Exhibit A
Camas NUGA Sewer Transmission Main
Scope of Work
FINAL
September 18, 2015

Project Understanding

The City of Camas has been studying ways to best provide sewer service to the North Urban Growth Area (NUGA), which is an area north of Lacamas Lake in the city's urban growth area. The April 2010 General Sewer Plan Amendment (GSPA) provides an overview of a proposed sewer layout, which includes a temporary service option for the Green Mountain area that directs effluent to the city's STEP sewer main. As development activity has picked up, Camas realized the need for a more fully developed plan to serve the area and limit the reliance on STEP systems and the city's STEP main.

In 2014 the City embarked on a review of the GSPA and development of an alternatives analysis for the NUGA sewer transmission system (NUGA STS). The June 23, 2015 Alternatives Analysis Memorandum recommended a preferred option (Alternative 4) and the basic parameters of a plan to construct a sewer transmission system to serve the area.

Because development at Green Mountain will be ahead of construction of the NUGA Sewer Transmission system, the Green Mountain developers will construct a temporary system to serve their development until the NUGA STS is operational. It will include initial construction of Pump Station 1 and a force main to pump effluent to the existing Camas STEP system. A hydraulic limitation of no more than 350 units for this temporary system is the primary driver of time constrains to complete the NUGA STS project.

This initial project scope includes development of a preliminary design for the entire NUGA STS, which consists of three pump stations, and associated force mains and gravity mains that will convey flows to the city's Main Lift Station. It will follow the route and concepts developed in the June 2015 Alternative Analysis memorandum.

A subsequent project scope will address final design, construction document preparation, and bidding services for Phase 1 of the NUGA- STS, which is expected to include all facilities from Pump Station 1 to a connection point with an existing sewer pipe at or near the intersection of NE 22nd Avenue and NE Franklin Street.

Our consultant team is shown in Table I. Individual team responsibilities are described in detail with each of the tasks listed in this scope of work.

Table I: Design Team and Roles	
Firm	Role / Task Assignments
Otak	• Project Management • Flow projections • Pipeline Routing • Pipeline structures and appurtenances • Pipeline sizing and material selection • Pump Station site layouts • Preliminary Design Report • Structural Engineering • Landscape architecture • Topographic Surveys • Pipeline alignment and profile • Cost estimates
CH2M	• Hydraulics • Transient Analysis • Odor and Corrosion Control • Pump Station Design Drawings • Telemetry • Pipeline structures and appurtenances • Preliminary Design Report • Cost Estimates
Normandeau	• Environmental Permitting
GRI	• Geotechnical Investigations and Report
BergerABAM	• Alternatives Analysis • Flow projections • Preliminary Design Report
EPIC Land Services	• Real Property Services

Table I: Design Team and Roles	
Firm	Role / Task Assignments
Archaeological Investigations Northwest	• Cultural and Historic resource surveys

Design Objectives

The primary objective is to finalize design concepts for the project such that it can be advertised and constructed beginning in the first quarter of 2017. The services provided by the Otak, Inc. project team include the following tasks:

- Review and update prior studies
- Completion of aerial and field surveys for each pump station site and pipeline route.
- Environmental assessments to determine permit requirements and conditions.
- Geotechnical field investigations for the pump stations and pipeline routes.
- Hydraulic transient analysis of the force mains.
- Development of 30 percent plans and a design report.

Scope of Work

Task 1 Flow Projections

This task will confirm or revise the flow projections stated in the NUGA study and provide additional support for flow projections in next five (5) years.

- Review potential transmission system service areas.
- Review existing flow projections in the City of Camas, including those produced in 2014 for the NUGA Sewer study, and those in the City's General Sewer Plan Amendment.
- Review peaking factors for use in newer and developing portions of Camas.
- Assess status of current property ownership and development prospects in the NUGA.
- Revise the 2014 flow projections within the 20-year planning time frame as necessitated by this review. The review will focus on the first five (5) years, and the 20-year flows will remain as currently defined.
- Provide estimates of flow projections at three to four key intermediate points in the 20-year planning horizon. Intermediate points include start-up flows as well as two to three trigger points that will be tied to dates or major changes in flow contributions.

Assumptions:

- 20-year UGA and zoning shape files are available from Clark County.

- Sewer basin maps are available from previous NUGA Sewer studies in CAD or GIS form.
- The flow characteristics, such as per capita flow and peaking factors, used in this analysis will be as defined in the city's General Sewer Plan Amendment.

Deliverables:

- Map of service areas for each pump station.
- Population and flow projections through the end of Camas's current planning period, including three to four intermediate points.

Task 2: Alternatives Evaluation

Perform an evaluation of NUGA Sewer Transmission system pipelines routing alternatives, and for sites for Pump Stations 2 and 3.

Subtask 2.1: Camp Currie Alignment:

This task includes the review of an alternative pipeline alignment from Pump Station #1 through Camp Currie to Leadbetter Road. The alternative analysis will include an analysis of cultural resources, environmental resources, and ROW impacts. The tasks will include:

Cultural Resource Assessment

To assess whether significant archaeological resources are within the Camp Currie alignment, the resource survey will be a phased approach, designed to first assess the most likely areas, then verify whether archaeological sites are present, followed by determining whether impacts to resources can be avoided. The approach will be to:

- Conduct a pedestrian survey of the proposed alternative.
- Shovel test areas that appear most likely for an archaeological site, based on the landform, historical research, or presence of artifacts nearby. Up to 100 shovel tests may be excavated.
- Delineate the resources found, if any. Up to 40 shovel tests may be excavated.
- Conduct additional survey near resources to determine whether a shift in the corridor will avoid resources.

Once the Camp Currie option alignment has been investigated, the rest of the corridor will be surveyed and shovel tested, where needed. This is covered in Task 9.

