

**CITY OF SANTA ROSA TRANSPORTATION AND PUBLIC WORKS
PROJECT WORK ORDER NO. A010215-2017-05**

PROJECT NAME: **SANITARY SEWER SYSTEM MASTER PLAN UPDATE**

CITY PROJECT MANAGER: **JASON ROBERTS**

CONSULTANT PROJECT MANAGER: **GISA JU**

SCOPE OF SERVICE: See Consultant's Scope of Services/Proposal for Services and Fee Schedule dated October 17, 2019, attached as Exhibit B-1.

START DATE: **NOVEMBER 2019**

COMPLETION DATE: **JUNE 2021**

CHARGE NUMBER FOR PAYMENT: **70805**

NOT-TO-EXCEED AMOUNT FOR THIS PROJECT: **\$2,133,308.00**

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10/18/19

TERMS AND CONDITIONS: This Project Work Order is issued and entered into as of the last date written below in accordance with the terms and conditions set forth in the "Master Professional Services Agreement with Woodard & Curran, Agreement No. A010215," dated December 5, 2017, which is hereby incorporated and made part of this Project Work Order. In the event of a discrepancy or conflict between the terms and conditions of the Project Work Order and the Master Agreement, the Master Agreement shall govern.

CITY OF SANTA ROSA,
A California charter city

By: _____
Daniel J. Galvin III
Board of Public Utilities Chair

Date: _____

WOODARD & CURRAN,
A California corporation

By: _____
Name: _____
Title: _____

Date: _____

By: _____
Name: _____
Title: _____

Date: _____

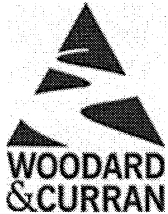
APPROVED AS TO FORM:

By: _____
Santa Rosa City Attorney's Office

Attachments: Exhibit B-1 - Consultant's proposal and fee for services for this Project Work Order

Exhibit B-1

October 17, 2019



Mr. Jason Roberts
City of Santa Rosa
Transportation and Public Works Department
69 Stony Circle
Santa Rosa, CA 95401

Re: Proposal for Sanitary Sewer System Master Plan Update

Dear Mr. Roberts:

Enclosed is Woodard & Curran's proposed scope of work and fee estimate for preparing the City's Sanitary Sewer System Master Plan Update. The work would include conducting a temporary flow monitoring program; inspection and condition assessment of the City's large diameter trunk sewers and sewer siphons; developing and calibrating a hydraulic model of the trunk sewer system; and preparing a Sewer Master Plan Update to identify and prioritize trunk sewer rehabilitation and capacity improvement needs. The flow monitoring field work and sewer inspections would be conducted by firms experienced in these areas under subcontract to Woodard & Curran. In addition, Woodard & Curran would provide ongoing collection system planning and model analyses on an as-needed basis after completion of the Master Plan.

If you have any questions about our proposed scope of work or fee estimate, please feel free to contact either of us at the email addresses or telephone numbers shown below.

Sincerely,

WOODARD & CURRAN

A handwritten signature in black ink, reading "Dave L. Richardson".

Dave Richardson, P.E.
Principal-in-Charge
drichardson@woodardcurran.com
925.627.4138

A handwritten signature in black ink, reading "Gisa Ju".

Gisa Ju, P.E.
Project Manager
gju@woodardcurran.com
925.627.4139

SCOPE OF SERVICES

TEMPORARY SEWER FLOW MONITORING, SEWER INSPECTION AND CONDITION ASSESSMENT, SANITARY SEWER SYSTEM MASTER PLAN UPDATE, AND ONGOING SEWER SYSTEM MODELING

This scope of work details Woodard & Curran's proposed scope of services to conduct sewer system flow monitoring, hydraulic modeling, trunk sewer and siphon inspections, sewer condition and capacity assessment, and development of a Sanitary Sewer System Master Plan Update (Master Plan) for the City of Santa Rosa's wastewater collection system. The project is expected to be completed within about 18 to 20 months starting in late 2019 and extending to the spring/summer of 2021.

This Scope of Services provides a description of each task and subtask and the anticipated deliverables. It follows the basic format (major tasks) of the Scope of Services included in the City's Request for Proposals for this project, with some modifications, enhancements, and consolidation of subtasks. In addition to interim memoranda, reports, maps, data, and model files listed as specific deliverables, analysis methodologies, assumptions, and results will be presented and discussed at project progress meetings. Unless specifically noted, it is assumed that draft deliverables will be submitted electronically for the City's review, and City will provide one set of consolidated, written comments on draft deliverables. City's comments on deliverables will be incorporated into the Master Plan report and appendices to be prepared under Task 6. However, if City comments on draft deliverables are substantial, the City may request revised documents prior to the final report preparation.

