HIGHLINE WATER DISTRICT
KING COUNTY, WASHINGTON

RESOLUTION 15-4-13C

RESOLUTION AUTHORIZING AMENDMENT #1 TO CONTRACT #14-50-09 WITH ROBINSON NOBLE, INC. RELATING TO THE TYEE WELLFIELD ALTERNATIVES ANALYSIS (PHASE 1)

WHEREAS, the District entered into Contract #14-50-09 with Robinson Noble to evaluate alternatives to increase production from the Tyee Wellfield, and

WHEREAS, as discussed with the Commissioners at the 12/17/14 Board Meeting, the conclusion by the District's consultant, Robinson Noble, is to rehabilitate the Tyee Well to improve the long-term pumping rate and regain specific capacity; and

WHEREAS, the District requested Robinson Noble submit a Scope of Work/Budget Proposal to assist the District with the Tyee Well Rehabilitation (Phase 2), which includes the following tasks:
(1) Contracting and Preconstruction Conference; (2) Hydraulic Services; (3) Well Evaluation and Final Report; and

WHEREAS, the General Manager and District Engineer have reviewed the 4/10/15 Scope of Work/Budget Proposal (Exhibit A) and the General Fee Schedule (Exhibit B) submitted by Robinson Noble (attached and incorporated herein by this reference) for assistance with the Tyee Well Rehabilitation and recommend approval of this resolution.

NOW THEREFORE, BE IT RESOLVED:

1. The Board of Commissioners approves Contract Amendment No. 1 for a not-to-exceed amount of $25,535.00 (excluding sales tax).

2. The General Manager or Designee is authorized to execute Amendment No. 1 (referenced as Attachment 1 and incorporated herein) for the Tyee Well Rehabilitation.

ADOPTED BY THE BOARD OF COMMISSIONERS of Highline Water District, King County, Washington, at an open public meeting held this **13th** day of **April 2015.**

BOARD OF COMMISSIONERS

George Landon, President

Vince Koester, Secretary

Gerald R. Guite, Commissioner

Daniel Johnson, Commissioner

Kathleen Quong-Vermeire, Commissioner

ROBINSON NOBLE

EXHIBIT A

April 10, 2015

Jeremy Delmar
Highline Water District
23828 30th Avenue South
Kent, WA 98032

Subject: 2015 Tyee Well Acid Redevelopment

Dear Jeremy,

As requested, Robinson Noble has prepared the following scope of work to accomplish an acid redevelopment of the Tyee Well to address progressive declines in well efficiency. The field procedures will be largely similar to those accomplished on the well during the 2006 effort. The specific bacteria species dominating the orange-brown debris recently observed in the Tyee Well control valve was not determined, but this bio-fouling is presumed related to the iron bacteria (predominately *Gallionella ferruginea*) and sulfur bacteria (*Thiodendron mucosum*) previously identified in the well in 2005. A sample of the debris was submitted to Design Water Technologies (DWT; the chemicals vendor used for the 2006 redevelopment), and DWT confirmed the efficacy of the Unicid chemical to dissolve the bacterial deposits.

For this effort, Robinson Noble will prepare technical specifications, perform video inspections, provide site inspection and oversight of the redevelopment activities, and consultation regarding the installation of a downhole biocide injection system. We will also work with DWT (vendor for redevelopment chemistry) and PQ Products (chemical distributor) to help secure the necessary chemicals and define field procedures.

Scope of Work

The proposed work will incorporate standard mechanical surge development and chemical treatment of the Tyee Well; the District should also evaluate available means to decontaminate the transmission lines from the well to the treatment plant. The chemical treatment will consist of the use of an acid (Unicid) and a companion agent (Catalyst). The acid is designed for use in water wells for the dissolution of mineral deposits including iron, manganese, and sulfates. The catalyst agent is designed to work with the acid to penetrate bio-film, detach it, and suspend the bacteria for removal. Video inspections, both before and after treatment, will provide a visual measure of the efficacy of treatment within the wellbore. Given the native bacterial community present in the aquifer and the fact that this is the second acid redevelopment of the Tyee Well in nine years, the goal of this effort is to eliminate as much bacterial matter and related deposits as possible and maximize well efficiency so as to minimize the effects of these bacteria. Water level data collected by the District's SCADA system, once the well is back online, will reveal the well's resultant efficiency.

