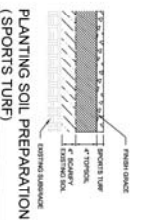
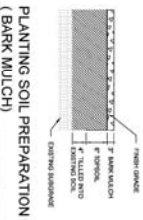
- SPRINKLER-1.42 ACRES IN TOTAL
- DRIP-0.36 ACRES IN TOTAL

LOADING DOCK

PROPOSED BUILDING IGC-D

SERVICE ACCESS & FIRE LANE

MATCHLINE - SEE SHEET L1.04



- LEGEND:**
- WASHED ROCK MULCH TO 4" DEPTH
 - TOPSOIL, TILED INTO EXISTING SOIL
 - WATER DRAINAGE
 - STREAM BED COBBLE TO 12" DEPTH
 - LANDSCAPE ECOLOGICAL MULCH TO 4" DEPTH
 - TOPSOIL, TILED INTO EXISTING SOIL
 - SPORTS TURF
 - TOPSOIL, SCARIFY SUBGRADE TO 4" DEPTH
 - THREE INCH BOULDER
 - ONE INCH BOULDER
 - LANDSCAPE ECOLOGICAL MULCH TO 4" DEPTH
 - MULCH AND STREAM BED COBBLE
 - WATER DRAINAGE
- GENERAL NOTES:**
- SEE LANDSCAPE SCHEDULE AND NOTES SHEET L1.05
 - SEE PLANTING DETAILS, SHEET L1.03
 - SEE IRRIGATION PLANS, SHEETS L1.06 - L1.08



PURPOSE: INSTALLATION OF NON-CONTACT COOLING WATER SPRAY FIELD

ADJACENT PROPERTY OWNERS:

- INTERGATE COLUMBIA III LLC
12201 TUKWILA INTERNATIONAL BLVD, 4TH FLOOR
SEATTLE, WA 98168
- LEGACY LLC
305 OLDS STATION RD
WENATCHEE, WA 98801-0000

IRRIGATION BLDG D-2



LAT. 47.4072 N / LONG. -120.1870 W

IN: SABEY DATA CENTER
404 GRANT ROAD
EAST WENATCHEE, WA
COUNTY OF: DOUGLAS
STATE: WA
APPLICATION BY:

SHEET NO. 6 OF 7 DATE: 4/24/19

BPC-2018-021

A PORTION OF THE SW 1/4 OF SECTION 10, TWP 27 N, RGE 23 E, WM, EAST WENATCHEE, WASHINGTON

MATCHLINE - SEE SHEET L1.03

SERVICE ACCESS & FIRE LANE

BERM MATCHLINE - A-1 (SEE A-2)

SABEY EXISTING IRRIGATION, BUILDING D

SPRINKLER-1.42 ACRES IN TOTAL

DRIP-0.36 ACRES IN TOTAL

GENERAL NOTES:

1. SEE LANDSCAPE SCHEDULE AND NOTES, SHEET L1.05
2. SEE PLANTING DETAILS, SHEET L1.03
3. SEE IRRIGATION PLANS, SHEETS L1.06 - L1.09

LEGEND:

- WASHER ROCK MULCH TO 4" DEPTH
- WEED BARRIER
- KINNIKINNICK GROUNDCOVER
- 6" TOPSOIL, TILED INTO 4" EXISTING SOIL
- SEE PLANT SCHEDULE, SHEET L1.06
- SPORTS TURF
- 4" TOPSOIL, SODDERY SURGRADE TO 4" DEPTH



SCALE: 1" = 20'

END OF BERM

BERM MATCHLINE - A-2 (SEE A-1)

PURPOSE: INSTALLATION OF NON-CONTACT COOLING WATER

ADJACENT PROPERTY OWNERS:

1. INTERGATE COLUMBIA III LLC

12201 TUKWILA INTERNATIONAL BLVD, 4TH FLOOR
SEATTLE, WA 98168

2. LEGACY LLC

305 OLDS STATION RD
WENATCHEE, WA 98801-0000

IRRIGATION BLDG D-3



LAT. 47.4072 N / LONG. -120.1870 W

IN: SABEY DATA CENTER

404 GRANT ROAD
EAST WENATCHEE, WA

COUNTY OF: DOUGLAS

STATE: WA

APPLICATION BY:

SHEET NO. 7 OF 7 DATE: 4/24/19

Table 1. Pogue Loam Profile Characteristics

Source Data: NRCS Web Soil Survey

Avg AWC	Drainage	Permeability
.15 in./in.	Somewhat Excessively Drained	moderately rapid permeability
.13 in./in.	Somewhat Excessively Drained	moderately rapid permeability
.03 in./in.	Somewhat Excessively Drained	very rapid permeability

Source Data: NRCS Web Soil Survey Douglas County Washington; USDA NRCS National Engineering Handbook, Irrigation Guide 1997

H1 Column inches	Total AWC (in.)@ H1 Root Depth	H2 Avg AWC	H2 Column inches	Total AWC (in.)@ H2 Root Depth	H3 Avg AWC	H3 Column inches	Total AWC (in.)@ H3 Root Depth	Sum AWC (in.) @ Root Depth	MAD	Net Irrigation
12	1.68	.13 in./in.	0	0	.03 in./in.	0	0	1.68	0.4	.672 inches
18	2.7	.13 in./in.	6	0.78	.03 in./in.	0	0	3.48	0.4	1.392 inches
18	2.7	.13 in./in.	7	0.91	.03 in./in.	11	0.33	3.94	0.4	1.576 inches
18	2.7	.13 in./in.	7	0.91	.03 in./in.	11	0.33	3.94	0.5	1.97 inches
18	2.7	.13 in./in.	7	0.91	.03 in./in.	34	1.02	4.63	0.5	2.315 inches

Table 2a. April Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 April

* ET for Lawn and Apple in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.0976	6.885245902	0.097	0.679
Turf	24 in.	1.392	0.0976	14.26229508	0.097	0.679
Turf	36 in.	1.576	0.0976	16.14754098	0.097	0.679
Nursery Stock	36 in.	1.97	0.0356	55.33707865	0.0356	0.249
Trees	60 in.	2.315	0.0356	65.02808989	0.0356	0.249

2017 April

* ET for Lawn and Apple in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.0976	6.885245902	0.0976	0.6832
Turf	24 in.	1.392	0.0976	14.26229508	0.0976	0.6832
Turf	36 in.	1.576	0.0976	16.14754098	0.0976	0.6832
Nursery Stock	36 in.	1.97	0.0553	35.6238698	0.0553	0.3871
Trees	60 in.	2.315	0.0553	41.86256781	0.0553	0.3871

2018 April ET(r)

*ET(r) in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.122	18.97540984	0.122	0.854

2017 April ET(r)

*ET(r) in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.121	19.1322314	0.121	0.847

April-Early May Penman ET(r)

*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport

Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.672	0.17	3.952941176	0.17	1.19
Turf (light breeze)	12 in.	0.672	0.26	2.584615385	0.26	1.82

April Pan ET(r)

*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Recommened irrigation rate (in./wk)
Turf	12 in.	0.672	0.0266	25.26315789	0.0266	0.1862	0
Turf	24 in.	1.392	0.0266	52.33082707	0.0266	0.1862	0
Turf	36 in.	1.576	0.0266	59.2481203	0.0266	0.1862	0
Nursery Stock	36 in.	1.97	0.0106	185.8490566	0.0106	0.0742	0
Trees	60 in.	2.315	0.0106	218.3962264	0.0106	0.0742	0

Table 2b. May Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 May

* ET for Lawn and Apple in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.1719	3.909249564	0.1719	1.2033
Turf	24 in.	1.392	0.1719	8.097731239	0.1719	1.2033
Turf	36 in.	1.576	0.1719	9.168121001	0.1719	1.2033
Nursery Stock	36 in.	1.97	0.1796	10.9688196	0.1796	1.2572
Trees	60 in.	2.315	0.1796	12.88975501	0.1796	1.2572

2017 May

* ET for Lawn and Apple in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.1467	4.580777096	0.1467	1.0269
Turf	24 in.	1.392	0.1467	9.488752556	0.1467	1.0269
Turf	36 in.	1.576	0.1467	10.74301295	0.1467	1.0269
Nursery Stock	36 in.	1.97	0.1645	11.97568389	0.1645	1.1515
Trees	60 in.	2.315	0.1645	14.07294833	0.1645	1.1515

2018 May ET(r)

*ET(r) in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.2154	10.74744661	0.2154	1.5078

2017 May ET(r)

*ET(r) in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.1835	12.61580381	0.1835	1.2845

Late May-July Penman ET(r)

*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport

Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.672	0.21	3.2	0.21	1.47
Turf (light breeze)	12 in.	0.672	0.26	2.584615385	0.26	1.82

May Pan ET(r)

*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Recommended irrigation rate (in./wk)
Turf	12 in.	0.672	0.0258	26.04651163	0.0258	0.1806	0.9122
Turf	24 in.	1.392	0.0258	53.95348837	0.0258	0.1806	0.9122
Turf	36 in.	1.576	0.0258	61.08527132	0.0258	0.1806	0.9122
Nursery Stock	36 in.	1.97	0.0154	127.9220779	0.0154	0.1078	0.5103
Trees	60 in.	2.315	0.0154	150.3246753	0.0154	0.1078	0.5103