Task 1 – Project Management and Coordination

Subtask 1.1 – Meetings and communication

Woodard & Curran will prepare for and attend a kickoff meeting to review project requirements, schedule, and coordination protocols. In addition, Woodard & Curran will attend 6 additional progress meetings to review project status, site investigation reports, proposed analysis criteria, preliminary study results, and other milestones as required by the project. The budget for this subtask includes attendance at seven (7) meetings at City offices, in addition to weekly telephone or email reports on work status and any identified issues. Woodard & Curran's project manager will serve as a single point-of-contact for all communications and coordination with the City.

Subtask 1.2 – Project administration

The Woodard & Curran will perform day-to-day management of the project, including ongoing tracking and review of project staffing, budget, and schedule; subcontract administration; and preparation of monthly invoices and progress reports. At the beginning of the project, Woodard & Curran will prepare a project management plan that details project management and coordination procedures and protocols.

Subtask 1.3 QA/QC activities

In compliance with its Quality Assurance/Quality Control (QA/QC) program, Woodard & Curran will conduct an internal Senior Technical Approach Review (STAR) Workshop following the City's Notice to Proceed. The STAR workshop will include Woodard & Curran's project management and task leadership team members, technical review leads, and other technical experts, to review the project scope, schedule and

technical challenges to ensure that project objectives will be met. Additionally, throughout the project, Woodard & Curran will follow established QA/QC procedures for review of data, results and deliverables prior to submittal to the City. (Note: labor effort and budget for QC review and checking are included under individual project tasks.)

Deliverables:

- *Project management plan*
- *Meeting agenda and minutes*
- *Monthly invoices and progress reports*

Assumptions:

- *Consultant shall attend up to seven (7) meetings at City offices during the course of the project.*

Task 2 – Flow Monitoring

Under a separate Project Work Order, Woodard & Curran will develop a plan for flow and rainfall monitoring in the collection system. This task includes the installation, calibration, and maintenance of the flow meters and rain gauges, quality review of the collected data, and preparation of a flow monitoring report. It is anticipated that the monitoring program will include between 32 and 47 flow meters and up to 5 rain gauges and be conducted for a period of one calendar year. The flow monitoring field work will be conducted by Woodard & Curran's subconsultant, ADS Environmental Services (ADS).

Subtask 2.1 – Install, calibrate, maintain, and remove monitoring equipment

After approval of the meter sites and upon direction of the City to begin installation, ADS will install the meters and rain gauges at the approved sites. ADS will coordinate meter installation with the City's designated contact person, and comply with applicable Federal, State, and the City's health and safety requirements. All meters will be in place within 4 weeks after notice of approval, by January 2020, unless directed otherwise by City. City may request installation of rain gauges in advance of flow meter installation. Meters will record data in no more than 5-minute intervals and be reported in 15-minute increments.

ADS will maintain and calibrate the meters throughout the monitoring period. Field calibration measurements of depth and velocity will be taken at time of meter installation and removal and at least three additional times at approximate 2-week intervals during the monitoring period. Calibration measurements will include a range of flow depths, including the full range of diurnal dry weather flow and wet weather flow to the extent possible.

Data will be reviewed on at least a weekly basis. Any equipment problems, suspect data, or problematic hydraulic conditions will be reported to the City within 24 hours after observation, and identified equipment problems will be corrected with 48 hours after detection. The City reserves the right to reject data that does not appear to meet quality standard or request that meters be relocated if site conditions do not appear to be providing good data. The City may request relocation of up to 3 meters at no additional charge during the flow monitoring period.

ADS will remove any existing, inactive City-owned flow meters if needed to install project meters (removal of 29 meters is included in the budget for this task). All meters will be removed at the end of the flow monitoring period, as directed by the City.

City will provide access to meter sites and site preparation, if required, including exposing manholes, clearing easements, and cleaning sewers. City will also provide secure locations and access for rain gauges installations that are to be installed at City-owned sites.

ADS will obtain necessary permits and prepare and submit standard traffic control plans as required to the City's Traffic Department. ADS will provide standard traffic control (one arrowboard or flashing vehicle beacon, 2 signs and 18 cones) at meter sites and provide plans, if required, for standard traffic control setups. As described under Optional Additional Services, ADS will prepare site-specific traffic control plans and/or retain a traffic control contractor at additional cost for sites requiring more than standard traffic control (unless City can provide additional traffic control at these locations).