Environmental Assessment

The proposed alignment requires an evaluation of natural resources to determine if resource impacts in this segment (particularly wetland and stream impacts), when added to impacts from the remaining corridor segment, can be addressed with a U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) that requires less than 0.5 acres of impact (fill). Also, the general extent of buffer impacts from wetlands off the corridor needs to be estimated and what the extent of buffer mitigation, if any, would be. This task will include:

- Traversing the proposed alternative alignment to identify presence of wetlands and streams

along and adjacent to the alignment and associated corridor. Wetland limits and location of streams will not represent complete delineations, rather identify presence of wetlands and approximate boundaries.

- Completing preliminary functional assessments and categorizations of wetlands according to Washington State Department of Ecology's (Ecology's) Wetland Rating System.
- Coordinating with City staff to determine lead agency status with Clark County for Critical Areas located in Clark County.

Survey

- Establish survey control on Project Datum along the preliminary alternate alignment, from NE 232nd Avenue to NE Goodwin Road (Approx. 7500');
- Stake preliminary alternate alignment between NE 232nd Avenue and NE Goodwin Road with lath every 100' and at angle points (Approx. 100 stakes);
- Map locations of archeological, wetland, and geotechnical flagging, plots, pits, etc., along the preliminary alternate alignment;
- Supplement survey control as necessary for an alignment revised to miss cultural and/or environmental resources. (Approx. 3500');
- Stake secondary alternate alignment where different than preliminary alternate alignment. (Approx. 40 stakes);
- Map locations of archeological, wetland, and geotechnical flagging, plots, pits, etc., along the secondary alternate alignment.

Real Property Services Assessment (Clark County, Lacamas Creek Communities and BPA)

Otak will evaluate the ability to get easements from Clark County, from Lacamas Creek Communities, and from the BPA. This will be done by meeting with each agency and owner to confirm their willingness to allow the pipeline on their property and for the city to purchase an easement.

Hydraulics Assessment

CH2M will perform hydraulic assessment of pipeline alternatives between Pump Station 1 and Pump Station 2. This effort includes the following activities:

- Develop Pump Station #1 criteria associated with the both the baseline alignment and the Camp Currie alignment.
- Provide input into pipeline sizing for each alternative and perform a cursory transient evaluation to define requirements.
- Investigate options for pumping equipment to meet criteria associated with each alternative; determine if proposed criteria limit or eliminate equipment options, or drive the need for differing approaches (e.g. series pumping).
- Define upgrade requirements to Pump Station #1 for both pipeline alternatives (designed and constructed by others)

Alignment Evaluation

Once the assessments have been completed the two alternatives (base alternative versus Camp Currie alternative) will be evaluated as follows:

- Prepare budget-level capital and life cycle cost estimates for both pump station alternative. The costs will not be all-inclusive but will be for comparative purposes. The intent is for the costs to be accurate relative to each other for selection purposes.
- Develop criteria to evaluate each option. Criteria are expected to include life-cycle costs, environmental impacts, cultural resource impacts, availability and reliability of pumps, and easement acquisition potential.
- Develop narrative guidelines on the qualitative measurement of each criterion.
- Review criteria and weighting with the city.
- Qualitatively score the performance of the alternatives against the criteria (Scale of 1 to 5).
- While performing the analysis, assumed fatal flaws to the Camp Currie alignment include:
- Wetland impacts such that the project will not quality for a nationwide permit.
- Significant, unavoidable cultural resource sites are found.
- Unable to receive a permit from the BPA.
- Unable to obtain an easement from the Lacamas Creek Communities.

Upon completion of this evaluation, a meeting will be held with city staff to review the analysis and select a route.

Assumptions:

- The Camp Currie portion is 7,500 feet long and 50 feet wide.

Deliverables:

- Decision matrix with selection criteria
- Meeting minutes from selection meeting

Subtask 2.2: Pump Station Alternatives

This task is to determine locations for Pump Stations 2 and 3:

- Establish the location of Pump Station 2. This will be determined based on the ability to provide gravity service to the tributary basin (Basin 3), and critical lands avoidance. GIS topography indicates that Pump Station 2 should be located between 500 to 1000 feet south of NE 9th Street to allow for gravity service from Basin 3 to the pump station.
- Establish the location of Pump Station 3. This location will be based upon the ability to serve Basin 4 (the CJ Dens parcel). It will be assumed that the pump station will be located just off of Leadbetter Road on the CJ Dens property.
- Review City standards for pump station configuration and provide a summary of proposed

enhancements for consideration by Owner. Meet with Owner to review enhancements and facilitate endorsement by City of configuration for all three new stations.

- Develop two alternative site layouts at each site. This will include activities such as: (1) determine structure size, location, and orientation; (2) layout roadways/truck access corridors and define maneuvering requirements (design vehicle); (3) size and locate parking lots for employees and visitors to the facility; (4) determine emergency vehicle access requirements. (4) evaluate flood plain impacts and constraints; (5) locate storm water management facilities. (6) locate utility and piping corridors (horizontal and vertical).
- Review concepts and draft work products with the city for selection of a preferred alternative.

Assumptions:

- None

Deliverables:

- Draft and final memorandum describing the selection process, along with a map showing the pump station locations.

Subtask 2.3: Pipeline Route Alternatives - SR 500 to Downtown

This task is to review options for installing the pipeline in State Route 500, and to review routes to the Main Pump Station. This task will include:

- Determining the best approach for crossing the channel between Lacamas and Round Lakes. Options include crossing on the existing bridge, installing a new bridge, or using trenchless technology to cross under the channel.
- SR 500 between Leadbetter Road and NE 35th Avenue has limited room for new pipelines, as there are many utilities in the road. In addition, this is a main traffic corridor, including a main route for school buses.
- Reviewing options to install the pipeline on the route of a new road west of SR 500 to serve Fallen Leaf Park.
- Review routes previously considered between Lacamas Lake and the Main Pump Station.

Assumptions:

- None

Deliverables:

- Draft and final memorandum describing the selection process, along with maps showing alternative and preferred routes.

Subtask 2.4: Define Odor and Corrosion Control Approach

- Based on the proposed system configuration establish the recommended alternatives for odor and corrosion control for the NUGA STS. The alternatives will be evaluated based on life cycle cost, treatment effectiveness, space availability, installation requirements, and ease of

O&M.

