HERRERA

TECHNICAL MEMORANDUM

Date: October 1, 2021

To: Brandi Lubliner, Washington State Department of Ecology

Copy to: Jessica Atlakson, City of Redmond
Curtis Nickerson, City of Redmond

From: John Lenth, Herrera Environmental Consultants, Inc.
Dylan Ahearn, Herrera Environmental Consultants, Inc.

Subject: Redmond Paired Watershed Study Pond Retrofit Effectiveness Monitoring Proposal

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INTRODUCTION

The Redmond Paired Watershed Study (RPWS) is one of several effectiveness monitoring studies that was selected for implementation starting in 2014 for the Stormwater Action Monitoring (SAM) program for Puget Sound. The goal of effectiveness monitoring under the SAM program is to provide widely applicable information for improving stormwater management in the region. The specific study question to be addressed through the RPWS is as follows:

> *How effective are watershed rehabilitation efforts at improving receiving water conditions at the watershed scale?*

In this context, rehabilitation efforts could include any of the following practices:

- Stormwater management retrofits in upland areas that would include facilities for onsite stormwater management (e.g., low impact development [LID] practices), runoff treatment, and flow control
- Riparian and instream habitat improvements
- Programmatic practices for stormwater management

To address this study question, a conceptual experimental design for the RPWS was subsequently developed and summarized in the *Redmond Paired Watershed Study Experimental Design Report* (Herrera 2015a). Building on this previous work, a Quality Assurance Project Plan (QAPP) was developed to guide the implementation of all subsequent phases of the RPWS (Herrera 2015b). This QAPP documents the experimental design and procedures that will be used during data collection, processing, and analysis to ensure all results obtained for the RPWS are scientifically defensible.

As described in the QAPP, the experimental design for the RPWS has two primary components:

- **Status and Trends Monitoring:** Routine and continuous measurements of various hydrologic, chemical, physical habitat, and biological indicators of stream health over an extended timeframe to quantify improvements in receiving water conditions in response to watershed rehabilitation efforts.
- **Effectiveness Monitoring:** Measurements of hydrologic and/or chemical parameters over a relatively short timeframe to document the effectiveness of specific structural stormwater controls that have been constructed to improve receiving water conditions.

The Status and Trends Monitoring utilizes a "paired watershed" experimental design that involves collecting these measurements in seven watersheds (Table 1; Figure 1) categorized as follows:

- Three "Application" watersheds with wadeable lowland streams that are moderately impacted by urbanization and prioritized for rehabilitation efforts.
- Two "Reference" watersheds with relatively pristine wadeable lowland streams that do not require rehabilitation.
- Two "Control" watersheds with wadeable lowland streams that are significantly impacted by urbanization and not currently prioritized for rehabilitation.

Table 1. Application, Reference, and Control Watersheds for the Redmond Paired Watershed Study.

Watershed Name	Watershed Type	Dominant Land Use/Cover	Watershed Total Area (acres)	Watershed Area Inside Redmond (acres)
Evans Creek Tributary 108	Application	Residential	397	0[a]
Monticello Creek	Application	Residential/Commercial	345	264
Tosh Creek	Application	Residential/Commercial	299	276
Colin Creek[a]	Reference	Forest	1,990	90
Seidel Creek[a]	Reference	Forest	1,188	615
Country Creek	Control	Residential/Commercial	212	212
Tyler's Creek	Control	Residential/Commercial	168	167

[a] Watershed is in unincorporated King County.

Status and Trends Monitoring was initiated in 2016 and is currently ongoing; this component of the RPWS is anticipated to continue through 2025. The onset of Effectiveness Monitoring has been delayed for the following reasons:

- Per the QAPP, Status and Trends Monitoring was conducted over a "baseline" period prior to the implementation of any rehabilitation efforts to increase the likelihood of detecting trends in the Application watersheds.
- To date, no new structural stormwater controls have come online in an Application watershed that are suitable for Effectiveness Monitoring.

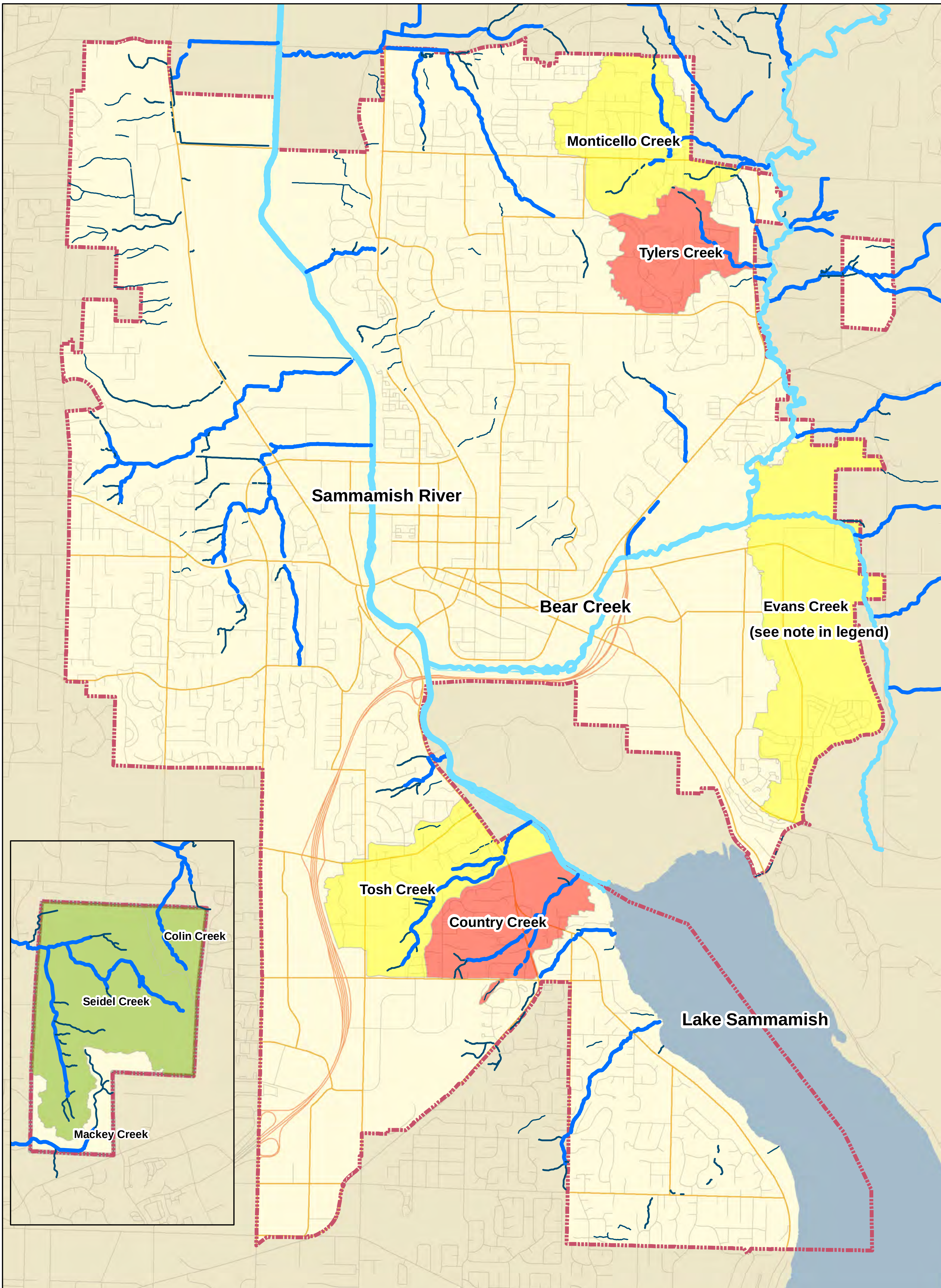

Figure 1 - Application, Reference, and Control Watersheds

City of Redmond, Washington

06/18/2015

City of Redmond WASHINGTON

0 0.25 0.5 1 1.5 Miles

Disclaimer: This map is created and maintained by the Natural Resources Division of the City of Redmond, Washington, for reference purposes only. The City makes no guarantee as to the accuracy or completeness of the features shown on this map.

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- City Limits
- Reference Watersheds
- Application Watersheds
- Control Watersheds

This figure shows Evans Creek watershed within Redmond. Evans 108 is east of Redmond.

In April 2021, the City of Redmond retrofitted two existing stormwater detention ponds in the Monticello Watershed with a continuous monitoring and adaptive control (CMAC) system to improve their performance for managing peak flows during storm events. This memorandum outlines proposed monitoring of these ponds for the Effectiveness Monitoring component of the RPWS and the related linkages to ongoing Status and Trends Monitoring. It is organized to include the following information to support this proposed monitoring:

- Description of the stormwater detention ponds and the CMAC system
- Description of the procedures that will be used for the Effectiveness Monitoring
- Description of the data analysis methods that will be used to quantify performance improvements stemming from the CMAC system
- Description of reporting activities for the Effectiveness Monitoring
- Planning level cost estimate for the Effectiveness Monitoring

Stormwater Detention Pond Retrofit Description

Following a pilot study conducted by Osborn Consulting, Inc., that examined the feasibility and cost/benefit of retrofitting stormwater detention ponds (Appendix A), the City is planning to retrofit two stormwater detention ponds in the Monticello Creek watershed (Figure 1) with a CMAC system that was developed by Opti. As shown in Figure 2, the Curry East pond is located near the intersection of Northeast 116th Street and 174th Place Northeast while the Whistler Ridge pond is located near the intersection of Northeast 116th Street and 176th Place Northeast. Both ponds discharge to the southern fork of Monticello Creek at a location just downstream of existing hydrologic monitoring (Mon-Mid-S) and physical habitat monitoring (Mont-3) stations for the Status and Trends Monitoring and upstream of existing hydrologic monitoring (Mont-Mouth) and physical habitat monitoring (Mont-1 and Mont-2) stations on the main stem of the creek (Figure 3).

The Curry East pond was constructed in 2004, and the Whistler Ridge pond was constructed in 2003. Both ponds were designed pursuant to the *Stormwater Management Manual for Puget Sound* (Ecology 1992) and sized to limit peak flows discharged from the developed site to 50 percent of the existing condition 2-year, 24-hour event and to maintain the existing condition peak flow rates for the 10-year and 100-year, 24-hour design storms. Collectively, the two ponds treat approximately 10 percent of the total contributing watershed area for Monticello Creek. For reference, as-built drawings for the ponds are provide in Appendix B to this memorandum; the drainage report for the Curry East pond is provide in Appendix C.

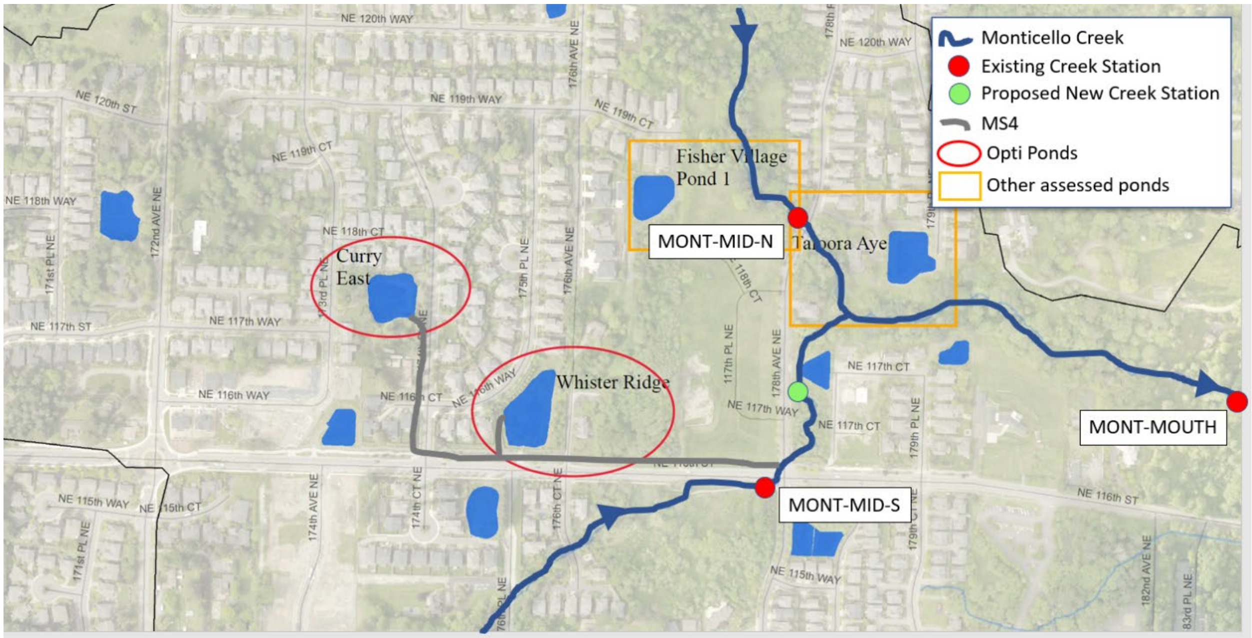

Figure 2. Location of Pond Retrofit Projects.

The CMAC system developed by Opti optimizes the performance of existing stormwater detention facilities by leveraging forecast information with onsite sensors, allowing adaptive use of the full storage volume available to mimic flow patterns that existed prior to land development. By limiting and controlling outflows, the Opti CMAC system is able to minimize erosion and flashiness in the downstream channel (often greater than 50 percent improvement from passive pond operation), improving habitat conditions in downstream receiving waters. More detailed information on the Opti CMAC system is provided in Appendix D to this memorandum. The Opti CMAC system received approval through the Washington Department of Ecology's Technology Assessment Protocol – Ecology (TAPE) program for use in meeting the State's Flow Duration Control (FDC) requirements (Appendix E).

It is anticipated that the Opti CMAC system will be installed and become operational in both ponds sometime in the spring of 2021.

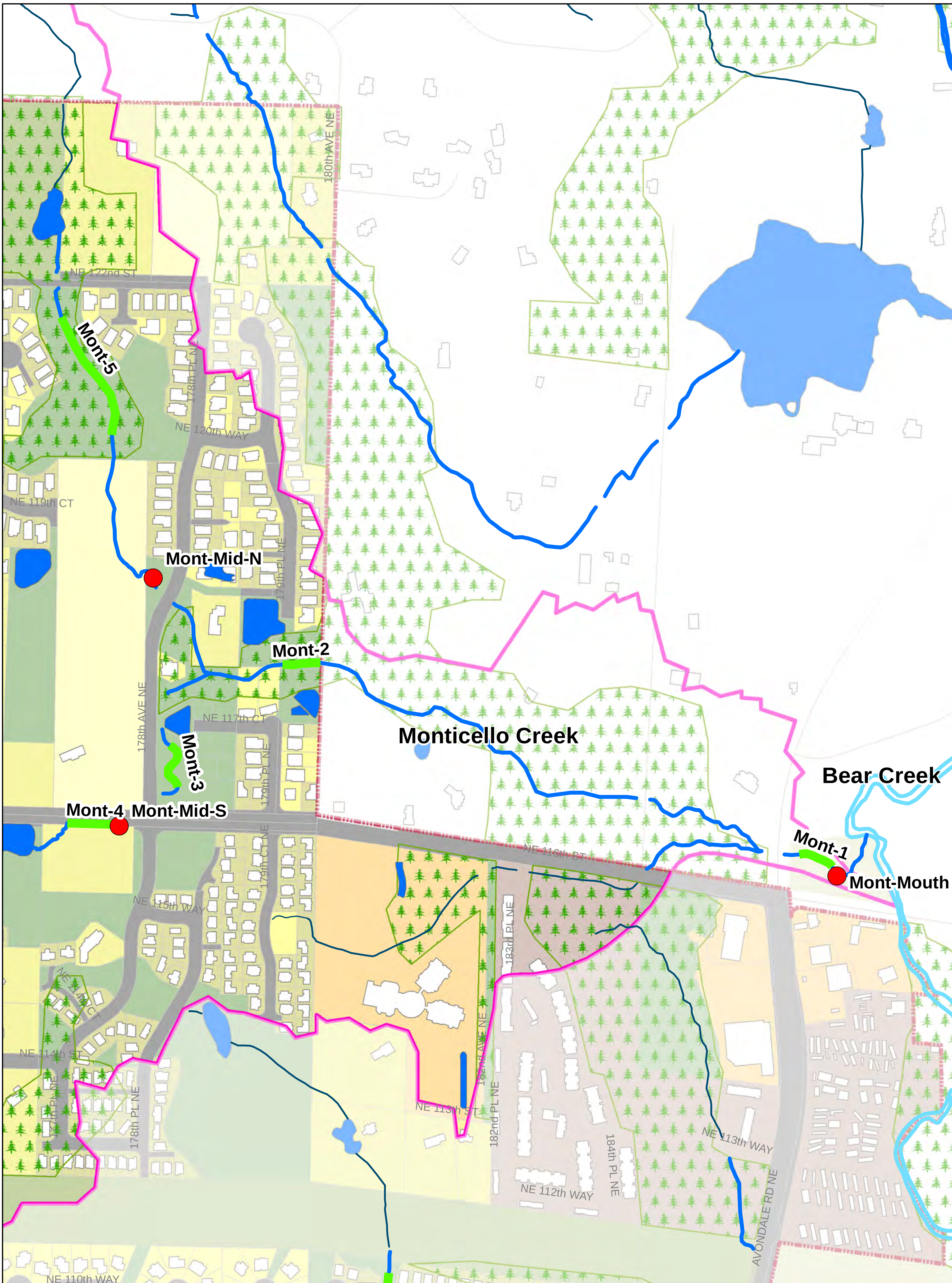

Figure 3. Monticello Creek Paired Watershed Study Monitoring Locations

City of Redmond, Washington

6/25/2015

Legend

- Class I Stream
- Class II Stream
- Class III Stream
- Class IV Stream
- Ponds
- City Limits
- Watershed Boundary
- Commercial
- Industrial
- Multifamily
- Park / Undeveloped
- Public ROW
- Single Family HighDensity
- Single Family Low Density
- Single Family Medium Density
- Single Family Rural Density
- Flow & WQ Monitoring
- Habitat, Sediment & Biological Monitoring

Effectiveness Monitoring Procedures

Effectiveness Monitoring would involve comparisons of the measured outflow from the ponds with the Opti CMAC system to modeled estimates of outflow from the ponds in their current configuration. Measured outflow from the ponds will be obtained from sensors that will be installed in association with the Opti CMAC system. The inflow to each pond is required to model outflow in their current configuration. Because each pond has multiple inlets, it was deemed too costly to install monitoring equipment to directly measure inflow. Therefore, the following stepwise procedure will be employed to estimate inflow to the ponds:

1. Using the Opti CMAC system to prevent discharge from each pond, capture water during successive storm events until each pond is completely filled.

2. During a dry period, use the Opti CMAC system to perform a controlled release of water from each pond while continuously measuring the pond outflow and stage.

3. Using the data obtained from Step 2, develop relationships for predicting the available storage in each pond as a function of stage.

4. Using the relationships obtained from Step 3, develop spreadsheet models to estimate the average inflow rate to the ponds over 15-minute intervals based on the following equation and using measured data from the Opti CMAC system for pond outflow and stage:

   $Q_{inflow} = (Q_{outflow} + \Delta_{storage})/900$

   Where:

   Q_{inflow} = estimated average pond inflow rate in cubic feet per second over 15-minute interval

   $Q_{outflow}$ = measured pond outflow in cubic feet over 15-minute interval

   $\Delta_{storage}$ = measured change in pond storage in cubic feet over 15-minute interval

   Example calculations for this equation are provided in Appendix F.

5. Using the spreadsheet models from Step 4, estimate the inflow to each pond over an entire water year using continuous measurements (15-minute logging interval) of outflow and stage from the Opti CMAC system over the same period.

6. Use the continuous estimates of inflow to the ponds from Step 5 as input for a Western Washington Hydrology Model (WWHM) that will be developed for each pond to predict outflows in their current configuration.

It is anticipated that the Effectiveness Monitoring described herein would initiate once the CMAC system becomes operational in each pond (spring of 2021) and extend over a period capturing Water Years (WY) 2022 and 2023. This will produce a continuous time series of pond outflow that will be collected over a sufficient duration to detect pond performance improvements across a range of storm sizes.

It should be noted that the accuracy of the spreadsheet models from Step 5 may decrease if baseflow enters the ponds between storm events during wet weather months. To ensure the accuracy of these models, inlets to each pond will be inspected in October, December, February, and April over the period of monitoring identified above to check for baseflow. If baseflow is observed at an inlet, a manual measurement will be made using a portable flow meter to quantify the baseflow discharge. These data will then be used to modify the spreadsheet models from Step 5 to increase their accuracy.

Data Analysis Methods

Data obtained from the monitoring described above will be analyzed to detect a significant decrease in peak outflow from the ponds relative to the expected peak outflow of the ponds in their current configuration. The specific null hypothesis (H_o) and alternative hypothesis (H_a) for this analysis are as follows:

> **H_o:** Peak outflow from the ponds with the Opti CMAC system is equal to or higher than the peak outflow from the ponds in their current configuration.
>
> **H_a:** Peak outflow from the ponds with the Opti CMAC system is lower than the peak outflow from the ponds in their current configuration.

To facilitate this analysis, the time series data described above for outflow will be processed using a computer algorithm to identify individual storm “events” based on a minimum inter-event dry period with less than 0.04 inch of rainfall. Once these events are defined, the algorithm will automatically calculate peak outflow during individual storm events for the ponds with the Opti CMAC system and the ponds in their current configuration. These data will then be compared using a Wilcoxon signed rank test to evaluate the null and alternate hypotheses identified above. The statistical significance of this test will be assessed based on an alpha (α) level of 0.05.

In addition to the statistical test described above, flow duration curves will be computed based on the outflow from the ponds with the Opti CMAC system and the outflow from the ponds in their current configuration. These curves will be compared to determine if the ponds with the Opti CMAC system provide a level of performance that more closely matches design expectations from the current Stormwater Management Manual for Western Washington (Ecology 2019).

Data from existing monitoring stations that were established for the Status and Trends Monitoring component of the RPWS will also be leveraged to detect improving trends in receiving water conditions that may stem from the pond retrofits. Specifically, trend analyses will be performed on the data from existing hydrologic monitoring stations in the Monticello Creek watershed based on procedures identified in Herrera (2015b and 2020). Given the point of discharge for the ponds on the creek (Figure 3), improving trends would be expected at the main stem hydrologic monitoring station (Mont-Mouth) but not at the stations located on the northern and southern forks of the creek (Mont-Mid-S and Mont-Mid-N, respectively).

Similarly, data from existing physical habitat monitoring stations that were established for the Status and Trends Monitoring will be leveraged for the same purpose. Based on the locations of these stations on the creek (Figure 3), improving trends would be expected at the main stem physical habitat monitoring stations (Mont-1 and Mont-2) but not at the stations located on the northern and southern forks of the creek (Mont-4 and Mont-5, respectively).

Results from the analyses described above will be summarized in a stand-alone Effectiveness Monitoring Report that will be produced following the conclusion of monitoring at the end of WY2023. A draft version of this report will be produced for review by the Technical Advisory Committee (TAC) that was established for the RPWS. A final version of the report will then be produced based on comments received from the TAC on the draft version.

Planning Level Cost Estimates

Planning levels costs for the Effectiveness Monitoring described herein are summarized in Table 2 by major deliverables.

Table 2. Planning Level Cost Estimates.

Deliverable	Anticipated Completion	Cost
Spreadsheet models to predict pond inflow	Spring 2022	$4,000
WWHM to predict pond outflow	Spring 2022	$4,000
Inflow estimates for each pond through the end of WY2022	Fall 2022	$8,500
Inflow estimates for each pond through the end of WY2023	Fall 2023	$8,500
Draft Effectiveness Monitoring Report	Fall/Winter 2023	$15,000
Final Effective Monitoring Report	Winter/Spring 2024	$4,000
Total Cost		**$44,000**

WY: water year

References

Ecology. 1992. Stormwater Management Manual for the Puget Sound Basin (The Technical Manual). Washington State Department of Ecology, Olympia, Washington. February. <https://apps.ecology.wa.gov/publications/documents/9175.pdf>.

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Herrera. 2015a. Redmond Paired Watershed Study Experimental Design Report. Prepared for the City of Redmond by Herrera Environmental Consultants, Inc., Seattle, Washington. July 14.

Herrera. 2015b. Quality Assurance Project Plan: Redmond Paired Watershed Study. Prepared for the City of Redmond by Herrera Environmental Consultants, Inc., Seattle, Washington. December 31.

Herrera. 2020. Redmond Paired Watershed Study Trend Analysis Report: Water Years 2016–2019. Draft. Prepared for the City of Redmond by Herrera Environmental Consultants, Inc., Seattle, Washington. July 22.

APPENDIX A

Redmond Continuous Monitoring and Adaptive Control Pilot Study

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1800 112th Avenue NE Suite 220-E | Bellevue, WA 98004 | P: 425.451.4009

DATE JULY 21, 2020

TO PETER HOLTE, AARON MOLDVER; CITY OF REDMOND

AUTHOR(S) JOSH VAN WIE, PE, SARA LUCERO, EIT; OSBORN CONSULTING, INC.; KAITLIN VACCA, PE, OPTIRTC, INC.; SETH BRYANT, OPTIRTC

CMAC PILOT STUDY
FEASIBILITY AND COST/BENEFIT ANALYSIS

OVERVIEW

The purpose of this memo is to summarize the feasibility and cost/benefit analysis for retrofitting two stormwater ponds in the City of Redmond with continuous monitoring and adaptive control (CMAC) systems. The analysis consisted of assessing the planning level cost and improvement in flow durations at potential pond locations after installing a CMAC retrofit. Flow durations were brought as close as possible to pre-developed durations by adjusting the active orifice sizes and CMAC control parameters.

The analysis will be used to finalize the selection of two stormwater ponds for retrofit pilot projects and verify initial hydraulic parameters for the selected ponds so equipment can be ordered to allow installation during fall 2020. The equipment order has been identified as a critical path item and will consist of an order for the CMAC actuator assemblies that are estimated to have a 16-week lead time.

The City has identified four ponds as possible retrofit locations, with two preferred options that would allow management of the largest basin area. Each pond is located in the Monticello Creek watershed. Monticello Creek was selected as a priority watershed for restoration after completion of the City's 2013 Watershed Management Plan. The four ponds are shown in **Figure 1** and include the following:

- Whistler Ridge (preferred location)
- Curry East (preferred location)
- Taloora Aye
- Fisher Village Pond #1

Each pond was investigated to determine the benefits, feasibility, and planning-level costs of retrofitting with a CMAC system that operates using software developed by OptiRTC, Inc. (Opti).

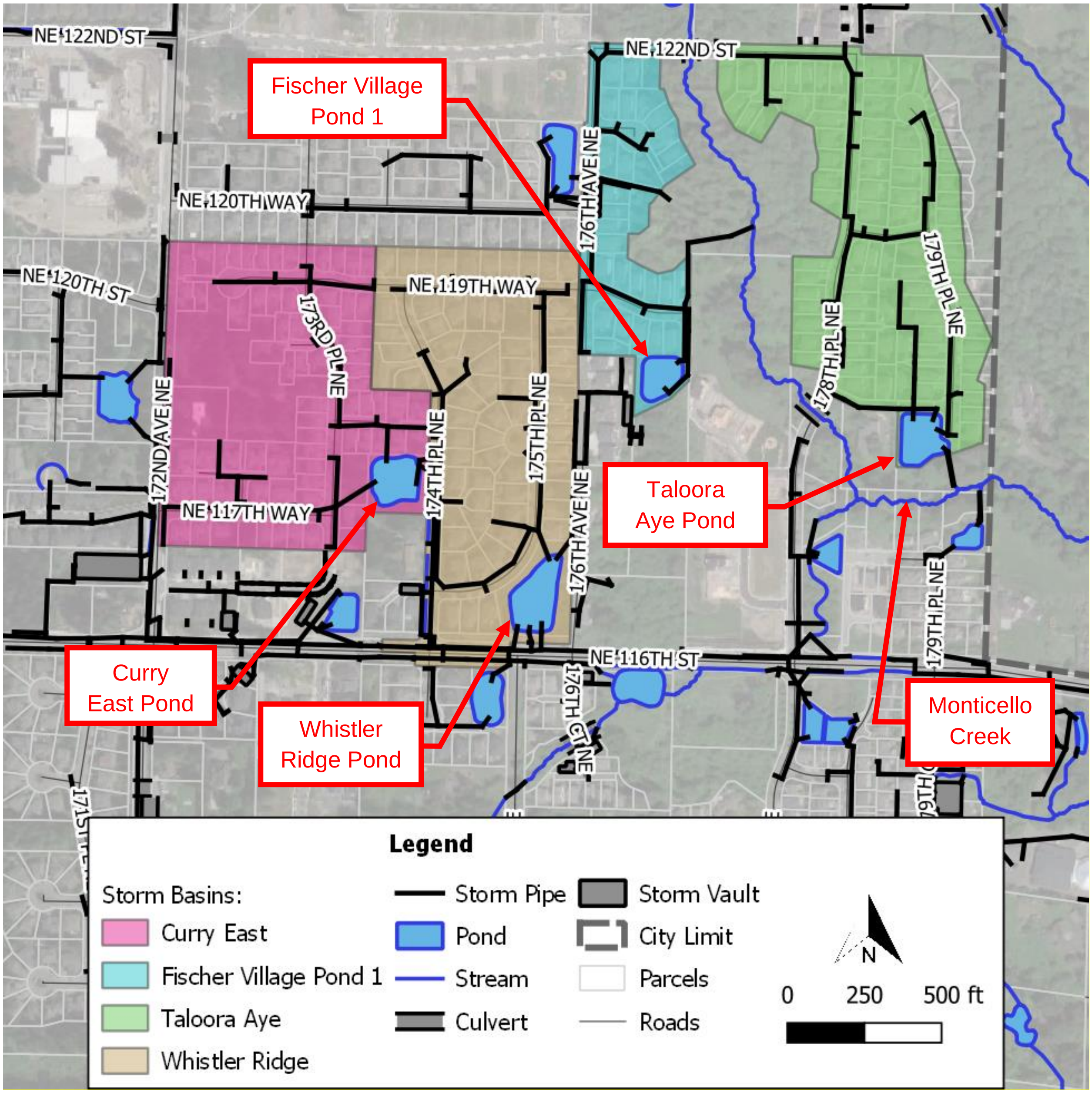


Figure 1 | Project Area Map

EXISTING CONDITIONS

The four stormwater ponds are located in north Redmond in residential subdivisions on the north side of NE 116th Street. All ponds are within approximately a quarter mile of each other. The ponds discharge to Monticello Creek either directly or through a storm drain system that conveys flow from west to east along NE 116th Street. According to record drawings, the ponds were constructed between 2001 and 2005. The ponds were intended to manage runoff from the residential developments also constructed at that time.

According to drainage reports, the ponds and control structures were designed to provide flow control using the Santa Barbara Urban Hydrograph (SBUH) method and sized to match pre-developed (forested) flows for 50 percent of the 2-year peak flow and the full peak flows for the 10-year and 100-year events.

This methodology aligned with the 1992 Ecology Stormwater Management Manual for the Puget Sound Basin, which was adopted by the City of Redmond at the time.

FEASIBILITY

Feasibility for retrofitting the ponds was determined by completing site visits to verify record drawings and determine whether adequate conditions exist for installing a CMAC retrofit. Site visits to each pond were completed by OCI on July 2, 2020. Each pond was inspected for the following elements:

- Accessibility for construction equipment
- Verification that outlet structures matched record drawings
- Adequate space for installation of CMAC system, including space for an actuator installed above the outlet structure and an electrical panel installed nearby
- Adequate space for a solar panel that would not be inhibited by excessive tree cover

Based on the criteria above, all four locations were determined to be feasible for installation of a CMAC system. The Whistler Ridge and Curry East ponds were noted to be enclosed in fenced areas, while the Taloora Aye and Fischer Village ponds were not fenced.

WWHM AND CMAC MODELING

Potential improvements from CMAC retrofits were investigated using the Western Washington Hydrology Model (WWHM) Version 4.2.17 and a spreadsheet tool provided by Opti that calculates the change in flow durations based on CMAC software logic expected to be employed at each site. For each pond, a model was first run in WWHM and then imported into the Opti spreadsheet. Modeling was completed according to guidelines in the Redmond Stormwater Technical Notebook.

WWHM hydrology parameters were taken from drainage reports that were available for each pond. Land cover in pre-developed conditions was assumed to be forest. For existing conditions, pervious areas were generally assumed to be lawn, except for several park areas and natural areas that were assumed to be forest based on heavy tree cover shown in aerial images. According to data from the USDA web soil survey, soils in the area consist of Alderwood gravelly sandy loam. This soil was modeled as Type C in WWHM. Slopes were determined using GIS contours and modeled using the flat slope category for all basins. Basin parameters are summarized in **Table 1**.

TABLE 1 | WWHM MODEL PARAMETERS

Pond	Basin Area (AC)	Impervious Area (AC)	Forest Area (AC)	Lawn Area (AC)	Percent Impervious	Slope Category
Whistler Ridge	16.91	9.97	0	6.94	59%	Flat
Curry East	17.03	9.12	1.97	5.93	53%	Flat
Taloora Aye	15.78	7.73	2.36	5.70	49%	Flat
Fischer Village	7.02	4.30	0	2.72	61%	Flat

For the existing conditions WWHM models, pond parameters were taken from record drawings and included pond dimensions, live storage volumes, and the sizes and depths of orifices and risers. To simplify the modeling, the dead storage volume below the pond outlet elevations was not modeled.

CMAC model parameters consisted of WWHM output data and parameters for guiding CMAC logic during the model simulation. WWHM parameters were taken from WWHM model output and included pre-developed and existing conditions runoff timeseries, precipitation timeseries, and stage-storage curves for the ponds. The primary CMAC logic parameters were the depth and size of the proposed active orifices, target maximum stage during active control, and minimum desired flow to be released during the simulation. Orifices depth was set equal to the pond outlet to allow active control at all flow rates. The target maximum stage was set to the top of the overflow riser in the control structure. Minimum desired flow was set equal to or less than 50 percent of the 2-year peak flow based on the WWHM model, which was roughly half the minimum flow that the ponds were designed to release under the 1992 standards. This is the flow rate that will be targeted during times when the pond is releasing water after filing up during a storm event. The spreadsheet includes multiple other CMAC parameters related to logic decisions based on weather forecasting and were generally left at the default settings for this preliminary stage of design. These parameters will be fine-tuned during final design and the post-construction software optimization period, which will be performed by Opti.

TABLE 2 | OPTI SPREADSHEET PARAMETERS

Pond	Existing Control Structure and Inverts (ft NAVD88)	Active CMAC Orifice		Target Maximum Stage (ft)	Minimum Desired Flow (cfs)
		Diameter (in)	Proposed Valve Inverts (ft NAVD88)		
Whistler Ridge	1.70-in Orifice, 213.89 5.94-in Orifice, 220.46 8-in Orifice, 221.35	12	217.37	3.8	0.25
Curry East	2.94-in Orifice, 264.50 1.25-ft Notched Weir, 269.43	10	267.00	5.5	0.25
Taloora Aye	2.09-in Orifice, 182.93 1.48-ft Notched Weir, 188.93	12	184.38	5.0	0.10
Fischer Village	1.90-in Orifice, 203.51 2.20-ft Notched Weir, 206.45	10	203.71	6.0	0.23

COST/BENEFIT ANALYSIS

Costs for the retrofit projects were compared using hardware cost estimates provided by Opti. Because each retrofit location would have similar hardware components, the costs did not vary significantly between the pond locations. Costs were primarily estimated using equipment quotes provided by Opti. A 10 percent contingency was added for equipment costs, and a 30 percent contingency was added for construction costs. Planning level cost estimates are summarized in **Table 3** and attached included in Appendix A.

Benefits were assessed by comparing basin area managed, change in flow durations, and advantages and disadvantages of each site location. The basin area managed was greatest for the Whistler Ridge pond (16.91 acres) and the Curry East pond (17.03 acres). The Taloora Aye pond (15.78 acres) manages slightly less area, while the Fischer Village pond (7.02 acres) manages the smallest area.

Flow duration plots are included in Appendix B and indicate that flow durations improved in each pond with the CMAC retrofit. Current flow control in the Redmond Technical Notebook require flow control facilities for new or redevelopment projects to match pre-developed flow durations for 50 percent of the 2-year peak flow through the full 50-year peak flow (flow control standard) along with matching pre-developed durations for 8 percent of the 2-year flow through 50 percent of the 2-year flow (LID standard) if LID facilities are not used to the maximum extent feasible. Because the existing ponds were designed under older standards and the volume of the ponds is not proposed to be increased with this retrofit, it was not possible to meet the current flow control standards. Flow durations were brought as close as possible to pre-developed durations by adjusting the active orifice sizes and CMAC control parameters.

The Whistler Ridge and Curry East ponds have the site advantages of being enclosed in gated areas, which could be useful in providing extra security for a CMAC system that includes a control panel and solar panel installed above ground. The costs and benefits for each pond are summarized in **Table 3**.

TABLE 3 | COST/BENEFIT SUMMARY

Pond	Planning Level Construction Cost with Contingency	Basin Area Managed by Retrofit (ac)	Site Advantages/ Disadvantages
Whistler Ridge	$103,422	16.91	Enclosed in gated area
Curry East	$105,388	17.03	Enclosed in gated area
Taloora Aye	$105,449	15.78	Not enclosed
Fischer Village	$103,634	7.02	Not enclosed

Note: Annual software licensing costs are not included in the construction cost estimates. For two ponds, annual software licensing costs are $27,600.

RECOMMENDATIONS

The Whistler Ridge pond and Curry East pond are recommended for moving forward with CMAC retrofits. These ponds have the advantages of managing the largest basin areas and being located in enclosed areas that will provide extra security.

Based on modeling results, both of these ponds are recommended to have a 12-inch orifice, which will require an IQT500 actuator assembly based on information provided by Opti. It is recommended that the City move forward with ordering the actuator assemblies so that construction can occur during fall 2020.

APPENDIX A: PLANNING LEVEL COST ESTIMATES

City of Redmond
CMAC Retrofit Pilot Project
Planning Level Cost Estimate
Whistler Ridge

Item	Unit	Unit Cost	Quantity	Cost
OPTI EQUIPMENT				
Rototork IQT 500 24 VDC Actuator	LS	$12,000.00	1	$12,000
12-Inch Butterfly Valve, 10-Foot Valve Stem, 24-in to 12-in Reducer on 18-in Metal Outlet	LS	$9,950.00	1	$9,950
24 VDC Solar Panels	LS	$4,000.00	1	$4,000
Opti Control Panel	LS	$10,000.00	1	$10,000
PMC Water Level Sensor and 80 ft Cable	LS	$2,200.00	1	$2,200
Davis Rain Gauge	LS	$175.00	1	$175
Camera	LS	$1,500.00	1	$1,500
Opti Equipment Subtotal				$39,825
Shipping (10%)				$3,983
Equipment Contingency (10%)				$4,381
Opti Equipment Total				$48,188
CONTRACTOR ITEMS				
Modified Control Structure Riser	LS	$5,000.00	1	$5,000
Mobilization and Construction	LS	$35,000.00	1	$35,000
Contractor Items Subtotal				$40,000
Sales Tax (10%)				$4,000
Construction Contingency (30%)				$13,200
Contractor Items Total				$57,200
Opti Equipment Plus Contractor Items Total				**$105,388**

SOFTWARE LICENSE	
Ongoing Annual Costs for Software License (Total Price for Two Ponds)	**$27,600**

City of Redmond
CMAC Retrofit Pilot Project
Planning Level Cost Estimate
Curry Pond

Item	Unit	Unit Cost	Quantity	Cost
OPTI EQUIPMENT				
Rototork IQT 500 24 VDC Actuator	LS	$12,000.00	1	$12,000
10-Inch Butterfly Valve, 7-Foot Valve Stem, Collar with Reducer on 18-Inch Metal Outlet	LS	$8,325.00	1	$8,325
24 VDC Solar Panels	LS	$4,000.00	1	$4,000
Opti Control Panel	LS	$10,000.00	1	$10,000
PMC Water Level Sensor and 80 ft Cable	LS	$2,200.00	1	$2,200
Davis Rain Gauge	LS	$175.00	1	$175
Camera	LS	$1,500.00	1	$1,500
Opti Equipment Subtotal				$38,200
Shipping (10%)				$3,820
Equipment Contingency (10%)				$4,202
Opti Equipment Total				$46,222
CONTRACTOR ITEMS				
Modified Control Structure Riser	LS	$5,000.00	1	$5,000
Mobilization and Construction	LS	$35,000.00	1	$35,000
Contractor Items Subtotal				$40,000
Sales Tax (10%)				$4,000
Construction Contingency (30%)				$13,200
Contractor Items Total				$57,200
Opti Equipment Plus Contractor Items Total				**$103,422**

SOFTWARE LICENSE	
Ongoing Annual Costs for Software License (Total Price for Two Ponds)	**$27,600**

Taloora Aye

City of Redmond
CMAC Retrofit Pilot Project
Planning Level Cost Estimate
Taloora Aye

Item	Unit	Unit Cost	Quantity	Cost
OPTI EQUIPMENT				
Rototork IQT 500 24 VDC Actuator	LS	$12,000.00	1	$12,000
12-Inch Butterfly Valve, Stem, and Reducer	LS	$10,000.00	1	$10,000
24 VDC Solar Panels	LS	$4,000.00	1	$4,000
Opti Control Panel	LS	$10,000.00	1	$10,000
PMC Water Level Sensor and 80 ft Cable	LS	$2,200.00	1	$2,200
Davis Rain Gauge	LS	$175.00	1	$175
Camera	LS	$1,500.00	1	$1,500
Opti Equipment Subtotal				$39,875
Shipping (10%)				$3,988
Equipment Contingency (10%)				$4,386
Opti Equipment Total				$48,249
CONTRACTOR ITEMS				
Modified Control Structure Riser	LS	$5,000.00	1	$5,000
Mobilization and Construction	LS	$35,000.00	1	$35,000
Contractor Items Subtotal				$40,000
Sales Tax (10%)				$4,000
Construction Contingency (30%)				$13,200
Contractor Items Total				$57,200
Opti Equipment Plus Contractor Items Total				**$105,449**

SOFTWARE LICENSE	
Ongoing Annual Costs for Software License (Total Price for Two Ponds)	**$27,600**

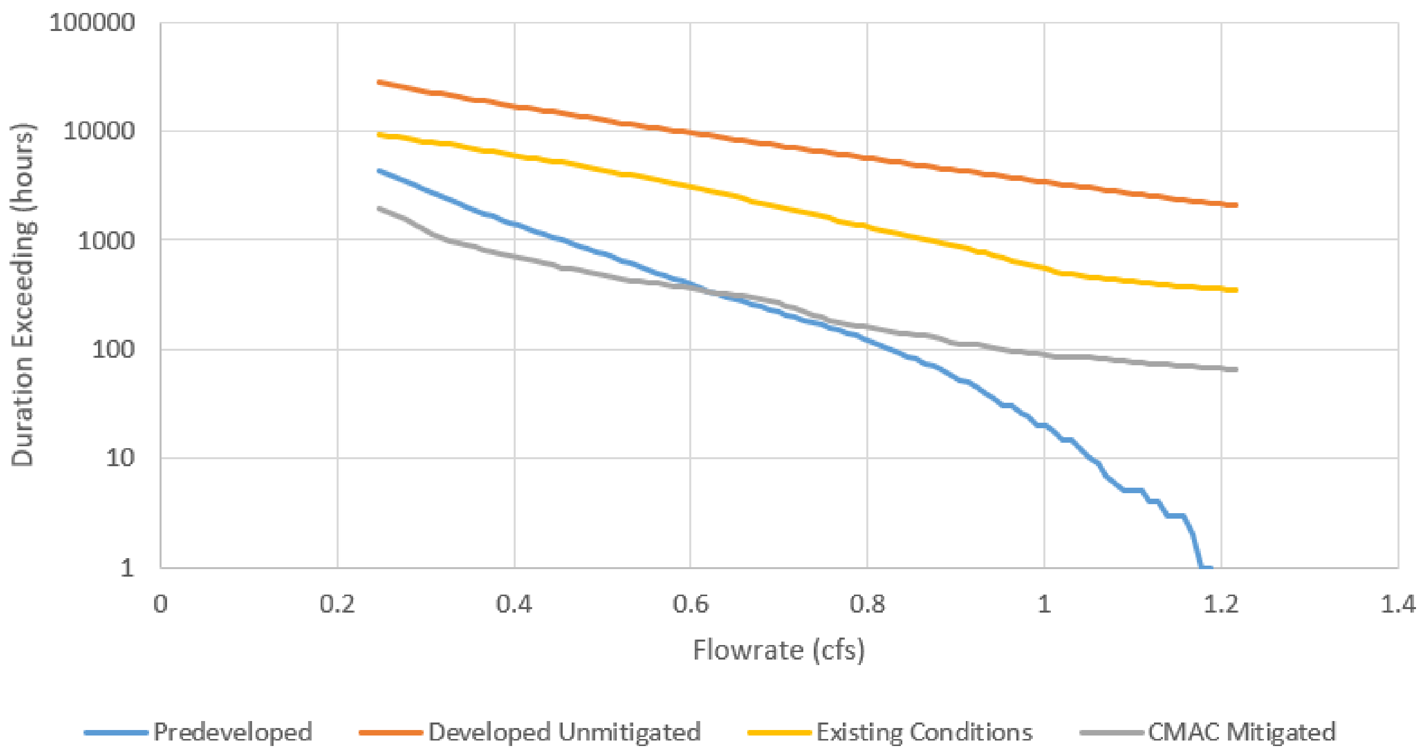
City of Redmond
CMAC Retrofit Pilot Project
Planning Level Cost Estimate
Fischer Village

Item	Unit	Unit Cost	Quantity	Cost
OPTI EQUIPMENT				
Rototork IQT 500 24 VDC Actuator	LS	$12,000.00	1	$12,000
12-Inch Butterfly Valve, Stem, and Reducer	LS	$8,500.00	1	$8,500
24 VDC Solar Panels	LS	$4,000.00	1	$4,000
Opti Control Panel	LS	$10,000.00	1	$10,000
PMC Water Level Sensor and 80 ft Cable	LS	$2,200.00	1	$2,200
Davis Rain Gauge	LS	$175.00	1	$175
Camera	LS	$1,500.00	1	$1,500
Opti Equipment Subtotal				$38,375
Shipping (10%)				$3,838
Equipment Contingency (10%)				$4,221
Opti Equipment Total				$46,434
CONTRACTOR ITEMS				
Modified Control Structure Riser	LS	$5,000.00	1	$5,000
Mobilization and Construction	LS	$35,000.00	1	$35,000
Contractor Items Subtotal				$40,000
Sales Tax (10%)				$4,000
Construction Contingency (30%)				$13,200
Contractor Items Total				$57,200
Opti Equipment Plus Contractor Items Total				**$103,634**

SOFTWARE LICENSE	
Ongoing Annual Costs for Software License (Total Price for Two Ponds)	**$27,600**

APPENDIX B: FLOW DURATION CURVES

City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Plot
Whistler Ridge Pond



City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Summary
Whistler Ridge Pond

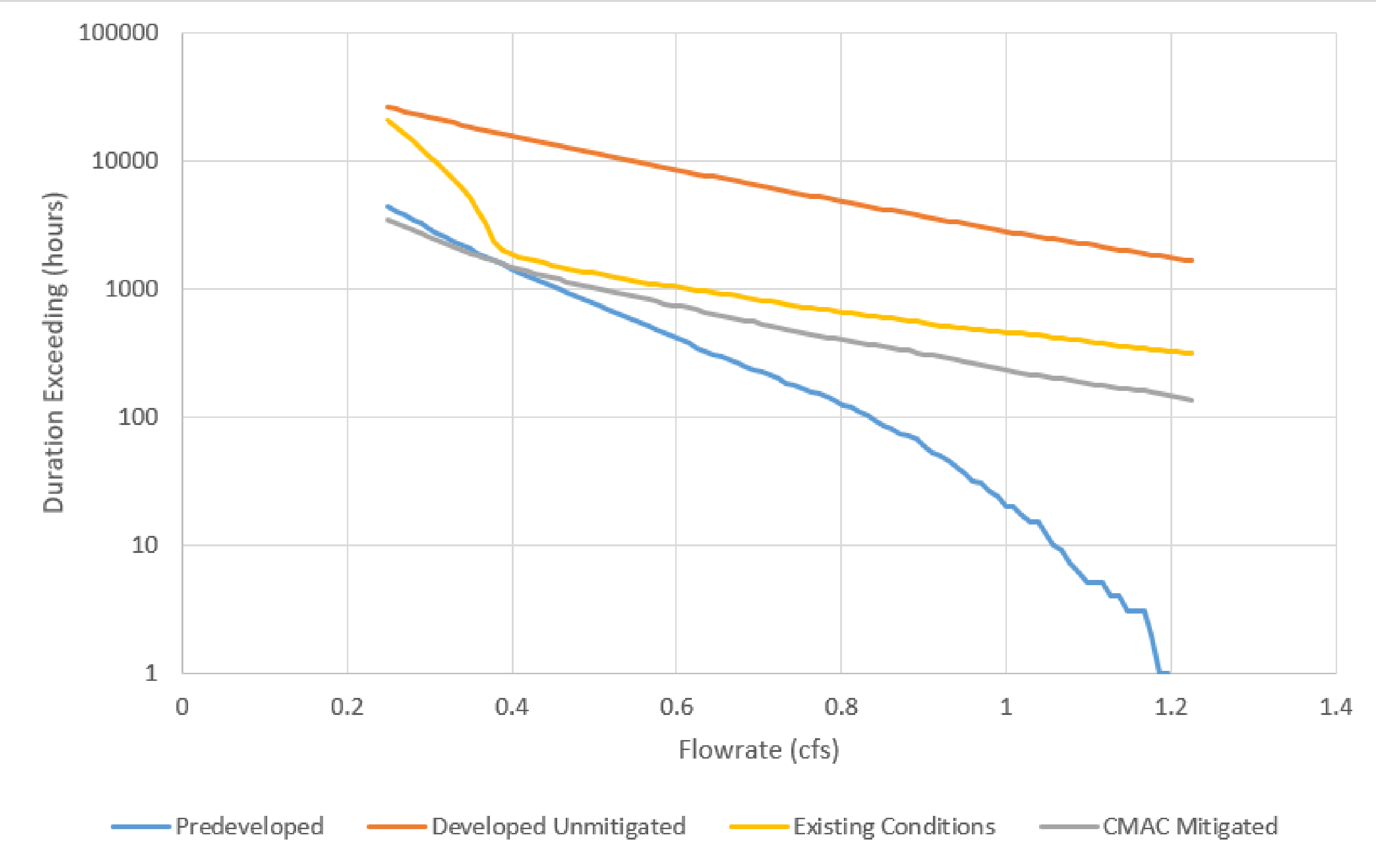
Note: Flow durations were brought as close as possible to pre-developed durations by adjusting the active orifice sizes and CMAC control parameters. Passing conditions could not be achieved for all flow durations because of the volume of the existing ponds.

Flow(cfs)	Duration Exceeding Flowrate, hours				Percentage (Mitigated/ Predeveloped)	Pass/Fail	Percent Reduction from Existing Conditions
	Predeveloped	Developed Unmitigated	Existing Conditions	CMAC Mitigated			
0.2486	4386	27811	9332	1955	45	Pass	79
0.2584	4036	26842	9057	1802	45	Pass	80
0.2682	3729	25853	8831	1655	44	Pass	81
0.2779	3458	25034	8586	1525	44	Pass	82
0.2877	3214	24291	8346	1398	43	Pass	83
0.2975	2955	23564	8142	1275	43	Pass	84
0.3073	2723	22791	7941	1161	43	Pass	85
0.3171	2527	22075	7752	1051	42	Pass	86
0.3269	2345	21345	7553	987	42	Pass	87
0.3366	2183	20697	7345	938	43	Pass	87
0.3464	2043	20048	7133	895	44	Pass	87
0.3562	1893	19427	6901	861	45	Pass	88
0.366	1768	18865	6690	822	46	Pass	88
0.3758	1644	18334	6493	784	48	Pass	88
0.3856	1539	17807	6288	761	49	Pass	88
0.3954	1442	17289	6087	729	51	Pass	88
0.4051	1361	16785	5925	693	51	Pass	88
0.4149	1273	16317	5766	672	53	Pass	88
0.4247	1202	15867	5595	643	53	Pass	89
0.4345	1129	15453	5466	609	54	Pass	89
0.4443	1056	15039	5317	592	56	Pass	89
0.4541	1003	14595	5181	563	56	Pass	89
0.4638	943	14189	5031	546	58	Pass	89
0.4736	887	13805	4879	530	60	Pass	89
0.4834	835	13401	4726	516	62	Pass	89
0.4932	787	12993	4553	494	63	Pass	89
0.503	740	12626	4382	478	65	Pass	89
0.5128	697	12276	4244	459	66	Pass	89
0.5226	648	11918	4074	441	68	Pass	89
0.5323	611	11612	3947	429	70	Pass	89
0.5421	577	11308	3807	424	73	Pass	89
0.5519	540	10998	3680	415	77	Pass	89
0.5617	503	10697	3546	404	80	Pass	89
0.5715	477	10415	3400	396	83	Pass	88
0.5813	446	10154	3271	385	86	Pass	88
0.591	421	9912	3150	375	89	Pass	88
0.6008	395	9643	3035	363	92	Pass	88
0.6106	370	9404	2919	350	95	Pass	88
0.6204	343	9158	2816	340	99	Pass	88

0.6302	325	8889	2705	329	101	Pass	88
0.64	306	8655	2603	324	106	Pass	88
0.6498	291	8414	2505	317	109	Pass	87
0.6595	275	8210	2419	308	112	Fail	87
0.6693	263	8004	2311	298	113	Fail	87
0.6791	245	7798	2204	286	117	Fail	87
0.6889	234	7605	2121	278	119	Fail	87
0.6987	221	7393	2044	265	120	Fail	87
0.7085	209	7197	1968	253	121	Fail	87
0.7182	196	6998	1888	236	120	Fail	88
0.728	181	6824	1822	225	124	Fail	88
0.7378	175	6651	1737	205	117	Fail	88
0.7476	168	6493	1659	194	115	Fail	88
0.7574	158	6337	1587	185	117	Fail	88
0.7672	149	6195	1517	179	120	Fail	88
0.777	141	6039	1461	170	121	Fail	88
0.7867	134	5868	1409	164	122	Fail	88
0.7965	124	5695	1359	161	130	Fail	88
0.8063	118	5568	1303	156	132	Fail	88
0.8161	109	5436	1243	152	139	Fail	88
0.8259	101	5306	1201	147	146	Fail	88
0.8357	93	5189	1147	142	153	Fail	88
0.8454	86	5071	1098	138	160	Fail	87
0.8552	81	4940	1048	136	168	Fail	87
0.865	74	4826	1009	135	182	Fail	87
0.8748	71	4720	975	129	182	Fail	87
0.8846	66	4594	933	127	192	Fail	86
0.8944	59	4470	893	116	197	Fail	87
0.9042	52	4356	868	113	217	Fail	87
0.9139	50	4260	831	112	224	Fail	87
0.9237	45	4146	795	110	244	Fail	86
0.9335	40	4044	769	107	268	Fail	86
0.9433	36	3948	729	105	292	Fail	86
0.9531	31	3851	692	101	326	Fail	85
0.9629	30	3754	655	97	323	Fail	85
0.9726	26	3664	628	94	362	Fail	85
0.9824	24	3583	591	92	383	Fail	84
0.9922	20	3502	568	91	455	Fail	84
1.002	20	3413	543	88	440	Fail	84
1.0118	17	3326	518	86	506	Fail	83
1.0216	15	3255	498	85	567	Fail	83
1.0314	15	3183	486	84	560	Fail	83
1.0411	12	3119	472	84	700	Fail	82
1.0509	10	3039	462	84	840	Fail	82
1.0607	9	2972	453	83	922	Fail	82
1.0705	7	2887	444	82	1171	Fail	82
1.0803	6	2805	437	79	1317	Fail	82
1.0901	5	2730	429	78	1560	Fail	82
1.0998	5	2676	419	76	1520	Fail	82
1.1096	5	2615	406	75	1500	Fail	82
1.1194	4	2564	401	74	1850	Fail	82
1.1292	4	2516	396	74	1850	Fail	81
1.139	3	2463	387	73	2433	Fail	81
1.1488	3	2401	378	71	2367	Fail	81

1.1586	3	2346	374	70	2333	Fail	81
1.1683	2	2309	372	70	3500	Fail	81
1.1781	1	2266	366	69	6900	Fail	81
1.1879	1	2217	363	69	6900	Fail	81
1.1977	0	2171	359	67	N/A	Fail	81
1.2075	0	2133	352	66	N/A	Fail	81
1.2173	0	2081	347	65	N/A	Fail	81

City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Plot
Curry Pond



City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Summary
Curry Pond

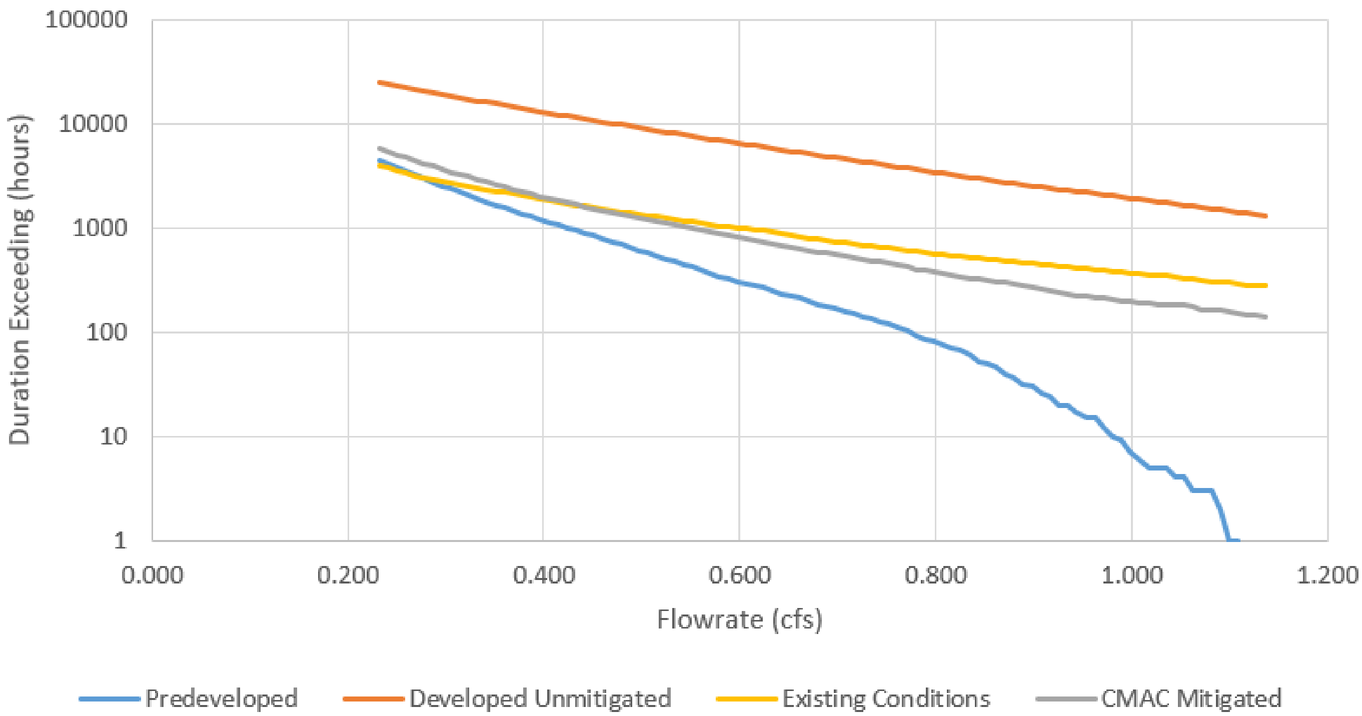
Note: Flow durations were brought as close as possible to pre-developed durations by adjusting the active orifice sizes and CMAC control parameters. Passing conditions could not be achieved for all flow durations because of the volume of the existing ponds.

Flow(cfs)	Duration Exceeding Flowrate, hours				Percentage (Mitigated/ Predeveloped)	Pass/Fail Status for Current Flow Control Standard	Percent Reduction from Existing Conditions
	Predeveloped	Developed Unmitigated	Existing Conditions	CMAC Mitigated			
0.2503	4388	26019	20578	3420	78	Pass	83
0.2602	4038	25062	18272	3221	80	Pass	82
0.2701	3729	24241	16142	3030	81	Pass	81
0.2799	3456	23386	14157	2861	83	Pass	80
0.2898	3212	22569	12373	2696	84	Pass	78
0.2996	2955	21780	10877	2543	86	Pass	77
0.3095	2723	21047	9526	2408	88	Pass	75
0.3193	2527	20332	8245	2264	90	Pass	73
0.3292	2346	19635	7078	2144	91	Pass	70
0.339	2183	18993	6051	1998	92	Pass	67
0.3489	2043	18386	5080	1887	92	Pass	63
0.3587	1893	17819	4086	1805	95	Pass	56
0.3686	1768	17253	3202	1717	97	Pass	46
0.3785	1644	16696	2311	1635	99	Pass	29
0.3883	1539	16181	1988	1562	101	Pass	21
0.3982	1442	15723	1848	1489	103	Pass	19
0.408	1361	15261	1785	1424	105	Pass	20
0.4179	1273	14771	1714	1367	107	Pass	20
0.4277	1202	14310	1648	1320	110	Pass	20
0.4376	1129	13905	1588	1266	112	Fail	20
0.4474	1057	13423	1537	1216	115	Fail	21
0.4573	1003	12991	1483	1171	117	Fail	21
0.4671	942	12579	1441	1128	120	Fail	22
0.477	887	12198	1400	1091	123	Fail	22
0.4868	835	11844	1358	1054	126	Fail	22
0.4967	787	11514	1324	1026	130	Fail	23
0.5066	740	11175	1287	995	134	Fail	23
0.5164	697	10833	1255	968	139	Fail	23
0.5263	648	10496	1217	938	145	Fail	23
0.5361	611	10231	1194	904	148	Fail	24
0.546	577	9938	1157	878	152	Fail	24
0.5558	541	9658	1129	849	157	Fail	25
0.5657	503	9391	1101	818	163	Fail	26
0.5755	477	9112	1073	791	166	Fail	26
0.5854	446	8871	1057	761	171	Fail	28
0.5952	421	8598	1038	741	176	Fail	29
0.6051	395	8336	1018	723	183	Fail	29
0.6149	370	8085	991	703	190	Fail	29
0.6248	343	7873	963	680	198	Fail	29
0.6347	325	7657	947	648	199	Fail	32

0.6445	306	7449	926	627	205	Fail	32
0.6544	291	7221	908	611	210	Fail	33
0.6642	275	7012	894	590	215	Fail	34
0.6741	263	6827	874	574	218	Fail	34
0.6839	245	6640	850	561	229	Fail	34
0.6938	234	6461	820	549	235	Fail	33
0.7036	221	6297	804	525	238	Fail	35
0.7135	209	6129	794	509	244	Fail	36
0.7233	196	5942	772	492	251	Fail	36
0.7332	181	5768	763	480	265	Fail	37
0.743	175	5603	742	463	265	Fail	38
0.7529	168	5464	720	452	269	Fail	37
0.7628	158	5319	711	435	275	Fail	39
0.7726	149	5196	694	423	284	Fail	39
0.7825	141	5058	679	417	296	Fail	39
0.7923	134	4925	670	407	304	Fail	39
0.8022	124	4808	656	395	319	Fail	40
0.812	118	4669	642	383	325	Fail	40
0.8219	109	4541	626	374	343	Fail	40
0.8317	101	4406	616	366	362	Fail	41
0.8416	93	4284	602	360	387	Fail	40
0.8514	86	4175	592	349	406	Fail	41
0.8613	81	4063	584	342	422	Fail	41
0.8712	74	3962	568	334	451	Fail	41
0.881	71	3855	562	329	463	Fail	41
0.8909	66	3744	552	316	479	Fail	43
0.9007	59	3662	543	307	520	Fail	43
0.9106	52	3565	527	303	583	Fail	43
0.9204	50	3467	516	297	594	Fail	42
0.9303	45	3380	505	284	631	Fail	44
0.9401	40	3298	499	276	690	Fail	45
0.95	36	3208	492	268	744	Fail	46
0.9598	31	3123	481	264	852	Fail	45
0.9697	30	3047	478	254	847	Fail	47
0.9795	26	2958	468	247	950	Fail	47
0.9894	24	2878	460	239	996	Fail	48
0.9993	20	2801	456	230	1150	Fail	50
1.0091	20	2729	450	221	1105	Fail	51
1.019	17	2661	446	218	1282	Fail	51
1.0288	15	2597	438	213	1420	Fail	51
1.0387	15	2540	431	209	1393	Fail	52
1.0485	12	2484	427	204	1700	Fail	52
1.0584	10	2426	413	197	1970	Fail	52
1.0682	9	2365	408	196	2178	Fail	52
1.0781	7	2320	405	191	2729	Fail	53
1.0879	6	2265	396	185	3083	Fail	53
1.0978	5	2212	391	184	3680	Fail	53
1.1076	5	2162	379	178	3560	Fail	53
1.1175	5	2108	374	176	3520	Fail	53
1.1274	4	2064	367	172	4300	Fail	53
1.1372	4	2014	358	166	4150	Fail	54
1.1471	3	1978	350	164	5467	Fail	53
1.1569	3	1930	346	161	5367	Fail	53
1.1668	3	1889	339	160	5333	Fail	53

1.1766	2	1838	333	157	7850	Fail	53
1.1865	1	1796	331	151	15100	Fail	54
1.1963	1	1756	326	148	14800	Fail	55
1.2062	0	1714	322	144	N/A	Fail	55
1.216	0	1666	315	137	N/A	Fail	57
1.2259	0	1634	309	135	N/A	Fail	56

City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Plot
Taloora Aye Pond



City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Summary
Taloora Aye Pond

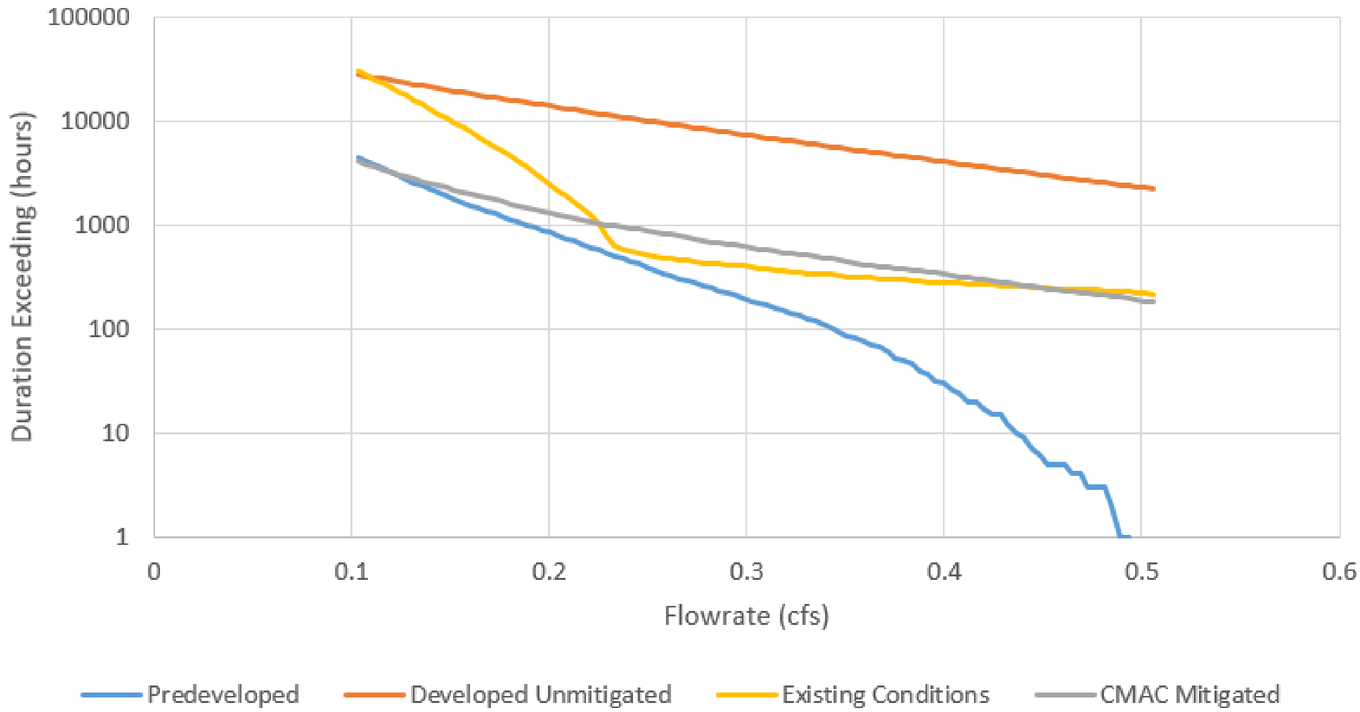
Note: Flow durations were brought as close as possible to pre-developed durations by adjusting the active orifice sizes and CMAC control parameters. Passing conditions could not be achieved for all flow durations because of the volume of the existing ponds.