The budget for this task is based on installation of 32 flow meters and five (5) rain gauges installed for 12 calendar months during 2020, and assumes that no permit fees are required. Up to 15 additional flow meters may be included in the program if authorized by the City as an additional service.

Subtask 2.2 –Data review during flow monitoring period

ADS will download the data via wireless telemetry on a daily basis to its PRISM Web Data Delivery application or manually interrogate the meters weekly in cases of communication issues (manually downloaded data will be uploaded to PRISM within 3 days after interrogation). ADS data analysts will review the data on at least a weekly basis (normally twice weekly, or more frequently if PRISM auto review identifies a potential data issue) to identify any changes that may indicate equipment problems or site issues such as sensors fouled by debris. If such issues are noted, ADS will notify their field crew manager immediately. Woodard & Curran will also independently periodically download and review the flow monitoring data during the flow monitoring period to check data quality and consistency, and report any questions or observations about the data to ADS. City will be provided access to PRISM and may review the data and provide comments or questions if indicated. ADS and Woodard & Curran will respond to these comments and questions in a timely manner and take any action needed to resolve them.

Subtask 2.3 – Prepare flow monitoring data and report

All final flow data (including level, velocity, and flow rate) and rainfall data will be provided in 15-minute increments in Excel or equivalent spreadsheet format. ADS will provide a summary report documenting the flow monitoring program including flow meter site reports, field calibration data (including date/time, measured versus recorded level and velocity), and summary information for each flow meter (e.g., average, minimum and peak flows) and plots of depth, velocity, flow rate and rainfall. Three (3) copies of a draft report and once electronic copy in PDF format will be provided. City's comments will be incorporated into the final report. Six (6) copies of the final report and one electronic copy on a CD in PDF format will be provided.

Subtask 2.4 - Obtain gauge-adjusted radar rainfall data

Woodard & Curran will purchase gauge-adjusted radar rainfall (GARR) data for wet weather periods during the flow monitoring program (up to 5 months) from an established GARR provider. The GARR provider will adjust (calibrate) the raw rainfall data using data from the temporary rain gauges installed for this project and other publicly available rainfall data sources in the Santa Rosa area. The data will be provided in 1 km

by 1 km pixels in 5-minute time increments (aggregated to 15-minute data for model calibration), providing an accurate spatial representation of rainfall over the service area.

Deliverables:

- *Access to ADS's PRISM web application for data viewing and download*
- *Flow data electronic files*
- *Draft and Final Flow Monitoring Report*
- *GARR data*

Assumptions:

- *Budget for this task is based on installation of 32 flow meters and 5 rain gauges (up to 15 additional meters may be installed if authorized by the City as an additional service)*
- *Up to 29 inactive meters will be removed.*
- *City will provide sewer cleaning, easement clearing, and site access as need for meter and rain gauge installation.*
- *Budget for this task assumes no permit fees will be required, and standard traffic control will be adequate for meter sites. If additional traffic control or non-standard traffic control plans are required for any sites, the City will authorize this as an additional service.*
- *If GARR cannot be obtained for the service area due to insufficient radar availability, then rainfall data from the temporary rain gauges and/or publicly available rain gauges in the service area will be used.*

Task 3 – Model Development

Under this task, Woodard & Curran will develop and calibrate a hydraulic model of the City's sanitary sewer system. The model will be developed in InfoWorks ICM fully dynamic hydraulic modeling software. Woodard & Curran will use its own software licenses for the modeling work.

Subtask 3.1 – Develop model network and parameters for hydraulic control structures

Using data from City's sewer GIS and previous trunk system model (if available) as reference, Woodard & Curran will develop a hydraulic model of the trunk sewer system. The modeled sewer network will include, at a minimum, all 10-inch and larger sewers plus critical smaller diameter pipes, including those that serve areas of significant size, are known or suspected by City staff to have capacity problems, provide alternative flow paths within the system, or serve areas of potential future growth. The modeled network will also include the West College Storage Facility (WCSF) and any system lift stations and other hydraulic control structures located within the modeled trunk network.