- Develop a layout and summarize the design criteria for the recommended odor and corrosion treatment/prevention alternatives based on successfully installed systems and performance. The design criteria will include air flow rate, size of the unit(s), tank sizes, performance efficiency, space requirements, chemical feed, water flow rate, fan size, effectiveness and utility requirements such as water, drainage, and electrical and other factors, as applicable.
- Develop alternatives for ventilation and air collections methods. Evaluate ventilation rates and source containment of odors and recommend the economical and effective alternative that minimizes the size of the odor treatment system and limits annual operating costs associated with liquid chemical addition to the extent possible.. Incorporate recommendations for material selection for those components subject to corrosive gases.

Assumptions:

- None

Deliverables:

- Draft and final memorandum describing the selection process, and describing the proposed odor/corrosion control method.

Task 3 Preliminary Design

The purpose of this task is to use the data and guidelines developed in Tasks 1 and 2, develop and evaluate alternative design concepts, and agree upon a single design concept. The end products from this task will include sketches and preliminary drawings which will provide sufficient information for Owner and agency review and design team coordination and review. Drawings and other materials that may be required exhibits for environmental permit applications will be available at the conclusion of this phase (assumed 30 percent level of design). The preliminary design work will be performed by Otak and CH2M, and specific work activities and deliverables from this task are as identified below.

Subtask 3.1: Transient/Surge Analysis

CH2M will perform a preliminary surge evaluation of the forcemain and pump station systems for Pump Stations 1, 2 and 3. This analysis will consist of a power failure pump shutdown scenario to determine the potential surge pressures associated with the pipeline system. This analysis will be performed for the maximum flow condition. The analysis will include separate analyses for each pump station and forcemain system. .If the initial analysis indicates that surge conditions may be leading to excessive positive or negative pressures, additional surge analysis will be performed to evaluate potential surge mitigation alternatives. This analysis will also provide a description of the steady state flow conditions for the pipeline. It is anticipated that commercially available analysis tools will be used such as Bentley Hammer. A technical memorandum will be prepared for the initial analysis and revised for the final analysis that will occur at 90% design.

- Gather necessary data required to create a computer model of the pump station and force main system under both initial and ultimate flow conditions.

- Establish initial non-transient hydraulic grade line elevations for pump power failure and start-up analysis under initial and future flow conditions.
- Perform simulations for pump power failure and start-up of the pump station under initial and future flow conditions.
- Review the results of the analysis and, if deemed necessary, incorporate surge protection measures for the force main and pump station to eliminate possible adverse surges created as a result of the power failure and start-up.
- Provide preliminary recommendations for sizes and locations of air/vacuum facilities, and/or other mitigating measures (surge tanks) if necessary for protection from surge conditions.

Subtask 3.2: Preliminary Pump Station Design

The scope components assumed for this task include Pump Stations 1, 2 and 3 as well as odor and corrosion control systems for the transmission system. It is assumed that preliminary design will be developed for all three stations.

Objectives and Standards

Document the Owner's institutional standards as well as external standards and criteria that influence the project design work. The standards and criteria in the following areas will be considered:

- Owner design criteria standards and preferences: Identify any Owner standards for design criteria or standard products. Discuss any Owner preferred equipment types, suppliers and vendors.
- Graphic standards: Standard drawing size/border, standard symbols/legends, CAD software standards (including software versions), requirements for electronic deliverables, standards/preferences for P&IDs, process flow stream IDs etc.
- Procurement policies: Bidding/procurement requirements, sole source restrictions, any existing master agreement for the purchase of materials, and equipment.
- Labor standards and policies: Design provisions for staff/visitors with accessibility limitations, any existing noise restrictions, any existing labor union restrictions, site security requirements, parking requirements etc.
- Equipment and materials: Preferences on indoor versus outdoor locations for equipment, preferred equipment types and suppliers, local control/local disconnect preferences (lockable MCCs versus local disconnect switches), standby power provisions, preferences regarding the use of adjustable frequency drives etc.
- Structural/Mechanical: Identify local permitting agency, obtain current local design codes and standards that are in effect, define permitting requirements.
- Electrical/I&CS: Define redundancy requirements, identify primary contact at local utility, Owner telemetry standards and approaches.

Civil and Site Development

Schematic design work will include the following activities.

- Confirm adequacy of topographical and boundary mapping. Evaluate legal, ownership, permitting and zoning constraints. Identify environmentally sensitive areas such as wetlands, flood plains, known hazardous waste areas, etc
- Coordinate with geotechnical engineer on boring locations; record boring locations on site drawings.
- Develop preliminary erosion control plan for project. Prepare preliminary storm water calculations suitable for submission to local site permitting authorities. Develop preliminary storm water control concepts (swales, curb, and gutter). Meet with local storm water and erosion and sediment control agency to determine permitting requirements for site plans, and impact of requirements on preparation of contract documents. Document findings.
- Set preliminary finished floor levels for new structures. Establish preliminary finished grades; overall major surfaces, road profiles, etc. Iterate preliminary surfaces and structures to optimize earthwork if necessary.
- Review concepts and draft work products with and seek approval from quality control reviewer.

Structural

Schematic design for structural will include the following activities:

- Consult with lead process engineer on building/structure layouts.
- Develop structure foundation and concepts based on schematic layouts.
- Review concepts and draft work products with and seek approval from quality control reviewer.

Geotechnical

Geotechnical work will include the following:

- Determine site specific geotechnical conditions for each facility and structure. Develop specific foundation requirements.
- Verify constructability (shoring and bracing requirements, dewatering issues).
- Prepare foundation and corrosion control recommendations.
- Review concepts and draft work products with and seek approval from quality control reviewer.

Mechanical

Schematic design for mechanical will include the following:

- Select and size all major process equipment including pumps. Prepare sizing calculations and obtain review. Establish level of redundancy required for all process equipment.
- Prepare equipment list with sizing for major equipment. Coordinate with the owner on preferences of equipment manufacturer and processes.
- Prepare preliminary drawings for equipment arrangements.