Flow(cfs)	Duration Exceeding Flowrate, hours				Percentage (Mitigated/ Predeveloped)	Pass/Fail	Percent Reduction from Existing Conditions
	Predeveloped	Developed Unmitigated	Existing Conditions	CMAC Mitigated			
0.232	4385	24904	4005	5681	130	Fail	-42
0.241	4038	23986	3765	5329	132	Fail	-42
0.250	3730	23032	3551	4990	134	Fail	-41
0.259	3455	22179	3367	4682	136	Fail	-39
0.269	3214	21337	3179	4412	137	Fail	-39
0.278	2955	20530	3009	4137	140	Fail	-37
0.287	2723	19825	2892	3893	143	Fail	-35
0.296	2527	19098	2785	3665	145	Fail	-32
0.305	2348	18439	2671	3442	147	Fail	-29
0.314	2184	17800	2581	3238	148	Fail	-25
0.323	2043	17189	2487	3074	150	Fail	-24
0.332	1893	16605	2397	2897	153	Fail	-21
0.342	1768	16054	2324	2737	155	Fail	-18
0.351	1644	15502	2250	2584	157	Fail	-15
0.360	1539	14991	2178	2463	160	Fail	-13
0.369	1442	14509	2090	2333	162	Fail	-12
0.378	1360	14015	2014	2204	162	Fail	-9
0.387	1273	13502	1942	2100	165	Fail	-8
0.396	1202	13030	1878	1997	166	Fail	-6
0.406	1129	12583	1800	1905	169	Fail	-6
0.415	1056	12175	1747	1809	171	Fail	-4
0.424	1003	11798	1692	1739	173	Fail	-3
0.433	943	11428	1638	1669	177	Fail	-2
0.442	887	11084	1598	1589	179	Fail	1
0.451	835	10734	1548	1519	182	Fail	2
0.460	787	10389	1505	1459	185	Fail	3
0.469	740	10075	1460	1401	189	Fail	4
0.479	697	9781	1407	1352	194	Fail	4
0.488	648	9448	1374	1298	200	Fail	6
0.497	610	9161	1340	1249	205	Fail	7
0.506	577	8904	1308	1200	208	Fail	8
0.515	541	8613	1275	1144	211	Fail	10
0.524	503	8324	1226	1102	219	Fail	10
0.533	477	8066	1192	1072	225	Fail	10
0.542	446	7818	1169	1040	233	Fail	11
0.552	421	7591	1132	1001	238	Fail	12
0.561	395	7373	1102	967	245	Fail	12
0.570	370	7115	1075	918	248	Fail	15
0.579	343	6923	1043	885	258	Fail	15
0.588	325	6725	1024	852	262	Fail	17

0.597	306	6529	1005	823	269	Fail	18
0.606	291	6329	983	794	273	Fail	19
0.616	275	6134	960	760	276	Fail	21
0.625	263	5948	936	722	275	Fail	23
0.634	245	5776	904	698	285	Fail	23
0.643	234	5590	881	675	288	Fail	23
0.652	221	5444	855	650	294	Fail	24
0.661	209	5290	831	623	298	Fail	25
0.670	196	5135	797	601	307	Fail	25
0.679	181	5005	774	587	324	Fail	24
0.689	175	4849	757	571	326	Fail	25
0.698	169	4701	734	554	328	Fail	25
0.707	158	4566	713	532	337	Fail	25
0.716	149	4435	698	518	348	Fail	26
0.725	141	4308	679	501	355	Fail	26
0.734	134	4178	664	484	361	Fail	27
0.743	124	4065	652	471	380	Fail	28
0.752	118	3947	638	460	390	Fail	28
0.762	109	3844	623	442	406	Fail	29
0.771	101	3736	611	417	413	Fail	32
0.780	93	3633	597	400	430	Fail	33
0.789	86	3522	580	389	452	Fail	33
0.798	81	3423	565	377	465	Fail	33
0.807	74	3331	550	360	486	Fail	35
0.816	71	3225	540	350	493	Fail	35
0.826	66	3134	526	340	515	Fail	35
0.835	59	3050	514	330	559	Fail	36
0.844	52	2960	507	320	615	Fail	37
0.853	50	2873	497	309	618	Fail	38
0.862	45	2806	487	301	669	Fail	38
0.871	40	2731	478	295	738	Fail	38
0.880	36	2659	470	286	794	Fail	39
0.889	31	2584	464	275	887	Fail	41
0.899	30	2513	455	265	883	Fail	42
0.908	26	2455	447	256	985	Fail	43
0.917	24	2391	440	250	1042	Fail	43
0.926	20	2328	431	241	1205	Fail	44
0.935	20	2275	425	230	1150	Fail	46
0.944	17	2220	415	224	1318	Fail	46
0.953	15	2173	404	220	1467	Fail	46
0.962	15	2116	396	212	1413	Fail	46
0.972	12	2067	391	209	1742	Fail	47
0.981	10	2015	381	202	2020	Fail	47
0.990	9	1972	375	199	2211	Fail	47
0.999	7	1928	369	194	2771	Fail	47
1.008	6	1878	363	191	3183	Fail	47
1.017	5	1828	356	186	3720	Fail	48
1.026	5	1777	350	183	3660	Fail	48
1.036	5	1728	345	182	3640	Fail	47
1.045	4	1682	336	181	4525	Fail	46
1.054	4	1645	330	179	4475	Fail	46
1.063	3	1604	325	174	5800	Fail	46
1.072	3	1570	318	165	5500	Fail	48
1.081	3	1522	306	164	5467	Fail	46

1.090	2	1487	300	162	8100	Fail	46
1.099	1	1453	296	156	15600	Fail	47
1.109	1	1414	287	148	14800	Fail	48
1.118	0	1375	282	146	N/A	Fail	48
1.127	0	1335	277	143	N/A	Fail	48
1.136	0	1306	276	139	N/A	Fail	50

City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Plot
Fischer Village Pond 1



City of Redmond
CMAC Retrofit Pilot Project
Flow Duration Summary
Fischer Village Pond 1

Note: Flow Parameters were brought as close as possible to pre-developed durations by adjusting the active orifice sizes and CMAC control parameters. Passing conditions could not be achieved for all flow durations because of the volume of the existing ponds.

Flow(cfs)	Duration Exceeding Flowrate, hours				Percentage (Mitigated/ Predeveloped)	Pass/Fail	Percent Reduction from Existing Conditions
	Predeveloped	Developed Unmitigated	Existing Conditions	CMAC Mitigated			
0.1032	4386	28181	30056	4093	93	Pass	86
0.1073	4034	27196	27497	3861	96	Pass	86
0.1113	3731	26299	25202	3634	97	Pass	86
0.1154	3454	25403	23018	3436	99	Pass	85
0.1194	3216	24663	21038	3240	101	Pass	85
0.1235	2955	23947	19163	3067	104	Pass	84
0.1276	2722	23266	17362	2894	106	Fail	83
0.1316	2527	22542	15834	2755	109	Fail	83
0.1357	2346	21833	14264	2623	112	Fail	82
0.1398	2177	21132	12903	2500	115	Fail	81
0.1438	2043	20531	11688	2375	116	Fail	80
0.1479	1891	19882	10576	2278	120	Fail	78
0.1519	1768	19315	9584	2167	123	Fail	77
0.156	1644	18767	8671	2079	126	Fail	76
0.1601	1536	18267	7813	1995	130	Fail	74
0.1641	1442	17751	7056	1904	132	Fail	73
0.1682	1360	17245	6321	1809	133	Fail	71
0.1723	1273	16782	5669	1738	137	Fail	69
0.1763	1202	16319	5089	1669	139	Fail	67
0.1804	1129	15887	4567	1579	140	Fail	65
0.1844	1057	15508	4069	1515	143	Fail	63
0.1885	1003	15095	3585	1452	145	Fail	59
0.1926	942	14677	3135	1387	147	Fail	56
0.1966	887	14279	2764	1326	149	Fail	52
0.2007	835	13896	2418	1286	154	Fail	47
0.2047	787	13518	2132	1236	157	Fail	42
0.2088	740	13131	1875	1195	161	Fail	36
0.2129	697	12748	1657	1153	165	Fail	30
0.2169	648	12406	1433	1121	173	Fail	22
0.221	610	12081	1221	1084	178	Fail	11
0.2251	577	11743	1025	1046	181	Fail	-2
0.2291	541	11466	776	1001	185	Fail	-29
0.2332	503	11174	614	970	193	Fail	-58
0.2372	477	10870	584	942	197	Fail	-61
0.2413	446	10579	557	923	207	Fail	-66
0.2454	421	10299	534	898	213	Fail	-68
0.2494	395	10049	515	876	222	Fail	-70
0.2535	370	9817	494	852	230	Fail	-72
0.2576	343	9560	480	831	242	Fail	-73
0.2616	325	9327	470	805	248	Fail	-71

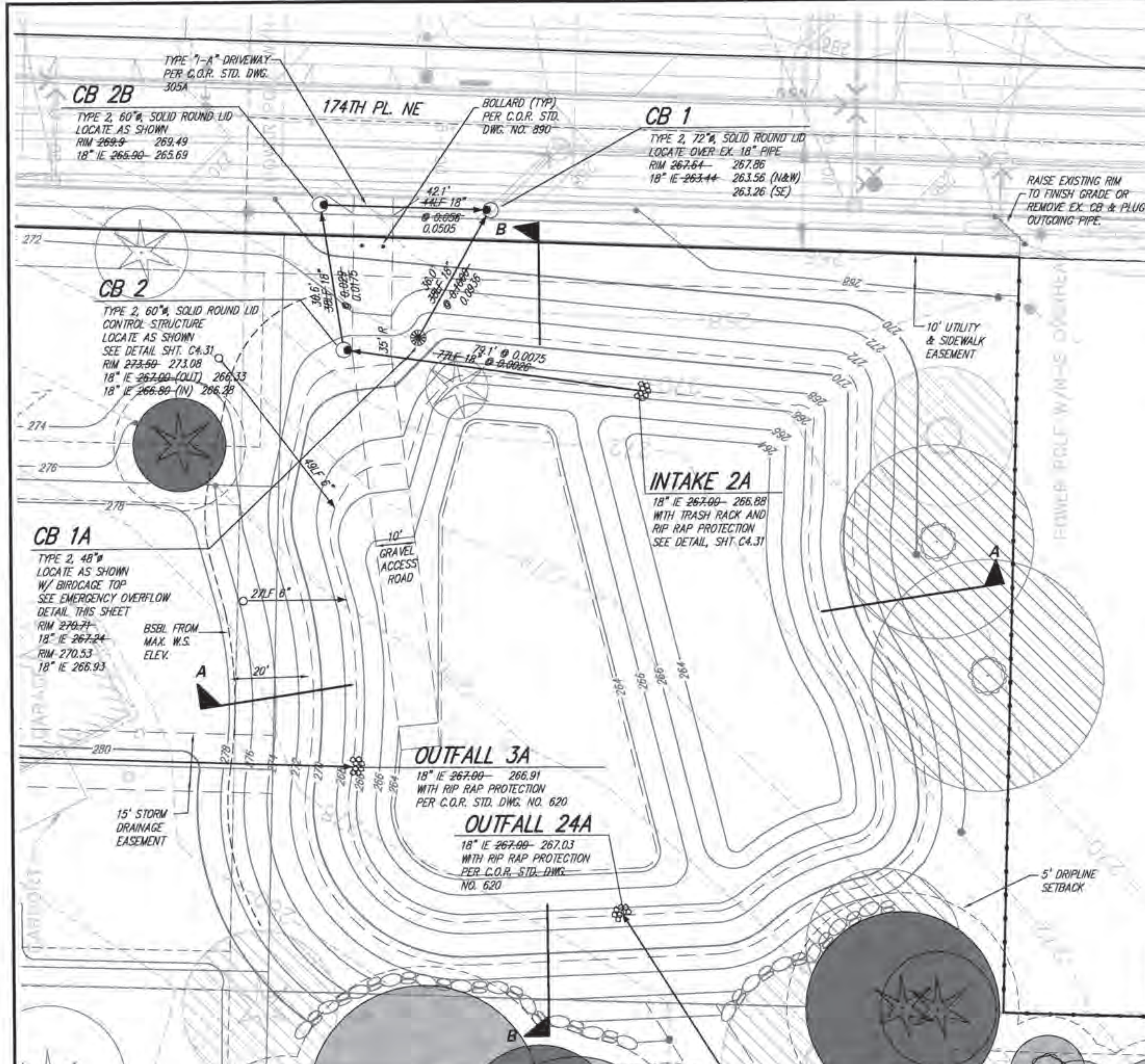
0.2657	306	9086	460	770	252	Fail	-67
0.2697	291	8848	451	752	258	Fail	-67
0.2738	275	8599	444	723	263	Fail	-63
0.2779	262	8380	432	704	269	Fail	-63
0.2819	245	8200	427	685	280	Fail	-60
0.286	234	7986	423	664	284	Fail	-57
0.29	221	7794	416	648	293	Fail	-56
0.2941	209	7595	411	637	305	Fail	-55
0.2982	196	7395	404	618	315	Fail	-53
0.3022	181	7205	393	595	329	Fail	-51
0.3063	175	7013	381	586	335	Fail	-54
0.3104	168	6837	378	569	339	Fail	-51
0.3144	158	6686	368	553	350	Fail	-50
0.3185	149	6513	360	539	362	Fail	-50
0.3225	141	6365	352	529	375	Fail	-50
0.3266	134	6221	344	520	388	Fail	-51
0.3307	124	6083	340	511	412	Fail	-50
0.3347	118	5938	335	500	424	Fail	-49
0.3388	109	5757	335	481	441	Fail	-44
0.3429	101	5610	331	470	465	Fail	-42
0.3469	93	5490	327	457	491	Fail	-40
0.351	86	5361	317	444	516	Fail	-40
0.355	81	5243	314	426	526	Fail	-36
0.3591	74	5131	311	415	561	Fail	-33
0.3632	71	5010	308	408	575	Fail	-32
0.3672	66	4891	305	393	595	Fail	-29
0.3713	59	4785	301	386	654	Fail	-28
0.3753	52	4679	300	382	735	Fail	-27
0.3794	50	4563	295	377	754	Fail	-28
0.3835	45	4447	291	371	824	Fail	-27
0.3875	40	4338	284	362	905	Fail	-27
0.3916	36	4221	281	354	983	Fail	-26
0.3957	31	4125	279	346	1116	Fail	-24
0.3997	30	4030	278	334	1113	Fail	-20
0.4038	26	3938	275	328	1262	Fail	-19
0.4078	24	3832	273	318	1325	Fail	-16
0.4119	20	3750	270	312	1560	Fail	-16
0.416	20	3669	266	306	1530	Fail	-15
0.42	17	3580	266	295	1735	Fail	-11
0.4241	15	3493	265	285	1900	Fail	-8
0.4282	15	3425	261	281	1873	Fail	-8
0.4322	12	3340	257	276	2300	Fail	-7
0.4363	10	3261	257	270	2700	Fail	-5
0.4403	9	3192	253	262	2911	Fail	-4
0.4444	7	3130	250	256	3657	Fail	-2
0.4485	6	3057	247	248	4133	Fail	0
0.4525	5	2986	244	243	4860	Fail	0
0.4566	5	2904	243	237	4740	Fail	2
0.4607	5	2834	242	233	4660	Fail	4
0.4647	4	2757	240	228	5700	Fail	5
0.4688	4	2692	239	221	5525	Fail	8
0.4728	3	2634	238	218	7267	Fail	8
0.4769	3	2584	237	213	7100	Fail	10
0.481	3	2535	233	209	6967	Fail	10

0.485	2	2488	230	205	10250	Fail	11
0.4891	1	2433	230	202	20200	Fail	12
0.4931	1	2381	230	194	19400	Fail	16
0.4972	0	2332	224	186	N/A	Fail	17
0.5013	0	2293	217	185	N/A	Fail	15
0.5053	0	2249	215	179	N/A	Fail	17

APPENDIX B

Curry East and Whistler Ridge Pond As-Built Drawings

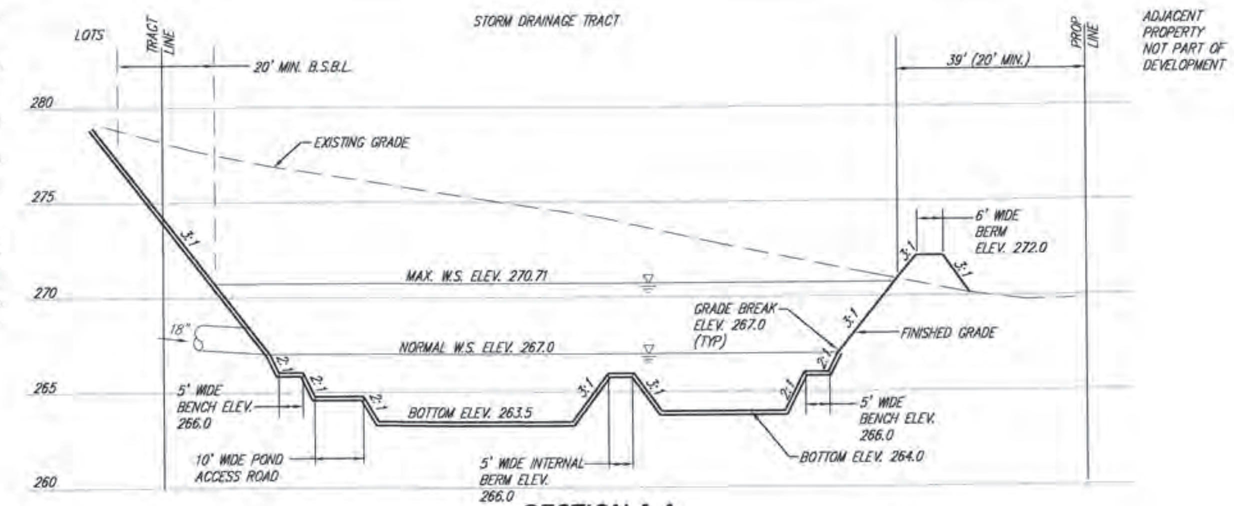
SEC. 25, TWP. 26 N., RGE. 5 E., W.M.



WATER QUALITY/DETENTION POND PLAN

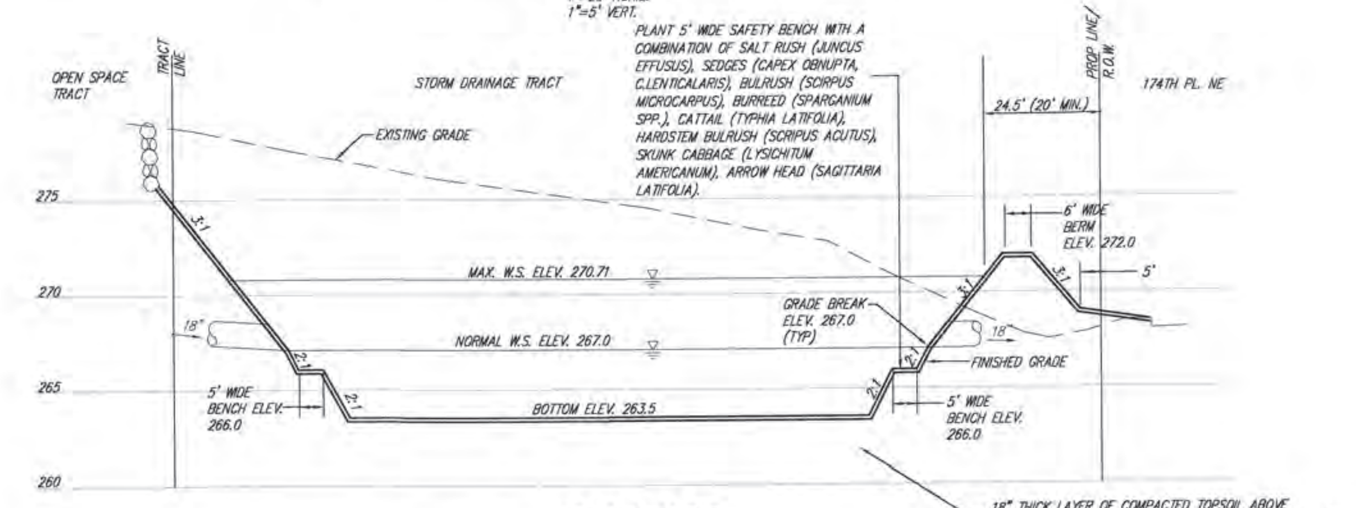
1" = 20'

DEAD STORAGE VOLUME REQUIRED = 37,607 CF
DEAD STORAGE VOLUME PROVIDED = 39,278 CF
LIVE STORAGE VOLUME REQUIRED = 72,313 CF
LIVE STORAGE VOLUME PROVIDED = 72,313 CF



SECTION A-A

1"=20' HORIZ.
1"=5' VERT.



SECTION B-B

1"=20' HORIZ.
1"=5' VERT.

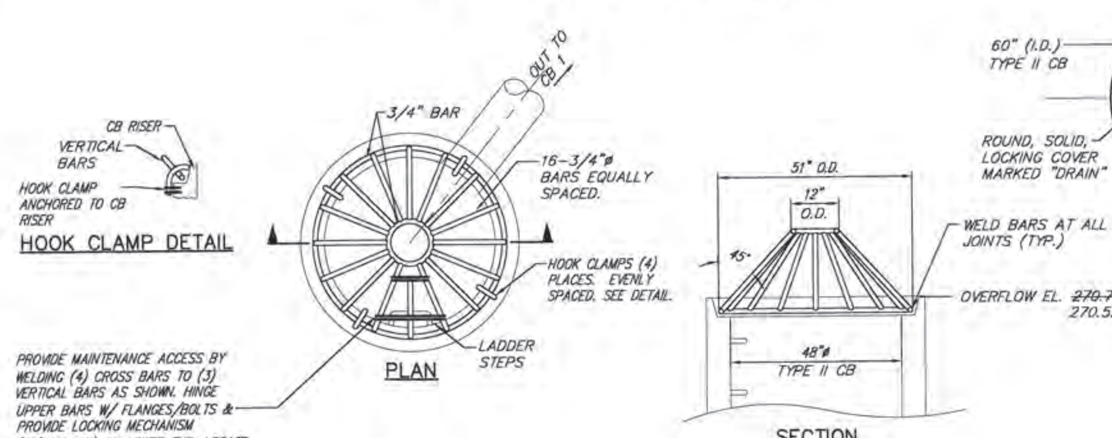
18" THICK LAYER OF COMPACTED TOPSOIL ABOVE IMPERMEABLE LINER (TYP), LINER MAY BE EITHER A 12" THICK LAYER OF CLAY OR GEOMEMBRANE. SEE CLAY LINER SPECIFICATIONS THIS SHEET. GEOMEMBRANE SHALL HAVE A MIN. THICKNESS OF 30 MILS AND BE ULTRAVIOLET RESISTANT. GEOTEXTILE FABRIC SHALL BE INSTALLED ON THE TOP AND BOTTOM OF THE GEOMEMBRANE. SEE GEOTEXTILE FABRIC SPECIFICATIONS, THIS SHEET.

CLAY LINER SPECIFICATIONS

PROPERTY	TEST METHOD	UNIT	SPECIFICATION
PERMEABILITY	ASTM D-2434	CM/SEC	1×10^{-6}
PLASTICITY INDEX OF CLAY	ASTM D-423 & D-424	PERCENT	NOT LESS THAN 15
LIQUID LIMIT OF CLAY	ASTM D-2216	PERCENT	NOT LESS THAN 30
CLAY PARTICLES PASSING	ASTM D-422	PERCENT	NOT LESS THAN 30
CLAY COMPACTION	ASTM D-2216	PERCENT	95% OF STANDARD PROCTOR DENSITY

GEOTEXTILE FABRIC SPECIFICATIONS

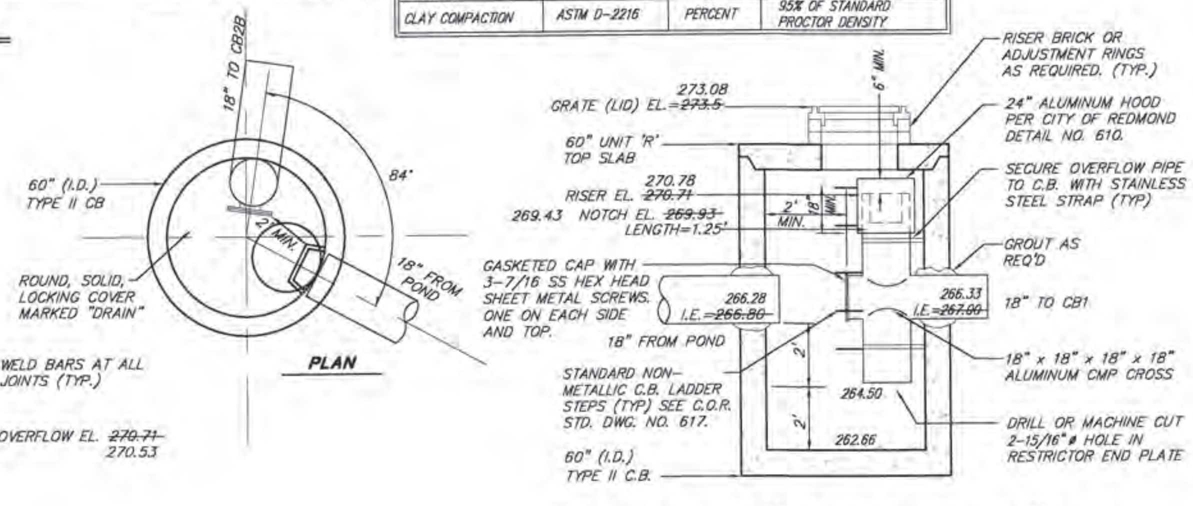
PROPERTY	TEST METHOD	UNIT	SPECIFICATION
MATERIAL			NONWOVEN GEOTEXTILE
UNIT WEIGHT		OZ/SQ. YD.	8 (MIN)
FILTRATION RATE		IN./SEC.	0.08 (MIN)
PUNCTURE STRENGTH	ASTM D-751 (MODIFIED)	LBS	125 (MIN)
MULLEN BURST STRENGTH	ASTM D-751	PSI	400 (MIN)
TENSILE STRENGTH	ASTM D-1682	LBS	300 (MIN)
EQUIVALENT OPENING SIZE	US STANDARD SIEVE	NO.	80 (MIN)



PROVIDE MAINTENANCE ACCESS BY WELDING (4) CROSS BARS TO (3) VERTICAL BARS AS SHOWN. HINGE UPPER BARS W/ FLANGES/BOLTS & PROVIDE LOCKING MECHANISM (W/PADLOCK) ON LOWER END. LOCATE LADDER STEPS DIRECTLY BELOW.

CB 1A EMERGENCY OVERFLOW CB

NOT TO SCALE



NOTE: ALL PARTS AND SURFACES MUST BE MADE OF NON-METALLIC MATERIAL OR ALUMINUM. COMPLETE CORROSION PROTECTION MUST BE ASSURED.

SEE CITY OF REDMOND STANDARD PLAN NO. 610 FOR ADDITIONAL DETAILS.

CB 2, CONTROL STRUCTURE

SCALE: 1" = 3'

RECORD DRAWING
04-278

POND DETAILS
CURRY P.R.D.

CAMWEST REAL ESTATE DEVELOPMENT
9720 NE 120TH PL. #100
KIRKLAND, WASHINGTON 98034

AS-BUILT

CORE DESIGN
ENGINEERING · PLANNING · SURVEYING
14711 NE 29th Place Suite 101
Bellevue, Washington 98007
425.885.7877 Fax 425.885.7963

10-17-05

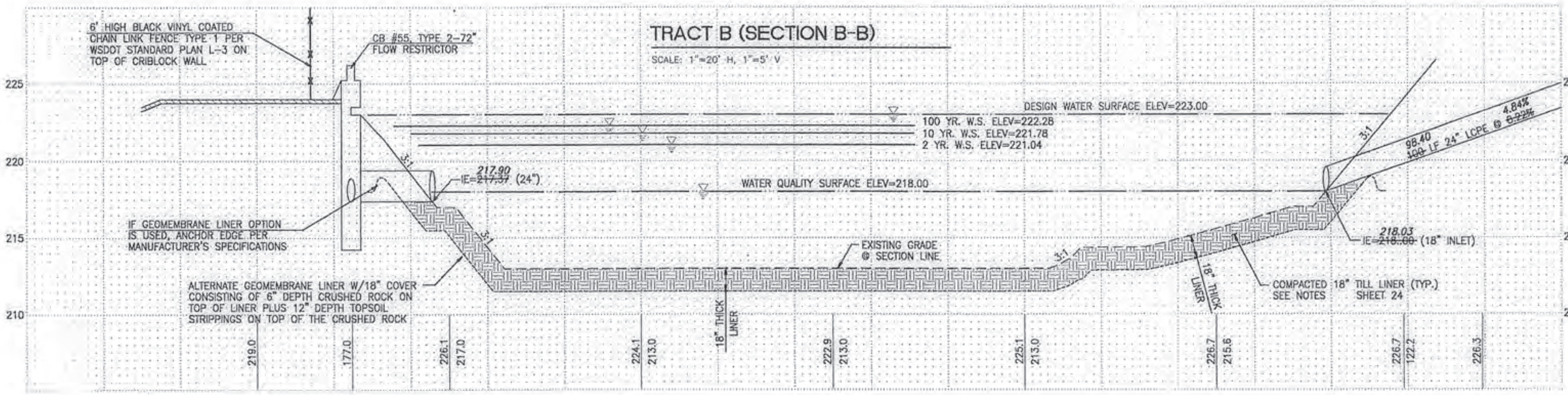
DATE	JANUARY 2003
DESIGNED	GINA R. BROOKS, P.E.
DRAWN	T.L. KENDALL
APPROVED	J.A.O.
	JAMES A. OLSEN, P.E. PROJECT MANAGER
SHEET	C4.32
OF	46
PROJECT NUMBER	00009A

NO. REVISIONS DATE

J:\2000\00009\As-Built\00009C432.dwg, 10/27/05 5:43:21 PM, sdm

A PORTION OF THE SE 1/4 OF SECTION 25, TOWNSHIP 26 N., RANGE 5 E., W.M.
CITY OF REDMOND, KING COUNTY, WASHINGTON

NOTE: THE DEVELOPMENT SHALL BE CONSTRUCTED WITH THE CITY OF REDMOND YEAR 2000 STANDARD SPECIFICATIONS AND DETAILS.



TRACT 'B' WETPOND/DETENTION DATA:

WETPOND
TOP OF POND EL=224.00
EMERGENCY OVERFLOW WATER SURFACE EL = 223.70
EMERGENCY OVERFLOW SPILLWAY EL = 223.00
DETENTION LIVE WATER SURFACE EL = 223.00
WATER QUALITY STATIC SURFACE ELEV = 218.00
BOTTOM OF WET/DETENTION POND ELEV = 213.00

WETPOND VOLUME REQUIRED = 49,624 C.F.
WETPOND VOLUME PROVIDED = ~~60,178~~ C.F. 50,279
LENGTH TO WIDTH RATIO = 3.1:1 > 3:1

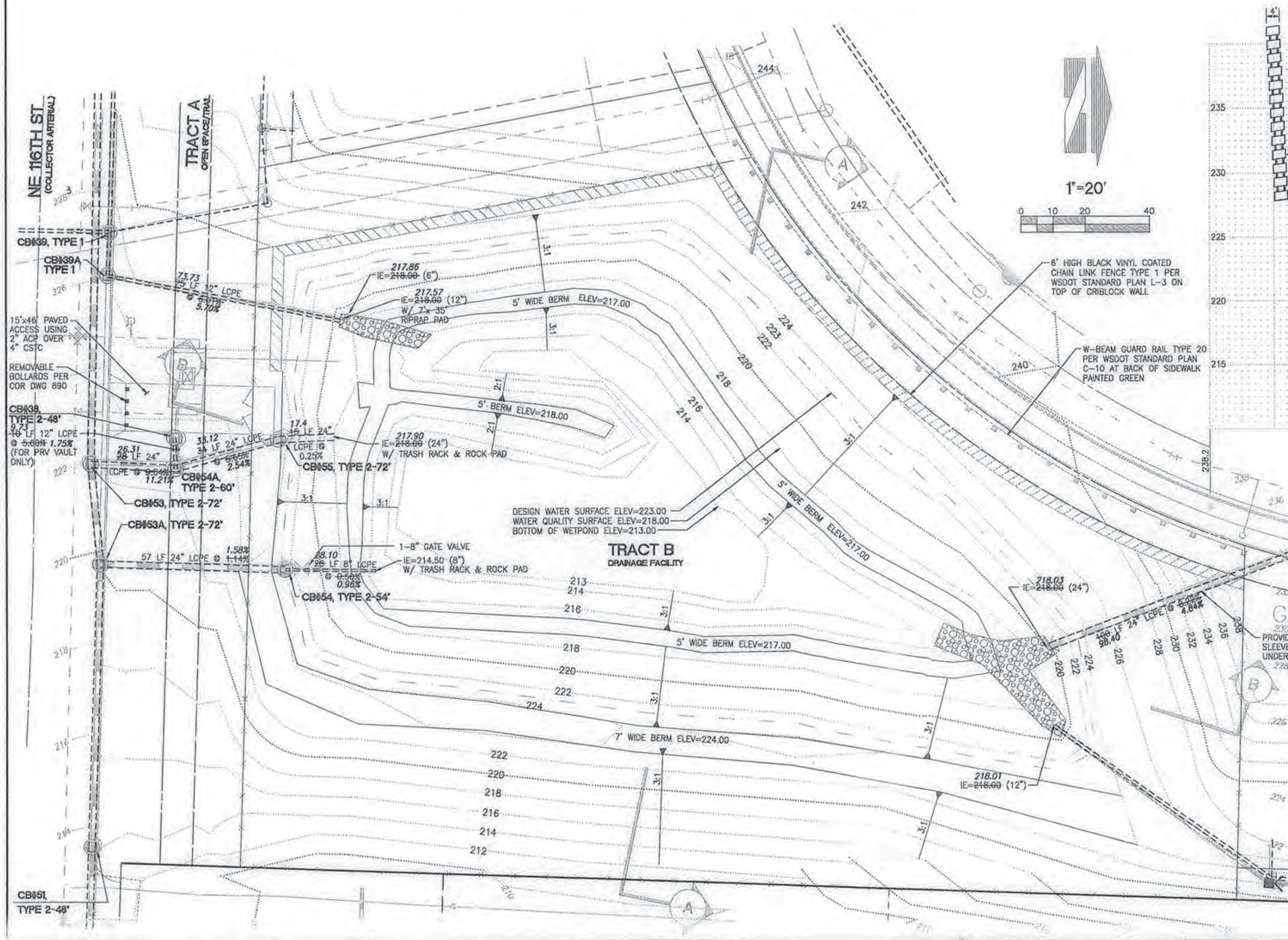
ELEVATION	AREA (SF)	INCREMENTAL VOLUME	TOTAL VOLUME
213	~~6,947~~ 4,222	0	0
214	~~8,504~~ 6,617	~~7,725~~ 5,420	~~7,725~~ 5,420
216	~~12,144~~ 9,900	~~20,648~~ 16,517	~~28,373~~ 21,780
217	~~17,656~~ 14,848	~~13,211~~ 12,380	41,584 34,160
218	~~19,632~~ 17,390	~~18,504~~ 16,119	~~60,178~~ 50,279

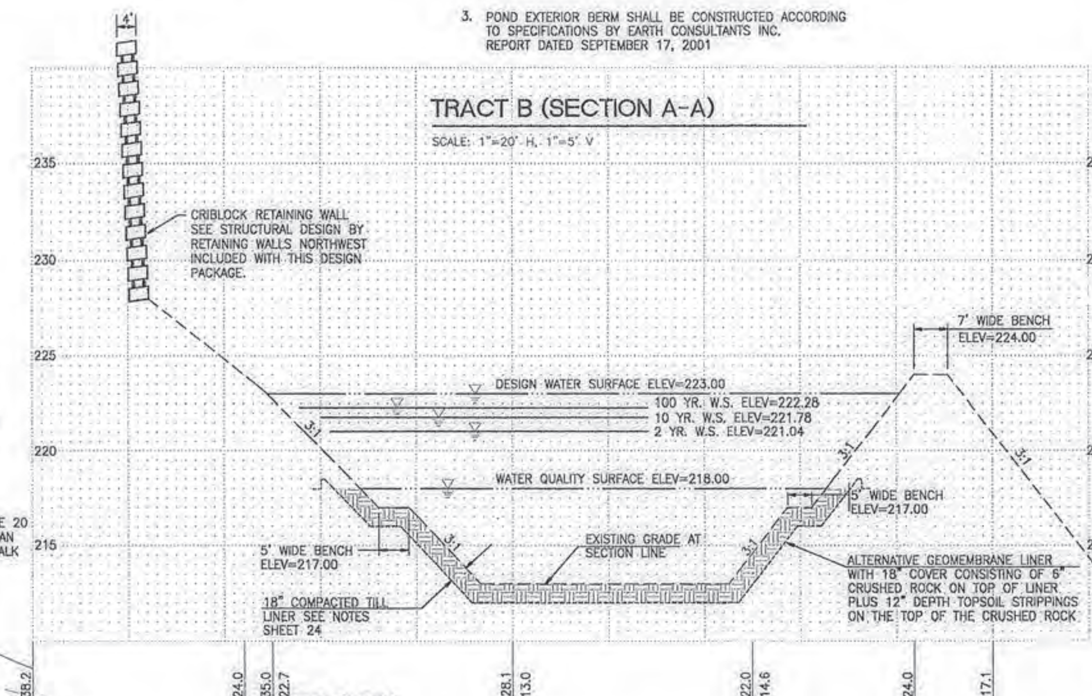
DETENTION VOLUME REQUIRED = 101,948 C.F.
DETENTION VOLUME PROVIDED = ~~122,592~~ C.F. 114,662

ELEVATION	AREA (SF)	INCREMENTAL VOLUME	TOTAL VOLUME
218	~~19,632~~ 17,390	0	0
220	~~23,403~~ 21,821	~~42,935~~ 39,211	~~42,935~~ 39,211
222	~~27,595~~ 26,282	~~50,908~~ 48,103	~~93,843~~ 87,314
223	~~29,903~~ 28,413	~~28,749~~ 27,348	~~122,592~~ 114,662

NOTES:

1. REFER TO LANDSCAPE PLANS SHTS L1-L8 FOR SPECIFICATION OF AQUATIC PLANTINGS FOR WET POND PER DOE.
2. SEE SHEET 24 FOR POND LINER SPECIFICATIONS.
3. POND EXTERIOR BERM SHALL BE CONSTRUCTED ACCORDING TO SPECIFICATIONS BY EARTH CONSULTANTS INC. REPORT DATED SEPTEMBER 17, 2001





CB DATA

CB#38, TYPE 2-48"
W/ SOLID LID
2593251.18 N: ~~2593252.2379~~
1327089.55 E: ~~1327089.7157~~
223.47 RIM=~~223.50~~
217.80 IE=~~217.58~~ (12" OUT E)
THE GRATE SHALL HAVE A HOLE CUT IN TO ACCOMODATE 6" PRV RELIEF VALVE DISCHARGE PER COR STD. DWG. 710A

CB #39A TYPE 1
W/ VANED GRATE
64+49.90, 17.29' STA. ~~64+50, 21.25'~~ LT
225.91 RIM=~~226.00~~
222.62 IE=~~221.50~~ (12" IN W)
222.06 IE=~~221.50~~ (12" OUT NE)

CB #53, TYPE 2-72"
65+08.70, 17.29' STA. ~~65+08.63, 17.00'~~ LT
W/ROUND SOLID LOCKING LID
221.8 RIM=~~221.08~~
213.68 IE=~~213.55~~ (24" IN N)
213.10 IE=~~213.55~~ (24" IN W)
213.50 IE=~~213.55~~ (24" OUT E)

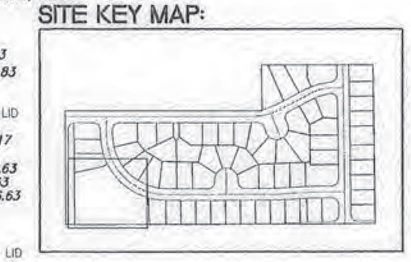
CB #53A, TYPE 2-72"
65+40.08, 20.95' STA. ~~65+40, 21.25'~~ LT
W/VANED GRATE
219.58 RIM=~~219.71~~
211.93 IE=~~212.38~~ (24" IN N)
211.48 IE=~~212.38~~ (24" IN W)
211.78 IE=~~212.38~~ (24" OUT E)

CB#54, TYPE 2-54"
STA ~~65+40, 78.25'~~ LT 65+40.46, 78.09'
EMERGENCY OVERFLOW
W/ BIRDCAGE TOP
RIM=~~223.00~~ 222.56
IE=~~214.38~~ (8" IN NE) 214.23
IE=~~213.03~~ (24" OUT S) 212.83

CB #54A, TYPE 2-60"
W/ ROUND SOLID LOCKING LID
N: ~~259352.0074~~ 259351.84
E: ~~1327097.7124~~ 1327098.17
RIM=~~223.50~~ 223.16
IE=~~216.08~~ (24" IN NW) 216.63
IE=~~217.08~~ (12" IN W) 217.63
IE=~~216.08~~ (24" OUT S) 216.63

CB#55, TYPE 2-72"
FLOW RESTRICTOR
W/ ROUND, SOLID LOCKING LID
RIM=~~226.00~~ 226.22
IE=~~217.06~~ (24" IN N) 217.37
IE=~~218.00~~ (24" OUT S) 217.47

SITE KEY MAP:



12-19-03
EXPIRES 2/8/04

02-1032

No.	Date	By	Ckd.	Appr.	Revision
4	8-21-03	CMT	CMT	RJA	ASBUILT PLANS
3	4-15-02	CMT	CMT	RJA	REVISED PER CITY OF REDMOND REVIEW #3
2	2-19-02	CMT	CMT	RJA	REVISED PER CITY OF REDMOND REVIEW #2
1	1-2-02	CMT	CMT	RJA	REVISED PER CITY OF REDMOND REVIEW #1

Title: TRACT B
DRAINAGE POND PLAN
SECTIONS AND DETAILS
WHISTLER RIDGE PPL99-001

For: JOHN F. BUCHAN CONSTRUCTION, INC.
2821 NORTHUP WAY, SUITE 100
BELLEVUE, WA 98004
CONTACT: MIKE DELILE (425) 417-5005

Scale: Horizontal 1"=20' Vertical 1"=5'
Designed CMT Drawn CMT Checked RJA Approved RJA Date 9/17/01

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES
CONTACT: ROB ARMSTRONG

Job Number 6918
Sheet 23 of 58

A PORTION OF THE SE 1/4 OF SECTION 25, TOWNSHIP 26 N., RANGE 5 E., W.M.
CITY OF REDMOND, KING COUNTY, WASHINGTON

NOTE: THE DEVELOPMENT SHALL BE CONSTRUCTED WITH THE CITY OF REDMOND YEAR 2000 STANDARD SPECIFICATIONS AND DETAILS.

COMPACTED TILL LINERS:

1. LINER THICKNESS SHALL BE 18 INCHES AFTER COMPACTION.
2. SOIL SHALL BE COMPACTED TO 95% MINIMUM DRY DENSITY, MODIFIED PROCTOR METHOD (ASTM-1557).
3. A DIFFERENT DEPTH AND DENSITY SUFFICIENT TO RETARD THE INFILTRATION RATE TO $2.4x10^{-5}$ INCHES PER MINUTE ($1x10^{-6}$ cm/s) MAY ALSO BE USED IN LIEU OF CRITERIA 1 AND 2.
4. SOILS SHOULD BE PLACED IN 6 INCH LIFTS
5. SOILS MAY BE USED THAT MEET THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT PASSING
6 INCH	100
4 INCH	90
#4	70-100
#200	20-100

NOTE:

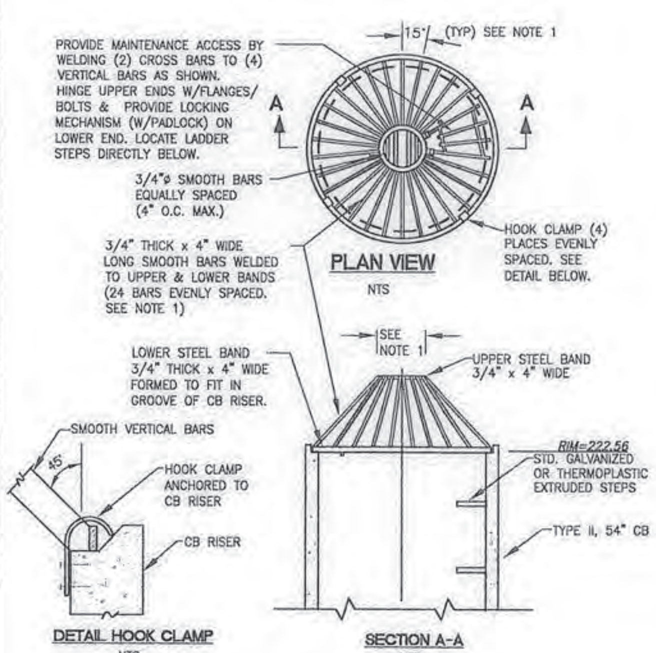
1. ALL EARTHWORK, GRADING AND RETAINING WALLS SHALL BE CONSTRUCTED IN ACCORDANCE WITH EARTH CONSULTANTS, INC. GEOTECHNICAL REPORT DATED SEPTEMBER 17, 2001 AND ANY SUBSEQUENT REPORTS AND FIELD DIRECTION. CONTRACTOR SHALL OBTAIN APPLICABLE REPORTS AND KEEP ON SITE WITH THE APPROVED PLANS.

GEOMEMBRANE LINERS:

1. GEOMEMBRANE LINERS SHALL BE UV RESISTANT AND HAVE A MINIMUM THICKNESS OF 30 mils A THICKNESS OF 40 mils SHALL BE USED IN ARES OF MAINTENANCE ACCESS OR WHERE HEAVY MACHINERY MUST BE OPERATED OVER THE MEMBRANE.
2. GEOMEMBRANES SHALL BE BEDDED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
3. LINERS SHALL BE INSTALLED SO THAT THEY CAN BE COVERED WITH 12 INCHES OF TOP DRESSING FORMING THE BOTTOM AND SIDES OF THE WATER QUALITY FACILITY. TOP DRESSING SHALL CONSIST OF 6 INCHES OF CRUSHED ROCK COVERED WITH 6 INCHES OF NATIVE SOIL. THE ROCK LAYER IS TO MARK THE LOCATION OF THE LINER FOR THE FUTURE MAINTENANCE OPERATIONS. AS AN ALTERNATIVE TO CRUSHED ROCK, 12 INCHES OF NATIVE SOIL MAY BE USED IF ORANGE PLASTIC "SAFETYT FENCING" OR ANOTHER HIGHLY-VISIBLE, CONTINUOUS MARKER IS EMBEDDED 6 INCHES ABOVE THE MEMBRANE.
4. IF POSSIBLE, LINERS SHOULD BE OF A CONTRASTING COLOR SO THAT MAINTENANCE WORKERS ARE AWARE OF ANY AREAS WHERE A LINER MAY HAVE BECOME EXPOSED WHEN MAINTAINING THE FACILITY.
5. GEOMEMBRANE LINERS SHALL NOT BE USED ON SLOPES STEEPER THAN 5H:1V TO PREVENT THE TOP DRESSING MATERIAL FROM SLIPPING. TEXTURED LINERS MAY BE USED ON SLOPES UP TO 3H:1V UPON ECOMMENDATION BY A GEOTECHNICAL ENGINEER THAT THE TOP DRESSING WILL BE STABLE FOR ALL SITE CONDITIONS, INCLUDING MAINTENANCE.

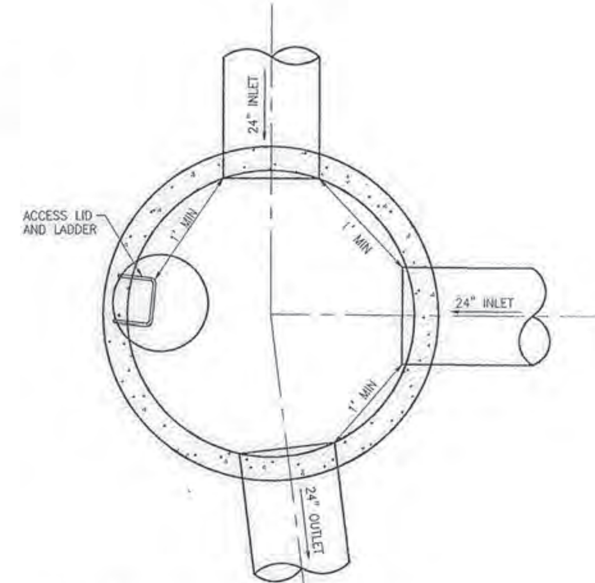
TOPSOIL OVER LINER SPECIFICATION:

PER. KCSWDM (SECTION 6.2.4, PAGE 6-22)
WHERE GRASS MUST BE PLANTED OVER A LOW PERMEABILITY LINER PER THE FACILITY DESIGN, A MINIMUM OF 6 INCHES OF GOOD TOPSOIL OR COMPOST-AMENDED NATIVE SOIL (2 INCHES COMPOST TILLED INTO 6 INCHES OF NATIVE SOIL) MUST BE PLACED OVER THE LINER IN THE AREA TO BE PLANTED. TWELVE INCHES IS PREFERRED.



NOTES:
1. DIMENSIONS ARE FOR INSTALLATION ON 54"ø CB. FOR DIFFERENT DIA. CB'S ADJUST DIMENSIONS TO MAINTAIN 45° ANGLE ON "VERTICAL" BARS & 4" O.C. MAX. SPACING OF BARS AROUND LOWER STEEL BAND. WHEN VERTICAL BAR SPACING EXCEEDS 4" O.C., PROVIDE HORIZONYAL RINGS 4" O.C.
2. METAL PARTS: CORROSION RESISTANT (STEEL PARTS GALVANIZED OR STAINLESS STEEL).
3. THIS DEBRIS BARRIER IS ALSO RECOMMENDED FOR USE ON THE INLET TO ROADWAY CROSS-CULVERTS WITH HIGH POTENTIAL FOR DEBRIS COLLECTION (EXCEPT ON CLASS 2 STREAMS).

BIRDCAGE OVERFLOW STRUCTURE
CB#54, TYPE 2-54"
NOT TO SCALE



CB#53
TYPE 2-72" CATCH BASIN - PLAN
SCALE: 1"=2'

ROCK PROTECTION AT OUTFALLS

DISCHARGE VELOCITY AT DESIGN FLOWS (fps)		REQUIRED PROTECTION				
		MINIMUM DIMENSIONS				
GREATER THAN	LESS THAN OR EQUAL TO	TYPE	THICKNESS	WIDTH	LENGTH	HEIGHT
0	5	ROCK LINING*	1 ft.	DIAMETER + 6 ft.	8 ft. OR 4X dia., WHICHEVER IS GREATER	CROWN + 1 ft.
6	10	RIP RAP**	2 ft.	DIAMETER + 6 ft. OR 3X dia., WHICHEVER IS GREATER	12 ft. OR 4X dia., WHICHEVER IS GREATER	CROWN + 1 ft.
11	20	GABION OUTFALL	AS REQUIRED	AS REQUIRED	AS REQUIRED	CROWN + 1 ft.
20	N/A	ENGINEERED ENERGY DISSIPATOR REQUIRED				

* ROCK LINING SHALL BE IN ACCORDANCE WITH SECTION 9-13.1 OF THE WSDOT/APWA STANDARD SPECIFICATIONS. RIP RAP TO BE REASONABLY WELL GRADED WITH ROCK GRADATION AS FOLLOWS:

PASSING 8" SQUARE SIEVE 100%
PASSING 3" SQUARE SIEVE 40-60%
PASSING 3/4" SQUARE SIEVE 0-10%

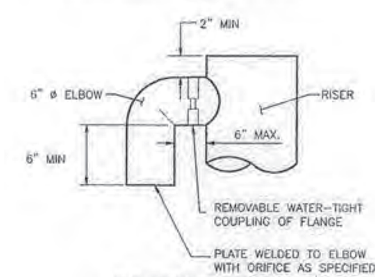
** RIP RAP TO BE REASONABLY WELL GRADED WITH ROCK GRADATION AS FOLLOWS:

MAXIMUM STONE SIZE 24" (NOMINAL DIAMETER)
MEDIUM STONE SIZE 16"
MINIMUM STONE SIZE 4"

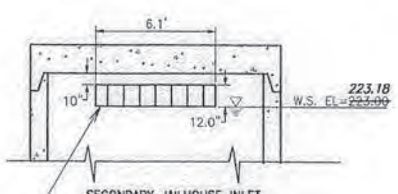
NOTE: [illegible] COVERED BY [illegible] CHANNEL, ASSUMED TO BE 3:1

INFORMATION PLATE:
A BRASS OR STAINLESS STEEL PLATE SHALL BE PERMANENTLY ATTACHED INSIDE EACH CONTROL STRUCTURE. ENGRAVED INFORMATION ON THE PLAT SHALL INCLUDE THE FOLLOWING:

NAME AND FILE NUMBER OF PROJECT
NAME AND COMPANY OF (1) DEVELOPER, (2) ENGINEER, AND (3) CONTRACTOR
DATE CONSTRUCTED
DAT OF MANUAL USED FOR DESIGN
OUTFLOW PERFORMANCE CRITERIA
RELEASE MECHANISM SIZE, TYPE, AND INVERT ELEVATION
LIST OF STAGE, DISCHARGE, AND VOLUME AT ONE-FOOT INCREMENTS
ELEVATION OF OVERFLOW
RECOMMENDED FREQUENCY OF MAINTENANCE



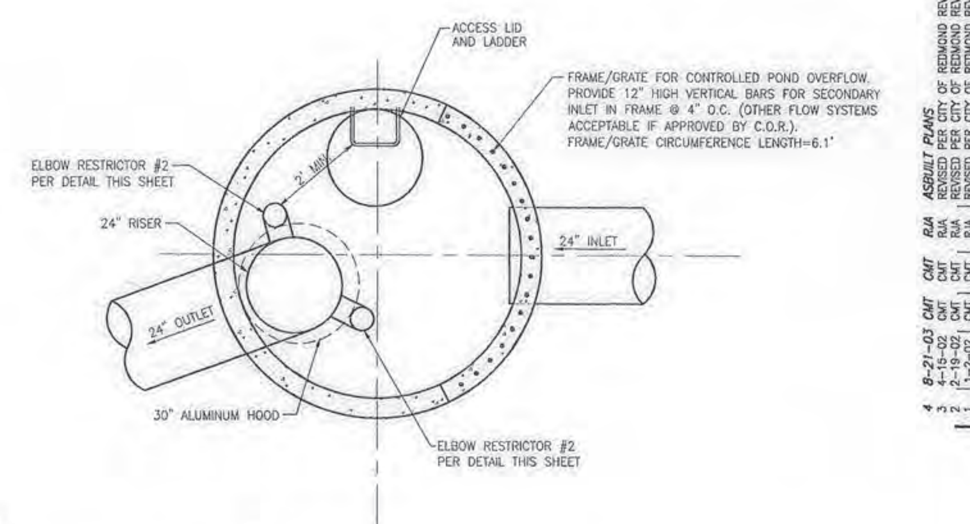
ELBOW RESTRICTOR DETAIL



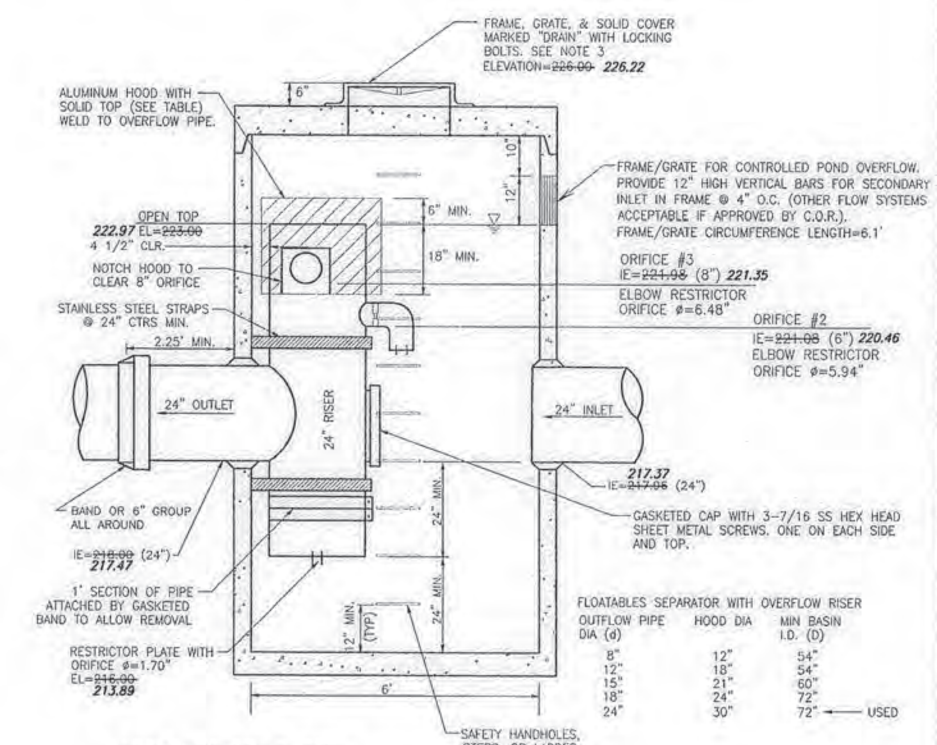
SECONDARY JAILHOUSE INLET

FRAME/GRATE FOR CONTROLLED POND OVERFLOW. PROVIDE 12" HIGH VERTICAL BARS FOR SECONDARY INLET IN FRAME @ 4" O.C. (OTHER FLOW SYSTEMS ACCEPTABLE IF APPROVED BY C.O.R.). FRAME/GRATE CIRCUMFERENCE LENGTH=6.1'

CB NOTES:
1. EXCEPT AS SHOWN OR NOTED, UNITS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS FOR CATCH BASIN TYPE 2-60" MIN. DIAMETER
2. OUTLET CAPACITY: 100 YEAR DEVELOPED PEAK FLOW
3. METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PREFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1.
4. FRAME & LADDER OR STEPS OFFSET SO:
   A) CLIMBDOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE.
   B) FRAME IS CLEAR OF CURB
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4".
6. THE RESTRICTOR/SEPARATOR SHALL BE FABRICATED FROM 0.060" ALUMINUM, OR 0.064" ALUMINIZED STEEL, OR 0.064" GALVANIZED STEEL PIPE; IN ACCORDANCE WITH AASHTO M 36, M 196, M 197 AND M 274. GALVANIZED STEEL SHALL HAVE ASPHALT TREATMENT 1.
7. LOCATE ELBOW RESTRICTORS TO PROVIDE MINIMUM CLEARANCE AS SHOWN
8. OUTLET SHALL BE CONNECTED TO CULVERT OR SEWER PIPE WITH A STANDARD COUPLING BAND FOR CORRUGATED METAL PIPE, OR GROUTED INTO THE BELL OF CONCRETE PIPE.
9. THE VERTICAL RISER STEM OF THE RESTRICTOR/SEPARATOR SHALL BE THE SAME DIAMETER AS THE HORIZONTAL OUTLET PIPE.



CB#55, TYPE 2-72"
DETENTION SYSTEM CONTROL STRUCTURE (PLAN VIEW)
SCALE:1"=2' DESIGN PER C.O.R. STD. #610



FLOATABLES SEPARATOR WITH OVERFLOW RISER

OUTFLOW PIPE DIA (d)	HOOD DIA	MIN BASIN I.D. (D)	
8"	12"	54"	
12"	18"	54"	
15"	21"	60"	
18"	24"	72"	
24"	30"	72"	← USED

CB#55, TYPE 2-72"
DETENTION SYSTEM CONTROL STRUCTURE (SECTION VIEW)
SCALE:1"=2' DESIGN PER C.O.R. STD. #610

ROBERT J. ARMSTRONG
STATE OF WASHINGTON
26016
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 2/5/04
12-19-03

02-1033

No.	Date	By	Ckd.	Appr.	Revision
4	8-21-03	CMT	CMT	RJA	ASBUILT PLANS
3	4-15-02	CMT	CMT	RJA	REVISED PER CITY OF REDMOND REVIEW #3
2	2-19-02	CMT	CMT	RJA	REVISED PER CITY OF REDMOND REVIEW #2
1	1-2-02	CMT	CMT	RJA	REVISED PER CITY OF REDMOND REVIEW #1

Title:
TRACT B
DRAINAGE POND DETAILS
AS-BUILT
WHISTLER RIDGE PPL99-001

For:
JOHN F. BUCHAN CONSTRUCTION, INC.
2821 NORTHUP WAY, SUITE 100
BELLEVUE, WA 98004
CONTACT: MIKE DELILE (425) 417-5005

Scale: Horizontal AS SHOWN Vertical AS SHOWN

Designed CMT
Drawn CMT
Checked RJA
Approved RJA
Date 9/17/01

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES
CONTACT: ROB ARMSTRONG

Job Number 6918
Sheet 24 of 58

P:\06000s\6918\asbuilt\6918-m2.dwg Date/Time: 08/22/2003 08:56 Scale: 1=2 ctebaldi Xrefs: Z6918-B.

APPENDIX C

Curry East Pond Drainage Report

CURRY P.R.D. PRD02-001
FINAL REPORT 4/8/04
JAY HUMMEL/ROTH HILL ENGR

BC147

CITY OF REDMOND

FINAL REPORT

PROJECT:
CURRY P.R.D.
PRD02-001

APRIL 8, 2004

ROTH HILL JOB NO.: 53-269-41

PREPARED BY: LDS
Lance Stevens, E.I.T.

REVIEWED BY:
Jay Hummel, P.E.

Roth Hill Engineering Partners, LLC
2600 116TH AVE NE, # 100, BELLEVUE, WA 9800
(425) 869-9448 800-835-0292 FAX (425) 869-1190

RothHill

CONTENTS

WAIVED CONDITIONS

WAIVED CONDITIONS:

PROJECT: Curry PRD
JOB NO.: 53-269-41

The following issues discovered and/or resolved during our review that were waived or clarified by City staff:

Use Catch basin sediment trap such as Siltsack Layfield Sediment Trap or approved "equal". "Equal" shall have capacity to allow overflow if sediment clogs fabric. (Jeff Dendy)

REVIEW SUMMARY

REVIEW SUMMARY:

PROJECT: **Curry P.R.D.**
JOB NO.: 53-269-41

The following is a summary of the major items that were required to be addressed after each review submittal:

Submittal 1 (8/15/03)

General information

List site area in square feet and acres.
Correct typo's where noted.
Reference COR Standards.

TESC

Show trees to remain with designated dripline and protective fencing shown 5 ft outside of driplines.
Interceptor swale must be Min. 1 ft deep per COR #504.
Show inlet protection on existing CB's adjacent to the site. Do not show on proposed except for any specifically needed for the TESC plan.
Do not show proposed features on TESC plan.
Show construction access routes.
Show all existing utilities.
Add filter fencing where indicated.
Add note: "This TESC applies to the dry season only."
Make line types consistent between plans and legend.
Where does swale on C2.03 go? Not shown on C2.04.
Provide profile through TESC pond.
Galvanized materials are not allowed in storm ponds in Redmond.
Use updated TESC notes.

Grading

Provide a handrail on top of rockery since there is an 8 ft drop into pond.
Rockeries over 4 ft require geotech recommendation/structural design.

Road & Storm Drainage Plan/Profile

Reference COR # 607 for Type I and COR # 609 for Type II CB's.
All grates are required to be vaned unless solid.
Thru curb inlets are required on every 3rd inlet and on sag curves.
Include note that tracer wire will be included on roof drains.
Include all symbols in legend.
Include cleanouts where indicated.
Add Matchlines where indicated.

In the orientation shown, will the structural integrity of CB #24 be maintained with an 18", 15", 12", and 6" pipe into a 48" Type II?
Plans on C4.02 rotated 180° from the key map
Show matching crowns in profile.
Show pipes in correct locations in profile.
Maximum of 3 lot drains per collection pipe.
Rotate key map so that North is up, for clarity.
Pipe leading into CB 32 is skewed from center of MH.
Should have spot elevations on ¼ points for approach on curbs (Typ)
Curb radius for arterial streets is 25 ft.
5 ft horizontal clearance needed between utilities.
Correct scale on profile where indicated.
Provide trash rack on pipe on C4.08.
20' x 100' site triangle needed for arterials.

<u>Details</u>

Bollards should be called out per COR Std #890 and not shown in detail.
Rip Rap should be called out per COR Std. #620 and not shown in detail.
Specify aluminum for all CMP.
3:1 max slope above permanent water surface elevation. 2:1 only allowed in dead storage area
Specify wetlands planting mix per DOE requirements for plant benches.
18" thick layer of compacted topsoil above pond liner required.
List all design storms on pond profile or show in storm report.
Show all pipes entering and leaving pond profiles.
Weir length shown in storm report (1.15 ft) is what should be shown in detail

<u>Drainage Report</u>

Provide sub-basin areas on sub-basin map.
Provide 100-yr overflow map assuming CB's are plugged. Runoff must not impact buildings.
Preliminary plat plan included in report is not current.
Correct typo's where indicated.
Explain the bypass area in more detail.
Include SCS soils types chart with appropriate curve numbers added.
Explain composite curve # in text on previous page.
What does weir height refer to?
Include flow from Cogan-Allen to CB 42 in conveyance calcs.

Submittal 2 (12/30/03)

<u>General information</u>

Correct typo's where noted.
Reference COR Standards.

TESC

Show trees to remain with designated dripline and protective fencing shown 5 ft outside of driplines.
Galvanized materials are not allowed in control structures in Redmond.

Grading

Rockery detail must comply with COR Std. #909.

Road & Storm Drainage Plan/Profile

All roof drain stubs should cross sidewalks/ landscape strips as close to 90° as possible.
Show correct area for C4.08 on Key map.
Show box areas for C4.01-02 in Key map on C4.09.
Show 18" pipe to the south on CB 3.
Show matching crowns in profile.
5 ft horizontal clearance needed between utilities.

Details

Correct Storm and Grading Notes as indicated.
Galvanized materials not allowed in COR.
Show and label correct slope on pond. 3:1 and 2:1 shown for same slope.
Lower control structure inlet to provide slope in upstream pipe.

Drainage Report

Provide statement about downstream bypass line capacity to accommodate Curry.
Bypass areas are usually treated as a separate sub-basin. Please explain methodology more thoroughly.
Correct typo's where indicated.
Provide information to state that the 1.49 acres of Cogan-Allen will not be developed beyond one residential lot.
Waterworks printout and pond volume calcs sheet are not consistent.
The property draining to CB 37 should be based upon developed conditions to assure proper conveyance capacity.
Explore routing the swale for CB 35 between Lots 60 and 61. Need to provide assurance that swale will be maintained in working condition.
A map showing flow routes assuming all catch basins are plugged is required for all developments in the City of Redmond.
Conveyance pipes should not surcharge in the 10-yr condition.
Cogan-Allen flows should be added in at CB 42.

Submittal 3 (02/13/04)

General information

Correct typo's where noted.
Reference COR Standards.

TESC

Show trees to remain with designated dripline and protective fencing shown 5 ft outside of driplines.
Galvanized materials are not allowed in control structures in Redmond.
Use Catch basin sediment trap such as Siltsack Layfield Sediment Trap or approved equal. Equal will have capacity to allow overflow if sediment clogs fabric. (Jeff Dendy)

Grading

Rockery detail must comply with COR Std. #909.

Road & Storm Drainage Plan/Profile

All roof drain stubs should cross sidewalks/ landscape strips as close to 90^{O} as possible.
Show correct area for C4.08 on Key map.
Show box areas for C4.01-02 in Key map on C4.09.
Show 18" pipe to the south on CB 3.
Show matching crowns in profile.
5 ft horizontal clearance needed between utilities.

Details

Correct Storm and Grading Notes as indicated.
Galvanized materials not allowed in COR.
Show and label correct slope on pond. 3:1 and 2:1 shown for same slope.
Lower control structure inlet to provide slope in upstream pipe.

Drainage Report

Correct typo's where indicated.

STORM WATER CHECKLIST

APPENDIX A-4

CITY OF REDMOND

CLEARING, GRADING AND STORMWATER MANAGEMENT PLAN REVIEW CHECKLISTS

Project Name: Curry PRD　　Submittal Dates:　　Review Dates/Initials:
Tax Parcel or Plat #: 252605-9015-00; 9099-01; 9058-08; 9124-08　　/
Engineer: CORE DESIGN　　08/01/03　　08/15/03 / COS
Contact: Gina Brooks　　12/17/03　　~~12/30/03~~ / COS
Phone: (425) 885-7963　　02/13/04　　02/2?/04 / COS

Review Notes: I = Incomplete/Incorrect/Must be Addressed, C = Complete/Correct, N = Non-Applicable, [ ] = Reference, __/__/__ = 1st/2nd/3rd Review

REDMOND COMMUNITY DEVELOPMENT GUIDE

Plans shall conform to Section 20E.90.10-080 of Redmond Community Development Guide. The general headings listed below must be addressed.

__/__/__Erosion and Sediment Control
__/__/__Drainage Facilities
__/__/__Water Quality Control
__/__/__Water Quantity Control
__/__/__Stabilization of Disturbed Areas
__/__/__Protection of Adjacent Properties
__/__/__Maintenance
__/__/__Identification of Sensitive Areas and Associated Buffers
__/__/__Identification of Easements
__/__/__Accurate Description of Work Area
__/__/__Control of Pollutants Other Than Sediment on Construction Sites
__/__/__Source Control of Pollution
__/__/__Controlling Off-Site Erosion
__/__/__Other BMPs
__/__/__Separate Public and Private Drainage
__/__/__Limited Topographic Change
__/__/__Tree Preservation Plan

DRAWING FORMAT AND CONTENT

– NORTH ARROW AT TOP or LEFT EDGE OF DRAWING

Plans shall conform with the standards in this Stormwater Notebook.

C+ / __ Construction Drawing Size - 22" x 34".

Include Note: "This Development Shall Be Constructed with the City of Redmond Year 2000 Standard Specifications and Details"

C/ /

I/C/ Drawing Content - shall contain all information necessary to review the design and to construct the improvements.

C/ / Title Block/Drawing Title

- C/ / Issue or Revision Date
- C/ / Section, Township and Range.
- C/ / Project Name & Phase
- C/ / Tax Parcel/Plat Number
- C/ / Legal Description
- C/ / Engineer Information - name, address, phone and contact.
- C/ / Owner Information - name, address, phone and contact.

C/ / Vicinity Map - showing the general location of the project.

C/ / City Approval Block - must be on every sheet at lower right hand corner.

C/ / Horizontal Scale - 1"=20'.

C/ / Vertical Scale - 1"=5'.

C/ / Vertical Datum - minimum of two (2) C.O.R. datum must be shown.