The chemicals will be purchased in quantities (estimated by the manufacturer, DWT) to be sufficient to accomplish the desired treatment of both the well and the pump column; refunds will

be given for any unopened containers of chemicals returned to the supplier. Per DWT, the quantity of acid required for a treatment should provide for the initial reduction of pH of the water in the well and adjacent formation to below a pH of 3.0 (based largely on the amount of water in the well and adjacent formation) as well as two "adjustments" to maintain pH. Surge development of the acidic solution over the course of two to three days will circulate the solution and help remove loosened material. Once the pH of the water stabilizes in the well at a pH of 3.0 or less, there is no longer any material to dissolve and the project proceeds to neutralization of the acid. A similar solution is used to clean the pump column. The wellbore and adjacent formation is then sterilized with a buffered chlorine product (Sterilene), which will be surged into the formation. The following day, the chlorine solution will be removed from the well and neutralized, and the pump readied for re-installation.

Task 1: Contracting and Preconstruction Conference:

Robinson Noble will prepare a set of technical specifications for the rehabilitation of the Tyee Well to be incorporated by the District into its standard bid package. With the District's assistance, we will determine whether (and at what pH) disposal of the neutralized chemical solution can be pumped directly to sanitary sewer, stored in District holding tanks, or needs to be otherwise disposed of. Proper disposal of this material will then be incorporated into the technical specifications.

Given the sensitive nature of working safely with (and neutralizing/disposing of) acids, *we strongly recommend that the District make prior experience in the chemical treatment of wells a requirement for prospective contractors.* We will assist the District, as requested, in assessing the contractor's experience and other considerations when evaluating how to award the contract. Robinson Noble personnel will also work with the chemical manufacturer and their supplier to obtain a current cost estimate for the estimated chemical agents for the treatment of the Tyee Well. Our personnel will participate in a pre-construction conference at the District office and the well site to assure that the contract elements are understood and can be complied with.

Task 2: Hydrogeologic Services:

On March 19, Robinson Noble was notified that the District wished to pursue a mechanical and chemical rehabilitation of the Tyee Well on an expedited basis. Since that time, Robinson Noble has had communications with the District (regarding status of the pump and redevelopment and operations options), and RH2 (regarding recent well pump observations, well efficiency concerns, and downhole biocide injection systems). We have also communicated with vendors, including DWT (regarding the chemical quantities required and field procedures for chemical redevelopment) and PQ Products (the distributor through which the DWT chemicals are purchased by drilling contractors). A preliminary scope of work and contractor cost estimate was generated and subsequently modified in light of the observations made when PumpTech removed the pump and column from the well. In addition, we have reviewed RH2's letter report regarding the Tyee Well pump and done some preliminary research into the downhole biocide injection system (BioShield) being considered by RH2 and the prevalence of such systems in the Puget Sound area.

We understand that the District's pump contractor (PumpTech) removed the pump from the Tyee Well on April 6 and that, given the extent of biofouling, the pump column will be replaced

rather than cleaned. We further presume that PumpTech will be responsible for any necessary cleaning, maintenance, and reinstallation of the pump.

As discussed, Robinson Noble will perform an initial video inspection of the well in its current, bio-fouled state prior to any cleaning. The intent of this inspection is to verify there are no obstructions in the borehole, observe where the biofouling within the well is concentrated, and inform both the subsequent redevelopment efforts and the future placement of the downhole biocide injection sites. Note that the camera will disturb accumulated material within the well on its way down, and we will likely only get one pass (on the way down) before material cascading down the borehole obstructs visibility. We will make arrangements with the District to run water from the treatment plant into the well for a minimum of two days in advance of the inspection to clear the column and increase visibility to the degree possible.

After contracting, the drilling contractor will mobilize to the site and bail the well clean of material that has settled into the tailpipe. If the initial video inspection is unable to observe the physical condition of the screen and casing, some level of the mechanical redevelopment (e.g., brushing of the casing and screens) may be required in advance of the second video inspection. Ideally, the drilling contractor will be able to make arrangements with the District to pump dirty water and entrained bacterial matter to the District's holding tanks or sanitary sewer with a centrifugal pump and then run water into the well to clear the column. We will then work with the drilling contractor and Well Scan, Inc. to schedule the video inspection.