Table 2c. June Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 June		* ET for Lawn and Apple in Manson 2018 used				
Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.185	3.632432432	0.185	1.295
Turf	24 in.	1.392	0.185	7.524324324	0.185	1.295
Turf	36 in.	1.576	0.185	8.518918919	0.185	1.295
Nursery Stock	36 in.	1.97	0.222	8.873873874	0.222	1.554
Trees	60 in.	2.315	0.222	10.42792793	0.222	1.554

2017 June		* ET for Lawn and Apple in Manson 2017 used				
Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.1833	3.666121113	0.1833	1.2831
Turf	24 in.	1.392	0.1833	7.59410802	0.1833	1.2831
Turf	36 in.	1.576	0.1833	8.597926896	0.1833	1.2831
Nursery Stock	36 in.	1.97	0.2196	8.970856102	0.2196	1.5372
Trees	60 in.	2.315	0.2196	10.54189435	0.2196	1.5372

2018 June ET(r)		*ET(r) in Manson 2018 used				
Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.2313	10.00864678	0.2313	1.6191

2017 June ET(r)		*ET(r) in Manson 2017 used				
Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.2286	10.12685914	0.2286	1.6002

Late May-July Penman ET(r)		*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport				
Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.672	0.22	3.054545455	0.22	1.54
Turf (light breeze)	12 in.	0.672	0.28	2.4	0.28	1.96

June Pan ET(r)		*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used					
Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Recommened irrigation rate (in./wk)
Turf	12 in.	0.672	0.0266	25.26315789	0.0266	0.1862	1.654
Turf	24 in.	1.392	0.0266	52.33082707	0.0266	0.1862	1.654
Turf	36 in.	1.576	0.0266	59.2481203	0.0266	0.1862	1.654
Nursery Stock	36 in.	1.97	0.0226	87.16814159	0.0226	0.1582	1.39
Trees	60 in.	2.315	0.0226	102.4336283	0.0226	0.1582	1.39

Table 2d. July Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 July

* ET for Lawn and Apple in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.2051	3.276450512	0.2051	1.4357
Turf	24 in.	1.392	0.2051	6.786933203	0.2051	1.4357
Turf	36 in.	1.576	0.2051	7.684056558	0.2051	1.4357
Nursery Stock	36 in.	1.97	0.2564	7.683307332	0.2564	1.7948
Trees	60 in.	2.315	0.2564	9.028861154	0.2564	1.7948

2017 July

* ET for Lawn and Apple in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.2325	2.890322581	0.2325	1.6275
Turf	24 in.	1.392	0.2325	5.987096774	0.2325	1.6275
Turf	36 in.	1.576	0.2325	6.778494624	0.2325	1.6275
Nursery Stock	36 in.	1.97	0.289	6.816608997	0.289	2.023
Trees	60 in.	2.315	0.289	8.010380623	0.289	2.023

2018 July ET(r)

*ET(r) in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.2567	9.01830931	0.2567	1.7969

2017 July ET(r)

*ET(r) in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.2896	7.99378453	0.2896	2.0272

Late May-July Penman ET(r)

*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport

Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.672	0.24	2.8	0.24	1.68
Turf (light breeze)	12 in.	0.672	0.31	2.167741935	0.31	2.17

July Pan ET(r)

*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Reccomended irrigation rate (in./wk)
Turf	12 in.	0.672	0.0258	26.04651163	0.0258	0.1806	1.899
Turf	24 in.	1.392	0.0258	53.95348837	0.0258	0.1806	1.899
Turf	36 in.	1.576	0.0258	61.08527132	0.0258	0.1806	1.899
Nursery Stock	36 in.	1.97	0.0258	76.35658915	0.0258	0.1806	1.899
Trees	60 in.	2.315	0.0258	89.72868217	0.0258	0.1806	1.899

Table 2e. August Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 August

* ET for Lawn and Apple in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.15	4.48	0.15	1.05
Turf	24 in.	1.392	0.15	9.28	0.15	1.05
Turf	36 in.	1.576	0.15	10.50666667	0.15	1.05
Nursery Stock	36 in.	1.97	0.1829	10.77091307	0.1829	1.2803
Trees	60 in.	2.315	0.1829	12.65718972	0.1829	1.2803

2017 August

* ET for Lawn and Apple in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.1654	4.062877872	0.1654	1.1578
Turf	24 in.	1.392	0.1654	8.415961306	0.1654	1.1578
Turf	36 in.	1.576	0.1654	9.528415961	0.1654	1.1578
Nursery Stock	36 in.	1.97	0.2022	9.742828882	0.2022	1.4154
Trees	60 in.	2.315	0.2022	11.44906034	0.2022	1.4154

2018 August ET(r)

*ET(r) in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.1874	12.35325507	0.1874	1.3118

2017 August ET(r)

*ET(r) in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.2077	11.14588349	0.2077	1.4539

August Penman ET(r)

*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport

Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.672	0.24	2.8	0.24	1.68
Turf (light breeze)	12 in.	0.672	0.31	2.167741935	0.31	2.17

August Pan ET(r)

*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Reccomended irrigation rate (in./wk)
Turf	12 in.	0.672	0.0258	26.04651163	0.0258	0.1806	1.334
Turf	24 in.	1.392	0.0258	53.95348837	0.0258	0.1806	1.334
Turf	36 in.	1.576	0.0258	61.08527132	0.0258	0.1806	1.334
Nursery Stock	36 in.	1.97	0.0258	76.35658915	0.0258	0.1806	1.334
Trees	60 in.	2.315	0.0258	89.72868217	0.0258	0.1806	1.334

Table 2f. September Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 September

* ET for Lawn and Apple in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.107	6.280373832	0.107	0.749
Turf	24 in.	1.392	0.107	13.00934579	0.107	0.749
Turf	36 in.	1.576	0.107	14.72897196	0.107	0.749
Nursery Stock	36 in.	1.97	0.0843	23.36892052	0.0843	0.5901
Trees	60 in.	2.315	0.0843	27.46144721	0.0843	0.5901

2017 September

* ET for Lawn and Apple in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.0953	7.051416579	0.0953	0.6671
Turf	24 in.	1.392	0.0953	14.60650577	0.0953	0.6671
Turf	36 in.	1.576	0.0953	16.53725079	0.0953	0.6671
Nursery Stock	36 in.	1.97	0.075	26.26666667	0.075	0.525
Trees	60 in.	2.315	0.075	30.86666667	0.075	0.525

2018 September ET(r)

*ET(r) in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.1336	17.32784431	0.1336	0.9352

2017 September ET(r)

*ET(r) in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.1196	19.35618729	0.1196	0.8372

September Penman ET(r)

*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport

Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.672	0.21	3.2	0.21	1.47
Turf (light breeze)	12 in.	0.672	0.27	2.488888889	0.27	1.89

September Pan ET(r)

*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Recommened irrigation rate (in/wk)
Turf	12 in.	0.672	0.0266	25.26315789	0.0266	0.1862	0.9613
Turf	24 in.	1.392	0.0266	52.33082707	0.0266	0.1862	0.9613
Turf	36 in.	1.576	0.0266	59.2481203	0.0266	0.1862	0.9613
Nursery Stock	36 in.	1.97	0.0253	77.86561265	0.0253	0.1771	0.9123
Trees	60 in.	2.315	0.0253	91.50197628	0.0253	0.1771	0.9123

Table 2g. October Net Irrigation and ET Data by Crop

Source Data: USDA NRCS National Engineering Handbook, Irrigation Guide 1997; Irrigation Guide 1997 Appendix A; www.usbr.gov, Manson 2017 and 2018; WSU-TFREC Orchard Calculator

2018 October

* ET for Lawn and Apple in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf	12 in.	0.672	0.0129	52.09302326	0.0129	0.0903
Turf	24 in.	1.392	0.0129	107.9069767	0.0129	0.0903
Turf	36 in.	1.576	0.0129	122.1705426	0.0129	0.0903
Nursery Stock	36 in.	1.97	0 n/a		0	0
Trees	60 in.	2.315	0 n/a		0	0

2017 October

* ET for Lawn and Apple in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Approx. Crop ET per day (in.) Manson	Irrigation Frequency in Days (Net/Crop ET)	inches/day	inches/wk
Turf and Pasture	12 in.	0.672	0.0688	9.76744186	0.0688	0.4816
Turf and Pasture	24 in.	1.392	0.0688	20.23255814	0.0688	0.4816
Turf and Pasture	36 in.	1.576	0.0688	22.90697674	0.0688	0.4816
Nursery Stock	36 in.	1.97	0 n/a		0	0
Trees	60 in.	2.315	0 n/a		0	0

2018 October ET(r)

*ET(r) in Manson 2018 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.0509	45.48133595	0.0509	0.3563

2017 October ET(r)

*ET(r) in Manson 2017 used

Crop	Avg Root Depth	Net Irrigation (in.)	Average ET(r) per day (in.) Manson	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Alfalfa	60 in.	2.315	0.0866	26.73210162	0.0866	0.6062

October Penman ET(r)

*WSU-TFREC Orchard Calculator used; Penman environmental data derived from Pangborn Memorial Airport

Crop	Avg Root Depth	Net Irrigation (in.)	Average Penman ET per day (in.) Wenatchee	Irrigation Frequency in Days (Net/ET(r))	inches/day	inches/wk
Turf (calm)	12 in.	0.6721	0.17	3.953529412	0.17	1.19
Turf (light breeze)	12 in.	0.672	0.22	3.054545455	0.22	1.54

October Pan ET(r)

*Avg. Pan Factor and Irrigation Requirements for Turf and Apple W/O Cover in Wenatchee 1985, Appendix A used