C/ / Horizontal Datum - minimum of two (2) C.O.R. datum and NAD 83-91 coordinates on two (2) minimum points at exterior lot/boundary corners must be shown..

C/ / North Arrow & Scale Bar - shown in the upper left hand corner of the drawings

C/ / Drawing Layout - shall be laid out to afford the maximum understanding possible.

C/ / Profiles of Storm Drainage Systems - required for public drainage systems and may be required for private systems where conflicts with other utilities are possible.

I/C/ Profile Information - include existing and proposed grade, all utility crossings and crossings clearances, pipe slope, pipe size, pipe length, pipe material, manhole depths, inverts, etc.

C/ / Plan View Information - shall indicate and identify all existing and proposed features, utilities, street improvements and paving, and other features that will affect the design and construction of the site grading and the drainage system.

C/ / Engineer Stamp and Signed and Dated Consistently with Issued or Revised Date - drawings shall be stamped before submittal and review by the City.

I/C/ Legend - identify line types and symbols used.

C/ / Property Data - shall include property lines with bearings and distances, right-of-way lines, parcel numbers, lot numbers, plat names, and street names.

_/_/_ Phased Project Drawings - depict all construction necessary to complete the phase (each phase shall be independently approved).

C/ / Standard Notes (see Appendix A-3).

CITY GENERAL NOTES

MINIMUM DESIGN REQUIREMENTS, CLEARING, GRADING & TESC

Plans shall conform to the **Minimum Design Requirements** identified in the Stormwater Notebook.

NO LOW SPOTS

I/C/ Fully Identify Work - clearing and grading limits shown, with stockpile/staging areas and sequence of construction.

I/I/C Disturbed Area - in acres must be shown on the Clearing and Grading plans.

C/ / Limits of Clearing - fenced with 42" orange safety fence or approved filter fence.

C/_/_Trees to Remain - shall be shown with the dripline designated (must have protective fencing at five (5) feet beyond the dripline if adjacent to cleared areas) - no grading or filling permitted within the dripline. Show pertinent information within 50' of clearing.

C/_/_Buffer Strips of Sensitive Areas.

N/A~~_/_~~Steep Slope Setback

C/_/_Grades - show existing and proposed contours. MAX 3:1. 2:1 MAY BE OKAY AT ROAD

C/_/_Cut/Fill - shall not exceed 8 ft.

N/A~~_/_/_~~Stabilization of Disturbed Areas.

I/C/_Stockpile location and ground slopes.

I/I/CEstimate of Earthwork Quantities.

N/A~~_/_~~Timing and Stabilization of Sediment Trapping Measures.

C/_/_Silt Fence [COR Std 502] (no straw bale permitted - must use silt fence).

C/_/_Construction Entrance [COR Std 503]. \ ONLY IF POSSIBLE

N/A~~_/_~~Clean Water Diversion - areas onsite and offsite that are not disturbed must be diverted away from disturbed areas.

N/A~~_/_~~Dewatering Construction Sites – show sediment traps.

N/A~~_/_~~Stabilization of Temporary Conveyance Channels and Outlets – no erosion for 10 year, 24-hour storm.

C/_/_Storm Drain Inlet Protection – inlet protection must be provided for all storm drain inlets within the construction vicinity.

I/I/CTemporary Swales and/or Trenches - show shape, dimensions, spot elevations every 50 feet, drainage area, channel stabilization treatment type and computations of flow and velocity (cannot exceed 4 fps without rip-rap lining) [COR Std 504].

C/_/_Check Dams - show detail, dimensions and quantity of rock protection. No straw bales allowed.

C/_/_Temporary Culverts - show drainage area, 1 ft minimum cover, type of pipe, length and diameter, and slope.

C/_/_Temporary Sediment Pond(s) - show size, bottom elevation, top elevation, cleanout elevation, outlet protection, drainage area, volume required, volume provided, cross-section through the dam, profile through the pond, spillway and consistent with calculations. Not allowed near future infiltration sites.

C/_/_Rip-rap Outlet Protection - show size of stone, quantity and stabilization fabric under stone [COR Std 620].

_/_/_Maximum open trench length = 300'.

_/_/_TESC performance bond posted.

C/_/_Construction Access Routes.

C/_/_Removal of Temporary BMPs.

N/A~~_/_~~Preservation of Natural Drainage Systems.

I/C/_Sequence of Construction - describe how construction will proceed in order to limit erosion, include phasing if appropriate

I/C/_Standard Notes (see Appendix A-3).

I/C/_ Include Note "This T.E.S.C. Plan applies to the dry season only."

SITE PLAN (All Proposed Information Must be Distinguished From Existing Information)

C/_/_Property Lines - including bearings and distances.
C/_/_Right of Way - including bearings and distances.
C/_/_Lot Numbers.
C/_/_Site Area - shown in square feet and acres.
C/_/_Streets - edge of pavement or curb and sidewalk, centerline, and name shown.
C/_/_Contours - (dashed lines for existing and solid lines for proposed) 1 or 2 foot interval (slopes 40% or greater may be shown with 5 foot contours).
C/_/_Onsite Features - easements, buffers, +40% slopes, etc.
C/_/_Offsite Information - all features within offsite areas that drain onsite, and all information within 20 feet of all property lines.
C/_/_Utilities (water, sewer, telephone, cable television, gas, power, etc.).
C/_/_All Utilities Easements Shown with Dimensions Labeled.
_/_/_Setbacks
- _/_/_Building
- _/_/_Steep Slope (in accordance with geo-technical recommendations).
- _/_/_Other________________________________

DRAINAGE BASIN MAP

C/_/_North Arrow
C/_/_Scale (larger engineering scale may be used as appropriate)
C/_/_Title Block
C/_/_Property Lines
C/_/_Proposed and Existing Contours
C/_/_Proposed Storm Drainage Inlets and Numbers
C/_/_Existing Storm Drainage
I/C/_Drainage Area to Each Inlets
C/_/_Drainage Area to SWM Facility
C/_/_Offsite Areas Draining Onsite
C/_/_Flow Path for Time of Concentration Computations
C/_/_Legend of Symbols
I/C/_Storm Drainage Table (include: inlet number, drainage area, rational method "C" factor and t_c,)
I/C/_Stormwater Management Data (include: facility number, drainage area and compensated area)
N/A/ ~~/ Zoning~~
C/_/_Road and Stream Names

STORMWATER MANAGEMENT REPORT

DRAINAGE CALCULATIONS

C/__/__Rainfall Intensity (KCSWM Manual Fig. 3.5.1C - 3.5.1I)

- __/__/__6 month - 24 hr ____________
- C/__/__2 year - 24 hr 1.81
- C/__/__10 year - 24 hr 2.73
- C/__/__25 year - 24 hr ____________
- C/__/__100 year - 24 hr 3.69

I/I/C Pre-develop Condition

- C/__/__Pervious Area ____________
- C/__/__Pervious Area Curve Number ____________
- C/__/__Impervious Area ____________
- C/__/__Impervious Area Curve Number ____________
- C/__/__Time of Concentration ____________(Show Calculation)
- __/__/__Drainage Calculation Results ____________

I/I/C Post-develop Condition

- __/__/__Pervious Area ____________
- __/__/__Pervious Area Curve Number ____________
- __/__/__Impervious Area ____________
- __/__/__Impervious Area Curve Number ____________
- __/__/__Time of Concentration ____________(Show Calculation)
- __/__/__Drainage Calculation Results ____________

QUANTITY CONTROL

C/__/__Release Rate(s) [half of pre 2 yr. for post 2 yr., pre 10 yr. for post 10 yr. and pre 100 yr. for 100 yr.; riser rate of 0.2187 ft/min.; Tech. Ltr.]

C/__/__Storage Volume Required 72,392

C/__/__Storage Volume Provided 72,392

__/__/__Control Structure(s)

__/__/__Quantity Control Facilities

QUALITY CONTROL

C/__/__Water Quality Volume Required (6 month - 24 hr.) ____________

__/__/__Treatment Volume Provided ____________

__/__/__Control Structure(s)

__/__/__Quality Control Facilities

CONVEYANCE SYSTEM

I/I/C Storm Drain Computations - rational method (KCSWM Manual) for pipe sizing, include: "C" factor determination, time of concentration determination and flow calculations.

C/__/__Design Slope - 0.25% minimum and 20% maximum.

I/C/__Hydraulic Grade Line Computations – hgl for 10 Year must be 1' below overflow condition (allowances may be made near detention system or large bodies of water surcharge).

I/I/__Downstream Analysis - provide storm drain computations and hydraulic grade line computations for existing storm drainage systems which are being revised by changes to the drainage area or system expansion.

I/C/__Safe 100 Year Flow Conveyance - the provision of the 100 year storm flow shall not impact any buildings.

I/C/__Information presented in the calculations is consistent with plan.

STORMWATER MANAGEMENT PLAN

PLAN REVIEW

C/__/__Minimum Pipe Size - 8" minimum for public storm drain systems and 6" minimum for private systems.

C/__/__Pipe Data - pipe size, length, slope, and material labeled.

I/I/C Horizontal Clearance - 5 feet from all other utilities and structures, and 8 feet from trees (street trees may be closer than 8' with root barrier).

I/C/__Vertical Clearance - one foot from other utilities. 18" for sewer with storm above sewer.

C/__/__Rockeries/Retaining Walls - shall not cross or be near storm drain pipes. Exceptions shall only be approved where no alternatives exist. Any crossing of a wall shall be perpendicular to the wall and special construction techniques including steel casings may be required. No rockeries allowed over roof or footing drains

C/__/__Structure Data - structure number, structure type and/or size, type of cover, rim elevation, and all pipe inverts labeled.

C/__/__Structure Spacing - 350' preferred (400' may be allowed).

C/__/__Easements – shown with dimensions labeled. 20' minimum width. No obstructions allowed in easements.

C/__/__Drains Behind Sidewalk - required in all cut situations and at the base of slopes.

I/C/__Cleanouts Spacing - to be at bends, end of lines and at 100 ft o.c. (required in all cut situations and at the base of slopes).

C/__/__Cleanouts Specifications - shall be specified with Carson boxes or equal with ungasketted caps in soft area and traffic bearing in paved areas [COR Std 621].

C/__/__Footing/Foundation Drains - including pipe size, material, and cleanouts shall be connected to the storm drain system (shown as stubbed to lots only for plats).

I/C/__Roof Drains - including pipe size, material, and cleanouts shall be connected to the stormdrain system (shown as stubbed to lots only for plats). 6" minimum.

I/C/__Footing/Foundation Drains and Roof Drains - shall be connected at a structure only (private onsite structure or at the street).

C/__/__3 ft. Paved Area - around roof drain cleanout or catch basin Type 1A required.

I/C/__Tracer Wire – must be shown on roof drains from the building to the property line.

I/C/__ CMP should be called out as corrugated aluminum pipe.

C/__/__ Provide vehicular access to all CBs

C / / Outfall Protection - sized for 10 year storm (unless otherwise specified by SWM Div.); provide: type, size dimensions and quantity of stone. Stone must be laid on approved filter fabric. Maximum allowable discharge velocity to rock outlet is 10 fps without special design [COR Std 620].

PROFILES (Required for Public System)

C / / Profile - pipes and structures.
I / / Other Utilities - labeled and designate size and type.
C / / Profile grades - show and label existing and proposed grades.
C / / Pipe Cover - 18 inches minimum. (OR USE DI)
C / / Pipe Profile Information - show invert and top of pipe, pipe size, pipe material, and design slope.
N/A / Drop structures only allowed per approval of Stormwater Engineer.
C / / Grates: - through-curb inlets at sag curves, possible bypass points and every third inlet; Vaned Grates ~~on Slopes > 5%; Herringbone otherwise~~. required unless solid or thru-curb.
I / C Utility Crossings - all crossings must be shown, label utility type, line size, invert of utility and storm lines and clearance between pipes (1 foot minimum vertical clearance and 30 degrees minimum crossing angle).
C / / Structure Profile Information - label type of structure, structure number, size, and pipe inverts.
I / C Berm Section - in accordance with geo-technical recommendation for open ponds.
C / / Public Storm Structure – with four feet (4') or greater from the top to the invert must be Type II catch basin. 5' for private structure. See Standard detail 608
N / / Type III catch basin required for structures with bottoms between 12' and 25'. See Standard Detail 615.

STORMWATER MANAGEMENT FACILITIES

UNDERGROUND DETENTION

NA Runoff Determination - per DOE Manual, for the design storms as established by the Technical Committee review.
__/__/__ Area Draining to SWM System, Bypass and Compensation Areas.
__/__/__ Offsite Areas Draining on Site - generally do not need to be controlled but, must be safely conveyed.
__/__/__ Detention Volume Computation - show volume required and volume provided. Stage/storage curve must match proposed facility.
__/__/__ Controlling Orifice Computation - plans and computation must match.
__/__/__ Control Structure - designed and detailed (plan view and cross section required) shall conform to COR Std 610 or equivalent.
__/__/__ Profile of Detention Pipe or Vault.
__/__/__ Structural Details and Vault Calculations (separate building division review and permit required).
__/__/__ Inverts - show for all pipes entering and leaving control structure or vault.
__/__/__ Vent - minimum 2" diameter for pipe detention systems.

N/A__Maintenance Vehicle Access - required to both ends of detention pipes and two accesses to vaults (one near control structure). THROUGH ROOF, NOT THROUGH 36" PIPE.

__/__/__Maximum Distance Between Detention System Access Points - 100 feet and ladder access must be provided at all ends.

__/__/__Easement - 5' minimum around all public detention systems (20 foot minimum width).

__/__/__Fire Hydrant - within 100 feet of detention pipe systems 4 feet in diameter or larger, and for all vault systems over 1000 cubic feet of total volume may be required.

__/__/__Detention Pipe Note - "Detention pipes may be air tested before final acceptance".

INFILTRATION

N/A__Soil Permeability Tests or Gradation per D.O.E. - two tests minimum or one for every 5000 square feet of infiltration system bottom area. Test must end up being not more than 20 feet from the final location of the infiltration system. Note on plans - to be verified by field observation.

__/__/__Soil Test - must be taken at the proposed bottom of infiltration system.

__/__/__Excavation or Boring - is required in the trench area to a minimum depth of 4 feet below the proposed bottom of the trench. Infiltration not feasible if evidence of ground water or bedrock/hard pan.

__/__/__Infiltration Bed - all infiltration system should be a minimum of 3 feet above the seasonal high water mark, bedrock, hardpan and impermeable layer.

__/__/__Setbacks

- __/__/__Minimum 500 feet from drinking water wells and springs, septic tanks and drain fields.
- __/__/__Minimum 20 feet down slope and 100 feet up slope of building foundations.
- __/__/__Minimum 10 feet from and NGPE and property line.

__/__/__Down Spout Infiltration System - shall be designed with overall project for typical lot with individual homes.

__/__/__Maximum Drainage Area

- __/__/__Down Spout Infiltration Systems - 5000 sq. ft.
- __/__/__Infiltration Basin - 50 acres.
- __/__/__Infiltration Trench - 15 acres.

__/__/__Infiltration System Location - may not be located in an area previously used as a sediment trap.

__/__/__Inflow to an Infiltration System - must first pass through a pre-settling BMP or a biofilter. Disturbed areas shall not drain to the infiltration system.

__/__/__Add the following note to the plan "The contractor shall construct infiltration systems only after the entire area draining to it has been stabilized".

__/__/__Filter fabric is required on all sides, top and bottom of infiltration trenches.

__/__/__Maximum Trench Length - 100 feet.

__/__/__Observation Well - one is required per trench.

__/__/__Provisions for the 100 year overflow path required.

__/__/__Maximum Ponding - in an open infiltration basins is 3 feet for the maximum storm entering the basin (not to exceed the 100 year - this includes headwater to pass storm flow out any overflow) 1 foot of freeboard is required to the top of the structure.

N/A__Basins Side Slopes - shall not exceed 3:1.
_/_/__Infiltration Basin Berm - must use impervious material for berm and the berm must be 2 feet wide at the top for each foot in height as measured from the ponding area bottom.

BIOFILTRATION (See DOE Chapter III-6)

N/A__Required Length - 200 feet minimum (may be reduced to 150 feet for redevelopment projects only).
_/_/__Designed Storm - 6 month - 24 hour storm, high flow bypass required unless otherwise designated.
_/_/__Maximum Velocity - 1.5 fps for the design storm.
_/_/__Swale Slope - 6% maximum. For slope less than 2%, biofilter must be lined with underdrain. For slope greater than 4%, check dams must be provided.
_/_/__Setbacks - no buildings or trees within 10 feet of the normal high water.
_/_/__Vehicle Access - required for all biofilters for maintenance.
_/_/__Easement - public systems shall be in tracts, or easements, unless approved during site review.
_/_/__Cross Section - show dimensions, design flow depth and 1 foot minimum freeboard.
_/_/__Vegetation Specifications - shall provide for water tolerant plants and shall address shading of vegetation. Biofilter planting shall be shown on the civil drawings and subject to approval from the Construction Division.
_/_/__Swales/Trenches - including, grading, slope, spot elevations (a minimum of every 50 feet and at both ends), bottom width, side slopes, and lining.
_/_/__No filter strips allowed.

WETPOND/DETENTION FACILITIES

N/_/__Setbacks - 20 ft minimum away from structure and ROW, and 50 ft minimum away from steep slope (15% or greater).
N/_/__Length/Width Ratio - minimum of 3.0. (Preferred)
E/C/__Interior Slope - maximum of 3H:1V (Preferred) 2:1 Below water surface OK.
C/_/__Permanent Pool - minimum of 6 months 24-hr release.
C/_/__Live Storage - maximum of 100 years 24-hr release.
C/_/__Berm Embankment - maximum of 6 ft. high. (Preferred)
C/_/__Toe of Embankment - minimum of 55 ft. from ROW.
C/_/__Factor-of-Safety - applied against overflow.
C/_/__Multi-Celled - minimum of 2 cells. (Preferred)
C/_/__Emergency Overflow - for open pond, shall be separated from pond outlet.
C/_/__ 5-Foot wide safety bench set at 1' depth around perimeter of pond. Plant bench with wetland planting.
N/_/__ Natural shape preferred.
E/C/_ Liner provided for detention ponds, covered w/ 18" thick layer of compacted topsoil.

ROTH HILL DRAINAGE CALCULATIONS

Cogan Dev Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
Cogan Dev	0.33	8.00	0.1296	1.49	SBUH/SCS	TYPE1A	2 yr
Cogan Dev	0.61	8.00	0.2286	1.49	SBUH/SCS	TYPE1A	10 yr
Cogan Dev	0.93	8.00	0.3380	1.49	SBUH/SCS	TYPE1A	100 yr

Drainage Area: Cogan Dev

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	0.9200 ac	86.00	0.17 hrs			
Impervious	0.5700 ac	98.00	0.17 hrs			
Total	1.4900 ac					
Supporting Data:						
Pervious CN Data:						
None Entered		86.00	0.9200 ac			
Impervious CN Data:						
None Entered		98.00	0.5700 ac			
Pervious TC Data:						
Flow type:	Description:		Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered		0.00 ft	0.00%	10.0000	10.00 min
Impervious TC Data:						
Flow type:	Description:		Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered		0.00 ft	0.00%	10.0000	10.00 min

Curry Dev Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
Curry Dev	3.86	8.00	1.4121	12.87	SBUH/SCS	TYPE1A	2 yr
Curry Dev	6.42	8.00	2.3298	12.87	SBUH/SCS	TYPE1A	10 yr
Curry Dev	9.17	8.00	3.3152	12.87	SBUH/SCS	TYPE1A	100 yr

Drainage Area: Curry Dev

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	3.9500 ac	86.00	0.17 hrs			
Impervious	8.9200 ac	98.00	0.17 hrs			
Total	12.8700 ac					
Supporting Data:						
Pervious CN Data:						
None Entered		86.00	3.9500 ac			
Impervious CN Data:						
None Entered		98.00	8.9200 ac			
Pervious TC Data:						
Flow type:	Description:		Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered		0.00 ft	0.00%	10.0000	10.00 min
Impervious TC Data:						
Flow type:	Description:		Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered		0.00 ft	0.00%	10.0000	10.00 min

Pre Dev- Cogan Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
Pre Dev- Cogan	0.05	10.00	0.0605	1.49	SBUH/SCS	TYPE1A	2 yr
Pre Dev- Cogan	0.14	9.00	0.1378	1.49	SBUH/SCS	TYPE1A	10 yr
Pre Dev- Cogan	0.27	8.67	0.2314	1.49	SBUH/SCS	TYPE1A	100 yr

Drainage Area: Pre Dev- Cogan

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	1.4900 ac	81.00	1.46 hrs	
Impervious	0.0000 ac	0.00	0.00 hrs	
Total	1.4900 ac			

Supporting Data:

Pervious CN Data:

None Entered	81.00	1.4900 ac

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Sheet	None Entered	300.00 ft	4.50%	0.8000	86.56 min
Channel	None Entered	42.00 ft	0.40%	17.0000	0.65 min
Channel	None Entered	24.00 ft	0.40%	42.0000	0.15 min
Channel	None Entered	11.00 ft	3.60%	17.0000	0.06 min

Pre Dev Upstrm Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
Pre Dev Upstrm	0.17	9.17	0.1977	4.16	SBUH/SCS	TYPE1A	2 yr
Pre Dev Upstrm	0.45	9.00	0.4235	4.16	SBUH/SCS	TYPE1A	10 yr
Pre Dev Upstrm	0.81	8.67	0.6924	4.16	SBUH/SCS	TYPE1A	100 yr

Drainage Area: Pre Dev Upstrm

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	3.9500 ac	81.73	1.54 hrs	
Impervious	0.2100 ac	98.00	1.54 hrs	
Total	4.1600 ac			

Supporting Data:

Pervious CN Data:

None Entered	81.00	3.3700 ac
None Entered	86.00	0.5800 ac

Impervious CN Data:

None Entered	98.00	0.2100 ac

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Sheet	None Entered	300.00 ft	4.50%	0.8000	86.56 min
Shallow	None Entered	184.00 ft	2.90%	3.0000	6.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Sheet	None Entered	300.00 ft	4.50%	0.8000	86.56 min
Shallow	None Entered	184.00 ft	2.90%	3.0000	6.00 min

Pre Developed Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
Pre Developed	0.39	12.00	0.5230	12.87	SBUH/SCS	TYPE1A	2 yr
Pre Developed	1.05	9.50	1.1900	12.87	SBUH/SCS	TYPE1A	10 yr
Pre Developed	1.97	9.17	1.9987	12.87	SBUH/SCS	TYPE1A	100 yr

Drainage Area: Pre Developed

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	12.8700 ac	81.00	2.11 hrs	
Impervious	0.0000 ac	0.00	0.00 hrs	
Total	12.8700 ac			

Supporting Data:

Pervious CN Data:

None Entered	81.00	12.8700 ac

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Sheet	None Entered	300.00 ft	3.30%	0.8000	97.99 min
Shallow	None Entered	922.00 ft	3.20%	3.0000	28.63 min

Control Structure ID: Combo - Combination Control Structure

Descrip:	Multiple Orifice		
Start El	Max El	Increment	
267.0000 ft	280.0000 ft	0.10	
ID List:	Notch Weir	Orifice	Riser

Control Structure ID: Orifice - Multiple Orifice Structure

Descrip:	Multiple Orifice			
Start El	Max El	Increment		
267.0000 ft	280.0000 ft	0.10		
Orif Coeff:	0.62		Bottom El:	265.00 ft
			Lowest Diam:	2.9380 in

Control Structure ID: Notch Weir - Rectangular weir

Descrip:	Multiple Orifice	
Start El	Max El	Increment
269.9300 ft	274.0000 ft	0.10
Length:	1.2500 ft	

Control Structure ID: Riser - Overflow riser

Descrip:	Riser				
Start El	Max El	Increment			
270.7100 ft	280.0000 ft	0.10			
Riser Dia:	18.00 in	Orif Coeff:	3.78	Weir Coeff:	9.74

Node ID: Pond

Desc:	Manhole structure			
Start El:	267.0000 ft		Max El:	274.0000 ft
Contrib Basin:			Contrib Hyd:	

Stage	Input	Volume	Volume
267.00	0.00 cf	0.00 cf	0.0000 acft
268.00	17166.00 cf	17166.00 cf	0.3941 acft
270.00	56514.00 cf	56514.00 cf	1.2974 acft
271.00	78798.00 cf	78798.00 cf	1.8090 acft
272.00	102578.00 cf	102578.00 cf	2.3549 acft
273.00	127458.00 cf	127458.00 cf	2.9260 acft
274.00	152338.00 cf	152338.00 cf	3.4972 acft

Node ID: Level Pool

Desc:	Manhole structure			
Start El:	267.0000 ft		Max El:	274.0000 ft
Contrib Basin:			Contrib Hyd:	
Storage Id:	Pond	Discharge Id:	Combo	

RLPCOMPUTE [Level Pool] SUMMARY

2 yr Match Q: 0.3825 cfs Peak Out Q: 0.3917 cfs - Peak Stg: 269.80 ft - Active Vol: 1.2055 acft

10 yr Match Q: 1.6431 cfs Peak Out Q: 1.4606 cfs - Peak Stg: 270.34 ft - Active Vol: 1.4731 acft

100 yr Match Q: 3.0420 cfs Peak Out Q: 2.9277 cfs - Peak Stg: 270.70 ft - Active Vol: 1.6530 acft

ROTH HILL CONVEYANCE SYSTEM CALCULATIONS

cb 4 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 4	0.28	8.00	0.0975	0.38	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 4

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1200 ac	86.00	0.08 hrs	
Impervious	0.2600 ac	98.00	0.08 hrs	
Total	0.3800 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 5 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 5	0.26	8.00	0.0899	0.35	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 5

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1100 ac	86.00	0.08 hrs	
Impervious	0.2400 ac	98.00	0.08 hrs	
Total	0.3500 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 6 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 6	0.26	8.00	0.0880	0.34	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 6

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	0.1000 ac	86.00	0.08 hrs			
Impervious	0.2400 ac	98.00	0.08 hrs			
Total	0.3400 ac					

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 7 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 7	0.08	8.00	0.0287	0.11	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 7

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	0.0300 ac	86.00	0.08 hrs			
Impervious	0.0800 ac	98.00	0.08 hrs			
Total	0.1100 ac					

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 8 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 8	0.83	8.00	0.2971	1.69	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 8

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	1.4500 ac	81.30	0.08 hrs			
Impervious	0.2400 ac	98.00	0.08 hrs			
Total	1.6900 ac					

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 9 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 9	0.35	8.00	0.1186	0.46	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 9

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1400 ac	86.00	0.08 hrs	
Impervious	0.3200 ac	98.00	0.08 hrs	
Total	0.4600 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 10 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 10	0.25	8.00	0.0851	0.33	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 10

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1000 ac	86.00	0.08 hrs	
Impervious	0.2300 ac	98.00	0.08 hrs	
Total	0.3300 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 11 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 11	0.14	8.00	0.0488	0.19	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 11

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	0.0600 ac	86.00	0.08 hrs			
Impervious	0.1300 ac	98.00	0.08 hrs			
Total	0.1900 ac					

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 12 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 12	0.33	8.00	0.1149	0.57	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 12

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	0.3900 ac	82.00	0.08 hrs			
Impervious	0.1800 ac	98.00	0.08 hrs			
Total	0.5700 ac					

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 13 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 13	0.53	8.00	0.1854	0.91	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 13

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number		
Peak Factor:	484.00		SCS Abs:	0.20		
Storm Dur:	24.00 hrs		Intv:	10.00 min		
	Area	CN	TC			
Pervious	0.6100 ac	82.10	0.08 hrs			
Impervious	0.3000 ac	98.00	0.08 hrs			
Total	0.9100 ac					

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 14 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 14	0.20	8.00	0.0670	0.26	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 14

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0800 ac	86.00	0.08 hrs	
Impervious	0.1800 ac	98.00	0.08 hrs	
Total	0.2600 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 15 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 15	0.02	8.00	0.0076	0.03	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 15

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0100 ac	86.00	0.08 hrs	
Impervious	0.0200 ac	98.00	0.08 hrs	
Total	0.0300 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 17 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 17	0.27	8.00	0.0928	0.36	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 17

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.1100 ac	86.00	0.08 hrs				
Impervious	0.2500 ac	98.00	0.08 hrs				
Total	0.3600 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 18 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 18	0.35	8.00	0.1186	0.46	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 18

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.1400 ac	86.00	0.08 hrs				
Impervious	0.3200 ac	98.00	0.08 hrs				
Total	0.4600 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 19 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 19	0.12	8.00	0.0411	0.16	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 19

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.0500 ac	86.00	0.08 hrs				
Impervious	0.1100 ac	98.00	0.08 hrs				
Total	0.1600 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 20 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 20	0.16	8.00	0.0545	0.21	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 20

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0600 ac	86.00	0.08 hrs	
Impervious	0.1500 ac	98.00	0.08 hrs	
Total	0.2100 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 21 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 21	0.63	8.00	0.2184	0.98	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 21

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.5300 ac	82.90	0.08 hrs	
Impervious	0.4500 ac	98.00	0.08 hrs	
Total	0.9800 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 22 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 22	0.39	8.00	0.1340	0.53	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 22

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.1800 ac	85.40	0.08 hrs				
Impervious	0.3500 ac	98.00	0.08 hrs				
Total	0.5300 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 23 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 23	0.52	8.00	0.1779	0.69	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 23

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.2100 ac	86.00	0.08 hrs	
Impervious	0.4800 ac	98.00	0.08 hrs	
Total	0.6900 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 24 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 24	0.07	8.00	0.0229	0.09	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 24

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0300 ac	86.00	0.08 hrs	
Impervious	0.0600 ac	98.00	0.08 hrs	
Total	0.0900 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 25 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 25	0.28	8.00	0.0975	0.38	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 25

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1200 ac	86.00	0.08 hrs	
Impervious	0.2600 ac	98.00	0.08 hrs	
Total	0.3800 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 26 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 26	0.16	8.00	0.0545	0.21	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 26

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0600 ac	86.00	0.08 hrs	
Impervious	0.1500 ac	98.00	0.08 hrs	
Total	0.2100 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 27 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 27	0.40	8.00	0.1387	0.54	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 27

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1700 ac	86.00	0.08 hrs	
Impervious	0.3700 ac	98.00	0.08 hrs	
Total	0.5400 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 28 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 28	0.40	8.00	0.1371	0.58	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 28

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.2600 ac	83.70	0.08 hrs	
Impervious	0.3200 ac	98.00	0.08 hrs	
Total	0.5800 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 29 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 29	0.32	8.00	0.1081	0.42	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 29

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1300 ac	86.00	0.08 hrs	
Impervious	0.2900 ac	98.00	0.08 hrs	
Total	0.4200 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 30 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 30	0.07	8.00	0.0229	0.09	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 30

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0300 ac	86.00	0.08 hrs	
Impervious	0.0600 ac	98.00	0.08 hrs	
Total	0.0900 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 31 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 31	0.29	8.00	0.1004	0.39	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 31

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1200 ac	86.00	0.08 hrs	
Impervious	0.2700 ac	98.00	0.08 hrs	
Total	0.3900 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 32 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 32	0.35	8.00	0.1186	0.46	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 32

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1400 ac	86.00	0.08 hrs	
Impervious	0.3200 ac	98.00	0.08 hrs	
Total	0.4600 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 33 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 33	0.03	8.00	0.0105	0.04	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 33

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0100 ac	86.00	0.08 hrs	
Impervious	0.0300 ac	98.00	0.08 hrs	
Total	0.0400 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 35 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 35	0.48	8.00	0.1645	0.64	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 35

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.2000 ac	86.00	0.08 hrs	
Impervious	0.4400 ac	98.00	0.08 hrs	
Total	0.6400 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 36 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 36	0.32	8.00	0.1110	0.43	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 36

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.1300 ac	86.00	0.08 hrs	
Impervious	0.3000 ac	98.00	0.08 hrs	
Total	0.4300 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 37 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 37	0.43	8.00	0.1470	0.71	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 37

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.5800 ac	86.00	0.08 hrs	
Impervious	0.1300 ac	98.00	0.08 hrs	
Total	0.7100 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 38 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 38	0.26	8.00	0.0899	0.35	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 38

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.1100 ac	86.00	0.08 hrs				
Impervious	0.2400 ac	98.00	0.08 hrs				
Total	0.3500 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 39 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 39	0.16	8.00	0.0545	0.21	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 39

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.0600 ac	86.00	0.08 hrs				
Impervious	0.1500 ac	98.00	0.08 hrs				
Total	0.2100 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 41 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 41	0.14	8.00	0.0488	0.19	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 41

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number			
Peak Factor:	484.00		SCS Abs:	0.20			
Storm Dur:	24.00 hrs		Intv:	10.00 min			
	Area	CN	TC				
Pervious	0.0600 ac	86.00	0.08 hrs				
Impervious	0.1300 ac	98.00	0.08 hrs				
Total	0.1900 ac						

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 42 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 42	0.11	8.00	0.0382	0.15	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 42

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0500 ac	86.00	0.08 hrs	
Impervious	0.1000 ac	98.00	0.08 hrs	
Total	0.1500 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 43 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 43	0.05	8.00	0.0182	0.07	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 43

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.0200 ac	86.00	0.08 hrs	
Impervious	0.0500 ac	98.00	0.08 hrs	
Total	0.0700 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

cb 45 Event Summary:

BasinID	Peak Q	Peak T	Peak Vol	Area	Method	Raintype	Event
-------	(cfs)	(hrs)	(ac-ft)	ac	/Loss		
cb 45	0.38	8.00	0.1349	0.67	SBUH/SCS	TYPE1A	100 yr

Drainage Area: cb 45

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.4600 ac	82.00	0.08 hrs	
Impervious	0.2100 ac	98.00	0.08 hrs	
Total	0.6700 ac			

Pervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	Prototype tc just to have something	0.00 ft	0.00%	5.0000	5.00 min

Impervious TC Data:

Flow type:	Description:	Length:	Slope:	Coeff:	Travel Time
Fixed	None Entered	0.00 ft	0.00%	5.0000	5.00 min

Conveyance System Analysis
Rational Method

Project:	Curry PRD		
Job No.:	53269		
Prepared by:	LDS	2/24/2004	
Checked by:	ELB	2/25/2004	
Revised:			

STORM FREQUENCY (YRS)

		a	b
2		1.58	0.58
5		2.33	0.63
10		2.44	0.64
25		2.66	0.65
50		2.75	0.65
100		2.61	0.63

VALUES USED FOR THIS SPREADSHEET

P =	3.69	100
a =	2.61	year
b =	0.63	

RUNOFF COEFFICIENTS

LAND COVER	C
Dense forest	0.10
Light forest	0.15
Pasture	0.20
Lawns	0.25
Playgrounds	0.30
Gravel areas	0.80
Pavement and roofs	0.90
Open water (ponds, lakes, wetlands)	1.00
FOR SINGLE FAMILY RES AREA SEE KCSWM PAGE 4.3.3-2	

100 YEAR STORM

Upstm CB	Dnstm CB	Upstream Rim elev	Upstm IE	Dwnstm IE	Sub-basin Description	Area (Ac.)	Tc (min)	SBUH Incr. flow	Total SBUH Qr	Pipe (in)	Length (ft)	n	Slope	Qf (cfs)	Vf (fps)	Q/Qf	q/Qfull	d/D	V/Vf	N Depth	Vf (fps)	Tt (min)	Depth	CB Type		Type 3?	Pipe Cover
43	40	301.76	298.73	298.11	43	0.07	6.300	0.050	0.050	12	123.00	0.012	0.0050	2.748	3.498	0.018	0.010	0.040	0.165	0.040	0.577	3.551	3.03	Type 1	Type 1		2.03
42	41	307.23	302.49	301.11	42	0.15	6.300	0.970	0.970	12	276.00	0.012	0.0050	2.737	3.484	0.354	0.350	0.414	0.908	0.414	3.162	1.455	4.74	Type 2	Type 1		3.74
41	40	305.02	301.11	297.41	41	0.19	7.755	0.130	1.100	12	200.00	0.012	0.0185	5.264	6.702	0.209	0.200	0.303	0.735	0.303	4.926	0.677	3.91	Type 1	Type 1		2.91
40	38	303.84	297.41	296.57	x		8.431		1.150	12	77.00	0.012	0.0109	4.042	5.147	0.284	0.280	0.364	0.833	0.364	4.285	0.300	6.43	Type 2	Type 2		5.43
39	38	300.18	297.16	296.90	39	0.21	6.300	0.150	0.150	8	26.00	0.012	0.0100	1.313	3.760	0.114	0.110	0.225	0.595	0.150	2.237	0.194	3.02	Type 1	Type 1		2.35
38	30	300.18	296.57	284.39	38	0.35	8.731	0.240	1.540	12	158.00	0.012	0.0771	10.745	13.681	0.143	0.140	0.255	0.653	0.255	8.927	0.295	3.61	Type 1	Type 1		2.61
37	36	298.00	294.07	293.40	37	0.71	6.300	0.400	0.400	12	111.00	0.012	0.0060	3.007	3.828	0.133	0.130	0.243	0.630	0.243	2.412	0.767	3.93	Type 1	Type 1		2.93
36	34	297.26	293.40	285.40	36	0.43	7.067	0.300	0.700	12	62.00	0.012	0.1290	13.902	17.700	0.050	0.050	0.143	0.428	0.143	7.567	0.137	3.86	Type 1	Type 1		2.86
35	34	288.92	285.85	285.40	35	0.64	6.300	0.440	0.440	12	89.00	0.012	0.0051	2.752	3.504	0.160	0.150	0.262	0.665	0.262	2.330	0.637	3.07	Type 1	Type 1		2.07
34	32	293.76	285.40	284.99	x		7.204		1.140	12	81.00	0.012	0.0051	2.753	3.506	0.414	0.410	0.451	0.955	0.451	3.348	0.403	8.36	Type 2	Type 2		7.36
33	32	290.69	287.67	285.32	33	0.04	6.300	0.030	0.030	8	24.00	0.012	0.0979	4.107	11.767	0.007		#N/A	#N/A	#N/A	#N/A	#N/A	3.02	Type 1	Type 1		2.35
32	30	290.69	284.99	284.39	32	0.46	7.607	0.320	1.490	12	22	0.012	0.0273	6.391	8.138	0.233	0.230	0.326	0.778	0.326	6.327	0.058	5.70	Type 2	Type 2		4.70
31	30	291.12	287.69	284.72	31	0.39	6.300	0.270	0.270	8	27.00	0.012	0.1100	4.354	12.472	0.062	0.060	0.160	0.465	0.107	5.799	0.078	3.43	Type 1	Type 1		2.76
30	29	290.70	284.39	277.34	30	0.09	9.026	0.060	3.360	12	164.00	0.012	0.0430	8.024	10.217	0.419	0.410	0.451	0.955	0.451	9.757	0.280	6.31	Type 2	Type 2		5.31
29	27	280.86	277.34	271.62	29	0.42	9.306	0.290	3.650	12	104.00	0.012	0.0550	9.076	11.556	0.402	0.400	0.445	0.945	0.445	10.921	0.159	3.52	Type 1	Type 1		2.52
28	27	275.24	272.25	271.95	28	0.58	6.300	0.370	0.370	8	30.00	0.012	0.0100	1.313	3.760	0.282	0.280	0.364	0.833	0.243	3.131	0.160	2.99	Type 1	Type 1		2.32
27	24	275.25	271.37	268.19	27	0.54	9.465	0.370	4.390	15	53.00	0.012	0.0600	17.188	14.006	0.255	0.250	0.342	0.798	0.427	11.170	0.079	3.88	Type 1	Type 1		2.63
26	25	272.78	269.69	269.43	26	0.21	6.300	0.150	0.150	8	26.00	0.012	0.0100	1.313	3.760	0.114	0.110	0.225	0.595	0.150	2.237	0.194	3.09	Type 1	Type 1		2.42
25	24	272.78	269.10	268.44	25	0.38	6.494	0.260	0.410	12	131.00	0.012	0.0050	2.747	3.498	0.149	0.140	0.255	0.653	0.255	2.282	0.957	3.68	Type 1	Type 1		2.68
45	44	281.45	278.50	278.25	45	0.67	6.300	0.360	0.360	8	26.00	0.012	0.0096	1.287	3.687	0.280	0.270	0.357	0.820	0.238	3.024	0.143	2.95	Type 1	Type 1		2.28
44	24	281.45	277.92	268.44	44	0.06	6.443	0.040	0.400	12	158.00	0.012	0.0600	9.480	12.070	0.042	0.040	0.130	0.400	0.130	4.828	0.545	3.53	Type 1	Type 1		2.53
24	24a	276.71	267.94	267.00	24	0.09	9.544	0.060	5.260	18	150.00	0.012	0.0063	9.033	5.111	0.582	0.580	0.550	1.055	0.824	5.393	0.464	8.77	Type 2	Type 2		7.27
23	21	301.16	297.97	292.34	23	0.69	6.300	0.480	0.480	12	194.00	0.012	0.0290	6.593	8.394	0.073	0.070	0.175	0.500	0.175	4.197	0.770	3.19	Type 1	Type 1		2.19
22	21	296.07	292.93	292.67	22	0.53	6.300	0.360	0.360	8	26.00	0.012	0.0100	1.313	3.760	0.274	0.270	0.357	0.820	0.238	3.084	0.141	3.14	Type 1	Type 1		2.47
21	16	296.07	292.34	284.43	21	0.98	6.300	0.580	1.420	12	113.00	0.012	0.0700	10.239	13.037	0.139	0.130	0.243	0.630	0.243	8.213	0.229	3.73	Type 1	Type 1		2.73
20	19	294.28	291.28	291.01	20	0.21	6.300	0.150	0.150	8	27.00	0.012	0.0100	1.313	3.760	0.114	0.110	0.225	0.595	0.150	2.237	0.201	3.00	Type 1	Type 1		2.33
19	16	294.28	290.68	284.43	19	0.16	6.501	0.110	0.260	12	50.00	0.012	0.1250	13.683	17.422	0.019	0.010	0.040	0.165	0.040	2.875	0.290	3.60	Type 1	Type 1		2.60
18	17	289.42	286.73	286.00	18	0.46	6.300	0.320	0.320	8	26.00	0.012	0.0281	2.199	6.301	0.145	0.140	0.255	0.653	0.170	4.111	0.105	2.69	Type 1	Type 1		2.02
17	16	289.42	285.67	284.43	17	0.36	6.405	0.250	0.570	12	207.00	0.012	0.0060	2.995	3.814	0.190	0.190	0.295	0.720	0.295	2.746	1.256	3.75	Type 1	Type 1		2.75
16	15	294.65	284.18	283.85	x		6.791		2.250	15	66.00	0.012	0.0050	4.962	4.043	0.453	0.450	0.475	0.983	0.594	3.972	0.277	10.47	Type 2	Type 2		9.22
15	14	293.35	283.85	283.58	15	0.03	7.068	0.020	2.270	15	53.00	0.012	0.0051	5.008	4.081	0.453	0.450	0.475	0.983	0.594	4.010	0.220	9.50	Type 2	Type 2		8.25
14	11	292.33	283.58	283.20	14	0.26	7.288	0.180	2.450	15	75.00	0.012	0.0051	4.995	4.070	0.491	0.490	0.499	1.010	0.624	4.111	0.304	8.75	Type 2	Type 2		7.50
13	12	291.73	288.74	288.38	13	0.91	6.300	0.490	0.490	8	24.00	0.012	0.0150	1.608	4.606	0.305	0.300	0.379	0.855	0.253	3.938	0.102	2.99	Type 1	Type 1		2.32
12	11	291.73	288.05	283.45	12	0.57	6.402	0.300	0.790	12	46.00	0.012	0.1000	12.238	15.582	0.065	0.060	0.160	0.465	0.160	7.246	0.106	3.68	Type 1	Type 1		2.68
11	9	290.93	283.20	282.68	11	0.19	7.592	0.130	3.370	15	103.00	0.012	0.0050	4.986	4.063	0.676	0.670	0.599	1.093	0.749	4.441	0.387	7.73	Type 2	Type 2		6.48
10	9	289.30	286.23	283.26	10	0.33	6.300	0.230	0.230	8	27.00	0.012	0.1100	4.354	12.472	0.053	0.050	0.143	0.428	0.095	5.332	0.084	3.07	Type 1	Type 1		2.40
9	7	289.19	282.68	280.97	9	0.46	7.979	0.320	3.920	15	190.00	0.012	0.0090	6.657	5.424	0.589	0.580	0.550	1.055	0.687	5.723	0.553	6.51	Type 2	Type 2		5.26
8	7	284.72	282.07	281.55	8	1.69	6.300	0.780	0.780	8	26.00	0.012	0.0200	1.856	5.318	0.420	0.420	0.457	0.958	0.305	5.092	0.085	2.65	Type 1	Type 1		1.98
7	5	284.72	280.72	275.72	7	0.11	8.532	0.080	4.780	18	122.00	0.012	0.0410	23.100	13.072	0.207	0.200	0.303	0.735	0.455	9.608	0.212	4.00	Type 1	Type 1		2.50
6	5	281.84	278.90	276.55	6	0.34	6.300	0.240	0.240	8	24.00	0.012	0.0979	4.107	11.767	0.058	0.050	0.143	0.428	0.095	5.030	0.080	2.94	Type 1	Type 1		2.27
5	3	281.84	275.72	268.72	5	0.35	8.744	0.240	5.260	18	35.00	0.012	0.2000	51.029	28.876	0.103	0.100	0.210	0.568	0.315	16.387	0.036	6.12	Type 2	Type 2		4.62
4	3	272.94	269.88	269.22	4	0.38	6.300	0.260	0.260	12	131	0.012	0.0050	2.747	3.498	0.095	0.090	0.199	0.545	0.199	1.906	1.145	3.06	Type 1	Type 1		2.06
3	3a	281.00	268.72	267.00	3		8.779		5.520	18	111	0.012	0.0155	14.204	8.038	0.389	0.380	0.433	0.933	0.649	7.495	0.247	12.28	Type 2	Type 2	Type 3	10.78

100 YEAR STORM BACKWATER

Dnstrm CB	Upstrm CB	Upstream Rim elev	Dwnstrm IE	Upstrm IE	Qr (cfs)	Length (ft)	Pipe (ft)	n	Barrel Area (ft^2)	Barrel Vel (fps)	Bar Vel Head (ft)	TW elev (ft)	Frict Loss (ft)	Ent HGL elev (ft)	Ent. Head Loss (ft)	Exit Head Loss (ft)	Outlet cont elev (ft)	Inlet cont elev (ft)	Appr. Vel. Head (ft)	Bend Head Loss (ft)	Junc Head Loss (ft)	HW elev (ft)	Freeboard (ft)
3a	3	281.00	267.00	268.72	5.520	120	1.50	0.012	1.767	3.12	0.152	270.35	0.280	270.63	0.076	0.152	270.86	269.620	0.152	0.203	0.007	270.92	10.08
3	4	272.94	269.22	269.88	0.260	131	1.00	0.012	0.785	0.33	0.002	270.85	0.006	270.86	0.001	0.002	270.86	270.480	0.002	0.002		270.86	2.08
3	5	281.84	268.72	275.72	5.260	35.00	1.50	0.012	1.767	2.98	0.138	270.85	0.074	270.92	0.069	0.138	271.13	276.620	0.138	0.184	0.006	276.67	5.17
5	6	281.84	276.55	278.90	0.240	24.00	0.67	0.012	0.349	0.69	0.007	276.67	0.008	276.68	0.004	0.007	276.69	279.300	0.007	0.010		279.30	2.54
5	7	284.72	275.72	280.72	4.780	122.00	1.50	0.012	1.767	2.70	0.114	276.67	0.213	276.89	0.057	0.114	277.06	281.620	0.114		0.018	281.52	3.20
7	8	284.72	281.55	282.07	0.780	26.00	0.67	0.012	0.349	2.23	0.078	281.52	0.091	281.62	0.039	0.078	281.73	282.470	0.078			282.39	2.33
7	9	289.19	280.97	282.68	3.920	190.00	1.25	0.012	1.227	3.19	0.158	281.52	0.591	282.12	0.079	0.158	282.35	283.430	0.158	0.212	0.009	283.49	5.70
9	10	289.30	283.26	286.23	0.230	27.00	0.67	0.012	0.353	0.65	0.007	283.49	0.008	283.50	0.003	0.007	283.51	286.632	0.007	0.009		286.63	2.67
9	11	290.93	282.68	283.20	3.370	103.00	1.25	0.012	1.227	2.75	0.117	283.49	0.237	283.73	0.059	0.117	283.91	283.950	0.117	0.023	0.029	283.89	7.04
11	12	291.73	283.45	288.05	0.790	46.00	1.00	0.012	0.785	1.01	0.016	283.89	0.019	283.90	0.008	0.016	283.93	288.650	0.016	0.013		288.65	3.08
12	13	291.73	288.38	288.74	0.490	24.00	0.67	0.012	0.353	1.39	0.030	288.65	0.032	288.68	0.015	0.030	288.72	289.142	0.030	0.040		289.15	2.58
11	14	292.33	283.20	283.58	2.450	75.00	1.25	0.012	1.227	2.00	0.062	283.89	0.091	283.98	0.031	0.062	284.07	284.330	0.062	0.051		284.32	8.01
14	15	293.35	283.58	283.85	2.270	53.00	1.25	0.012	1.227	1.85	0.053	284.32	0.055	284.37	0.027	0.053	284.45	284.600	0.053	0.044		284.59	8.76
15	16	294.65	283.85	284.18	2.250	66.00	1.25	0.012	1.227	1.83	0.052	284.59	0.068	284.66	0.026	0.052	284.74	284.930	0.052	0.010	0.009	284.90	9.75
16	17	289.42	284.43	285.67	0.570	207.00	1.00	0.012	0.785	0.73	0.008	284.90	0.045	284.94	0.004	0.008	284.95	286.270	0.008			286.26	3.16
17	18	289.42	286.00	286.73	0.320	26.00	0.67	0.012	0.353	0.91	0.013	286.26	0.015	286.28	0.006	0.013	286.30	287.132	0.013	0.017		287.14	2.28
16	19	294.28	284.43	290.68	0.320	50.00	1.00	0.012	0.785	0.41	0.003	284.90	0.003	284.90	0.001	0.003	284.90	291.280	0.003			291.28	3.00
19	20	294.28	291.01	291.28	0.31	27.00	0.67	0.012	0.353	0.88	0.012	291.28	0.015	291.29	0.006	0.012	291.31	291.682	0.012	0.016		291.69	2.59
16	21	296.07	284.43	292.34	1.420	113.00	1.00	0.012	0.785	1.81	0.051	284.90	0.151	285.05	0.025	0.051	285.13	292.940	0.051	0.068	0.024	292.98	3.09
21	22	296.07	292.67	292.93	0.360	26.00	0.67	0.012	0.353	1.02	0.016	292.98	0.019	293.00	0.008	0.016	293.02	293.332	0.016	0.022	0.021	293.36	2.71
21	23	301.16	292.34	297.97	0.480	194.00	1.00	0.012	0.785	0.61	0.006	292.98	0.030	293.01	0.003	0.006	293.02	298.570				298.57	2.59
24a	24	276.71	267.00	267.94	5.260	156.00	1.50	0.012	1.767	2.98	0.138	270.35	0.330	270.68	0.069	0.138	270.89	268.840	0.138	0.184	0.078	271.01	5.70
24	44	281.45	268.44	277.92	0.400	158.00	1.00	0.012	0.785	0.51	0.004	271.01	0.017	271.03	0.002	0.004	271.03	278.520	0.004	0.005		278.52	2.93
44	45	281.45	278.25	278.50	0.360	26.00	0.67	0.012	0.353	1.02	0.016	278.52	0.019	278.54	0.008	0.016	278.56	278.902	0.016	0.022		278.91	2.54
24	25	272.78	268.44	269.10	0.410	131.00	1.00	0.012	0.785	0.52	0.004	271.01	0.015	271.03	0.002	0.004	271.03	269.700	0.004	0.002		271.03	1.75
25	26	272.78	269.43	269.69	0.150	26.00	0.67	0.012	0.353	0.43	0.003	271.03	0.003	271.03	0.001	0.003	271.04	270.092	0.003	0.004		271.04	1.74
24	27	275.25	268.19	271.37	4.390	53.00	1.25	0.012	1.227	3.58	0.199	271.01	0.207	271.22	0.099	0.199	271.52	272.120	0.199	0.079	0.129	272.13	3.12
27	28	275.24	271.95	272.25	0.370	30.00	0.67	0.012	0.353	1.05	0.017	272.13	0.023	272.15	0.009	0.017	272.18	272.652	0.017	0.023		272.66	2.58
27	29	280.86	271.62	277.34	3.650	104.00	1.00	0.012	0.785	4.65	0.335	272.13	0.921	273.05	0.168	0.335	273.55	277.940	0.335			277.60	3.26
29	30	290.70	277.34	284.39	3.360	164.00	1.00	0.012	0.785	4.28	0.284	277.60	1.231	278.84	0.142	0.284	279.26	284.990	0.284		0.042	284.75	5.95
30	31	291.12	284.72	287.69	0.270	27.00	0.67	0.012	0.353	0.77	0.009	284.75	0.011	284.76	0.005	0.009	284.77	288.092	0.009	0.010		288.09	3.03
30	32	290.69	284.39	284.99	1.490	22	1.00	0.012	0.785	1.90	0.056	284.75	0.032	284.78	0.028	0.056	284.86	285.590	0.056	0.075	0.001	285.61	5.08
32	33	290.69	285.32	287.67	0.030	24.00	0.67	0.012	0.353	0.09	0.000	285.61	0.000	285.61	0.000	0.000	285.61	288.072	0.000	0.000		288.07	2.62
32	34	293.76	284.99	285.40	1.140	81.00	1.00	0.012	0.785	1.45	0.033	285.61	0.070	285.68	0.016	0.033	285.73	286.000	0.033		0.014	285.98	7.78
34	35	288.92	285.40	285.85	0.440	89.00	1.00	0.012	0.785	0.56	0.005	285.98	0.011	285.99	0.002	0.005	286.00	286.450	0.005	0.007		286.45	2.47
34	36	297.26	285.40	293.40	0.700	60.00	1.00	0.012	0.785	0.89	0.012	285.98	0.020	286.00	0.006	0.012	286.02	294.000	0.012	0.017		294.00	3.26
36	37	298.00	293.40	294.07	0.400	110.00	1.00	0.012	0.785	0.51	0.004	294.00	0.012	294.02	0.002	0.004	294.02	294.670	0.004	0.005		294.67	3.33
30	38	300.18	284.39	296.57	1.540	158.00	1.00	0.012	0.785	1.96	0.060	284.75	0.249	285.00	0.030	0.060	285.09	297.170	0.060		0.007	297.12	3.06
38	39	300.18	296.90	297.16	0.150	26.00	0.67	0.012	0.353	0.43	0.003	297.12	0.003	297.12	0.001	0.003	297.12	297.562	0.003	0.004		297.56	2.62
38	40	303.84	296.57	297.41	1.150	77.00	1.00	0.012	0.785	1.46	0.033	297.12	0.068	297.18	0.017	0.033	297.23	298.010	0.033		0.002	297.98	5.86
40	41	305.02	297.41	301.11	1.100	200.00	1.00	0.012	0.785	1.40	0.030	297.98	0.161	298.14	0.015	0.030	298.18	301.710	0.030	0.041		301.72	3.30
41	42	307.23	301.11	302.49	0.970	276.00	1.00	0.012	0.785	1.24	0.024	301.72	0.173	301.89	0.012	0.024	301.93	303.090	0.024			303.07	4.16
40	43	301.76	298.11	298.73	0.050	123.00	1.00	0.012	0.785	0.06	0.000	297.98	0.000	297.98	0.000	0.000	297.98	299.330	0.000	0.000		299.33	2.43

APPENDIX A

Approved Storm Drainage Report

Core Design, Inc.
14711 N.E. 29th Place Suite #101
Bellevue, Washington 98007
425.885.7877 Fax 425.885 7963

STORM DRAINAGE REPORT

FOR

CURRY P.R.D.

REDMOND, WASHINGTON

RECEIVED
APR - 6 2004
ROTHHILL ENGINEERING
BELLEVUE, WA

GINA R. BROOKS
STATE OF WASHINGTON
36478
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 2-10-05
3-3-04

Prepared By: Gina R. Brooks, P.E.
Date: April 2002
Revised: December 2003, January 2004, March 2004
Core No.: 00009A

ENGINEERING · PLANNING · SURVEYING

CURRY P.R.D.
TABLE OF CONTENTS

SECTION I: PROJECT OVERVIEW

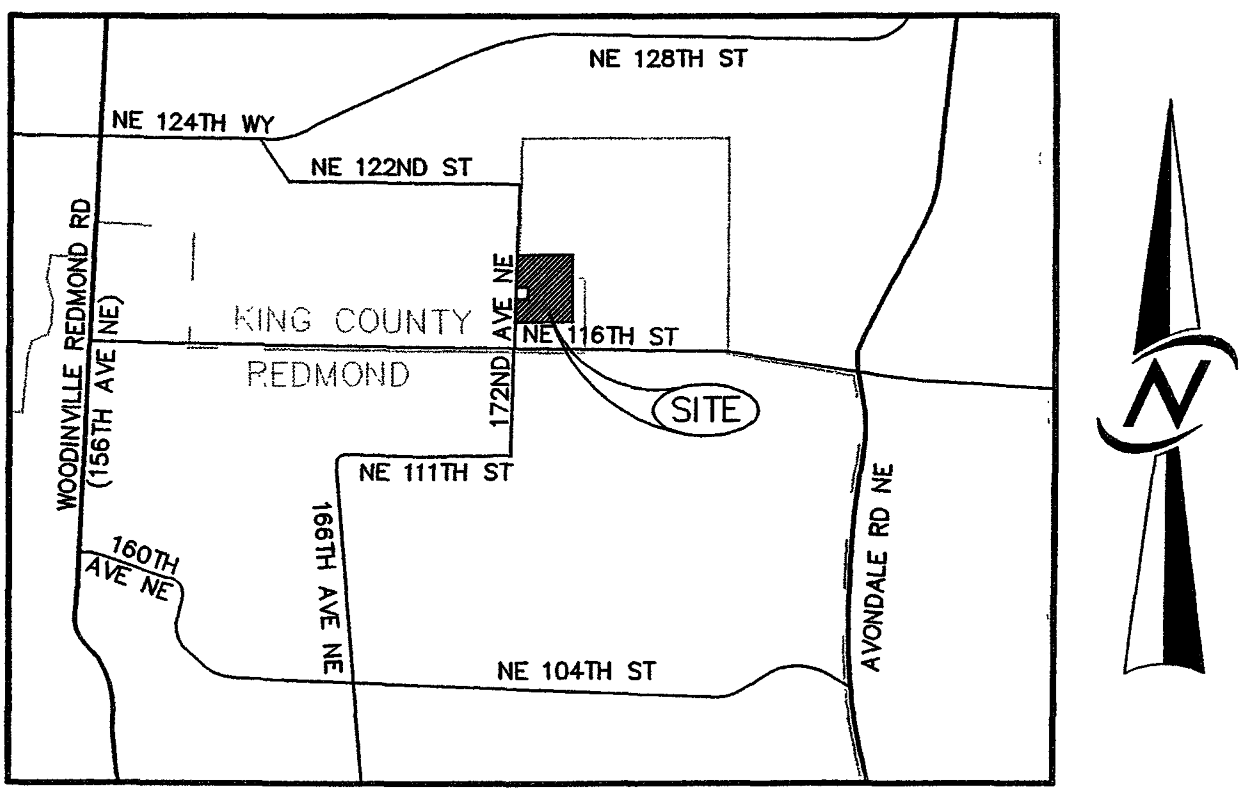
The Curry P.R.D. is a proposed residential development consisting of single family residences. The subject property 15.68 acres in size. The property is bordered by 172nd Avenue NE to the west, the Proposed Plat of Wynstone to the north, residential properties to the south, and the Proposed Plat of Whistler Ridge to the east.

The property currently slopes from northwest to southeast with slopes varying from 2% to 7%. The property consists of two single family residences with associated outbuildings. The remaining portion of the property is covered by second growth trees and brush.

Proposed development of the property will include the demolition of all structures on the property and construction of 69 single family residences on 12.36 acres within the property. Frontage improvements along 172nd Avenue NE will also be installed as part of the subject project.

The runoff from the site will be detained on site and released at a controlled rate, based on the City of Redmond's design criteria for detention and water quality. A wetpond will be located at the southeast corner of the site. The detained flows will then be discharged into the proposed storm drainage bypass line located on 174th Place NE that was constructed as part of the Whistler Ridge project.

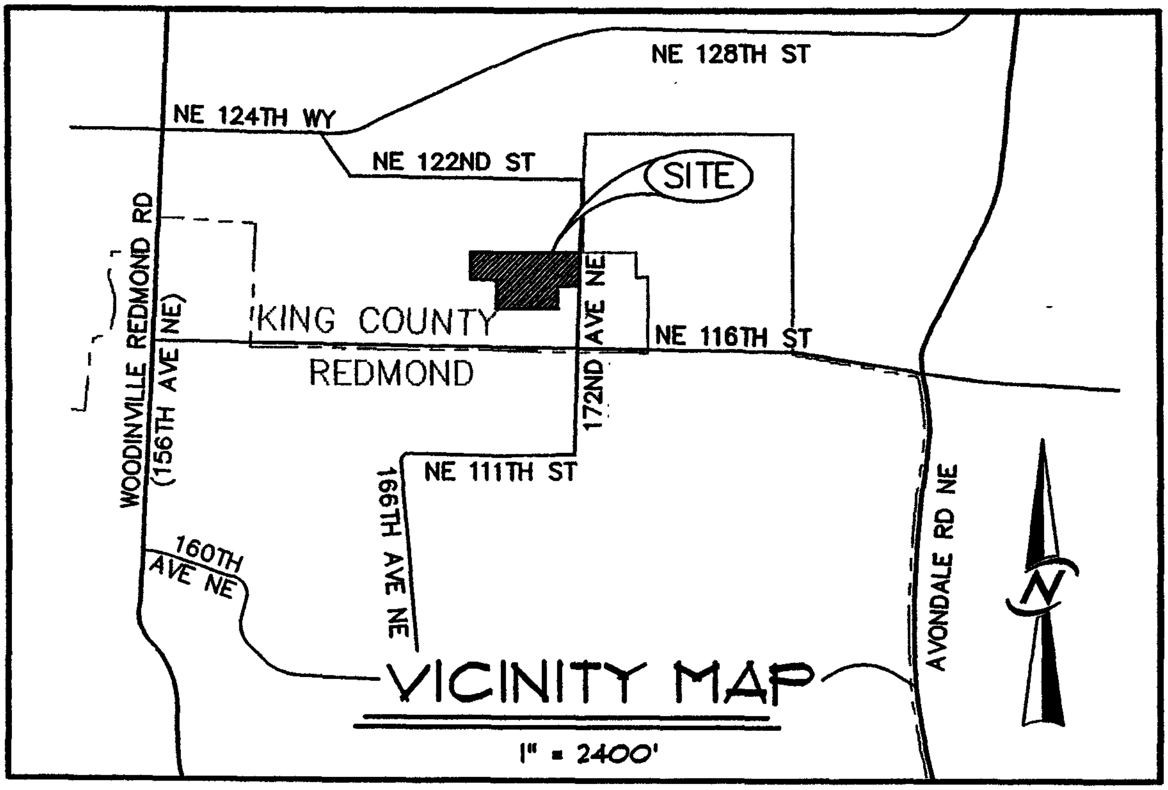
A small portion of a proposed development, currently named Cogan-Allen P.R.D. located opposite of Curry P.R.D along 172nd Avenue NE, will be discharging its drainage to the proposed tight-lined storm drainage system along 172nd Avenue NE that will be installed for the Curry P.R.D. This area that will be collected by Curry's storm drainage system will be treated and detained within the proposed Curry wetpond.



VICINITY MAP

1" = 2400'

VICINITY MAP
CURRY P.R.D.
CORE NO. 00009A



COGAN-ALLEN P.R.D.
VICINITY MAP
CURRY P.R.D.
CORE NO. 00009A

ATTACHMENT B
CONDITIONS OF APPROVAL

(Changes are in caps, underlined and in bold)

I. PLANNING REQUIREMENTS

A. SEPA: A Mitigated Determination of Non-Significance was issued for this project. The MDNS was amended to resolve a scrivener's error on March 28, 2003. The following mitigation measures are incorporated into this approval as conditions of approval:

1. 172nd Avenue NE. The applicant is required to construct a second southbound lane on 172nd Avenue NE as it approaches NE 116th Street. This will allow for the separation of southbound turning movements, which will decrease vehicle delay and improve level of service. The new lane is required to have a minimum storage length of 150 feet along with an appropriate transition back to the existing cross section. The traffic consultant reviewed the results of this improvement in the Traffic Impact Analysis. In 2005 with the project traffic and this mitigation, the southbound through movements will operate at LOS-E, with an approach delay of 42.8 seconds. Thus, this measure effectively mitigates the project impact to this movement by returning the level of service and delay to approximately the same as prior to the development. If the reconstruction of the intersection of NE 116th Street and 172nd Avenue NE as part of the planned widening of NE 116th Street is shown to be fully funded as part of the City of Redmond's 2004 Transportation Improvement Program, the City and the project applicant may propose the modification or elimination of this condition.

2. Water System. The project proponent shall mitigate adverse quantity or quality impacts that are demonstrated to have occurred during or within one year of site civil construction to domestic water supply wells on adjacent properties. This mitigation shall be required where it can be demonstrated that the adverse impacts occurred as an apparent result of dewatering of utility trench excavations, surface grading, storm-water collection or runoff of turbid storm-water or contamination caused by spillage and seepage of noxious substances on the site during construction. Each of four adjacent properties is served by its own well, more or less as shown on sheet P3 of the preliminary

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PRD drawings dated 3/26/02. These adjacent properties potentially affected are King County tax parcel numbers 252605-9098, 252605-9097, 252605-9088 and 252605-9090. **EACH WELL SHALL BE TESTED PRIOR TO CONSTRUCTION TO ESTABLISH BASELINE CONDITIONS.** Should an impact **TO THE QUANTITY OR QUALITY OF THE WATER** be determined, each impacted property shall be provided with city water service. Water services shall be installed from the main fronting the affected property and meter setters and boxes placed to serve the residence. The water service shall further be extended from the meter box to the house and connection made to the existing plumbing. All work shall be done in accordance with city standards and all applicable codes. Connection, meter installation and reimbursement fees shall be paid to the city.

B. General Planning Requirements:

1. This approval is subject to all general criteria of the Redmond Community Development Guide and Redmond Municipal Code. Refer to Attachment VI.A, General Planning Approval Conditions, for a checklist of drawing, bond, and general planning requirements. The checklist does not substitute for the code; it is intended to be used as a guide in preparing your final construction drawing/building permit submittal. Refer to the Redmond Community Development Guide and Redmond Municipal Code for detailed information on each requirement.

2. To ensure compliance with residential site standards, at the time that construction drawings are submitted for Public Works review, the applicant shall provide two (2) copies of the construction drawings, clearing/grading plan and tree retention plan at a scale of 1" = 20' to the Planning Department.

3. A sign permit application must be submitted separately to the Planning Department for review and approval prior to installation of any proposed signs (RCDG Section 20D.160.10-020).

4. Transportation, parks, and fire impact fees shall be assessed at the time of building permit issuance for each residence. The fee in effect at the time of complete building permit application shall apply.

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C. Specific Planning Requirements:

1. Planned Residential Development Approval. The proposal is dependent upon the approval of a Planned Residential Development application. The Hearing Examiner receives testimony and recommends to approve, conditionally approve, modify, or deny the application for Planned Residential Development to the Redmond City Council. The Preliminary Plat shall not be undertaken except in compliance with the approval of a Planned Residential Development application in the same format as those plans dated December 16, 2002.

2. Landscaping:

The landscape plan should include landscaping details for the storm water facility, which will enhance its appearance as a naturally occurring water feature (RCDG Section 20D.40.25-080). The general goal should be to create a varied planting pattern with a diversity of native species that would be found in a palustrine emergent, seasonally flooded (or otherwise inundated) wetland. The planting must be appropriate for the water regime that is anticipated. The design should be done by a qualified wetland consultant or landscape architect with experience in wetland mitigation or planting in wetland areas.

Landscaping shall be coordinated with water/sewer lines and fire hydrants/connections. Trees shall be planted no closer than 8 feet from the centerline of any water/sewer lines. Shrubs shall be planted to maintain at least 4 feet of clearance from the outside edge of the shrub to the center of all fire hydrants/connections. Ground cover may be planted within this radius. (RCDG Section 20D.80.10-150(8)).

Planting shall meet the City requirements for site clearance at intersections as identified in Section 20D.210.25 of the Redmond Community Development Guide. (20D.80.10-150(2))

For any landscaping along 172nd Avenue NE and 174th **PLACE** NE, an irrigation system shall be maintained by the Home Owners' Association or other means

acceptable by the City of Redmond Parks Department. Maintenance of landscaping shall be the responsibility of the Homeowners Association, including that portion

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located within the public right-of-way along 172nd Avenue NE and 174th **PLACE** NE. Any installation or other work in the public right of way requires an Extended Right of Way Use Permit issued by the Public Works Department.

Street trees are required as follows (RCDG Section 20D.80.10-140):

Street	Species	Spacing on Center	Notes
172nd Avenue NE	*Cleveland Maples*	*30'*	*Minimum 2.5" caliper. Specimen to be grown for street use.*
Internal Streets	*To be determined.*	*TBD*	*Per Landscaping Requirements. Note: The City does not maintain internal street trees.*

Sensitive Areas:

a. A wetland and buffer enhancement plan shall be submitted with the Construction Drawings. The plan shall meet the requirements of Appendix 20D-2 (V) of the Redmond Community Development Guide.

b. A sensitive areas analysis shall be completed for off-site improvements that extend into areas with potential wetlands or streams. Mitigation will be required where improvements extend into a sensitive area or its buffer and beyond those improvements that currently exist.

c. A split rail fence shall be installed to delineate all sensitive areas and native growth protection area tracts. Sensitive area signage (available from the City of Redmond) shall be installed to provide for notice in the field regarding the presence of sensitive areas. Signage shall be affixed to the fence approximately on the midpoint of each lot's rear property line. Where fencing does not abut an individual lot, signage shall be placed approximately every 100'. Signage and fencing shall be shown on the construction drawings. Final location and materials will be subject to approval by the Planning Department.