The drilling contractor will likely require about three weeks to accomplish the mechanical and chemical redevelopment efforts. Robinson Noble personnel will be on site as necessary to supervise rehabilitation efforts including mechanical surge development, the introduction of acid and catalyst product, subsequent development activities, the neutralization and storage/disposal of waste water, and the post-redevelopment video inspection. The amount of time required for us to supervise these activities is directly dependent upon the experience and communication and scheduling skills of the selected drilling contractor. An experienced contractor who can schedule his/her time well and keep us apprised of progress and any scheduling changes will allow us to minimize our time on site. Conversely, a less experienced contractor with poor communication skills will require greater on-site supervision, extra trips to the site, and greater down time for the wells.

For the purposes of the current estimate, we have presumed that our personnel will be on site as needed for the majority of site activities, excluding site mobilization/demobilization. Initial mechanical surge development and chemical treatment and neutralization will depend on well response. Based upon the 2006 effort, the initial mechanical development of the Tyee Well is estimated at 4 days, followed by chemical introduction and development of the well (four days), acid neutralization and disposal (five days), chlorine dosing and development (one day), and chlorine neutralization (two days).

Task 3: Well Evaluation and Final Report:

Following the completion of redevelopment activities, reinstallation of the pump, and installation of the biocide injection system, the Tyee Well will be brought online. All efforts should be made to minimize pumping rates in excess of 500 gpm, including at startup and shutdown. When first bringing the well online, the VFD should be used to gradually increase flow from the lowest practical rate in order to observe how the well responds. The District should target

steady, continuous production at modest rates from the Tyee Well, as intermittent, high rates of production exacerbate well inefficiency and may promote bacterial growth within the well and adjacent aquifer.

The District will supply water level and production data for the Tyee Well from its SCADA system for the first several weeks of production. Robinson Noble will compare pre- and post-rehabilitation data to determine the efficacy of the redevelopment effort as indicated by the change in dynamic specific capacity of the Tyee Well. Our scope also includes up to four additional hours of consultation regarding the placement and operation of the proposed biocide injection system. We will prepare a letter report to document the video inspections, re-development efforts, biocide injection system (if installed), and the response of the well. Our report will provide the District with a re-evaluation of the long-term production potential of the well and our recommendations regarding future redevelopment efforts. Two copies of the letter report will be delivered to the District following the completion of site activities and evaluation of production data.

Project Cost Estimate

For the scope of work described above, we estimate the following costs:

Task 1:	Contracting and Pre-construction Meeting	$ 2,715
Task 2:	Hydrogeologic Services	$16,950
Task 3:	Well Evaluation and Final Report	$ 5,870
	Total:	$25,535

Robinson Noble typically works on a time-and-expense basis according to the attached General Fee Schedule. We estimate the cost of our services, as described above, to be $25,535 based upon our understanding of the project and the conditions outlined in this scope. The estimate will remain valid for 90 days from the date of this scope. Whether approved as a new contract or an extension of our existing contract, we request that contracting documents reflect a start date of **March 19, 2015** to account for project work already accomplished to facilitate an expedited schedule.

This estimate does not include cost for any extra insurance, business licenses or fees, or applicable local taxes that might be necessary to complete the project. We will request that these additional costs be added to the above total estimate when they become known to us. Rental costs for our standard field equipment and any specialized equipment as detailed in this scope are included in the above estimate. Should additional equipment be deemed necessary or warranted in order to properly complete the project, we will submit a change in scope request with estimated costs based on the equipment rental schedule included in the General Fee Schedule.

The costs for project activities will be tracked closely and any foreseeable changes to the project cost will be discussed with the District at the earliest opportunity. Should the District decide to pursue some or all of the work discussed above we will prepare a Professional Services Agreement outlining the specific tasks to be completed. Alternatively, we will gladly review the District's standard contract as applied to this scope of work.

We hope this scope of work and cost estimate is adequate for your needs. Please contact us if we can provide additional information or modify the scope of work to better assist the District. If at any time prior to or during this project, the District identifies a concern or problem with our work or progress that cannot be resolved by the assigned Robinson Noble project manager, please contact Joseph Becker, our company President, and he will make every effort to resolve the issue to your satisfaction.