Crop	Avg Root Depth	Net Irrigation (in.)	Average Pan data per day (in.) Wenatchee	Irrigation Frequency in Days (Net/Pan)	inches/day	inches/wk	Recommened irrigation rate (in./wk)
Turf and Pasture	12 in.	0.672	0.0258	26.04651163	0.0258	0.1806	0.1151
Turf and Pasture	24 in.	1.392	0.0258	53.95348837	0.0258	0.1806	0.1151
Turf and Pasture	36 in.	1.576	0.0258	61.08527132	0.0258	0.1806	0.1151
Nursery Stock	36 in.	1.97	0.018	109.4444444	0.018	0.126	0.0677
Trees	60 in.	2.315	0.018	128.6111111	0.018	0.126	0.0677

Table 3. Weekly Water Budget by Month

Manson ET data				*Based off of Solid-Set Under Tree Sprinkler System, DOE GUID-1210 Water Resources Program Guidance 10/11/05					** Pangborn WETS Data 2018		*** (Td Precip.-19685)x.75=Eff. Precip.		**** Pangborn Env. Data	
April	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.5		
Turf	0.7	0.1862	0.8862	0.1	0.01	0.04	0.1329	1.0191	0.1306	0	1			
Nursery/Trees	0.3	0.0742	0.3742	0.1	0.01	0.04	0.05613	0.43033	0.1306	0	0.4			
May	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.7		
Turf	1.1	0.1806	1.2806	0.1	0.01	0.04	0.19209	1.47269	0.1693	0	1.5			
Nursery/Trees	1.2	0.1078	1.3078	0.1	0.01	0.04	0.19617	1.50397	0.1693	0	1.5			
June	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.8		
Turf	1.3	0.1862	1.4862	0.1	0.01	0.04	0.22293	1.70913	0.0793	0	1.7			
Nursery/Trees	1.6	0.1582	1.7582	0.1	0.01	0.04	0.26373	2.02193	0.0793	0	2			
July	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.9		
Turf	1.5	0.1806	1.6806	0.1	0.01	0.04	0.25209	1.93269	0.0316	0	1.9			
Nursery/Trees	1.9	0.1806	2.0806	0.1	0.01	0.04	0.31209	2.39269	0.0316	0	2.4			
August	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.9		
Turf	1.1	0.1806	1.2806	0.1	0.01	0.04	0.19209	1.47269	0.0474	0	1.5			
Nursery/Trees	1.4	0.1806	1.5806	0.1	0.01	0.04	0.23709	1.81769	0.0474	0	1.8			
September	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.7		
Turf	0.7	0.1862	0.8862	0.1	0.01	0.04	0.13293	1.01913	0.042	0	1			
Nursery/Trees	0.6	0.1771	0.7771	0.1	0.01	0.04	0.116565	0.893665	0.042	0	0.9			
October	ET per Week			Irrigation Inefficiencies					Water Gains		Water Budget (in./wk)	****Avg. Penman Value (in./ wk)		
Crop	Avg. Crop ET(r), rounded	Pan ET	Total ET	%Evaporation	Leaks	Canopy Loss (Avg)	Total Irrigation Loss: Total ET x(%E+Leaks+Canopy Loss)	Sum in inches: (ET + Irrigation Loss)	**Avg, Precip. (in./wk)	***Effective Precip	(Sum-Effective Precip.)	1.4		
Turf	0.29	0.1806	0.4706	0.1	0.01	0.04	0.07059	0.54119	0.1332	0	0.5			
Nursery/Trees	0	0.126	0.126	0.1	0.01	0.04	0.0189	0.1449	0.1332	0	0.2			

Table 4. Spray Field Capacity Data

DOE Permitted Non-Contact Cooling Water Volume (gal./day)			
Maximum	75% Maximum	50% Maximum	25% Maximum
30,000	22500	15000	7500

Estimated Avg. Volume Non-Contact Water Generated per Day (gal.)								
Month	2017	2018	2017, 2018 Avg.	25% Increase Above Avg.	50% Increase Above Avg.	75% Increase Above Avg.	100% Increase Above Avg.	Maximum Permitted
April	13,673.98	16,643.33	15,158.66	18,948.32	22,737.98	26,527.66	30,317.32	30,000.00
May	10,683.33	15,123.33	12,903.33	16,129.46	19,355.69	22,581.83	25,808.66	30,000.00
June	22,672.63	16,870.00	19,671.32	24,589.15	29,506.98	34,424.81	39,342.64	30,000.00
July	22,396.23	17,193.33	19,794.78	24,743.48	29,692.17	34,640.87	39,589.56	30,000.00
August	21,194.55	17,236.67	19,215.61	24,019.51	28,823.42	33,627.32	38,431.22	30,000.00
Sept	17,950.51	11,343.33	14,646.92	18,308.65	21,970.38	25,632.11	29,293.84	30,000.00
Oct	18,163.56	"Missing"	18,163.56	22,704.45	27,245.45	31,786.23	36,327.12	30,000.00

Volumes	April Avg. (gal.)	May Avg. (gal.)	June Avg. (gal.)	July Avg. (gal.)	Aug. Avg. (gal.)	Sept. Avg. (gal.)	Oct. Avg. (gal.)	Maximum (gal.)	75% Max. (gal.)	50% Max. (gal.)	25% Max. (gal.)
Day	15,158.66	12,903.33	19,671.32	19,794.78	19,215.61	14,646.92	18,163.56	22,500.00	17,000.00	10,000.00	7,500.00
Week	106,110.62	90,323.31	137,699.24	138,563.46	134,509.27	102,528.44	127,144.92	210,000.00	157,500.00	105,000.00	75,000.00
Month; Adjusted	454,759.80	400,003.23	590,139.60	613,638.18	595,683.91	439,407.60	563,076.36	930,000.00	697,500.00	465,000.00	325,000.00
30 Days	454,759.80	387,099.90	590,139.60	593,843.40	576,681.30	439,407.60	543,906.80	900,000.00	675,000.00	450,000.00	232,500.00

Estimated Spray Field Capacity

Neutral Water Budget (Recommended Rates by Crop)																							
		*1 inch water/acre (gal.):				2 inches water/acre (gal.):				5,308.58													
Turf (High Water)						Landscape/Nursery (High Water)						Landscape/Nursery (Moderate-Low Water)						Xeric Landscape (Low Water)					
	acres	"in. water/acre/wk	gal/wk	gal/month (30 days)	acres	"in. water/acre/wk	gal/wk	gal/month (30 days)	acres	"in. water/acre/wk	gal/wk	gal/month (30 days)	acres	"in. water/acre/wk	gal/wk	gal/month (30 days)	Total gal/month (30 days)	% Current Avg. (30 days)	% Max Permitted (30 days)	Diff. Avg.	Diff. Max		
April	1.75	1.5	47,520.01	203,657.19	2	1.5	21,723.43	93,100.42	0.25	0.5	2,715.43	11,637.55	0.5	0.25	3,394.21	14,546.94	322,943.17		71	36	(131,817.70)	(577,057.90)	
May	1.75	1.5	47,520.01	203,657.19	2	1.5	21,723.43	93,100.42	0.25	0.5	2,715.43	11,637.55	0.5	0.25	3,394.21	14,546.94	322,943.17		71	36	(131,817.70)	(577,057.90)	
June	1.75	1.7	54,885.76	239,126.59	2	1.5	21,723.43	93,100.42	0.25	0.5	2,715.43	11,637.55	0.5	0.25	3,394.21	14,546.94	322,943.17		71	36	(131,817.70)	(577,057.90)	
July	1.75	1.7	54,885.76	239,126.59	2	1.5	21,723.43	93,100.42	0.25	0.5	2,715.43	11,637.55	0.5	0.25	3,394.21	14,546.94	322,943.17		71	36	(131,817.70)	(577,057.90)	
August	1.75	1.9	62,880.01	264,217.20	2	1.5	21,723.43	93,100.42	0.25	0.5	2,715.43	11,637.55	0.5	0.25	3,394.21	14,546.94	322,943.17		71	36	(131,817.70)	(577,057.90)	
September	1.75	1.5	47,520.01	203,657.19	2	0.9	10,861.72	46,550.21	0.25	0.2	1,357.71	5,618.49	0.5	0	0	0	154,197.58		17	17	(390,709.22)	(745,802.42)	
October	1.75	0.5	23,760.00	101,828.58	2	0.9	10,861.72	46,550.21	0.25	0.2	1,357.71	5,618.49	0.5	0	0	0	154,197.58		17	17	(390,709.22)	(745,802.42)	