The preliminary model network will initially be defined and verified for connectivity as part of the development of the flow monitoring plan. It is understood based on information from the City that the GIS data is relatively complete, with rim and invert elevations provided for most sewers. Following the construction of the model database, Woodard & Curran will use a process called "model validation" to verify the data before beginning model runs. This process will include checking data completeness and reasonableness for apparent discrepancies (e.g., negative pipe slopes, outlet pipe invert elevations higher than inlet invert elevations etc.). Missing or suspect data will be resolved to the extent possible through review of available record drawings or additional requested field verification. The source of new or updated data in the model will be documented directly in the model using InfoWorks "flags" and notes.

In addition to the trunk network, Woodard & Curran will also develop an “all-pipe” *network* that includes all sewers in the system. This network would form the basis for creating a future all-pipe model, but will also provide the basis for allocating system loads on a parcel basis to the modeled network. As part of developing the flow monitoring plan, the all-pipe network will be validated for connectivity to ensure it is a fully connected network through which parcel model loads can be traced and aggregated downstream to the trunk model network (as discussed in Subtask 3.2).

In addition to basic pipe attribute data, Woodard & Curran will develop the parameters needed to model various hydraulic control structures, including lift station wet well dimensions and elevations, pump curves and operating levels, overflow diversion elevations and weir or gate dimensions and coefficients, storage basin elevations and volumes, and operating parameters that control the operation both the WCSF and Laguna Treatment Plant (LTP) storage facilities, based on information provided by the City.

Subtask 3.2 - Develop existing model base wastewater flow loads

Woodard & Curran will review existing parcel, customer billing and water use data provided by the City to determine the best approach for using this data to estimate existing base wastewater flow (BWF) loads to the existing modeled sewer network. Woodard & Curran will request two to three years of water consumption data by parcel (identified by assessor parcel number or customer address), as well as information on the type of account (e.g., residential, commercial, etc.) and other customer or parcel information available (e.g., number/type of dwelling units, building square footage). The exact methodology to be used to develop model loadings will depend on the format and completeness of available parcel-based data; however, it is expected that winter water consumption data will be the primary source of information used.

Existing BWF loads will be developed on a parcel basis, and each parcel will be assigned to a specific pipe in the all-pipe network (as developed under Subtask 3.1). The pipe network (and associated parcels) will then be “pruned” to create subbasins (subcatchments) and the associated BWF loads to modeled trunk manholes.

Woodard & Curran will develop preliminary criteria to be used to estimate base wastewater flows, including wastewater return factors (percent of winter water use “returned” to the sewer system as wastewater flows); dwelling unit flow factors (for example, if residential water billing is not flow-based); and diurnal base wastewater flow patterns. These criteria will be developed based on the flow monitoring data plus Woodard & Curran’s experience with similar Bay Area systems. Large or atypical users will also be identified to assess the need for user-specific diurnal or seasonal patterns for these customers. These criteria will be verified/refined through model calibration. Note that infiltration/inflow (I/I) characteristics, including groundwater infiltration (GWI) rates and rainfall-dependent I/I (RDI/I) parameters will be developed as part of the model calibration process in Subtask 3.3.

Subtask 3.3 – Model calibration and verification

Woodard & Curran will run the model under existing conditions and compare the computed dry weather and wet weather flow hydrographs to observed flow monitoring data collected under Task 2. Initially, calibration will be based on the initial 4 months of wet season monitoring in 2020 (using dry periods during those months to perform initial dry weather calibration and estimate wet season GWI), with refinements to dry weather flow calibration being made after a few months of summertime dry weather flow data are obtained. Modeling parameters such as unit flow rates, wastewater return factors, diurnal curves, and I/I factors will be adjusted as needed to achieve a reasonable match of modeled to metered flow rates and, to

the extent possible, flow depths and velocities. If adjustments can be supported by actual data on pipe materials and condition, refinements to pipe friction factors may also be made.

Woodard & Curran will use criteria established by the international "WaPUG Code of Practice for the Hydraulic Modeling of Sewer Systems" to confirm that the model is well-calibrated. The key WaPUG guidelines for model calibration include:

- Average and peak model flows for non-rainfall periods within +/- 10% of observed flows
- Model peak flows within +25% to -15% of significant wet weather peaks
- Modeled flow volume within +20% to -10% of observed flow volume during rainfall event

Where this accuracy is not achieved, additional investigations will be performed to identify the possible cause of any discrepancies, e.g., the system will be reviewed for possible connectivity errors or needed model refinements at flow diversion locations, monitoring data will be reviewed to assess relative data confidence, and system operations staff will be interviewed to identify locations with known capacity problems or potential service-related problems such as roots and grease that may impact system flows. The overall goal of the model calibration will be to achieve accuracy to within 5% at key locations (on major trunks and at the treatment plant) to ensure that the overall flow balance in the system is correct.