- Review concepts and draft work products with and seek approval from quality control reviewer.

Odor Control/Plumbing

Schematic design for Odor Control and plumbing will include the following:

- Select type of ventilation system to be used in pump station and other structures inlet air tempered with inlet and outlet fans, simple exhaust fan system).
- Determine overall potable water requirements for the project. Confirm adequate quantity and pressure can be obtained from the local potable water supply utility.
- Review concepts and draft work products with and seek approval from quality control reviewer.

Instrumentation and Control Systems (I&CS)

Schematic design work for the instrumentation and control will include the following activities:

- Prepare a process flow drawing (PFD) for each system. Information to be included on each PFD includes at a minimum: Process configuration, flow streams, valve and gate locations (manual and powered), chemical additions points/types, equipment location/type including packaged control panels and adjustable-speed drives, flow meters and other process control devices.
- Develop equipment/instrument tag numbering, naming, and abbreviation conventions.
- Review existing telemetry systems and client goals and develop a needs assessment
- Develop recommendations for communications systems for new pump stations, considering integration into existing City communications network.
- Prepare written operational description of each pump station, reflecting system wide operations (developed in Task 3.4).
- Develop overall control philosophy including local control approach, control system, level of automation, telemetry approach and supervisory control.
- Review concepts and draft work products with and seek approval from quality control reviewer.

Electrical

Schematic design work for electrical will include the following:

- Prepare preliminary one-line diagrams for proposed facilities.
- Prepare preliminary load calculations.
- Size electrical systems
- Coordinate with local power utility to determine locations of power feeds, voltage, billing details (peak usage rates), requirements for reduced voltage starters, substation requirements
- Determine redundancy requirements for power supplies and power distribution.

- Establish preferred voltages for power distribution and utilization equipment.
- Compile list of chemicals and amounts to be used. Coordinate with other disciplines (mechanical and I&CS) to resolve code compliance issues specific to these disciplines (e.g., National Electrical Code and National Fire Protection Association 820 issues). Develop preliminary schedule of hazardous and corrosive locations. Review concepts and draft work products with and seek approval from quality control reviewer.
- Evaluate potential incentive funding from Clark Public Utilities for which the City may be eligible.

Assumptions:

No buildings will be provided for at-grade equipment.

Deliverables:

- Process & Instrumentation Diagrams (P&IDs)
- Process Control Narratives.

Subtask 3.3: Pipeline Design

Pipeline Alignments

Pipeline alignments will be developed and refined using field survey information. Locations within roadways will be identified, and exact alignments in non-roadway areas will be determined. Existing utility locations and environmental information will be reviewed, and pipeline alignments will be adjusted to avoid utility conflicts and environmental areas where possible. Topographic considerations (reducing the number of high and low points) and surge analysis will dictate the size and quantity of combined air release/vacuum valves, which will also influence final alignment routes and profile.

Design Standards

Determine design standards to be applied to the pipelines. Identify Washington Department of Ecology (Ecology) requirements for sanitary force main construction.

Pipeline sizing

The size of each gravity pipeline will be reviewed, along with the use of a single force main versus dual force mains.

Pipe Materials Evaluation

Pipe materials will be reviewed and evaluated based on criteria such as corrosion resistance, hydraulics, pressure and transients, longevity, ease of installation, local experience, and availability in the northwest. These criteria will be used to rate and rank different pipeline materials, and this analysis will be summarized in a Technical Memorandum, which will be incorporated into the Design Report.

Pipeline Design Criteria

Criteria to be evaluated include internal pressures, external loading, thrust restraint, buoyancy and

uplift.

Subtask 3.4: Flow Management and Operation/Maintenance Plan

This task will include:

- Develop a written plan for the NUGA system addressing flow management, system operations, and maintenance of the NUGA STS. Develop and evaluate O&M and flow management for extreme low flow, average flow, and peak flow at startup and at system capacity for each of the phases of the NUGA sewer transmission project. The plan will also address:
- Flow Monitoring Plan including flow triggers and operational queues indicating capacity needs
- Emergency Response for key system failures (pump station failure, force main failure, gravity trunk failure)
- Develop advantages/disadvantages for all flow scenarios, including considerations for solids management in force mains and gravity sewers, capital costs, operating costs, and odor and corrosion control requirements.

Assumptions:

- The plan will not address infrastructure downstream of the NUGA STS discharge point.

Deliverables:

- Draft and final technical memorandum.

Subtask 3.5: Preliminary Design Workshops

Otak and CH2M will conduct a series of half day workshops throughout the preliminary design phase to review preliminary design concepts, make design decisions.

These tasks will be performed by Otak and CH2M and will consist of bi-weekly workshops throughout the preliminary design phase with the Engineer's design team and client staff. Tentative topics include:

- Flow management and overall system operation.
- Phasing and flow triggers associated with improvements.
- Pump station design criteria (elevation, capacity, redundancy requirements, capacity for expansion).
- Pump station configuration.
- City's preferred O&M features.
- Odor and corrosion control options
- Draft control loop descriptions.
- Draft P&IDs.
- Emergency power supply.

- Draft electrical design standards.
- Draft mechanical design standards.
- Draft instrumentation design standards.
- Remote operational capability and telemetry.
- Site plan features.
- Identify permitting issues along the force main routing and develop an action plan to resolve potential issues.
- Meeting agendas, complete with anticipated attendees, will be developed with key staff early enough to facilitate scheduling of staff members.

Assumptions:

- Approximately 10 four-hour workshops will be held at city offices. Assume approximately 4 consultant team members will attend each meeting.