Tree Protection Measures:

d. Existing Significant Trees to Remain, as designated on the proposed Tree Preservation Plan, dated 12/16/2002, shall be saved.

e. Tree preservation measures for trees designated to be saved must at a minimum comply with required tree protection in RCDG Section 20D.80.20-100(1). These measures include but are not limited to the following requirements:

   i. All construction activities, including staging and traffic areas, shall be prohibited within five feet of the dripline of protected trees.

   ii. Tree protection barriers shall be installed along the outer edge and completely surround the area 5' from the dripline of significant trees to be protected prior to any land disturbance.

   iii. Tree protection barriers shall be a minimum of four feet high, constructed of chain link, or polyethylene laminar safety fencing or similar material. "Tree Protection Area" signs shall be posted visibly on all sides of the fenced areas. Signs requesting subcontractor cooperation and compliance with tree protection standards may also be required to be posted at site entrances.

   iv. Where tree protection areas are remote from areas of land disturbance, and where approved by the Planning Department, alternative forms of tree protection may be used in lieu of tree protection barriers, provided that protected trees are completely surrounded with continuous rope or flagging and are accompanied by "Tree Save Area-Keep Out" signs.

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v. Per RCDG Section 20D.80.20-080(1), each significant tree that is removed on the site must be replaced by one new tree. The required number of replacement trees must be identified on the Tree Replacement Plan. The minimum size of replacement trees is 2-½ -inch caliper for deciduous trees and six to eight feet in height for evergreen trees. **STREET TREES OF THIS CALIPER WILL BE COUNTED AS REPLACEMENT TREES.**

vi. Two copies of the final Tree Preservation Plan, Landscape Plan and Tree Replacement Plans at 1"=20' scale must be submitted with construction drawings and approved prior to issuance of construction drawings. The final plans shall be prepared or approved by a licensed landscape architect, registered Washington certified nurseryman or registered Washington certified landscaper (RCDG Section 20D.80.10-040). This certification shall be noted on all landscape-related plans. A copy of the Tree Preservation Plan shall be recorded with the Final Plat.

vii. Restrictive covenants shall include a statement notifying property owners and the Homeowner's Association that significant and landmark trees on individual lots may only be removed in accordance with the approved tree retention plan. This language shall be reviewed and approved by the Planning Department prior to recording of the restrictive covenants with King County.

viii. A tree health assessment shall be completed for off-site improvements that extend into areas with significant and landmark trees. Mitigation will be required where trees are removed or improvements extend within 5' of the dripline of any healthy, significant or landmark tree, beyond those improvements that currently exist.

Reduction of Front Yard Setback. The proposed reduction in front yard setback to below the required 10' is not approved. The site plan shall be revised such that the 10' front yard setback is met. Impacts to trees resulting from the change shall be mitigated.

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II. ENGINEERING REQUIREMENTS

A. No lots shall be permitted direct access to 172nd Avenue NE. The specific lots affected by this restriction shall be listed on the face of the final plat and other documents.

B. Easements & Dedications: Existing and proposed easements and rights-of-way shall be shown on the final plat, civil plans and other documents. Any existing easements for ingress, egress, private utilities, franchise utilities, etc. that lie within the Plat or within rights-of-way adjacent to the Plat shall be released or modified to the City of Redmond's satisfaction prior to final plat approval.

1. Public easements are required as follows:

a) 10-feet wide for sidewalk and utilities adjacent to the right of way along the east side of 172nd Avenue NE.

b) 10-feet wide for sidewalk and utilities adjacent to the right of way along the west side of 174th Place NE.

c) 10-feet wide for sidewalk and utilities adjacent to the rights of way along both sides of the internal plat streets: NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE.

d) 10-feet wide for pedestrians from NE 119th Court across private Tract E to 172nd Avenue NE and from 173rd Place NE across private Tracts G and H to 174th Place NE.

e) Rights-of-way dedicated to the City of Redmond are required as follows: 50 feet wide for the internal plat streets: NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE.

f) Private tracts are required as follows:

(1) 35 feet wide for the internal plat streets within Tracts F, G and I.

(2) 20 feet wide for the internal plat streets within Tracts E and H.

(3) New right-of-way lines joining at intersections shall connect with a minimum of a 25-foot radius, or with a chord that encompasses an

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equivalent area. The area formed by this radius or chord shall also be dedicated as right-of-way.

(4) All lots are subject to an easement for utilities and drainage facilities over, under and across a strip of land 2-1/2 feet wide along each side of the interior lot lines within the development, together with a strip of land 5 feet wide along the lot lines around the perimeter of the development.

C. Public and Private Engineering/Transportation Improvements

1. Half street improvements are required on 172nd Avenue NE including asphalt paving 18 feet from centerline to face of curb with appropriate tapers, type A-1 concrete curb and gutter, planter strip, concrete sidewalk, storm drainage, streetlights, street trees, street signs and underground utilities including power and telecommunications. The minimum pavement section for 172nd Avenue NE shall consist of:

a) 4" Asphalt Pavement Cl. A

b) 5" Asphalt Pavement Cl. E

c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTMD 1557)

d) Street crown 2% sloped to drain system

2. Half street improvements are required on 174th Place NE behind the existing curb and gutter including planter strip, concrete sidewalks, street lights, street trees, street signs and underground utilities including power and telecommunications.

3. On 172nd Avenue NE and 174th Place NE the asphalt street shall be planed, overlaid, and/or patched to repair damage done by utility cuts and other work, as determined by the Engineering Division.

4. Sidewalks constructed to City standards are required within the pedestrian easements between private Tract E and 172nd Avenue NE and between private Tracts G and H.

5. Other off-site improvements include widening of 172nd Avenue NE on the southbound approach to NE 116th Street as outlined in the SEPA conditions for this Plat.

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6. Prior to the City allowing occupancy of any home constructed within the Curry Property Plat, the developer shall design and construct an interim walkway for school children along the east side of 172nd Avenue NE from the pedestrian connection at Tract E to NE 116th Street, along with other minor improvements at the 172nd Avenue NE/NE 116th Street intersection as needed to ensure safe crossing of these streets. The interim walkway shall be constructed of asphalt or Portland cement concrete. The interim walkway shall be a minimum of 5-feet wide when located adjacent to curb and gutter or other traffic barrier acceptable to the City. The interim walkway shall be a minimum of 4-feet wide and located a minimum of 10-feet from the street edge where no curb and gutter or other traffic barrier acceptable to the City exists. A safety railing or fencing will be required when (1) the interim walkway is located at the top of a slope or wall that is 2:1 or steeper and (2) the walkway elevation is 30-inches or higher than the toe of the slope or wall. This requirement is also a condition for the Wynstone Plat located to the north of the Curry Property. The applicant is encouraged to work with the Wynstone Plat applicant to share the cost of this improvement. For that portion of the safe walking route across Tax Parcel 252605-9098, completion of the curb, gutter and sidewalk is likely the most cost effective alternative.

7. All vehicle use areas including driveways, private streets, service areas, etc. shall be paved.

8. Specific subdivision public street improvement conditions for NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE:

a) Street improvements within the 50-foot wide dedicated right-of-way shall include asphalt paving (28 feet curb to curb), with appropriate tapers, type A-1 concrete curb and gutter, planter strips, street trees, concrete sidewalks, storm sewers, streetlights, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(1) 3" Asphalt Pavement Cl. B

(2) 4" Asphalt Treated Base

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(3) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTMD 1557)

(4) Street crown 2% sloped to drain system

(5) The cul-de-sac on NE 119th Court is required to have a minimum radius of 44 feet to the face of curb. A planter island shall be provided in the center of the cul-de-sac to reduce, as much as possible, the amount of asphalt. The maintenance of the landscape in the island shall be the responsibility of the adjacent property owners. This maintenance requirement shall be included on the face of the final plat.

b) Specific short subdivision private street improvement conditions for the internal streets within Tracts F, G and I:

(1) Street improvements shall include asphalt paving (28 feet), with appropriate tapers, thickened asphalt edge or type A-1 concrete curb and gutter, concrete sidewalk (one side), storm sewers, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(a) 2" Asphalt Pavement Class B

(b) 4" Crushed Rock surfacing

(c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTM D 1557)

(d) Street crown 2% sloped to drain system

c) Specific short subdivision private street improvement conditions for the internal streets within Tracts E and H:

(1) Street improvements shall include asphalt paving (20 feet), with appropriate tapers, thickened asphalt edge or type A-1 concrete curb and gutter, storm sewers, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(a) 2" Asphalt Pavement Class B

(b) 4" Crushed Rock surfacing

(c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTM D 1557)

(d) Street crown 2% sloped to drain system

(2) Installation of mailbox stand(s) shall be in accordance with City standards.

d) All power, telephone, streetlights, etc. shall be shown on the engineering drawings and landscape plans submitted for construction permits.

e) A composite drawing that includes all utilities, landscaping including trees, etc., is necessary to minimize the possibility of utilities/landscaping conflicts.

f) Conversion of Aerial Utilities (Power, Telephone, T.V., Etc. to Underground)

(1) All aerial utilities shall be converted to underground along all street frontages and within the plat according to 20D.220.10 "Underground Wiring" in the Redmond Community Development Guide.

D. The applicant shall meet the construction plan and construction requirements in Attachment B, "REQUIREMENTS FOR CONSTRUCTON DRAWINGS" and Attachment C, "GENERAL INFORMATION AND ADMINISTRATION REQUIREMENTS" **from the Technical Committee Report dated March 31, 2003.**

III. UTILITIES REQUIREMENTS

A. Sewer

1. Sewer service will require a developer extension of the City of Redmond sewer system as follows:

a) Construct sanitary sewer improvements more or less as shown on the Preliminary Plat drawings dated December 12, 2002.

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Redmond, WA 98073-9710

b) (The sewer main location shown on the site plan may not conform to City standard location. Revisions to comply with City standard locations may be required.)

2. Vehicular access to all new and existing manholes shall be provided. The access easement shall be a minimum of 20 feet in width with asphalt concrete surfacing. Alternative surfacing may be approved by the City depending upon the location. If access passes through fencing then 14-foot minimum width gates shall be provided. The plat or easement document shall (1) show and dedicate the 20-foot access easement, (2) have covenants advising property owners of their obligation to maintain the availability of the access by providing gates and not obstructing the access, and (3) that the property owners maintain, repair and replace the access surfacing as needed.

B. Water:

1. Water service will require a developer extension of the City of Redmond water system as follows:

a) Construct on-site water improvements more or less as shown on the Preliminary Plat drawings dated December 12, 2002. A 12-inch water main shall be constructed to serve the site in 172nd Avenue NE from NE 116th Street to the northern limits of the plat, more or less as shown on the Preliminary Plat drawings. An 8-inch stub shall be extended across 172nd Avenue NE in the vicinity of NE 117h Street and connected with the existing 8-inch main in that vicinity.

b) (The water main location shown on the site plan may not conform to City standard locations. Revisions to comply with City standard locations may be required.)

IV. CLEARING/GRADING AND STORMWATER MANAGEMENT

A. Erosion control systems must be implemented throughout the construction process and until the site is stabilized. Design of all systems must be in accordance with section 20E.90.10 of the Community Development Guide and the most recent issue of the City of Redmond STORMWATER MANAGEMENT AND EROSION CONTROL TECHNICAL NOTEBOOK

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(notebook). Contact the Stormwater Division at 556-2890 for information about, or a copy of, the notebook. Preferred methods for management and control are discussed in the notebook.

B. Stormwater Management

1. Quantity Control

a) In an open pond; provide detention for peak discharge control to match one half of the 2-year and match the 10-year and 100-year storms natural (prior to any development) runoff peak flow rates.

b) Provide for overflow routes through the site for the 100 year storm runoff (100 year flow may not impact any buildings).

2. Quality control. Use a lined, open pond to provide water quality treatment for the runoff from the 6-month, 24-hour design storm event. Use the developed condition land use when determining the water quality storm flow rate and volume.

3. Provide maintenance vehicle access to the pond bottom and outlet control structure from 174th Place NE.

C. Miscellaneous

1. Construction activities may be limited or suspended during the rainy season (October 1 – April 30).

2. Stencil all on-site storm drainage inlets with "DUMP NO WASTE DRAINS TO STREAM". Stencils are available from the Stormwater Division located at the City Annex (phone 556-2840). Design plans shall identify the requirement to stencil drainage inlets. Easements will be required for any public conveyance systems.

3. Trees are not allowed within 8 feet of storm systems.

4. Ponds shall be lined in accordance with the Department of Ecology Stormwater Management Manual for the Puget Sound Basin, (1992).

5. Designate private roads on the construction plans and plat drawings by adding (Private) after the road name.

V. FIRE PROTECTION

A. EMERGENCY VEHICLE ACCESS ROADWAY REQUIREMENTS

1. Emergency vehicle access roadways shall be an unobstructed 20 feet in width and 13' 6" high. Turning radii shall be 25' interior and 45' exterior.

2. Fire lanes shall be located wherever curbs, road edges, or loading areas are adjacent to the 20-foot wide vehicle access roadway. Fire lanes identified through site plan review shall be included on the final civil drawings. Additional fire lanes and marking may be required anytime during the life of the development upon evaluation by and direction of the Fire Marshal. Where fire lanes are a 28 feet wide access tract or easement, the side not used for parking shall be signed "No Parking - this side" or "No Parking –Fire Lane- this side". If the access tract or easement is 20 feet then both sides shall be signed.

3. Driveway entries or curb returns shall be provided to meet minimum roadway radii at all tracts, easements or other intersections. Do not measure into areas where parking is allowed. This includes where Tract E meets 172nd Ave NE.

4. Traffic circles shall not impede into required radii. The circle at NE 119th and Tract E, and at NE 119th and 173rd AVE NE shall be reduced in diameter to allow through movements in both directions.

B. ADDRESSING

1. Each lot shall have the building address numerals installed per the Redmond Fire Department Design and Construction Guide. A nominal 6-inch high numeral shall be used.

2. Approval is required for building and unit addressing.

3. Temporary signs shall be used at the job site as soon as construction begins. Numerals shall be high contrast in color, face the street fronting the property, and be a minimum 6" high.

4. The "T" road labeled NE 118th shall be called 172nd Ct NE and so signed at the intersection with NE 117th Way. Lots 66, 65 and 64 shall be addressed with 117xx, ascending odd numbers. Lots 62 and 63 shall be addressed with 117xx, ascending even numbers.

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5. Lots 14, 13, 16, 15 shall be ascending odd numbers addressed off 174th Pl NE.

C. CITY APPROVED FIRE ALARM SYSTEM: Single station smoke detection is required in all residential occupancies.

D. KNOX BOX: A "Knox" padlock is the only locking device approvable for the bollards at Tract E. Contact the Redmond Fire Department for purchase information.

E. HYDRANTS

1. Hydrants must be in place and serviceable prior to combustible construction.

2. Planter islands or peninsulas for hydrants require a minimum diameter of 8 feet. Four feet is to be maintained between face of curbs and fire protection equipment. Hydrants shall not be located behind parking. See the hydrant on the west side of 173rd Pl NE, just south of NE 118th CT (Tract F). This may need to be moved to the east side of the street.

OTHER: ADDITIONAL REQUIREMENTS MAY BE SET ON REVIEW OF CIVIL, ARCHITECTURAL, FIRE ALARM AND/OR FIRE SPRINKLER PLANS.

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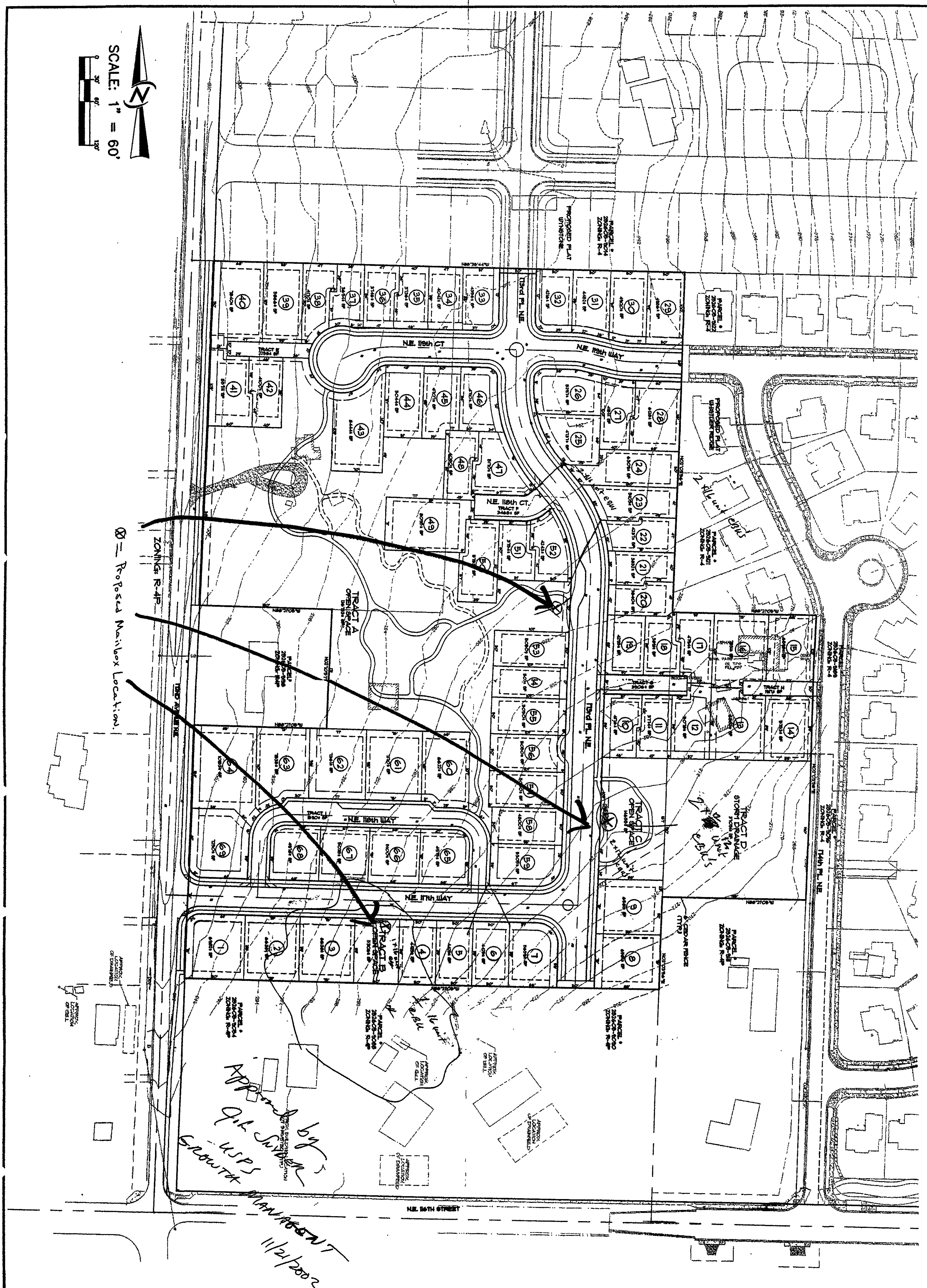


DATE DECEMBER, 2001	PRELIMINARY PLAT
DESIGNED CRAIG KRUEGER	CURRY PROPERTY
DRAWN M. J. STEWART	CAMWEST REAL ESTATE DEVELOPMENT
APPROVED J.A. OLSEN	9720 NE 120TH PL. #100
JAMES A. OLSEN, P.E. PROJECT MANAGER	KIRKLAND, WA 98034

CORE DESIGN
4205 148th Ave. N.E. Suite 100
Bellevue, Washington 98007
425.885.7877 Fax 425.885.7963
ENGINEERING · PLANNING · SURVEYING

NO.	REVISIONS	DATE
1	PER CITY COMMENTS	3-25-02
2	PER CITY COMMENTS	5-13-02
3	PER CITY COMMENTS	10-16-02

SHEET P2 OF 16
PROJECT NUMBER 00009A

SECTION III: OFFSITE ANALYSIS

Upstream:

Upstream area will consist of the open space designated within the property along with the property that is surrounded by the subject property and adjacent to 172nd Avenue NE. The asphalt section along the frontage on 172nd Avenue NE from the crown of the road to the existing edge of asphalt will also be considered upstream tributary area.

Downstream:

The site naturally drains to a low area located at the southeast corner of the site. A wetpond will be located in this low area and will discharge to the 18" storm drainage bypass system along 174th Place NE that was constructed as part of the Whistler Ridge development (PPL99-001). The bypass line will convey flows south along the proposed 174th Place NE and then east along NE 116th Street.

Drainage that enters the bypass system along 174th Place NE will include the discharge from the Curry PRD pond plus some adjacent residences along 174th Place NE. The storm drainage report for Whistler Ridge does not state the allowable release rate from the Curry PRD that can be conveyed within the bypass system. Therefore, a basin analysis has been completed within this report in Section V that shows all flows approaching and entering the bypass system along 174th Place NE and an analysis of the bypass system and whether or not the size is adequate to accept the incoming drainage.

SECTION IV: DETENTION ANALYSIS AND DESIGN

A. Hydraulic Analysis

Storm water runoff for the site was modeled using WaterWorks hydrology software and the Santa Barbara Urban Hydrograph Methodology. Soils type on-site are Alderwood gravely sandy loam, hydrologic group C. The detention criteria used for this analysis is per the Stormwater Management Manual for the Puget Sound. The required peak release rates are as follows:

Dev 2-year, 24-hr peak release → 50% Pre-Dev 2-year, 24-hr peak release
Dev 10-year, 24-hr peak release → Pre-Dev 10-year, 24-hr peak release
Dev 100-year, 24-hr peak release → Pre-Dev 100-year, 24-hr peak release

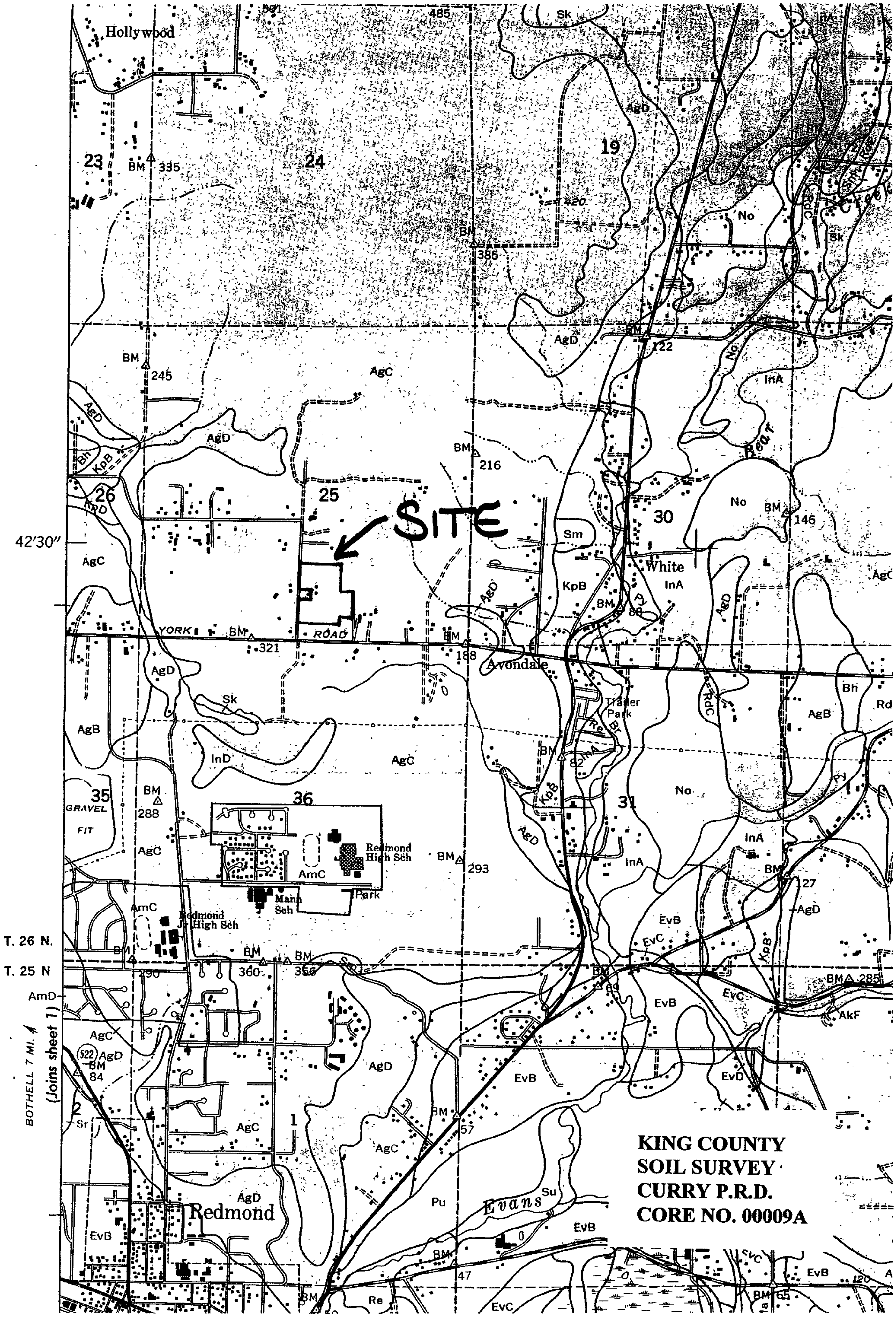
The precipitation rates used for this analysis are as follows:

6-month, 24-hour storm → 1.16 in.
2-year, 24-hour storm → 1.81 in.
10-year, 24-hour storm → 2.73 in.
100-year, 24-hour storm → 3.69 in.

Pre-Developed Conditions

Pre-Developed conditions for the project site were analyzed assuming 100% pervious ground cover consisting of second growth forest as defined in the City of Redmond code under the definition of Pre-Development Conditions. See "Site Plan Basin Map" exhibit on the following pages. Proposed development of the property will include the demolition of all structures on the property and construction of 69 single family residences on 12.36 acres within the property boundary. Half-street improvements along 172nd Avenue NE adjacent to the property will be constructed as part of the development. The area defined as the existing site will include that area along the frontage from the edge of existing asphalt to the property line. A portion of the frontage will be bypassing the proposed storm drainage system. Another portion of improvements along 172nd Avenue NE which includes the addition of a 25:1 taper and a 5' asphalt walkway from the subject site to NE 116th Street will also bypass the proposed storm drainage system. These areas of bypass, 5,421 square feet or 0.12 acre, will be compensated for by taking an equal area of existing asphalt along the frontage that will be collected and treating it as 2nd Growth Forest in its existing condition. This is a conservative approach since the frontage improvements will include some pervious area installation in the form of a planter strip.

Frontage area that will be collected, detained, and treated within the site boundary is 0.51 acre. This frontage area includes those areas that will be directly collected by the proposed 172nd Avenue NE conveyance system but does not include the delineated



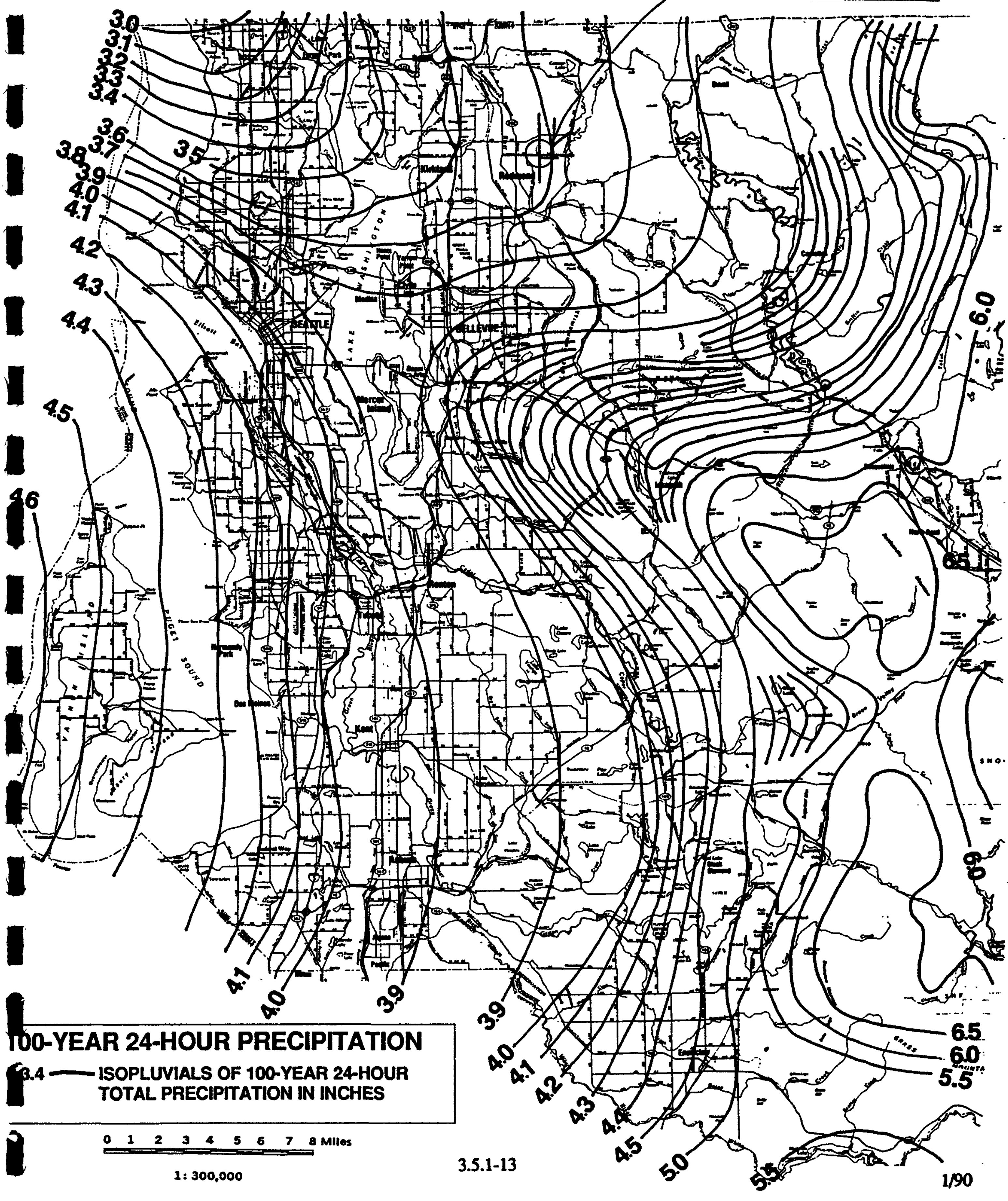
KING COUNTY
SOIL SURVEY
CURRY P.R.D.
CORE NO. 00009A
SITE
Hollywood
Avondale
White
Redmond
YORK ROAD
Redmond High Sch
Redmond Jr. High Sch
Mann Sch
Park
Trailer Park
GRAVEL PIT
Evans
Bear
42'30"
T. 26 N.
T. 25 N
BOTHELL 7 MI.
(Joins sheet 1)

Table III-1.6 Hydrologic Soil Groups for Soils in the Puget Sound Basin

Soil Type	Hydrologic Soil Group	Soil Type	Hydrologic Soil Group
Agnew	C	Colter	C
Ahl	B	Custer	ND
Aits	C	Dabob	ND
Alderwood	C	Delphi	D
Arents, Alderwood	B	Dick	ND
Arents, Everett	B	Dimal	D
Ashoe	B	Dupont	D
Baldhill	B	Earlmont	C
Barneston	C	Edgewick	C
Baumgard	B	Eld	B
Beausite	B	Elwell	B
Belfast	C	Esquatzel	B
Bellingham	D	Everett	A
Bellingham variant	C	Everson	D
Boistfort	B	Galvin	D
Bow	D	Getchell	A
Briscot	D	Giles	B
Buckley	C	Godfrey	D
Bunker	B	Greenwater	A
Cagey	C	Grove	C
Carlsborg	ND	Harstine	C
Casey	ND	Hartnit	ND
Cassolary	C	Hoh	ND
Cathcart	B	Hoko	ND
Centralia	B	Hoodsport	ND
Chehalis	B	Hoogdal	C
Chesaw	A	Hoypus	ND
Cinebar	B	Huel	ND
Clallam	C	Indianola	ND
Clayton	B	Jonas	B
Coastal beaches	variable	Jumpe	ND
Kapowsin	C/D	Kalaloch	C
Katula	C	Renton	D
Kilchis	C	Republic	B
Kitsap	C	Riverwash	variable
Klaus	ND	Rober	C
Klone	ND	Salal	C
Lates	C	Salkum	B
Lebam	B	Sammamish	D
Lummi	ND	San Juan	ND
Lynnwood	ND	Scamman	D
Lystair	ND	Schneider	B
Mal	C	Seattle	D
Manley	B	Sekiu	ND
Mashel	B	Semiahmoo	D
Maytown	C	Shalcar	D
McKenna	D	Shano	B
McMurray	ND	Shelton	C
Melbourne	B	Si	C
Menzel	ND	Sinclair	C
Mixed Alluvial	variable	Skipopa	D
Molson	B	Skykomish	B
Mukilteo	C/D	Snahopish	ND
Naff	B	Snohomish	D
Nargar	A	Solduc	B
National	ND	Solleks	ND
Neilton	A	Spana	D

3.69in

FIGURE 3.5.1H 100-YEAR 24-HOUR ISOPLUVIALS

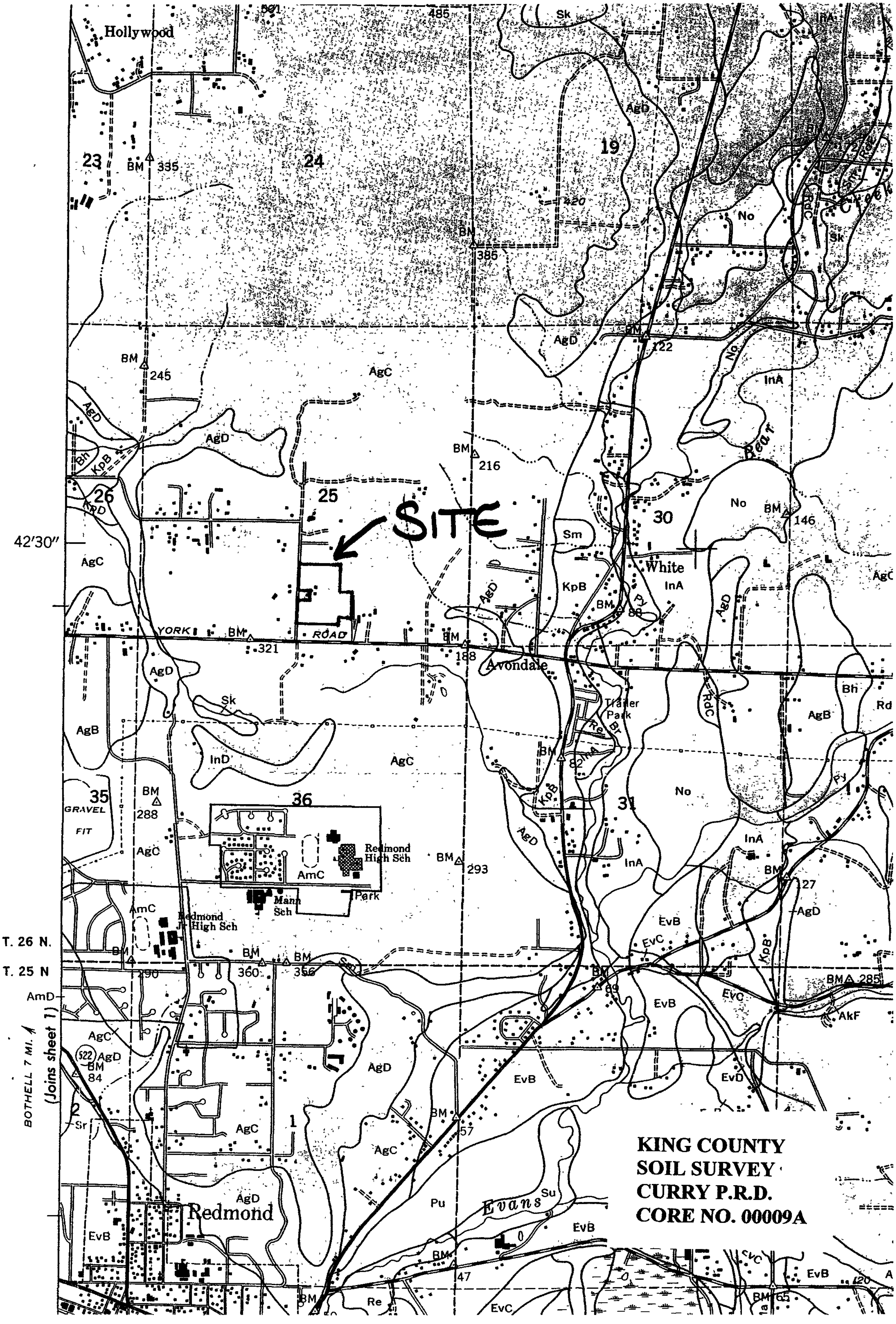


100-YEAR 24-HOUR PRECIPITATION

3.4 —— ISOPLUVIALS OF 100-YEAR 24-HOUR TOTAL PRECIPITATION IN INCHES

0 1 2 3 4 5 6 7 8 Miles

1: 300,000


KING COUNTY
SOIL SURVEY
CURRY P.R.D.
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SITE
Hollywood
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Trailer Park
Redmond High Sch
Redmond Jr. High Sch
Mann Sch
Park
GRAVEL PIT
Bear
Evans
42'30"
T. 26 N.
T. 25 N
BOTHELL 7 MI.
(Joins sheet 1)
23
24
19
25
26
30
35
36
31
1
2
AgC
AgD
AgB
AmC
AmD
KpB
KpD
InA
InD
No
Sk
Sm
Bh
EvB
EvC
EvD
Pu
Py
Re
Rd
RdC
Sr
Su
AkF
BM
335
385
420
245
216
146
122
321
188
88
82
288
293
27
290
360
356
69
285
84
57
47
65
485
522

Table III-1.6 Hydrologic Soil Groups for Soils in the Puget Sound Basin

Soil Type	Hydrologic Soil Group	Soil Type	Hydrologic Soil Group
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Ahl	B	Custer	ND
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Arents, Alderwood	B	Dick	ND
Arents, Everett	B	Dimal	D
Ashoe	B	Dupont	D
Baldhill	B	Earlmont	C
Barneston	C	Edgewick	C
Baumgard	B	Eld	B
Beausite	B	Elwell	B
Belfast	C	Esquatzel	B
Bellingham	D	Everett	A
Bellingham variant	C	Everson	D
Boistfort	B	Galvin	D
Bow	D	Getchell	A
Briscot	D	Giles	B
Buckley	C	Godfrey	D
Bunker	B	Greenwater	A
Cagey	C	Grove	C
Carlsborg	ND	Harstine	C
Casey	ND	Hartnit	ND
Cassolary	C	Hoh	ND
Cathcart	B	Hoko	ND
Centralia	B	Hoodsport	ND
Chehalis	B	Hoogdal	C
Chesaw	A	Hoypus	ND
Cinebar	B	Huel	ND
Clallam	C	Indianola	ND
Clayton	B	Jonas	B
Coastal beaches	variable	Jumpe	ND
Kapowsin	C/D	Kalaloch	C
Katula	C	Renton	D
Kilchis	C	Republic	B
Kitsap	C	Riverwash	variable
Klaus	ND	Rober	C
Klone	ND	Salal	C
Lates	C	Salkum	B
Lebam	B	Sammamish	D
Lummi	ND	San Juan	ND
Lynnwood	ND	Scamman	D
Lystair	ND	Schneider	B
Mal	C	Seattle	D
Manley	B	Sekiu	ND
Mashel	B	Semiahmoo	D
Maytown	C	Shalcar	D
McKenna	D	Shano	B
McMurray	ND	Shelton	C
Melbourne	B	Si	C
Menzel	ND	Sinclair	C
Mixed Alluvial	variable	Skipopa	D
Molson	B	Skykomish	B
Mukilteo	C/D	Snahopish	ND
Naff	B	Snohomish	D
Nargar	A	Solduc	B
National	ND	Solleks	ND
Neilton	A	Spana	D

2.73 in

FIGURE 3.5.1E 10-YEAR 24-HOUR ISOPLUVIALS

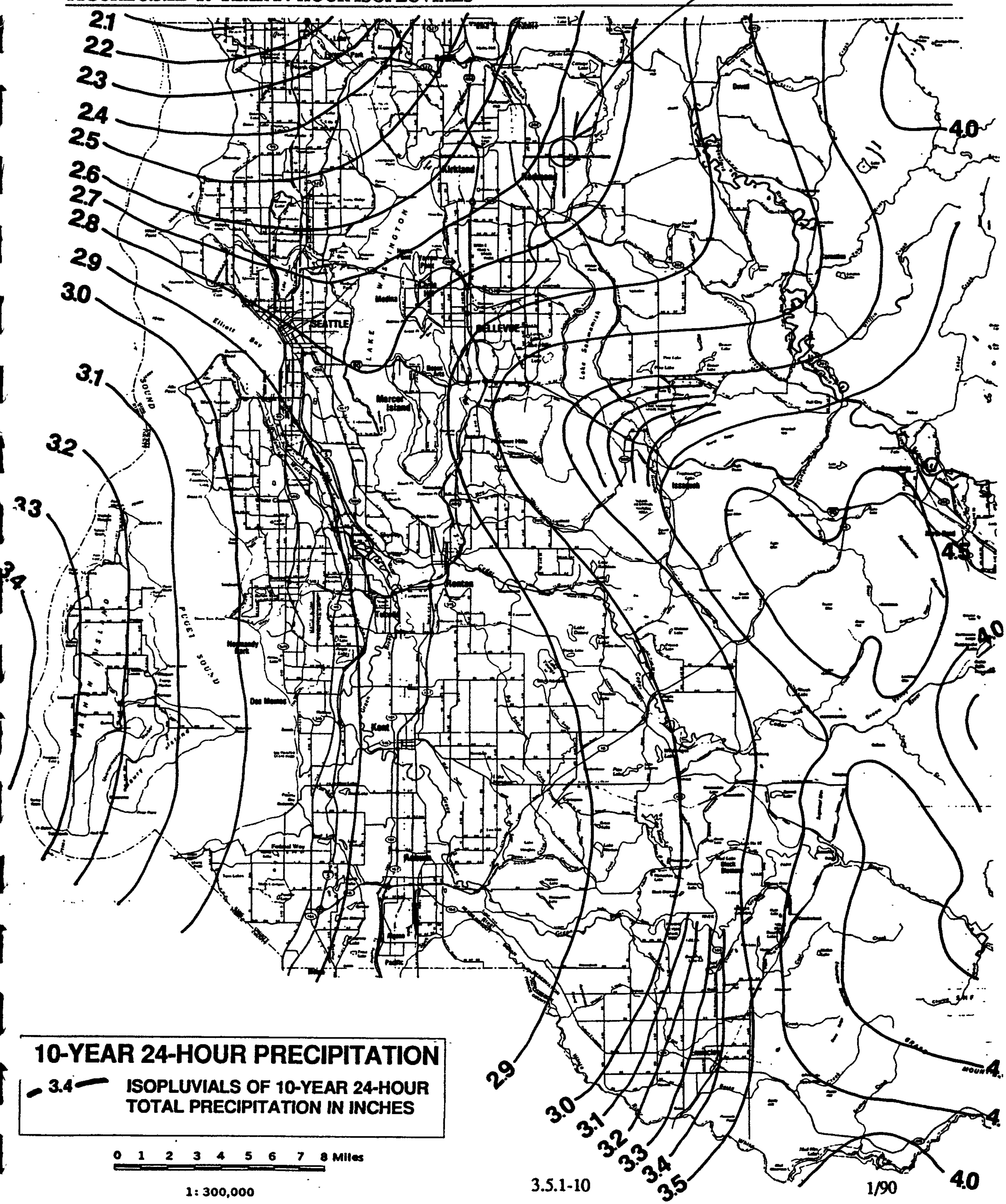

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FIGURE 3.5.1H 100-YEAR 24-HOUR ISOPLUVIALS

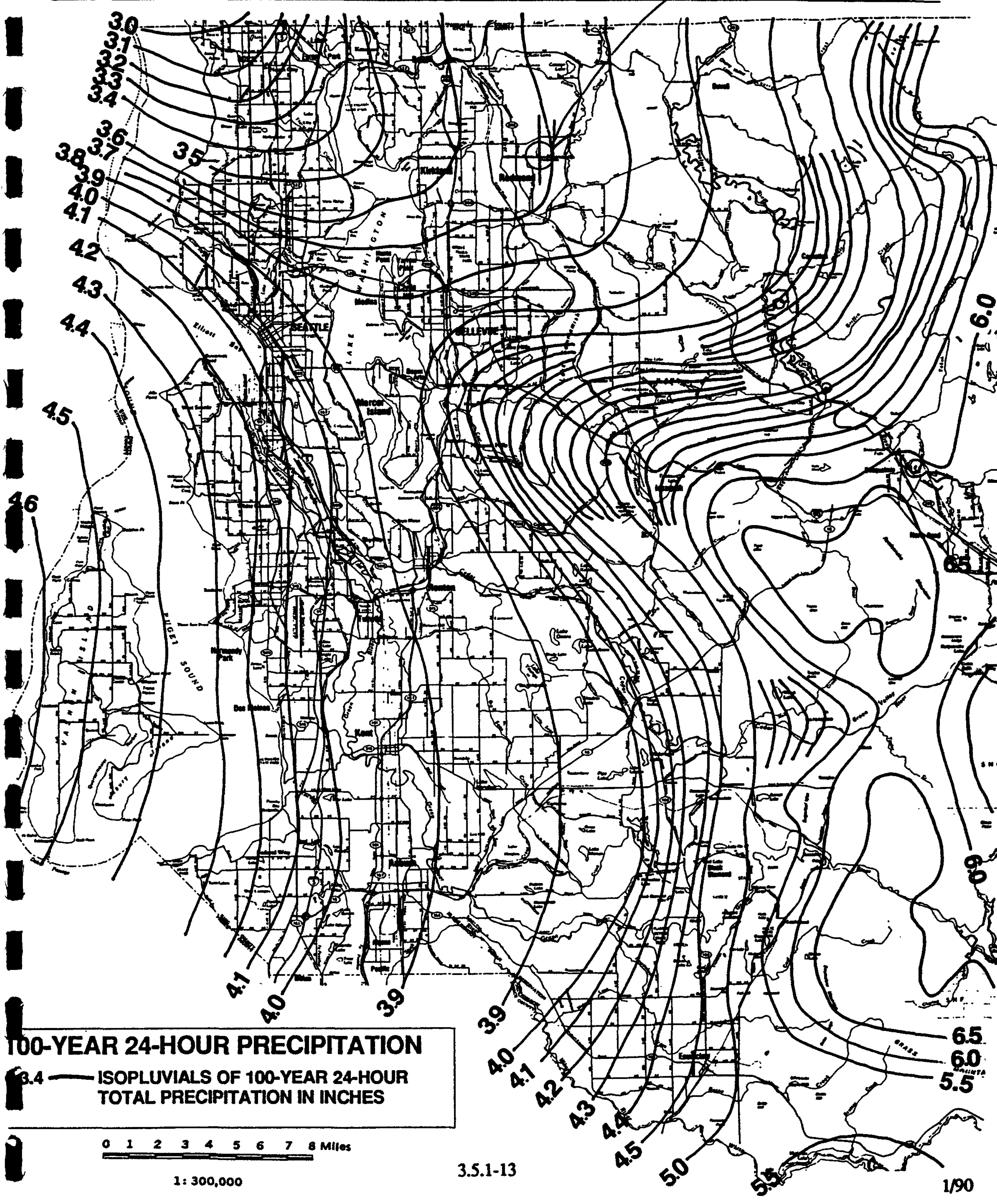

Table III-1.6 Hydrologic Soil Groups for Soils in the Puget Sound Basin

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Arents, Everett	B	Dimal	D
Ashoe	B	Dupont	D
Baldhill	B	Earlmont	C
Barneston	C	Edgewick	C
Baumgard	B	Eld	B
Beausite	B	Elwell	B
Belfast	C	Esquatzel	B
Bellingham	D	Everett	A
Bellingham variant	C	Everson	D
Boistfort	B	Galvin	D
Bow	D	Getchell	A
Briscot	D	Giles	B
Buckley	C	Godfrey	D
Bunker	B	Greenwater	A
Cagey	C	Grove	C
Carlsborg	ND	Harstine	C
Casey	ND	Hartnit	ND
Cassolary	C	Hoh	ND
Cathcart	B	Hoko	ND
Centralia	B	Hoodsport	ND
Chehalis	B	Hoogdal	C
Chesaw	A	Hoypus	ND
Cinebar	B	Huel	ND
Clallam	C	Indianola	ND
Clayton	B	Jonas	B
Coastal beaches	variable	Jumpe	ND
Kapowsin	C/D	Kalaloch	C
Katula	C	Renton	D
Kilchis	C	Republic	B
Kitsap	C	Riverwash	variable
Klaus	ND	Rober	C
Klone	ND	Salal	C
Lates	C	Salkum	B
Lebam	B	Sammamish	D
Lummi	ND	San Juan	ND
Lynnwood	ND	Scamman	D
Lystair	ND	Schneider	B
Mal	C	Seattle	D
Manley	B	Sekiu	ND
Mashel	B	Semiahmoo	D
Maytown	C	Shalcar	D
McKenna	D	Shano	B
McMurray	ND	Shelton	C
Melbourne	B	Si	C
Menzel	ND	Sinclair	C
Mixed Alluvial	variable	Skipopa	D
Molson	B	Skykomish	B
Mukilteo	C/D	Snahopish	ND
Naff	B	Snohomish	D
Nargar	A	Solduc	B
National	ND	Solleks	ND
Neilton	A	Spana	D

Table III-1.3 SCS Western Washington Runoff Curve Numbers (Published by SCS in 1982) Runoff curve numbers for selected agricultural, suburban and urban land use for Type 1A rainfall distribution, 24-hour storm duration.

LAND USE DESCRIPTION		CURVE NUMBERS BY HYDROLOGIC SOIL GROUP A	B	C	D
Cultivated land(1):	winter condition	86	91	94	95
Mountain open areas:	low growing brush & grasslands	74	82	89	92
Meadow or pasture:		65	78	85	89
Wood or forest land:	undisturbed	42	64	76	81
Wood or forest land:	young second growth or brush	55	72	81	86
Orchard:	with cover crop	81	88	92	94
Open spaces, lawns, parks, golf courses, cemeteries, landscaping.					
Good condition:	grass cover on ≥75% of the area	68	80	86	90
Fair condition:	grass cover on 50-75% of the area	77	85	90	92
Gravel roads & parking lots:		76	85	89	91
Dirt roads & parking lots:		72	82	87	89
Impervious surfaces, pavement, roofs etc.		98	98	98	98
Open water bodies:	lakes, wetlands, ponds etc.	100	100	100	100
Single family residential(2):					
Dwelling Unit/Gross Acre	%Impervious(3)	Separate curve number shall be selected for pervious & impervious portions of the site or basin			
1.0 DU/GA	15				
1.5 DU/GA	20				
2.0 DU/GA	25				
2.5 DU/GA	30				
3.0 DU/GA	34				
3.5 DU/GA	38				
4.0 DU/GA	42				
4.5 DU/GA	46				
5.0 DU/GA	48				
5.5 DU/GA	50				
6.0 DU/GA	52				
6.5 DU/GA	54				
7.0 DU/GA	56				
PUD's, condos, apartments, commercial businesses & industrial areas	%impervious must be computed				

(1) For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Sec. 4, Hydrology, Chapter 9, August 1972.
(2) Assumes roof and driveway runoff is directed into street/storm system.
(3) The remaining pervious areas (lawn) are considered to be in good condition for these curve numbers.

1.81 in

FIGURE 3.5.1C 2-YEAR 24-HOUR ISOPLUVIALS

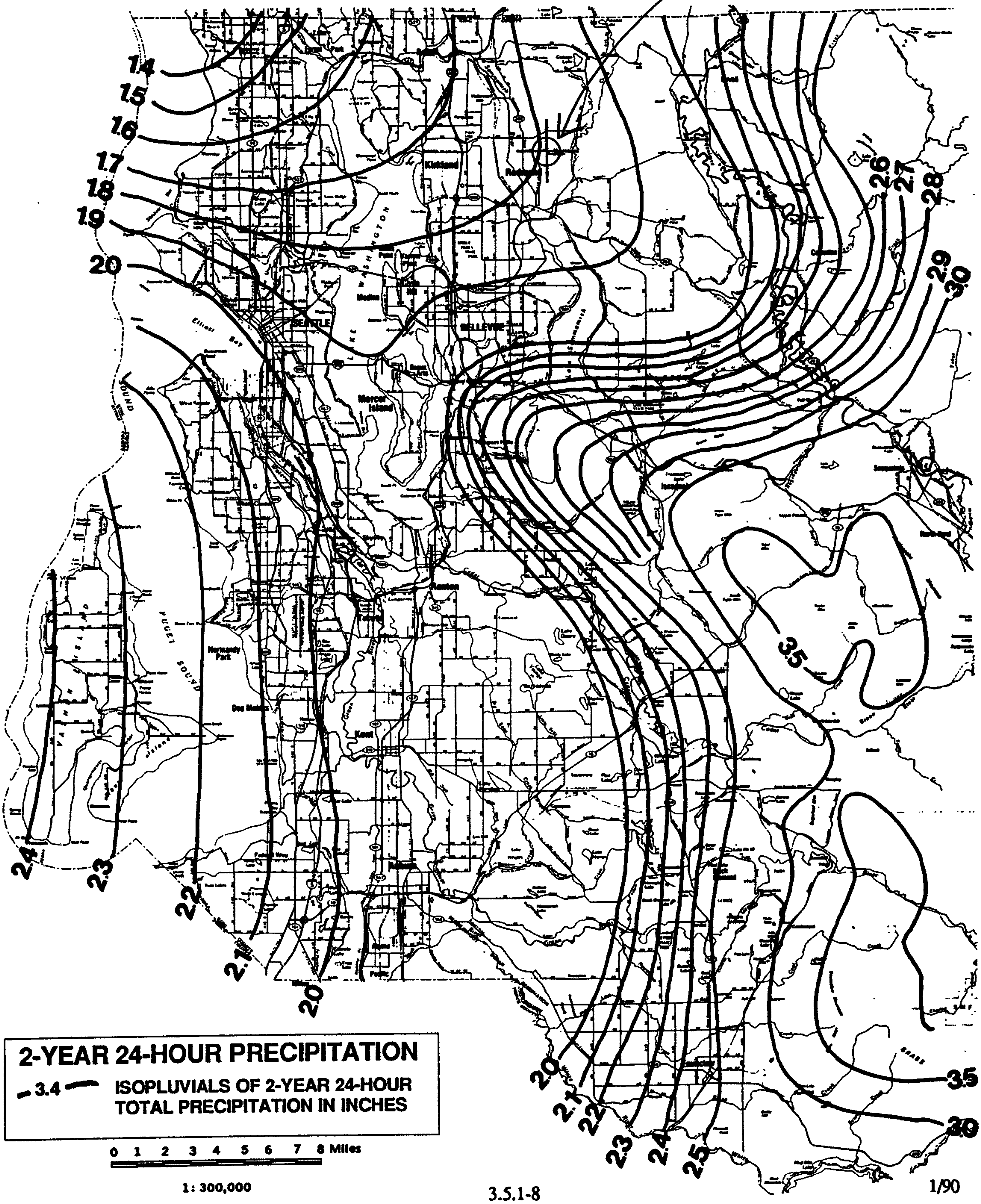

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FIGURE 3.5.1E 10-YEAR 24-HOUR ISOPLUVIALS

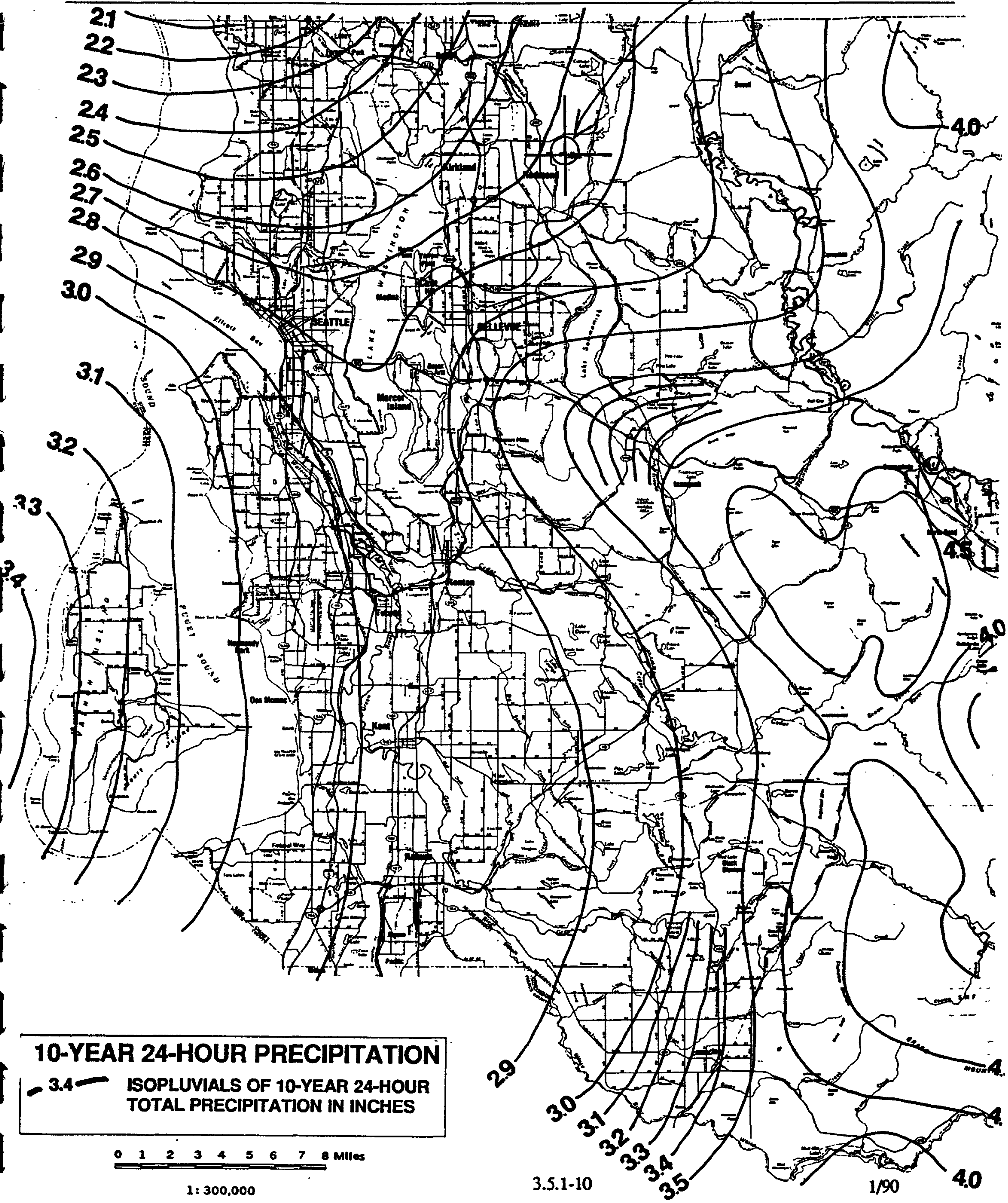

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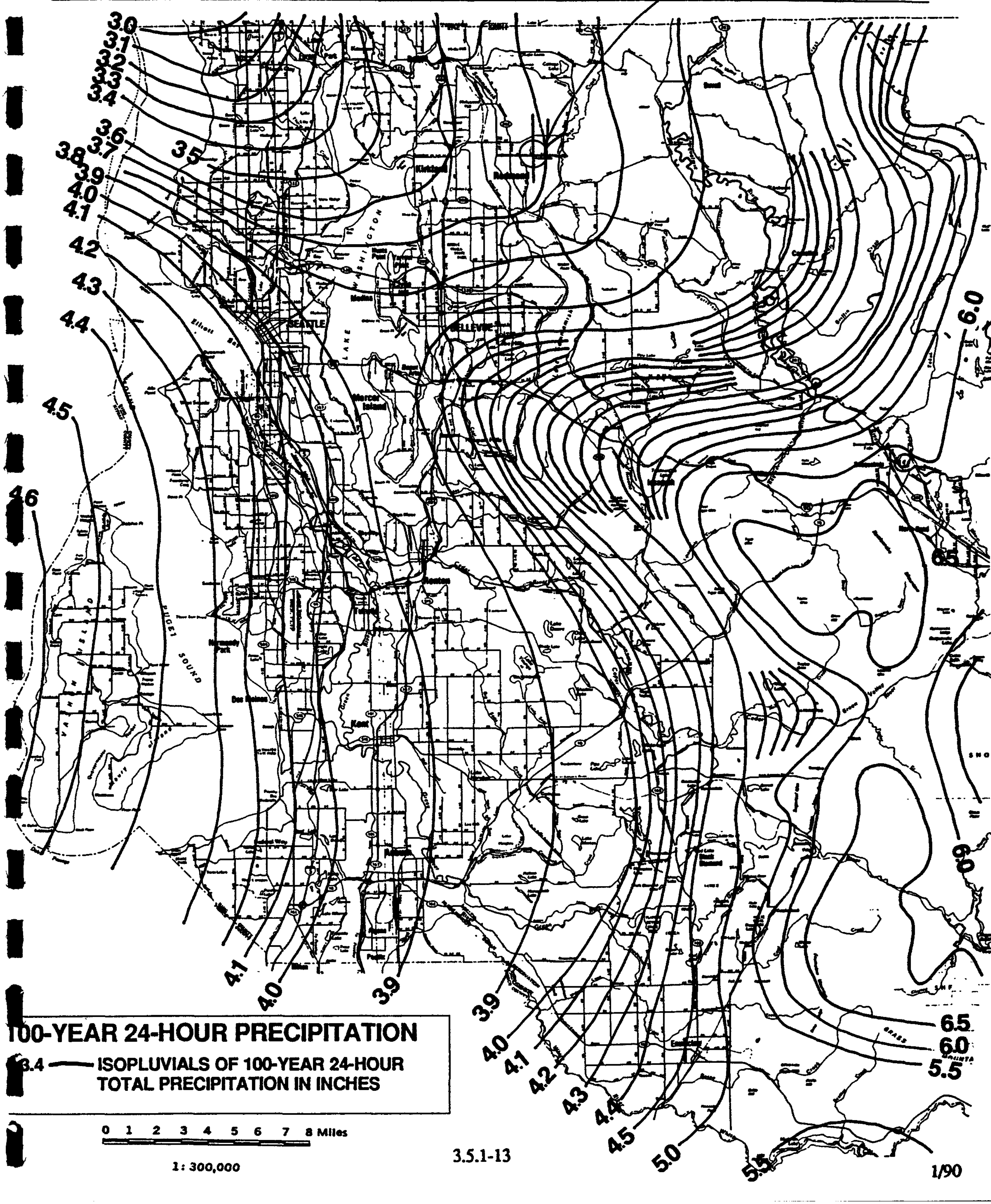
FIGURE 3.5.1H 100-YEAR 24-HOUR ISOPLUVIALS



CORE NO. 00009A

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BASIN SUMMARY

```
BASIN ID: ex002        NAME: existing 2-year
SBUH METHODOLOGY
TOTAL AREA.......:  12.87 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:   1.81 inches    AREA..:   12.87 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:   81.00          0.00
                                    TC....:   126.62 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.8000 p2yr: 1.81 s:0.0330
TcReach - Shallow L: 922.00 ks:3.00 s:0.0320
PEAK RATE:   0.40 cfs  VOL:   0.52 Ac-ft  TIME:    780 min

BASIN ID: ex010        NAME: existing 10-year
SBUH METHODOLOGY
TOTAL AREA.......:  12.87 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:   2.73 inches    AREA..:   12.87 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:   81.00          0.00
                                    TC....:   126.62 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.8000 p2yr: 1.81 s:0.0330
TcReach - Shallow L: 922.00 ks:3.00 s:0.0320
PEAK RATE:   1.04 cfs  VOL:   1.19 Ac-ft  TIME:    550 min

BASIN ID: ex100        NAME: existing 100-year
SBUH METHODOLOGY
TOTAL AREA.......:  12.87 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   12.87 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:   81.00          0.00
                                    TC....:   126.62 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.8000 p2yr: 1.81 s:0.0330
TcReach - Shallow L: 922.00 ks:3.00 s:0.0320
PEAK RATE:   1.94 cfs  VOL:   2.00 Ac-ft  TIME:    550 min
```

```
CORE NO. 00009A
POND CALCULATIONS
======================================================================
                             BASIN SUMMARY


BASIN ID: ex002CA       NAME: existing 2-yr (Cogan-Allen)
SBUH METHODOLOGY
TOTAL AREA.......:   1.49 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   1.81 inches    AREA..:    1.49 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:   81.00          0.00
                                    TC....:   87.41 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.8000 p2yr: 1.81 s:0.0450
TcReach - Channel L:  42.00 kc:17.00 s:0.0040
TcReach - Channel L:  24.00 kc:42.00 s:0.0040
TcReach - Channel L:  11.00 kc:17.00 s:0.0360
PEAK RATE:    0.05 cfs  VOL:    0.06 Ac-ft  TIME:    660 min

BASIN ID: ex010CA       NAME: existing 10-yr (Cogan-Allen)
SBUH METHODOLOGY
TOTAL AREA.......:   1.49 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   2.73 inches    AREA..:    1.49 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:   81.00          0.00
                                    TC....:   87.41 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.8000 p2yr: 1.81 s:0.0450
TcReach - Channel L:  42.00 kc:17.00 s:0.0040
TcReach - Channel L:  24.00 kc:42.00 s:0.0040
TcReach - Channel L:  11.00 kc:17.00 s:0.0360
PEAK RATE:    0.14 cfs  VOL:    0.14 Ac-ft  TIME:    540 min

BASIN ID: ex100CA       NAME: existing 100-yr (Cogan-Allen)
SBUH METHODOLOGY
TOTAL AREA.......:   1.49 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:    1.49 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:   81.00          0.00
                                    TC....:   87.41 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.8000 p2yr: 1.81 s:0.0450
TcReach - Channel L:  42.00 kc:17.00 s:0.0040
TcReach - Channel L:  24.00 kc:42.00 s:0.0040
TcReach - Channel L:  11.00 kc:17.00 s:0.0360
PEAK RATE:    0.26 cfs  VOL:    0.23 Ac-ft  TIME:    540 min
```

Upstream Tributary Conditions

Upstream area will consist of the open space designated within the property, 3.37 acres, along with the property that is surrounded by the subject property and adjacent to 172nd Avenue NE, 0.71 acre. The existing asphalt section collected within the proposed storm drainage system along the frontage on 172nd Avenue NE from the crown of the road to the existing edge of asphalt, 0.08 acre, will also be considered upstream tributary area. The impervious coverage for the property along 172nd Avenue NE was calculated using Table III-1.3 in the 1992 D.O.E. Manual. The dwelling units per gross acre is 1 DU/0.71 AC = 1.4 DU/AC. The impervious coverage is therefore 19% or 19%*0.71 acre = 0.13 acre.

UPSTREAM TRIBUTARY CONDITIONS	Total Area = 4.16 acres	Pervious/ Impervious Areas		CN (avg)
GROUND COVER	AREA(acre)		CN	
2nd Growth Forest	3.37		81	
Lawn (Landscaping)	0.58	3.95	86	81.73
Impervious	0.21	0.21	98	98
Time of concentration				92.56 min.

Upstream Tributary Conditions

Upstream area will consist of the open space designated within the property, 3.37 acres, along with the property that is surrounded by the subject property and adjacent to 172nd Avenue NE, 0.71 acre. The existing asphalt section collected within the proposed storm drainage system along the frontage on 172nd Avenue NE from the crown of the road to the existing edge of asphalt, 0.08 acre, will also be considered upstream tributary area. The impervious coverage for the property along 172nd Avenue NE was calculated using Table III-1.3 in the 1992 D.O.E. Manual. The dwelling units per gross acre is 1 DU/0.71 AC = 1.4 DU/AC. The impervious coverage is therefore 19% or 19%*0.71 acre = 0.13 acre.

UPSTREAM TRIBUTARY CONDITIONS	Total Area = 4.16 acres	Pervious/ Impervious Areas		CN (avg)
GROUND COVER	AREA(acre)		CN	
2nd Growth Forest	3.37		81	
Lawn (Landscaping)	0.58	3.95	86	81.73
Impervious	0.21	0.21	98	98
Time of concentration				92.56 min.