Model simulations for dry weather calibration will be run for a minimum two-week periods, and wet weather calibration periods will typically encompass at least three storm events. Up to two historical storms will be simulated to confirm the model parameters by comparing model flows to recorded flows at permanent metering locations. A continuous simulation of an entire winter wet season (2 months or longer) will be conducted to ensure the model adequately represents seasonal flow variations as well as storage facility operations at the WCSF and LTP.

Subtask 3.4 – Hydraulic Model Documentation

Woodard & Curran will prepare documentation describing the development of the hydraulic model, including development of model loads and model calibration results. The document will provide sufficient detail to facilitate future model updates. The model documentation will also be included as an appendix to the Master Plan report. All hydraulic model files will also be provided to the City at the conclusion of the project (interim files will also be provided if requested).

Deliverables:

- *Hydraulic model documentation*
- *Hydraulic model files*

Assumptions:

- *City's sewer GIS data is relatively complete with respect to manhole rim elevations and pipe diameters, lengths, and invert elevations (i.e., data is populated for at least 90 percent of the trunk sewers) and generally based on the same elevation datum.*
- *City will provide record drawings, survey data, or field investigation as needed to verify missing or suspect data or relative pipe depths and configuration at flow diversion locations.*
- *The budget for this task includes up to 24 hours of record drawing research.*
- *City will provide information on pump station and storage basin operation, including record drawings, pump curves, operating parameters, and existing control strategies.*

Task 4 – Inspection and Condition Assessment

This task includes inspection and condition assessment of the large diameter gravity trunk sewers, sewer siphons, and associated manholes and structures in the City's wastewater collection system.

Subtask 4.1 – Develop inspection work plan

Woodard & Curran will review existing sewer system information in order to assess appropriate inspection methods and technologies to perform structural condition assessment of the City's approximately 13 miles of large diameter trunk sewers, 28 sewer siphons, and associated manholes/structures. Woodard & Curran will prepare a strategic work plan including proposed methods and technologies; data format (data deliverables must conform to the City's specifications); inspection schedule (including number of crews, hours of operation and nighttime work where required); other activities required for the inspection work (cleaning, dewatering, traffic control, etc.); required coordination with the City or other agencies; and cost estimate for the work. It is anticipated that the inspections will include a combination of closed-circuit television (CCTV), sonar, and man-entry physical testing.

A draft inspection work plan will be prepared for review by City staff, followed by a workshop with staff to review the work plan prior to finalizing the trunk, manhole, and siphon inspection scope of work. A final version of the work plan will be submitted incorporating the City's comments and decisions reached at the workshop.

Subtask 4.2 – Conduct inspections

Woodard & Curran will retain inspection contractors as needed to execute the inspection work plan. The contractors will be appropriately licensed with the necessary capabilities, experience, and availability to perform the work according to the requirements and schedule set forth in the work plan. Woodard & Curran will coordinate the inspection work and perform quality review of the inspection data deliverables submitted by the contractors. Woodard & Curran will provide frequent progress reports to the City during the course of the inspection work.

Subtask 4.3 – Condition assessment

Woodard & Curran will use the inspection data collected under Subtask 4.2 to assess the condition of the City's trunk sewer system and develop a list of rehabilitation and replacement needs for each inspected trunk sewer, siphon and manhole. The list will then be used to develop recommended projects in Task 6. Woodard & Curran will also develop recommendations for additional inspections identified outside the scope of this project. This subtask will also include estimating the remaining useful life of the inspected facilities based on the available data.

Subtask 4.4 – Inspection and condition assessment report

Woodard & Curran will prepare a report summarizing the results of the trunk sewer and siphon inspections and condition assessment. The report will be brief and contain mostly summary tables and maps. It will serve as an interim deliverable to provide information to the City on this portion of the project work. The report will also be included as an appendix to the Master Plan report.