Respectfully submitted,
Robinson Noble, Inc.

James E. Hay, LHG
Associate Hydrogeologist

ROBINSON NOBLE

EXHIBIT B

General Fee Schedule — January 2015

Professional Positions	Fee per Hour
Principal Engineer, Hydrogeologist or Environmental Scientist	$175
Associate Engineer, Hydrogeologist or Environmental Scientist	$160
Senior Engineer, Hydrogeologist or Environmental Scientist	$135
Senior Project Engineer, Hydrogeologist or Environmental Scientist	$117
Project Engineer, Hydrogeologist or Environmental Scientist	$105
Staff Engineer, Hydrogeologist or Environmental Scientist	$95
Senior Field Staff	$86
Field Staff	$69
Legal Support/Expert Witness Services/Testimony	150% of above rates
Support Positions	
Senior GIS/CAD Specialist	$91
Senior Technician	$91
Senior Administrator	$80
GIS/CAD Specialist	$80
Technician	$80
Administrator	$69
Clerical Support	$69
Other Fees and Costs	
Subcontracts/ Management Fee — Professional services	15%
Subcontracts/ Management Fee — Outside laboratory services	15%
Subcontracts/ Management Fee — Construction subcontracts	15%
Other Costs — Travel (auto)	$0.62/mile
Other Costs — Travel (other)	Cost +10%
Other Costs — Per diem	Prevailing State rate +10%
Other Costs — Other direct expenses	Cost +10%
Field and laboratory testing/equipment rental	See following pages

This fee schedule is subject to change according to contract or Professional Services Agreement conditions.

Hydrogeologic Equipment Rental Schedule

January 2015

Equipment		Unit	Rate
Water Level Transducer and Data Logger		Per day	$25
Field Laptop Computer		Per day	$40
Electric Water Level Sounder(s)	0 to 300 ft	Flat fee per project	$30
	over 300 ft	Flat fee per project	$60
DC Submersible Purge Pump (Single Stage)		Per pump	List price + 10%
DC Submersible Purge Pump (Dual Stage)		Per pump	List price + 10%
Double-Ring Infiltrometer		Per day	$50
Schonstedt Gradient Magnetometer		Per day	$75
Geonics EM-61 Metal Detector		Per day	$500
Downhole Gamma/Resistivity/Temperature Logging Equipment		Per day	$500
Downhole Caliper Logging Equipment		Per day	$350
Draw Works		Per day	$600
Mechanical Sieve Sample Equipment		Flat fee per well	$50
2-inch Gasoline-powered Centrifugal Pump (includes hoses)		Per day	$55
2-inch Submersible Pump + Controller		Per day	$180
Generator		Per day	$70
Survey Gear (laser level & rod)		Per day	$85
FlowTracker Acoustic Doppler Velocimeter Stream Gaging Equipment		Per day	$200
GPS		Per day	$22.50
Other Equipment		Negotiated	Negotiated
Digital Camera		Per day	$10

This fee schedule is subject to change according to contract or Professional Services Agreement conditions.

Environmental Equipment Rental and Consumable Schedule
January 2015

Equipment	Unit	Rate
Water Level Transducer and Data Logger	Per day	$100
Field Laptop Computer	Per day	$50
Electronic Water Level Sounder	Per day	$30
Electronic Interface Probe	Per day	$75
DC Operated Peristaltic Pump	Per day	$45
2-inch Gasoline-powered Centrifugal Pump	Per day	$100
2-inch Submersible Pump + Controller	Per day	$350
Generator	Per day	$100
Low-Flow Bladder Pump	Per day	$175
Photoionization Detector	Per day	$75
Combustible Gas Indicator	Per day	$65
Water Quality Meter	Per day	$200
Teflon Water Bailer	Per day	$30
Soil Sampling Equipment (manual)	Per day	$25
Mechanical Sieve Sample Equipment	Flat fee per project	$25
Survey Gear (laser level & rod)	Per day	$85
Soil Vapor Extraction System	Per month	$750
Digital Camera	Per day	$10
Other Equipment	Negotiated	Negotiated
Consumable Items:		
Polyethylene Purge/Sampling Tubing	Each 10 feet	$2.50
DC Submersible Purge Pump (Single stage)	Per pump	List price + 10%
DC Submersible Purge Pump (Dual Stage)	Per pump	List price + 10%
Silicone Peristaltic Pump Head Tubing	Each foot	$4.00
Bladders for Low-Flow Bladder Pump	Each	$5.00
Water Sample Bailer	Each	$10
Bailer Rope/String	Each 10 feet	$1.00
Personal Protection Equipment	Per day per person	$50

This fee schedule is subject to change according to contract or Professional Services Agreement conditions.