CURRY PROPERTY

CORE NO. 00009A

BASIN SUMMARY

```
BASIN ID: d002          NAME: developed 2-year
SBUH METHODOLOGY
TOTAL AREA.......:  12.87 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   1.81 inches    AREA..:     3.95 Acres    8.92 Acres
TIME INTERVAL....:    10.00 min     CN....:    86.00          98.00
                                    TC....:    10.00 min     10.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   3.63 cfs  VOL:   1.41 Ac-ft  TIME:    480 min

BASIN ID: d010          NAME: developed 10-year
SBUH METHODOLOGY
TOTAL AREA.......:  12.87 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   2.73 inches    AREA..:     3.95 Acres    8.92 Acres
TIME INTERVAL....:    10.00 min     CN....:    86.00          98.00
                                    TC....:    10.00 min     10.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   6.01 cfs  VOL:   2.33 Ac-ft  TIME:    480 min

BASIN ID: d100          NAME: developed 100-year
SBUH METHODOLOGY
TOTAL AREA.......:  12.87 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:     3.95 Acres    8.92 Acres
TIME INTERVAL....:    10.00 min     CN....:    86.00          98.00
                                    TC....:    10.00 min     10.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   8.56 cfs  VOL:   3.32 Ac-ft  TIME:    480 min
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CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

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BASIN ID: d002CA          NAME: developed 2-yr (Cogan-Allen)
SBUH METHODOLOGY
TOTAL AREA.......:   1.49 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   1.81 inches   AREA..:    0.92 Acres    0.57 Acres
TIME INTERVAL....:     10.00 min   CN....:   86.00          98.00
                                   TC....:   10.00 min     10.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.32 cfs  VOL:    0.13 Ac-ft  TIME:     480 min

BASIN ID: d010CA          NAME: developed 10-yr (Cogan-Allen)
SBUH METHODOLOGY
TOTAL AREA.......:   1.49 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   2.73 inches   AREA..:    0.92 Acres    0.57 Acres
TIME INTERVAL....:     10.00 min   CN....:   86.00          98.00
                                   TC....:   10.00 min     10.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.58 cfs  VOL:    0.23 Ac-ft  TIME:     480 min

BASIN ID: d100CA          NAME: developed 100-yr (Cogan-Allen)
SBUH METHODOLOGY
TOTAL AREA.......:   1.49 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   3.69 inches   AREA..:    0.92 Acres    0.57 Acres
TIME INTERVAL....:     10.00 min   CN....:   86.00          98.00
                                   TC....:   10.00 min     10.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.87 cfs  VOL:    0.34 Ac-ft  TIME:     480 min
```

B. Water Quality Calculations

Water quality will be accomplished by providing dead storage in the wetpond. According to the DOE manual, the dead storage of the wetpond shall be equal to the volume of the water quality storm in the developed condition. The water quality storm is defined as a storm having a precipitation of 64% of the 2-year precipitation.

The water quality storm for the site has a volume of 0.80 ac-ft or 34,704 CF. The water quality storm for the Cogan-Allen site has a volume of 0.07 ac-ft or 2,903 CF. Therefore, the total dead storage required is 37,607 CF. The live storage in the pond will therefore begin at the water surface elevation of the dead storage. Referring to the volume calculations for the pond on the following pages, the volume of the dead storage at elevation 267.0 where the live storage begins is 39,278 CF which exceeds the volume of the required dead storage.

CURRY PROPERTY

CORE NO. 00009A

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BASIN SUMMARY

BASIN ID: d0006 NAME: developed 6-month

SBUH METHODOLOGY

TOTAL AREA.......:	12.87 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	1.16 inches	AREA..:	3.95 Acres	8.92 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	10.00 min	10.00 min

ABSTRACTION COEFF: 0.20

PEAK RATE: 2.02 cfs VOL: 0.80 Ac-ft TIME: 480 min

34,704 CF

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

BASIN ID: d006CA NAME: developed 6-mo (Cogan-Allen)
SBUH METHODOLOGY

TOTAL AREA.......:	1.49 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	1.16 inches	AREA..:	0.92 Acres	0.57 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	10.00 min	10.00 min

ABSTRACTION COEFF: 0.20
PEAK RATE: 0.15 cfs VOL: 0.07 Ac-ft TIME: 480 min

2903 CF

POND
VOLUME CALCULATIONS
CORE PROJECT NO. 00009A
PROJECT NAME: CURRY

ELEVATION	SURFACE AREA	INCREMENTAL VOLUME	TOTAL VOLUME	LIVE VOLUME
	SF	CF	CF	CF
263.5	5060		0	
		2,634		
264.0	5476		2,634	
		0		
264.0	8640		2,634	
		20,808		
266.0	12168		23,442	
		0		
266.0	15312		23,442	
		15,836		
267.0	16360		39,278	0
		17,166		
268.0	17972		56,444	17,166
		39,348		
270.0	21376		95,792	56,514
		22,284		
271.0	23192		118,076	78,798

C. Detention Calculations

A detention/water quality pond will be located at the southeast corner of the site. A stage-storage relationship was calculated for the proposed wetpond. The proposed wetpond will have a bottom elevation of 263.5 in the first cell and 264.0 in the second cell, a maximum water surface elevation of 270.71, and a berm elevation of 272.0. The outlet elevation will be located at elevation 267.0. This elevation as shown previously will provide the necessary dead storage for the dead storage portion of the pond. See volume calculations for the live storage in the water quality portion of this section.

The total release from the pond will not exceed the allowable peak releases as indicated below. The detention criteria used for this analysis is D.O.E. criteria. The required peak release rates are as follows:

- ♦Developed 2-year, 24-hr peak release + Cogan-Allen Developed 2-year, 24-hr peak release + Upstream Tributary 2-year, 24-hr peak release (Hyd. 10) → 50% (Existing 2-year, 24-hr peak release + Cogan-Allen Existing 2-year, 24-hr peak release) + Upstream Tributary 2-year, 24-hr peak release (Hyd. 7)

- ♦Developed 10-year, 24-hr peak release + Cogan-Allen Developed 10-year, 24-hr peak release + Upstream Tributary 10-year, 24-hr peak (Hyd. 11) → Existing 10-year, 24-hr peak release + Cogan-Allen Existing 10-year, 24-hr peak release + Upstream Tributary 10-year, 24-hr peak (Hyd. 8)

- ♦Developed 100-year, 24-hr peak release + Cogan-Allen Developed 100-year, 24-hr peak release + Upstream Tributary 100-year, 24-hr peak (Hyd. 12) → Existing 100-year, 24-hr peak release + Cogan-Allen Existing 100-year, 24-hr peak release + Upstream Tributary 100-year, 24-hr peak (Hyd. 9)

See attached WaterWorks printouts on the following pages. The routing results are summarized as follows.

ROUTING RESULTS	2 year storm	10 year storm	100 year storm
Qp allowable release from (cfs) Hyd 7,8,9	0.39	1.62	2.99
Qp inflow into pond (cfs) Hyd 10,11,12	4.06	6.96	10.13
Qp released from pond (cfs) Hyd 13,14,15	0.39	1.50	2.99
Pond live storage required (CF)	52,461	64,381	72,313

CORE NO. 00009A
POND CALCULATIONS

HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
~~1~~	~~0.365~~	~~660~~	~~20003 cf~~	~~17.03~~
~~2~~	~~1.481~~	~~550~~	~~70284 cf~~	~~17.03~~
~~3~~	~~2.727~~	~~540~~	~~117225 cf~~	~~17.03~~
~~4~~	~~3.746~~	~~480~~	~~70123 cf~~	~~17.03~~
~~5~~	~~6.381~~	~~480~~	~~119934 cf~~	~~17.03~~
~~6~~	~~9.261~~	~~480~~	~~174571 cf~~	~~17.03~~
7	0.390	660	21322 cf	18.52
8	1.623	550	76285 cf	18.52
9	2.991	540	127304 cf	18.52
10	4.062	480	75770 cf	18.52
11	6.962	480	129894 cf	18.52
12	10.134	480	189293 cf	18.52
13	0.392	1460	53122 cf	18.52
14	1.500	970	102682 cf	18.52
15	2.992	680	161356 cf	18.52
16	3.207	670	174953 cf	20.02 Hyd 15+ 174100
~~19~~	~~2.204~~	~~550~~	~~97145 cf~~	~~14.36~~
~~20~~	~~1.181~~	~~550~~	~~57841 cf~~	~~14.36~~

CORE NO. 00009A
POND CALCULATIONS

STAGE STORAGE TABLE

CUSTOM STORAGE ID No. pond
Description: final pond

STAGE (ft)	STORAGE ---cf---	STORAGE --Ac-Ft-	STAGE (ft)	STORAGE ---cf---	STORAGE --Ac-Ft-	STAGE (ft)	STORAGE ---cf---	STORAGE --Ac-Ft-	STAGE (ft)	STORAGE ---cf---	STORAGE --Ac-Ft-
267.00	0.0000	0.0000	268.10	19133	0.4392	269.20	40775	0.9361	270.30	63199	1.4509
267.10	1717	0.0394	268.20	21101	0.4844	269.30	42742	0.9812	270.40	65428	1.5020
267.20	3433	0.0788	268.30	23068	0.5296	269.40	44710	1.0264	270.50	67656	1.5532
267.30	5150	0.1182	268.40	25036	0.5747	269.50	46677	1.0716	270.60	69884	1.6043
267.40	6866	0.1576	268.50	27003	0.6199	269.60	48644	1.1167	270.70	72113	1.6555
267.50	8583	0.1970	268.60	28970	0.6651	269.70	50612	1.1619	270.80	74341	1.7066
267.60	10300	0.2364	268.70	30938	0.7102	269.80	52579	1.2071	270.90	76570	1.7578
267.70	12016	0.2759	268.80	32905	0.7554	269.90	54547	1.2522	271.00	78798	1.8090
267.80	13733	0.3153	268.90	34873	0.8006	270.00	56514	1.2974			
267.90	15449	0.3547	269.00	36840	0.8457	270.10	58742	1.3485			
268.00	17166	0.3941	269.10	38807	0.8909	270.20	60971	1.3997			

CORE NO. 00009A
POND CALCULATIONS

STAGE DISCHARGE TABLE

COMBINATION DISCHARGE ID No. comboCA
Description: final combo w/ Cogan Allen
Structure: notchCA Structure:
Structure: orifCA Structure:
Structure:

STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------
267.00	0.0000	268.10	0.2457	269.20	0.3474	270.30	1.3044
267.10	0.0741	268.20	0.2566	269.30	0.3552	270.40	1.6738
267.20	0.1048	268.30	0.2671	269.40	0.3629	270.50	2.0749
267.30	0.1283	268.40	0.2772	269.50	0.3704	270.60	2.5018
267.40	0.1481	268.50	0.2869	269.60	0.3777	270.70	2.9500
267.50	0.1656	268.60	0.2963	269.70	0.3849	270.80	3.4155
267.60	0.1814	268.70	0.3054	269.80	0.3920	270.90	3.8951
267.70	0.1960	268.80	0.3143	269.90	0.3989	271.00	4.3856
267.80	0.2095	268.90	0.3229	270.00	0.4808		
267.90	0.2222	269.00	0.3313	270.10	0.6931		
268.00	0.2342	269.10	0.3394	270.20	0.9739		

CORE NO. 00009A
POND CALCULATIONS

STAGE DISCHARGE TABLE

NOTCH WEIR ID No. notchCA
Description: final notch w/ Cogan Allen
Weir Length: 1.2500 ft. Weir height (p): 2.9300 ft.
Elevation : 269.93 ft. Weir Increm: 0.10

STAGE (ft)	<--DISCHARGE---> ---cfs--	STAGE (ft)	<--DISCHARGE---> ---cfs--	STAGE (ft)	<--DISCHARGE---> ---cfs--	STAGE (ft)	<--DISCHARGE---> ---cfs--
269.93	0.0000	270.20	0.5549	270.50	1.6366	270.80	2.9589
270.00	0.0751	270.30	0.8789	270.60	2.0573	270.90	3.4325
270.10	0.2807	270.40	1.2419	270.70	2.4994	271.00	3.9171

CURRY PROPERTY

CORE NO. 00009A
POND CALCULATIONS

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STAGE DISCHARGE TABLE

MULTIPLE ORIFICE ID No. orifCA
Description: final orifice w/ Cogan Allen
Outlet Elev: 267.00
Elev: 265.00 ft Orifice Diameter: 2.9380 in.

STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------
267.00	0.0000	268.10	0.2457	269.20	0.3474	270.30	0.4255
267.10	0.0741	268.20	0.2566	269.30	0.3552	270.40	0.4319
267.20	0.1048	268.30	0.2671	269.40	0.3629	270.50	0.4382
267.30	0.1283	268.40	0.2772	269.50	0.3704	270.60	0.4444
267.40	0.1481	268.50	0.2869	269.60	0.3777	270.70	0.4506
267.50	0.1656	268.60	0.2963	269.70	0.3849	270.80	0.4566
267.60	0.1814	268.70	0.3054	269.80	0.3920	270.90	0.4626
267.70	0.1960	268.80	0.3143	269.90	0.3989	271.00	0.4685
267.80	0.2095	268.90	0.3229	270.00	0.4057		
267.90	0.2222	269.00	0.3313	270.10	0.4124		
268.00	0.2342	269.10	0.3394	270.20	0.4190		

CORE NO. 00009A
POND CALCULATIONS

LEVEL POOL TABLE SUMMARY

<--------DESCRIPTION--------->	MATCH (cfs)	INFLOW (cfs)	-STO- --id-	-DIS- --id-	<-PEAK-> <-STAGE>	id	OUTFLOW (cfs)	STORAGE VOL (cf)
2-yr	0.39	4.06	pond	comboCA	269.79	21	0.39	52461.28 cf
10-yr	1.62	6.96	pond	comboCA	270.35	21	1.50	64381.41 cf
100-yr	2.99	10.13	pond	comboCA	270.71	21	2.99	72313.20 cf

SECTION V: CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The conveyance system for the site was designed for both the 10-year, 24-hour storm and the 100-year, 24-hour storm. A conveyance sheet was generated for the 10-year and 100-year storms using SBUH methodology to calculate flows for each area collected by each catch basin. The precipitation rates for the 10-year, 24-hour storm and the 100-year, 24-hour storm are 2.73 inches and 3.69 inches respectively.

The flows generated from the 10-year, 24-hour and 100-year, 24-hour storms were input into a backwater analysis spreadsheet to confirm adequate sizing. The total developed flows that were calculated for the Cogan-Allen P.R.D. that are draining to the proposed conveyance system will be input into the conveyance system at CB 42. The SBUH flows generated from the 10-year, 24-hour and 100-year, 24-hour storms for Cogan-Allen are 0.58 cfs and 0.87 cfs respectively.

The tailwater elevations within the pond were derived from the WaterWorks Level Pool Table Summary. The tailwater elevations for the 10-year, 24-hour storm and the 100-year, 24-hour storm are elevation 270.35 and elevation 270.71 respectively.

The backwater analysis was performed to ensure that during the 10-year design storm, the maximum water surface elevation in each structure did not exceed an elevation equal to 1' less the rim. The backwater analysis was also performed to ensure that during the 100-year design storm, if the maximum water surface elevation were to exceed any rims, that flows could either be safely conveyed to the next downstream catch basin or ponding water could be ensured not to cause damage to buildings.

Each area tributary to each catch basin was assumed to have a consistent impervious coverage as the entire site. The percentage of impervious coverage for the entire developed site is 8.92 AC/12.87 AC = 69.3%. See Developed Conditions summary in Section IVA of this report.

Some catch basins collect portions of the developed site plus portions of the open space. These catch basins include CB 8, CB 12, CB 13, CB 21, CB 22, CB 28, and CB 45. The CN value for the open space within the property is 81. These catch basins will each have a different CN value for the pervious areas based on the characteristics and portion of the open space collected.

CB 37 was specifically located to collect drainage upon development of the property that is adjacent to 172nd Avenue NE and not part of the subject development. It is assumed that CB 37 collects this property under its existing condition today. This property is summarized in Section IVA of this report under Upstream Tributary Conditions. Upon development of this property, detention will be required and existing flows as they are today will be reduced to flows that would be calculated using forest conditions per the City criteria for detention sizing. Therefore, worst case flows to CB 37 are the conditions as they are today. The impervious coverage is 0.13 acre with a CN = 98 and a pervious coverage of 0.71 acre – 0.13 acre = 0.58 acre with a CN = 86.

CB 8

Open Space Collected:	1.35 AC – CN = 81	
Site Area Collected:	0.34 AC – 69.3% impervious →	0.24 AC – CN = 98
		0.10 AC – CN = 86
	Impervious 0.24 AC – CN = 98	
	Pervious 1.45 AC – CN_{avg} = 81.3	

CB 12

Open Space Collected:	0.31 AC – CN = 81	
Site Area Collected:	0.26 AC – 69.3% impervious →	0.18 AC – CN = 98
		0.08 AC – CN = 86
	Impervious 0.18 AC – CN = 98	
	Pervious 0.39 AC – CN_{avg} = 82.0	

CB 13

Open Space Collected:	0.48 AC – CN = 81	
Site Area Collected:	0.43 AC – 69.3% impervious →	0.30 AC – CN = 98
		0.13 AC – CN = 86
	Impervious 0.30 AC – CN = 98	
	Pervious 0.61 AC – CN_{avg} = 82.1	

CB 21

Open Space Collected:	0.33 AC – CN = 81	
Site Area Collected:	0.65 AC – 69.3% impervious →	0.45 AC – CN = 98
		0.20 AC – CN = 86
	Impervious 0.45 AC – CN = 98	
	Pervious 0.53 AC – CN_{avg} = 82.9	

CB 22

Open Space Collected:	0.02 AC – CN = 81	
Site Area Collected:	0.51 AC – 69.3% impervious →	0.35 AC – CN = 98
		0.16 AC – CN = 86
	Impervious 0.35 AC – CN = 98	
	Pervious 0.18 AC – CN_{avg} = 85.4	

CB 28

Open Space Collected:	0.12 AC – CN = 81	
Site Area Collected:	0.46 AC – 69.3% impervious →	0.32 AC – CN = 98
		0.14 AC – CN = 86
	Impervious 0.32 AC – CN = 98	
	Pervious 0.26 AC – CN_{avg} = 83.7	

CB 45

Open Space Collected:	0.37 AC – CN = 81	
Site Area Collected:	0.30 AC – 69.3% impervious →	0.21 AC – CN = 98
		0.09 AC – CN = 86
	Impervious 0.21 AC – CN = 98	
	Pervious 0.46 AC – CN_{avg} = 82.0	

During the 10-year, 24-hour storm, all headwater elevations within each catch basin remained 1-foot or more below the rim elevations. During the 100-year, 24-hour storm, all headwater elevations remained below all catch basin rims.

PIPE FLOW USING SANTA BARBARA

JOB NAME:	CURRY PRD				JOB NUMBER: 00009A				PREPARED BY:	GRB	LOCATION:	KING COUNTY		24-HR RAINFALL: 2.73 INCHES		DESIGN STORM: 10 YEAR	
PIPE SEGMENT		INCREMENTAL AREA		INCREMENTAL SBUH FLOW	TOTAL SBUH FLOW				MANNING'S	PIPE DIAMETER	PIPE SLOPE	PIPE LENGTH	ACTUAL VELOCITY	TRAVEL TIME	PIPE CAPACITY SUMMARY		
FROM	TO	(ACRES)		(CFS)	(CFS)				"n"	(INCHES)	(PERCENT)	(FEET)	(FT/SEC)	(MINUTES)	Q(FULL) (CFS)	V(FULL) (FT/SEC)	Q(ACT)/Q(FULL) (PERCENT)
CB 45	CB 44	0.670		0.23	0.230				0.012	8	1.000	26	2.72	0.16	1.309	3.75	17.6%
CB 44	CB 24	0.060		0.03	0.260				0.012	12	6.000	158	4.57	0.58	9.454	12.04	2.8%
CB 43	CB 40	0.070		0.03	0.030				0.012	12	0.500	123	1.06	1.93	2.729	3.47	1.1%
					INCL. COGAN ALLEN FLOWS												
CB 42	CB 41	0.150		0.65	0.650				0.012	12	0.500	276	2.78	1.65	2.729	3.47	23.8%
CB 41	CB 40	0.190		0.09	0.740				0.012	12	1.850	200	4.65	0.72	5.250	6.68	14.1%
CB 40	[redacted]	0.000		0.00	0.770				0.012	12	1.100	77	3.89	0.33	4.048	5.15	19.0%
CB 39	[redacted]	0.210		0.10	0.100				0.012	8	1.000	26	2.12	0.20	1.309	3.75	7.6%
CB 38	[redacted]	0.350		0.17	1.040				0.012	12	7.710	158	8.26	0.32	10.717	13.65	9.7%
CB 37	CB 36	0.710		0.25	0.250				0.012	12	0.600	111	2.25	0.82	2.990	3.81	8.4%
CB 36	[redacted]	0.430		0.21	0.460				0.012	12	12.900	62	7.59	0.14	13.863	17.65	3.3%
CB 35	[redacted]	0.640		0.31	0.310				0.012	12	0.500	89	2.19	0.68	2.729	3.47	11.4%
[redacted]	CB 32	0.000		0.00	0.770				0.012	12	0.500	81	2.97	0.45	2.729	3.47	28.2%
CB 33	CB 32	0.040		0.02	0.020				0.012	8	9.800	24	0.00	0.00	4.098	11.74	0.5%
CB 32	[redacted]	0.460		0.22	1.010				0.012	12	2.730	22	5.64	0.06	6.377	8.12	15.8%
CB 31	[redacted]	0.390		0.19	0.190				0.012	8	11.000	27	5.91	0.08	4.342	12.44	4.4%
[redacted]	CB 29	0.090		0.04	1.240				0.012	12	4.390	183	7.16	0.43	8.087	10.30	15.3%
CB 29	[redacted]	0.420		0.20	1.440				0.012	12	5.500	86	8.01	0.18	9.052	11.53	15.9%
CB 28	[redacted]	0.580		0.25	0.250				0.012	8	1.000	30	2.83	0.18	1.309	3.75	19.1%

PIPE FLOW USING SANTA BARBARA

LOCATION: KING COUNTY — 24-HR RAINFALL: 2.73 INCHES

JOB NAME: CURRY PRD — JOB NUMBER: 00009A — PREPARED BY: GRB — DESIGN STORM: 10 YEAR

PIPE SEGMENT FROM	PIPE SEGMENT TO	INCREMENTAL AREA (ACRES)		INCREMENTAL SBUH FLOW (CFS)	TOTAL SBUH FLOW (CFS)				MANNING'S "n"	PIPE DIAMETER (INCHES)	PIPE SLOPE (PERCENT)	PIPE LENGTH (FEET)	ACTUAL VELOCITY (FT/SEC)	TRAVEL TIME (MINUTES)	PIPE CAPACITY SUMMARY Q(FULL) (CFS)	V(FULL) (FT/SEC)	Q(ACT)/Q(FULL) (PERCENT)
[redacted]	CB 24	0.540		0.26	1.950				0.012	15	6.000	53	8.80	0.10	17.142	13.97	11.4%
CB 26	CB 25	0.210		0.10	0.100				0.012	8	1.000	26	2.12	0.20	1.309	3.75	7.6%
CB 25	CB 24	0.380		0.18	0.280				0.012	12	0.500	131	2.19	1.00	2.729	3.47	10.3%
CB 24	24A	0.090		0.04	2.530				0.012	18	0.630	150	4.37	0.57	9.032	5.11	28.0%
CB 23	[redacted]	0.690		0.34	0.340				0.012	12	2.900	194	4.23	0.77	6.573	8.37	5.2%
CB 22	[redacted]	0.530		0.25	0.250				0.012	8	1.000	26	2.83	0.15	1.309	3.75	19.1%
[redacted]	[redacted]	0.980		0.39	0.980				0.012	12	7.000	113	7.87	0.24	10.212	13.00	9.6%
CB 20	CB 19	0.210		0.10	0.100				0.012	8	1.000	27	2.12	0.21	1.309	3.75	7.6%
CB 19	[redacted]	0.160		0.08	0.180				0.012	12	12.500	50	5.30	0.16	13.646	17.37	1.3%
CB 18	CB 17	0.460		0.22	0.220				0.012	8	2.800	26	3.95	0.11	2.191	6.28	10.0%
CB 17	[redacted]	0.360		0.18	0.400				0.012	12	0.600	207	2.53	1.36	2.990	3.81	13.4%
[redacted]	CB 15	0.000		0.00	1.560				0.012	15	0.500	66	3.51	0.31	4.948	4.03	31.5%
CB 15	CB 14	0.030		0.01	1.570				0.012	15	0.500	53	3.51	0.25	4.948	4.03	31.7%
CB 14	[redacted]	0.260		0.13	1.700				0.012	15	0.500	75	3.63	0.34	4.948	4.03	34.4%
CB 13	CB 12	0.910		0.31	0.310				0.012	8	1.500	24	3.47	0.12	1.603	4.59	19.3%
CB 12	[redacted]	0.570		0.19	0.500				0.012	12	10.000	46	7.38	0.10	12.205	15.54	4.1%
[redacted]	[redacted]	0.190		0.09	2.290				0.012	15	0.500	103	3.95	0.43	4.948	4.03	46.3%
CB 10	[redacted]	0.330		0.16	0.160				0.012	8	11.000	27	5.35	0.08	4.342	12.44	3.7%
[redacted]	[redacted]	0.460		0.22	2.670				0.012	15	0.900	195	5.09	0.64	6.639	5.41	40.2%

PIPE FLOW USING SANTA BARBARA

LOCATION: KING COUNTY

24-HR RAINFALL: 2.73 INCHES

JOB NAME: CURRY PRD

JOB NUMBER: 00009A

PREPARED BY: GRB

DESIGN STORM: 10 YEAR

PIPE SEGMENT FROM	PIPE SEGMENT TO	INCREMENTAL AREA (ACRES)		INCREMENTAL SBUH FLOW (CFS)	TOTAL SBUH FLOW (CFS)				MANNING'S "n"	PIPE DIAMETER (INCHES)	PIPE SLOPE (PERCENT)	PIPE LENGTH (FEET)	ACTUAL VELOCITY (FT/SEC)	TRAVEL TIME (MINUTES)	PIPE CAPACITY SUMMARY Q(FULL) (CFS)	V(FULL) (FT/SEC)	Q(ACT)/Q(FULL) (PERCENT)
CB 8	[redacted]	1.690		0.46	0.460				0.012	8	2.000	26	4.35	0.10	1.851	5.30	24.8%
[redacted]	CB 5	0.110		0.05	3.180				0.012	18	4.060	122	8.63	0.24	22.929	12.98	13.9%
CB 6	CB 5	0.340		0.17	0.170				0.012	8	9.800	24	5.58	0.07	4.098	11.74	4.1%
CB 5	CB 3	0.350		0.17	3.520				0.012	18	20.000	35	15.55	0.04	50.892	28.80	6.9%
CB 4	CB 3	0.380		0.18	0.180				0.012	12	0.500	131	1.88	1.16	2.729	3.47	6.6%
CB 3	3A	0.000		0.00	3.700				0.012	18	1.550	111	6.73	0.27	14.168	8.02	26.1%

BACKWATER CALCULATIONS

JOB NAME: CURRY P.R.D. — PREPARED BY: G. Brooks

JOB NUMBER: 00009A — DESIGN STORM: 10 YEAR

FROM CB	TO CB	FLOW (CFS)	PIPE LENGTH (FEET)	PIPE DIA. (IN)	MANNING'S n VALUE	OUTLET ELEVATION (FEET)	INLET ELEVATION (FEET)	PIPE AREA (SQ FT)	FLOW VELOCITY (FT/SEC)	VELOCITY HEAD (FEET)	TAILWATER ELEVATION (FEET)	FRICTION LOSS (FEET)	ENTRANCE HGL ELEVATION (FEET)	ENTRANCE HEAD LOSS (FEET)	EXIT HEAD LOSS (FEET)	OUTLET CONTROL ELEVATION (FEET)	INLET CONTROL ELEVATION (FEET)	APPROACH VELOCITY HEAD (FEET)	BEND HEAD LOSS (FEET)	JUNCTION HEAD LOSS (FEET)	HEADWATER ELEVATION (FEET)	RIM EL
3A	3	3.70	111	18	0.012	267.00	268.72	1.77	2.09	0.07	270.35	0.12	270.47	0.03	0.07	270.57	270.22	0.06	0.08	0.00	270.59	281.00
3	4	0.18	131	12	0.012	269.22	269.88	0.79	0.23	0.00	270.59	0.00	270.88	0.00	0.00	270.88	270.88	0.00	0.00	0.00	270.88	272.94
3	5	3.52	35	18	0.012	268.72	275.72	1.77	1.99	0.06	270.59	0.03	277.22	0.03	0.06	277.31	277.22	0.05	0.00	0.00	277.27	281.84
5	6	0.17	24	8	0.012	276.55	278.90	0.35	0.49	0.00	277.27	0.00	279.57	0.00	0.00	279.57	279.57	0.00	0.00	0.00	279.57	281.84
5	7	3.18	122	18	0.012	275.72	280.67	1.77	1.80	0.05	277.27	0.09	282.17	0.03	0.05	282.25	282.17	0.07	0.07	0.01	282.25	284.54
7	8	0.46	26	8	0.012	281.50	282.02	0.35	1.32	0.03	282.25	0.03	282.69	0.01	0.03	282.73	282.69	0.00	0.00	0.00	282.73	284.54
7	9	2.67	195	15	0.012	280.92	282.68	1.23	2.18	0.07	282.25	0.28	283.93	0.04	0.07	284.04	283.93	0.05	0.01	0.00	284.00	289.19
9	10	0.16	27	8	0.012	283.26	286.23	0.35	0.46	0.00	284.00	0.00	286.90	0.00	0.00	286.90	286.90	0.00	0.00	0.00	286.90	289.30
9	11	2.29	103	15	0.012	282.68	283.20	1.23	1.87	0.05	284.00	0.11	284.45	0.03	0.05	284.53	284.45	0.03	0.00	0.01	284.52	290.93
11	12	0.50	46	12	0.012	283.45	288.05	0.79	0.64	0.01	284.52	0.01	289.05	0.00	0.01	289.06	289.05	0.01	0.01	0.00	289.06	291.73
12	13	0.31	24	8	0.012	288.38	288.74	0.35	0.89	0.01	289.06	0.01	289.41	0.01	0.01	289.43	289.41	0.00	0.00	0.00	289.43	291.73
11	14	1.70	75	15	0.012	283.20	283.58	1.23	1.39	0.03	284.52	0.04	284.83	0.01	0.03	284.87	284.83	0.03	0.00	0.00	284.85	292.33
14	15	1.57	53	15	0.012	283.58	283.85	1.23	1.28	0.03	284.85	0.03	285.10	0.01	0.03	285.14	285.10	0.03	0.00	0.00	285.12	293.35
15	16	1.56	66	15	0.012	283.85	284.18	1.23	1.27	0.03	285.12	0.03	285.43	0.01	0.03	285.47	285.43	0.02	0.03	0.01	285.48	294.65
16	17	0.40	207	12	0.012	284.43	285.67	0.79	0.51	0.00	285.48	0.02	286.67	0.00	0.00	286.68	286.67	0.01	0.01	0.00	286.68	289.42
17	18	0.22	26	8	0.012	286.00	286.73	0.35	0.63	0.01	286.68	0.01	287.40	0.00	0.01	287.41	287.40	0.00	0.00	0.00	287.41	289.42
16	19	0.18	50	12	0.012	284.43	290.68	0.79	0.23	0.00	285.48	0.00	291.68	0.00	0.00	291.68	291.68	0.00	0.00	0.00	291.68	294.28
19	20	0.10	27	8	0.012	291.01	291.28	0.35	0.29	0.00	291.68	0.00	291.95	0.00	0.00	291.95	291.95	0.00	0.00	0.00	291.95	294.28
16	21	0.98	113	12	0.012	284.43	292.34	0.79	1.25	0.02	285.48	0.07	293.34	0.01	0.02	293.38	293.34	0.00	0.00	0.01	293.38	296.07
21	22	0.25	26	8	0.012	292.67	292.93	0.35	0.72	0.01	293.38	0.01	293.60	0.00	0.01	293.61	293.60	0.00	0.00	0.00	293.61	296.07
21	23	0.34	194	12	0.012	292.34	297.97	0.79	0.43	0.00	293.38	0.01	298.97	0.00	0.00	298.97	298.97	0.00	0.00	0.00	298.97	301.16
24A	24	2.53	150	18	0.012	267.00	267.94	1.77	1.43	0.03	270.35	0.07	270.42	0.02	0.03	270.47	269.44	0.04	0.00	0.00	270.44	276.71
24	25	0.28	131	12	0.012	268.44	269.10	0.79	0.36	0.00	270.44	0.01	270.45	0.00	0.00	270.45	270.10	0.00	0.00	0.00	270.45	272.78
25	26	0.10	26	8	0.012	269.43	269.69	0.35	0.29	0.00	270.45	0.00	270.45	0.00	0.00	270.45	270.36	0.00	0.00	0.00	270.45	272.78
24	27	1.95	53	15	0.012	268.19	271.37	1.23	1.59	0.04	270.44	0.04	272.62	0.02	0.04	272.68	272.62	0.05	0.00	0.01	272.63	275.25
27	28	0.25	30	8	0.012	271.95	272.25	0.35	0.72	0.01	272.63	0.01	272.92	0.00	0.01	272.93	272.92	0.00	0.00	0.00	272.93	275.24
27	29	1.44	86	12	0.012	271.62	276.35	0.79	1.83	0.05	272.63	0.12	277.35	0.03	0.05	277.43	277.35	0.04	0.00	0.00	277.39	279.72
29	30	1.24	183	12	0.012	276.35	284.72	0.79	1.58	0.04	277.39	0.19	285.72	0.02	0.04	285.78	285.72	0.03	0.00	0.02	285.77	290.70
30	31	0.19	27	8	0.012	284.39	287.69	0.35	0.54	0.00	285.77	0.01	288.36	0.00	0.00	288.36	288.36	0.00	0.00	0.00	288.36	291.12
30	32	1.01	22	12	0.012	284.39	284.99	0.79	1.29	0.03	285.77	0.01	285.99	0.01	0.03	286.03	285.99	0.01	0.00	0.00	286.01	290.69
32	33	0.02	24	8	0.012	285.32	287.67	0.35	0.06	0.00	286.01	0.00	288.34	0.00	0.00	288.34	288.34	0.00	0.00	0.00	288.34	290.69
32	34	0.77	81	12	0.012	284.99	285.40	0.79	0.98	0.01	286.01	0.03	286.40	0.01	0.01	286.42	286.40	0.01	0.02	0.01	286.44	293.76
34	35	0.31	89	12	0.012	285.40	285.85	0.79	0.39	0.00	286.44	0.01	286.85	0.00	0.00	286.85	286.85	0.00	0.00	0.00	286.85	288.92

BACKWATER CALCULATIONS

JOB NAME: CURRY P.R.D. PREPARED BY: G. Brooks

JOB NUMBER: 00009A DESIGN STORM: 10 YEAR

FROM CB	TO CB	FLOW (CFS)	PIPE LENGTH (FEET)	PIPE DIA. (IN)	MANNING'S n VALUE	OUTLET ELEVATION (FEET)	INLET ELEVATION (FEET)	PIPE AREA (SQ FT)	FLOW VELOCITY (FT/SEC)	VELOCITY HEAD (FEET)	TAILWATER ELEVATION (FEET)	FRICTION LOSS (FEET)	ENTRANCE HGL ELEVATION (FEET)	ENTRANCE HEAD LOSS (FEET)	EXIT HEAD LOSS (FEET)	OUTLET CONTROL ELEVATION (FEET)	INLET CONTROL ELEVATION (FEET)	APPROACH VELOCITY HEAD (FEET)	BEND HEAD LOSS (FEET)	JUNCTION HEAD LOSS (FEET)	HEADWATER ELEVATION (FEET)	RIM EL
34	36	0.46	62	12	0.012	285.40	293.40	0.79	0.59	0.01	286.44	0.01	294.40	0.00	0.01	294.41	294.40	0.00	0.01	0.00	294.41	297.26
36	37	0.25	111	12	0.012	293.40	294.07	0.79	0.32	0.00	294.41	0.00	295.07	0.00	0.00	295.07	295.07	0.00	0.00	0.00	295.07	298.00
30	38	1.04	158	12	0.012	284.39	296.57	0.79	1.32	0.03	285.77	0.11	297.57	0.01	0.03	297.61	297.57	0.01	0.00	0.00	297.60	300.18
38	39	0.10	26	8	0.012	296.90	297.16	0.35	0.29	0.00	297.60	0.00	297.83	0.00	0.00	297.83	297.83	0.00	0.00	0.00	297.83	300.18
38	40	0.77	77	12	0.012	296.57	297.41	0.79	0.98	0.01	297.60	0.03	298.41	0.01	0.01	298.43	298.41	0.01	0.02	0.00	298.44	303.84
40	41	0.74	200	12	0.012	297.41	301.11	0.79	0.94	0.01	298.44	0.07	302.11	0.01	0.01	302.13	302.11	0.01	0.00	0.00	302.12	305.02
41	42	0.65	276	12	0.012	301.11	302.49	0.79	0.83	0.01	302.12	0.08	303.49	0.01	0.01	303.51	303.49	0.00	0.00	0.00	303.51	307.23
40	43	0.03	123	12	0.012	297.41	298.03	0.79	0.04	0.00	298.44	0.00	299.03	0.00	0.00	299.03	299.03	0.00	0.00	0.00	299.03	301.76
24	44	0.26	158	12	0.012	268.44	277.92	0.79	0.33	0.00	270.44	0.01	278.92	0.00	0.00	278.92	278.92	0.01	0.00	0.00	278.92	281.45
44	45	0.23	26	8	0.012	278.25	278.51	0.35	0.66	0.01	278.92	0.01	279.18	0.00	0.01	279.19	279.18	0.00	0.00	0.00	279.19	281.45

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

```
BASIN ID: cb04010         NAME: cb 4 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.38 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.12 Acres    0.26 Acres
TIME INTERVAL....:      10.00 min    CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.18 cfs  VOL:    0.07 Ac-ft  TIME:     480 min

BASIN ID: cb05010         NAME: cb 5 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.35 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.11 Acres    0.24 Acres
TIME INTERVAL....:      10.00 min    CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.17 cfs  VOL:    0.06 Ac-ft  TIME:     480 min

BASIN ID: cb06010         NAME: cb 6 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.34 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.10 Acres    0.24 Acres
TIME INTERVAL....:      10.00 min    CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.17 cfs  VOL:    0.06 Ac-ft  TIME:     480 min

BASIN ID: cb07010         NAME: cb 7 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.11 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.03 Acres    0.08 Acres
TIME INTERVAL....:      10.00 min    CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.05 cfs  VOL:    0.02 Ac-ft  TIME:     480 min
```

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===========================================================================
                              BASIN SUMMARY

BASIN ID: cb08010        NAME: cb 8 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     1.69 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                      PERV            IMP
PRECIPITATION....:     2.73 inches    AREA..:     1.45 Acres     0.24 Acres
TIME INTERVAL....:       10.00 min    CN....:    81.30           98.00
                                      TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.46 cfs  VOL:    0.19 Ac-ft  TIME:     480 min

BASIN ID: cb09010        NAME: cb 9 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.46 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                      PERV            IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.14 Acres     0.32 Acres
TIME INTERVAL....:       10.00 min    CN....:    86.00           98.00
                                      TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.22 cfs  VOL:    0.08 Ac-ft  TIME:     480 min

BASIN ID: cb10010        NAME: cb 10 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.33 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                      PERV            IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.10 Acres     0.23 Acres
TIME INTERVAL....:       10.00 min    CN....:    86.00           98.00
                                      TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.16 cfs  VOL:    0.06 Ac-ft  TIME:     480 min

BASIN ID: cb11010        NAME: cb 11 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.19 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                      PERV            IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.06 Acres     0.13 Acres
TIME INTERVAL....:       10.00 min    CN....:    86.00           98.00
                                      TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.09 cfs  VOL:    0.03 Ac-ft  TIME:     480 min
```

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

```
BASIN ID: cb12010        NAME: cb 12 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.57 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV          IMP
PRECIPITATION....:   2.73 inches   AREA..:     0.39 Acres   0.18 Acres
TIME INTERVAL....:    10.00 min    CN....:    82.00         98.00
                                   TC....:     5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.19 cfs  VOL:   0.08 Ac-ft  TIME:    480 min

BASIN ID: cb13010        NAME: cb 13 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.91 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV          IMP
PRECIPITATION....:   2.73 inches   AREA..:     0.61 Acres   0.30 Acres
TIME INTERVAL....:    10.00 min    CN....:    82.10         98.00
                                   TC....:     5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.31 cfs  VOL:   0.12 Ac-ft  TIME:    480 min

BASIN ID: cb14010        NAME: cb 14 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.26 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV          IMP
PRECIPITATION....:   2.73 inches   AREA..:     0.08 Acres   0.18 Acres
TIME INTERVAL....:    10.00 min    CN....:    86.00         98.00
                                   TC....:     5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.13 cfs  VOL:   0.05 Ac-ft  TIME:    480 min

BASIN ID: cb15010        NAME: cb 15 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.03 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV          IMP
PRECIPITATION....:   2.73 inches   AREA..:     0.01 Acres   0.02 Acres
TIME INTERVAL....:    10.00 min    CN....:    86.00         98.00
                                   TC....:     5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.01 cfs  VOL:   0.01 Ac-ft  TIME:    480 min
```

CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

```
BASIN ID: cb17010         NAME: cb 17 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.36 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                    PERV             IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.11 Acres    0.25 Acres
TIME INTERVAL....:      10.00 min    CN....:   86.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.18 cfs  VOL:    0.07 Ac-ft  TIME:     480 min

BASIN ID: cb18010         NAME: cb 18 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.46 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                    PERV             IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.14 Acres    0.32 Acres
TIME INTERVAL....:      10.00 min    CN....:   86.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.22 cfs  VOL:    0.08 Ac-ft  TIME:     480 min

BASIN ID: cb19010         NAME: cb 19 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.16 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                    PERV             IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.05 Acres    0.11 Acres
TIME INTERVAL....:      10.00 min    CN....:   86.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.08 cfs  VOL:    0.03 Ac-ft  TIME:     480 min

BASIN ID: cb20010         NAME: cb 20 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.21 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                    PERV             IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.06 Acres    0.15 Acres
TIME INTERVAL....:      10.00 min    CN....:   86.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.10 cfs  VOL:    0.04 Ac-ft  TIME:     480 min
```

CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

```
BASIN ID: cb21010        NAME: cb 21 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.98 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                  PERV          IMP
PRECIPITATION....:    2.73 inches    AREA..:   0.53 Acres    0.45 Acres
TIME INTERVAL....:      10.00 min    CN....:  82.90         98.00
                                     TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:   0.39 cfs  VOL:   0.15 Ac-ft  TIME:     480 min

BASIN ID: cb22010        NAME: cb 22 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.53 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                  PERV          IMP
PRECIPITATION....:    2.73 inches    AREA..:   0.18 Acres    0.35 Acres
TIME INTERVAL....:      10.00 min    CN....:  85.40         98.00
                                     TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:   0.25 cfs  VOL:   0.09 Ac-ft  TIME:     480 min

BASIN ID: cb23010        NAME: cb 23 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.69 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                  PERV          IMP
PRECIPITATION....:    2.73 inches    AREA..:   0.21 Acres    0.48 Acres
TIME INTERVAL....:      10.00 min    CN....:  86.00         98.00
                                     TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:   0.34 cfs  VOL:   0.13 Ac-ft  TIME:     480 min

BASIN ID: cb24010        NAME: cb 24 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.09 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                  PERV          IMP
PRECIPITATION....:    2.73 inches    AREA..:   0.03 Acres    0.06 Acres
TIME INTERVAL....:      10.00 min    CN....:  86.00         98.00
                                     TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:   0.04 cfs  VOL:   0.02 Ac-ft  TIME:     480 min
```

CORE NO. 00009A
POND CALCULATIONS

```
=========================================================================
                            BASIN SUMMARY

BASIN ID: cb25010         NAME: cb 25 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.38 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                     PERV          IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.12 Acres    0.26 Acres
TIME INTERVAL....:       10.00 min    CN....:    86.00          98.00
                                      TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.18 cfs  VOL:    0.07 Ac-ft  TIME:     480 min

BASIN ID: cb26010         NAME: cb 26 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.21 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                     PERV          IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.06 Acres    0.15 Acres
TIME INTERVAL....:       10.00 min    CN....:    86.00          98.00
                                      TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.10 cfs  VOL:    0.04 Ac-ft  TIME:     480 min

BASIN ID: cb27010         NAME: cb 27 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.54 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                     PERV          IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.17 Acres    0.37 Acres
TIME INTERVAL....:       10.00 min    CN....:    86.00          98.00
                                      TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.26 cfs  VOL:    0.10 Ac-ft  TIME:     480 min

BASIN ID: cb28010         NAME: cb 28 10-year
SBUH METHODOLOGY
TOTAL AREA.......:     0.58 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:      TYPE1A                     PERV          IMP
PRECIPITATION....:     2.73 inches    AREA..:     0.26 Acres    0.32 Acres
TIME INTERVAL....:       10.00 min    CN....:    83.70          98.00
                                      TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:     0.20
PEAK RATE:    0.25 cfs  VOL:    0.09 Ac-ft  TIME:     480 min
```

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

```
BASIN ID: cb29010          NAME: cb 29 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.42 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.13 Acres    0.29 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.20 cfs  VOL:    0.08 Ac-ft  TIME:    480 min

BASIN ID: cb30010          NAME: cb 30 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.09 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.03 Acres    0.06 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.04 cfs  VOL:    0.02 Ac-ft  TIME:    480 min

BASIN ID: cb31010          NAME: cb 31 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.39 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.12 Acres    0.27 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.19 cfs  VOL:    0.07 Ac-ft  TIME:    480 min

BASIN ID: cb32010          NAME: cb 32 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.46 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.14 Acres    0.32 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.22 cfs  VOL:    0.08 Ac-ft  TIME:    480 min
```

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

```
BASIN ID: cb33010          NAME: cb 33 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.04 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.01 Acres     0.03 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00           98.00
                                    TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.02 cfs  VOL:    0.01 Ac-ft  TIME:     480 min

BASIN ID: cb35010          NAME: cb 35 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.64 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.20 Acres     0.44 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00           98.00
                                    TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.31 cfs  VOL:    0.12 Ac-ft  TIME:     480 min

BASIN ID: cb36010          NAME: cb 36 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.43 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.13 Acres     0.30 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00           98.00
                                    TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.21 cfs  VOL:    0.08 Ac-ft  TIME:     480 min

BASIN ID: cb37010          NAME: cb 37 10-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.71 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV            IMP
PRECIPITATION....:   2.73 inches    AREA..:     0.58 Acres     0.13 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00           98.00
                                    TC....:     5.00 min       5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.25 cfs  VOL:    0.10 Ac-ft  TIME:     480 min
```

CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

```
BASIN ID: cb38010         NAME: cb 38 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.35 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.11 Acres    0.24 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.17 cfs  VOL:    0.06 Ac-ft  TIME:    480 min

BASIN ID: cb39010         NAME: cb 39 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.21 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.06 Acres    0.15 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.10 cfs  VOL:    0.04 Ac-ft  TIME:    480 min

BASIN ID: cb41010         NAME: cb 41 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.19 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.06 Acres    0.13 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.09 cfs  VOL:    0.03 Ac-ft  TIME:    480 min

BASIN ID: cb42010         NAME: cb 42 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.15 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:     0.05 Acres    0.10 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.07 cfs  VOL:    0.03 Ac-ft  TIME:    480 min
```

CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

```
BASIN ID: cb43010        NAME: cb 43 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.07 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                   PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.02 Acres    0.05 Acres
TIME INTERVAL....:      10.00 min    CN....:   86.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.03 cfs  VOL:    0.01 Ac-ft  TIME:     480 min

BASIN ID: cb44010        NAME: cb 44 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.06 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                   PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.02 Acres    0.04 Acres
TIME INTERVAL....:      10.00 min    CN....:   86.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.03 cfs  VOL:    0.01 Ac-ft  TIME:     480 min

BASIN ID: cb45010        NAME: cb 45 10-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.67 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                   PERV           IMP
PRECIPITATION....:    2.73 inches    AREA..:    0.46 Acres    0.21 Acres
TIME INTERVAL....:      10.00 min    CN....:   82.00          98.00
                                     TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.23 cfs  VOL:    0.09 Ac-ft  TIME:     480 min
```

PIPE FLOW USING SANTA BARBARA

LOCATION:	KING COUNTY	24-HR RAINFALL:	3.69 INCHES
JOB NAME: CURRY PRD	JOB NUMBER: 00009A	PREPARED BY: GRB	DESIGN STORM: 100 YEAR

PIPE SEGMENT FROM	TO	INCREMENTAL AREA (ACRES)		INCREMENTAL SBUH FLOW (CFS)	TOTAL SBUH FLOW (CFS)				MANNING'S "n"	PIPE DIAMETER (INCHES)	PIPE SLOPE (PERCENT)	PIPE LENGTH (FEET)	ACTUAL VELOCITY (FT/SEC)	TRAVEL TIME (MINUTES)	PIPE CAPACITY SUMMARY Q(FULL) (CFS)	V(FULL) (FT/SEC)	Q(ACT)/Q(FULL) (PERCENT)
CB 45	CB 44	0.670		0.36	0.360				0.012	8	1.000	26	3.15	0.14	1.309	3.75	27.5%
CB 44	CB 24	0.060		0.04	0.400				0.012	12	6.000	158	5.72	0.46	9.454	12.04	4.2%
CB 43	CB 40	0.070		0.05	0.050				0.012	12	0.500	123	1.06	1.93	2.729	3.47	1.8%
					INCL. COGAN ALLEN FLOWS												
CB 42	CB 41	0.150		0.97	0.970				0.012	12	0.500	276	3.13	1.47	2.729	3.47	35.5%
CB 41	CB 40	0.190		0.13	1.100				0.012	12	1.850	200	5.18	0.64	5.250	6.68	21.0%
CB 40	CB 39	0.000		0.00	1.150				0.012	12	1.100	77	4.41	0.29	4.048	5.15	28.4%
CB 39	CB 38	0.210		0.15	0.150				0.012	8	1.000	26	2.36	0.18	1.309	3.75	11.5%
CB 38	[redacted]	0.350		0.24	1.540				0.012	12	7.710	158	9.48	0.28	10.717	13.65	14.4%
CB 37	CB 36	0.710		0.40	0.400				0.012	12	0.600	111	2.53	0.73	2.990	3.81	13.4%
CB 36	CB 34	0.430		0.30	0.700				0.012	12	12.900	62	8.91	0.12	13.863	17.65	5.0%
CB 35	CB 34	0.640		0.44	0.440				0.012	12	0.500	89	2.52	0.59	2.729	3.47	16.1%
CB 34	CB 32	0.000		0.00	1.140				0.012	12	0.500	81	3.27	0.41	2.729	3.47	41.8%
CB 33	CB 32	0.040		0.03	0.030				0.012	8	9.800	24	2.70	0.15	4.098	11.74	0.7%
CB 32	[redacted]	0.460		0.32	1.490				0.012	12	2.730	22	6.50	0.06	6.377	8.12	23.4%
CB 31	[redacted]	0.390		0.27	0.270				0.012	8	11.000	27	6.72	0.07	4.342	12.44	6.2%
[redacted]	CB 29	0.090		0.06	1.820				0.012	12	4.390	183	8.24	0.37	8.087	10.30	22.5%
CB 29	[redacted]	0.420		0.29	2.110				0.012	12	5.500	86	9.22	0.16	9.052	11.53	23.3%
CB 28	[redacted]	0.580		0.37	0.370				0.012	8	1.000	30	3.21	0.16	1.309	3.75	28.3%

PIPE FLOW USING SANTA BARBARA

LOCATION:	KING COUNTY												24-HR RAINFALL:	3.69 INCHES			
JOB NAME:	CURRY PRD			JOB NUMBER:	00009A				PREPARED BY:	GRB			DESIGN STORM:	100 YEAR			
PIPE SEGMENT		INCREMENTAL AREA (ACRES)		INCREMENTAL SBUH FLOW (CFS)	TOTAL SBUH FLOW (CFS)				MANNING'S "n"	PIPE DIAMETER (INCHES)	PIPE SLOPE (PERCENT)	PIPE LENGTH (FEET)	ACTUAL VELOCITY (FT/SEC)	TRAVEL TIME (MINUTES)	PIPE CAPACITY SUMMARY		
FROM	TO														Q(FULL) (CFS)	V(FULL) (FT/SEC)	Q(ACT)/Q(FULL) (PERCENT)
[redacted]	CB 24	0.540		0.37	2.850				0.012	15	6.000	53	10.13	0.09	17.142	13.97	16.6%
CB 26	CB 25	0.210		0.15	0.150				0.012	8	1.000	26	2.36	0.18	1.309	3.75	11.5%
CB 25	CB 24	0.380		0.26	0.410				0.012	12	0.500	131	2.42	0.90	2.729	3.47	15.0%
CB 24	24A	0.090		0.06	3.720				0.012	18	0.630	150	4.80	0.52	9.032	5.11	41.2%
CB 23	[redacted]	0.690		0.48	0.480				0.012	12	2.900	194	4.73	0.68	6.573	8.37	7.3%
CB 22	[redacted]	0.530		0.36	0.360				0.012	8	1.000	26	3.15	0.14	1.309	3.75	27.5%
[redacted]	[redacted]	0.980		0.58	1.420				0.012	12	7.000	113	8.65	0.22	10.212	13.00	13.9%
CB 20	CB 19	0.210		0.15	0.150				0.012	8	1.000	27	2.36	0.19	1.309	3.75	11.5%
CB 19	[redacted]	0.160		0.11	0.260				0.012	12	12.500	50	5.30	0.16	13.646	17.37	1.9%
CB 18	CB 17	0.460		0.32	0.320				0.012	8	2.800	26	4.36	0.10	2.191	6.28	14.6%
CB 17	[redacted]	0.360		0.25	0.570				0.012	12	0.600	207	2.87	1.20	2.990	3.81	19.1%
[redacted]	CB 15	0.000		0.00	2.250				0.012	15	0.500	66	3.89	0.28	4.948	4.03	45.5%
CB 15	CB 14	0.030		0.02	2.270				0.012	15	0.500	53	3.89	0.23	4.948	4.03	45.9%
CB 14	[redacted]	0.260		0.18	2.450				0.012	15	0.500	75	3.99	0.31	4.948	4.03	49.5%
CB 13	CB 12	0.910		0.49	0.490				0.012	8	1.500	24	4.00	0.10	1.603	4.59	30.6%
CB 12	[redacted]	0.570		0.30	0.790				0.012	12	10.000	46	8.39	0.09	12.205	15.54	6.5%
[redacted]	[redacted]	0.190		0.13	3.370				0.012	15	0.500	103	4.35	0.39	4.948	4.03	68.1%
CB 10	[redacted]	0.330		0.23	0.230				0.012	8	11.000	27	6.28	0.07	4.342	12.44	5.3%
[redacted]	[redacted]	0.460		0.32	3.920				0.012	15	0.900	195	5.63	0.58	6.639	5.41	59.0%

PIPE FLOW USING SANTA BARBARA

LOCATION: KING COUNTY **24-HR RAINFALL:** 3.69 INCHES

JOB NAME: CURRY PRD **JOB NUMBER:** 00009A **PREPARED BY:** GRB **DESIGN STORM:** 100 YEAR

PIPE SEGMENT		INCREMENTAL AREA		INCREMENTAL SBUH FLOW	TOTAL SBUH FLOW				MANNING'S	PIPE DIAMETER	PIPE SLOPE	PIPE LENGTH	ACTUAL VELOCITY	TRAVEL TIME	PIPE CAPACITY SUMMARY		
FROM	TO	(ACRES)		(CFS)	(CFS)				"n"	(INCHES)	(PERCENT)	(FEET)	(FT/SEC)	(MINUTES)	Q(FULL) (CFS)	V(FULL) (FT/SEC)	Q(ACT)/Q(FULL) (PERCENT)
CB 8	[redacted]	1.690		0.78	0.780				0.012	8	2.000	26	5.07	0.09	1.851	5.30	42.1%
[redacted]	CB 5	0.110		0.08	4.780				0.012	18	4.060	122	10.06	0.20	22.929	12.98	20.8%
CB 6	CB 5	0.340		0.24	0.240				0.012	8	9.800	24	5.93	0.07	4.098	11.74	5.9%
CB 5	CB 3	0.350		0.24	5.260				0.012	18	20.000	35	18.14	0.03	50.892	28.80	10.3%
CB 4	CB 3	0.380		0.26	0.260				0.012	12	0.500	131	2.10	1.04	2.729	3.47	9.5%
CB 3	3A	0.000		0.00	5.520				0.012	18	1.550	111	7.46	0.25	14.168	8.02	39.0%

BACKWATER CALCULATIONS

JOB NAME: CURRY P.R.D.
JOB NUMBER: 00009A
PREPARED BY: G. Brooks
DESIGN STORM: 100 YEAR

FROM CB	TO CB	FLOW (CFS)	PIPE LENGTH (FEET)	PIPE DIA. (IN)	MANNING'S n VALUE	OUTLET ELEVATION (FEET)	INLET ELEVATION (FEET)	PIPE AREA (SQ FT)	FLOW VELOCITY (FT/SEC)	VELOCITY HEAD (FEET)	TAILWATER ELEVATION (FEET)	FRICTION LOSS (FEET)	ENTRANCE HGL ELEVATION (FEET)	ENTRANCE HEAD LOSS (FEET)	EXIT HEAD LOSS (FEET)	OUTLET CONTROL ELEVATION (FEET)	INLET CONTROL ELEVATION (FEET)	APPROACH VELOCITY HEAD (FEET)	BEND HEAD LOSS (FEET)	JUNCTION HEAD LOSS (FEET)	HEADWATER ELEVATION (FEET)	RIM EL
3A	3	5.52	111	18	0.012	267.00	268.72	1.77	3.12	0.15	270.71	0.26	270.97	0.08	0.15	271.20	270.22	0.14	0.18	0.01	271.24	281.00
3	4	0.26	131	12	0.012	269.22	269.88	0.79	0.33	0.00	271.24	0.01	271.25	0.00	0.00	271.25	270.88	0.00	0.00	0.00	271.25	272.94
3	5	5.26	35	18	0.012	268.72	275.72	1.77	2.98	0.14	271.24	0.07	277.22	0.07	0.14	277.43	277.22	0.11	0.01	0.01	277.32	281.84
5	6	0.24	24	8	0.012	276.55	278.90	0.35	0.69	0.01	277.32	0.01	279.57	0.00	0.01	279.58	279.57	0.00	0.00	0.00	279.58	281.84
5	7	4.78	122	18	0.012	275.72	280.67	1.77	2.70	0.11	277.32	0.21	282.17	0.06	0.11	282.34	282.17	0.16	0.15	0.02	282.35	284.54
7	8	0.78	26	8	0.012	281.50	282.02	0.35	2.23	0.08	282.35	0.09	282.69	0.04	0.08	282.80	282.69	0.00	0.00	0.00	282.80	284.54
7	9	3.92	195	15	0.012	280.92	282.68	1.23	3.19	0.16	282.35	0.61	283.93	0.08	0.16	284.17	283.93	0.12	0.02	0.01	284.08	289.19
9	10	0.23	27	8	0.012	283.26	286.23	0.35	0.66	0.01	284.08	0.01	286.90	0.00	0.01	286.91	286.90	0.00	0.00	0.00	286.91	289.30
9	11	3.37	103	15	0.012	282.68	283.20	1.23	2.75	0.12	284.08	0.24	284.45	0.06	0.12	284.63	284.45	0.06	0.01	0.03	284.60	290.93
11	12	0.79	46	12	0.012	283.45	288.05	0.79	1.01	0.02	284.60	0.02	289.05	0.01	0.02	289.07	289.05	0.03	0.02	0.00	289.06	291.73
12	13	0.49	24	8	0.012	288.38	288.74	0.35	1.40	0.03	289.06	0.03	289.41	0.02	0.03	289.45	289.41	0.00	0.00	0.00	289.45	291.73
11	14	2.45	75	15	0.012	283.20	283.58	1.23	2.00	0.06	284.60	0.09	284.83	0.03	0.06	284.92	284.83	0.05	0.01	0.00	284.88	292.33
14	15	2.27	53	15	0.012	283.58	283.85	1.23	1.85	0.05	284.88	0.06	285.10	0.03	0.05	285.18	285.10	0.05	0.00	0.00	285.13	293.35
15	16	2.25	66	15	0.012	283.85	284.18	1.23	1.83	0.05	285.13	0.07	285.43	0.03	0.05	285.51	285.43	0.05	0.07	0.01	285.54	294.65
16	17	0.57	207	12	0.012	284.43	285.67	0.79	0.73	0.01	285.54	0.04	286.67	0.00	0.01	286.68	286.67	0.01	0.01	0.00	286.68	289.42
17	18	0.32	26	8	0.012	286.00	286.73	0.35	0.92	0.01	286.68	0.02	287.40	0.01	0.01	287.42	287.40	0.00	0.00	0.00	287.42	289.42
16	19	0.26	50	12	0.012	284.43	290.68	0.79	0.33	0.00	285.54	0.00	291.68	0.00	0.00	291.68	291.68	0.00	0.00	0.00	291.68	294.28
19	20	0.15	27	8	0.012	291.01	291.28	0.35	0.43	0.00	291.68	0.00	291.95	0.00	0.00	291.95	291.95	0.00	0.00	0.00	291.95	294.28
16	21	1.42	113	12	0.012	284.43	292.34	0.79	1.81	0.05	285.54	0.15	293.34	0.03	0.05	293.42	293.34	0.01	0.00	0.02	293.43	296.07
21	22	0.36	26	8	0.012	292.67	292.93	0.35	1.03	0.02	293.43	0.02	293.60	0.01	0.02	293.62	293.60	0.00	0.00	0.00	293.62	296.07
21	23	0.48	194	12	0.012	292.34	297.97	0.79	0.61	0.01	293.43	0.03	298.97	0.00	0.01	298.98	298.97	0.00	0.00	0.00	298.98	301.16
24A	24	3.72	150	18	0.012	267.00	267.94	1.77	2.11	0.07	270.71	0.16	270.87	0.03	0.07	270.97	269.44	0.08	0.01	0.01	270.90	276.71
24	25	0.41	131	12	0.012	268.44	269.10	0.79	0.52	0.00	270.90	0.01	270.92	0.00	0.00	270.93	270.10	0.00	0.01	0.00	270.93	272.78
25	26	0.15	26	8	0.012	269.43	269.69	0.35	0.43	0.00	270.93	0.00	270.93	0.00	0.00	270.94	270.36	0.00	0.00	0.00	270.94	272.78
24	27	2.85	53	15	0.012	268.19	271.37	1.23	2.32	0.08	270.90	0.09	272.62	0.04	0.08	272.75	272.62	0.11	0.01	0.01	272.65	275.25
27	28	0.37	30	8	0.012	271.95	272.25	0.35	1.06	0.02	272.65	0.02	272.92	0.01	0.02	272.94	272.92	0.00	0.00	0.00	272.94	275.24
27	29	2.11	86	12	0.012	271.62	276.35	0.79	2.69	0.11	272.65	0.25	277.35	0.06	0.11	277.52	277.35	0.08	0.00	0.00	277.43	279.72
29	30	1.82	183	12	0.012	276.35	284.72	0.79	2.32	0.08	277.43	0.40	285.72	0.04	0.08	285.85	285.72	0.06	0.00	0.05	285.83	290.70
30	31	0.27	27	8	0.012	284.39	287.69	0.35	0.77	0.01	285.83	0.01	288.36	0.00	0.01	288.37	288.36	0.00	0.00	0.00	288.37	291.12
30	32	1.49	22	12	0.012	284.39	284.99	0.79	1.90	0.06	285.83	0.03	285.99	0.03	0.06	286.07	285.99	0.03	0.00	0.00	286.04	290.69
32	33	0.03	24	8	0.012	285.32	287.67	0.35	0.09	0.00	286.04	0.00	288.34	0.00	0.00	288.34	288.34	0.00	0.00	0.00	288.34	290.69
32	34	1.14	81	12	0.012	284.99	285.40	0.79	1.45	0.03	286.04	0.07	286.40	0.02	0.03	286.45	286.40	0.01	0.04	0.01	286.49	293.76
34	35	0.44	89	12	0.012	285.40	285.85	0.79	0.56	0.00	286.49	0.01	286.85	0.00	0.00	286.86	286.85	0.00	0.00	0.00	286.86	288.92

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

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BASIN ID: cb08100        NAME: cb 8 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   1.69 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   1.45 Acres    0.24 Acres
TIME INTERVAL....:     10.00 min    CN....:  81.30          98.00
                                    TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.78 cfs  VOL:    0.30 Ac-ft  TIME:     480 min

BASIN ID: cb09100        NAME: cb 9 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.46 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.14 Acres    0.32 Acres
TIME INTERVAL....:     10.00 min    CN....:  86.00          98.00
                                    TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.32 cfs  VOL:    0.12 Ac-ft  TIME:     480 min

BASIN ID: cb10100        NAME: cb 10 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.33 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.10 Acres    0.23 Acres
TIME INTERVAL....:     10.00 min    CN....:  86.00          98.00
                                    TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.23 cfs  VOL:    0.09 Ac-ft  TIME:     480 min

BASIN ID: cb11100        NAME: cb 11 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.19 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.06 Acres    0.13 Acres
TIME INTERVAL....:     10.00 min    CN....:  86.00          98.00
                                    TC....:   5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.13 cfs  VOL:    0.05 Ac-ft  TIME:     480 min
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BASIN SUMMARY

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BASIN ID: cb12100         NAME: cb 12 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.57 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.39 Acres    0.18 Acres
TIME INTERVAL....:     10.00 min    CN....:   82.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.30 cfs  VOL:    0.11 Ac-ft  TIME:     480 min

BASIN ID: cb13100         NAME: cb 13 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.91 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.61 Acres    0.30 Acres
TIME INTERVAL....:     10.00 min    CN....:   82.10          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.49 cfs  VOL:    0.19 Ac-ft  TIME:     480 min

BASIN ID: cb14100         NAME: cb 14 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.26 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.08 Acres    0.18 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.18 cfs  VOL:    0.07 Ac-ft  TIME:     480 min

BASIN ID: cb15100         NAME: cb 15 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.03 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                  PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.01 Acres    0.02 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:    0.02 cfs  VOL:    0.01 Ac-ft  TIME:     480 min
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CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

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BASIN ID: cb17100        NAME: cb 17 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.36 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.11 Acres    0.25 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.25 cfs  VOL:   0.09 Ac-ft  TIME:    480 min

BASIN ID: cb18100        NAME: cb 18 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.46 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.14 Acres    0.32 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.32 cfs  VOL:   0.12 Ac-ft  TIME:    480 min

BASIN ID: cb19100        NAME: cb 19 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.16 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.05 Acres    0.11 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.11 cfs  VOL:   0.04 Ac-ft  TIME:    480 min

BASIN ID: cb20100        NAME: cb 20 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.21 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV            IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.06 Acres    0.15 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.15 cfs  VOL:   0.05 Ac-ft  TIME:    480 min
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CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

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BASIN ID: cb21100         NAME: cb 21 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.98 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                        PERV             IMP
PRECIPITATION....:    3.69 inches     AREA..:     0.53 Acres      0.45 Acres
TIME INTERVAL....:      10.00 min     CN....:     82.90            98.00
                                      TC....:     5.00 min         5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.58 cfs   VOL:    0.22 Ac-ft   TIME:     480 min

BASIN ID: cb22100         NAME: cb 22 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.53 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                        PERV             IMP
PRECIPITATION....:    3.69 inches     AREA..:     0.18 Acres      0.35 Acres
TIME INTERVAL....:      10.00 min     CN....:     85.40            98.00
                                      TC....:     5.00 min         5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.36 cfs   VOL:    0.13 Ac-ft   TIME:     480 min

BASIN ID: cb23100         NAME: cb 23 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.69 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                        PERV             IMP
PRECIPITATION....:    3.69 inches     AREA..:     0.21 Acres      0.48 Acres
TIME INTERVAL....:      10.00 min     CN....:     86.00            98.00
                                      TC....:     5.00 min         5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.48 cfs   VOL:    0.18 Ac-ft   TIME:     480 min

BASIN ID: cb24100         NAME: cb 24 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.09 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:     TYPE1A                        PERV             IMP
PRECIPITATION....:    3.69 inches     AREA..:     0.03 Acres      0.06 Acres
TIME INTERVAL....:      10.00 min     CN....:     86.00            98.00
                                      TC....:     5.00 min         5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.06 cfs   VOL:    0.02 Ac-ft   TIME:     480 min
```

CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

```
BASIN ID: cb25100         NAME: cb 25 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.38 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.12 Acres    0.26 Acres
TIME INTERVAL....:    10.00 min     CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.26 cfs  VOL:   0.10 Ac-ft  TIME:    480 min

BASIN ID: cb26100         NAME: cb 26 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.21 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.06 Acres    0.15 Acres
TIME INTERVAL....:    10.00 min     CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.15 cfs  VOL:   0.05 Ac-ft  TIME:    480 min

BASIN ID: cb27100         NAME: cb 27 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.54 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.17 Acres    0.37 Acres
TIME INTERVAL....:    10.00 min     CN....:   86.00          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.37 cfs  VOL:   0.14 Ac-ft  TIME:    480 min

BASIN ID: cb28100         NAME: cb 28 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.58 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                   PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:    0.26 Acres    0.32 Acres
TIME INTERVAL....:    10.00 min     CN....:   83.70          98.00
                                    TC....:    5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.37 cfs  VOL:   0.14 Ac-ft  TIME:    480 min
```

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

```
BASIN ID: cb29100        NAME: cb 29 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.42 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                 PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.13 Acres   0.29 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00        98.00
                                    TC....:    5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.29 cfs  VOL:   0.11 Ac-ft  TIME:    480 min

BASIN ID: cb30100        NAME: cb 30 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.09 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                 PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.03 Acres   0.06 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00        98.00
                                    TC....:    5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.06 cfs  VOL:   0.02 Ac-ft  TIME:    480 min

BASIN ID: cb31100        NAME: cb 31 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.39 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                 PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.12 Acres   0.27 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00        98.00
                                    TC....:    5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.27 cfs  VOL:   0.10 Ac-ft  TIME:    480 min

BASIN ID: cb32100        NAME: cb 32 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.46 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                 PERV           IMP
PRECIPITATION....:   3.69 inches    AREA..:   0.14 Acres   0.32 Acres
TIME INTERVAL....:     10.00 min    CN....:   86.00        98.00
                                    TC....:    5.00 min     5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.32 cfs  VOL:   0.12 Ac-ft  TIME:    480 min
```

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

BASIN ID: cb33100 NAME: cb 33 100-year
SBUH METHODOLOGY

TOTAL AREA.......:	0.04 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	3.69 inches	AREA..:	0.01 Acres	0.03 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	5.00 min	5.00 min

ABSTRACTION COEFF: 0.20
PEAK RATE: 0.03 cfs VOL: 0.01 Ac-ft TIME: 480 min

BASIN ID: cb35100 NAME: cb 35 100-year
SBUH METHODOLOGY

TOTAL AREA.......:	0.64 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	3.69 inches	AREA..:	0.20 Acres	0.44 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	5.00 min	5.00 min

ABSTRACTION COEFF: 0.20
PEAK RATE: 0.44 cfs VOL: 0.16 Ac-ft TIME: 480 min

BASIN ID: cb36100 NAME: cb 36 100-year
SBUH METHODOLOGY

TOTAL AREA.......:	0.43 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	3.69 inches	AREA..:	0.13 Acres	0.30 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	5.00 min	5.00 min

ABSTRACTION COEFF: 0.20
PEAK RATE: 0.30 cfs VOL: 0.11 Ac-ft TIME: 480 min

BASIN ID: cb37100 NAME: cb 37 100-year
SBUH METHODOLOGY

TOTAL AREA.......:	0.71 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	3.69 inches	AREA..:	0.58 Acres	0.13 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	5.00 min	5.00 min

ABSTRACTION COEFF: 0.20
PEAK RATE: 0.40 cfs VOL: 0.15 Ac-ft TIME: 480 min

CORE NO. 00009A
POND CALCULATIONS

BASIN SUMMARY

```
BASIN ID: cb38100          NAME: cb 38 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.35 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    3.69 inches    AREA..:     0.11 Acres    0.24 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.24 cfs  VOL:    0.09 Ac-ft  TIME:      480 min

BASIN ID: cb39100          NAME: cb 39 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.21 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    3.69 inches    AREA..:     0.06 Acres    0.15 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.15 cfs  VOL:    0.05 Ac-ft  TIME:      480 min

BASIN ID: cb41100          NAME: cb 41 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.19 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    3.69 inches    AREA..:     0.06 Acres    0.13 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.13 cfs  VOL:    0.05 Ac-ft  TIME:      480 min

BASIN ID: cb42100          NAME: cb 42 100-year
SBUH METHODOLOGY
TOTAL AREA.......:    0.15 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:     TYPE1A                     PERV           IMP
PRECIPITATION....:    3.69 inches    AREA..:     0.05 Acres    0.10 Acres
TIME INTERVAL....:     10.00 min     CN....:    86.00          98.00
                                     TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:    0.20
PEAK RATE:    0.10 cfs  VOL:    0.04 Ac-ft  TIME:      480 min
```

CORE NO. 00009A
POND CALCULATIONS

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BASIN SUMMARY

```
BASIN ID: cb43100        NAME: cb 43 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.07 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   3.69 inches    AREA..:     0.02 Acres    0.05 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.05 cfs  VOL:   0.02 Ac-ft  TIME:    480 min

BASIN ID: cb44100        NAME: cb 44 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.06 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   3.69 inches    AREA..:     0.02 Acres    0.04 Acres
TIME INTERVAL....:     10.00 min    CN....:    86.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.04 cfs  VOL:   0.02 Ac-ft  TIME:    480 min

BASIN ID: cb45100        NAME: cb 45 100-year
SBUH METHODOLOGY
TOTAL AREA.......:   0.67 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   3.69 inches    AREA..:     0.46 Acres    0.21 Acres
TIME INTERVAL....:     10.00 min    CN....:    82.00          98.00
                                    TC....:     5.00 min      5.00 min
ABSTRACTION COEFF:   0.20
PEAK RATE:   0.36 cfs  VOL:   0.13 Ac-ft  TIME:    480 min
```

OVERFLOW ROUTES

The overflow routes are shown on the Catch Basin Subbasin Map exhibit. The overflow routes are indicated by arrows. All overflows are safely conveyed through the site without impact to any proposed houses. The only catch basins of concern are CB 25, CB 26, and CB 35. Possible overflow from CB 25 and CB 26 could overflow onto the adjacent property to the south. To prevent overflow from entering the southern property, a thru-curb grate was added to CB 26 thereby, eliminating plugging of the catch basin. Also, an asphalt-thickened edge was added to the end of the stub road. Any overflow from CB 25 will overflow the crown of the road and flow into CB 26 before jumping the asphalt-thickened edge and flowing onto the southern property. The southern property will therefore, not experience any overflow from the subject property with the addition of a thru-curb grate to CB 26 and an asphalt-thickened edge constructed at the end of the stub road.