Deliverables:

- *Draft and Final Inspection Work Plan*
- *Draft and Final Inspection and Condition Assessment Report*

Assumptions:

- City will provide as-built, maintenance, flow control, and other information for existing trunk sewer and siphons.
- City will provide input regarding work hours allowed for inspections.
- Cleaning, dewatering, and traffic control will be provided by subconsultants to Woodard & Curran.
- City will provide a representative to be present in the field during all inspection activities.
- Woodard & Curran will provide a representative to coordinate the field inspection teams on a daily basis.
- Coordination will be completed via telephone and email with limited field presence. Coordination in the field is assumed to include four 8-hour site visits plus 8 hours of pre-inspection coordination, for a total of 40 hours of field time. Any additional site visits are not part of this scope of services.
- A total budget of \$600,000 has been assumed for Subtask 4.2 as indicated by the City. W&C costs associated with this task may change depending on the type and extent of field work identified in Subtask 4.1. The fee associated with subconsultants as provided is \$600,000 minus estimated Woodard & Curran fee. This number may increase or decrease as field work activities are identified as part of Subtask 4.1 and actual quotes from inspection subconsultants have been acquired.
- If past inspection data is unavailable for a given (manhole to manhole) pipe segment, remaining useful life will be based on current condition of the existing sewer and rate of deterioration will not be accounted for.

Task 5 – QA Review of City’s Collector Sewer Inspections

Subtask 5.1 – Review and evaluate videos and data

Woodard & Curran will review and evaluate a limited selection of CCTV videos and data in the City's CCTV inspection database of routine inspections conducted by City crews. The videos and data will be evaluated for consistency and accuracy of the coded PACP observations and scores, relative to industry best practices. The review will include at least fifty (50) pipe segments, each approximately 300 feet in length. Woodard & Curran will work with City staff to identify appropriate segments for review, based on a representative sample of pipe materials, pipe sizes, operators, and other parameters suggested by the City. It is assumed that the inspection data can be exported from the City's CCTV software and will be provided in a standard PACP formatted database, and that the videos can be viewed using a standard video file viewer (e.g., Windows or VLC Media Player) or using a free viewer software specific to the CCTV software used by the City.

Subtask 5.2 – Recommend improvements

For each reviewed and evaluated segment, Woodard & Curran will make recommendations to improve coding accuracy by City staff, as appropriate. Woodard & Curran will summarize the results of the evaluation in a technical memorandum for review by City staff.

Deliverables:

- Data Review Summary Memorandum

Task 6 – Sanitary Sewer Master Plan Update

Woodard & Curran will use the hydraulic model developed in Task 3 and the results of the inspection and condition assessment in Task 4 to prepare an update of the City's sanitary sewer master plan.

Subtask 6.1 – Summarize existing system information

Woodard & Curran will summarize existing information about the City's sewer system, including a description of the service area and its customers and satellite agencies, existing wastewater flows, existing facilities and their operation, and the overall management of the system including existing operation & maintenance, inspection, asset management, and capital improvement programs. This summary will provide background information for the Master Plan report and will primarily be derived from information developed in previous tasks and information in the City's Sewer System Management Plan.

Subtask 6.2 - Establish Design Flow and Hydraulic Criteria

Woodard & Curran will work with City staff to establish the design and hydraulic criteria to be used for assessing the capacity of existing sewer facilities and sizing new facilities, including Manning's "n" factor for gravity sewers, maximum d/D values, minimum and maximum velocities, slopes, and depth of cover, and pump station design and reliability considerations (e.g., firm capacity). Woodard & Curran will also identify approaches for defining an appropriate design storm or storms, including use of an actual historical storm, use of a synthetic event based on rainfall intensity-duration-frequency statistics, or other methods such as the SCS Type IA distribution curve. Up to three design storm events may be selected in order to adequately evaluate the performance of the City's diversion and storage facilities under different wet weather scenarios (e.g., intense short-duration storm, longer lower intensity event with large rainfall volume, back-to-back storms, etc.). Woodard & Curran will propose criteria for evaluating the performance of the system under the design events (e.g., acceptable level of surcharge) that reflect the City's desired level of service and risk acceptance. The proposed criteria will be discussed with City staff at a project progress meeting to reach agreement on the criteria to be used for the Master Plan.

Subtask 6.3 - Develop land use projections and future model loads

Woodard & Curran will review the City's General Plan, Specific Plans, Housing Element, regional population and employment projections (e.g., as developed by ABAG), and lists of development projects currently in the planning and approval stages and consult with the City's Planning Department to identify specific planning issues and potential growth and planned development projects in the City. Using this information, estimates of future wastewater flows based on the locations of anticipated developments and growth will be developed. To the extent that the information is available, these estimates will be compiled at the parcel level. The projected timing of new developments will also be discussed and documented, and model flow scenarios representing near-term future (e.g., 5- to 10-year time frame) and long-term future (e.g., General Plan buildout) will be developed. The information will be compiled in a parcel-specific database and associated GIS mapping and will be formatted so that the data can be easily updated in the future to reflect changes in development plans or timing.