Positive Water Budget (Default to Highest Demand)										*1 inch water/acre (gal.)		2 inches water/acre (gal.)		54,308.58											
Turf (High Water)					Landscape/Nursery (High Water)					Landscape/Nursery (Moderate-Low Water)					Xeric Landscape (Low Water)										
Month	acres	"in. water/acre/wk	gal/wk	gal/month (30 days)	acres	"in. water/acre/wk	gal/wk	gal/month	acres	"in. water/acre/wk	gal/wk	gal/month	acres	"in. water/acre/wk	gal/wk	gal/month	Total gal/month	% Current Avg. (30 days)	% Max Permitted (30 days)	Diff. Avg.	Diff. Max				
April	1.75	1	71,200.00	213,600.18	1.5	2	54,308.58	232,751.06	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	608,253.17	100	75	23,289.26	(419,950.94)				
May	1.75	1	75,200.00	225,600.18	1.5	2	54,308.58	232,751.06	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	608,253.17	100	75	23,289.26	(419,950.94)				
June	1.75	2	140,800.00	422,400.36	1.5	2	54,308.58	232,751.06	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	608,253.17	100	75	23,289.26	(419,950.94)				
July	1.75	2	140,800.00	422,400.36	1.5	2	54,308.58	232,751.06	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	608,253.17	100	75	23,289.26	(419,950.94)				
August	1.75	2.4	114,048.02	488,772.12	1.5	2.4	130,340.59	565,602.54	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	916,020.58	102	121	497,177.18	191,020.58				
September	1.75	2	95,040.01	407,214.06	1.5	2	108,502.06	465,502.06	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	916,020.58	102	121	339,988.85	14,657.17				
October	1.75	1	47,520.01	203,657.18	1.5	1	54,308.58	232,751.06	0.25	1	6,788.57	20,953.88	0.5	1	6,788.57	20,953.88	408,049.06	109	109	50,641.46	(419,950.94)				
	1.75	0.5	23,760.00	101,828.59	1.5	0.5	27,154.29	116,375.06	0.25	0.5	1,357.71	5,187.78	0.5	0.5	1,357.71	5,187.78	238,569.84	44	27	(306,336.96)	(661,430.16)				

Negative Water Budget (Default to Lowest Demand)				*1 inch water/acre (gal.)		2 inches water/acre (gal.)		54,308.58														
Turf (High Water)				Landscape/Nursery (High Water)				Landscape/Nursery (Moderate/Low Water)				Xeric Landscape (Low Water)				Total gal/month		% Current Avg. (30 days)	% Max Permitted (30 days)	Diff. Avg.	Diff. Max	
acres	*in. water/acre (gal.)		gal/gk/wk	gal/month (30 days)	*in. water/acre/wk	gal/gk/wk	gal/month	acres	*in. water/acre/wk		gal/gk/wk	gal/month	acres	*in. water/acre/wk		gal/gk/wk	gal/month					
April	1.75	0.4	19,008.00	570,240	2	0.5	121,623.43	3,648,703	0.25	1	0.2	2,715.43	81,462.97	0.5	1	0.2	2,715.43	81,462.97	22	698,257.22	100	550,507.58
May	1.75	1.5	71,280.01	213,840.06	2	1.5	81,462.97	244,388.91	0.25	1	0.75	29,093.88	87,281.64	0.5	1	0.25	3,394.29	101,846.94	78	713,153.27	100	201,746.83
June	1.75	1.7	80,784.01	242,352.03	2	1.7	92,324.59	276,973.76	0.25	1	0.78	29,093.88	87,281.64	0.5	1	0.25	3,394.29	101,846.94	87	795,392.22	100	114,465.18
July	1.75	1.9	90,288.01	270,864.03	2	1.9	103,186.30	309,558.90	0.25	1	0.78	29,093.88	87,281.64	0.5	1	0.25	3,394.29	101,846.94	97	778,973.06	100	27,183.54
August	1.75	1.5	61,097.15	183,291.46	2	1.5	81,462.97	244,388.91	0.25	1	0.78	29,093.88	87,281.64	0.5	1	0.25	3,394.29	101,846.94	79	78,144.95	100	245,387.57
September	1.75	0.9	42,765.01	128,295.03	2	0.9	48,877.72	146,633.16	0.25	0.2	0.2	2618.94	78,568.94	0.5	0.2	0.2	6109.72	183,291.46	47	418,951.89	99	481,048.11
October	1.75	0.2	9,504.00	28,512.00	2	0.2	10,861.72	325,551.25	0.25	0.2	0.2	1,357.71	40,731.44	0.5	0	0	0	0	17	10	451,806.37	806,899.57

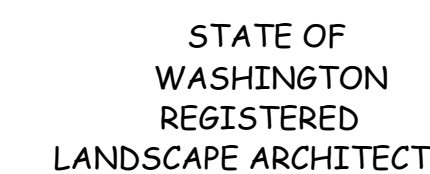
Data Source: <https://plants.usda.gov> and www.monrovia.com

Trees																							
Common	Latin	Drought Tolerance	Growth Form	Growth Rate	Height at Maturity (ft)	CA/C3 Tolerance	Frost Free Days, Min.	Moisture Use	pH Min.	pH Max.	Density per Acre Max.	Precip. Min.	Precip. Max.	Root Depth Min. (in.)	Salinity Tolerance	Shade Tolerance	Min. Temp.	Fuelwood	Lumber	Nursery Stock	Pulp	Veneer	approx. cost (ea.)
Alder	Alnus rubra	Medium	single stem	slow	88	High	30	High	5.2	7.3	1200	24	24	30	none	intolerant	-47	medium	yes	yes	yes	1.0 to 1	
Red Alder	Alnus rubra	Medium	single stem	rapid	90	low	180	High	4.3	7.3	1200	24	24	20	none	intolerant	-52	medium	yes	yes	yes	5.5 to 9	
Black Cottonwood	Populus balsamifera	Low	single stem	rapid	100	Medium	70	High	5.5	8	800	10	120	30	none	intolerant	-53	low	yes	no	yes	5.5 to 9	
Betula	Betula papyrifera	Low	single stem	slow	70	High	60	High	4.2	7.3	1200	24	24	30	none	intolerant	-43	medium	yes	yes	yes	5.5 to 9	
Red Oak	Quercus rubra	Low	single stem	moderate	81	Low	180	Medium	4.3	7.3	800	30	80	30	Medium	intermediate	-35	high	yes	no	yes	5.5 to 9	
Western Red Cedar	Thuja plicata	Low	single stem	slow	100	Medium	30	High	5.1	7.1	1200	30	120	30	none	tolerant	-63	medium	yes	yes	yes	5.5 to 9	
Ground Cover/Turf																							
Common	Latin	Drought Tolerance	Growth Form	Growth Rate	Height at Maturity (ft)	CA/C3 Tolerance	Frost Free Days, Min.	Moisture Use	pH Min.	pH Max.	Density per Acre Max.	Precip. Min.	Precip. Max.	Root Depth Min. (in.)	Salinity Tolerance	Shade Tolerance	Min. Temp. (F)	Palatable Browse	Palatable Grass	Protein Potential	cost (lb)	(\$s per acre seeded)	
White Clover	Trifolium repens	Low	Bunch	Rapid	0.3	Medium	70	Medium	5.2	8	1200	24	60	30	High	intolerant	-47	low	medium	low	3.5	8	
Bluegrass	Poa annua	Low	Bunch	Rapid	0.3	Medium	60	Medium	4.8	8	1200	24	60	30	High	intolerant	-47	low	medium	low	3.5	2	
Red Fescue	Festuca rubra	Medium	Rhizomatous	moderate	2	High	90	Medium	5	7.5	1200	30	70	40	medium	tolerant	-43	medium	low	medium	1.5	10	
Landscaping Species																							
Common	Latin	Drought Tolerance	Growth Form	Growth Rate	Height at Maturity (ft)	CA/C3 Tolerance	Frost Free Days, Min.	Moisture Use	pH Min.	pH Max.	Density per Acre Max.	Precip. Min.	Precip. Max.	Root Depth Min. (in.)	Salinity Tolerance	Shade Tolerance	Min. Temp.	Fuelwood	Lumber	Nursery Stock	Pulp	Veneer	approx. cost (ea.)
Autumn Black Pine	Pinus nigra	Low	single stem	slow	100	High	30	High	5.2	7.3	1200	24	24	30	none	intolerant	-47	medium	yes	yes	yes	15 to 50	
Autumn Blaze Maple	Acer x Freemanii 'Autumn Blaze'	Low-Medium	single stem	rapid	58	High	80	High	4.7	7.3	1200	25	80	30	none	intermediate	-47	medium	yes	yes	yes	95 to 105	
Guif Stream Heavenly Bamboo	Nandia domestica 'Guif Stream'	Low-Medium	clumping shrub	moderate	3.5	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Indigocone Pine	Pinus contorta	Low-Medium	single stem	rapid	150	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Sports Turf Grass Mix	Pinus horizontalis	Low-Medium	single stem	rapid	150	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Blue Ray Juniper	Juniperus horizontalis 'Wilton'	Medium	spreading groundcover	moderate	0.5	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	1.31 per lb.	
Chinese Redbud	Cercis chinensis 'Don Egolf'	Medium	multiple stem	slow	40	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	10 to 25	
Eastern Redbud	Cercis canadensis	Medium	multiple stem	slow	30	Low	170	Medium	5	7.9	1200	20	80	24	none	tolerant	-78	low	no	no	no	25 to 40	
Feathered Reed Grass	Calamagrostis x Acutiflora 'Karl Foerster'	Medium	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Infinita Watermelon Cucumber	Lagotis indica 'Infinita Watermelon'	Medium	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Meadow Grass	Miscanthus sinensis 'Straw Hat'	Medium	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Xeric Blue Grass	Bouteloua gracilis	Medium	tuffet perennial	slow	2	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Blue Sentry Yucca	Yucca Baccata 'Blue Sentry'	Medium-High	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Blue Spruce Russian Sage	Perovskia atriplicifolia 'Blue Spruce'	Medium-High	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Bristlecone Pine	Pinus aristata	Medium-High	single to multiple stem	slow	20	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Golden Sevier Yucca	Yucca filamentosa 'Golden Sevier'	Medium-High	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Laminate Lavender	Lamellaria linearifolia 'Munster'	Medium-High	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Raywood Ash	Fraxinus oxyacra	Medium-High	tree	slow	70	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Siwashwood Maple	Pinus mitis 'Siwashwood'	Medium-High	single stem	slow	5	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Stonewall Yucca	Yucca filamentosa 'Stonewall'	Medium-High	clumping	slow	4	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 25	
Limber Pine	Pinus flexilis 'Vanderwolf'	High	single stem	slow	66	Medium	30	High	5.5	8	1200	20	70	40	medium	tolerant	-43	medium	yes	no	yes	39.5 to 110	
Rock Mountain Juniper	Juniperus scopulorum	High	columnar	slow	50	High	100	Medium	6.2	7.5	700	18	25	20	none	intolerant	-70	medium	yes	no	yes	25 to 56	
Yucca/Native Species																							
Common	Latin	Drought Tolerance	Growth Form	Growth Rate	Height at Maturity (ft)	CA/C3 Tolerance	Frost Free Days, Min.	Moisture Use	pH Min.	pH Max.	Density per Acre Max.	Precip. Min.	Precip. Max.	Root Depth Min. (in.)	Salinity Tolerance	Shade Tolerance	Min. Temp.	approx. cost (ea.)					
Pale Evening Primrose	Oenothera pallida	High	Rhizomatous	moderate	2	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Shore Daisy	Eriogon spicatus	High	multiple stem	moderate	2.5	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Wild Blue Yucca	Yucca elata	High	single stem	slow	2	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Woolly Sunflower	Eriophyllum lanatum	High	multiple stem	moderate	2	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Blanket Flower	Gaillardia aristata	Medium	bunch	moderate	2	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Sonchid Goldenrod	Sonchid oleraceus	Medium	bunch	moderate	2	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Firecracker Penstemon	Penstemon antonii	Medium	single stem	slow	4	High	7	8	100	Medium	4.8	7.5	2700	10	20	6	none	intermediate	-33	6			
False Goldenrod	Heterotheca villosa	Medium	multiple stem	moderate	3	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Sweet Pea	Lathyrus pratensis	Medium	multiple stem	moderate	2	Medium	120	low	6	8	4800	10	18	16	none	intolerant	-38	6					
Blue Mountain Penstemon	Penstemon venosus	Medium	multiple stem	slow	2	Low	170	Medium	6.8	8	4800	8	68	6	none	intermediate	-18	6					