A shallow ditch was created that will convey overflows from CB 35 if the catch basin becomes plugged. The ditch was designed with a 100-year, 24-hour peak flow from the basin that would drain overland to CB 35. Per the proposed topography of the site, the only basin area that will contribute overflow is from Subbasin 35. See Catch Basin Subbasin Map. The 100-year, 24-hour peak flow from Subbasin 35 is 0.44 cfs. See WaterWorks Basin Summary sheet attached within this section of the report. Attached on the following page is an excel spreadsheet that calculates the capacity of a V-ditch designed with a worst case 0.5% longitudinal slope, 3:1 side slopes, and grass-lined with an n = 0.027 (1992 DOE Table III-2.8). The V-ditch can carry the required 0.44 cfs at 0.36' of depth. The V-ditch therefore, will be designed with a depth of 0.86' to allow for 0.5' of freeboard.

GRASS-LINED OVERFLOW DITCH ANALYSIS

DITCH DATA:			
BOTTOM WIDTH (FT) =	0.00	JOB NAME:	CURRY PRD
LEFT SIDE SLOPE (L:1)	3.00	JOB #:	00009A
RIGHT SIDE SLOPE (R:1	3.00	OPERATOR:	G.R. BROOKS
BOTTOM SLOPE (FT/FT	0.0050	DATE:	1/23/2004
MANNING'S n =	0.027		

FLOW DEPTH (FEET)	FLOW AREA (SQ FT)	WETTED PERIMETER (FEET)	HYDRAULIC RADIUS (FEET)	DITCH CAPACITY (CFS)	FLOW VELOCITY (FPS)
0.00	0.0000	0.0000	0.0000	0.000	0.000
0.05	0.0075	0.3162	0.0237	0.002	0.321
0.10	0.0300	0.6325	0.0474	0.015	0.510
0.15	0.0675	0.9487	0.0712	0.045	0.668
0.20	0.1200	1.2649	0.0949	0.097	0.810
0.25	0.1875	1.5811	0.1186	0.176	0.939
0.30	0.2700	1.8974	0.1423	0.286	1.061
0.35	0.3675	2.2136	0.1660	0.432	1.176
0.36	0.3888	2.2768	0.1708	**0.466**	1.198
0.40	0.4800	2.5298	0.1897	0.617	1.285
0.45	0.6075	2.8460	0.2135	0.844	1.390
0.50	0.7500	3.1623	0.2372	1.118	1.491
0.55	0.9075	3.4785	0.2609	1.442	1.589
0.60	1.0800	3.7947	0.2846	1.819	1.684
0.65	1.2675	4.1110	0.3083	2.251	1.776
0.70	1.4700	4.4272	0.3320	2.743	1.866
0.75	1.6875	4.7434	0.3558	3.297	1.954
0.80	1.9200	5.0596	0.3795	3.916	2.040
0.85	2.1675	5.3759	0.4032	4.604	2.124
0.90	2.4300	5.6921	0.4269	5.362	2.206
0.95	2.7075	6.0083	0.4506	6.193	2.287
1.00	3.0000	6.3246	0.4743	7.101	2.367

DOWNSTREAM CONVEYANCE SYSTEM

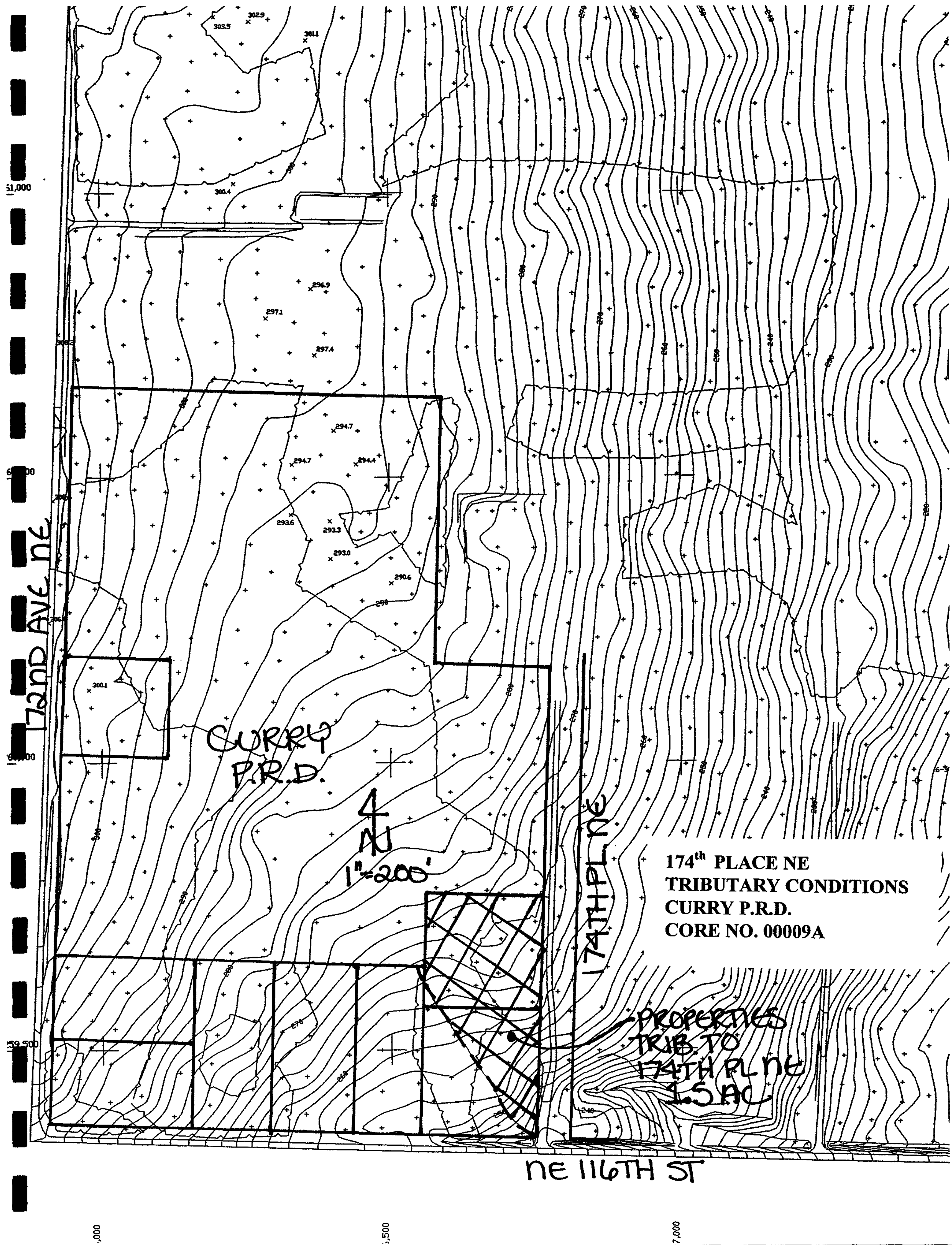
The 18" storm drainage bypass system was designed and installed along 174th Place NE by the Whistler Ridge development to accept drainage from the Curry PRD and any tributary area that sheetflows to 174th Place NE from the west. The bypass system is an 18" storm drainage system that is at worst designed at a 1.99% slope along 174th Place NE per the City approved plans for the Whistler Ridge development.

The tributary area that drains to 174th Place NE, aside from the Curry PRD discharge, is approximately 1.5 acres. The impervious coverage for the approximately 1-1/2 properties that drains to 174th Place NE was calculated using Table III-1.3 in the 1992 D.O.E. Manual. The dwelling units per gross acre is 1.5 DU/1.5 AC = 1 DU/AC. The impervious coverage is therefore 19% or 19%*1.5 acre = 0.29 acre. The basin summary for the tributary area that drains to 174th Place NE is delineated below. See WaterWorks printout on the following page.

174th PL. NE TRIBUTARY CONDITIONS	Total Area = 1.5 acres	
GROUND COVER	AREA(acre)	CN
Lawn (Landscaping)	1.21	86
Impervious	0.29	98
Time of concentration	Assumed	10.00 min.

To convey the 100-year release rate from the proposed Curry PRD detention/water quality pond and the100-year, 24-hour storm event from those properties that drain directly to 174th Place NE, the 18" storm drainage bypass system would need to convey 3.21 cfs. See Hydrograph 16 (Sum of the 100-year pond release and the 100-year, 24-hour storm event for 174th Pl. NE Tributary) in Section IV.C. of this report.

The 18" storm drainage system along 174th Place NE which is at worst sloped at 1.99% can carry $Q(full) = 1.49/n*A*R^{2/3}*S^{1/2} = (1.49/0.012)(\pi/4*1.5^2)(0.75/2)^{2/3}(0.0199)^{1/2} =$ 16.1 cfs which exceeds the required 100-year flow that would enter the 18" storm drainage system along 174th Place NE as calculated above. Therefore, the downstream bypass storm drainage system along 174th Place NE has been adequately sized to convey all drainage that is tributary to the storm drainage system along 174th Place NE.


174th PLACE NE
TRIBUTARY CONDITIONS
CURRY P.R.D.
CORE NO. 00009A
172ND AVE NE
CURRY P.R.D.
N
1"=200'
174TH PL NE
PROPERTIES TRIB. TO 174TH PL NE 1.5 AC
NE 116TH ST

CORE NO. 00009A
POND CALCULATIONS

===

BASIN SUMMARY

BASIN ID: 174100 NAME: 174th Pl NE Trib. 100-year
SBUH METHODOLOGY

TOTAL AREA.......:	1.50 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	3.69 inches	AREA..:	1.21 Acres	0.29 Acres
TIME INTERVAL....:	10.00 min	CN....:	86.00	98.00
		TC....:	10.00 min	10.00 min

ABSTRACTION COEFF: 0.20
PEAK RATE: 0.81 cfs VOL: 0.31 Ac-ft TIME: 480 min

SECTION VI: EROSION/SEDIMENTATION CONTROL DESIGN

A combination of silt fence, interceptor ditch along with a sediment pond will be used for all disturbed areas to control sediment laden runoff from leaving the site. The sediment pond was designed per the Department of Ecology Manual, Section II-5.8.7.

<u>Design Sediment Pond</u>

Q_{10} = 6.46 cfs (assuming developed conditions)
Required Surface Area = 1250 SF/cfs * Q_{10} = 1250 * 6.46 = 8,075 SF

The provided surface area at the top of the standpipe for the sediment pond is approximately 19,674 SF at elevation 269. The provided surface area exceeds the minimum required surface area and therefore, will provide the treatment as required per the Department of Ecology Manual.

APPENDIX B

Conditions of Approval Letter

RECEIVED
AUG 01 2003
ROTHHILL ENGNR. PARTNERS, LLC
BELLEVUE, WA

THE CITY OF REDMOND
PLANNING DEPARTMENT

AGENDA
HEARING EXAMINER

March 31, 2003

Redmond City Council Chamber
Public Safety Building
8701 160 Ave NE

7:00 p.m.

I. CALL TO ORDER

II. DESCRIPTION OF HEARING SEQUENCE AND PROCEDURES

III. PUBLIC HEARING

Curry Preliminary Plat and Planned Residential Development - PRD02-001

Request: Subdivision of approximately 15.68 acres into lots for 69 single-family residential dwellings designed as a planned residential development.

Location: North of NE 116th Street on the east side of 172nd Ave NE, includes 11840 172nd Ave NE.

IV. ADJOURNMENT

O:\Sheryle\HE3-31

15670 N.E. 85TH STREET • PO BOX 97010 • REDMOND, WASHINGTON 98073-9710 • FAX (425) 556-4242 • (425) 556-2440

The following exhibits were offered and admitted:

Exhibit A:	Technical Committee Report dated 3/31/03 with attachments
Exhibit B:	Letter from City to Harkness requesting additional information – 6/12/02
Exhibit C:	Traffic Impact Analysis from Gary Struthers Associates, Inc. – 11/22/02
Exhibit D:	Letter from City to Harkness requesting additional information – 11/15/02
Exhibit E:	Letter from City to Harkness re: Curry PRD/PPL SEPA determination and MDNS dated 2/13/03
Exhibit F:	Memo from Gary Struthers Associates, Inc and attached email
Exhibit G:	CamWest's Powerpoint presentation

The Examiner visited the site prior to the hearing. The hearing adjourned at 8:15 pm

From the foregoing the Examiner makes the following:

FINDINGS OF FACT

1. Proposal. CamWest Development Inc. (CamWest) proposes to subdivide a 15.68-acre site into lots for 69 single-family residential dwellings to include roads, sidewalks, stormwater facilities, sewer and water lines, landscaping, and a major open space for trails and public access and enjoyment.

2. Site. The site is located at 11840 172nd Avenue NE and lies generally north of NE 116th Street and east of 172nd Avenue NE. The residence of Gerald and Telka Gustafson at 11810 172nd Avenue NE is surrounded by and excluded from the site. The proposed Wynstone Development lies to the north and the Whistler Ridge plat, now under construction, lies to the east. One tier of single-family lots separates the site from NE 116th Street. The site is generally flat, slopping from Northwest to Southeast and consists of 55% trees, 40% pasture grass, and 5% structures. It is currently developed with three single-family homes and outbuildings.

3. Comprehensive Plan – Zoning. The site is in the North Redmond Neighborhood and is designated for Low-Moderate Density Residential uses. It is zoned R-4. All surrounding land is also zoned R-4, except for portions of King County which lie to the west and are zoned R-8.

4. Access. Vehicular access to the site will be from 172nd Avenue NE, from the Wynstone plat to the north, from the Whistler Ridge plat to the east and from a new 173rd Place NE to the south. None of the residences will have direct access from 172nd Avenue NE. School children will be able to walk safely to bus stops on NE 116th Street.

5. SEPA. A Mitigated Determination of Non-Significance (MDNS) was issued on February 14, 2003. The appeal period ended on March 17, 2003. There was no appeal. Two conditions were attached to the MDNS:
   - Applicant will be required to construct a second southbound lane on 172nd Avenue NE as it approaches NE 116th Street, to separate right-turning vehicles from other traffic.
   - Applicant must mitigate adverse quality and quantity impacts of construction to domestic water supply wells on adjacent properties caused by construction of the subdivision.

6. Impact Fees. Applicant shall pay impact fees at the rates in effect when building permits are issued, as follows:
   - Fire. Now $94.00 per single-family dwelling unit
   - Transportation. Now $3,064.15 per single-family dwelling unit
   - Parks. Now $1611.00 per single-family dwelling unit

7. Trees. There are 560 significant and landmark trees on the site. Applicant proposes to remove 13 landmark trees and 30 significant trees. Eleven landmark trees and 33 significant trees will be "retained", and 51 landmark trees and 145 significant trees will be "saved". Trees that are "retained " are those from which site work is proposed to

City of Redmond
Office of the Hearing Examiner
8701 160th Avenue NE
P.O. Box 97010
Redmond, WA 98073-9710

occur within 5 feet of the designated drip line. Trees that are to be "saved" are those that will not be subject to such site work. As a result, Applicant will save more than 35% of all healthy significant trees. Applicant has received administrative approval to remove or impact the root protection zone of 24 landmark trees. All trees to be saved will be in Native Growth Protection Areas, in common areas or on residential lots.

8. Planned Residential Development. Applicant proposes to cluster the housing on smaller than average lots in order to establish a major open space in the tract. If approved, this will allow the following modifications of the normal development regulations:

Regulation	**Normal**	**Proposed**
Density	63 dwelling units	69 dwelling units
Mimimum Average Lot Size	7,000 sq. ft	5, 498 sq. ft.
Minimum Lot Width Circle	40 ft.	20 ft.
Minimum Lot Frontage	20 ft.	11ft. & 9 ft. on Lots 17 & 8
Front Setback	15 ft, 18 ft for garage	10 ft. w/5 ft. for Lots 20 & 53
Side Setback	5 ft. & 10 ft.	4 ft. for 4 lots
Side Street Setback	15 ft.	10 ft. for 11 lots
Minimum Building Separation	10 ft.	8 ft. for 4 lots
Maximum Lot Coverage	35%	45%
Maximum Impervious Surface	60%	70%
Minimum Open Space	20%	(See site plan)

The Technical Committee recommends approval of all of the proposed modifications except for the 5-foot setbacks for lots 20 and 53. All modifications require City Council approval in the Planned Residential Development.

9. Studies. In support of the application, applicant submitted the following studies:

- Arborist Report

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- Stormwater Drainage Report
- Landmark Tree Removal Request
- Wetland Determination and Conceptual Mitigation
- Wildlife Study Report
- Preliminary Geotechnical Report
- Traffic Impact Analysis
- Phase I Environmental Survey

10. Stormwater. Stormwater runoff will be collected in a series of catch basins and conveyed by an underground system into an open detention and water quality pond. The system will be designed to match one-half of the two-year storms and match the 10 year and 100 year storms, based upon predevelopment runoff peak flow rates. Overflow routes through the site for the 100-year storm shall be designed so as to avoid any buildings. Water quality shall not be less than predevelopment storm flow rates and values.

11. Wetland. A Type III palustrine emergent wetland was identified on the site, which is isolated from other surface waters and measures 5,254 sq. ft. As the wetland is located at the intersection of two streets that cannot be relocated, the wetland will be filled and off-site mitigation will be provided in the nearby Roberts plat, which was also developed by CamWest.

12. Wildlife. The wildlife report indicates that the site has the potential to support at least 52 different species of wildlife, but very few were observed on the site. The presence of several large snags are valuable to species which prefer the conifer forest habitat. Applicant proposes to retain as many snags in open space areas as safety and development limitations allow.

13. Geotechnical. The geotechnical report indicates that the site appears generally suitable for development as a residential subdivision.

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14. Traffic. Traffic analysis indicates that the proposed subdivision will have a minimal impact on the transportation network within Redmond. To mitigate the substandard level of service at the intersection of NE 116th Street and 172nd Avenue NE, the consultant recommended that it operate as an all-way stop intersection. City staff rejected this mitigation and Applicant will instead be required to construct the additional southbound lane at 172nd Avenue NE. A variance from the 450 stopping sight distance requirement to the available 285 feet will be needed at the south site access.

15. Public Notice and Comment. Public notice of the application and public hearing was given as required by the RCDG. Four comments were received from the public:

- Gerald and Telka Gustafson of 11810 172nd Avenue NE expressed concern for the safety of their well and septic system, responsibility for fencing, and driveway access after a sidewalk was installed in front of their property.
- Lake Washington School District. The School District asked that the City impose and impact fee for school construction in the sum of $3,341.00 per single-family dwelling unit.
- Judith Sheldon of 11604 172nd Avenue NE pointed an error in the identification of her property, and expressed concern for the impact of road improvements on her property.
- Raul Munoz of 17234 NE 115th Street was concerned that metal tags had been attached to trees on his property, that trees on his property were close to the property line and could affect construction of homes on the site, that his private well might be affected by storm drainage, and that 172nd Avenue NE may not be adequate to handle additional traffic.

Munoz was the only member of the public to attend and speak at the hearing. He urged that his well water be tested for quantity and quality prior to any construction to establish a baseline to evaluate construction impacts, and that homes on lots five and six be located away from his trees along his property line. He urged that an arborist be consulted in the matter.

16. Any conclusion of law deemed to be a finding of fact is hereby adopted as such.

From these findings of fact, the Examiner makes the following:

CONCLUSIONS OF LAW

1. Jurisdiction. The Hearing Examiner is authorized to conduct a public hearing and approve an application for Preliminary Plat. The Hearing Examiner is authorized to conduct a public hearing and make a recommendation to the City Council on an application for a PRD.

2. Subdivision Criteria. Subdivision regulations are set forth in RCDG 20D.180. The review and approval criteria are contained in RCDG 20D.180.10-020, as follows:
   (1) Each proposed subdivision or short subdivision shall be reviewed to insure that:
      (a) The proposal conforms to the goals, policies and plans set forth in RCDG Title 20B;
      (b) The proposal conforms to the site requirements set forth in RCDG 20C.30.25-140, Site Requirements;
      (c) The proposal conforms to the requirements of this section and those set forth in RCDG Title 20F and submittal requirements on file in the Planning Department;
      (d) The proposed street system conforms to the City of Redmond Arterial Street Plan and Neighborhood Street Plans, and is laid out in such a manner as to provide for the safe, orderly and efficient circulation of traffic;
      (e) The proposed subdivision or short subdivision will be adequately served with City approved water and sewer, and other utilities appropriate to the nature of the subdivision or short subdivision;
      (f) The layout of lots and their size and dimensions take into account topography and vegetation on the site in order that buildings may be reasonably sited and that the least disruption of the site, topography and vegetation will result from development of the lots;

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(g) Identified hazards and limitations to development have been considered in the design of streets and lot layout to assure street and building sites are on geologically stable soil considering the stress and loads to which the soil may be subjected.

3. PRD Criteria. A Planned Residential Development (PRD) allows flexibility and variation from established site requirements and development standards to enhance the design of a residential development. The Decision Criteria for a PRD are set forth in RCDG 20C.30.105-040:

    (1) Design Criteria. The City may approve, or approve with modifications, a PRD or MPRD if the proposal meets the requirements of this chapter and the design of the proposed development achieves two or more of the following results:

        (a) High quality architectural design, placement, relationship or orientation of structures;
        (b) Achieving allowable densities for the subject property;
        (c) Providing housing types that effectively serve the affordable housing needs of the community;
        (d) Improving circulation patterns or the screening of parking facilities;
        (e) Minimizing the use of impervious surfacing materials;
        (f) Increasing open space or recreational facilities on site;
        (g) Landscaping, buffering, or screening in or around the proposed PRD or MRPD;
        (h) Providing pubic facilities;
        (i) Preserving, enhancing or rehabilitating natural features of the subject property such as significant woodlands, wildlife habitats or streams;
        (j) Incorporating energy efficient site design or building features;
        (k) Providing for an efficient use of infrastructure.

4. The concerns of the Gustafson's can be satisfied. The condition requiring mitigation for damage to their well assures them of adequate water supply. Their septic system may be

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maintained. Fencing is part of the development, an applicant has been encouraged to work with the Gustafson's in the design and construction of the fences. Applicant must construct a sidewalk along NE 172nd Avenue NE, and access to the Gustafson property must be maintained at all times.

5. The request of Lake Washington School District for imposition of an impact fee for schools cannot be granted, as the City of Redmond has not adopted a school impact fee ordinance.

6. The concerns of Judith Sheldon can be met. All road improvements will be within the existing right-of-way, although construction and slope easements maybe needed. It will be applicant's responsibility to obtain any necessary easements.

7. The concerns of Raul Munoz for safety of buildings on Lot 5 & 6 are well founded. His trees are near the property line, and a wind blown tree could cause considerable damage to a nearby residence. A condition requiring consultation with an arborist should be imposed. His request that Lots 5 & 6 be left as open space is unreasonable and should be denied. The condition concerning adverse impacts to wells will assure him of continued water service. His request that his well be test prior to construction is justified, and a condition to such effect should be imposed. The traffic report indicates that 172nd Avenue NE will be adequate to handle the additional traffic.

8. Staff analyzed the decision criteria for the Preliminary Plat and Planned Residential Development on pages 10-30 of the Technical Committee Report, and concluded that with conditions, both should be granted. The Hearing Examiner concurs. The homes will be of varying size and cost and will be of high quality design. More than the minimum percentage of trees will be preserved, and the large open space made possible by the PRD process will provide a pleasing amenity for the residents. Environmental impacts are adequately mitigated. The proposals should be approved.

9. Any finding of fact deemed to be a conclusion of law is adopted as such.

DECISION

The Preliminary Plat of Curry Property is **APPROVED** subject to conditions and subject to City Council approval of the Planned Residential Development.

RECOMMENDATION

The Hearing Examiner recommends **APPROVAL** for the Planned Residential Development for Curry Property.

Done this 14th day of April 2003.

/s/Gordon F. Crandall

GORDON F. CRANDALL
HEARING EXAMINER

Attachment A: Site Plan

Attachment B: Conditions of Approval (with changes in caps, underlined, and in bold)

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PROCEDURE FOR RECONSIDERATION

Any interested person (party of record) may file a written request for reconsideration with the Hearing Examiner. The request for reconsideration shall explicitly set forth alleged errors of procedure or fact. The final date for motion for reconsideration is **5:00 P.M. on April 28, 2003,** and should be sent to the **Office of the Hearing Examiner**, City of Redmond, MS: PSFHE, 8701 160th Avenue N.E., PO Box 97010, Redmond, Washington, 98073-9710.

NOTICE OF RIGHT OF APPEAL

You are hereby notified that the foregoing Findings of Fact, Conclusions, and Decisions are the final action on this application subject to the right of appeal to the Redmond City Council. Appeal procedures are governed by RCDG 20F.30.40-110 (Ordinance 2118) to which the reader is referred for detailed instructions. The written appeal must be received by the **Redmond Permit Center** no later than **5:00 P.M. on April 28, 2003, or within 10 business days following final action by the Hearing Examiner if a request for reconsideration is filed.** Please include the application number on any correspondence regarding this case.

The following statement is provided pursuant to RCW 36.70B.130: "Affected property owners may request a change in valuation for property tax purposes notwithstanding any program of revaluation."

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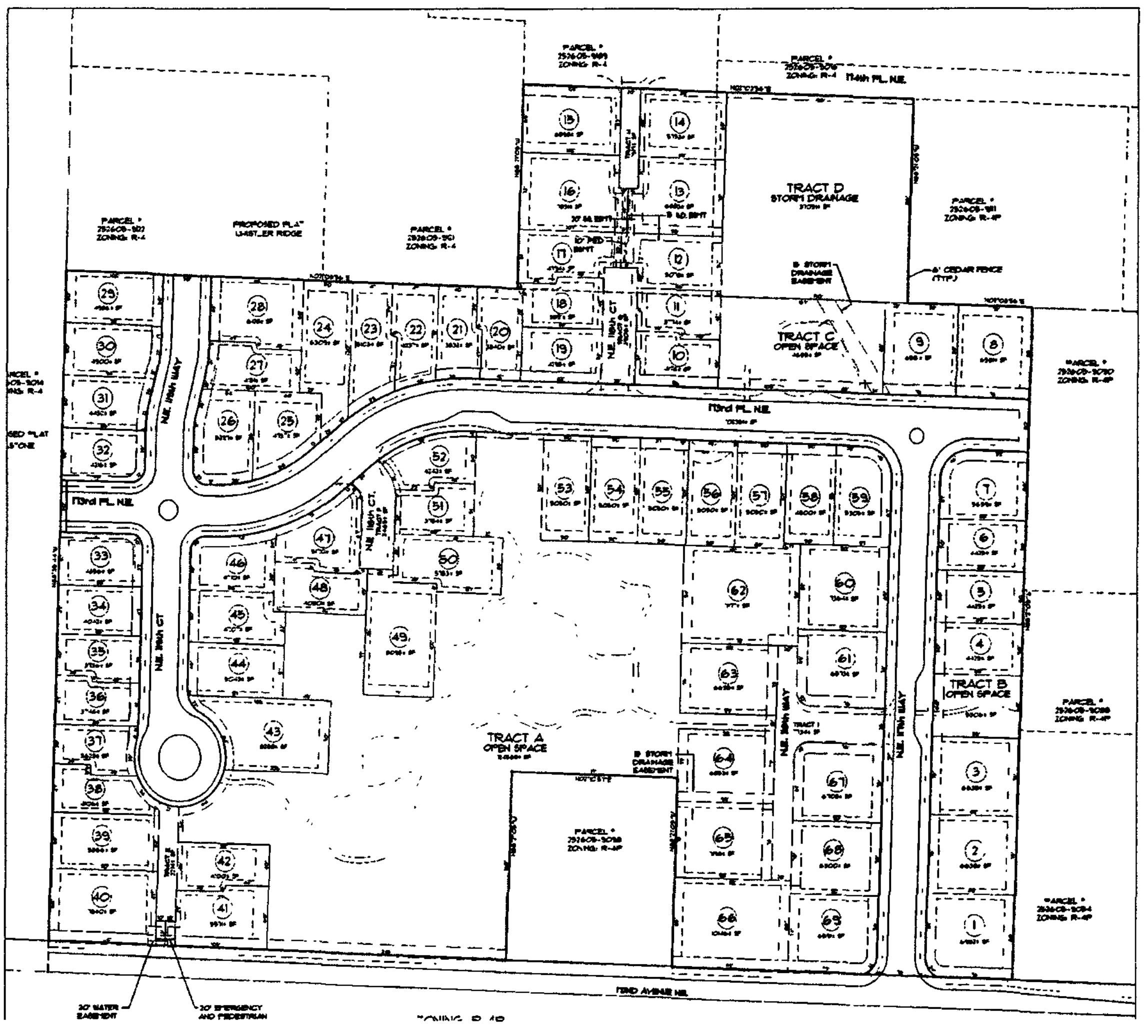
ATTACHMENT A

SITE PLAN



ATTACHMENT B
CONDITIONS OF APPROVAL

(Changes are in caps, underlined and in bold)

I. PLANNING REQUIREMENTS

A. SEPA: A Mitigated Determination of Non-Significance was issued for this project. The MDNS was amended to resolve a scrivener's error on March 28, 2003. The following mitigation measures are incorporated into this approval as conditions of approval:

1. 172nd Avenue NE. The applicant is required to construct a second southbound lane on 172nd Avenue NE as it approaches NE 116th Street. This will allow for the separation of southbound turning movements, which will decrease vehicle delay and improve level of service. The new lane is required to have a minimum storage length of 150 feet along with an appropriate transition back to the existing cross section. The traffic consultant reviewed the results of this improvement in the Traffic Impact Analysis. In 2005 with the project traffic and this mitigation, the southbound through movements will operate at LOS-E, with an approach delay of 42.8 seconds. Thus, this measure effectively mitigates the project impact to this movement by returning the level of service and delay to approximately the same as prior to the development. If the reconstruction of the intersection of NE 116th Street and 172nd Avenue NE as part of the planned widening of NE 116th Street is shown to be fully funded as part of the City of Redmond's 2004 Transportation Improvement Program, the City and the project applicant may propose the modification or elimination of this condition.

2. Water System. The project proponent shall mitigate adverse quantity or quality impacts that are demonstrated to have occurred during or within one year of site civil construction to domestic water supply wells on adjacent properties. This mitigation shall be required where it can be demonstrated that the adverse impacts occurred as an apparent result of dewatering of utility trench excavations, surface grading, storm-water collection or runoff of turbid storm-water or contamination caused by spillage and seepage of noxious substances on the site during construction. Each of four adjacent properties is served by its own well, more or less as shown on sheet P3 of the preliminary

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PRD drawings dated 3/26/02. These adjacent properties potentially affected are King County tax parcel numbers 252605-9098, 252605-9097, 252605-9088 and 252605-9090. **EACH WELL SHALL BE TESTED PRIOR TO CONSTRUCTION TO ESTABLISH BASELINE CONDITIONS.** Should an impact **TO THE QUANTITY OR QUALITY OF THE WATER** be determined, each impacted property shall be provided with city water service. Water services shall be installed from the main fronting the affected property and meter setters and boxes placed to serve the residence. The water service shall further be extended from the meter box to the house and connection made to the existing plumbing. All work shall be done in accordance with city standards and all applicable codes. Connection, meter installation and reimbursement fees shall be paid to the city.

B. General Planning Requirements:

1. This approval is subject to all general criteria of the Redmond Community Development Guide and Redmond Municipal Code. Refer to Attachment VI.A, General Planning Approval Conditions, for a checklist of drawing, bond, and general planning requirements. The checklist does not substitute for the code; it is intended to be used as a guide in preparing your final construction drawing/building permit submittal. Refer to the Redmond Community Development Guide and Redmond Municipal Code for detailed information on each requirement.

2. To ensure compliance with residential site standards, at the time that construction drawings are submitted for Public Works review, the applicant shall provide two (2) copies of the construction drawings, clearing/grading plan and tree retention plan at a scale of 1" = 20' to the Planning Department.

3. A sign permit application must be submitted separately to the Planning Department for review and approval prior to installation of any proposed signs (RCDG Section 20D.160.10-020).

4. Transportation, parks, and fire impact fees shall be assessed at the time of building permit issuance for each residence. The fee in effect at the time of complete building permit application shall apply.

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C. Specific Planning Requirements:

1. Planned Residential Development Approval. The proposal is dependent upon the approval of a Planned Residential Development application. The Hearing Examiner receives testimony and recommends to approve, conditionally approve, modify, or deny the application for Planned Residential Development to the Redmond City Council. The Preliminary Plat shall not be undertaken except in compliance with the approval of a Planned Residential Development application in the same format as those plans dated December 16, 2002.

2. Landscaping:

The landscape plan should include landscaping details for the storm water facility, which will enhance its appearance as a naturally occurring water feature (RCDG Section 20D.40.25-080). The general goal should be to create a varied planting pattern with a diversity of native species that would be found in a palustrine emergent, seasonally flooded (or otherwise inundated) wetland. The planting must be appropriate for the water regime that is anticipated. The design should be done by a qualified wetland consultant or landscape architect with experience in wetland mitigation or planting in wetland areas.

Landscaping shall be coordinated with water/sewer lines and fire hydrants/connections. Trees shall be planted no closer than 8 feet from the centerline of any water/sewer lines. Shrubs shall be planted to maintain at least 4 feet of clearance from the outside edge of the shrub to the center of all fire hydrants/connections. Ground cover may be planted within this radius. (RCDG Section 20D.80.10-150(8)).

Planting shall meet the City requirements for site clearance at intersections as identified in Section 20D.210.25 of the Redmond Community Development Guide. (20D.80.10-150(2))

For any landscaping along 172nd Avenue NE and 174th <u>PLACE</u> NE, an irrigation system shall be maintained by the Home Owners' Association or other means

acceptable by the City of Redmond Parks Department. Maintenance of landscaping shall be the responsibility of the Homeowners Association, including that portion

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located within the public right-of-way along 172nd Avenue NE and 174th **PLACE** NE. Any installation or other work in the public right of way requires an Extended Right of Way Use Permit issued by the Public Works Department.

Street trees are required as follows (RCDG Section 20D.80.10-140):

Street	Species	Spacing on Center	Notes
172nd Avenue NE	*Cleveland Maples*	*30'*	*Minimum 2.5" caliper. Specimen to be grown for street use.*
Internal Streets	*To be determined.*	*TBD*	*Per Landscaping Requirements. Note: The City does not maintain internal street trees.*

Sensitive Areas:

a. A wetland and buffer enhancement plan shall be submitted with the Construction Drawings. The plan shall meet the requirements of Appendix 20D-2 (V) of the Redmond Community Development Guide.

b. A sensitive areas analysis shall be completed for off-site improvements that extend into areas with potential wetlands or streams. Mitigation will be required where improvements extend into a sensitive area or its buffer and beyond those improvements that currently exist.

c. A split rail fence shall be installed to delineate all sensitive areas and native growth protection area tracts. Sensitive area signage (available from the City of Redmond) shall be installed to provide for notice in the field regarding the presence of sensitive areas. Signage shall be affixed to the fence approximately on the midpoint of each lot's rear property line. Where fencing does not abut an individual lot, signage shall be placed approximately every 100'. Signage and fencing shall be shown on the construction drawings. Final location and materials will be subject to approval by the Planning Department.

Tree Protection Measures:

d. Existing Significant Trees to Remain, as designated on the proposed Tree Preservation Plan, dated 12/16/2002, shall be saved.

e. Tree preservation measures for trees designated to be saved must at a minimum comply with required tree protection in RCDG Section 20D.80.20-100(1). These measures include but are not limited to the following requirements:

   i. All construction activities, including staging and traffic areas, shall be prohibited within five feet of the dripline of protected trees.

   ii. Tree protection barriers shall be installed along the outer edge and completely surround the area 5' from the dripline of significant trees to be protected prior to any land disturbance.

   iii. Tree protection barriers shall be a minimum of four feet high, constructed of chain link, or polyethylene laminar safety fencing or similar material. "Tree Protection Area" signs shall be posted visibly on all sides of the fenced areas. Signs requesting subcontractor cooperation and compliance with tree protection standards may also be required to be posted at site entrances.

   iv. Where tree protection areas are remote from areas of land disturbance, and where approved by the Planning Department, alternative forms of tree protection may be used in lieu of tree protection barriers, provided that protected trees are completely surrounded with continuous rope or flagging and are accompanied by "Tree Save Area-Keep Out" signs.

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v. Per RCDG Section 20D.80.20-080(1), each significant tree that is removed on the site must be replaced by one new tree. The required number of replacement trees must be identified on the Tree Replacement Plan. The minimum size of replacement trees is 2-½ -inch caliper for deciduous trees and six to eight feet in height for evergreen trees. **STREET TREES OF THIS CALIPER WILL BE COUNTED AS REPLACEMENT TREES.**

vi. Two copies of the final Tree Preservation Plan, Landscape Plan and Tree Replacement Plans at 1"=20' scale must be submitted with construction drawings and approved prior to issuance of construction drawings. The final plans shall be prepared or approved by a licensed landscape architect, registered Washington certified nurseryman or registered Washington certified landscaper (RCDG Section 20D.80.10-040). This certification shall be noted on all landscape-related plans. A copy of the Tree Preservation Plan shall be recorded with the Final Plat.

vii. Restrictive covenants shall include a statement notifying property owners and the Homeowner's Association that significant and landmark trees on individual lots may only be removed in accordance with the approved tree retention plan. This language shall be reviewed and approved by the Planning Department prior to recording of the restrictive covenants with King County.

viii. A tree health assessment shall be completed for off-site improvements that extend into areas with significant and landmark trees. Mitigation will be required where trees are removed or improvements extend within 5' of the dripline of any healthy, significant or landmark tree, beyond those improvements that currently exist.

Reduction of Front Yard Setback. The proposed reduction in front yard setback to below the required 10' is not approved. The site plan shall be revised such that the 10' front yard setback is met. Impacts to trees resulting from the change shall be mitigated.

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II. ENGINEERING REQUIREMENTS

A. No lots shall be permitted direct access to 172nd Avenue NE. The specific lots affected by this restriction shall be listed on the face of the final plat and other documents.

B. Easements & Dedications: Existing and proposed easements and rights-of-way shall be shown on the final plat, civil plans and other documents. Any existing easements for ingress, egress, private utilities, franchise utilities, etc. that lie within the Plat or within rights-of-way adjacent to the Plat shall be released or modified to the City of Redmond's satisfaction prior to final plat approval.

1. Public easements are required as follows:

a) 10-feet wide for sidewalk and utilities adjacent to the right of way along the east side of 172nd Avenue NE.

b) 10-feet wide for sidewalk and utilities adjacent to the right of way along the west side of 174th Place NE.

c) 10-feet wide for sidewalk and utilities adjacent to the rights of way along both sides of the internal plat streets: NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE.

d) 10-feet wide for pedestrians from NE 119th Court across private Tract E to 172nd Avenue NE and from 173rd Place NE across private Tracts G and H to 174th Place NE.

e) Rights-of-way dedicated to the City of Redmond are required as follows: 50 feet wide for the internal plat streets: NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE.

f) Private tracts are required as follows:

(1) 35 feet wide for the internal plat streets within Tracts F, G and I.

(2) 20 feet wide for the internal plat streets within Tracts E and H.

(3) New right-of-way lines joining at intersections shall connect with a minimum of a 25-foot radius, or with a chord that encompasses an

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equivalent area. The area formed by this radius or chord shall also be dedicated as right-of-way.

(4) All lots are subject to an easement for utilities and drainage facilities over, under and across a strip of land 2-1/2 feet wide along each side of the interior lot lines within the development, together with a strip of land 5 feet wide along the lot lines around the perimeter of the development.

C. Public and Private Engineering/Transportation Improvements

1. Half street improvements are required on 172nd Avenue NE including asphalt paving 18 feet from centerline to face of curb with appropriate tapers, type A-1 concrete curb and gutter, planter strip, concrete sidewalk, storm drainage, streetlights, street trees, street signs and underground utilities including power and telecommunications. The minimum pavement section for 172nd Avenue NE shall consist of:

a) 4" Asphalt Pavement Cl. A

b) 5" Asphalt Pavement Cl. E

c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTMD 1557)

d) Street crown 2% sloped to drain system

2. Half street improvements are required on 174th Place NE behind the existing curb and gutter including planter strip, concrete sidewalks, street lights, street trees, street signs and underground utilities including power and telecommunications.

3. On 172nd Avenue NE and 174th Place NE the asphalt street shall be planed, overlaid, and/or patched to repair damage done by utility cuts and other work, as determined by the Engineering Division.

4. Sidewalks constructed to City standards are required within the pedestrian easements between private Tract E and 172nd Avenue NE and between private Tracts G and H.

5. Other off-site improvements include widening of 172nd Avenue NE on the southbound approach to NE 116th Street as outlined in the SEPA conditions for this Plat.

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6. Prior to the City allowing occupancy of any home constructed within the Curry Property Plat, the developer shall design and construct an interim walkway for school children along the east side of 172nd Avenue NE from the pedestrian connection at Tract E to NE 116th Street, along with other minor improvements at the 172nd Avenue NE/NE 116th Street intersection as needed to ensure safe crossing of these streets. The interim walkway shall be constructed of asphalt or Portland cement concrete. The interim walkway shall be a minimum of 5-feet wide when located adjacent to curb and gutter or other traffic barrier acceptable to the City. The interim walkway shall be a minimum of 4-feet wide and located a minimum of 10-feet from the street edge where no curb and gutter or other traffic barrier acceptable to the City exists. A safety railing or fencing will be required when (1) the interim walkway is located at the top of a slope or wall that is 2:1 or steeper and (2) the walkway elevation is 30-inches or higher than the toe of the slope or wall. This requirement is also a condition for the Wynstone Plat located to the north of the Curry Property. The applicant is encouraged to work with the Wynstone Plat applicant to share the cost of this improvement. For that portion of the safe walking route across Tax Parcel 252605-9098, completion of the curb, gutter and sidewalk is likely the most cost effective alternative.

7. All vehicle use areas including driveways, private streets, service areas, etc. shall be paved.

8. Specific subdivision public street improvement conditions for NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE:

a) Street improvements within the 50-foot wide dedicated right-of-way shall include asphalt paving (28 feet curb to curb), with appropriate tapers, type A-1 concrete curb and gutter, planter strips, street trees, concrete sidewalks, storm sewers, streetlights, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(1) 3” Asphalt Pavement Cl. B

(2) 4” Asphalt Treated Base

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(3) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTMD 1557)

(4) Street crown 2% sloped to drain system

(5) The cul-de-sac on NE 119th Court is required to have a minimum radius of 44 feet to the face of curb. A planter island shall be provided in the center of the cul-de-sac to reduce, as much as possible, the amount of asphalt. The maintenance of the landscape in the island shall be the responsibility of the adjacent property owners. This maintenance requirement shall be included on the face of the final plat.

b) Specific short subdivision private street improvement conditions for the internal streets within Tracts F, G and I:

(1) Street improvements shall include asphalt paving (28 feet), with appropriate tapers, thickened asphalt edge or type A-1 concrete curb and gutter, concrete sidewalk (one side), storm sewers, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(a) 2" Asphalt Pavement Class B

(b) 4" Crushed Rock surfacing

(c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTM D 1557)

(d) Street crown 2% sloped to drain system

c) Specific short subdivision private street improvement conditions for the internal streets within Tracts E and H:

(1) Street improvements shall include asphalt paving (20 feet), with appropriate tapers, thickened asphalt edge or type A-1 concrete curb and gutter, storm sewers, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

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(a) 2" Asphalt Pavement Class B

(b) 4" Crushed Rock surfacing

(c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTM D 1557)

(d) Street crown 2% sloped to drain system

(2) Installation of mailbox stand(s) shall be in accordance with City standards.

d) All power, telephone, streetlights, etc. shall be shown on the engineering drawings and landscape plans submitted for construction permits.

e) A composite drawing that includes all utilities, landscaping including trees, etc., is necessary to minimize the possibility of utilities/landscaping conflicts.

f) Conversion of Aerial Utilities (Power, Telephone, T.V., Etc. to Underground)

(1) All aerial utilities shall be converted to underground along all street frontages and within the plat according to 20D.220.10 "Underground Wiring" in the Redmond Community Development Guide.

D. The applicant shall meet the construction plan and construction requirements in <u>Attachment B</u>, "REQUIREMENTS FOR CONSTRUCTON DRAWINGS" and <u>Attachment C</u>, "GENERAL INFORMATION AND ADMINISTRATION REQUIREMENTS" **<u>from the Technical Committee Report dated March 31, 2003.</u>**

III. UTILITIES REQUIREMENTS

A. Sewer

1. Sewer service will require a developer extension of the City of Redmond sewer system as follows:

a) Construct sanitary sewer improvements more or less as shown on the Preliminary Plat drawings dated December 12, 2002.

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b) (The sewer main location shown on the site plan may not conform to City standard location. Revisions to comply with City standard locations may be required.)

2. Vehicular access to all new and existing manholes shall be provided. The access easement shall be a minimum of 20 feet in width with asphalt concrete surfacing. Alternative surfacing may be approved by the City depending upon the location. If access passes through fencing then 14-foot minimum width gates shall be provided. The plat or easement document shall (1) show and dedicate the 20-foot access easement, (2) have covenants advising property owners of their obligation to maintain the availability of the access by providing gates and not obstructing the access, and (3) that the property owners maintain, repair and replace the access surfacing as needed.

B. Water:

1. Water service will require a developer extension of the City of Redmond water system as follows:

a) Construct on-site water improvements more or less as shown on the Preliminary Plat drawings dated December 12, 2002. A 12-inch water main shall be constructed to serve the site in 172nd Avenue NE from NE 116th Street to the northern limits of the plat, more or less as shown on the Preliminary Plat drawings. An 8-inch stub shall be extended across 172nd Avenue NE in the vicinity of NE 117h Street and connected with the existing 8-inch main in that vicinity.

b) (The water main location shown on the site plan may not conform to City standard locations. Revisions to comply with City standard locations may be required.)

IV. CLEARING/GRADING AND STORMWATER MANAGEMENT

A. Erosion control systems must be implemented throughout the construction process and until the site is stabilized. Design of all systems must be in accordance with section 20E.90.10 of the Community Development Guide and the most recent issue of the City of Redmond STORMWATER MANAGEMENT AND EROSION CONTROL TECHNICAL NOTEBOOK

City of Redmond
Office of the Hearing Examiner
8701 160th Avenue NE
P.O. Box 97010
Redmond, WA 98073-9710

(notebook). Contact the Stormwater Division at 556-2890 for information about, or a copy of, the notebook. Preferred methods for management and control are discussed in the notebook.

B. Stormwater Management

1. Quantity Control

a) In an open pond; provide detention for peak discharge control to match one half of the 2-year and match the 10-year and 100-year storms natural (prior to any development) runoff peak flow rates.

b) Provide for overflow routes through the site for the 100 year storm runoff (100 year flow may not impact any buildings).

2. Quality control. Use a lined, open pond to provide water quality treatment for the runoff from the 6-month, 24-hour design storm event. Use the developed condition land use when determining the water quality storm flow rate and volume.

3. Provide maintenance vehicle access to the pond bottom and outlet control structure from 174th Place NE.

C. Miscellaneous

1. Construction activities may be limited or suspended during the rainy season (October 1 – April 30).

2. Stencil all on-site storm drainage inlets with "DUMP NO WASTE DRAINS TO STREAM". Stencils are available from the Stormwater Division located at the City Annex (phone 556-2840). Design plans shall identify the requirement to stencil drainage inlets. Easements will be required for any public conveyance systems.

3. Trees are not allowed within 8 feet of storm systems.

4. Ponds shall be lined in accordance with the Department of Ecology Stormwater Management Manual for the Puget Sound Basin, (1992).

5. Designate private roads on the construction plans and plat drawings by adding (Private) after the road name.

V. FIRE PROTECTION

City of Redmond
Office of the Hearing Examiner
8701 160th Avenue NE
P.O. Box 97010
Redmond, WA 98073-9710

A. EMERGENCY VEHICLE ACCESS ROADWAY REQUIREMENTS

1. Emergency vehicle access roadways shall be an unobstructed 20 feet in width and 13' 6" high. Turning radii shall be 25' interior and 45' exterior.

2. Fire lanes shall be located wherever curbs, road edges, or loading areas are adjacent to the 20-foot wide vehicle access roadway. Fire lanes identified through site plan review shall be included on the final civil drawings. Additional fire lanes and marking may be required anytime during the life of the development upon evaluation by and direction of the Fire Marshal. Where fire lanes are a 28 feet wide access tract or easement, the side not used for parking shall be signed "No Parking - this side" or "No Parking –Fire Lane- this side". If the access tract or easement is 20 feet then both sides shall be signed.

3. Driveway entries or curb returns shall be provided to meet minimum roadway radii at all tracts, easements or other intersections. Do not measure into areas where parking is allowed. This includes where Tract E meets 172nd Ave NE.

4. Traffic circles shall not impede into required radii. The circle at NE 119th and Tract E, and at NE 119th and 173rd AVE NE shall be reduced in diameter to allow through movements in both directions.

B. ADDRESSING

1. Each lot shall have the building address numerals installed per the Redmond Fire Department Design and Construction Guide. A nominal 6-inch high numeral shall be used.

2. Approval is required for building and unit addressing.

3. Temporary signs shall be used at the job site as soon as construction begins. Numerals shall be high contrast in color, face the street fronting the property, and be a minimum 6" high.

4. The "T" road labeled NE 118th shall be called 172nd Ct NE and so signed at the intersection with NE 117th Way. Lots 66, 65 and 64 shall be addressed with 117xx, ascending odd numbers. Lots 62 and 63 shall be addressed with 117xx, ascending even numbers.

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Redmond, WA 98073-9710

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EXHIBIT A
TECHNICAL COMMITTEE REPORT

MEMO TO: Gordon Crandall, Hearing Examiner

FROM: Technical Committee

DATE: March 31, 2003

PREPARED BY: Geoffrey Thomas, PWS, AICP – Senior Environmental Planner

SUBJECT: Curry Preliminary Plat and Planned Residential Development

LOCATION: The proposal is located north of NE 116th Street on the east side of 172nd Avenue NE. The project site includes property addressed as 11840 – 172nd Avenue NE. The affected tax parcels are 252605-9015, -9058, -9099, and -9124.

REQUEST: The proposal consists of two applications. The requests are:

1. Approve with conditions the **Curry Preliminary Plat,** PPL02-001, as illustrated in the plan set dated December 16, 2002, and
2. Recommend to the City Council to approve with conditions the **Curry Planned Residential Development**, PRD 02-001, as illustrated in the plan set dated December 16, 2002.

EXHIBIT B
ATTACHMENTS

Attachments that are underlined below have been provided to the Hearing Examiner. These exhibits are available for public review at Redmond City Hall. Request file number PRD-02-001, Curry PRD. Dates shown below are the dates that materials were accepted by the Permit Center at the City of Redmond.

I. Application Materials

a. Application form with Letter Explaining Consistency with PRD Criteria (01/24/02)
b. Site Plan and Landscaping Drawings (12/16/03 Versions)
c. Table Identifying the Proposed Variances from Lot Standards (10/10/02)
d. Arborist Report (10/10/02, Arboricultural Consulting)
e. Preliminary Stormwater Drainage Report (01/24/02, Core Design)
f. Landmark Tree Removal Request (10/10/02, CamWest)
g. Wetland Determination and Conceptual Mitigation (01/15/02, Schulz, Gary)
h. Conceptual Wetland Mitigation (10/10/02, Schulz, Gary)
i. Wildlife Study Report (10/10/02, Chad Armour, LLC)
j. Preliminary Geotechnical Engineering Report (01/24/02, Associated Earth Sciences, INC.)
k. Traffic Impact Analysis (01/24/02, Garry Struthers Associates, INC.)
l. Phase I Environmental Assessment (01/24/02, Environmental Associates, INC.
m. Plat Certificate (01/24/02, Transnation)

II. Notices

a. Notice of Application
b. Notice of Public Hearing
c. ~~Certification of Public Notice~~
d. Comment – Gerald and Tekla Gustafson
e. Comment – Ralph Munoz
f. Comment – Lake Washington School District
g. Comment Response to Lake Washington School District

III. SEPA

a. SEPA Checklist (10/10/02 Version)
b. Mitigated Determination of Non-Significance
c. Amended MDNS
d. Comment – Judith Sheldon

IV. Staff Attachments

a. General Planning Approval Conditions
b. General Information and Administration Requirements (Public Works)
c. Requirements for Construction Drawings (Public Works)

BACKGROUND

Applicant:	John Harkness, CamWest PO Box 676 Kirkland, WA 98083	
Processing Dates:	**Application Submitted:**	01/24/02
	Determination of Incompleteness:	02/20/02
	Response Received:	04/11/02
	Determination of Incompleteness:	04/25/02
	Response Received:	05/14/02
	Vesting Date:	**05/14/02**
	Notice of Application:	06/19/02
	Request for Add. Information:	06/12/02
	Response Received:	10/10/02
	Request for Add. Information:	11/15/02
	Response Received:	12/16/02
	SEPA Issued (MDNS):	**02/14/03**
	Hearing Scheduled:	**03/31/03**

Project review authority and procedures: The application involves two applications. Those applications are a Preliminary Plat and a Planned Residential Development.

Preliminary Plat. The procedures for review of a Preliminary Plat are in Redmond Community Development Guide (RCDG) Section 20F.20.150, Subdivision and Short Subdivision Procedures. The Preliminary Plat is a Type III application[1]. The Hearing Examiner conducts a hearing to receive testimony and makes the final decision for a Type III application.[2]

Planned Residential Development. The procedures for review of a Planned Residential Development are in Redmond Community Development Guide (RCDG) Section 20F.40.90 Planned Developments. The Planned Residential Development is a Type IV application[3]. The Hearing Examiner conducts a hearing to receive testimony and makes a recommendation to the City Council for a Planned Residential Development. The City Council reviews the recommendation and makes the final decision to accept the Hearing Examiner's recommendation.[4]

Technical Committee: The Technical Committee *"shall review all applications...and report its findings, conclusions and recommendations to the appropriate body prior to that authority making its final decision...and shall be responsible for City implementation of the State Environmental Policy Act*

[1] *20F.30.15-040 Classification of Permits and Decisions – Table.*
[2] *20F.30.15-020 (3) Classification of Permits and Decisions.*
[3] *20F.30.15-040 Classification of Permits and Decisions – Table.*
[4] *20F.30.15-020 (4) Classification of Permits and Decisions.*

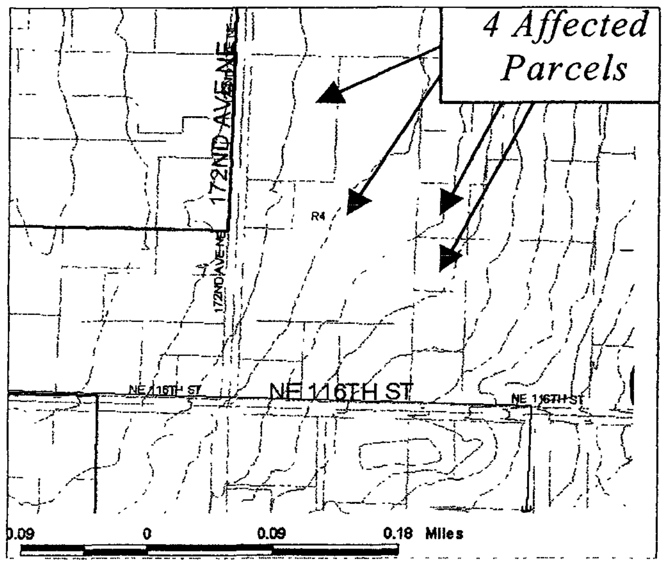
(SEPA) including the assessment of impacts...". In addition, the Technical Committee *"shall act in an advisory capacity to the Hearing Examiner..."*[5]

Hearing Examiner: The Hearing Examiner shall conduct public hearings on behalf of and in some cases make recommendations to the City Council as described in RCDG 20F.30.15, Types of Review[6].

FINDINGS

Project Name: Curry Preliminary Plat and Planned Residential Development

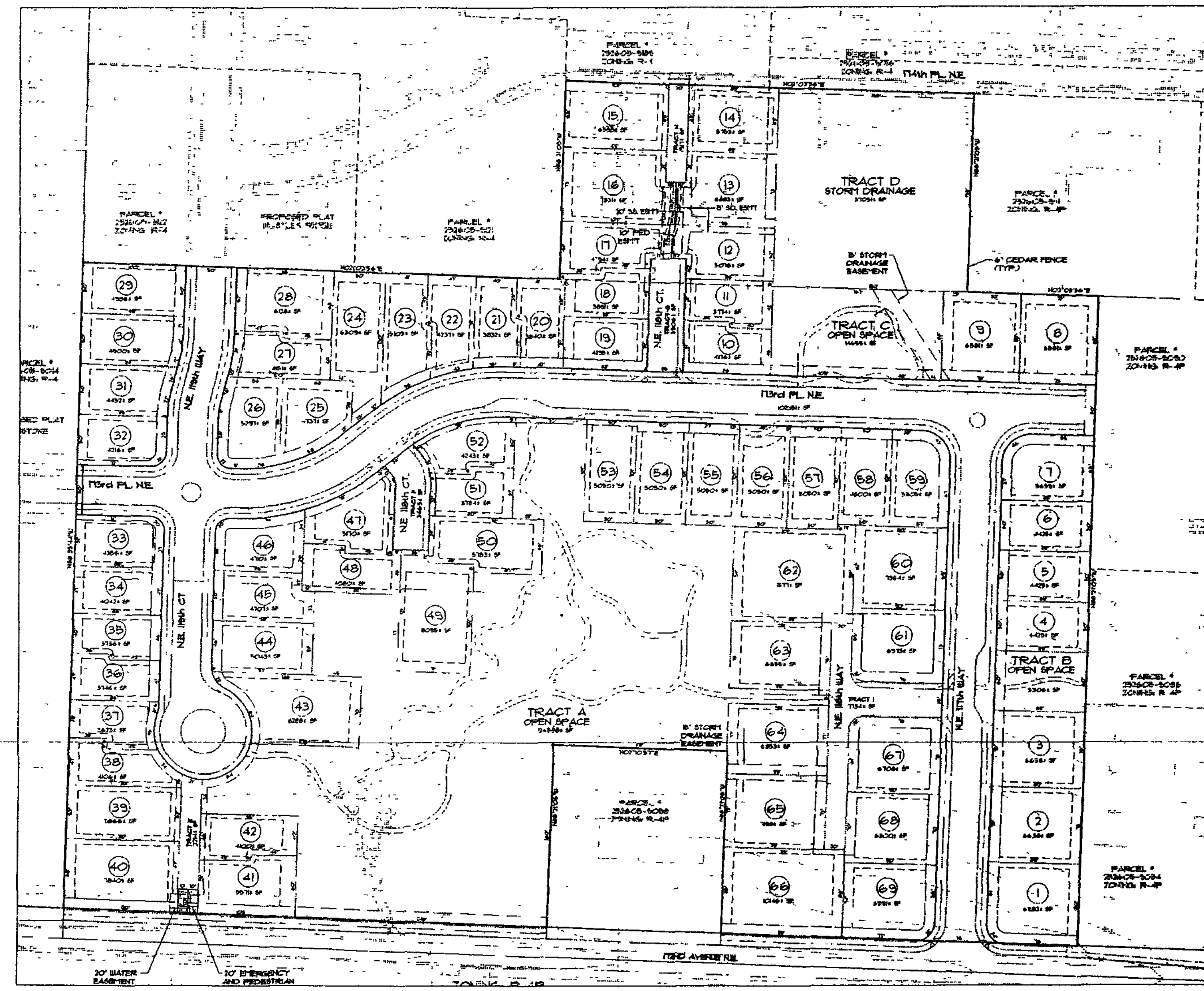
Location: The proposal is located north of NE 116th Street on the east side of 172nd Avenue NE. The project site includes property addressed as 11840 – 172nd Avenue NE. The affected tax parcels are 252605-9015, -9058, -9099, and -9124. (Inset Illustration and Attachment I.A).



Proposal: The applicant proposes the subdivision of approximately 15.68 acres into lots for 69 single-family residential dwellings. The proposal is designed as a Planned Residential Development. The proposal includes construction of related infrastructure including, but not limited to: roads, sidewalks, stormwater facilities, sewer lines, water lines, landscaping, and related mitigation. See inset map, next page.

Project Size: The total area of the site is ***15.68 acres***.

[5] *20F.50.25-020 Authority and Duties.*
[6] *20F.50.35-020 Authority and Duties.*


TRACT D
STORM DRAINAGE
TRACT C
OPEN SPACE
TRACT A
OPEN SPACE
TRACT B
OPEN SPACE
113rd PL NE
NE 116th CT
NE 116th WAY
NE 117th WAY
NE 118th CT
NE 118th WAY
114th PL NE
6' CEDAR FENCE (TYP.)
8' STORM DRAINAGE EASEMENT
20' WATER EASEMENT
20' EMERGENCY AND PEDESTRIAN

Legal Description: The legal description is found on Attachment I.a.

Neighborhood: The site is in the ***North Redmond Neighborhood***.

Land Use Designation: The land use designation is ***Low-Moderate Density***, as described in Comprehensive Plan Policy LU-117. This designation allows for a residential zoning district with a density of 4 - 6 units per gross acre.

Zoning Designation: The subject property is zoned ***R-4*** (4 units per gross acre).

Surrounding Land Use and Zoning: The site is currently developed with Two ~~three~~ single-family residences and outbuildings. The inset aerial photo illustrates the pattern of development in 1996. Arrows point at the parcels involved in the proposal. Footnotes in Table 1 indicate changes since 1996. Surrounding land use and zoning is as follows:

Table 1: Surrounding Land Use and Zoning

	Zoning	Existing Land Use
North:	R-4	Single-Family Residential.[7]
East:	R-4	Single-Family Residential.[8]
South:	R-4	Single-Family Residential
West:	R-4 (Redmond)[9] R-8 (King Co.)	Single-Family Residential

Access: The Preliminary Plat includes Four ~~three~~ points of access:

(1) 172nd Avenue NE,

(2) A future road connection from Wynstone Preliminary Plat on the northern boundary, and

(3) A new road from Whistler Ridge on the eastern plat boundary.

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[7] *This property adjoining the northern boundary was recently the subject of the Wynstone Preliminary Plat Approval.*

[8] *Portions of the property adjoining the eastern boundary were recently the subjects of the Whistler Ridge Preliminary Plat Approval.*

[9] *The City limits extends approximately from NE 116th Street northward to a point that would approximate the southern third of the project.*

Vehicle access to the proposed lots would be from an internal street, Road A, except for lots 13, 14, 15, and 16, which use access from 174th Place NE, a road recently constructed as part of the Whistler Ridge development.

Topography: The site is generally flat, sloping from the northwest to the southeast with slopes varying from 2% to 7%. The steepest portion of the site at 7% is in the southeast corner.[10]

Soils/Surface Geology: As identified by the Soil Conservation Services, the soils found on the site are Alderwood.[11]

Vegetation: As illustrated by the inset 1996 aerial photo, the site can be described as approximately 40% pasture grasses, 55% trees, and 5% structures and ornamental landscaping. The trees include Red Alder, Big Leaf Maple, Black Cottonwood, Western Red Cedar, Douglas Fir, and Western Hemlock.[12] Wet soil plants and other shrubs and emergents are identified in the wetland report prepared for the project.

Public Notice: Requirements for public notice are contained in RCDG Section 20G.30.10(1), Notice Requirements. Public notice was given for the project as follows:

Notice of Application: The Notice of Application was posted June 19, 2002 at the site, library, City Hall, post office, and through a mailing to property owners within 500 feet of the subject property, and to those agencies with potential jurisdiction over portions of the proposal. (Attachments III.A).

Notice of Public Hearing: The Notice of Public Hearing was posted at the site, library and City Hall. Notice was mailed to property owners within 500' of the project and to potential agencies with jurisdiction on or before March 17, 2003. Notice was published through a one-time newspaper publication. (Attachments II)

State Environmental Policy Act (SEPA): On February 14, 2003 a Mitigated Determination of Non-Significance (MDNS) was issued. The comment period ended on March 3, 2003 and the appeal period ended March 17, 2003(Attachments III).

Impact Fees: Subdivisions do not vest for the impact fees that exist on the date of Preliminary Plat application or approval. Instead, impact fees for Fire, Transportation, and Park services are collected at the time that a building permit is issued for each house in the proposal. **Fees noted herein are subject to change.**

Fire Impact Fees: The current fee is $94.00 per single-family dwelling unit. However, the fee in effect at the time of building permit issuance shall apply.

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[10] *SEPA Checklist, Page 2, Environmental Elements – Earth, A and B.*
[11] *Schulz, Gary C., Wetland Determination & Conceptual Mitigation, Curry Property, January 15, 2002.*
[12] *SEPA Checklist, Page 6, Vegetation.*

Transportation Impact Fees: The impact fee varies for projects according to the Transportation Management District in which a project is located. The proposal is located in Area 5, Education Hill. The current fee is $3,064.15[13] per single-family dwelling unit in the District. However, the fee in effect at the time of building permit issuance shall apply.

Park Impact Fees: The current fee is $1,611 per single-family dwelling unit. However, the fee in effect at the time of building permit issuance shall apply.

Public Input: The City of Redmond is responsible for soliciting written public input by means of a "Notice of Application" and "Notice of Public Hearing". Interested parties may further comment on the SEPA threshold determination.

Notice of Application. The City received three comments on the Notice of Application.

1. **Gerald and Tekla Gustafson, November 21, 2002.**[14] The Gustafsons own land located at 11810 – 172nd Avenue NE, which is that parcel that is surrounded by the proposal. The Gustafsons expressed concern regarding impacts to their well, septic system, driveway access when the sidewalk is installed, and fencing.

In responding to the comments, the City has issued an MDNS, in which any demonstrated impacts to the well on this property shall be mitigated by connecting the Gustafson property to public water. The septic system will not be required to be abandoned.

Fencing is permitted as part of the development. Typically fences along property lines are maintained in common by those neighbors sharing the fence, however in some cases private agreements can be reached between neighbors regarding fences. The City encourages the applicant to work with the Gustafsons in the design, construction, and maintenance of any fencing.

The applicant will be required to install a sidewalk from the proposal's northernmost project boundary to 172nd Avenue NE. The City will require that access to the Gustafson's property be properly maintained during and after construction.