Woodard & Curran will also consult with the City and, as necessary, with its satellite agencies (Cities of Rohnert Park, Cotati, and Sebastopol, and South Park County Sanitation District) to identify potential increases in future flows from these agencies that may impact the City's sewer system capacity and operation.

Subtask 6.4 – Evaluate system hydraulic performance

Using the hydraulic model developed under Task 3 and the information developed in the previous subtasks, Woodard & Curran will evaluate the hydraulic performance of the system under existing and future dry and wet weather flows. The results will be used to identify specific facilities (trunk sewers, lift stations, force mains, storage facilities) with potential capacity deficiencies for which capacity improvement projects and/or changes in system operations may be needed.

Subtask 6.5 – Develop capacity improvement projects

Using an iterative simulation process and engineering judgment, Woodard & Curran will develop and test solutions to identified capacity deficiencies. Solutions may include upsizing or paralleling existing pipes, upgrading lift stations that lack sufficient firm capacity, consolidating flows in new sewers or existing sewers with available capacity, implementing flow diversions at critical locations, modifying storage operations, or initiating sewer rehabilitation to reduce I/I. Based on preliminary model results and discussion with City staff, the alternatives will be refined and focused on the most viable solutions to be brought forward for more detailed project development.

Woodard & Curran will evaluate potential project alternatives in further detail, including review of project sites on aerial mapping or in the field. The purpose of these evaluations is to confirm the suitability of pipeline alignments, and identify design, constructability, permitting, or environmental issues that could potentially be “fatal flaws” or that should be considered in project development. The development of capacity improvement projects will be coordinated with the results of the trunk sewer and siphon condition assessments and development of rehabilitation projects for those facilities (Subtask 6.6), with emphasis on developing cost-effective solutions for both capacity and condition deficiencies. Woodard & Curran will prepare project descriptions and planning-level cost estimates for each project. Planning level costs for recommended improvements will be based on the City's historical costs for sewer projects as well as data from other similar agencies compiled by Woodard & Curran.

Subtask 6.6 – Develop trunk sewer and siphon rehabilitation projects

Based on the results of the inspection and condition assessment work in Task 4, Woodard & Curran will develop rehabilitation project recommendations, including recommended methods (e.g., spot repair, lining, replacement, further inspection), for the pipe segments identified as being in need of rehabilitation based on the results of Task 4. Woodard & Curran will prepare project descriptions and planning-level cost estimates for each project. Planning level costs for recommended improvements will be based on the City's historical costs for sewer rehabilitation projects as well as data from other similar agencies compiled by Woodard & Curran. This scope of work assumes project descriptions and cost estimates will be provided for up to ten rehabilitation projects.

Subtask 6.7 – Prioritize projects and develop sewer system CIP

Based on the results of the above tasks, Woodard & Curran will develop a capital improvement plan for the recommended capacity and condition deficiency improvements, including prioritization of projects, estimated construction and capital costs, and implementation schedule. A risk-based approach will be used to prioritize rehabilitation and capacity improvement projects that reflect likelihood of failure (degree of structural degradation or capacity deficiency) as well as consequence of failure (economic, social, and environmental impact). The criteria for the risk analysis will be developed in close coordination with City staff. Projects will be scheduled in 5-year increments based on priorities, timing of need (e.g., for serving future growth), and City's overall budget objectives. Based on discussions with the City, Woodard & Curran may utilize software such as Innovyze's InfoAsset Planner for this task.

If desired by the City, Woodard & Curran will incorporate other City sewer rehabilitation projects (based on the routine inspection and condition assessment of its smaller diameter sewers and/or condition assessment of system lift stations) into the Master Plan sewer CIP. Descriptions, estimated costs, and priorities for these projects would be provided by the City.

Subtask 6.8 – Develop model viewer

Woodard & Curran will provide a web-based model viewer for use by City staff in viewing hydraulic model results for existing and future growth scenarios. The viewer will allow viewing of all modeled infrastructure on a suitable GIS base map along with attribute data, model flows for various scenarios, and recommended improvement projects. The viewer will be developed using ArcGIS Online. Woodard & Curran will assist the City in installing the viewer. As an option, Woodard & Curran will “host” the viewer on its own web server. If desired by the City, the viewer will be developed earlier so that City staff can use it during the course of the Task 6 work to view interim study results and recommendations.