Geotechnical Field and Laboratory Testing Schedule

January 2015

Test		Fee
Portable Nuclear Density Gauge	Per Hour	$5.00
Slope Inclinometer	Per day	$250
Direct Shear	Point	$200
Moisture-Density Relationship Curves:	Each Each	1 pt $120 Multiple pts $200
Sieve Analyses (Gradations-Wet Sieve)	Each	$150
Hydrometer Analysis	Each	$175
Falling Head Permeability	Each	$165
Atterberg Limits (Liquid Limit or Plastic Limit)	Each	$100
Moisture Content	Each	$10
Dynamic Cone Penetrometer Points	Day Each	$225 $20
Consolidation Test Incremental Loading (9 loads, 0.125 TSF to 32 TSF, 4 unloads)		$550 $50/each additional load
Shelby Tube Extrusion/Sample Description		$40

This fee schedule is subject to change according to contract or Professional Services Agreement conditions.

AMENDMENT #1 TO CONSULTANT AGREEMENT FOR SERVICES

HIGHLINE WATER DISTRICT
TYEE WELLFIELD ALTERATIVES ANALYSIS (PHASE 1)
ROBINSON NOBLE, INC. - CONTRACT NO. 14-50-09

Robinson Noble, Inc. submitted a Scope of Work/Budget Proposal (Exhibit A) dated 4/10/15 and General Fee Schedule (Exhibit B) requested by Highline Water District for assistance with the Tyee Well Rehabilitation (Phase 2): The additional work includes the following:

Task	Description	
1.	Contracting and Preconstruction Conference	$2,715.00
2.	Hydrogeologic Services	$16,950.00
3.	Well Evaluation and Final Report	$5,870.00
	Total Request	$25,535.00
	Current Contract Amount	$5,835.00
	REVISED CONTRACT AMOUNT	**$31,370.00**

Robinson Noble, Inc. will undertake the above-referenced additional work on a time-and-expense basis. The estimated cost for these additional services is $25,535.00. The current contract amount is $5,835.00. The revised contract amount is $31,370.00. The same standard general terms and conditions will apply as agreed to in Contract #14-50-09 dated 7/1/14.

Effective Date. The effective date of this Amendment shall be the date signed by an authorized representative of the District.

HIGHLINE WATER DISTRICT

By: _____
Matt Everett

Title: General Manager

Date: _____

ROBINSON NOBLE, INC.

By: _____
Joseph E. Becker

Title: President

Date: _____

Agenda Item No.: 5.3
Agenda Date: 4/13/15
Reviewed By: JSD / M.E.

Subject: Authorize Amendment #1 – Robinson Noble, Inc. - Contract #14-50-09
Add Phase 2 - Tyee Well Rehabilitation

CATEGORY	
Executive	☐
Administrative	☐
Engineering/Operations	☒

FINANCIAL						
Expenditures?	Yes	☒	No	☐	N/A	☐
Budgeted?	Yes	☒	No	☐	N/A	☐

Estimated Amount: $ 25,535.00
Excludes sales tax

ATTACHMENTS:

1. Resolution: 15-4-13C
2. Exhibit A: Robinson Noble – 4/10/15 Scope of Work/Budget Proposal for Phase 2 - Tyee Well Rehabilitation
3. Exhibit B: Robinson Noble – 2015 General Fee Schedule
4. Attachment 1 – Amendment 1

COMMENTS:

Robinson Noble, Inc. submitted a proposal for additional costs relating to Phase 2 - Tyee Well Rehabilitation.

The General Manager and District Engineer have reviewed the 4/10/15 Scope of Work/Budget Proposal for Phase 2 - Tyee Well Rehabilitation (Amendment No. 1) from Robinson Noble and recommend approval of this resolution.