ADDENDUM TO INDUSTRIAL WASTEWATER LAND TREATMENT SYSTEM ENGINEERING REPORT

ATTACHMENT A:

IRRIGATION AND LANDSCAPING PLAN DESIGN FOR SABEY BUILDINGS A, B, AND D

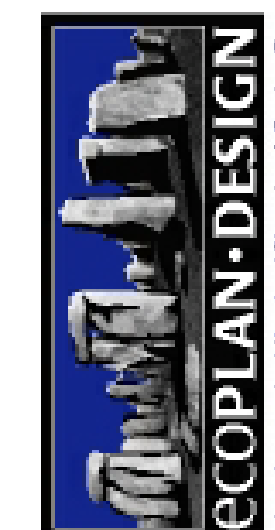


THOMAS D. VETTER
CERTIFICATE NO. 330

REVISIONS BY	
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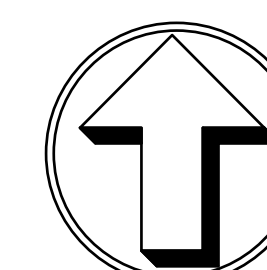
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509 663 5259
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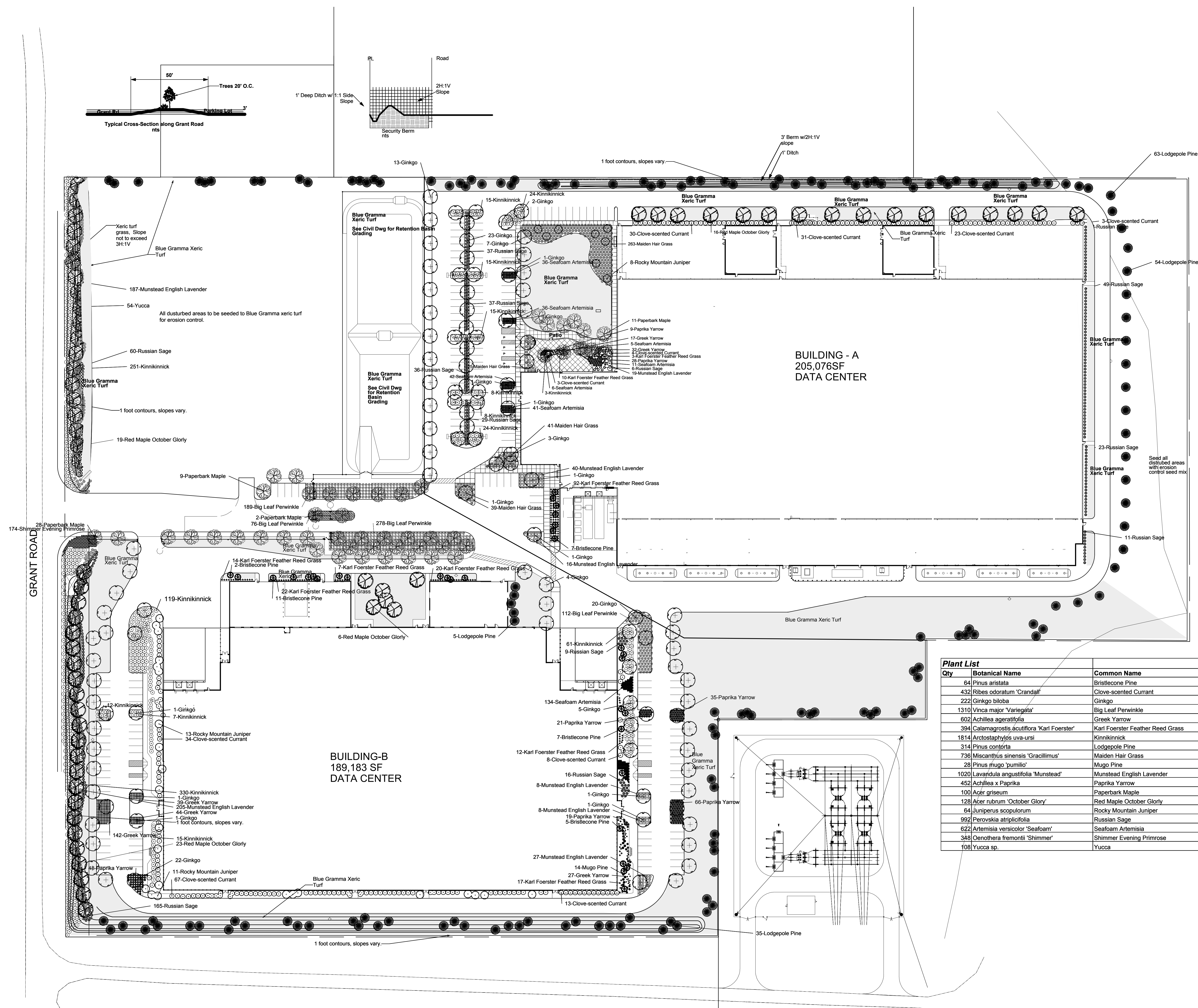
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EAST WENATCHEE, WASHINGTON

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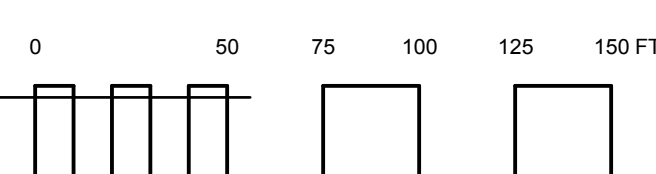
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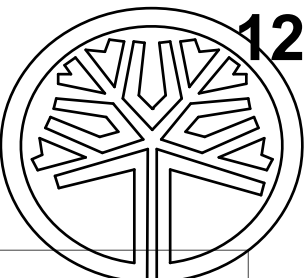


LANDSCAPE PLAN



LANDSCAPE PLAN
PERMIT DWG.





STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

THOMAS D. VETTER
CERTIFICATE NO. 330

REVISED BY
12 July 07 tdv

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Wenatchee, WA 98801
509 663 5259
thom@ecoplanandesign.com



COLUMBIA INTERGATE
SABEY COOPERATION
EAST WENATCHEE, WASHINGTON

DATE
14 Jan 2010

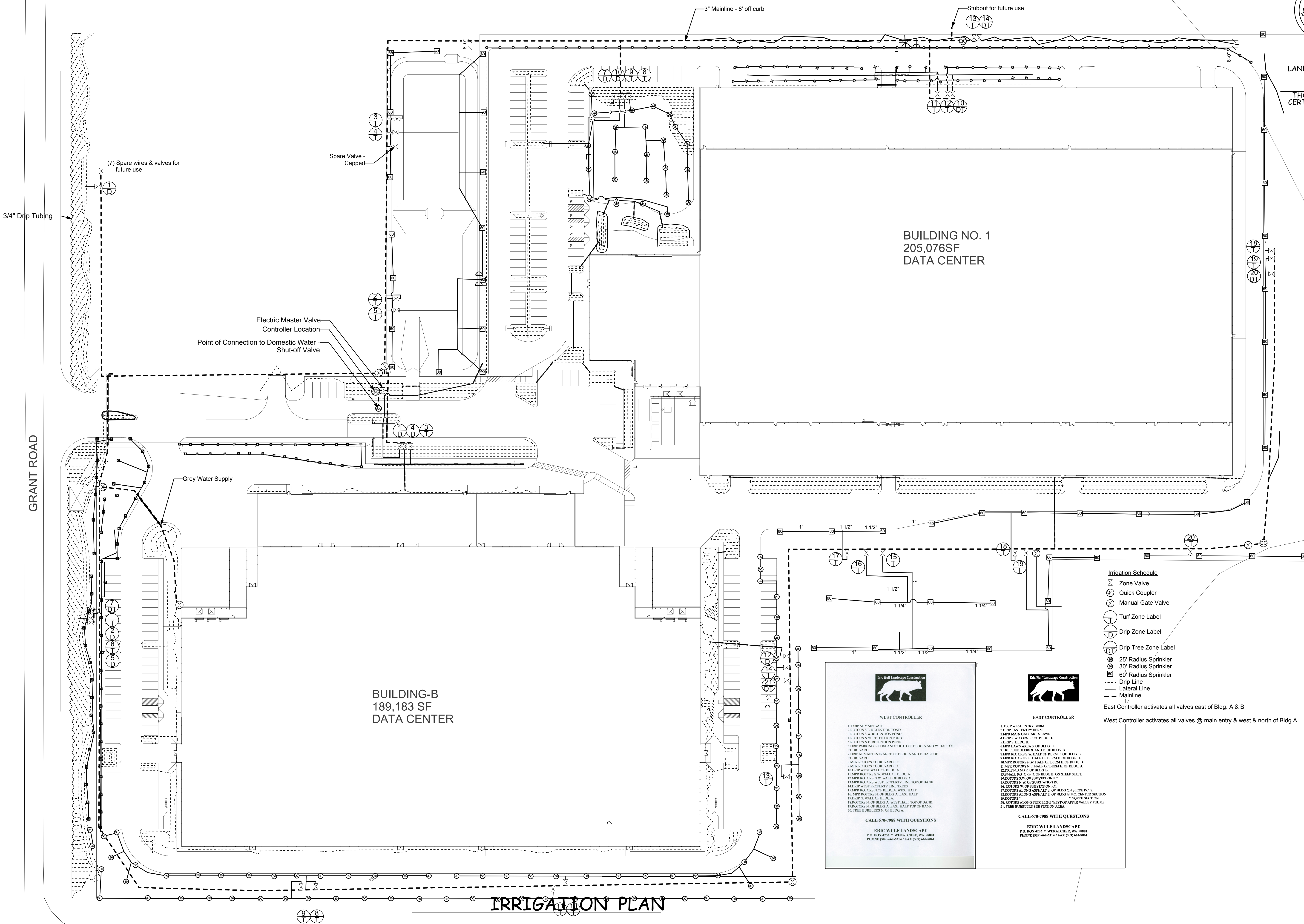
SCALE
1=40

DRAWN
TDV

JOB

SHEET

L2.1



A north arrow pointing upwards, consisting of a circle with a vertical arrow inside. Below the arrow is the word "NORTH" in large, bold, capital letters. Underneath "NORTH" is the text "SCALE: 1" = 20'". At the bottom is a graphic scale bar with alternating black and white segments, marked with the numbers 20, 0, 10, 20, and 40.

- WASHED ROCK MULCH TO 4" DEPTH
- 6" TOPSOIL, TILLED INTO 4" EXISTING SOIL
- WEED BARRIER

- STREAM BED COBBLE TO 12" DEPTH
- WEED BARRIER

- BARK MULCH TO 3" DEPTH
- 6" TOPSOIL, TILLED INTO 4" EXISTING SOIL

- SPORTS TURF
- 4" TOPSOIL, SCARIFY SUBGRADE TO 4" DEPTH

THREE-MAN BOULDER
TWO-MAN BOULDER
ONE-MAN BOULDER

ROOT BARRIER

LANDSCAPE EDGING (WASHED ROCK
MULCH AND STREAM BED COBBLE
AREAS ONLY)

1. SEE LANDSCAPE SCHEDULE AND NOTES, SHEET L1.05
2. SEE PLANTING DETAILS, SHEET L1.03
3. SEE IRRIGATION PLANS, SHEETS L1.06 - L1.09

LOADING
DOCK

SABEY
Data Centers

OWNER:
SABEY DATA CENTER PROPERTIES, LLC
12201 Tukwila International Blvd., Fourth Floor
Seattle, WA 98168-5121
TEL: (206) 281-8700
FAX: (206) 282-9951



CONSULTANT:
DAVID EVANS & ASSOCIATES, INC
 1620 W MARINE VIEW DRIVE - SUITE
 EVERETT, WASHINGTON 98201
 TEL: (425) 259-4099
 FAX: (425) 259-3230

KDW SALASO BRIEN
10202 Fifth Avenue NE, Suite 300
Seattle, Washington 98125
p. 206.547.1940 | f. 206.547.8212
www.salasobrien.com



INTERGATE COLUMBIA II
BUILDING D
4405 GRANT ROAD
EAST WENATCHEE, WA 98802





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BPC-2018-021

1.02

MATCHLINE - SEE SHEET L1.02



- 
 - WASHED ROCK MULCH TO 4" DEPTH
 - 6" TOPSOIL, TILLED INTO 4" EXISTING SOIL
 - WEED BARRIER
- 
 - STREAM BED COBBLE TO 12" DEPTH
 - WEED BARRIER
- 
 - BARK MULCH TO 3" DEPTH
 - 6" TOPSOIL, TILLED INTO 4" EXISTING SOIL
- 
 - SPORTS TURF
 - 4" TOPSOIL, SCARIFY SUBGRADE TO 4" DEPTH

1. SEE LANDSCAPE SCHEDULE AND NOTES, SHEET L1.05
2. SEE PLANTING DETAILS, SHEET L1.03
3. SEE IRRIGATION PLANS, SHEETS L1.06 - L1.09



BPC-2018-021

DE
TM

CONSULTANT:

DAVID EVANS & ASSOCIATES, INC
1620 W MARINE VIEW DRIVE - SUITE 200
EVERETT, WASHINGTON 98201
TEL: (425) 259-4099



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INTERGATE COLUMBIA II
BUILDING D
4405 GRANT ROAD
EAST WENATCHEE, WA 98802

SUED	DATE
PERMIT SET	X/XX/20XX
REVISED	DATE
LANDSCAPE PLAN AND PLANTING DETAILS	

1.03

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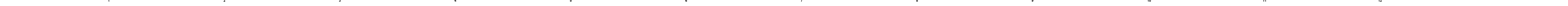
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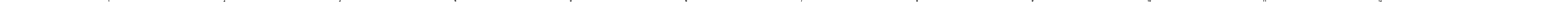
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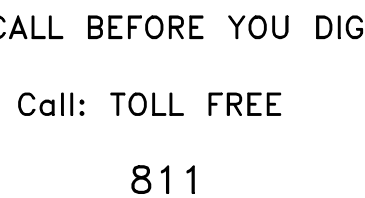
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SITE PREPARATION

- BARK MULCH*

SCREEN	PERCENT PASSING	
	MIN.	MAX.
2*	95	100
NO.4	0	30

WEED BARRIER

- WASHED ROCK

- STREAM BED COBBLE

- | APPROX. SIZE | PERCENT PASSING |
|--------------|-----------------|
| 12" | 99-100 |
| 10" | 70-90 |
| 5" | 30-60 |
| 3/4" | 10 MAX. |

BOULDERS

ROCK TYPE	APPROX. SIZE
ONE MAN	12"-18"
TWO MAN	18"-28"
THREE MAN	28"-36"

$$\text{APPROX. SIZE} = \frac{\text{LENGTH} + \text{WIDTH} + \text{THICKNESS}}{3}$$

PLANTING GENERAL

-
- Diagram illustrating the triangular spacing method for planting. The diagram shows a planting bed with a continuous outer row of plants (marked with a cross) and an inner area for triangular spacing (marked with a circle). The distance from the edge of the planting bed to the first row is labeled "SETBACK FROM EDGE OF PLANTING BED WITH TRIANGULAR SPACING INSIDE BED (TYP.)". The distance between plants in the triangular spacing is labeled "X = SPACING". The distance from the edge of the planting bed to the first row is labeled "1/2 X (TYP.)". The area for triangular spacing is labeled "AREA FOR TRIANGULAR SPACING".