2. June 26, 2002, Ralph Munoz.[15] Mr. Munoz lives at 17234 NE 116th Street, which adjoins the proposal's southern property line at the rear of proposed lots 4 and 5 and open space Tract B. Mr. Munoz expressed concern regarding (a) metal tags found on his property that had been placed by surveyors, (b) the impact caused by the proposal on large trees on his property, (c) impacts to his well, and (d) the adequacy of the intersection at NE 116th Street and 172nd Avenue NE.

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[13] *Sum of Redmond fees (RCDG 20D.210.10-125) and King County fees (RCDG 20D.210.10-127).*
[14] *Attachment II.d.*
[15] *Attachment II.e.*

Tags. Staff contacted Mr. Munoz via phone and provided contact information for the applicant. The applicant discussed the issue of tags on trees on his property. The City requires that trees be located up to 50' from a project boundary. The reason for this is to identify trees where development might be proposed within the tree's drip line. The tags were likely placed as part of this process.

Trees. Houses that would be built in lots 4 and 5 would maintain a 10' setback from Mr. Munoz's northern property line. Further, some trees in the rear yards of lots 4 and 5 would be saved. In relation to the open space tract, structures would not be built within Tract B and three trees within that tract are proposed to be saved. Given the 10' rear yard setback and the preservation of trees along the southern plat boundary and in the vicinity of Mr. Munoz's northern lot line, the City does not believe that the proposal will present a direct hazard to these trees.

Well. Mr. Munoz expressed concern regarding the quality and quantity of water from his well. He expressed particular concern regarding the adequacy of the stormwater system at protecting the aquifer that supplies his well. The City believes that the stormwater system will provide for adequate protection, however it recognizes that unforeseen water quality and quantity impacts can occur with development. Consequently, the City has issued a Mitigated Determination of Non-Significance, which included measures to mitigate for impacts to wells, including that well located on Mr. Munoz's property.

Intersection of NE 116th Street and NE 172nd Avenue. Mr. Munoz expressed concern that the intersection might not be adequate to handle the increase in traffic resulting from the proposal. In a review of traffic generation studies, the Public Works Department determined that improvements were warranted at this intersection. The required improvements were incorporated into the City's Mitigated Determination of Non-Significance for the proposal. The mitigating measure will require that the applicant construct a new southbound lane to accommodate turn movements. The southbound lane will be constructed from the intersection, thence northward for 150'.

3. July 8, 2002, Lake Washington School District.[16] The Lake Washington School District submitted comments requesting that school impact fees be collected for the proposal. The City reviewed the request and responded in a letter dated August 2, 2002[17]. In that response, the City expressed that it was unable to collect school impact fees because the City had not adopted a School Impact Fee Ordinance.

SEPA. The City received one comment on the threshold determination.[18] The commenting party was Judith Sheldon. Ms. Sheldon owns two parcels south of

[16] *Attachment II.f.*
[17] *Attachment II.g.*
[18] *Attachment III.d.*

the Curry proposal and north of NE 116th Street. Both parcels adjoin 172nd Avenue NE.

Ms. Sheldon expressed concern regarding whether the parcels in the MDNS were properly identified for the Utilities mitigating measure. That mitigating measure identifies properties where wells are located and where the applicant would be required to provide public water in the event that wells were adversely impacted by the Curry proposal. In reviewing her comments, the Public Works Department determined that the mitigating measure does in fact mis-identify one of the tax parcels. An amended MDNS[19] was issued to correct this error on March 28, 2003. This amended MDNS represents a modification to correct a typographical error. Given that this amendment does not result in substantive changes, the amended document does not have a comment or appeal period.

Ms. Sheldon further expressed concern regarding road improvements and their impact upon her property. The Public Works Department confirmed that any improvements on 172nd Avenue NE would occur within the right of way for 172nd Avenue NE. In some cases, easements are required for road construction or side slopes. Details regarding necessary easements will become more available as construction drawings are developed for the required road improvements on 172nd Avenue NE. The applicant will be required to work with Ms. Sheldon if any easements are required for construction or side slopes.

ANALYSIS

The proposal requires an approval for a Preliminary Plat and an approval for a Planned Residential Development. A Preliminary Plat and a Planned Residential Development have different criteria that must be considered for their respective approval. The following analysis is consequently divided into two headings: Preliminary Plat and Planned Residential Development.

Preliminary Plat Analysis

To approve a Preliminary Plat, the Hearing Examiner must find that the proposal complies with RCDG 20D.180.[20] Under RCDG 20D.180.10–020-(2), the code states that *"lack of compliance with the criteria set forth in RCDG 20D.180.10-020 (1) shall be grounds for denial of a proposed subdivision ... or for the issuance of conditions necessary to more fully satisfy the criteria."* (Bracketed items added). The following is an evaluation of the proposal's conformance with RCDG 20D.180.10-020 (1).

I. COMPREHENSIVE PLAN POLICIES[21]

Preliminary Plats must comply with the City's Comprehensive Plan. The Land Use chapter of the Comprehensive Plan contains certain policies applicable to all areas within the City and land use designations within the community. The

[19] *Attachment III.c.*

[20] *20F.40.150-050 Preliminary Plat.*

[21] *RCDG 20D.180.10-020 (1) (a)*

policies applicable to this development are listed below. Policies that do not apply to this proposal are not included in this staff report.

Policy Number. *Description*	Discussion	Conform
M. General Land Use Policies: *The efficient use of land is important to limit sprawl, protect rural areas and resource lands, provide for affordable housing, reduce land development costs for businesses and industry and conserve our supply of urban land.*	The City of Redmond has determined through the Comprehensive Plan and subsequent updates that low-moderate density residential is an appropriate designation for this property to meet General Land Use Policy "M". The proposal is contained within a parcel of land that is within the City's corporate limits. The property is not in King County's "Rural Lands". Subdivision of this parcel is consistent with the existing uses developed or permitted to be developed on nearby and neighboring properties.	Yes.
Policy LU-105: *Development regulations, including the allowed density and intensity, should provide for and encourage the efficient use of land.*	The proposal would provide an efficient use of the site by providing the required number of units per RCDG Section 20C.30.25-140, Site Requirements Chart. The minimum number of units for an R-4 district with 15.68 acres is 26 units; the maximum number of units is 63 units.[22] The applicant is proposing 69 by using density bonuses afforded to Planned Residential Developments. While the Planned Residential Development component will be evaluated in the next heading under "Analysis", the proposal complies with LU-105 by providing the minimum density required.	Yes
Policy LU-110: *New development should only be allowed where the City can adequately provide public facilities and services. Capacity should be allocated among all types of uses to meet community goals.*	The Technical Committee has determined that the City can adequately provide public facilities and services as conditioned at the end of this report.	Yes
Neighborhood Vision. *Low-moderate density residential uses are located along NE 116th Street, NE 122nd*	The proposal is located adjacent to 172nd Avenue NE and must conform to this vision statement. The Redmond	Yes

[22] *Core Design, Curry Property Plan Set, P1 of 16, December 16, 2002.*

Street and 172nd Avenue NE.	Community Development Guide defines "R-4" as "low-moderate density". The R-4 zoning district sets a standard of four dwelling units per acre, however, that density can be exceeded through a Planned Residential Development. The proposed Preliminary Plat with increased density through a Planned Residential Development is consistent with "low-moderate" density uses.	
Neighborhood Vision. *Trails used by equestrians, pedestrians and bicyclists take advantage of the area's open space corridors and improved streets.*	The proposal provides for trails within open space tracts. These tracts will be preserved as open space within the Preliminary Plat. The project will further provide pedestrian connections through sidewalks along the property's frontage on 172nd Avenue NE and to adjacent properties.	Yes
N-NR-1: *The North Redmond area shall remain a primarily residential neighborhood.*	The Curry Preliminary Plat proposes 69 single-family residences.	Yes
N-NR-2: *The City should encourage a variety of lot sizes and housing types within this neighborhood.*	Lot sizes will average 5,498 square feet. Lot sizes range from approximately 3,623[23] to 11,177[24] square feet.	Yes
N-NR-3	Relates to supporting Bear Creek neighborhood plan in when planning actions in North Redmond.	N/A
N-NR-4: *In order to create a cohesive and well-designed neighborhood, owners of underdeveloped contiguous parcels should be encouraged to coordinate master planning.*	Two Preliminary Plats have been approved along the eastern and northern plat boundaries. The plat to the East has been constructed. Other Preliminary Plats, farther to the East, have also been approved. The applicants of each of these plats coordinated infrastructure improvements and developed conceptual alignments for connections from the approved plats to properties in the vicinity. The parcels involved in the Curry Preliminary Plat were considered in the coordinated infrastructure planning.	Yes
N-NR-5 through 8	Relate to zoning and re-zoning properties in North Redmond.	N/A
N-NR-9: *Future development shall preserve the area's important natural*	The proposal would create a four open space tracts (approximately	Yes

[23] *Lot 37.*
[24] *Lot 62.*

features.	open space tracts (approximately 4.17 acres).[25] Two of the tracts (approximately 2.9 acres) are proposed for the purpose of low impact recreation and to preserve wooded areas of the site. Additional measures are being employed to preserve both individual trees and stands of trees on the property.	
N-NR-10: *Horsekeeping shall continue to be allowed in low density residential areas. Trails in open space corridors and along setbacks should form a link to regional trails just beyond the neighborhood.*	(1) The proposal is in a low-moderate density area and not subject to the horsekeeping requirement. (2) The trails and sidewalks within the proposal will connect to sidewalks in adjoining subdivisions. These connections will provide residents with opportunities to connect to the regional trail system.	(1) N/A (2) Yes
N-NR-11: *Site design shall respect the natural features of the subarea, such as terraces, ravines, woodlands, streams and wetlands. Open space corridors should create a nearly seamless transition between rural areas and sensitive areas adjacent to developed portions of the neighborhood.*	The site design respects the woodlands located onsite through the preservation of stands of trees in open space tracts and through the preservation of individual trees on individual lots. The open space areas provide for nearly seamless transitions between developed areas of the site and the tracts. A Type III, emergent wetland located on-site will be filled, however off-site mitigation will occur. The fill is necessary as two roads intersect at the location of the wetland.	Yes, with mitigation
N-NR-12: *Trees shall be retained along principal and collector arterials unless their location endangers public safety.*	The proposal preserves stands of trees within the plat. These trees are predominantly within commonly owned tracts or on individual lots. The design has preserved some trees in areas along roadways such as west of Tract D and on the east side of Tract A near lot 50.	Yes

[25] *Core Design, Curry Property Site Plan Set, P1 of 16, December 16, 2002.*

N-NR-13, 14, 15, 16, and 17.	These policies relate to new developments along existing arterials, such as NE 116th Street. N-NR-17 relates to development adjacent to the Sammamish Valley and not the location of this proposal.	N/A
N-NR-18: *Scenic view corridors toward the Cascades and the Sammamish Valley should be preserved. Proposed developments shall have view corridors delineated on Preliminary Plat maps.*	The property is situated on the south and east side of a crown of a hill north of NE 116th Street. The Sammamish Valley is located to the west and there would not be views of that valley. Any views would be toward the Cascades. On site visits by staff, view corridors of the Cascades were not readily apparent. This is likely attributed to the topography, which is fairly level, and the wooded nature of the site. View corridors have not been identified. .	N/A
N-NR-19	This policy relates to development on properties that are rural and large lot residential.	N/A
N-NR-20: *In order to encourage clustering in the Low-Moderate Density Residential areas, a housing density bonus shall be used as an incentive.*	The proposal involves a Planned Residential Development, which includes a density bonus.	Yes
N-NR-21: *Structures shall be clustered so that they maintain significant amounts of contiguous open space.*	The Curry Preliminary Plat will preserve 27% of the total project site as commonly owned open space.[26] This open space includes a 2.86 acre tract of land, Tract A, that will be developed with "low intensity" recreational opportunities such as a trail system, picnic benches, and children's playground. The proposal accommodates the open space through clustering under the Planned Residential Development process.	Yes

[26] *Based on the sum of Tracts A, B, C, and D divided by the gross land area.*

Policy N-NR-22: *The City shall determine the percentage of open space set aside for clustering. The amount of open space should be no less than 25 percent of the site.*[27]	The Curry Preliminary Plat proposal includes 4.17 acres of open space (Tracts A, B, C, and D). This equals approximately 27% of the gross site and exceeds the 25 percent open space requirement	Yes
Policy N-NR-23: *Open space set aside due to clustering should be placed adjacent to open space corridors, parks, sensitive areas, buffers and low-density residential areas.*	Open space is within Tracts and corridors. Tract A, is located central to the subdivision. Tracts B, C, and D are located on the project perimeter and include pedestrian facilities and connections to adjacent properties.	Yes
Policy N-NR-24: *Design of clustered developments should be designed to minimize surface water impacts.*	The proposal will comply with the requirements of applicable stormwater requirements of the City of Redmond Community Development Guide.	Yes
N-NR-25: *The design of clustered developments shall be subject to an administrative review process.*	The proposal is a Planned Residential Development, which is subjected to a hearing process.	N/A
N-NR-26: *Existing rural structures should be retained without affecting the location of the clustering or the area that can be occupied by the cluster.*	The applicant proposed retaining an existing barn, however, due to requirements for providing access to the structure for Fire safety related reasons, the structure is no longer proposed for retention.	Yes
Policy N-NR-27: *Existing significant natural features shall be retained and enhanced. These include steep slopes, wetlands, streams and forested areas.*	The proposal preserves a significant percentage of forested area within tracts and trees on individual lots. A Type III wetland was delineated on-site, however, due to the location of road stubs from the Whistler Ridge (east) and Wynstone (north) Preliminary Plats, the wetland must be filled to accommodate the intersection of these two, established roads. The Sensitive Areas Regulations authorize fill of wetlands under certain circumstances.[28]	Yes, *with mitigation*
Policy N-NR-28: *Redmond's*	As noted in N-NR-27, a Type III	Yes

[27] *This policy requirement of 25% open space is also a code requirement for PRDs, see RCDG 20C.70.30-040.*

[28] *20D.140.10-140 Alteration or Development of Sensitive Areas – Standards and Criteria.*

sensitive area ordinance shall be enforced. Due to severe natural limitations, steep or erodible slopes, wetlands, wetland buffers, flood plains and stream corridors should remain undeveloped and undisturbed.	wetland is proposed for fill due to the location of road stubs from adjacent properties. The proposal provides mitigation, consistent with the Sensitive Areas Ordinance.	
N-NR-29	This policy relates to Bear and Cottage Creeks, which are located approximately one mile from the site.	N/A
N-NR-30: *Development should provide for connecting significant wildlife habitat into protected wildlife corridors.*	The proposal clusters development to retain significant portions of the site in uninterrupted tracts of wooded land. As adjacent properties develop to the south and to the west, the City will work with those applicants to connect to Tract A and Tract B to enhance wildlife use of Tract A.	Yes
N-NR-31: *When more than 50% of wooded portions of the site must be cleared, a plan for re-vegetation, superior to existing conditions, should be implemented.*	The proposal provides for a landscaping plan to enhance the wooded areas of the site with evergreen and deciduous trees.	Yes
N-NR-32	Relates to the purchase of land for parks properties.	N/A
N-NR-33: *A multi-purpose trail system should be developed which links residential areas with open spaces, parks, schools, stables and other recreational areas.*	A multi-purpose trail system is proposed along the frontage of NE 116th Street that will include a 10' wide concrete path and 6' wide soft surface trail. The trails will link the proposed plat with other uses and recreational opportunities in the area. A pedestrian connection is proposed to link the proposal to adjacent developments, which will provide access to these regional trails.	Yes
N-NR-34: *Adequate rights-of-way should be provided for trail use in accordance with City plans when development of property occurs.*	The City trails map illustrates a trail system on 172nd Avenue NE, however the trail is on the west side of the right-of-way, which is on the opposite side of 172nd Avenue NE from the proposal. The right-of-way referred to under this policy is not	N/A

	required for this proposal.	
N-NR-35	Requires the City to create a Parks and Recreational Plan for North Redmond.	N/A
N-NR-36: *New subdivisions shall result in attractive, safe places to live.*	The Planned Residential Development includes elevations for structures. The Planning Department has reviewed the elevations and determined that they meet the requirements[29] of the City's design requirements and fulfill N-NR-36.	Yes
N-NR-37: *Proposed housing developments in the area should be appropriate to the needs and desires of individuals employed in and around Redmond.*	The proposal provides for a mix of housing and property sizes and anticipated market values. In their submittal of May 14, 2002, the applicant describes home styles as ranging from 1600 to 3500 square feet on lots from 3400 to 9000 square feet. Housing prices are expected to range from \$350,000 to \$600,000 in 2002 "dollars". The price range provides for a range of housing opportunities based upon cost. The range in square footage will serve a variety of housing desires, such as smaller houses for those who do not desire the upkeep of larger structures. The range in lot sizes, accompanied by the open space tracts, will serve a variety of desires for private space, such as smaller lots for those who do not desire the upkeep of larger lots. The proposal is expected to provide opportunities for housing that will fulfill N-NR-37.	Yes
N-NR-38 and 39	Relate to the City encouraging clustered and Planned Residential Developments. This is done through regulation. The policy is not within the applicant's ability to satisfy.	N/A

[29] *RCDG 20D.40.*

N-NR-40, 41, and 42	Relate to the City developing transportation and traffic studies for the neighborhood as a whole. Although the applicant has produced project-specific studies, the policy is not within the applicant's ability to satisfy.	N/A
Policy N-NR-43: *New local and neighborhood collector streets shall be limited to two lanes with additional turn lanes where necessary.*	Local access streets within the plat are limited to two lanes. The Transportation Division has determined that turn lanes are not warranted for streets within the plat.	Yes
N-NR-44: *All new local and neighborhood collector streets shall be built at the minimum allowable width in order to preserve the area's character, protect sensitive areas and reduce stormwater runoff.*	Local streets within the proposed subdivision will be constructed at a minimum allowable width of 28 feet with neck-downs to 20 feet in appropriate locations.	Yes
N-NR-45: *New streets and roads should follow, when possible, the natural topographic contours of the land.*	The site is fairly level.	Yes
N-NR-46: *Traffic-calming techniques should be used to slow through residential traffic. Connecting 172nd Avenue NE road segments should be contingent on implementing such traffic-calming methods.*	(1) The proposal includes traffic calming, such as a bulb-out near Tract B and a traffic circle at the intersection of NE 119th Street with 173rd Place NE. (2) Relates to extending 172nd Ave NE.	(1) Yes (2) N/A
N-NR-47	Relates to lighting near agriculture, rural and large lot residential.	N/A
N-NR-48	Encourages the City to consider different curbs and sidewalks. This policy is not within the ability of the applicant to satisfy.	N/A
N-NR-49	Relates to trail systems along existing roadways. Although impact fees may aid in funding construction of these facilities, the applicant is not required to physically construct portions of the trails.	N/A
N-NR-50	Relates to Annexations by the City.	N/A

N-NR-51: *New development shall fund public facility improvements necessary to serve growth.*	The applicant will be funding the construction of public facility improvements including water, sewer, stormwater, and street improvements. The applicant will also be assessed park, fire, and traffic impact fees in accordance with RCDG Section 20D.60, Impact Fees.	Yes
N-NR-52	Encourages property owners to form Local Improvement Districts.	N/A
N-NR-53: *The City shall require public sewers for wastewater collection in urban areas designated for one to four dwelling units per acre.*	The proposed subdivision will provide a public sewer system for wastewater collection, in compliance with City standards.	Yes
N-NR-54, 55, 56, 57, 58, 59, and 60	Relate to the extension of public facilities (sewer and water) into the North Redmond neighborhood. The applicant will extend public water and sewer to the project site. Other aspects of these policies are more directed toward City staff.	N/A

The proposal conforms to the Redmond Comprehensive Plan. This is a requirement under the Redmond Community Development Guide's Subdivision Chapter[30] and North Redmond Neighborhood Chapter[31].

II. SITE REQUIREMENTS

The second decision criteria[32] for approving a Preliminary Plat is that it must *"conform to the site requirements set forth in RCDG 20C.30.25-140, Site Requirements."* In evaluating site requirements, the Technical Committee is required to consider zoning requirements, sensitive areas, tree protection, and other similar design standards. The Technical Committee has found that the proposal is in substantial conformity with these design requirements. The following is a detailed discussion of design requirements and sensitive areas.

A. LOT DIMENSIONS AND PLAT DENSITY

30 *RCDG 20D.180.10-020 (1) (a)*
31 *RCDG 20C.70.30-030.*
32 *RCDG 20D.180.10-020 (1) (b)*

1. Allowable Density: The maximum number of dwelling units permitted on a site equals the gross site area, multiplied by the maximum number of dwelling units allowed per gross acre. RCDG Section 20C.30.105-050(2), Modification of Development Regulations. Allowed density for the proposal is calculated as follows:

Total Site Area (Acres)	15.68 Acres
Multiplied by the Maximum units/acre	4 Units per Acre
Maximum Units Allowed	**63 Units**

Through the Planned Residential Development process, the applicant can increase the number of units by an additional 10%[33], which would be six additional units. The proposal includes this 10% and arrives at a total unit count of 69 units.

The Preliminary Plat can be approved with the condition that the number of lots is contingent upon the City Council approving the Planned Residential Development. If not approved, the number of units will need to be reduced to 63.

2. Minimum Required Density: The minimum number of dwelling units required for a site is equal to the net acreage (gross site area less sensitive areas, common utilities areas, access corridors and right-of-ways) multiplied by 80%. The minimum required density for the proposal is calculated as follows:

Total Site Area (Acres)	15.68 Acres
Less surface water retention areas, open space areas	- 4.17Acres
Less road dedication, utilities, and access areas	- 2.78 Acres
Total Net Acreage	8.73 Acres
Multiplied by the Maximum units/acre	4 Units per Acre
	35 Units
Multiplied by 80%	0.80
Total Minimum Units Required	**28 Units**

The proposal exceeds the minimum number of units required by code.

3. Minimum Average Lot Size: The RCDG allows a Preliminary Plat to have a range of lot sizes, provided the total of the lot areas meets a minimum "average lot size." The Minimum Average Lot Size requirement for the R-4 zone is 7,000 square feet. The average lot size proposed is 5,498 square feet, which is below the requirement.

Through the Planned Residential Development Process, the proposal can be approved with 5,498 square feet. RCDG 20C.30.105-050 (4) removes the required average lot size. The Preliminary Plat can be approved with the condition that the

[33] *RCDG 20C.30.105-050 (2).*

average lot size is contingent upon the City Council approving the Planned Residential Development. If not approved, the average lot sizes will need to be increased.

4. Minimum Lot Width Circle: The standard minimum lot width circle requirement for the R-4 zone is 40-feet in diameter. However, in a Planned Residential Development, the lot width circle may be reduced to 20 feet. The applicant has illustrated this 20' diameter circle on Sheet P1 of 16, December 16, 2002 submittal.

   The Preliminary Plat can be approved with the condition that the action on the Preliminary Plat is subject to the City Council's approval of the Planned Residential Development.

5. Minimum Lot Frontage: The minimum lot frontage for the R-4 zone is 20 feet as defined in RCDG Section 20C.30.25-140, Site Requirements Chart. The proposal would apply a 20' lot frontage for all lots, except for lots 17 and 48 where an 11' and 9' frontage is proposed. This reduction can be allowed, if approved by the City Council, under RCDG 20C.30.105-060 (2).

6. Site Standards: The current site standards as outlined within RCDG Section 20C.30.25-140, Site Requirements Chart, for the R-4 zone are as follows:

1.	Front Building Setback	15 ft. w/ 18 ft garage setback
	PRD Allows:	10'
	Applicant Proposes:	10' w/ 18' garage setback 5' for Lots 20 and 53 only

The proposal would apply a 5' front yard setback for lot 20 and 53 for preserving trees. This reduction can be allowed under 20D.80.20-070 Tree Protection Standards subsection (1) (b) where significantly more than 35% of trees are protected. The proposal saves only the minimum 35%; therefore the setback for these lots cannot be reduced. A condition of approval should state that the minumum front yard setback for all lots shall be 10' with the 18' garage setback.

2.	Side/Interior Setback (each side)	5 ft. and 10 ft.
	PRD Allows:	Not Specified.
	Applicant Proposes:	5 ft.
3.	Side Street Setback	15 ft.
	PRD Allows:	10 ft.
	Applicant Proposes:	10 ft.
4.	Rear Setback	10 ft.
	PRD Allows:	10 ft.

	Applicant Proposes:	10'	
5.	Maximum Height of Structures		35 ft.
	PRD Allows:	45 ft.	
	Applicant Proposes:	35 ft.	
6.	Minimum Building Separation		10 ft.
	PRD Allows:	10 ft.	
	Applicant Proposes:	10 ft.	
7.	Maximum Lot Coverage for Structures		40%[34]
	PRD Allows:	40%	
	Applicant Proposes:	40%	
8.	Maximum Impervious Surface Area	60%	
	PRD Allows:	~~60%~~ 70%	
	Applicant Proposes:	40% 70%	
9.	Minimum Open Space	20%	
	PRD Allows:	20%	
	Applicant Proposes:	27%	

The applicant proposes modifications to some standards. These modifications to the dimensional standards for lots can only be approved if the City Council approves the Planned Residential Development. The Preliminary Plat should be conditioned upon the City Council's approval of the Planned Residential Development Application.

B. STREET AND UTILITIES IMPROVEMENTS

Site Access: The Preliminary Plat includes three accesses:

(1) 172nd Place NE,

(2) A future road connection from Wynstone Preliminary Plat on the northern boundary, and

(3) A new road from Whistler Ridge on the eastern plat boundary.

Vehicle access to the proposed lots would be from an internal street, Road A, except for lots 13, 14, 15, and 16, which use access from 174th Avenue NE, a road recently constructed as part of the Whistler Ridge development.

Street Improvements: Street improvements, within the 50-foot wide dedicated right-of-way of Road 'A', shall include asphalt paving from curb to curb, concrete curb and gutter, planter strips, concrete sidewalks, storm sewers, street lights, street signs, and underground utilities

[34] *R-5 zone requirement, as allowed by the cluster subdivision process*

including water, sewer, power, and telecommunications. Half-street improvements will be required on 172nd Avenue NE and 174th Place NE. Details regarding street improvements are shown as Recommended Conditions of Approval.

Stormwater: Stormwater runoff from the site will be collected in a series of catch basins and routed via an underground storm sewer conveyance system into an open-surface detention and water quality pond at nearly the midpoint of the eastern plat boundary. Details regarding stormwater requirements are shown as Recommended Conditions of Approval and on the associated site plans.

Sanitary Sewer: The proposal will serve all new homes within the development with a sanitary sewer collection system. A sanitary sewer collection system will be extended into the proposal from NE 117th Street (Whistler Ridge Plat) by the applicant.

Domestic Water. A domestic water supply system will be extended from the intersection of NE 116th Street with 172nd Avenue NE by the applicant. Water service to individual lots will be provided through the roadways, public/private easements, and utility tracts within the proposed plat.

C. NATURAL FEATURES & SENSITIVE AREAS

Tree Retention Requirements: The Redmond Community Development Guide requires that all healthy landmark trees and 35% of all healthy significant trees be saved[35]. Landmark trees are those trees that are greater than 30" in diameter at breast height. Significant trees are those trees that are between 6" and 30" in diameter at breast height. Tree health was assessed in an arborist's report (Attachment I.c.). The Curry proposal includes measures to protect 35% (196) of healthy existing trees on-site. An additional 7.9% (44) of the total trees will be retained on-site, however impacts may occur within the root protection zone.

The applicant is requesting, however, to either remove or impact the root zone of 24 landmark trees. The applicant applied for an exception to the prohibition from landmark tree removal. The Technical Committee has reviewed this request of October 7, 2002, and approved the removal and proposed mitigation.

Trees would be saved in a combination of Native Growth Protection Area Tracts and on individual lots. For trees on individual lots, purchasers of lots would be placed on notice by a recorded tree preservation plan and other recorded documents, such as Covenants and Restrictions. Trees within sensitive areas and their buffers and also trees in recognizable "stands" would be saved in Native Growth Protection Area Tracts, which would be delineated with a combination of a split rail style fence and signage. The Tract's ownership would be with a Homeowners' Association or other party acceptable to the City.

[35] *A "saved" tree is a tree where encroachments do not occur within 5' of a tree's dripline.*

Sensitive Areas Ordinance (SAO): The RCDG contains standards that regulate development impacts to wetlands, flood hazards, geologic hazards, aquifer recharge areas, stream corridors, and wildlife habitat (RCDG 20D.140). The following sensitive areas are located on this site: Class III wetland. The inset map illustrates approximate locations of the wetland, stream, and flood plain sensitive areas. Descriptions of these areas follow.

1. Wetlands: A Type III palustrine emergent wetland was delineated on the property.[36] This wetland is hydraulically isolated from other surface waters and measures 5,254 square feet. The wetland is located at the intersection of 173rd Place NE and NE 119th Way. This intersection cannot be avoided as the stubs for the roads were established by previous plats. At the time that the stubs were set, the City did not have the benefit of a wetland delineation on the Curry property.

   The Redmond Community Development Guide allows the fill of Type III wetlands where there are not reasonable alternatives to avoid the fill.[37] Due to the lack of adequate water availability on-site, the applicant proposes off-site mitigation on the southern portion of the Roberts Plat. The Roberts Plat is a project located on the south side of NE 116th Street, west of Einstein Elementary. The plat was developed by CamWest, the applicant. CamWest has the ability to perform the off-site mitigation on this property.

   The applicant's consultant provided conceptual information to support the off-site mitigation.[38] The conceptual mitigation plan demonstrates that the off-site mitigation is appropriate given the unique circumstances associated with the Curry proposal. A more detailed mitigation plan will be required with construction drawings.

2. Geologic Hazard Areas: None identified.

3. Wildlife Habitat: None identified.

4. Streams: None identified.

5. Shorelines: This site is not within the jurisdiction of the Redmond Shoreline Master Program

6. Flood Hazards: None identified.

7. Aquifer Recharge Areas: The site is located within a Low Significance Aquifer Recharge Area. The proposal is compatible with this classification of aquifer.

D. PARKS & RECREATION

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36 *Schulz, Gary C., Wetland Determination and Conceptual Mitigation, Curry Property, January 15, 2002.*
37 *20D.140.10-180 Alteration of Wetlands.*
38 *Schulz, Gary C., Conceptual Wetland Mitigation Plan, Curry Property, October 10, 2002.*

The Puget Sound Electric Powerline Trial is located approximately one mile south of the proposal. This trail provides users with opportunities to connect to the regional trail and parks system. A temporary pedestrian connection from the plat's frontage to NE 116th Street will facilitate trail use by residents. The Trails Plan illustrates a trail on the west side of 172nd Avenue NE in the future.

III. SUBMITTAL REQUIREMENTS.

The third requirement for approving a Preliminary Plat is that a proposal conform "to the requirements of this section and those set forth in RCDG Title 20F and submittal requirements on file in the Planning Department."[39] These requirements reflect procedural issues including submittal requirements, providing notices, receiving comments, making a SEPA threshold determination, and holding a public hearing. Compliance with these requirements has been demonstrated throughout this report.

IV. STREET SYSTEM

The fourth requirement to approve a Preliminary Plat requires that *"the proposed street system conforms to the City of Redmond Arterial Street Plan and Neighborhood Street Plans, and is laid out in such a manner as to provide for the safe, orderly and efficient circulation of traffic…"*.[40] The proposed street system conforms to the Transportation Circulation Plan for the North Redmond neighborhood.

V. WATER AND SEWER

The fifth requirement to approve a Preliminary Plat requires that *"the proposed subdivision … will be adequately served with City approved water and sewer and other utilities appropriate to the nature of the subdivision …"*.[41] The Technical Committee has determined that the proposed subdivision can be served by extending a water line from the intersection of NE 116th Street and 172nd Avenue NE to the plat. Sewer can be provided by connecting at 119th Way NE.

VI. LOT LAYOUT

The sixth requirement to approve a Preliminary Plat requires that the lot layout, site characteristics (e.g. trees, sensitive areas, etc.), and topography is appropriate for the site and fulfills.[42] The previous assessment under "II" illustrates that the proposal meets this requirement.

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39 *RCDG 20D.180.10-020 (1) (c)*
40 *RCDG 20D.180.10-020 (1) (d)*
41 *RCDG 20D.180.10-020 (1) (e)*
42 *RCDG 20D.180.10-020 (1) (f)*

VII. IDENTIFIED HAZARDS

The seventh requirement to approve a Preliminary Plat requires that the general layout does not result in conflicts between the proposed use and identified hazards.[43] After review of sensitive areas related material associated with the project, the Technical Committee has not located any hazards or limitations that would impact the proposed design of the streets and lot layouts. The applicant has applied a subdivision design that minimizes conflicts between those hazardous areas (such as steep slopes) and the proposed lots and infrastructure.

Planned Residential Development Analysis

The following is an analysis of the proposal's compliance with the City's Planned Residential Development decision criteria.[44] To reduce duplication and where appropriate, reference has been made to earlier sections of this report. The Hearing Examiner will review this analysis, consider testimony related to the PRD proposal, and make a recommendation to City Council. City Council is the decision-making body for the Planned Residential Development application.

(1) Design Criteria. The City may approve, or approve with modifications, a PRD or MPRD if the proposal meets the requirements of this chapter and the design of the proposed development achieves two or more of the following results:

Requirement	Discussion	Conform
(a) High quality architectural design, placement, relationship or orientation of structures;	The proponent submitted elevations for the proposed structures and identifed on site plans the location and orientation of proposed structures. In reviewing the material, the Technical Committee has determined that the proposed designs and placement of structures meet the requirement for high quality architectual design, placement, and relationship or orientation of structures. Copies of the elevations will be presented at the hearing on March 31, 2003.	Yes
(b) Achieving allowable densities for the subject property;	In some cases, sensitive areas or other site characteristics may make it difficult for an applicant to achieve allowable densities under the applicable zoning district. This is not the case for this application. A PRD is not required to meet allowable densities for this subject property.	N/A
(c) Providing housing types	Although not providing specifically for	N/A

[43] *RCDG 20D.180.10-020 (1) (g)*
[44] *20C.30.105-040 Decision Criteria.*

that effectively serve the affordable housing needs of the community;	"affordable housing", the proposal includes a range of housing and lot sizes. Typically, a range of sizes allows for greater diversity in a neighborhood, those allowing more affordable and less affordable housing to be located in the same neighborhood.	
(d) Improving circulation patterns or the screening of parking facilities;	The proposal would result in appropriate neighborhood circulation, including connections to each of the plat boundaries. However, the PRD is not necessary to provide these connections.	N/A
(e) Minimizing the use of impervious surfacing materials;	As compared with a more traditional Preliminary Plat, the proposal minimizes the amount of impervious surfacing that would otherwise occur. In a more traditional subdivision, less open space would exist as the parcels would be developed more uniformly with lots. This would require additional road surfacing, which is not required by the proposal.	Yes
(f) Increasing open space or recreational facilities on-site;	By applying the flexiblity authorized in a PRD, the proposal creates a large open space tract, Tract A. This large tract does not commonly occur in typical plats. The open space tract will allow for tree preservation, general open space, and recreational opportunities that will be unique and provide for a positive benefit to the community. Additional tracts (Tracts B, C, and D) are providing for additional open space opportunities as well.	Yes
(g) Landscaping, buffering, or screening in or around the proposed PRD or MPRD;	Tract A provides for signficant screening of the development from 172nd Avenue NE.	Yes
(h) Providing public facilities;	Aside from the significant amount of open space, unique public facilities are not part of this proposal.	N/A
(i) Preserving, enhancing or rehabilitating natural features of the subject property such as significant woodlands, wildlife habitats or streams;	Through open space tracts A, B, and C, the proposal provides for significant preservation of existing stands of trees. Although trees will be removed as part of the development, the remaining stands of trees will be enhanced through tree plantings.	Yes
(j) Incorporating energy efficient site design or building features;	Retaining continuous open space areas will influence the microclimate within the proposal. The microclimate will help cool structures in the summer.	Yes

(k) Providing for an efficient use of infrastructure.	The proposal makes for efficient use of infrastructure by clustering development along its streets. In a more traditional layout with less open space and larger lots, longer lines of utilities and roads would be required to accommodate more of the site being developed.	Yes

In addition to meeting two of the above criteria, the following criteria shall be met:

(2) Public Facilities. The PRD or MPRD shall be served by adequate public facilities including streets, bicycle and pedestrian facilities, fire protection, water, storm water control, sanitary sewer, and parks and recreation facilities.	The proposal will provide the required public facilities.
(3) Perimeter Design. The perimeter of the PRD or MPRD shall be appropriate in design, character and appearance with the existing or intended character of development adjacent to the subject property and with the physical characteristics of the subject property.	In assessing this, it is important to understand the pattern of development adjacent to the project. The properties to the east are currently under development to single-family detached dwellings on "clusterd" lots. Many of these lots involve modified side yard setbacks that result in approximately 10' of separation between structures. The proposal would be consistent with development to the east. The property to the north has been approved for residential, single-family units as well. These units, however, will use the standard side yard setbacks, which will result in 15' of separation between structures. This is slightly different than the 10' between structures that the PRD proposes. However, the proposal would be compatible with the development approved for the property to the north. The properties to the west and across 172nd Avenue NE are lower density, single-family residences. Lots are over ½ acre in size. The PRD has some frontage on 172nd Avenue NE, but a large amount of the frontage is Tract A, which is the open space tract. The proposal is expected to be consistent with existing and planned development patterns. The properties to the south are gennerally

	single-family residences on parcels of over ½ acre. These parcels can be developed to the same R-4 density, however until that occurs, they are lower density parcels. The proposal responds to the existing conditions by retaining trees in Tract B and in the rear yards of lots 4, 5, and 6.
(4) Open Space and Recreation. Open space and recreation facilities shall be provided and effectively integrated into the overall development of a PRD or MPRD and surrounding uses.	The proposal does well at integrating the proposal with its open space tracts. A trail system and other recreational opportunities are proposed within Tract A and C. A pedestrian connection is proposed in Tract B. Finally, Tract D, stormwater drainage, is proposed to be constructed to appear as a naturally occuring wetland. The facilities are available to all residents and, particularly Tracts A, and C/D are closely associated with many of the lots.
(5) Streets and Sidewalks. Existing and proposed streets and sidewalks within a PRD or MPRD shall be suitable and adequate to carry anticipated traffic within the proposed project and in the vicinity of the subject property. (Ord. 1901)	The Public Works Department has reviewed the proposal and found that the proposed accessways are not substandard and will adequately accommodate the anticipated usage.

The proposal uses the PRD process to vary dimensional standards, as identified in earlier sections of this report. In short, the applicant requests variations from average lot sizes and setbacks. Additional information is in the Variance Table, which is attached to the application.

After reviewing the above decision criteria for PRDs, the Technical Committee finds the proposal in conformity with 20C.30.105, Planned Residential Developments.

CONSISTENCY WITH DEVELOPMENT REGULATIONS AND SEPA

In addition to compliance with RCDG 20D.180.10, when the City receives a permit application, RCDG Section 20G.40, Consistency with Development Regulations and SEPA, requires that it determine the project's consistency with development regulations, Comprehensive Plan policies, and the City's SEPA ordinance. In doing so, the City must consider the following:

A. *Consistency with development regulations, such as adequate provision of infrastructure.*

B. *Consistency with SEPA, including the City's SEPA policies and regulations, whether additional studies are required to analyze environmental impacts and whether additional mitigation measures are required.*

C. *Adequacy of the analysis of environmental impacts under existing regulations, such as whether impacts are adequately addressed by development regulations, policies and other laws, including the laws of other agencies.*

With the project conditioned, the City determined that:

A. *The proposal is consistent with the regulations and policies of the City, including the SEPA ordinance, and the laws and rules of other agencies.*

B. *The proposal adequately addresses probable adverse environmental impacts under existing regulations and policies.*

C. *Adequate infrastructure will be provided (i.e. street, storm, water, and sewer extensions) to serve the project.*

D. *Wetland determination, Geotechnical and soils reports were required to analyze environmental impacts.*

E. *Environmental impacts are adequately mitigated.*

RECOMMENDATIONS

Prior to hearing public testimony, it is recommended that the Hearing Examiner:

1. Approve the **Curry Preliminary Plat,** PPL02-001, as illustrated in the plan set dated December 16, 2002,

2. Recommend to the City Council to approve the Curry Planned Residential Development, PRD 02-001, as illustrated in the plan set dated December 16, 2002, and

both subject to the conditions below:

I. PLANNING REQUIREMENTS

A. SEPA: A Mitigated Determination of Non-Significance was issued for this project. The MDNS was amended to resolve a scrivener's error on March 28, 2003. The following mitigation measures are incorporated into this approval as conditions of approval:

1. 172nd Avenue NE. The applicant is required to construct a second southbound lane on 172nd Avenue NE as it approaches NE 116th Street. This will allow for the separation of southbound turning movements, which will decrease vehicle delay and improve level of service. The new lane is required to have a minimum storage length of 150 feet along with an appropriate transition back to the existing cross section. The traffic consultant reviewed

the results of this improvement in the Traffic Impact Analysis. In 2005 with the project traffic and this mitigation, the southbound through movements will operate at LOS-E, with an approach delay of 42.8 seconds. Thus, this measure effectively mitigates the project impact to this movement by returning the level of service and delay to approximately the same as prior to the development. If the reconstruction of the intersection of NE 116th Street and 172nd Avenue NE as part of the planned widening of NE 116th Street is shown to be fully funded as part of the City of Redmond's 2004 Transportation Improvement Program, the City and the project applicant may propose the modification or elimination of this condition.

2. Water System. The project proponent shall mitigate adverse quantity or quality impacts that are demonstrated to have occurred during or within one year of site civil construction to domestic water supply wells on adjacent properties. This mitigation shall be required where it can be demonstrated that the adverse impacts occurred as an apparent result of dewatering of utility trench excavations, surface grading, storm-water collection or runoff of turbid storm-water or contamination caused by spillage and seepage of noxious substances on the site during construction. Each of four adjacent properties is served by its own well, more or less as shown on sheet P3 of the preliminary PRD drawings dated 3/26/02. These adjacent properties potentially affected are King County tax parcel numbers 252605-9098, 252605-9097, 252605-9088 and 252605-9090. Should an impact be determined, each impacted property shall be provided with city water service. Water services shall be installed from the main fronting the affected property and meter setters and boxes placed to serve the residence. The water service shall further be extended from the meter box to the house and connection made to the existing plumbing. All work shall be done in accordance with city standards and all applicable codes. Connection, meter installation and reimbursement fees shall be paid to the city.

B. General Planning Requirements:

1. This approval is subject to all general criteria of the Redmond Community Development Guide and Redmond Municipal Code. Refer to Attachment VI.A, General Planning Approval Conditions, for a checklist of drawing, bond, and general planning requirements. The checklist does not substitute for the code; it is intended to be used as a guide in preparing your final construction drawing/building permit submittal. Refer to the Redmond Community Development Guide and Redmond Municipal Code for detailed information on each requirement.

2. To ensure compliance with residential site standards, at the time that construction drawings are submitted for Public Works review, the applicant shall provide two (2) copies of the construction drawings, clearing/grading plan and tree retention plan at a scale of 1" = 20' to the Planning Department.

3. A sign permit application must be submitted separately to the Planning Department for review and approval prior to installation of any proposed signs (RCDG Section 20D.160.10-020).

4. Transportation, parks, and fire impact fees shall be assessed at the time of building permit issuance for each residence. **The fee in effect at the time of complete building permit application shall apply.**

C. Specific Planning Requirements:

1. Planned Residential Development Approval. The proposal is dependent upon the approval of a Planned Residential Development application. The Hearing Examiner receives testimony and recommends to approve, conditionally approve, modify, or deny the application for Planned Residential Development to the Redmond City Council. The Preliminary Plat shall not be undertaken except in compliance with the approval of a Planned Residential Development application in the same format as those plans dated December 16, 2002.

2. Landscaping:

   a. The landscape plan should include landscaping details for the storm water facility, which will enhance its appearance as a naturally occurring water feature (RCDG Section 20D.40.25-080). The general goal should be to create a varied planting pattern with a diversity of native species that would be found in a palustrine emergent, seasonally flooded (or otherwise inundated) wetland. The planting must be appropriate for the water regime that is anticipated. The design should be done by a qualified wetland consultant or landscape architect with experience in wetland mitigation or planting in wetland areas.

   b. Landscaping shall be coordinated with water/sewer lines and fire hydrants/connections. Trees shall be planted no closer than 8 feet from the centerline of any water/sewer lines. Shrubs shall be planted to maintain at least 4 feet of clearance from the outside edge of the shrub to the center of all fire hydrants/connections. Ground cover may be planted within this radius. (RCDG Section 20D.80.10-150(8)).

   c. Planting shall meet the City requirements for site clearance at intersections as identified in Section 20D.210.25 of the Redmond Community Development Guide. (20D.80.10-150(2))

   d. For any landscaping along 172nd Avenue NE and 174th Avenue NE, an irrigation system shall be maintained by the Home Owners' Association or other means acceptable by the City of Redmond Parks Department. Maintenance of landscaping shall be the responsibility of the Homeowners Association, including that portion located within the public right-of-way along 172nd Avenue NE and 174th Avenue NE. Any installation or other work in the public right of way requires an Extended Right of Way Use Permit issued by the Public Works Department.

   e. Street trees are required as follows (RCDG Section 20D.80.10-140):

Street	Species	Spacing on Center	Notes
172nd Avenue NE	*Cleveland Maples*	*30'*	*Minimum 2.5" caliper. Specimen to be grown*

			for street use.
Internal Streets	*To be determined.*	*TBD*	*Per Landscaping Requirements. Note: The City does not maintain internal street trees.*

2. Sensitive Areas:

   a. A wetland and buffer enhancement plan shall be submitted with the Construction Drawings. The plan shall meet the requirements of Appendix 20D-2 (V) of the Redmond Community Development Guide.

   b. A sensitive areas analysis shall be completed for off-site improvements that extend into areas with potential wetlands or streams. Mitigation will be required where improvements extend into a sensitive area or its buffer and beyond those improvements that currently exist.

   c. A split rail fence shall be installed to delineate all sensitive areas and native growth protection area tracts. Sensitive area signage (available from the City of Redmond) shall be installed to provide for notice in the field regarding the presence of sensitive areas. Signage shall be affixed to the fence approximately on the midpoint of each lot's rear property line. Where fencing does not abut an individual lot, signage shall be placed approximately every 100'. Signage and fencing shall be shown on the construction drawings. Final location and materials will be subject to approval by the Planning Department.

3. Tree Protection Measures:

   a. Existing Significant Trees to Remain, as designated on the proposed Tree Preservation Plan, dated 12/16/2002, shall be saved.

   b. Tree preservation measures for trees designated to be saved must at a minimum comply with required tree protection in RCDG Section 20D.80.20-100(1). These measures include but are not limited to the following requirements:

      i. All construction activities, including staging and traffic areas, shall be prohibited within five feet of the dripline of protected trees.

      ii. Tree protection barriers shall be installed along the outer edge and completely surround the area 5' from the dripline of significant trees to be protected prior to any land disturbance.

iii. Tree protection barriers shall be a minimum of four feet high, constructed of chain link, or polyethylene laminar safety fencing or similar material. "Tree Protection Area" signs shall be posted visibly on all sides of the fenced areas. Signs requesting subcontractor cooperation and compliance with tree protection standards may also be required to be posted at site entrances.

iv. Where tree protection areas are remote from areas of land disturbance, and where approved by the Planning Department, alternative forms of tree protection may be used in lieu of tree protection barriers, provided that protected trees are completely surrounded with continuous rope or flagging and are accompanied by "Tree Save Area-Keep Out" signs.

v. Per RCDG Section 20D.80.20-080(1), each significant tree that is removed on the site must be replaced by one new tree. The required number of replacement trees must be identified on the Tree Replacement Plan. The minimum size of replacement trees is 2-½ -inch caliper for deciduous trees and six to eight feet in height for evergreen trees.

vi. Two copies of the final Tree Preservation Plan, Landscape Plan and Tree Replacement Plans at 1"=20' scale must be submitted with construction drawings and approved prior to issuance of construction drawings. The final plans shall be prepared or approved by a licensed landscape architect, registered Washington certified nurseryman or registered Washington certified landscaper (RCDG Section 20D.80.10-040). This certification shall be noted on all landscape-related plans. A copy of the Tree Preservation Plan shall be recorded with the Final Plat.

vii. Restrictive covenants shall include a statement notifying property owners and the Homeowner's Association that significant and landmark trees on individual lots may only be removed in accordance with the approved tree retention plan. This language shall be reviewed and approved by the Planning Department prior to recording of the restrictive covenants with King County.

viii. A tree health assessment shall be completed for off-site improvements that extend into areas with significant and landmark trees. Mitigation will be required where trees are removed or improvements extend within 5' of the dripline of any healthy, significant or landmark tree, beyond those improvements that currently exist.

4. **Reduction of Front Yard Setback. The proposed reduction in front yard setback to below the required 10' is not approved. The site plan shall be revised such that the 10' front yard setback is**

met. Impacts to trees resulting from the change shall be mitigated.

II. ENGINEERING REQUIREMENTS

A. No lots shall be permitted direct access to 172nd Avenue NE. The specific lots affected by this restriction shall be listed on the face of the final plat and other documents.

B. Easements & Dedications: Existing and proposed easements and rights-of-way shall be shown on the final plat, civil plans and other documents. Any existing easements for ingress, egress, private utilities, franchise utilities, etc. that lie within the Plat or within rights-of-way adjacent to the Plat shall be released or modified to the City of Redmond's satisfaction prior to final plat approval.

1. Public easements are required as follows:

   a) 10-feet wide for sidewalk and utilities adjacent to the right of way along the east side of 172nd Avenue NE.

   b) 10-feet wide for sidewalk and utilities adjacent to the right of way along the west side of 174th Place NE.

   c) 10-feet wide for sidewalk and utilities adjacent to the rights of way along both sides of the internal plat streets: NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE.

   d) 10-feet wide for pedestrians from NE 119th Court across private Tract E to 172nd Avenue NE and from 173rd Place NE across private Tracts G and H to 174th Place NE.

   e) Rights-of-way dedicated to the City of Redmond are required as follows: 50 feet wide for the internal plat streets: NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE.

   f) Private tracts are required as follows:

      (1) 35 feet wide for the internal plat streets within Tracts F, G and I.

      (2) 20 feet wide for the internal plat streets within Tracts E and H.

      (3) New right-of-way lines joining at intersections shall connect with a minimum of a 25-foot radius, or with a chord that encompasses an equivalent area. The area formed by this radius or chord shall also be dedicated as right-of-way.

      (4) All lots are subject to an easement for utilities and drainage facilities over, under and across a strip of land 2-1/2 feet wide along each side of the interior lot lines within the development, together with a strip of land 5 feet wide along the lot lines around the perimeter of the development.

C. Public and Private Engineering/Transportation Improvements

1. Half street improvements are required on 172nd Avenue NE including asphalt paving 18 feet from centerline to face of curb with appropriate tapers, type A-1 concrete curb and gutter, planter strip, concrete sidewalk, storm drainage, streetlights, street trees, street signs

and underground utilities including power and telecommunications. The minimum pavement section for 172nd Avenue NE shall consist of:

a) 4" Asphalt Pavement Cl. A

b) 5" Asphalt Pavement Cl. E

c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTMD 1557)

d) Street crown 2% sloped to drain system

2. Half street improvements are required on 174th Place NE behind the existing curb and gutter including planter strip, concrete sidewalks, street lights, street trees, street signs and underground utilities including power and telecommunications.

3. On 172nd Avenue NE and 174th Place NE the ASPHALT STREET shall be planed, overlaid, and/or patched to repair damage done by utility cuts and other work, as determined by the Engineering Division.

4. Sidewalks constructed to City standards are required within the pedestrian easements between private Tract E and 172nd Avenue NE and between private Tracts G and H.

5. Other off-site improvements include widening of 172nd Avenue NE on the southbound approach to NE 116th Street as outlined in the SEPA conditions for this Plat.

6. Prior to the City allowing occupancy of any home constructed within the Curry Property Plat, the developer shall design and construct an interim walkway for school children along the east side of 172nd Avenue NE from the pedestrian connection at Tract E to NE 116th Street, along with other minor improvements at the 172nd Avenue NE/NE 116th Street intersection as needed to ensure safe crossing of these streets. The interim walkway shall be constructed of asphalt or Portland cement concrete. The interim walkway shall be a minimum of 5-feet wide when located adjacent to curb and gutter or other traffic barrier acceptable to the City. The interim walkway shall be a minimum of 4-feet wide and located a minimum of 10-feet from the street edge where no curb and gutter or other traffic barrier acceptable to the City exists. A safety railing or fencing will be required when (1) the interim walkway is located at the top of a slope or wall that is 2:1 or steeper and (2) the walkway elevation is 30-inches or higher than the toe of the slope or wall. This requirement is also a condition for the Wynstone Plat located to the north of the Curry Property. The applicant is encouraged to work with the Wynstone Plat applicant to share the cost of this improvement. For that portion of the safe walking route across Tax Parcel 252605-9098, completion of the curb, gutter and sidewalk is likely the most cost effective alternative.

7. All vehicle use areas including driveways, private streets, service areas, etc. shall be paved.

8. Specific subdivision public street improvement conditions for NE 117th Way, NE 119th Court, NE 119th Way, 173rd Place NE:

a) Street improvements within the 50-foot wide dedicated right-of-way shall include asphalt paving (28 feet curb to curb), with appropriate tapers, type A-1 concrete curb and gutter, planter strips, street trees, concrete sidewalks, storm sewers, streetlights, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(1) 3" Asphalt Pavement Cl. B

(2) 4" Asphalt Treated Base

(3) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTMD 1557)

(4) Street crown 2% sloped to drain system

(5) The cul-de-sac on NE 119th Court is required to have a minimum radius of 44 feet to the face of curb. A planter island shall be provided in the center of the cul-de-sac to reduce, as much as possible, the amount of asphalt. The maintenance of the landscape in the island shall be the responsibility of the adjacent property owners. This maintenance requirement shall be included on the face of the final plat.

b) Specific short subdivision private street improvement conditions for the internal streets within Tracts F, G and I:

(1) Street improvements shall include asphalt paving (28 feet), with appropriate tapers, thickened asphalt edge or type A-1 concrete curb and gutter, concrete sidewalk (one side), storm sewers, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(a) 2" Asphalt Pavement Class B

(b) 4" Crushed Rock surfacing

(c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTM D 1557)

(d) Street crown 2% sloped to drain system

c) Specific short subdivision private street improvement conditions for the internal streets within Tracts E and H:

(1) Street improvements shall include asphalt paving (20 feet), with appropriate tapers, thickened asphalt edge or type A-1 concrete curb and gutter, storm sewers, street signs, and underground utilities including power and telecommunications. The minimum pavement section for the streets shall consist of:

(a) 2" Asphalt Pavement Class B

(b) 4" Crushed Rock surfacing

(c) Subgrade compacted to 95% compacted maximum density as determined by modified Proctor (ASTM D 1557)

(d) Street crown 2% sloped to drain system

(2) Installation of mailbox stand(s) shall be in accordance with City standards.

d) All power, telephone, streetlights, etc. shall be shown on the engineering drawings and landscape plans submitted for construction permits.

e) A composite drawing that includes all utilities, landscaping including trees, etc., is necessary to minimize the possibility of utilities/landscaping conflicts.

f) <u>CONVERSION OF AERIAL UTILITIES (POWER, TELEPHONE, T.V., ETC. TO UNDERGROUND)</u>

(1) All aerial utilities shall be converted to underground along all street frontages and within the short plat according to 20D.220.10 "Underground Wiring" in the Redmond Community Development Guide.

D. The applicant shall meet the construction plan and construction requirements in <u>Attachment B</u>, "REQUIREMENTS FOR CONSTRUCTON DRAWINGS" and <u>Attachment C</u>, "GENERAL INFORMATION AND ADMINISTRATION REQUIREMENTS".

III. UTILITIES REQUIREMENTS

A. Sewer

1. Sewer service will require a developer extension of the City of Redmond sewer system as follows:

a) Construct sanitary sewer improvements more or less as shown on the Preliminary Plat drawings dated December 12, 2002.

b) (The sewer main location shown on the site plan may not conform to City standard location. Revisions to comply with City standard locations may be required.)

2. <u>Vehicular access to all new and existing manholes shall be provided.</u> The access easement shall be a minimum of 20 feet in width with asphalt concrete surfacing. Alternative surfacing may be approved by the City depending upon the location. If access passes through fencing then 14-foot minimum width gates shall be provided. The plat or easement document shall (1) show and dedicate the 20-foot access easement, (2) have covenants advising property owners of their obligation to maintain the availability of the access by providing gates and not obstructing the access, and (3) that the property owners maintain, repair and replace the access surfacing as needed.

B. Water:

1. Water service will require a developer extension of the City of Redmond water system as follows:

a) Construct on-site water improvements more or less as shown on the Preliminary Plat drawings dated December 12, 2002. A 12-inch water main shall be constructed to serve the site in 172nd Avenue NE from NE 116th Street to the northern limits of the plat, more or less as shown on the Preliminary Plat drawings. An 8-inch stub shall be extended across 172nd Avenue NE in the vicinity of NE 117h Street and connected with the existing 8-inch main in that vicinity.

b) (The water main location shown on the site plan may not conform to City standard locations. Revisions to comply with City standard locations may be required.)

IV. CLEARING/GRADING AND STORMWATER MANAGEMENT

A. Erosion control systems must be implemented throughout the construction process and until the site is stabilized. Design of all systems must be in accordance with section 20E.90.10 of the Community Development Guide and the most recent issue of the City of Redmond STORMWATER MANAGEMENT AND EROSION CONTROL TECHNICAL NOTEBOOK (notebook). Contact the Stormwater Division at 556-2890 for information about, or a copy of, the notebook. Preferred methods for management and control are discussed in the notebook.

B. Stormwater Management

1. Quantity Control

a) In an open pond; provide detention for peak discharge control to match one half of the 2-year and match the 10-year and 100-year storms natural (prior to any development) runoff peak flow rates.

b) Provide for overflow routes through the site for the 100 year storm runoff (100 year flow may not impact any buildings).

2. Quality control. Use a lined, open pond to provide water quality treatment for the runoff from the 6-month, 24-hour design storm event. Use the developed condition land use when determining the water quality storm flow rate and volume.

3. Provide maintenance vehicle access to the pond bottom and outlet control structure from 174th Place NE.

C. Miscellaneous

1. Construction activities may be limited or suspended during the rainy season (October 1 – April 30).

2. Stencil all on-site storm drainage inlets with "DUMP NO WASTE DRAINS TO STREAM". Stencils are available from the Stormwater Division located at the City Annex (phone 556-2840). Design plans shall identify the requirement to stencil drainage inlets. Easements will be required for any public conveyance systems.

3. Trees are not allowed within 8 feet of storm systems.

4. Ponds shall be lined in accordance with the Department of Ecology Stormwater Management Manual for the Puget Sound Basin, (1992).

5. Designate private roads on the construction plans and plat drawings by adding **(Private)** after the road name.

V. FIRE PROTECTION

A. EMERGENCY VEHICLE ACCESS ROADWAY REQUIREMENTS

1. Emergency vehicle access roadways shall be an unobstructed 20 feet in width and 13' 6" high. Turning radii shall be 25' interior and 45' exterior.

2. Fire lanes shall be located wherever curbs, road edges, or loading areas are adjacent to the 20-foot wide vehicle access roadway. Fire lanes identified through site plan review shall be included on the final civil drawings. Additional fire lanes and marking may be required anytime during the life of the development upon evaluation by and direction of the Fire Marshal. Where fire lanes are a 28 feet wide access tract or easement, the side not

used for parking shall be signed "No Parking - this side" or "No Parking –Fire Lane- this side". If the access tract or easement is 20 feet then both sides shall be signed.

3. Driveway entries or curb returns shall be provided to meet minimum roadway radii at all tracts, easements or other intersections. Do not measure into areas where parking is allowed. This includes where Tract E meets 172nd Ave NE.

4. Traffic circles shall not impede into required radii. The circle at NE 119th and Tract E, and at NE 119th and 173rd AVE NE shall be reduced in diameter to allow through movements in both directions.

B. ADDRESSING

1. Each lot shall have the building address numerals installed per the Redmond Fire Department Design and Construction Guide. A nominal 6-inch high numeral shall be used.

2. Approval is required for building and unit addressing.

3. Temporary signs shall be used at the job site as soon as construction begins. Numerals shall be high contrast in color, face the street fronting the property, and be a minimum 6" high.

4. The "T" road labeled NE 118th shall be called 172nd Ct NE and so signed at the intersection with NE 117th Way. Lots 66, 65 and 64 shall be addressed with 117xx, ascending odd numbers. Lots 62 and 63 shall be addressed with 117xx, ascending even numbers.

5. Lots 14, 13, 16, 15 shall be ascending odd numbers addressed off 174th Pl NE.

C. CITY APPROVED FIRE ALARM SYSTEM: Single station smoke detection is required in all residential occupancies.

D. KNOX BOX: A "Knox" padlock is the only locking device approvable for the bollards at Tract E. Contact the Redmond Fire Department for purchase information.

E. HYDRANTS

1. Hydrants must be in place and serviceable prior to combustible construction.

2. Planter islands or peninsulas for hydrants require a minimum diameter of 8 feet. Four feet is to be maintained between face of curbs and fire protection equipment. Hydrants shall not be located behind parking. See the hydrant on the west side of 173rd Pl NE, just south of NE 118th CT (Tract F). This may need to be moved to the east side of the street.

F. OTHER: ADDITIONAL REQUIREMENTS MAY BE SET ON REVIEW OF CIVIL, ARCHITECTURAL, FIRE ALARM AND/OR FIRE SPRINKLER PLANS.

CONCLUSION

With those conditions of approval recommended herein and with those mitigating measures identified on the threshold determination for this proposal, the Curry Preliminary Plat and the Curry Planned Residential Development proposals appear to be consistent with the applicable Redmond Comprehensive Plan policies. The proposal appears to satisfy the Development Guide's site requirements for residential development, and standards related to streets and utilities improvements, natural features and sensitive areas, and fire protection.

JAMES L. ROBERTS
Assistant Director
Department of Planning and Community Development

RICHARD BARTHOL
Assistant City Engineer
Public Works Department

Attachment A
General Planning Requirements

Topic	Code Reference *	Brief Explanation
Drawing Submittal Requirements		
Landscape Plan		Preparer: Prepared or approved by a licensed landscape architect, registered WA certified nurseryman or registered WA certified landscaper. Note certification on all landscape related plans. Scale: 1"=20'; Submittal Timeframe: With the building permit/construction drawings; Required Elements: (1) Conditions of approval listed; (2) Complete plant schedule listing for each plant with the scientific and common names, quantities, size in height/spread, and spacing; (3) Identify which trees are designated as replacement trees, saved trees, and new planting. Show locations of trees in relation to water and drainage lines; (4) Note the area in square feet and the percent of the total site devoted to the following type of landscaping: perimeter, interior parking lot, building foundation, and courtyard/patio/plaza.
Tree Preservation/Tree Replacement Plan		Preparer: Prepared or approved by a licensed landscape architect, registered WA certified nurseryman or registered WA certified landscaper. Note certification on all landscape related plans. Scale: 1"=20'; Submittal Timeframe: With the building permit/construction drawings; Required Elements: (1) Conditions of approval listed; (2) Show location, species, size of trees designated for retention; (3) List total percentage of trees to be retained (4) Identify size and species of replacement trees (5) Show all tree protection measures.
Reduced set of the building permit/construction drawings		Must be submitted with the building permit/construction drawings. Either 8 ½ x 11 or 11 x 17 is acceptable.
Restrictions		The following statement must be included on the mylars and all construction drawings: "Trees to be preserved shall be designated in accordance with the approved tree preservation plan on file with the City of Redmond Planning Department. Designated trees which are damaged or destroyed shall be replaced in accordance with RCDG Section 20D.80.20-080, or as hereafter amended."
Required Bonds		
Landscape and Irrigation Improvements Performance and Maintenance Bonds	RCDG 20D.80.10-190 RCDG 20D.80.10-050	Purpose: Performance security for landscape improvements; Estimate: Submit estimate with quantities, sizes, and unit costs for planting and an overall cost for irrigation and labor with the building permit/construction drawings; Bond Submittal Timeframe: Prior to issuance of the building permit/construction drawings. Amount: Must represent 100% of the cost of the improvements, 15%

Topic	Code Reference *	Brief Explanation
		contingency, and 8.6% sales tax; Maintenance Bond: A 1 year maintenance bond shall be required for the release of the performance bond. Maintenance bond shall be valued at 10% of the performance bond.
Tree Protection Measures Bond	RCDG 20D.80.20-120(1)	Purpose: Ensure the installation, maintenance and adequate performance of tree protection measures; Bond Submittal Timeframe: Prior to issuance of the building permit/construction drawings. Amount: equal to 150% of the City's estimated cost of replacing each protected tree ($250.00) plus 8.6% sales tax; Estimate: Submit estimate of bond amount with the building permit /construction drawings; Bonding period: 5 years; Note: Prior to issuance of the CO, any protected tree found to be irreparably damaged, severely stressed or dying shall be replaced.
Tree Replacement Bond	RCDG 20D.80.20-120(2)	Purpose: Ensure survival of replacement trees; Bond Submittal Timeframe: Prior to issuance of the building permit/construction drawings. Amount: Equal 150 percent of the cost of plant material, periodic fertilizing and pruning and labor until tree survival is ensured, plus 8.6% sales tax; Estimate: Submit estimate of bond amount with the building permit /construction drawings; Bonding period: 3 years
General Requirements		
Landscaping Improvements		
Automatic Irrigation System	RCDG 20D.80.10-180	An automatic irrigation system shall be installed in all planting areas over 500 square feet. An irrigation plan must be submitted with the final landscape plan. Irrigation systems in the public right of way will require an Extended Use Permit.
Adjacent Unimproved Right-of-way	RCDG 20D.80.10-110	Adjacent unimproved portion of the public right-of-way shall be landscaped from the property line to the edge of the pavement and shown on the landscape plan. The installation of private irrigation facilities in the public right of way requires an Extended Right of Way Use Permit and related Certificate of Insurance. Please contact the Public Works Department regarding this permit.
Coordination With Water/ Sewer Lines & Fire Hydrants	RCDG 20D.80.10-150(8)	Trees shall be planted a minimum of 8 ft from the centerline of any water/sewer lines. Shrubs must be planted a min of 4 ft from the center of all fire hydrants/connections.
Site Clearance	RCDG 20D.80.10-150(2)	Planting must meet site clearance requirements at intersections
Minimum Tree Size at Installation	RCDG 20D.80.10-100(5)	Deciduous trees: 2" caliper; Vine maples and other multi-stemmed trees: 7'-8' minimum height; Evergreen trees: 6'-7' minimum height; Medium and tall shrubs: 24"-30" minimum height; Groundcover: 4" container (18" o.c.).
Minimum Planting Area	RCDG 20D.80.10-120	All planting area shall be 100 square feet and no less than 5 ft in width or length.
Spacing of Parking Trees from Curbs	RCDG 20D.80.10-150(5)	Trees shall be planted at least 4+ feet from pavement edges where vehicles overhang pavement edges.
Ground Cover Plantings	RCDG 20D.80.10-	Bark, mulch, gravel or other non-vegetative material

Topic	Code Reference *	Brief Explanation
	100(7)	shall only be used in conjunction with ground cover plantings to assist growth and maintenance or to visually complement plant material.
Sensitive Areas		
Final Sensitive Area Report	RCDG Appendix 20D-2	A final sensitive area report and mitigation plan must be submitted with the building permit/construction drawings.
Recording of Sensitive Area	RCDG 20D.140.10-110(3); 20D140.10-100(6); 20D.140.10-090(6); 20D.140.10.290(2)(j)	The regulated sensitive area and its associated buffer must be protected by a NGPE or placed on a separate tract where development is prohibited. Proof of recording must be submitted to the City prior to issuance of Certificate of Occupancy.
Sensitive Area Contingency Plan	RCDG 20D.140.10-330	Must be established for indemnity on the event that the sensitive area mitigation project is inadequate or fails.
Tree Preservation	RCDG 20D.80.20-080 (4)	All construction activity is prohibited within 5 ft of the drip line of protected trees. Refer to the code section for additional tree protection measures.
Tree Replacement	RCDG 20D.80.20-080	The planting of replacement trees must be in accordance with the guidelines outlined in this code section. All required tree replacement and other required mitigation must be completed prior to issuance of a CO/recording of final plat.

* Code References:
RCDG - Redmond Community Development
RMC – Redmond Municipal Code
UBC – Uniform Building Code
WAC – Washington Administrative Code

Attachment B
Requirements For Construction Drawings

I. Engineering/Transportation

A. General Requirements

1. **Engineering Plans** for on-site and off-site drainage (storm water management), clearing, grading, utility and street improvements are required. The plans shall be prepared by a registered engineer and shall be reviewed and approved by Public Works Department prior to issuance of the building, foundation, clearing and grading or street use permits. Plan size must be 22" x 34" at a scale of 1" = 20' unless otherwise approved by the City. **The following design manuals should be obtained to guide design work:**

   a) Standard Specifications and Details

   b) Clearing, Grading and Storm water Management Redmond Technical Notebook

   c) Design Requirements for Water and Sewer System Extensions

   d) Community Development Guide

   These manuals reference a number of other commonly used engineering standards. It is vital the design professional performing this work be aware of the City and other pertinent standards to reduce review time. ***The City will not accept designs that deviate from the standards without substantial justification.*** Early consultation between design professionals and City staff is highly recommended if a design will propose deviations.

   All power, telephone, streetlights, etc. shall be shown on construction drawings to facilitate identification and resolution of utility conflicts. All utilities to individual homes and on new streets shall be placed underground unless specifically exempted in rare cases for existing homes. All existing aerial utilities shall be converted to underground along all street frontages.

   The designer must be sensitive to the existence or creation of utility easements within the project. Permanent structures not associated with the utility use—including rockeries—shall not be built within easements.

   When construction drawings are submitted for review, eight (8) complete copies of the civil plans and two (2) sets of drainage computations and studies are required for a complete submittal. Only complete submittals will be accepted for review. (After the initial submittal, fewer copies may be required. If desired, you may contact Public Works at 556-2740 to determine the exact number required.)