Deliverables:

- Meeting minutes and action item lists from each meeting, which will be reviewed at the following meeting.
- A report will be prepared that documents the approach and findings of the preliminary design. The report will document the design process and equipment selection performed for this phase of the project and will include the following information:
    - Pipelines
        - Force main size and material selection (including dual versus single force main selection)
        - Gravity trunk size and material selection
        - Trenchless technology design parameters, if these methods are proposed.
        - Locations for air/vacuum release valves, drainage piping, isolation valves, pigging facilities and other appurtenances.
        - Basis of Design calculations
        - Route evaluation and final route selection
    - Pump Stations
        - Wet well/Pump Configuration and Sizing
        - Discipline Technical Memoranda
        - Odor control for pump station and force main
        - Corrosion control for wet well and force main
    - Work Sequence
    - Flow Management (TM from Task 3.5, revised to address city comments).
    - Project programming and phasing

- Thirty percent pipeline drawings, which will include:
    - General Overview: Indexes to Drawings and Legends, Project Location Overview
    - Plan and profiles for the pipelines.
    - Trench detail showing width and bedding and backfill requirements.
- Thirty percent pump station drawings, which will include:
    - Pump Station arrangement drawings
    - Odor Control system arrangement drawings
    - Process flow drawing (PFD) for each system
    - Preliminary Process Control Narratives
    - Control System Block Diagram
    - Equipment List
    - Preliminary one-line diagram
- 30 percent cost estimate with a 25 percent contingency and an escalation factor to the estimated midpoint of construction for each project.

Task 4: Survey and Mapping

Survey will be performed for the final alignment pipeline route, CARV and pump station locations. Survey will be a combination of aerial and ground survey techniques, as described below.

1. Aerial mapping services

- Establish survey control for aerial photography of final alignment;
- Aerial photo acquisition;
- Aero triangulation and preparation of digital orthophoto/orthomosaic;
- Mapping of planimetric features;
- Digital terrain model development;
- Mapping specifications:
- 1' contours
- 0.25' pixel density of photo
- 0.33' vertical accuracy on visible, hard surfaces

2. Field/Ground mapping services

- Supplement aerial photo control as necessary to perform ground mapping work;
- Field review of mapping to determine areas obscured by vegetation/overhangs;
- Mark for utility locates;
- Map areas obscured from aerial mapping by vegetation;
- Map underground utilities;

- Bathymetric surveying near SR 500 bridge over Lacamas/Round Lake;
- Detailed mapping of SR 500 bridge over Lacamas/Round Lake ;
- Tie environmental/resource areas identified and flagged;
- Tie soil boring and piezometer locations;
- Up to 10 pot holes of existing underground utilities to verify location, depth, and size.

3. Office mapping services

- Prepare topographic/right-of-way base map which includes:
- Aerial and ground topographic data;
- Existing ground digital terrain model;
- Centerline, right-of-way along route;
- Underground utilities and inverts (where available);
- Locations of all archeological, natural resource, and geotechnical flagging, test plots, etc.
- Compile utility as-built records and locations for public and private utilities (water, sanitary sewer, storm sewer, electric, telephone, gas, etc.)

Task 5 Geotechnical Investigation

This task will be performed by GRI and will include:

Subtask 5.1: Geotechnical Data Review

- Review available geotechnical and geological information for the sewer alignments, including well log reports.
- Review available aerial photographs and topographic maps of the project area for topographic conditions, areas of obvious shallow bedrock, and obvious indications of slope instability.

Subtask 5.2: Geotechnical Reconnaissance

- A licensed engineering geologist from GRI will complete a geologic reconnaissance of the transmission main alignments, pump stations, and bridge locations.
- Subsurface conditions along the alignment will be evaluated with up to 12 push-probe borings and 10 geotechnical borings.
- The push-probe borings will be advanced to depths of 15 to 20 feet, unless refusal on rock is encountered at a lesser depth. The push-probe method of investigation provides a cost-effective approach to rapidly explore subsurface conditions, particularly if hard rock is present. A metal tube with a sleeve is advanced into the ground to the depth desired, or to refusal on hard rock. A continuous core of the soils and, in some cases, soft rock, is obtained in the sleeve. Due to the relatively small (2 in.) diameter of the push-probe core, testing of the soil sample is limited to classification tests, such as moisture content and grain size analysis. The push-probe unit will be provided and operated by an experienced subcontractor. The push-

probe field work will be coordinated by a geotechnical engineer or engineering geologist from GRI who will document the work and obtain soil samples. It is anticipated that most, if not all, of the push-probe borings will be made on or along roadways, and traffic control will be required.

- Geotechnical borings will be completed using a truck-mounted hollow-stem auger unit. The borings will be completed in the sewer alignment including at the proposed pump stations and bridge crossing to supplement the information from the push-probes and further characterize the engineering properties of the soils and rock. Borings will be drilled to depths of between 20 and 30 ft. The total estimated drilling footage will be on the order of 260 ft. If hard rock is encountered within the proposed depth of excavation rock coring methods will be used to advance the borings to the maximum depth planned and rock core samples will be collected. Disturbed split-spoon samples will be obtained from the borings at about 2.5-ft intervals of depth in the upper 10 ft and at 5-ft intervals below this depth. The Standard Penetration Test will be conducted while the disturbed split-spoon samples are being taken.
- Vibrating-wire piezometers with data loggers will be installed in up to eight borings to measure the depth to groundwater and the seasonal variation. The vibrating-wire piezometers will allow for near-continuous measurement of the groundwater, which will be particularly useful for planning construction dewatering. Data from the data logger will be collected by GRI personnel on a three-month interval for a period of one year after drilling.
- The data logger will be protected at the ground-surface with a highway-rated, flush-mounted monument. The pavement at the borings locations not completed as piezometers will be patched with permanent cold-patch asphalt.
- Geotechnical laboratory testing will include standard classification tests, such as natural water content, grain size analysis, and Atterberg limit determinations to evaluate the suitability of the on-site material for structural fill and provide information to the contractor for construction dewatering. Unconfined compression testing will be performed on rock core samples to help evaluate rock excavation.