Subtask 6.9 – Prepare Master Plan report

Woodard & Curran will prepare a report summarizing the work performed under Task 6 and detailing deficiencies, projects, and their planning level costs. The report appendices will include the hydraulic model documentation and condition assessment report prepared under previous tasks, as well as tabulated model results, project descriptions and costs. Woodard & Curran will prepare up to two versions of the draft report for City's review. Comments on the draft report will be incorporated into a final report.

Deliverables:

- *Model viewer*
- *Project descriptions and cost estimates*
- *1st and 2nd Draft Master Plan report (4 copies) and electronic files*
- *Final Master Plan report (4 copies) and electronic files*

Assumptions:

- *Recommendations for rehabilitation methods and capacity improvements will be based on existing information such as CCTV inspection data, mapping, as-builts, and google earth imagery. Site visits are not part of this task.*

Task 7 – Ongoing Collection System Planning and Analysis

Woodard & Curran will support the City with ongoing modeling to support collection system planning and analyses.

Subtask 7.1 – On-call modeling services

Woodard & Curran will provide sewer system modeling services on an on-call basis to support justification of pending or future CIP projects, or to support development reviews or operational analyses. Technical memoranda (TMs) will be prepared if requested to document these analyses. The budget for this subtask assumes preparation of approximately 30 TMs.

Subtask 7.2 – Sewer model updates

At City's request, Woodard & Curran will update the sewer model with completed CIP project information. The budget for this subtask assumes approximately eight (8) updates. This subtask does not include updating of model loads unless parcel-specific information is provided by the City and/or authorized as a separate project work order.

Deliverables:

- *Model results technical memoranda*
- *Updated model files and model viewer*

Optional Additional Services

The following additional services will be provided if authorized by the City.

Additional flow monitoring and model calibration

Based on the recommendations of the temporary flow monitoring plan to be developed under a separate Project Work Order, the City may authorize up to 15 additional flow meters to be included in the flow monitoring program under Task 2. If authorized, Woodard & Curran would also include use of the data from these meters for model calibration under Task 3.

Additional traffic control for flow meter installation

If more than standard traffic control and traffic control plans are required by the City for any of the flow meters sites identified in the temporary flow monitoring plan, the City will authorize ADS to prepare site-specific traffic control plans and/or provide non-standard (extra) traffic control (by retaining a traffic control contractor) based on the unit costs indicated in the Fee Schedule.

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ning of the calendar year for all ongoing contracts. This cost proposal

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2019 Standard Rates	
Labor Category	Rate
Engineer 1 (E1) Scientist 1 (S1) Geologist 1 (G1) Planner 1 (P1) Technical Specialist 1 (TS1)	162
Engineer 2 (E2) Scientist 2 (S2) Geologist 2 (G2) Planner 2 (P2) Technical Specialist 2 (TS2)	187
Engineer 3 (E3) Scientist 3 (S3) Geologist 3 (G3) Planner 3 (P3) Technical Specialist 3 (TS3)	212
Project Engineer 1 (PE1) Project Specialist 1 (PS1) Project Geologist 1 (PG1) Project Planner 1 (PP1) Project Technical Specialist 1 (PTS1)	221
Project Engineer 2 (PE2) Project Specialist 2 (PS2) Project Geologist 2 (PG2) Project Planner 2 (PP2) Project Technical Specialist 2 (TS2)	236
Project Manager 1 (PM1) Technical Manager 1 (TM1)	251
Project Manager 2 (PM2) Technical Manager 2 (TM2)	266
Senior Project Manager (SPM) Senior Technical Manager (STM)	282
Senior Technical Practice Leader (STPL)	310
National Practice Leader (NPL) Strategic Business Unit Leader (SBUL)	320
Software Engineer 1 (SE1)	147
Software Engineer 2 (SE2)	170
Designer 1 (D1)	125
Designer 2 (D2)	155
Designer 3 (D3) Senior Software Developer (SSD)	160
Senior Designer (SD)	165
Project Assistant (PA)	110
Marketing Assistant (MA) Graphic Artist (GA)	118
Senior Accountant (SA) Senior Project Assistant Billing Manager (BM)	129
Marketing Manager (MM) Graphics Manager (GM)	149

Note: The individual hourly rates include salary, overhead and profit. Other direct costs (ODCs) such as reproduction, delivery, mileage (as allowed by IRS guidelines), and travel expenses will be billed at actual cost plus 10%. Subconsultants will be billed as actual cost plus 10%. Woodard & Curran, Inc., reserves the right to adjust its hourly rate structure at the beginning of each year for all ongoing contracts.