At the time of construction drawing approval, a digital file of the drawings shall be submitted to the city. File format shall conform to the requirements identified under '2000 Record Drawing Requirements' (see below).

B. Survey Control

1. Vertical control: Elevations must be referenced to City of Redmond Datum. This Datum is based on the U.S.C. & G.S. benchmark B-385 (1927). The Surveyor must tie the project to two numbered benchmarks. A publication of the benchmarks may be purchased from the City's Public Works service counter under the name City of Redmond Vertical Control Survey February 1990.

2. Horizontal control: The surveyor shall tie the project to two City of Redmond horizontal control monuments. The plans shall show NAD 83-91 coordinates on a minimum to two points at exterior lot/boundary corners. A publication of the Redmond City Horizontal Control Notebook dated 1993 can be purchased at the Public Works service counter.

3. New and Existing Monumentation: New survey monuments shall be installed at new street intersections, street tangent points and center of cul-de-sacs in accordance with the City of Redmond Standard Details. Existing monumentation must be identified on the construction plans and maintained by the contractor throughout the construction period.

C. Street Design:

1. Civil plans for all public and private street construction must include existing and proposed centerline profiles and curb/edge of pavement elevations. Cross sections at regular stationing along the length of the project may be required.

2. All intersection shall be "+"-type intersections with side streets aligned with each other, or "T"-type intersections with side streets separated by a distance of at least 150 feet.

3. Horizontal alignment shall indicate radius, length of tangent between curves, and length of curve. Minimum curve radii and tangents shall comply with the requirements stated in Appendix 20D-3 in the Redmond Community Development Guide.

4. Vertical curves shall indicate length of vertical curve, slopes, and length of tangent between curves. Minimum stopping sight distance for design shall be 450 feet on arterials and collectors, 225 feet on local public access, and 150 feet on private streets. Minimum tangents shall comply with the requirements stated in Appendix 20D-3 in the Redmond Community Development Guide.

5. Cross slopes and superelevation of roadways shall not exceed two (2) percent unless approved by the City of Redmond Public Works Department.

6. On sloping approaches at intersections, landings are not to exceed 2 feet difference in elevation for 30 feet approaching an arterial or 20 feet approaching a local access street (measured from the back of sidewalk or the back of curb if no sidewalk exists).

7. Curb radius shall be 25 feet for local access streets and 30 feet for arterial and collector streets.

8. Street rights-of-way shall intersect at 80 to 90 degrees where possible.

9. Sight Distance: Adequate entering sight distance shall be maintained at all connections to public streets in accordance with Section 20D.210.25 "Sight Clearance at Intersections" of the Redmond Community Development Guide, pages 347 and 348. The appropriate sight distance triangles shall be drawn on the civil and landscaping plans.

10. Any pedestrian crossings at intersections, or across curb return type driveways need to include handicap ramps. These ramps must be designed to meet the most recent ADA standards.

D. **General Notes:** The following notes shall be included on the construction plans for this project:

1. Safety railings shall be required when the bottom of a rock wall, retaining wall or slope is 30" or more below the finished elevation of a sidewalk or other pedestrian facility.

2. WSDOT approved guard rails shall be required as directed by the City Inspector, subject to approval by the City Transportation Engineer.

3. Contractor is responsible for installing all signs and channelization per City of Redmond standards. Contractor shall lay out all signs and channelization, and then contact Deby Canfield, Senior Transportation Technician, at (425) 556-2752 48 hours in advance of installation to verify layout.

4. All necessary signs and markings on-site, along property frontage, and at specifically designated off-site locations shall be provided by the applicant as required by the Transportation Division whether or not these are indicated on the construction drawings.

5. When requested by the City Inspector, the geotechnical engineer employed by the developer shall verify and subsequently advise the City of Redmond that the installation of the paving section(s) conforms to his/her design. The project will not be accepted until this written documentation is submitted.

E. Signs, Striping, Street Lighting and Signals

1. Separate 40 scale channelization plans are required for all public streets being modified or constructed. The plan shall include the existing and proposed signs, striping and street lighting for all streets adjacent to the site and within 150 feet of the site property line (both sides of the street). The plan shall conform to the requirements in the City of Redmond Standard Specifications and Details Manual.

2. All traffic control devices, including signs and pavement markings, shall conform to the MUTCD and the City of Redmond Standard Details. The Transportation Division shall approve all layouts prior to installation.

3. Streetlights are required on the internal plat streets to illuminate the property frontage. The street lighting shall be designed using the following criteria:

Table 2: Street Lighting

Roadway Classification	*Area Classification*	*Average Illuminance (Foot-candles)*	*Uniformity Ratio (Average/Minimum)*
Collector and Local	*Residential*	*0.6-0.4*	*6:1*

Luminaire spacing should be designed to meet the specified criteria for the applicable lamp size, luminaire height and roadway width. Contact Dave Alm, Transportation Operations Manager, at (425) 556-2875 with questions.

Attachment C
General Information and Administration Requirements

I. FEES:

A. Parks: Parks impact fees will be assessed at time of building permit issuance per the adopted fee schedule.

B. Water/Sewer

1. Plan review and construction inspection fees are required and will be at the rate in effect when plans are approved. Connection fees are at the rate in effect when water meter and side sewer permits are issued. Contact the Utility Division of the Public Works Department to obtain an estimate of the fees that will apply.

2. All reimbursement fees shall be paid prior to sale of water and side sewer permits. Reimbursement fee may be required prior to plat or short plat recording.

C. Fire: This development will be assessed impact fees per the adopted fee schedule.

D. Stormwater - Fees to be Paid Prior to Permit

1. Fees must be paid for construction drawing review and for construction inspection.

2. Based upon the plans presented, the **construction drawing review fee** is estimated to be **$2,437.00**. A deposit equal to that amount is due and payable when construction drawings are presented for review. The construction drawing review fee will be adjusted to account for plan changes during review and will be determined prior to drawing approval. If the adjustments cause the fee to exceed the deposit, the balance due must be paid prior to approval of drawings. If adjustments result in a final figure less than the deposit, the overpayment may be credited against the subsequent fee below or will be refunded.

3. A **construction inspection fee** equal to the final construction drawing review fee is due and payable at the time a permit is issued.

4. Based upon the current estimate, the total storm water review and inspection fees for this project will be approximately **$4874.00**. Crediting the project with the initial deposit of $304, the total amount due will be approximately **$4570.00**.

E. Engineering/Transportation

1. A plan review fee shall be paid to both the water and sewer utility and the storm water utility prior to construction drawing review. Inspection fees shall be paid to the utilities prior to construction drawing approval. Plan review and construction inspection fees are required and will be at the rate in effect when plans are approved. Contact the respective utility for fee information.

2. Water and sewer connection fees for homes built on the proposed lots will be paid at the rate in effect when water meter and side sewer permits are issued. Contact the Utility Division of the Public Works Department at 556-2840 to obtain information and/or an estimate of the fees that will apply.

3. Non-Utility Plan Review and Inspection fees are paid through the Engineering Plan Review and Inspection Fee (subject to annual revision.) The fees are (subject to annual revision): Subdivision Fee = $5,988 plus $436/lot *.

4. Transportation Impact Fees: This project is subject to Redmond Transportation impact fees. Transportation impact fees shall be collected at time of building permit issuance.

5. The City has recently imposed other impact fees on development. Contact the Permit Center to determine the extent to which these fees apply to this development.

6. A Street Use Permit will be required and includes:

   a) A maximum of $324* fee (subject to annual revision) for utility installation in the public right-of-way.

   b) A posting of a $250 cash bond for street cleaning.

   c) Note: * A 3% technology surcharge will also be applied to these fees effective January 1, 2001 through December 31, 2002, as authorized by Ordinance No. 2090, adopted on December 5, 2000.

II. Easements/Agreements:

A. Planning: Refer to Attachment A for Requirements.

B. Water/Sewer

1. Easements shall be provided for all water and sewer improvements as required in the design requirements. <u>Offsite easements must be recorded prior to construction drawing approval.</u> Onsite easements must be recorded prior to the improvements being placed into operation.

C. Engineering/Transportation

1. A copy of all recorded easements pertaining to the property is required. Permanent structures including rockeries cannot be built over easements.

2. Easements shall be provided for all water, sewer and storm water improvements (both public and private) as required in the design requirements. **Off-site easements needed to execute the proposed improvements must be recorded prior to construction drawing approval.** On-site easements must be recorded prior to the improvements being placed into operation.

3. When clearing and grading involves excessive amounts of hauling, as determined by the Public Works Department, a Road Surface Impact Mitigation item shall be negotiated prior to approval of the Clearing and Grading Plans.

4. Any required landscape irrigation in the City of Redmond right-of-way necessitates the execution of a Hold-Harmless Agreement and submittal of as-built construction plans to the City.

D. Approvals and Reports

1. Water/Sewer:

   a) <u>Agency Approvals</u>, Construction drawings for sewer improvements shall be reviewed and approved by Metro and DOE prior to construction. Construction drawings for water improvements may need to be reviewed and approved by DSHS prior to construction.

b) Bill of Sale. A Bill of Sale shall be provided for all water and sewer improvements to be owned and operated by the City.

c) Asset Summary. A Developer Extension Asset Summary shall be provided for all water and sewer improvements to be owned and operated by the City.

d) Permit Applications. Water meter and side sewer permit applications shall be submitted for approval to the Utility Division. Permits and meters will not be issued until all improvements are constructed and administrative requirements are complete. Requests to install water meters or construct side sewers prior to completion of all water and sewer improvements and administrative requirements will only be approved on a case by case basis after review of the project specifics. Various additional guarantees or requirements may be imposed as determined by the Utilities Division for issuance of meters and permits prior to improvements or administrative requirements being completed.

e) Reimbursement Agreement: Portions of this extension may benefit other properties and meet the criteria to be eligible for a reimbursement agreement. In order to be eligible for reimbursement, the City must have received a completed reimbursement agreement application prior to approval of construction drawings and the agreement must be fully executed, by the City, prior to commencement of construction of the facility.

2. Stormwater: A copy of the conditions of approval (this letter) must accompany all Grading and Storm drainage plan submittals.

3. Engineering/Transportation: In order to mitigate potential impacts to critical landslide hazard areas, all buildings shall be set back from the top/bottom of slope areas a distance as recommended by a geotechnical engineer through a slope stability analysis, but no closer than 15 feet. The top/bottom of the slope shall be field surveyed and verified (located by bearings and distances) on the final plat and construction drawings.

E. Bonds and Performance Guarantees:

1. Planning: Refer to Attachment A for Requirements.

2. Water/Sewer

a) Performance Guarantee. A performance guarantee shall be provided in a form acceptable to the City for sewer and water improvements as follows:

(1) Plats and short plats: All water and sewer improvements within City right-of-way or easement and any other portion of the improvements as required by the Utility Division.

(2) For any improvements not completed at time of recording of the plat or short plat.

(3) The amount of the performance guarantee shall be established by the City upon review of estimates prepared by the applicant and the guarantee shall be provided prior to plan approval.

b) Maintenance Guarantee. A maintenance guarantee shall be provided in a form acceptable to the City for all water and sewer improvements to be owned and operated by the City. Period of guarantee shall be 1 year from acceptance of all improvements by the City.

3. Engineering/Transportation:

a) A performance guarantee shall be provided in a form acceptable to the City for street, water, sewer and storm water improvements. An acceptable performance guarantee includes a performance bond, irrevocable letter of credit, or cash. (In some unusual circumstances assignment of loan proceeds may be acceptable.) The amount of the bond shall be 125% of the estimated cost. **Only City of Redmond security forms are acceptable.** The performance guarantee will not be released until letter from the Director of Public Works advises the developer that all conditions of approval have been met. Circumstances that require performance guarantee are as follows:

(1) Subdivision:

(a) The street and utility improvements within existing and new street right-of-way.

(b) Off-site storm drainage, water and sanitary sewer installation.

b) A maintenance guarantee shall be provided for all water, sewer, storm water and street improvements to be owned and operated by the City. Period of guarantee shall be 1 year from acceptance of all improvements by the City. (The City has authority to require a longer period where circumstances warrant.)

c) A cash deposit (refundable cash bond) shall be posted at the time of posting the performance guarantee to ensure the completion of the Record Drawing set. The minimum amount shall be $5,000.00, or as determined by the Engineering Division. The deposit for sets having a large number of sheets shall be established at $1,000.00 per sheet, not to exceed $25,000.00.

III. RECORD DRAWING REQUIREMENTS

A. Water/Sewer:

1. As-built Drawings. As-built utility drawings shall be submitted to the City prior to the improvements being placed in operation.

2. Construction Drawings. Construction drawings for water and sewer improvements shall be prepared in accordance with the Design Requirements for Water and Sewer System Extensions prepared by the Utilities Division of the Department of Public Works. A plan review fee shall be paid to the water and sewer utility prior to construction drawing review. An inspection fee shall be paid to the water and sewer utility prior to construction drawing approval. Contact this utility at 556-2840 for further information on fees and amounts.

B. Engineering/Transportation: One of the important steps upon the completion of construction improvements in the City of Redmond is a submittal of Record Drawings. The drawings are important assets to the City as well to its residents and customers. They are used for many purposes, ranging from indicating what was actually constructed in the field to helping locate facilities during emergency situations.

1. *What items shall be included?:* Record drawings will show accurate locations of storm, sewer, water mains and other water appurtenances, structures, conduits, power poles, light standards, vaults, width of streets, sidewalks, landscaping areas, building footprints, channelization and pavement markings, property lines, easements, etc.

2. *What are the accuracy requirements?:* The drawing will be accurately located in state plane coordinates using NAD-83-91 survey control and tied to any 2 City of Redmond Horizontal Control Monuments. The following is a partial list of the construction items and tolerance limits to be incorporated into the Record Drawings. Other items and tolerances shall be required depending on the type of improvements constructed.

a) Surveyed Sewer and Storm water elevations........................ +/-0.01'
Includes pipe invert elevations, top of castings (manholes, inlets, etc.)

b) Surveyed Water elevations.. +/-0.25'

c) Horizontal and vertical alignment...................................... +/-0.1'

3. *What is required from you?:* The Record Drawing delivery shall be in electronic as well as in hard copy format. Each drawing, except for the Digital file, shall bear the P.E./P.L.S. Stamp, Signature and Date and be reproduced on the following media:

a) Preliminary Submittal:

(1) Two sets of full size prints.

(2) Digital files with drawing/layer documentation.

b) Final Submittal:

(1) Full size PHOTOGRAPHIC MYLAR Sepia or Xerox mylars will not be accepted.

(2) 11"x17" PHOTOGRAPHIC MYLAR, matt finish preferred.

(3) 8-1/2"x11" PHOTOGRAPHIC NEGATIVE

(4) Three sets of full size PRINTS.

(5) Digital files with drawing/layer documentation.

4. *How does the Preliminary Record Drawing Submittal and Review Process work?:* Upon completion of improvements and prior to project acceptance, Record Drawings in digital and hard copy format shall be submitted for review and approval.

a) Submit 1 digital copy and 2 hard copy sets for review to Engineering Division, 3rd Floor, City Hall, Please call (425) 556-2735 if you have any questions.

b) If review of the preliminary Record drawings reveals errors and/or omissions, the digital files and drawings (redlines copies) will be returned to the Engineer/Surveyor for corrections. The Engineer/Surveyor shall make all corrections in the digital copy of the original construction plans and re-plot the hard copy. Please resubmit the digital files, two revised plans sets derived from the revised digital files and redlines for re-review. Upon approval of preliminary record drawings, the Engineer/Surveyor will be notified by the Public Works, Engineering department to proceed with the "Final Submittal".

5. *Who should approve the final drawings before submitting it to the City?:* The final drawings shall be prepared and stamped by a Professional Engineer and/or Professional Land Surveyor currently licensed in the State of Washington verifying that all improvements have been built in accordance with the approved construction plans and that all changes will be accurately noted in the digital file on the appropriate plan sheets and detailed drawings. The hard copy submittal derived from the digital file shall reflect these changes.

6. *What should the electronic delivery include?*

   a) All sheets of the original digital construction plans with noted construction changes. The construction contractor and/or design consultant shall record all field changes and any existing utilities encountered during construction.

   b) All Record Drawing changes will be made in the digital format.

   c) Changes to text: invert elevations, dimensions, notes, etc. will be lined out with the Record Drawing text placed above it. Do not alter, modify or erase original approved design text.

   d) Changes made to Graphic features: pipe, catch basins, hydrants, etc. shall be moved to reflect their accurate surveyed locations.

   e) An overall digital site plan.

   f) A detailed digital and/or hard copy list of drawing files with the corresponding layers/levels and their contents will be included with the digital drawing file. The list shall include but not be limited to: Digital File names, Drawing names (logical), Level number/Layer name and Level/Layer description.

7. *Do Record Drawing changes need to be made in the Original Digital Construction Drawing?: Yes, all changes need to be made to the original City Approved digital Construction files and then re-plotted to create the hard copy submittal. Digital Record Drawings created from anything other than the digital construction drawings will not be accepted. Hand drafted changes to Mylar or paper copy submittals will not be accepted.*

8. *What format should the electronic delivery be in?*

   a) Digital files shall be provided in a version of MicroStation ".DGN" (preferred), or AutoCAD (". DWG" format) deemed acceptable by the City. All support files required to display or plot the files in the same manner as they were developed shall be delivered along with these files. These files include but are not limited to (MicroStation) Customized Line Styles libraries, Cell Libraries, Font Libraries, Pen Tables and Referenced Files, (AutoCAD) Block Libraries, Font Files, Menu Files, Plotter Setup and Referenced Files. Do not include P.E./P.L.S. stamps, signature and border files. Scanned hard copy drawings using raster to vector conversions will not be acceptable digital format.

   b) The files will be submitted on a recordable compact disc (preferred) or MS-DOS formatted 3.5" floppy disk(s). Each disc will be labeled with the project name and the name of the company that prepared them.

   c) The drawing will be at full scale. Microstation working units will be set to 1:1000 with Master units set to "ft" for site plans; The drawing will be accurately

c) Haul hours will be within the hours of 9 a.m. - 4 p.m. and 6 p.m. to 10 p.m. On Saturdays, hauling may be continuous between 9 a.m. -10 p.m. as long as it is in compliance with the City's noise ordinance.

d) The applicant shall provide street sweeping at all times during hauling.

e) The applicant shall repair and/or replace any traffic markings (i.e., buttons, arrows, etc.) damaged during the hauling operations.

f) The Public Works Director shall retain the authority to stop or reroute hauling or change hours of hauling if operating times are unsatisfactory or inclement weather adversely affects City facilities.

g) In certain circumstances, a Clearing and Grading Permit (clearing prior to having all final plans approved) may be granted prior to Building Permit issuance.

5. Construction activities may be limited or suspended during the rainy season (October 1 – April 30).

APPENDIX C

Geotechnical Report

Associated Earth Sciences, Inc.

December 7, 2000
Project No. KE00782G

Cam West Development, Inc.
9720 NE 120th Place, Suite 100
Kirkland, Washington 98034

Attention: Mr. John Harkness

Subject: Preliminary Geotechnical Engineering Report
Curry Property
11840 - 172nd Avenue NE
Redmond, Washington

Dear Mr. Harkness:

In accordance with your request, this report presents the results of our subsurface exploration and preliminary geotechnical engineering study for the proposed Curry property. Our services have been performed for the exclusive use of Cam West Development, Inc. and their agents for specific application to this project in accordance with generally accepted geotechnical engineering practice. No other warranty is expressed or implied. Our services have been performed in accordance with our confirming proposal, dated November 17, 2000.

It should be noted that this report is preliminary in nature, and is intended to provide Cam West Development, Inc. and their design team with geotechnical information needed to make site and project planning decisions. We recommend that we be allowed to complete a thorough geotechnical investigation for the project once a site layout and project design plan are prepared. The recommendations in this letter should not be used as the sole geotechnical input to a final design for the project.

SITE DESCRIPTION

The project site is located at 11840 172nd Avenue NE in Redmond, Washington. The property fronts some 985 feet on the east side of 172nd Avenue NE and extends some 630 to 830 feet to the east. The site presently supports two single-family residences, each serviced by standard utilities. One residence is abandoned and fronts 172nd Avenue NE while the other is habited and is accessed off 174th Place NE. An old barn is situated roughly in the middle of the approximately 15-acre property. The site slopes gently to the southeast on the order of 3.5 to 5.5 percent. Overall site relief is on the order of 40 feet. Vegetation on the site consisted of several open grass fields amongst a medium dense to dense forest of mixed deciduous and coniferous trees with moderately dense undergrowth. One possible wetland area has been identified in the northeast portion of the site by others.

SUBSURFACE EXPLORATION

Subsurface conditions were evaluated by excavating 10 exploration test pits (EP-1 through EP-10) on November 28, 2000 utilizing a rubber-tired backhoe under subcontract to our firm. Representative samples of subsurface soils were obtained from each exploration pit where conditions changed. The test pits were observed and logged by a geologist from our firm. The exploration logs presented in Appendix A are based on the field logs, digging action, and inspection of the samples secured. The attached Site and Exploration Plan, Figure 1 shows the approximate locations of our exploration test pits shown on the topographic and tree survey dated December 30, 1999 prepared by Concept Engineering, Inc.

SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, visual reconnaissance of the site, and review of applicable geologic literature. As shown on the field logs, the explorations generally encountered a 6 to 12 inch layer of topsoil overlying glacially consolidated till deposits. The unweathered glacial till deposits generally consisted of dense to very dense, moist, gray, silty sand and some gravel. The unweathered till at depth was overlain by a weathered section consisting of medium dense, moist, brown, silty sand and some gravel. The weathered till was generally observed to a depth of 2 to 4 feet.

A review of the *Geologic Map of the Redmond Quadrangle, King County, Washington* (Minard, and Booth, 1988) indicates that the sediments encountered in our explorations are generally consistent with those identified on the referenced maps.

Ground water seepage was observed in exploration test pit EP-10 at a depth of 2½ feet at the contact between the medium dense weathered till and the dense to very dense unweathered glacial till. Orange mottling was observed in exploration pits EP-1 and EP-3 through EP-10 to a depth of 3 to 6 feet. The ground water seepage and orange mottling are indicators of a "perched" water condition. A "perched" water table occurs when surface water infiltrates down through relatively permeable soils and becomes trapped or "perched" atop a comparatively impermeable layer such as the glacial till. It should be noted that fluctuations in the level of ground water may occur due to the time of year and variations in rainfall. Once encountered during excavation, the quantity and duration of flow of perched ground water will vary depending on season and topography.

CONCLUSIONS AND RECOMMENDATIONS

This site appears generally suitable for development of the proposed new residential subdivision. Glacial till soils can be anticipated to provide good shallow foundation support for conventional shallow foundations bearing on undisturbed native soils. Till soils are also highly moisture-sensitive. If site grading were to proceed during the wet winter months, it would be necessary to expend significant effort to reduce the moisture content of excavated site soils in order to allow their reuse in structural fill applications. Moisture reduction can typically be accomplished through aeration and drying during favorable dry and warm weather, or by use of moisture reducing admixtures such as Portland cement or fly ash. If these drying measures are not or cannot be implemented, a significant portion of the site soils may not be available for reuse in structural fill applications and imported fill. Free-draining imported fill material will be required in some applications regardless of site conditions at the time of construction, such as for pavement subbase, backfilled wall drainage layers, capillary break material below floor slabs, and for footing drain backfills. It should be noted that site soils will likely have a lower moisture content during the dryer months of the year, typically mid summer through September or October. Earthwork during this time of year is expected to require less effort for drying soils with high moisture content.

FOUNDATION CONSIDERATIONS

For preliminary design purposes, allowable foundation bearing pressures of 3,000 pounds per square foot (psf) or higher can be anticipated on undisturbed native soils. If foundations are constructed above structural fill placed above suitable native soils, allowable bearing pressures should be limited to no more than 3,000 psf.

PAVEMENT CONSIDERATIONS

Till soils will provide suitable support for flexible pavements and concrete walkways; however, granular subbase courses may be required, particularly beneath heavy traffic areas such as the main roads and entryways. Subbase course might be omitted beneath passenger car driveways and parking areas; however, reduced pavement service life could result. Final pavement design on this site should be based on an estimated California Bearing Ratio (CBR) and the minimum City of Redmond standards for the proposed level of services and use classification.

SITE GRADING

The site soils are typically silty and highly moisture sensitive. Project planning should assume that at least some of the site soils will be above optimum moisture even during dry summer months, and will require drying during favorable weather or other special treatment to prepare them for use in compacted fills. We recommend that grading at this site be scheduled only during the fall or summer, when weather conditions are typically dryer. Grading during seasonal dry weather will reduce the amount of soils that will be wetter than optimum, and will provide suitable conditions to dry the soils for later use. If site grading must proceed in the spring or winter, it is likely that less of the on-site soils will be available for reuse in compacted fills.

SITE DRAINAGE

Shallow ground water seepage was present in one of the exploration test pits completed for this study. We recommend that project plans include perimeter foundation drains for all buildings, and include contingencies for french drains to be added, if warranted, at selected locations based either on the final site layout and exploration information or on-site conditions at the time of construction. We could provide more specific recommendations for site drainage improvements when a site layout plan is available and a final geotechnical investigation has been completed.

EXISTING WELL

An existing drinking water well was observed adjacent to the vacant home at 11840 172nd Avenue NE. If this well in not incorporated into the proposed development, it should be abandoned in accordance with the State of Washington RCW 88-08-070.

CLOSURE

It has been our pleasure to provide you with this information. Should you have any questions regarding this report or other geotechnical aspects of the project, please do not hesitate to call. Upon completion of the site layout and preliminary project plans, we would be available to provide a thorough geotechnical evaluation of the site and a final geotechnical report for the project which addresses requirements specific to the planned project.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

KURT D. ... STATE OF WASHINGTON ... 23... REGISTERED PROFESSIONAL ENGINEER

12/11/00

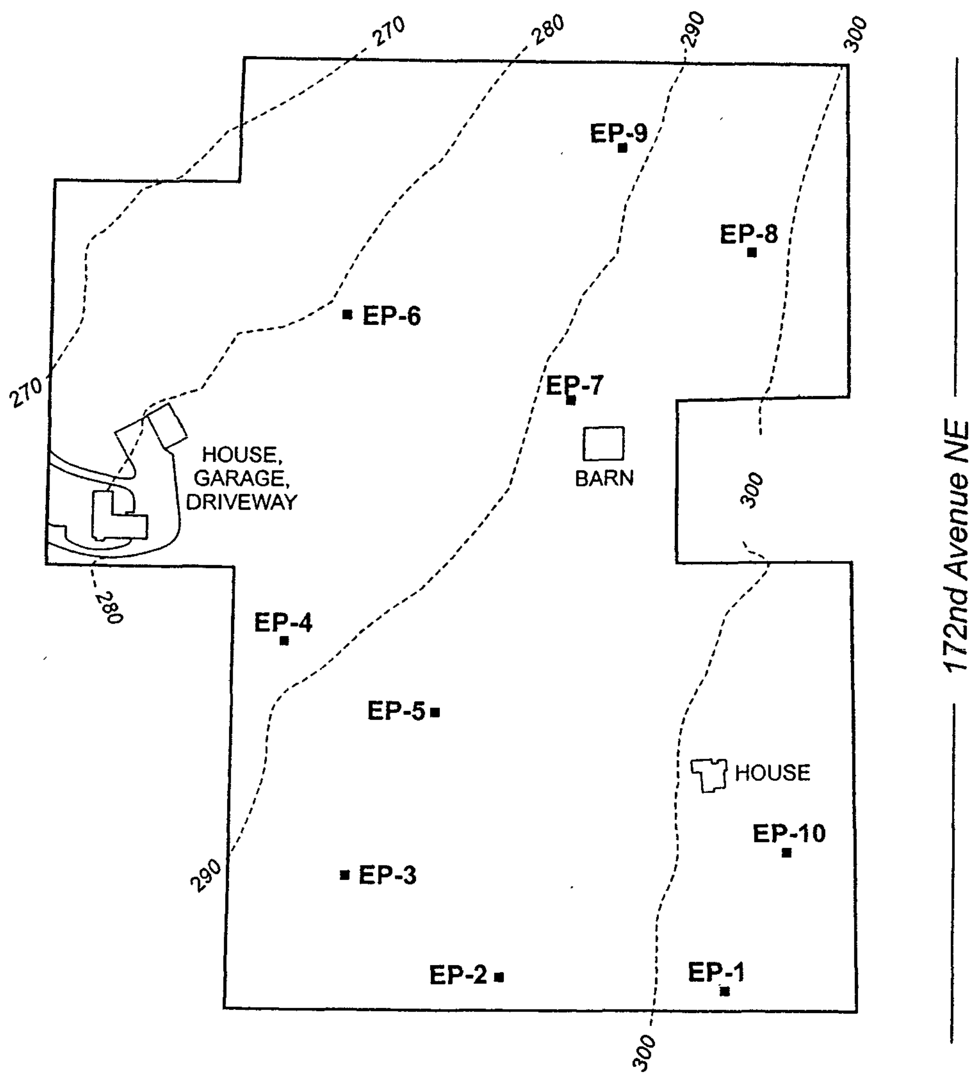
EXPIRES 11/20/02

Jesse P. Overton
Staff Geologist

Kurt D. Merriman, P.E.
Associate Engineer

Attachments: Figure 1: Site and Exploration Plan
Appendix A: Exploration Logs

JPO/da
KE00782G1
LD-D:\da\12-00 - W2K



LEGEND

EP-1 Approximate location of exploration pit

N

0 200

SCALE IN FEET

REFERENCE: CONCEPT ENGINEERING, INC.

Associated Earth Sciences, Inc.

SITE AND EXPLORATION PLAN
CURRY PROPERTY
REDMOND, WASHINGTON

FIGURE 1

DATE 12/00

PROJ. NO. KE00782G

00782 curry property\00782-site.cdr page1

LOG OF EXPLORATION PIT NO. EP-1

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth, ft	DESCRIPTION
	Topsoil
	Medium stiff, moist, dark brown, SANDY SILT, root ladened.
1	**Vashon Till (Qvt)**
2	Medium dense, moist, brown, SILTY SAND, some gravel.
3	Dense to very dense, moist, gray, SILTY SAND, some gravel.
4	
5	
6	Grades to SAND with silt at ~6'. Orange mottling to 6'.
7	
8	Bottom of exploration pit at depth 8 feet
9	
10	

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

LOG OF EXPLORATION PIT NO. EP-2

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Topsoil Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	Medium dense, moist, brown, SILTY SAND, some gravel.
2	Dense to very dense, moist, gray, SILTY SAND, some gravel.
3	
4	
5	
6	
7	
	Bottom of exploration pit at depth 7 feet
8	
9	
10	

KCTP3 00782.GPJ November 29, 2000

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

LOG OF EXPLORATION PIT NO. EP-3

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Topsoil Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	Medium dense, moist, brown, SILTY SAND, some gravel and roots.
2	Medium stiff, very moist, orange mottled gray, SANDY SILT, some gravel.
3	
4	Dense to very dense, moist, gray, SILTY SAND, some gravel.
5	
6	
7	
8	Bottom of exploration pit at depth 8 feet
9	
10	

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G

November 2000

LOG OF EXPLORATION PIT NO. EP-4

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a *simplification of actual conditions encountered.*

Depth, ft	DESCRIPTION
	Topsoil
	Medium stiff, moist, dark brown, SANDY SILT, root ladened.
1	**Vashon Till (Qvt)**
	Medium dense, moist, brown, SILTY SAND, some gravel and roots.
2	Medium dense, moist, orange mottled gray, SILTY SAND, some gravel.
3	
4	Dense to very dense, moist, gray, SILTY SAND, some gravel.
5	
6	
7	Bottom of exploration pit at depth 7 feet
8	
9	
10	

KCTP3 00782.GPJ November 29, 2000

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

LOG OF EXPLORATION PIT NO. EP-5

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth, ft	DESCRIPTION
	Topsoil
	Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
	Medium dense, very moist, brown, SILTY SAND, some gravel and roots.
1	
	Stiff to medium stiff, moist, orange mottled gray, SANDY SILT, some gravel.
2	
3	
	Dense to very dense, moist, gray, SILTY SAND, some gravel.
4	
5	
6	
7	
	Bottom of exploration pit at depth 7 feet
8	
9	
10	

Curry Property
Redmond, WA

Logged by: JPO

Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G

November 2000

LOG OF EXPLORATION PIT NO. EP-6

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Topsoil Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	Medium dense, moist, brown, SILTY SAND, some gravel and roots.
2	Medium dense, moist, orange mottled gray, SILTY SAND, some gravel.
3	
4	Dense to very dense, moist, gray, SILTY SAND, some gravel.
5	
6	
7	
8	Bottom of exploration pit at depth 8 feet
9	
10	

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

LOG OF EXPLORATION PIT NO. EP-7

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Topsoil
	Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	
	Medium dense, moist, brown, SILTY SAND, some gravel.
2	
3	
4	Dense to very dense, moist, gray, SILTY SAND, some gravel.
5	
6	Orange mottling to 6'.
7	
8	
	Bottom of exploration pit at depth 8 feet
9	
10	

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G

November 2000

LOG OF EXPLORATION PIT NO. EP-8

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Topsoil
	Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	
	Medium dense, moist, brown, SILTY SAND, some gravel.
2	
	Medium dense, very moist, tan, SILTY SAND, some gravel.
3	Dense to very dense, moist, gray, SILTY SAND, some gravel.
4	
5	*Orange mottling to 5'.*
6	
7	
	Bottom of exploration pit at depth 7 feet
8	
9	
10	

KCTP3 00782.GPJ November 29, 2000

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

LOG OF EXPLORATION PIT NO. EP-9

Depth, ft	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered. **DESCRIPTION**
	Topsoil Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	
	Medium dense, moist, brown, SILTY SAND, some gravel.
2	
3	Dense to very dense, moist, gray, SILTY SAND, some gravel.
4	
5	Orange mottling to 5'.
6	
7	
	Bottom of exploration pit at depth 7 feet
8	
9	
10	

KCTP3 00782.GPJ November 29, 2000

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

LOG OF EXPLORATION PIT NO. EP-10

This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

Depth, ft	DESCRIPTION
	Topsoil
	Medium stiff, moist, dark brown, SANDY SILT, root ladened.
	Vashon Till (Qvt)
1	
	Medium dense, very moist, brown, SILTY SAND, some gravel.
2	
	Dense to very dense, moist, gray, SILTY SAND, some gravel.
3	
4	
5	
6	Orange mottling to 6'.
7	
8	
	Bottom of exploration pit at depth 8 feet Moderate seepage at 2.5'.
9	
10	

Curry Property
Redmond, WA

Logged by: JPO
Approved by:

ASSOCIATED EARTH SCIENCES, INC

Project No. KE00782G
November 2000

Associated Earth Sciences, Inc.

November 18, 2003
Project No. KE00782G

CamWest Development, Inc.
9720 NE 120th Place, Suite 100
Kirkland, Washington 98034

Attention: Mr. John Harkness

Subject: Rockery Detail Drawing
Curry Property
11840 - 172nd Avenue NE
Redmond, Washington

Dear Mr. Harkness:

In accordance with the request of Ms. Gina Brooks of Core Design, Inc., this letter presents our recommended rockery construction detail drawing for the Curry Property project. We are familiar with the project as a result of our participation in the design, which has included completion of subsurface explorations, preparation of a geotechnical engineering report for the project, and preparation of an addendum letter containing recommendations for rockery design.

We were provided with current copies of project plan sheets 3.01 and 3.04 dated January 2003. These drawings depict rockeries up to approximately 8 feet tall facing excavation cuts on the west side of the pond basin on Tract D. The plans also depict three rockeries up to about 4 feet tall along the south property boundary that face planned structural fills.

In our opinion, the rockeries shown on the referenced plans do not require reinforcing or other special considerations if they are constructed in accordance with the recommendations contained in our December 7, 2000 geotechnical engineering report and our October 13, 2003 Rockery Addendum Letter. A rockery detail drawing that can be applied to the rockeries shown on the plans referenced above is attached with this letter.

911 Fifth Avenue, Suite 100 • Kirkland, WA 98033 • Phone 425 827-7701 • Fax 425 827-5424

It has been our pleasure to provide you with this information. Should you have any questions regarding this letter or other geotechnical aspects of the project, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

KURT D. MERRIMAN
STATE OF WASHINGTON
23580
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 11/20/04

11/21/03

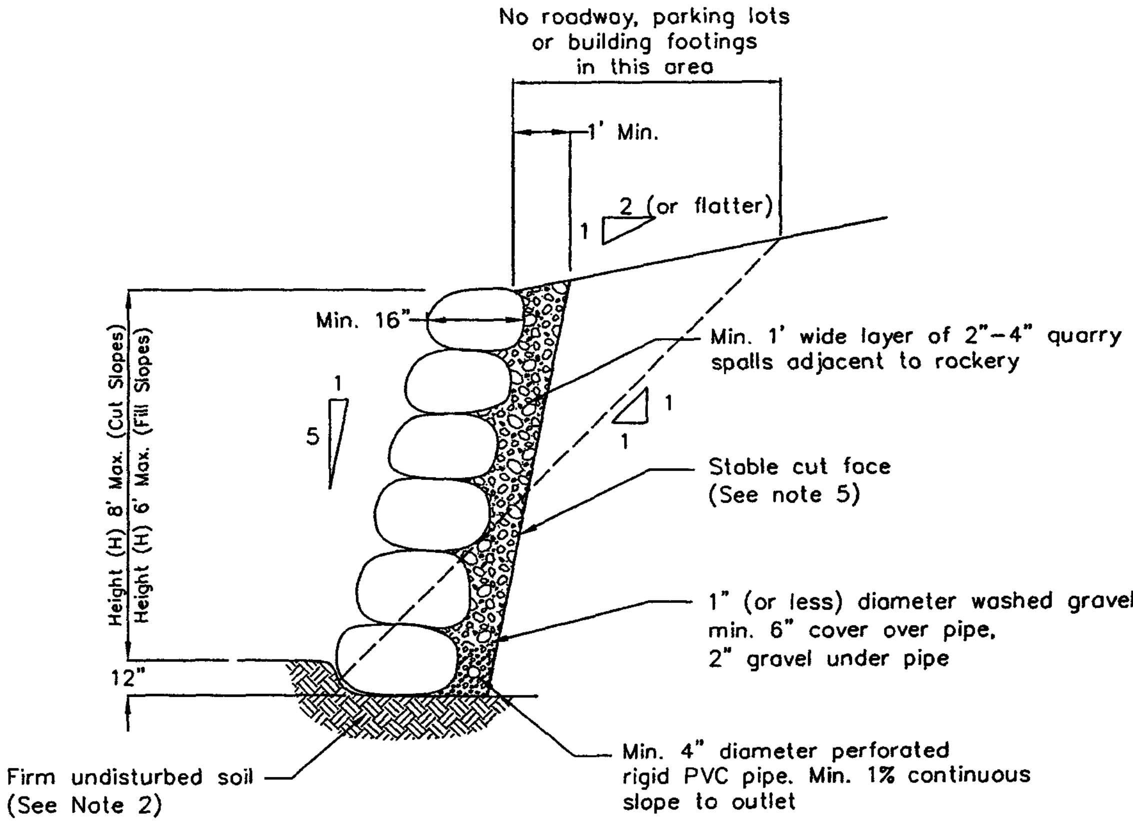
Bruce W. Guenzler, P.E.G.
Project Geologist

Kurt D. Merriman, P.E.
Principal Engineer

Attachment: Figure 1 - Unreinforced Rockery Detail

cc: Core Design, Inc.
14711 NE 29th Place, Suite 101
Bellevue, Washington 98007
Attention: Ms. Gina Brooks
grb@coredesigninc.com

BWG/ld
KE00782G5
Projects\2000782\KE\WP - W2K



NOTES:

1. Rockeries higher than 5' shall be constructed of rocks of graduated sizes from 5-man to 2-man, from bottom to top. Rockeries of 5' or lower shall be constructed of 3-man to 2-man, from bottom to top.
2. Inspection of subgrade, placement of base course and drainage, and finished rockery by engineer is required.
3. Rock shall be sound and have a minimum density of 160 pounds per cubic foot.
4. The long dimension of all rocks shall be placed perpendicular to the wall. Each rock should bear on two rocks in the tier below.
5. Rockeries are erosion-control structures, not retaining walls. Natural material must be stable and free standing in cut face. Maximum height of 6 feet for rockeries facing engineered structural fill soils.
6. See text of October 13, 2003 letter report for additional recommendations.

Rock	Lb.	Avg. Dimension (In.)
1-Man	50-200	12 to 18
2-Man	200-700	18 to 28
3-Man	700-2000	28 to 36
4-Man	2000-4000	36 to 48
5-Man	4000-6000	48 to 54

00782 curry property\rockery.dwg unreinforced

Associated Earth Sciences, Inc.

UNREINFORCED ROCKERY DETAIL

CURRY PROPERTY
REDMOND, WASHINGTON

FIGURE 1

DATE 11/03

PROJECT NO. KE00782G

APPENDIX D

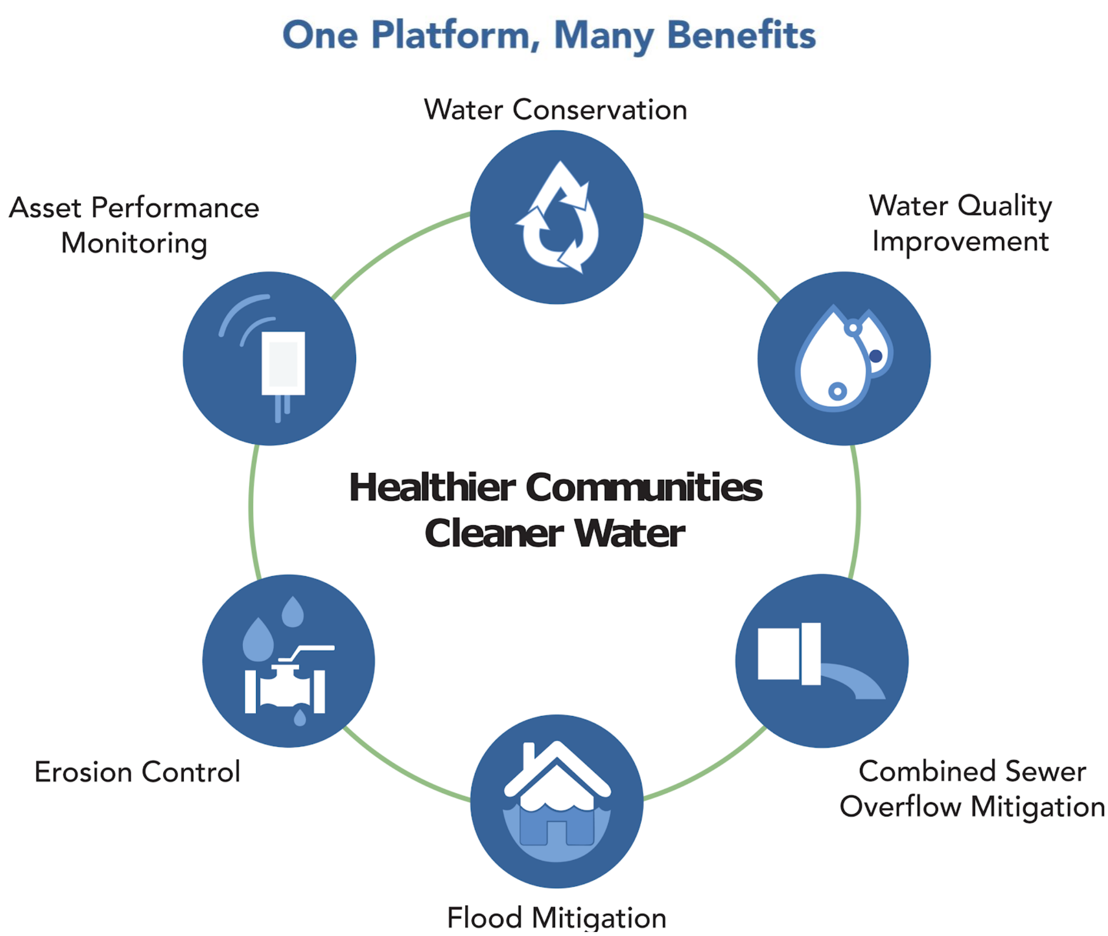
Opti Continuous Monitoring and Adaptive Control Technical Documentation

356 Boylston St, 2nd Floor
Boston, MA 02116
1-844-678-4782
www.optirtc.com

Smarter Stormwater Management

Opti provides a cloud-based platform that optimizes the collection, storage and distribution of stormwater through the Continuous Monitoring and Adaptive Control (CMAC) of stormwater infrastructure. The Opti software platform interacts with IoT (internet of things) enabled field equipment including sensors, actuated valves, SCADA systems, and pumps. A communication gateway is provided via cellular or LoRaWan technology. The combination of field equipment and software transforms traditionally passive assets into smarter resilient systems.

Our fully-automated control product leverages weather forecasts to predictively move water in advance of inclement weather, helping you get the best performance out of your investments. With over 90 parameters, the software application can be configured to meet one or more of your stormwater objectives. Opti is here to help you find peace of mind with economic and resilient solutions to water quality impairments, conservation, chronic flooding, coastal surge, sewer overflows or all of the above.



356 Boylston St, 2nd Floor
Boston, MA 02116
1-844-678-4782
www.optirtc.com

Combined Sewer Overflow (CSO) Mitigation: Opti is able to retain up to 90% of wet weather flows that cause CSO events. This is done by utilizing upstream storage more efficiently and shifting discharge timing. Most facilities within a municipality can be upgraded with Opti for significant reduction in wet weather flow, alleviating tens of millions of dollars of Capex required for new storage with similar performance.

Flood Mitigation: Opti's forecast integrated control utilizes stormwater storage more effectively. Opti automatically lowers the volume of water in a facility before an upcoming storm event, proactively adding capacity and mitigating flood risk from large storm events. In addition to pre-event drawdown, Opti can increase flood resilience in a watershed by controlling the timing of discharge from detention and retention assets to decrease the outflows during the peak downstream flooding conditions (i.e. peak shaving).

Water Quality Improvement: Opti improves water quality by increasing the average retention time in a facility by up to a factor of 10 (depending on site conditions). This increase in retention time within a facility enhances water quality by allowing additional particle settling, thus removing pollutants adhered to those sediment particles. The additional holding time also allows for more evapotranspiration, infiltration into subsurface soils, and nutrient uptake by vegetation in the facility. Opti was approved by the Chesapeake Urban Stormwater Work Group (USWG) and by the Maryland Department of the Environment (MDE) for pollutant removal efficiencies equivalent to the additional retention volumes achieved via active controls.

Asset Performance Monitoring: Communities reduce stormwater maintenance costs and improve compliance reporting with Opti's real-time monitoring and analytics. Opti provides alerting, decision support, and actionable insights to stormwater managers so that critical failures are stopped before they happen. Opti's software also integrates with third-party asset management and monitoring platforms.

Erosion Control & Hydromodification: Opti's active controls have demonstrated a 50% reduction in pulse counts and stream energy. Opti is able to discharge very low flows over a longer period of time, better emulating pre-development conditions of the watershed by using the entire storage volume of a system during small events. This is crucial for areas with erosion issues, and where stream habitat is sensitive for fish spawning and benthic organism health. Opti is approved by Washington State Technology Assessment Protocol - Ecology, better known as the TAPE program.

Water Conservation: Opti reduces capital expenditure and improves the cost-effectiveness of rainwater harvesting. With Opti, a single storage facility can be optimized for both stormwater detention and beneficial on-site use. Opti-controlled rainwater harvesting facilities have been approved nationwide to meet stormwater detention and retention requirements.

Monticello Watershed Flow-Duration Curve Modeling:

In the Monticello Watershed in the City of Redmond, WA, two existing stormwater retention ponds are currently being retrofitted with actively controlled outlets managed by Opti's active control software. Using the Western Washington Hydrology Model, flow-duration curves were developed for the two sites comparing the duration of critical flow rates using continuous rainfall data for a 61 year period (1948 - 2009). First, the potential improvement in site performance was estimated using continuous simulation of the existing stormwater basins with active controls; then additional model simulations were run to determine the equivalent sizing of a passive basin that would be needed to match the performance of the proposed active-control retrofits. **Preliminary results indicate that the existing ponds would need to more than double in size to match the flow duration curves of the proposed active control retrofits.**

Stormwater Retrofit Overview:

The two stormwater ponds considered in this analysis were the Whistler Ridge and Curry East ponds located within the City of Redmond, WA. Both ponds' contributing drainage areas are characterized by residential development with substantial portions of the watershed being directly-connected impervious surfaces. The critical range of flows for both sites was defined using a lower limit of 50% the 2 year pre-development flow rate and an upper limit of the 10 year pre-development flow rate, with the predeveloped condition defined as a forested watershed. Characteristics of the two stormwater basins and their corresponding drainage areas are shown in Table 1. In the proposed retrofits of the sites, the existing low-flow orifices will be replaced with larger butterfly valves that are actively controlled to continuously modulate outflows.

Table 1: Site Characteristics for Proposed Retrofit Ponds

	Whistler Ridge Pond	**Curry East Pond**
Active Storage Volume (ac-ft)	2.81	1.67
Drainage Area (Acres)	16.94	17.03
Impervious Area (Acres)	9.97	9.13
Passive Outlet Diameter (in)	1.70 (at 0' depth) 5.94 (at 2.99' depth) 6.48 (at 3.88' depth)	2.94 (at 0' depth) 16.2" (notch at 4' depth)
Riser Diameter (in)	24	18
Proposed Active Valve Diameter (in)	12	10
Critical Erosive Flow Range - Lower Limit (cfs)	0.249	0.250
Critical Erosive Flow Range - Upper Limit (cfs)	1.217	1.226

Methodology and Results:

Western Washington Hydrology Model (WWHM) simulations were completed for the existing conditions, the pre-development condition, and the proposed Opti control scenario at the two ponds to demonstrate benefit across the range of critical flows. To simulate Opti's control scenario, inflows to the pond from the WWHM were used as an input to a spreadsheet routing model that simulates Opti's control logic. For both the Whistler Ridge and Curry East ponds, results showed that the existing stormwater assets do not match pre-development flows across the full range of critical flows. By retrofitting the ponds with Opti's active controls, significant improvements were seen across the flow-duration curve bringing the expected performance significantly closer to pre-development conditions. Sample results from the initial Whistler Ridge Pond analysis can be seen in Figure 1, with results from Curry East Pond in Figure 2.

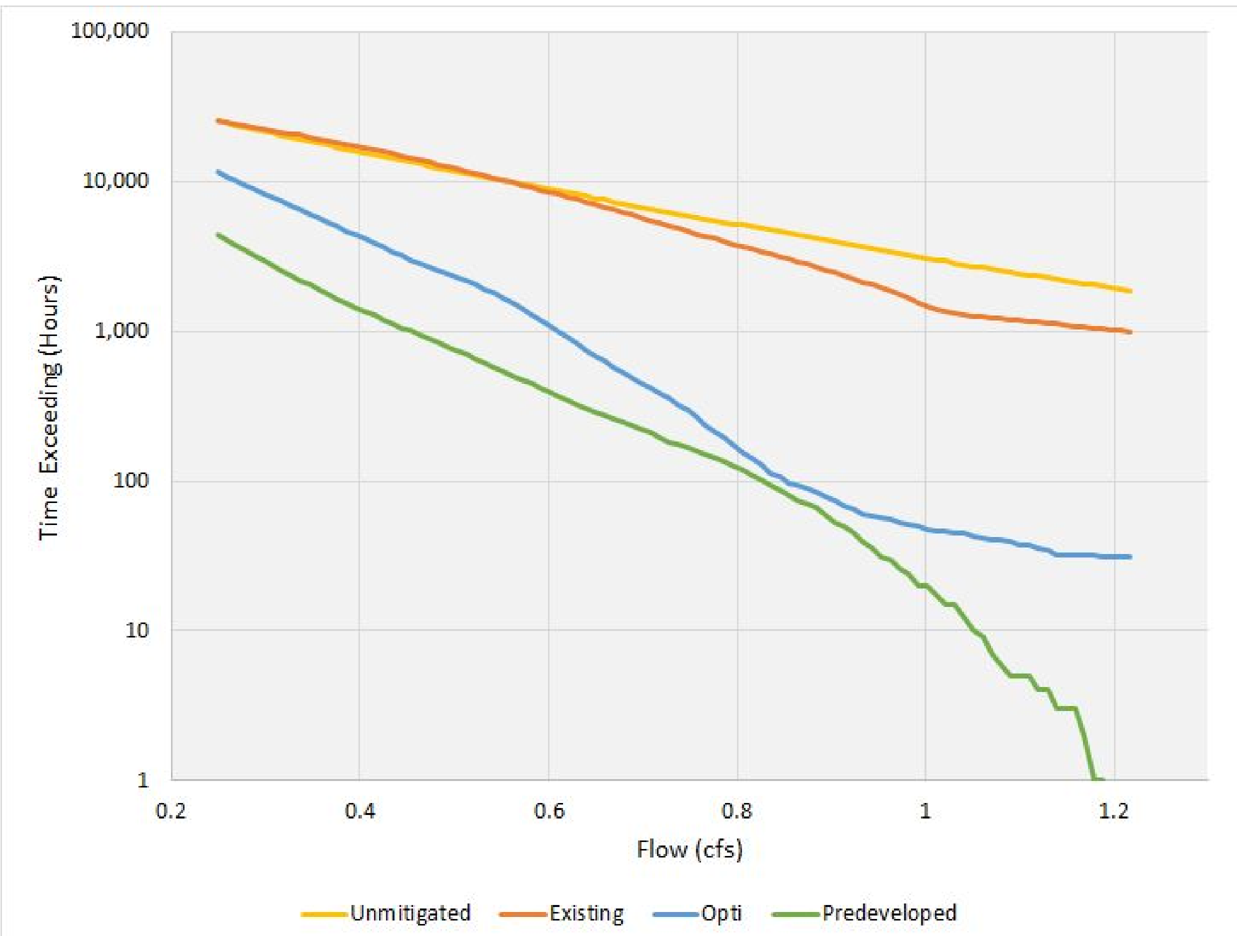


Figure 1: Whistler Ridge Flow-Duration Curve for Critical Flow Range, Existing and Proposed

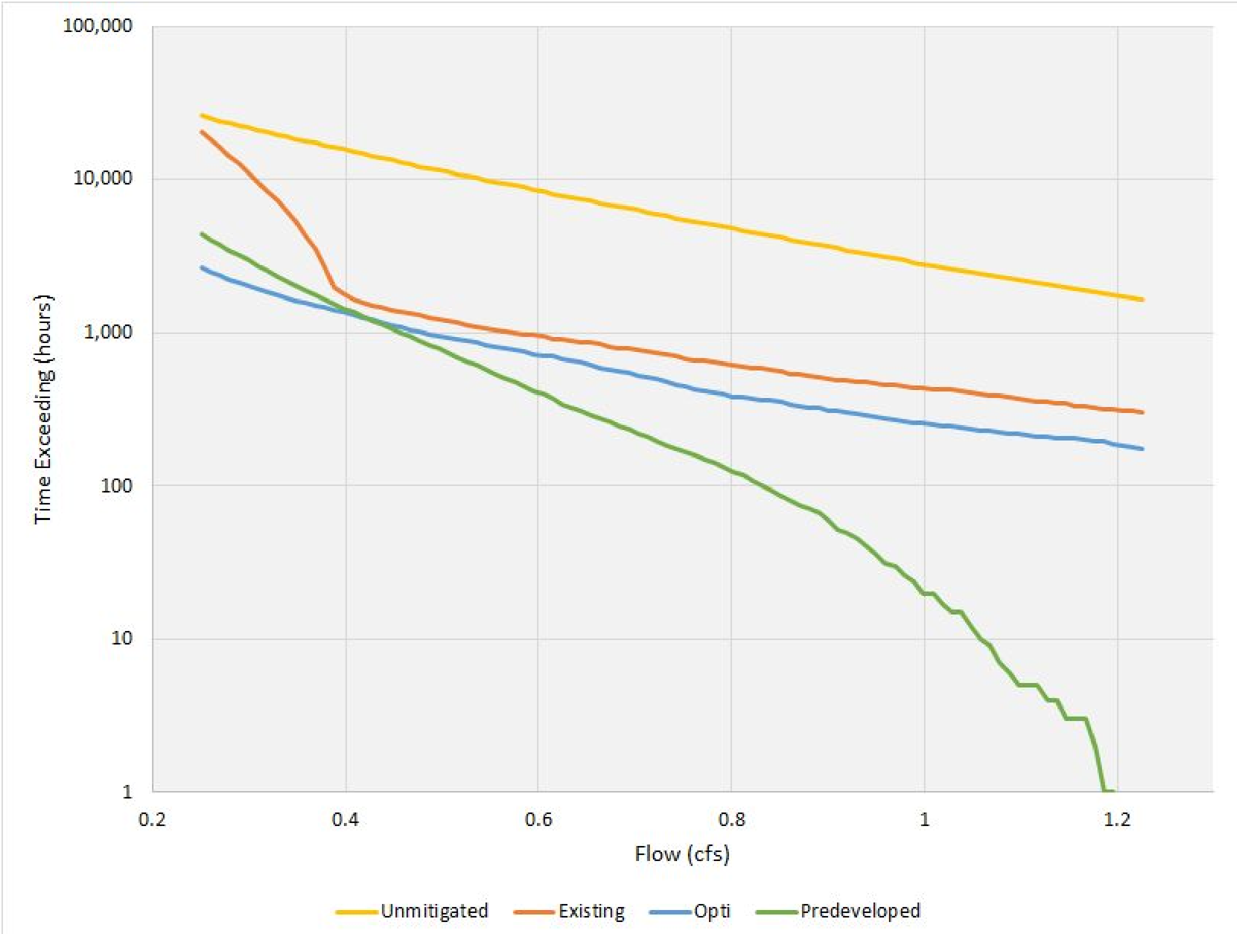


Figure 2: Curry East Flow-Duration Curve for Critical Flow Range, Existing and Proposed

To provide an equal comparison, subsequent model runs were completed to determine how much additional volume would be required in the existing ponds to match the expected performance of the existing ponds retrofitted with Opti active controls. The maximum depth of the ponds were kept constant in the passive scenarios (existing conditions with volume increased) while the footprint was expanded to increase the total volume in 10% increments. The low-flow orifice was adjusted to optimize the system flows while avoiding overflow from the pond in order to more closely match the Opti condition. A summary of the required storage volumes to replicate the performance of an Opti controlled system is shown in Table 2. For the purposes of the analysis, critical flows were assumed to range from 50% of the pre-development 2 year peak flow and the 10 year pre-development peak flow.

Table 2: Storage Volume Required for Equivalent Flow-Duration Curve Results

	Existing Volume (Used for control simulation - ac-ft)	**Required Additional Volume to match Proposed Opti Retrofit** (ac-ft)	**Percent Change**
Whistler Ridge Pond	2.81	7.03	+150%
Curry East Pond	1.67	3.51	+110%

Figures 2 and 3 show the flow-duration curves resulting from the analysis. For Whistler Ridge (Figure 3), an increase of 150% of the existing storage volume resulted in a flow-duration curve that exceeded the proposed Opti retrofit at the lower ranges of flows, but overall matched the behavior in the erosive flow range. For Curry East (Figure 4), an increase of 110% of the existing storage volume resulted in a curve that matched the shape and magnitude of the proposed Opti retrofit's results.

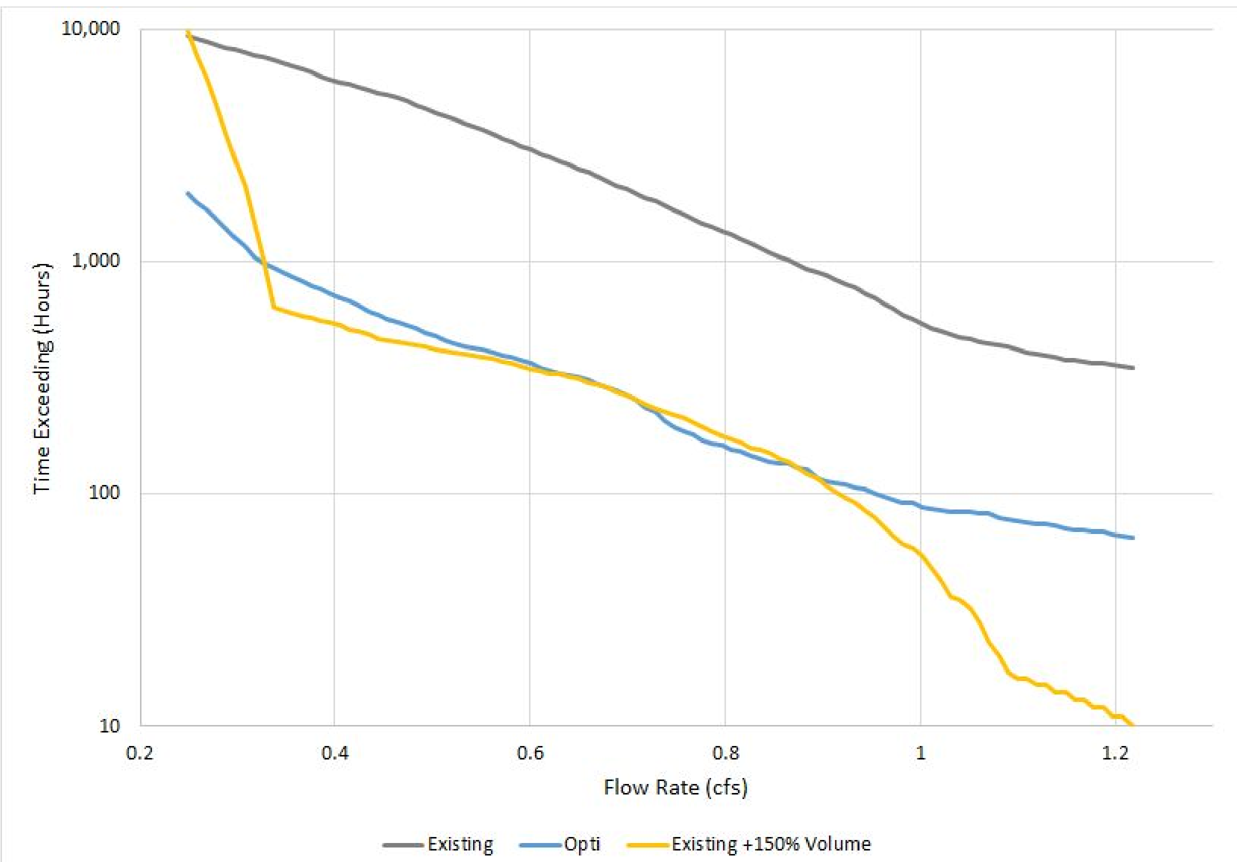


Figure 3: Flow-Duration Curve for Whistler Ridge Critical Flow Range - Existing, Opti, and Equivalent Passive Design

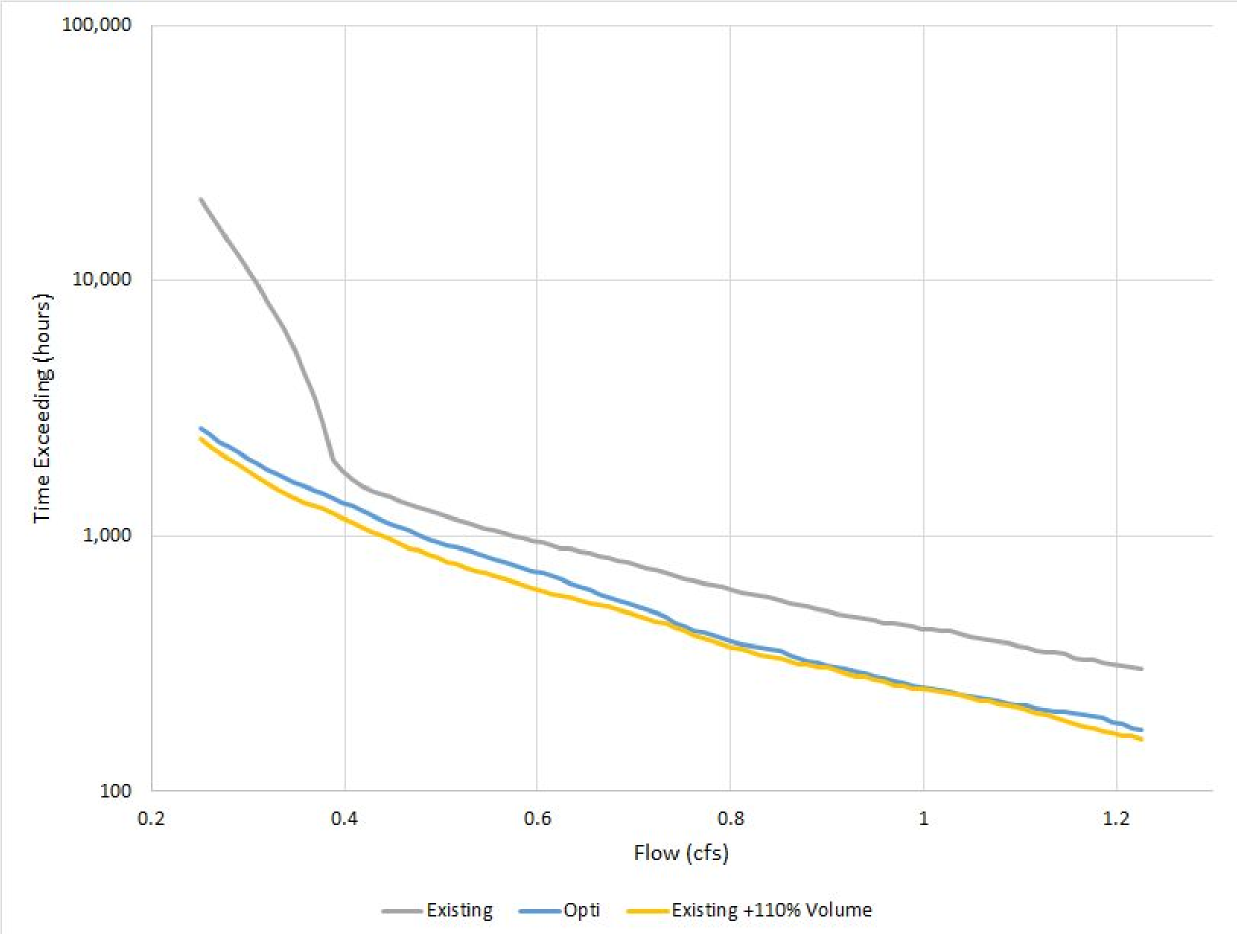


Figure 4: Flow-Duration Curve for Curry East Critical Flow Range- Existing, Opti, and Equivalent Passive Design

Conclusion

For both of the stormwater basins considered, the flow-duration curve analysis demonstrates the potential benefit and cost savings of retrofitting existing passive outlets with actively controlled outlets. By utilizing active controls on existing stormwater assets, the need for a greater basin footprint (and the costs associated with land acquisition, civil design and mass grading) is greatly reduced or eliminated. This is accomplished while achieving compliance goals and bringing peak flow rates closer to the pre-development condition. For the Whistler Ridge and Curry East Ponds, a simple retrofit of an existing passive outlet with Opti's active control equipment combined with Opti's forecast-based software, would be nearly equivalent to doubling the size of the existing ponds to achieve the same result in reduction of critical flows from the facilities.

APPENDIX E

Opti Continuous Monitoring and Adaptive Control Functional Equivalency Documentation

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 1, 2018

Mr. Marcus Quigley, P.E.
Chief Executive Officer
OptiRTC Inc.
356 Boylston Street, 2nd Floor
Boston, MA 02116

RE: Continuous Monitoring and Adaptive Control (CMAC) Functional Equivalency to Detention Pond Outlet Structures

Dear Marcus Quigley:

The Washington State Department of Ecology (Ecology) finds that the OptiRTC Continuous Monitoring and Adaptive Control (CMAC) system for hydraulic control of stormwater facilities is functionally equivalent to the standard outlet control structure for wet ponds, retention ponds, and detention ponds as described in the Stormwater Management Manual for Western Washington (SWMMWW) and the Stormwater Management Manual for Eastern Washington (SWMMEW).

OptiRTC CMAC is a control approach for stormwater facilities that can be designed to conform to various design criteria. This approach does not inherently confer a certain level of service; therefore, Opti has developed a CMAC analysis tool (current version is an Excel-based extension to the Western Washington Hydrology Model (WWHM)). The Opti CMAC system must be designed using the analysis tool and must adhere to the guidelines in the manufacturers specifications. Project applicants seeking to use Opti CMAC and the CMAC-WWHM Tool must obtain design input from OptiRTC regarding Tool application and system design. Designs without detailed input from OptiRTC are not acceptable and may not be installed.

Ecology cannot endorse this product or its manufacturer. Contractors may use the Opti CMAC without seeking additional Ecology approval, however Ecology is tracking the installations of the Opti CMAC system. Local governments with a National Pollutant Discharge Elimination System (NPDES) permit shall submit the enclosed Notice of Intent Form to Ecology when installing the Opti CMAC. All other jurisdictions are also encouraged to notify Ecology when installing the Opti CMAC.

If you have questions, please contact me at your earliest convenience at (360) 407-6444 or douglas.howie@ecy.wa.gov.

Sincerely,

Douglas C. Howie, P.E.
Stormwater Engineer
Program Development Services

cc: Carla Milesi, TAPE Program Manager, Washington Stormwater Center

APPENDIX F

Example Calculations

Example Calculations for Spreadsheet Models to Predict Inflow to the Ponds

Equation for estimating average pond inflow rate:

$Q_{inflow} = (Q_{outflow} + \Delta_{storage})/900$

Where:

Q_{inflow} = estimated average pond inflow rate in cubic feet per second (cfs) over 15-minute interval

$Q_{outflow}$ = measured pond outflow in cubic feet (cf) over 15-minute interval

$\Delta_{storage}$ = measured change in pond storage in cf over 15-minute interval

Example #1

$Q_{outflow}$ = 100 cf

$\Delta_{storage}$ = 0 cf

$Q_{inflow} = (100 + 0)/900 = 0.11$ cfs

Example #2

$Q_{outflow}$ = 100 cf

$\Delta_{storage}$ = 50 cf

$Q_{inflow} = (100 + 50)/900 = 0.16$ cfs