Subtask 5.3: Geotechnical Report

- Engineering studies and analyses will be accomplished that will lead to the preparation of conclusions and recommendations concerning
- Trenching conditions and considerations, including rock excavation;
- Earthwork, including cut and fill slopes, wet-weather construction, and the suitability of on-site soils for the use as structural fill;
- Foundation design criteria for the pump stations;
- Design lateral and uplift pressures and coefficient of base friction;
- Shoring;
- Dewatering; and
- Other geotechnical design or construction considerations that may arise during the course of

the study

- A report will be prepared that discusses the work accomplished and presents the results of the various tests and office studies. The report will provide our characterization of the soil, rock, and groundwater conditions along the alignment.

Assumptions:

- Abandonment of the vibrating-wire piezometers is not included in our scope of services and should be made part of the construction documents.
- A traffic control plan will be submitted to the City of Camas. GRI will subcontract the traffic control personnel.
- The borings will be subcontracted to a drilling contractor experienced in drilling and sampling soils for engineering purposes.
- The geotechnical boring field work will be completed under the direction of an experienced geotechnical engineer or engineering geologist from GRI, who will locate the general areas for drilling and maintain a detailed log of the materials and conditions disclosed during the course of the work.
- It is anticipated that most, if not all, of the geotechnical borings will be made on or along roadways, and traffic control will be required.

Deliverables:

- Draft and final electronic and three paper copies of the Geotechnical Reports

Task 6 Environmental Services

Subtask 6.1: Stream and Wetland Field Review and Report

A number of small streams and associated wetlands along the preferred option (Alternative 4) need to be identified to facilitate 30% (Phase 1) project design, for example, constraints regarding pump station locations. Also, the City's Stormwater Capital Improvement Plan includes upsizing culverts under Leadbetter Road. All streams and wetlands in this Alternative need to be reviewed for potential project impacts to Waters of the U.S. In addition, the Ordinary High Water Marks (OHWMs) of Lacamas Creek and Lacamas Lake need to be determined to identify extent of shoreline jurisdiction (the OHWM defined in the Shoreline Management Act [SMA] is a biological vegetation mark). For this subtask (in Phase 1), Normandeau will:

- Flag the OHWM, per Ecology guidance, of streams and limits of associated wetlands beyond the OHWM
- Flag the OHWM at the inlet to Round Lake from the SR-500 bridge eastward for approximately 125 feet.
- Conduct office work and field work to complete a functional assessment and categorize wetlands according to Ecology's Wetland Rating System (2014).
- Prepare a memorandum summarizing field methods and findings

Assumptions:

- Demarcating of the OHWM on small streams will follow *Determining the Ordinary High Water Mark on Streams in Washington State*, March 2010 Second Review Draft, Ecology Publication 08-06-001.
- The Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, ver. 2.0 (2010) will be followed.
- Wetland buffers terminate at the edge of the road prism and thus wetland abutting roadways do not need to be delineated.
- Normandeau will coordinate with Otak to survey the location of OHWM and wetland flags in the field.
- Four small stream crossings and associated wetlands will be delineated.
- Flagging of streams and associated wetland will extend approximately 50 feet from either side of the proposed centerline of alignment.
- Memorandum will not exceed 10 pages, not including appendices.

Deliverables:

- OHWM and wetland delineation memorandum (one internal draft electronic copy to Otak and the City; one final electronic copy to Otak and City).

Subtask 6.2: Joint Aquatic Resources Permit Application (JARPA) and Clean Water Act (CWA) Compliance

During Phase 1, the design team will coordinate with agency and City staff regarding project design/goals and issuance of a permit under CWA §404 and certification by Ecology under CWA §401. For this subtask (in Phase 1), Normandeau will:

- Attend an office visit with USACE and Ecology staff (if the latter elect to attend) to review the project and discuss concerns or recommendations agency staff may have regarding issuance of authorizations under the CWA.

Assumptions:

- Engineering drawings, impact acreages and drawings showing same, Best Management Practices, and related design and construction information will be provided by others.
- The project will meet Ecology's §401 General Conditions and thus is Certified under Nationwide Permit (NWP) 12 and NWP 14.
- No compensatory mitigation will be required by any agency.

Deliverables:

- Attend an office visit with USACE and Ecology staff (not to exceed 4 hours including travel and meeting time).

Subtask 6.3: Washington Department of Natural Resources (WDNR) Aquatic Use

Authorization

If the project plans include constructing a utility bridge adjacent to the SR-500 bridge over the inlet to Round Lake and the land beneath the inlet is owned by the State of Washington, then an aquatic resources authorization will be required from WDNR. This authorization is not a regulatory permit, but a legal contract with terms and conditions between the City and WDNR that allows the City to lease space above state-owned aquatic land. For this subtask (in Phase 1), Normandeau will:

- Telephone WDNR staff and explain the details of the project and discuss ownership of the Round lake inlet.
- Attend a site visit with WDNR staff to review project and discuss concerns or recommendations that agency staff may have regarding project.

Assumptions:

- OHWM demarcated at the inlet to Round Lake following Ecology guidance is acceptable to WDNR, and additional field work will not be required.
- The site visit with WDNR will last not more than four hours (including travel).

Deliverables:

- Email summary of telephone call and site visit to Otak and City.

Subtask 6.4: Washington Department of Fish & Wildlife (WDFW) Hydraulic Project Approval (HPA)

The project plans to cross the inlet to Round Lake; install new sewer line beneath several small streams along the preferred option route (Alternative 4); and upsize culverts under Leadbetter Road. The streams associated with those specific culverts will require a review for potential impacts to Waters of the State by WDFW. For this subtask (in Phase 1) Normandeau will:

- Attend an office meeting with WDFW staff to review project and discuss concerns or recommendations agency staff may have regarding the project.

Assumptions:

- OHWM demarcations following Ecology guidance are acceptable to WDFW.
- New and replacement culverts will follow WDFW culvert criteria.
- The office meeting with WDFW will be concurrent with the USACE and Ecology meeting of subtask 8.1.

Deliverables:

- Attend office meeting with WDFW, Otak, and City staff.