PLANTING SPACING

X = SPACING
(SEE LANDSCAPE PLANT SCHEDULE
SHEET L-2)

NOT TO SCALE

PLANTING INSTALLATION

- | KIND/VARIETY | | % BY WEIGHT | MIN. % GERM |
|--|-------------------------|----------------|-------------|
| MEDALIST GOLD (3 WAY PERENNIAL RYEGRASS BLEND) | LOLIUM PERENNE | 50% | 80% |
| CREEPING RED FESCUE | FESTUCA RUBRA | 30% | 80% |
| CEWINGS FESCUE | FESTUCA RUBRA COMMUTATA | 20% | 80% |
| APPLICATION RATE: _____ | | 200 LBS/ACRE | |
| CANFOR WOOD CELLULOSE ECO-FIBER MULCH: _____ | | 2,000 LBS/ACRE | |
| NUTRICAL TURF SEED STARTER FERTILIZER (16-45-7): _____ | | 200 LBS/ACRE | |
| CANFOR ECO-TAC GUAR TACKIFIER: _____ | | 60 LBS/ACRE | |

SPORT TURF SEED MIX

EDGING

WARRANTY

- ### MAINTENANCE

- SABEY**
Data Centers
- OWNER:
SABEY DATA CENTER PROPERTIES, LLC
12201 Tukwila International Blvd., Fourth Floor
Seattle, WA 98168-5121
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















INTERGATE COLUMBIA II
BUILDING D
4405 GRANT ROAD
EAST WENATCHEE, WA 98802

ISSUED	DATE
PERMIT SET	X/XX/20XX

REVISED	DATE

LANDSCAPE SCHEDULE AND NOT










-  2" DOUBLE CHECK VALVE ASSEMBLY
 WILKINS 2" BRONZE – PRESSURE REDUCER VALVE
 RAINBIRD FS–SERIES FLOW SENSOR – SIZE TO MATCH LINE
 RAIN BIRD VALVE PGA SERIES – SIZED AS SHOWN ON PLAN
 NETAFIM DRIP CONTROL ZONE KIT LVCZSF–150HP WITH SCREEN FILTER SF100–120
 RAINBIRD ESPLXMEF ELECTRONIC 12–STATION CONTROLLER WITH ADDITIONAL STATION MODULE AND STAINLESS STEEL CABINET FOR OUTSIDE WALL MOUNT. PROVIDE 120VAC ELECTRICAL SERVICE
 RAINBIRD RAIN SENSOR RSD–BEx. MOUNT ON SIDE OF BUILDING (NOT UNDER EAVE)
 RAINBIRD 200–PEB 2" MASTER VALVE
 BALL VALVE – BRASS, SIZE TO MATCH LINE
 NIBCO MANUAL DRAIN VALVE – 1"
 RAINBIRD QUICK COUPLING VALVE #44LRC
 TORO DL2000 AUTOMATIC FLUSH VALVE (INSTALL AT LOW POINT EACH DRIP ZONE)
 TORO DL–MP9 DRIP SYSTEM OPERATING INDICATOR – LOCATE AT EACH ZONE VALVE (NOT SHOWN ON PLAN)
 TORO DL2000 AIR/VACUUM RELIEF VALVE – INSTALL AT HIGH POINT EACH DRIP ZONE
 SCHEDULE 40 PVC MAINLINE – 2"
 SCHEDULE 40 PVC LATERAL – 1.5" SIZE UNLESS SHOWN OTHERWISE ON PLANS
 NETAFIM DRIPLINE TLHCVXR5–24 (0.53 GPH EMITTERS AT 24" O.C.). STAKE DRIPLINE AT 24" O.C.
 SCHEDULE 40 PVC SLEEVES – SIZED AT DOUBLE WORKING PIPE(S) DIAMETER

VALVE LEGEND

1	STATION NUMBER
1.5"	VALVE SIZE
11.8	GALLONS PER MINUTE

IRRIGATION HEAD SCHEDULE

HEAD	MANUF.	MODEL #	RADIUS	PATTERN/DEGREES	PSI	GPM
	HUNTER	PROS-12-PRS40-CV	12'	MP1000-360	40	0.84
	HUNTER	PROS-6-PRS40-CV	21'	MP2000-360	50-55	1.74
	HUNTER	PROS-6-PRS40-CV	25'-27'	MP3000-180	25-30	1.44-1.58
	HUNTER	PROS-6-PRS40-CV	25'-27'	MP3000-90	25-30	0.71-0.76
	HUNTER	PROS-6-PRS40-CV	25'	MP3000-360	25	2.88
	HUNTER	PROS-6-PRS40-CV	7'-12'	MP800SR-90	30-55	0.17-0.28
	HUNTER	PROS-6-PRS40-CV	7'-12'	MP800SR-180	30-55	0.33-0.50


CV = DRAIN CHECK VALVE

GENERAL NOTES :

- GENERAL NOTES:**
1. SEE IRRIGATION NOTES AND DETAILS. SHEET L1.09
 2. THE IRRIGATION PLAN IS DIAGRAMMATIC. INSTALL MAINLINE, VALVES, PIPE AND ASSOCIATED EQUIPMENT IN PLANTER BEDS WITHIN PROPERTY BOUNDARY

MATCHLINE - SEE SHEET L1.07

SABEY
Data Centers



DAVID EVANS & ASSOCIATES, INC.
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EVERETT, WASHINGTON 98201
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INTERGATE COLUMBIA II
BUILDING D
4405 GRANT ROAD
EAST WENATCHEE, WA 98802

PROJECT # DASC00000039

[illegible]

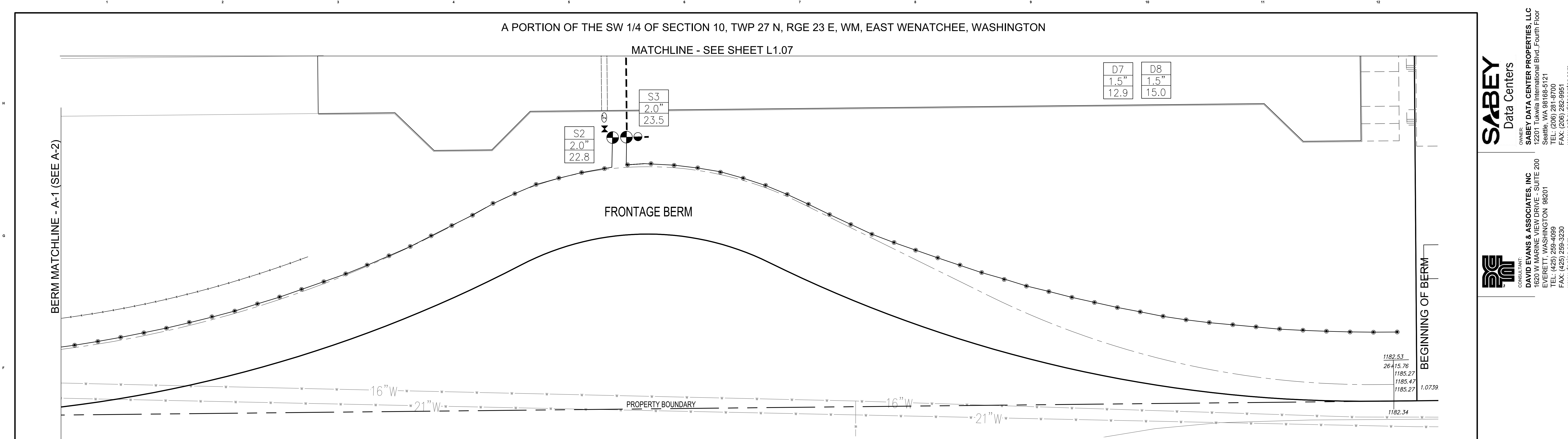
IRRIGATION PLAN

BPC-2018-021












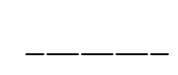

L1.06

PROJECT # DASC00000039








1.07



IRRIGATION EQUIPMENT LEGEND

-  2" DOUBLE CHECK VALVE ASSEMBLY
 -  WILKINS 2" BRONZE – PRESSURE REDUCER VALVE
 -  RAINBIRD FS–SERIES FLOW SENSOR – SIZE TO MATCH LINE
 -  RAIN BIRD VALVE PGA SERIES – SIZED AS SHOWN ON PLAN
 -  NETAFIM DRIP CONTROL ZONE KIT LVCZSF–150HP WITH SCREEN FILTER SF100–120
 -  RAINBIRD ESPLXMEF ELECTRONIC 12–STATION CONTROLLER WITH ADDITIONAL STATION MODULE AND STAINLESS STEEL CABINET FOR OUTSIDE WALL MOUNT. PROVIDE 120VAC ELECTRICAL SERVICE
 -  RAINBIRD RAIN SENSOR RSD–BEx. MOUNT ON SIDE OF BUILDING (NOT UNDER EAVE)
 -  RAINBIRD 200–PEB 2" MASTER VALVE
 -  BALL VALVE – BRASS, SIZE TO MATCH LINE
 -  NIBCO MANUAL DRAIN VALVE – 1"
 -  RAINBIRD QUICK COUPLING VALVE #44LRC
 -  TORO DL2000 AUTOMATIC FLUSH VALVE (INSTALL AT LOW POINT EACH DRIP ZONE)
 -  -- TORO DL–MP9 DRIP SYSTEM OPERATING INDICATOR – LOCATE AT EACH ZONE VALVE (NOT SHOWN ON PLAN)
 -  TORO DL2000 AIR/VACUUM RELIEF VALVE – INSTALL AT HIGH POINT EACH DRIP ZONE
 -  ---  --- SCHEDULE 40 PVC MAINLINE – 2"
 -  SCHEDULE 40 PVC LATERAL – 1.5" SIZE UNLESS SHOWN OTHERWISE ON PLANS
 -  NETAFIM DRIPLINE TLHCVXR5–24 (0.53 GPH EMITTERS AT 24" O.C.). STAKE DRIPLINE AT 24" O.C.
 -  --- SCHEDULE 40 PVC SLEEVES – SIZED AT DOUBLE WORKING PIPE(S) DIAMETER