Subtask 6.5: City and County Critical Areas and Significant Tree Permit

A Critical Areas report(s) will be required (in Phase 2) to address resources (wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat

conservation areas) impacted, but not addressed under the Shoreline Conditional Use Permit. Clark County GIS identifies Riparian Habitat Conservation Areas associated with small streams along the preferred alignment, particularly between the intersection of NE 28th Street and NE 232nd Avenue and the intersection of NE Everett Street (SR-500) and NW Lake Road. There may also be wetlands associated with these small streams.

During Phase 1 there should be coordination with City and County staff regarding project design/goals and issuance of a permit under Critical Areas. For this subtask (in Phase 1), Normandeau will:

- Attend an office visit with County and City staff to review the project and discuss concerns or recommendations agency staff may have regarding jurisdiction and critical area issues.

Assumptions:

- The Critical Area report will address the project area outside the Shoreline Master Program (SMP) jurisdiction. A shoreline-specific Critical Area analysis within those boundaries will be included with the SMP application.
- The each agency will act as a lead agency and will be responsible for processing of the Critical Area application under its regulations.

Deliverables:

- Attend an office meeting with county and city staff (two meetings not to exceed 4 hours each including travel and meeting time) and summary email of each meeting.

Task 7 Cultural and Historic Resource Assessments

This task will be performed by Archaeological Investigations Northwest (AINW), with support from Otak, to address Section 106 of the National Historic Preservation Act (due to a potential wetland impact that will require federal permitting) and local ordinances. The study will be an inventory or survey of the Area of Potential Effect (APE), and will include the following tasks.

Subtask 7.1: Background Review

Historic-period maps, such as early USGS quadrangles and General Land Office maps, will be reviewed. Areas where previous archaeological or historic resource studies have been conducted and where archaeological and historic resources have been recorded will be identified and shown on project maps. Previous studies that meet current standards and need no additional fieldwork will be identified. AINW will contact selected Tribes to assess whether ethnographic sites may be within the project.

This task also includes a review of the Area of Potential Effect (APE) maps prepared by others.

Subtask 7.2: Site Reconnaissance

A site reconnaissance of the project will be conducted. Goals for this reconnaissance include identifying areas where there is no need for pedestrian survey or shovel testing, and to verify the coverage of previous field studies.

Since the project alignment will be within roads for much of its length, it will be important to determine if there are areas that do not need archaeological study because they are deeply cut or filled. These include:

- Portions of the project where impacts are within roads—especially in road cuts that are well below grade—may need no additional exploration as impacts may occur in geologic layers deposited well before the time people were in the area.
- Determining whether the alignment will be within native soils—and have potential for an archaeological site—or will be entirely in fill or bedrock, for example, is likely to reduce the risk of encountering archaeological resources in some areas.

Subtask 7.3: Resource Surveys

After the reconnaissance is done, pedestrian surveys will be conducted, followed by shovel testing of areas where archaeological sites are deemed likely. Archaeological and historic resources will be documented during the survey.

Archaeological Survey and Shovel Testing

Archaeological survey of the roadway areas that the Camp Currie option will replace will be difficult to accomplish due to heavy traffic. Because construction trenching may intersect archaeological sites buried under the existing roadway, some areas may be targeted for probes through the roadway, if this can be accomplished, although archaeological investigation much prior to construction might be impossible.

- Areas along roads that are considered likely could be approached by investigating the shoulder areas and considering those areas to be a proxy for the undisturbed area under the road bed; a constraint may be the narrowness of road right of way.
- Alternatively, if shovel probes could be done ahead of construction in the high probability areas within roads, that will reduce risk. This may be possible in some low trafficked areas, but this strategy is not likely to address most of the project.
- It may be very difficult to adequately test for buried archaeological resources in some high risk areas, and monitoring may be appropriate for those areas; this is not the preferred situation as interruptions during construction would increase cost.
- Areas where an archaeological site is considered likely but the visibility of native soils is poor due to vegetation may be recommended for shovel testing. If artifacts are found during shovel testing, they will not be collected but will be documented, and a site or isolated find form will be prepared. Shovel tests will be excavated to meet the City's archaeological ordinance and the DAHP's standards and guidelines. They will be excavated 30 centimeters in diameter at the surface to at least 50 centimeters deep, and soils will be screened using ⅛-inch mesh hardware cloth, all to meet the City of Camas archaeological ordinance.

Historic Resource Field Inventory

Historic-period buildings and structures—those constructed more than 45 years ago—that are within the APE will be inventoried and a preliminary evaluation of significance assessed. At this time, two

previously identified resources that are significant are likely to be within the project APE include:

- The Pittock House on Leadbetter Road, also known as the Lakeside Leadbetter House, has been listed in the NRHP.
- The Camas Mill Ditch is crossed by the alignment near the southern end of the project, along Garfield Street; this is part of the complex making up the paper mill, which is considered to be a significant resource.

Other historic resources that are within the APE also will be identified and included in the inventory of historic resources. Historic resources will need to be documented on the DAHP's current inventory forms and the forms appended to the report. A preliminary evaluation will need to be provided as part of the documentation.

Subtask 7.4: Report

The report will be prepared to meet the survey-level standards of the City's archaeological ordinance, given the strong likelihood of an archaeological site within the APE and to meet SEPA review. The report will document the work performed to the level that will meet the standards for review by the Corps of Engineers.

The report will provide a project description and information on the environmental and historical/cultural setting of the project, summarize the background review and fieldwork, provide information about areas where additional survey may be needed, and provide an evaluation of resources. A preliminary Finding of Effect will be recommended. Forms for identified archaeological and historic resources will be appended to the report, and map atlases will note areas where the study has been completed as well as where resources are located and show where additional effort, such as monitoring during construction, may be recommended.

Assumptions:

- APE maps will be provided by others. AINW will review and make recommendations for adjustments.
- The DAHP database will be a main source of background information.
- AINW's library will be used to identify reports written prior to the start of the database compilation in the late 1990s.
- The project will be reviewed by the City of Camas, including the portions that are within Clark County (unincorporated).
- AINW will assist with identification of the project APE, in coordination with the project team.
- The project corridor (assumed APE for the alignment) is 8.8 kilometers (5.5 miles) long and the corridor is 50-feet wide on each side of pipeline, or along the right of way where along roads.
- The archaeological fieldwork will include a pedestrian survey using transects spaced 33 to 50 feet (10 to 15 meters) apart for all of the APE except paved areas, impenetrable areas, and private land where no permission has been obtained.

- Up to **190 shovel tests** will be excavated at high probability areas, where the surface visibility is inadequate to determine whether an archaeological site is present. The shovel tests will also be used to delineate resource boundaries.
- Shovel tests will be 30 centimeters at the surface and excavated at least 50 centimeters deep, to meet the City of Camas archaeological ordinance. (County standards require 50-centimeter diameter shovel tests.)
- Soils will be screened using ⅛-inch mesh hardware cloth. No artifacts will be collected.
- Up to 20 archaeological resources may be documented.
- Up to 10 historic resources may be identified.
- The study and report will be done to meet the "survey-level" of the City's archaeological ordinance; the report also will be prepared to meet standards of DAHP for a survey, so that it will meet standards of the Corps of Engineers, if needed.
- After review of the draft report and acceptance by the project team and the City, the draft report will be finalized for submittal to the City of Camas for its review under the City's archaeological ordinance and SEPA.
- Copies of the report will be sent to seven Tribes and DAHP via certified mail, to meet the City's ordinance.
- If resources are found that appear to be eligible for listing in the NRHP, and if impacts or adverse effects cannot be avoided, additional study may be needed.
- Archaeological sites that cannot be avoided and that may be significant may need additional testing. If the project is being done to meet Section 106, no permit from the DAHP would be needed for evaluation excavations or for mitigation excavation for sites found to be eligible for listing in the NRHP that cannot be avoided. By identifying these resources early in the project design, it may be possible to find avoidance measures. A site evaluation report would be prepared to present the information from evaluation testing, if this phase of work is needed.

Deliverables:

- Draft and final Cultural Resources report and resource forms (Five (5) paper copies).

Task 8: Right-of-Way Services

These tasks will be performed by Universal Field Services and will include:

- Contacting property owners to discuss the potential for a right of way subsurface easement across their property and discuss the process for obtaining these easements.
- Preparation of a preliminary project funding estimate based on proposed easements and will estimates of land values for identified properties and estimate of values for easements. The draft will include estimated values for land, improvements, damages and any relocations that may be required.

Assumptions:

- Up to 6 property owners will be contacted.

Deliverables:

- A written contact report will be submitted concerning property owners willingness to grant easements in the future.
- Preliminary Project Funding Estimate – 3 copies

Task 9 Project Management

These tasks will be performed by the consultant team and will include:

Subtask 9.1: Project Management and QA/QC

The Project Team will plan, manage, and execute the tasks described herein in accordance with the schedule, budget, and quality expectations that are established. This project management task includes the following work activities:

- Develop project work plan and quality assurance/quality control (QA/QC) plan. This plan will include:
- Agreement highlights including invoicing and billing procedures
- Project description
- Scope of work
- Work plan including project budget and schedule
- Progress evaluation for monitoring budget and schedule
- Quality assurance/quality control (QA/QC) plan
- Communication plan
- Documentation plan
- Scope change management procedures
- Decision making protocol
- Coordinate between tasks and team members. Document meeting decisions and action items, assign activities to team members, and follow up to ensure timely resolution.
- Manage the quality control review of all work activities and project deliverables.
- Preparation and ongoing maintenance of a comprehensive design schedule with individual task milestones, task duration, individual responsibilities of subconsultants and County staff, agencies, utilities, etc.
- Monthly progress reports to be submitted with billings. Monthly progress reports will reflect hourly/percent complete progress for each activity and identify budget status and tasks performed to date during the billing period.

Subtask 9.2: Project Meetings

- A project kick-off meeting to introduce the team players and discuss roles and schedule.
- Project team meetings at Otak's office throughout the project duration at appropriate intervals based upon design activities (Scope assumes 12 meetings).
- Preliminary Design Decision meetings (Assume 12 meetings)
- Project update meetings with the client project manager. Assume bi-weekly meetings through the duration of the project (Scope assumes 12 meetings).
- Attend and present at City Council work sessions (Scope assumes one (1) meeting).

Assumptions:

- Workshops with the consultant and client team for plan review and making project-related decisions is included elsewhere.

Deliverables:

- Meeting minutes from each meeting
- Action Item list, updated before each Client project manager meeting
- Monthly status reports and invoices
- Development and maintenance of the project schedule (Scope assumes four (4) updates)

Task 10 Risk Management

Risk management is an organized decision-making process that assesses the risks associated with achieving overall program objectives. By identifying, analyzing, forecasting, and quantifying the likelihood of risk, the City can allocate appropriate resources and contingencies to mitigate the risk—increasing the likelihood of project success. The purpose of this task is to establish and maintain a Risk Register throughout the project in order to bring certainty to project cost while creating opportunities to avoid using contingency funds.

Subtask 10.1: Establish Risk Register

- Plan and lead a Risk Management Workshop.
- Develop a SharePoint-driven Risk Management tool. Meet with team to develop and populate initial risk register. Register will include a documentation of risks and opportunities and assign potential monetary impact was well as probability of occurrence.
- Work with City staff to develop Risk Management strategies as well as project contingencies.

Subtask 10.2: Risk Register Updates

- Meet with City staff as well as other team members to update the Risk Register on a monthly basis.
- Assume monthly Risk Register meetings are performed via conference call or as part of regular project meetings.

Meetings:

- Initial Risk Register workshop with District staff and Designers.
- Assumed attendance at monthly (assume ten (10)) Risk Register meetings with City staff. Assume meetings are performed via conference call or as part of regular project meetings.

Deliverables:

- Initial Risk Register
- Regular updates to Risk Register