IRRIGATION HEAD SCHEDULE

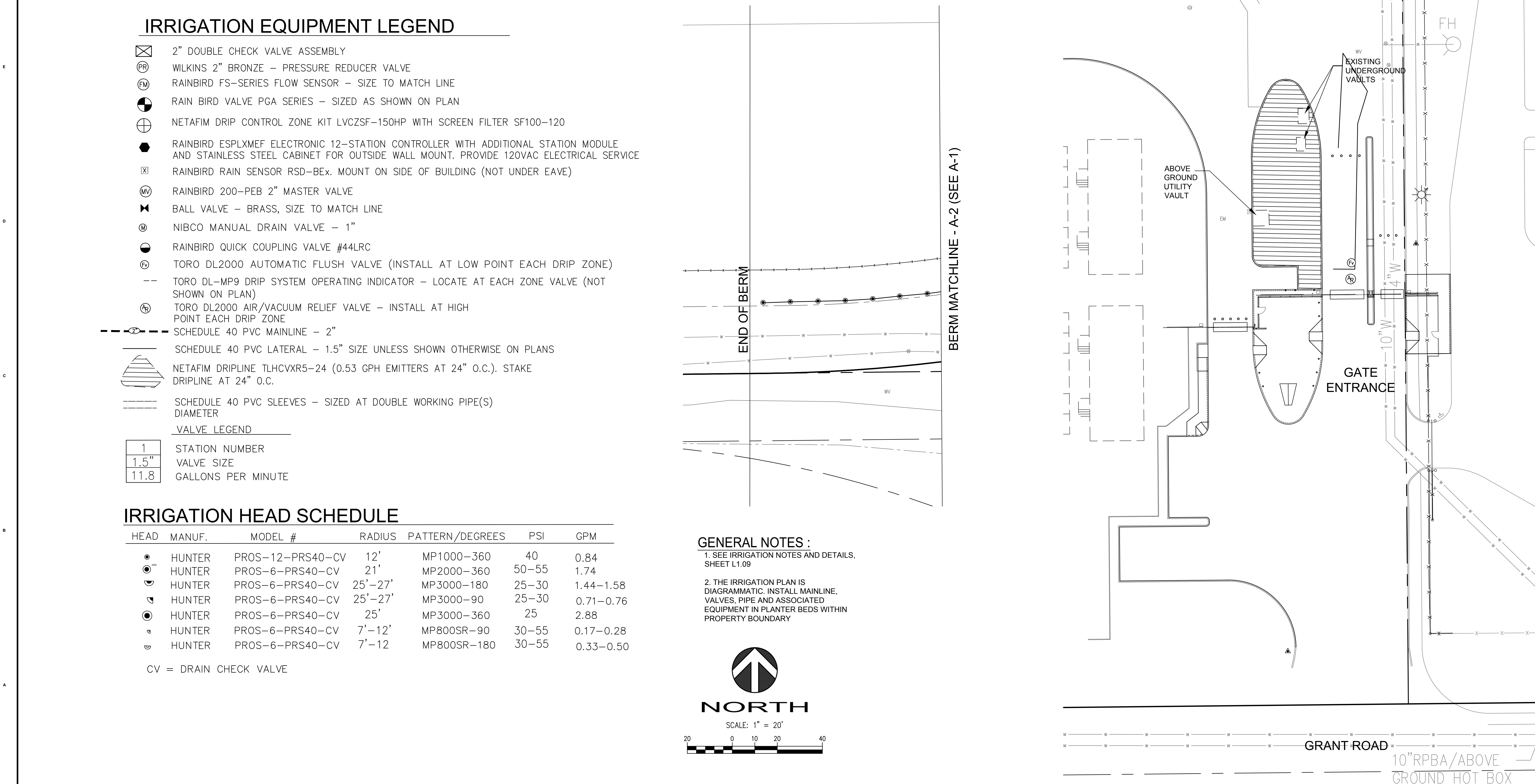
	HEAD	MANUF.	MODEL #	RADIUS	PATTERN/DEGREES	PSI	GPM
	HUNTER	PROS-12-PRS40-CV	12'	MP1000-360	40	0.84	
	HUNTER	PROS-6-PRS40-CV	21'	MP2000-360	50-55	1.74	
	HUNTER	PROS-6-PRS40-CV	25'-27'	MP3000-180	25-30	1.44-1.58	
	HUNTER	PROS-6-PRS40-CV	25'-27'	MP3000-90	25-30	0.71-0.76	
	HUNTER	PROS-6-PRS40-CV	25'	MP3000-360	25	2.88	
	HUNTER	PROS-6-PRS40-CV	7'-12'	MP800SR-90	30-55	0.17-0.28	
	HUNTER	PROS-6-PRS40-CV	7'-12'	MP800SR-180	30-55	0.33-0.50	

CV = DRAIN CHECK VALVE

HEAD	MANUF.	MODEL #	RADIUS	PATTERN/DEGREES	PSI	GPM	GENERAL NOTES :

●	HUNTER	PROS-12-PRS40-CV	12'	MP1000-360	40	0.84
●	HUNTER	PROS-12-PRS40-CV	24'	MP1000-360	50-55	1.71

☐	HUNTER	PROS-6-PRS40-CV	25'	MP 2000-300	25-30	1.74	2. THE IRRIGATION PLAN IS DIAGRAMMATIC. INSTALL MAINLINE, VALVES, PIPE AND ASSOCIATED EQUIPMENT IN PLANTER BEDS WITHIN PROPERTY BOUNDARY
☐	HUNTER	PROS-6-PRS40-CV	25'-27"	MP 3000-180	25-30	1.44-1.58	
☐	HUNTER	PROS-6-PRS40-CV	25'-27"	MP 3000-90	25-30	0.71-0.76	
☐	HUNTER	PROS-6-PRS40-CV	25'	MP 3000-360	25	2.88	

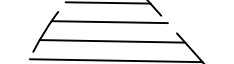



NORTH
SCALE: 1" = 20'

 CALL BEFORE YOU DIG
Call: TOLL FREE
811

10" RPBA / ABOVE
GROUND HOT BOX

GROUND HOT BOX BPC-2018-021 **L1.08**



NETAFIM DRIPLINE TLHCVR5-24 (0.53 GPH EMITTERS AT 24" O.C.). STAKE DRIPLINE AT 24" O.C.

----- SCHEDULE 40 PVC SLEEVES - SIZED AT DOUBLE WORKING PIPE(S) DIAMETER

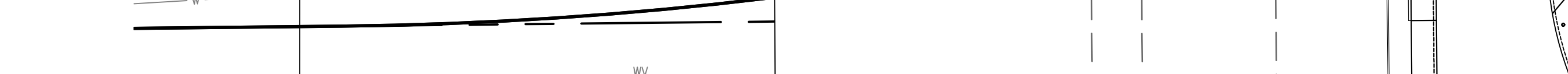
VALVE LEGEND

1
1.5"
11.8

STATION NUMBER

VALVE SIZE











GALLONS PER MINUTE



INTERGATE COLUMBIA II
BUILDING D
4405 GRANT ROAD
EAST WENATCHEE, WA 98802

IRRIGATION HEAD SCHEDULE

----	SCHEDULE 40 PVC SLEEVES – SIZED AT DOUBLE WORKING PIPE(S)
=====	DIAMETER
VALVE LEGEND	
1	STATION NUMBER
1.5"	VALVE SIZE
11.8	GALLONS PER MINUTE

	2" DOUBLE CHECK VALVE ASSEMBLY
	WILKINS 2" BRONZE - PRESSURE REDUCER VALVE
	RAINBIRD FS-SERIES FLOW SENSOR - SIZE TO MATCH LINE
	RAIN BIRD VALVE PGA SERIES - SIZED AS SHOWN ON PLAN
	NETAFIM DRIP CONTROL ZONE KIT LVCZSF-150HP WITH SCREEN FILTER SF100-120
	RAINBIRD ESPLXMEF ELECTRONIC 12-STATION CONTROLLER WITH ADDITIONAL STATION MODULE AND STAINLESS STEEL CABINET FOR OUTSIDE WALL MOUNT. PROVIDE 120VAC ELECTRICAL SERVICE
	RAINBIRD RAIN SENSOR RSD-BEX. MOUNT ON SIDE OF BUILDING (NOT UNDER EAVE)
	RAINBIRD 200-PEB 2" MASTER VALVE
	BALL VALVE - BRASS, SIZE TO MATCH LINE
	NIBCO MANUAL DRAIN VALVE - 1"

ADDENDUM TO INDUSTRIAL WASTEWATER LAND TREATMENT SYSTEM ENGINEERING REPORT

ATTACHMENT B:

DOUGLAS COUNTY SEWER DISTRICT NO. 1 LETTER OF APPROVED TREATMENT FOR NON-CONTACT COOLING WATER DISCHARGE

DOUGLAS COUNTY SEWER DISTRICT NO. 1

692 Eastmont Avenue

East Wenatchee, WA 98802

(509) 884-2484 ♦ Fax (509) 884-8091

March 8, 2019

Mr. Eron Drew

Grette Associates

151 S. Worthen Suite 101

Wenatchee, WA 98801

Mr. Drew;

The following chemicals are currently approved for use in treating non-contact cooling water discharged to the Douglas County Sewer District Number 1 (DCSD) Publicly Owned Treatment Works (POTW):

Chlorine

Sulfuric Acid

Peracetic Acid

Hydrogen Peroxide

Acetic Acid

Phosphonic Acid

Maleic Acid

Hydroxyphosphono-acetic Acid

DCSD reserves the right to make changes to this list at any time. Any request to use a treatment additive not on the list will be evaluated on a case-by-case basis, and that request should be supported by substantial industry research on the effects of the proposed additives in similar POTWs.

Please let me know if you have any further questions.

Sincerely,

Kurt Hosman

Douglas County Sewer District